

# CERTIFICATE OF ACCREDITATION

## Korea Testing Laboratory

**Accreditation No. :** KC01-028

**Corporation Registration No. :** 254371-0012187

**Address of Laboratory :**  
1. Haeon-ro 723, Sa-dong Sangnok-gu Ansan-si Gyeonggi-do,  
Republic of Korea  
1-① 10, Chungui-ro Jinju-si Gyeongsangnam-do, Republic of Korea  
1-② Dosuri 15-1, Techon Gwangju-si Gyeonggi-do, Republic of Korea

**Date of Initial Accreditation :** April 11, 2001.

**Validity of Accreditation :** December 09, 2021. ~ December 08, 2025.

**Scope of Accreditation :** Attached Annex

**Date of issue :** December 06, 2023.

**This calibration laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to Joint ISO-ILAC-IAF Communiqué).**



*CHIN CHONGWOOK*

**Head**

**Korea Laboratory Accreditation Scheme**

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017 & KS Q ISO/IEC 17025:2017

Korea Testing Laboratory  
723, Hae-an-ro, Sa-dong, Sangnok-gu, Ansan-si, Gyeonggi-do, Republic of Korea  
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CALIBRATION

Valid To : Dec. 08, 2025.

Accreditation No : KC01-028

In recognition of the successful completion of the KOLAS evaluation process,  
accreditation is granted to this laboratory to perform the following calibrations

| Field Code                  | Item of Calibration                            | on-site | Field Code            | Item of Calibration                             | on-site | Field Code               | Item of Calibration                                | on-site |
|-----------------------------|------------------------------------------------|---------|-----------------------|-------------------------------------------------|---------|--------------------------|----------------------------------------------------|---------|
| 101. Frequency of radiation |                                                |         | 10303                 | Autocollimators                                 | N       | 10508                    | Hardness indenters                                 | N       |
| 10101                       | Laser frequency                                | N       | 10304                 | Bevel protractors                               | N       | 10510                    | Laser trackers                                     | N       |
| 102. Linear dimension       |                                                |         | 10306                 | Clinometers                                     | N       | 10511                    | Measuring microscopes, profile projectors          | Y       |
|                             |                                                |         | 10308                 | Fine angle generators, level comparators        | N       | 10512                    | Micro measuring microscopes                        | Y       |
| 10201                       | Balls                                          | N       | 10311                 | Plate/square/electric levels                    | N       | 10514                    | Taper plug gauges                                  | N       |
| 10203                       | Electrical/mechanical comparators              | Y       | 10312                 | Auto levels                                     | N       | 10515                    | Taper ring gauges                                  | N       |
| 10204                       | Gauge block comparators                        | Y       | 10315                 | Polygons                                        | N       | 10517                    | Stylus type roughness testers                      | Y       |
| 10206                       | Dial/cylinder gauge testers                    | Y       | 10316                 | Rotary tables                                   | N       | 10519                    | Roughness standard                                 | N       |
| 10207                       | Doctor blades                                  | N       | 10317                 | Sine bars, plates, tables, centers              | N       |                          | /comparison specimens                              |         |
| 10208                       | Distance meters; electrooptic/laser/ultrasonic | N       | 10318                 | Squareness testers, right angle testers         | N       | 10525                    | Thread plug gauges                                 | N       |
| 10209                       | End bars                                       | N       |                       |                                                 |         | 10526                    | Taper thread plug gauges                           | N       |
|                             |                                                |         |                       |                                                 |         | 10527                    | Thread ring gauges                                 | N       |
| 10210                       | Extensometers, linear displacement transducers | Y       | 10319                 | Cylindrical squares                             | N       | 10528                    | Taper thread ring gauges                           | N       |
|                             |                                                |         | 10320                 | Precision squares                               | N       | 10529                    | V-blocks, box blocks                               | N       |
| 10211                       | Filler gauges                                  | Y       | 10321                 | Theodolites, transits                           | N       | 10531                    | SEM/TEM/SPM/AFM microscopes                        | Y       |
| 10212                       | Film applicators                               | N       | 10322                 | Angular displacement transducers                | Y       | 106. Various dimensional |                                                    |         |
| 10213                       | Gap gauges                                     | N       |                       |                                                 |         |                          |                                                    |         |
| 10214                       | Gauge blocks, by comparison                    | N       | 10323                 | Alignment telescopes, line of sight collimators | N       | 10601                    | Inside/outside/gear tooth calipers, caliper gauges | Y       |
| 10216                       | Height gauges/measuring machines               | Y       | 104. Form             |                                                 |         | 10603                    | Cylinder/bore gauges                               | Y       |
| 10219                       | Linear scales                                  | Y       |                       |                                                 |         | 10604                    | Depth gauges, depth micrometers                    | Y       |
| 10220                       | Standard measuring machines                    | Y       | 10401                 | Form testers                                    | Y       |                          |                                                    |         |
| 10221                       | Micro scales/standard scales                   | N       | 10404                 | Optical flats                                   | N       | 10605                    | Dial/digital gauges                                | Y       |
| 10223                       | Electronic micrometers                         | Y       | 10405                 | Optical parallels                               | N       | 10608                    | Grind gauges                                       | N       |
| 10224                       | Height micrometers, riser blocks               | N       | 10406                 | Parallel blocks                                 | N       | 10609                    | Micro indicators, test indicators                  | Y       |
| 10225                       | Laser scan micrometers                         | Y       | 10407                 | Precision surface plates                        | Y       | 10610                    | Micrometer heads                                   | Y       |
| 10227                       | Standard tape rules, peripheral gauges         | N       | 10408                 | Profile gauges                                  | N       | 10611                    | 3-Point micrometers                                | Y       |
| 10228                       | Cylindrical plug/pin thread measuring wire     | N       | 10409                 | Roundness measurement instruments               | Y       | 10612                    | Inside micrometers                                 | Y       |
|                             |                                                |         |                       |                                                 |         | 10613                    | Outside micrometers                                | Y       |
|                             |                                                |         | 10410                 | Form standard specimens                         | N       | 10614                    | Offset of retroreflectors                          | N       |
| 10229                       | Radius gauges                                  | N       | 10411                 | Roundness standard                              | N       | 10615                    | Particle counters                                  | N       |
| 10230                       | Cylindrical ring gauges                        | N       |                       | /roundness magnification standard specimens     |         | 10617                    | Standard sieves                                    | N       |
| 10231                       | Step blocks                                    | N       |                       |                                                 |         | 10619                    | Water level meters                                 | N       |
| 10232                       | Step gauges                                    | N       | 10412                 | Straight edges                                  | Y       | 10620                    | Welding gauges                                     | N       |
| 10233                       | Taper thickness gauges                         | N       | 10413                 | Straight rules                                  | N       | 201. Mass                |                                                    |         |
| 10234                       | Ultrasonic thickness gauges                    | N       | 10415                 | Test bars                                       | N       |                          |                                                    |         |
| 10235                       | Ultrasonic/coating specimens                   | N       | 105. Complex geometry |                                                 |         | 20102                    | Auto-hopper scale balances                         | Y       |
|                             |                                                |         |                       |                                                 |         | 20103                    | Auto-packer scale balances                         | Y       |
| 10236                       | Coating thickness testers                      | N       | 10502                 | Bench centers                                   | N       | 20104                    | Axle weigher balances                              | N       |
| 10237                       | Torque arms                                    | Y       | 10503                 | Contact coordinate measuring machines           | Y       | 20105                    | Counter beam balances                              | Y       |
| 10238                       | Width Measuring Specimens                      | N       |                       |                                                 |         | 20106                    | Dial platform scale balances                       | Y       |
| 103. Angle                  |                                                |         | 10504                 | Non-contact coordinate measuring machines       | Y       | 20107                    | Swing Dial scales                                  | N       |
|                             |                                                |         |                       |                                                 |         | 20109                    | Electric balances                                  | Y       |
| 10302                       | Angle gauge blocks                             | N       | 10505                 | Gauge block accessories                         | N       | 20112                    | Platform scale balances                            | Y       |

| Field Code    | Item of Calibration                                                                    | on-site | Field Code                 | Item of Calibration                      | on-site | Field Code                                   | Item of Calibration                                | on-site |
|---------------|----------------------------------------------------------------------------------------|---------|----------------------------|------------------------------------------|---------|----------------------------------------------|----------------------------------------------------|---------|
| 20113         | Spring scale balances                                                                  | Y       | 208. Viscosity             |                                          |         | 30202                                        | Contact type tachometers                           | Y       |
| 20116         | Weights                                                                                | Y       | 20801                      | Kinetic viscometers; capillary, etc      | N       | 30203                                        | Photo tachometers/stroboscopes                     | Y       |
| 202. Force    |                                                                                        |         | 20802                      | Dynamic viscometers; rotational, etc     | N       | 30204                                        | Speed meters                                       | Y       |
| 20202         | Force measuring devices                                                                | N       |                            |                                          |         | 30205                                        | wow-flutter generators                             | Y       |
| 20203         | Tension/compression testing machines                                                   | Y       | 209. Fluid flow            |                                          |         | 30206                                        | Wow-flutter meters                                 | Y       |
| 20204         | Push-pull gauges                                                                       | N       | 20901                      | Anemometers; hot-wire                    | N       | 401. DC volatage & current                   |                                                    |         |
| 203. Torque   |                                                                                        |         | 20902                      | Anemometers; pitot tube,                 | N       | 40101                                        | DC ammeters                                        | Y       |
| 20302         | Torque measuring devices                                                               | Y       | 20908                      | Gas flowmeters; differential pressure    | N       | 40102                                        | Transconductance amplifiers                        | Y       |
| 20303         | Torque wrenches/drivers                                                                | Y       | 20909                      | Liquid flowmeters; differential pressure | N       | 40103                                        | DC voltage/current calibrators                     | Y       |
| 20399         | Others; Nut runners                                                                    | Y       | 20910                      | Liquid flowmeters; electromagnetic       | Y       | 40104                                        | Electrical temperature                             | Y       |
| 204. Pressure |                                                                                        |         | 20911                      | Gas flowmeters; thermal mass, etc.       | N       | 40105                                        | DC current shunts                                  | Y       |
| 20401         | Altimeters                                                                             | Y       | 20912                      | Liquid flowmeters; Coriolis, etc.        | N       | 40106                                        | Galvanometers/null detectors                       | Y       |
| 20402         | Manometers                                                                             | N       | 20913                      | Liquid flowmeters; open channel, etc.    | N       | 40107                                        | Potentiometers                                     | Y       |
| 20403         | Pneumatic pressure                                                                     | N       | 20914                      | Gas flowmeters; positive displacement    | N       | 40108                                        | DC power supplies                                  | Y       |
| 20404         | Hydraulic pressure ballances                                                           | N       | 20915                      | Liquid flowmeters; positive displacement | Y       | 40109                                        | Standard cells                                     | Y       |
| 20405         | Air data test systems                                                                  | N       | 20916                      | Gas flowmeters; turbine                  | N       | 40110                                        | DC voltage dividers                                | Y       |
| 20406         | Absolute pressure gauges                                                               | Y       | 20917                      | Liquid flowmeters; turbine               | N       | 40111                                        | DC voltage standards                               | Y       |
| 20407         | Blood pressure gauges                                                                  | N       | 20918                      | Gas flowmeters; ultrasonic               | N       | 40112                                        | DC voltmeters                                      | Y       |
| 20408         | Compound pressure gauges                                                               | Y       | 20919                      | Liquid flowmeters; ultrasonic            | N       | 40113                                        | Static/Ionic voltmeter                             | Y       |
| 20409         | Differential pressure gauges                                                           | Y       | 20920                      | Gas flowmeters; variable area            | N       | 402. Resistance, Capacitance, and Inductance |                                                    |         |
| 20411         | Gauge pressure gauges                                                                  | Y       | 20921                      | Liquid flowmeters; area                  | N       | 40201                                        | Capacitance bridges/ indicators                    | Y       |
| 20412         | Pressure transducers/ transmitters                                                     | Y       | 20923                      | Liquid flowmeters; vortex                | N       | 40202                                        | Decade capacitors                                  | Y       |
| 20413         | Dial type vacuum gauges                                                                | Y       | 20925                      | Anemometers; vane, etc.                  | N       | 40204                                        | Standard capacitors                                | Y       |
| 20414         | Water depth meters                                                                     | Y       | 210. Hardness              |                                          |         | 40205                                        | Earth testers                                      | Y       |
| 205. Vacuum   |                                                                                        |         | 21001                      | Brinell hardness testers                 | Y       | 40206                                        | Inductance bridges/ indicators                     | Y       |
| 20501         | Capacitance diaphragm gauges                                                           | N       | 21002                      | Rockwell hardness testers                | Y       | 40208                                        | Inductors                                          | Y       |
| 20502         | Spinning rotor gauges                                                                  | N       | 21003                      | Shore hardness testers                   | Y       | 40209                                        | Mutual inductors                                   | Y       |
| 20503         | Ionization gauges                                                                      | N       | 21004                      | Vickers hardness testers                 | Y       | 40210                                        | Insulation testers                                 | Y       |
| 20504         | Thermal conductivity gauges; pirani, thermocouple, convectron etc.                     | N       | 21005                      | Durometer hardness testers               | N       | 40211                                        | Q-meters                                           | Y       |
| 20505         | Standard leaks, Helium leak detectors                                                  | N       | 21006                      | Leeb hardness testers                    | N       | 40212                                        | Direct reading ratio sets                          | Y       |
| 206. Volume   |                                                                                        |         | 211. Impact                |                                          |         | 40213                                        | Resistance bridges & Similar instruments           | Y       |
| 20601         | Volumetric glasswares                                                                  | N       | 21102                      | Charpy impact testers                    | Y       | 40214                                        | Resistance meters                                  | Y       |
| 20602         | Pycnometers                                                                            | N       | 21103                      | Izod impact testers                      | Y       | 40215                                        | Resistors                                          | Y       |
| 20603         | Rain gauges                                                                            | N       | 301. Time/frequency        |                                          |         | 40216                                        | Conductivity Meter                                 | N       |
| 20604         | Standard volume vessels                                                                | N       | 30102                      | Frequency standards                      | Y       | 40217                                        | Impedance bridges/LCR meters                       | Y       |
| 20605         | Concrete air content meters                                                            | N       | 30103                      | General frequency sources                | Y       | 403. AC voltage, current & power             |                                                    |         |
| 20606         | Piston type volume meters                                                              | N       | 30104                      | Frequency meters/counters                | Y       | 40301                                        | AC ammeters                                        | Y       |
| 207. Density  |                                                                                        |         | 30105                      | Time interval sources                    | Y       | 40302                                        | Clamp ammeters/voltmeters                          | Y       |
| 20702         | Liquid density meters                                                                  | N       | 30106                      | Time interval meters/Stop watches/Timers | Y       | 40303                                        | AC voltage/current Calibrators                     | Y       |
| 20704         | Salinity meters                                                                        | N       |                            |                                          |         | 40304                                        | Wattmeter calibrators                              | Y       |
| 20705         | Sucrose meters                                                                         | N       | 302. Velocity & revolution |                                          |         | 40305                                        | AC current shunts                                  | Y       |
| 20706         | Hydrometers ; density, specific gravity, API, baume, sugar, milk, soil, salinity, LPG, | N       | 30201                      | Standard RPM generators                  | Y       | 40306                                        | Phase angle generators, synchro resolve generators | Y       |
| 20707         | Chloride meters                                                                        | N       |                            |                                          |         | 40307                                        | Voltage/Current Phase meters / synchro resolve     | Y       |
|               |                                                                                        |         |                            |                                          |         | 40308                                        | Potential transformer test sets                    | Y       |
|               |                                                                                        |         |                            |                                          |         | 40309                                        | Potential transformers                             | Y       |
|               |                                                                                        |         |                            |                                          |         | 40310                                        | Power factor meters                                | Y       |
|               |                                                                                        |         |                            |                                          |         | 40311                                        | AC power meters                                    | Y       |

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|-----------------------------------------------|-------------------------------------------------------------|---------|-----------------------------------|-------------------------------------------------------------|---------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------|
| 40312                                         | AC power supplies                                           | Y       | 406. Radio frequency measurements |                                                             |         | 501. Contact thermometry     |                                                                                                                                    |         |
| 40313                                         | Puncture/ safety testers                                    | Y       | 40601                             | RF amplifiers                                               | Y       | 50101                        | Temperature generators; ovens, furnaces, isothermal liquid baths, ice-point baths, dry-block calibrators                           | Y       |
| 40314                                         | Power recorders                                             | Y       | 40602                             | coaxial attenuators                                         | Y       |                              |                                                                                                                                    |         |
| 40315                                         | Current transformer test sets                               | Y       | 40603                             | Waveguide attenuators                                       | N       |                              |                                                                                                                                    |         |
| 40316                                         | Current / turn current coil transformers                    | Y       | 40604                             | BER(Bit Error Rate)                                         | Y       |                              |                                                                                                                                    |         |
|                                               |                                                             |         | 40605                             | Burst pulse generators                                      | Y       | 50102                        | Temperature indicators/ recorders/controllers, temperature calibrators                                                             | Y       |
| 40317                                         | LF thermal voltage converters                               | Y       | 40607                             | RF power meter calibrators                                  | Y       |                              |                                                                                                                                    |         |
| 40318                                         | AC voltmeters                                               | Y       | 40608                             | EMC transducers ; current probes, absorbing clamps, etc.    | Y       | 50103                        | Glass thermometers; in-glass, Beckmann                                                                                             | N       |
| 40319                                         | Watt Hour Meters                                            | Y       |                                   |                                                             |         |                              |                                                                                                                                    |         |
| 40320                                         | Pulsed high voltage & current meters/Welding current meters | Y       | 40609                             | Delay lines                                                 | Y       | 50104                        | Resistance thermometers; SPRT, IPRT, thermistors,etc                                                                               | Y       |
|                                               |                                                             |         | 40610                             | Coaxial directional couplers/splitters                      | Y       |                              |                                                                                                                                    |         |
| 40321                                         | Ratio transformers                                          | Y       | 40611                             | Waveguide directional                                       | N       | 50105                        | Thermal expansion thermometers; bimetal, gas or liquid type                                                                        | Y       |
| 404. Other DC & AC Measurements               |                                                             |         | 40612                             | DS1/DS3 Communications systems                              | Y       |                              |                                                                                                                                    |         |
|                                               |                                                             |         | 40613                             | Electrostatic discharge generators                          | Y       |                              |                                                                                                                                    |         |
| 40401                                         | LF amplifiers                                               | Y       | 40614                             | EMC receivers                                               | Y       | 50106                        | Thermocouples; noble base metal, pure metal, special type, etc                                                                     | Y       |
| 40402                                         | DC/LF attenuators                                           | Y       | 40615                             | RF filters                                                  | Y       |                              |                                                                                                                                    |         |
| 40403                                         | Multimeter calibrators                                      | Y       | 40616                             | RF impedance meters                                         | Y       |                              |                                                                                                                                    |         |
| 40404                                         | Oscilloscope calibrators                                    | Y       | 40618                             | Line impedance stabilization networks; LISN, CDN, ISN, etc. | Y       |                              |                                                                                                                                    |         |
| 40406                                         | Video signal generators                                     | Y       |                                   |                                                             |         |                              |                                                                                                                                    |         |
| 40407                                         | Audio distortion analyzers/meters                           | Y       | 40619                             | Coaxial standard mismatches                                 | Y       | 50108                        | Primary fixde-point cells and apparatus                                                                                            | N       |
|                                               |                                                             |         | 40620                             | Waveguide standard mismatches                               | N       |                              |                                                                                                                                    |         |
| 40408                                         | LF filters                                                  | Y       | 40621                             | Mobile communication test sets                              | Y       | 502. Non Contact thermometry |                                                                                                                                    |         |
| 40409                                         | LF/Audio signal analyzers                                   | Y       | 40622                             | Modulation meters                                           | Y       | 50203                        | Optical pyrometers                                                                                                                 | N       |
| 40410                                         | Line frequency meters                                       | Y       | 40623                             | Network analyzers                                           | Y       | 50204                        | Radiation thermometers                                                                                                             | N       |
| 40411                                         | Function generators                                         | Y       | 40624                             | Noise figure meters                                         | Y       | 50205                        | Thermal image apparatus                                                                                                            | N       |
| 40412                                         | Genescopes                                                  | Y       | 40626                             | Noise impulse simulators                                    | Y       | 50206                        | Blackbody furnaces                                                                                                                 | N       |
| 40413                                         | AC/DC high voltages voltmeters                              | Y       | 40628                             | Coaxial noise sources                                       | Y       | 50207                        | ear thermometers                                                                                                                   | N       |
| 40414                                         | LF Impulse generators                                       | Y       | 40631                             | RF phase meters                                             | Y       | 503. Humidity                |                                                                                                                                    |         |
| 40416                                         | Leakage current testers                                     | Y       | 40635                             | RF power meters                                             | Y       |                              |                                                                                                                                    |         |
| 40417                                         | Electronic AC/DC loads                                      | Y       | 40636                             | Diode power sensors                                         | Y       | 50301                        | Dew-point hygrometer;chilled mirror, alumina thinfilm, etc.                                                                        | N       |
| 40418                                         | Modulation meters                                           | Y       | 40637                             | Thermocouple Power sensors                                  | Y       |                              |                                                                                                                                    |         |
| 40419                                         | Analogue/digital Multimeters                                | Y       | 40638                             | Pulse generators                                            | Y       | 50302                        | Relative humidity hygrometers;polymer thinfilm, hair, etc.                                                                         | Y       |
| 40420                                         | Noise meters                                                | Y       | 40639                             | Radar test sets                                             | Y       |                              |                                                                                                                                    |         |
| 40421                                         | Oscilloscopes                                               | Y       | 40640                             | RF signal generators                                        | Y       | 50303                        | Pscygrometers;assmann ventilated, PRT type, etc.                                                                                   | N       |
| 40422                                         | LF phase meters                                             | Y       | 40641                             | RF Spectrum analyzers                                       | Y       |                              |                                                                                                                                    |         |
| 40423                                         | Random wave generators                                      | Y       | 40642                             | RF speed guns                                               | Y       | 50304                        | Temperature humidity recorders; Hygrothermograph, etc.                                                                             | Y       |
| 40424                                         | Volt/Current recorders                                      | Y       | 40643                             | Surge generators                                            | Y       |                              |                                                                                                                                    |         |
| 40425                                         | Relay test sets                                             | Y       | 40644                             | SWR meters                                                  | Y       | 50305                        | Transducers; dew-point/relative humidity                                                                                           | Y       |
| 40426                                         | LF signal generators                                        | Y       | 40645                             | RF terminations                                             | Y       |                              |                                                                                                                                    |         |
| 40427                                         | LF spectrum analyzers                                       | Y       | 40646                             | Coaxial thermistor mounts                                   | Y       | 50306                        | Humidity generators;two-pressure, two-temperature, flow mixing humidity generator, constant temperature and humidity chamber, etc. | Y       |
| 40429                                         | Sweep generators                                            | Y       | 40648                             | Transmission trouble testers                                | Y       |                              |                                                                                                                                    |         |
| 40430                                         | Signal transducers                                          | Y       | 40650                             | RF voltmeters                                               | Y       |                              |                                                                                                                                    |         |
| 40431                                         | AC-DC transfer standards                                    | Y       | 40651                             | Vector voltmeters                                           | Y       |                              |                                                                                                                                    |         |
| 40432                                         | Transistor curve tracers                                    | Y       | 40652                             | Field strength meters                                       | Y       | 504. Moisture                |                                                                                                                                    |         |
| 40433                                         | Waveform analyzers                                          | Y       | 40653                             | AM/FM test sources                                          | Y       |                              |                                                                                                                                    |         |
| 40434                                         | AC/DC high voltage generators                               | Y       | 40654                             | DIP simulator                                               | Y       | 50401                        | Cereal moisture meters                                                                                                             | Y       |
| 40435                                         | AC/DC High voltage probes                                   | Y       | 40699                             | Permittivity meters                                         | N       |                              |                                                                                                                                    |         |
| 40436                                         | Logic analyzers                                             | Y       | 40699                             | Waveguide calibration kit                                   | N       | 50402                        | Wood moisture meters                                                                                                               | N       |
| 40437                                         | Telephone testers                                           | Y       | 407. Field strength & antennas    |                                                             |         |                              |                                                                                                                                    |         |
| 40438                                         | Video signal analyzers                                      | Y       |                                   |                                                             |         |                              |                                                                                                                                    |         |
| 40499                                         | Ultrasonic Flow Detector                                    | Y       | 40702                             | Probes                                                      | N       | 50403                        | Paper moisture meters                                                                                                              | N       |
| 405. Low frequency electric & magnetic fields |                                                             |         | 40703                             | Dipole Antennas                                             | N       | 601. Sound in air            |                                                                                                                                    |         |
|                                               |                                                             |         | 40704                             | Loop antennas                                               | N       |                              |                                                                                                                                    |         |
|                                               |                                                             |         | 40705                             | Monopole Antennas                                           | N       |                              |                                                                                                                                    |         |
| 40503                                         | Flux meters                                                 | N       | 40707                             | Horn antennas                                               | N       | 60102                        | Sound Calibrators                                                                                                                  | N       |
| 40504                                         | Flux sources                                                | N       |                                   |                                                             |         | 60104                        | Microphones                                                                                                                        | N       |
| 40508                                         | Magnetometers                                               | N       |                                   |                                                             |         | 60106                        | Sound level meters                                                                                                                 | Y       |
| 40510                                         | Reference/standard magnets                                  | N       |                                   |                                                             |         |                              |                                                                                                                                    |         |

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|------------|-----------------------------------------------------------------------|---------|------------|-----------------------------------------------------------------------|---------|------------|---------------------|---------|
| 603.       | Vibration                                                             |         | 70319      | Reflectance meters                                                    | N       |            |                     |         |
| 60301      | Vibration calibrators                                                 | N       | 70320      | Diffuse-reflectance meters                                            | Y       |            |                     |         |
| 60302      | Vibration transducers                                                 | N       | 70321      | Refractometers                                                        | N       |            |                     |         |
| 60303      | Vibration measuring instruments                                       | N       | 70323      | Transmittance meters                                                  | N       |            |                     |         |
|            |                                                                       |         | 70325      | Spectrophotometers including FT-IR spectrophotometers                 | Y       |            |                     |         |
| 701.       | Photometry                                                            |         | 70326      | Wavelength reference materials; absorption cell, bandpass filter, etc | N       |            |                     |         |
| 70101      | Illuminance meters                                                    | N       |            |                                                                       |         |            |                     |         |
| 70102      | Luminance meters                                                      | N       |            |                                                                       |         |            |                     |         |
| 70103      | Total luminous flux meters                                            | Y       |            |                                                                       |         |            |                     |         |
| 70104      | Luminous intensity meters                                             | Y       |            |                                                                       |         |            |                     |         |
|            |                                                                       |         | 704.       | Fiber optics                                                          |         |            |                     |         |
| 702.       | Properties of detector & sources                                      |         | 70402      | Broadband Optical Light Sources                                       | Y       |            |                     |         |
| 70202      | Color temperature meters                                              | Y       | 70408      | Multichannel laser sources                                            | Y       |            |                     |         |
| 70203      | Color temperature standard lamps                                      | N       | 70410      | Optical attenuators                                                   | Y       |            |                     |         |
| 70204      | Colorimeters; source color                                            | Y       | 70411      | Optical couplers                                                      | Y       |            |                     |         |
| 70207      | Laser power meters                                                    | N       | 70412      | Fiber-optic power meters                                              | Y       |            |                     |         |
| 70209      | Total luminous flux lamps                                             | N       | 70413      | Optical loss Testers                                                  | Y       |            |                     |         |
|            |                                                                       |         | 70415      | Optical multimeters                                                   | Y       |            |                     |         |
| 70211      | Pyranometers and pyrhemometers                                        | N       | 70417      | Optical spectrum analyzers                                            | Y       |            |                     |         |
| 70213      | Display color analyzers; luminance, chromaticity, white balance, etc. | Y       | 70418      | Optical time domain reflectors, OTDR                                  | Y       |            |                     |         |
|            |                                                                       |         | 70419      | PDH/SDH Analyzers                                                     | Y       |            |                     |         |
| 70214      | Luminous intensity standard lamps                                     | N       | 70423      | Return loss test sets                                                 | Y       |            |                     |         |
|            |                                                                       |         | 70424      | SDH/SONET Analyzers                                                   | Y       |            |                     |         |
| 70215      | Spectral irradiance lamps                                             | N       | 70426      | Multi-laser wavelength                                                | Y       |            |                     |         |
|            |                                                                       |         | 70429      | Frequency stabilized laser and LDs                                    | Y       |            |                     |         |
| 70216      | Total spectral radiant flux                                           | N       | 70430      | ASE light sources                                                     | Y       |            |                     |         |
| 70217      | Luminance standard source                                             | N       | 70431      | CW-laser Wavelength meters                                            | Y       |            |                     |         |
| 70218      | Spectral radiant standard                                             | N       |            |                                                                       |         |            |                     |         |
| 70219      | UV irradiance meters                                                  | N       |            |                                                                       |         |            |                     |         |
| 70220      | Spectral irradiance meters                                            | Y       | 901.       | Chemical Analysis                                                     |         |            |                     |         |
| 70221      | Total spectral radiant flux meters                                    | Y       | 90101      | Breath alcohol analyzers                                              | N       |            |                     |         |
| 70222      | Spectral radiance meters                                              | Y       | 90102      | Environmental air quality monitoring instruments                      | Y       |            |                     |         |
|            |                                                                       |         | 90103      | Gas analyzers                                                         | Y       |            |                     |         |
| 703.       | Properties of materials                                               |         | 90104      | Exhaust Gas test Instruments                                          | Y       |            |                     |         |
| 70301      | Colorimeters; material color                                          | Y       |            |                                                                       |         |            |                     |         |
| 70302      | Color standard filters                                                | N       |            |                                                                       |         |            |                     |         |
| 70304      | Color standard tiles                                                  | N       |            |                                                                       |         |            |                     |         |
| 70305      | Dioptrometers                                                         | N       |            |                                                                       |         |            |                     |         |
| 70306      | Gloss meters                                                          | Y       |            |                                                                       |         |            |                     |         |
| 70307      | Gloss standard plates                                                 | N       |            |                                                                       |         |            |                     |         |
| 70308      | Haze meters                                                           | Y       |            |                                                                       |         |            |                     |         |
| 70309      | Haze standard plates                                                  | N       |            |                                                                       |         |            |                     |         |
| 70312      | Lens meters                                                           | N       |            |                                                                       |         |            |                     |         |
| 70315      | Optical densitometers                                                 | N       |            |                                                                       |         |            |                     |         |
| 70316      | Optical filters                                                       | N       |            |                                                                       |         |            |                     |         |
| 70317      | Polarimeters                                                          | Y       |            |                                                                       |         |            |                     |         |

#### Note

1. This laboratory provides calibration services in permanent standard laboratory and at on-site.
2. Laboratory conducts on-site calibration should meet requirements of KOLAS-SR-007.
3. On-site calibration is allowed to items with marking 'Y', not allowed to items with marking 'N'.
4. Measurement uncertainty normally is quoted as an expanded uncertainty at a coverage probability of 95 %, which usually requires the use of a coverage factor of  $k=2$ . It expresses the lowest uncertainty of measurement that can be provided by accredited calibration laboratories in normal conditions.
5. Due to the calibration environment such as reference standards or customers' facilities, it is note that uncertainty of measurement on a calibration certificate may be expressed larger than measurement uncertainty on scope of accreditation in general.

## 101. Frequency of radiation

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                              | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.  |
|------------------------------------------|---------------|--------------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------|
| Laser frequency                          | 10101         | (473 612 ± 1.5) GHz<br>(632.992 ± 0.002) nm<br>(Vacuum wavelength) | 0.8 MHz<br>1.1 fm                                                  | Laser interferometers<br>/CP801-10101-1 |

## 102. Linear dimension

| Measured Quantity<br>Instrument or Gauge          | Field<br>Code | Range                                     | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                 | Standard/Method of<br>Measurement etc.                                                        |
|---------------------------------------------------|---------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Balls                                             | 10201         | (Ø0 ~ Ø50) mm                             | $\sqrt{0.11^2 + (2.0 \times 10^{-3} \times l)^2} \mu\text{m}$<br>(l unit : mm)                                                                                     | Standard measuring<br>machines<br>/CP801-10201-1                                              |
| Electrical/mechanical<br>comparators              | 10203         | (0 ~ 2) mm                                | 0.08 $\mu\text{m}$                                                                                                                                                 | Gauge blocks<br>/CP801-10203-1                                                                |
| Gauge block comparators                           | 10204         | (0 ~ 500) mm                              | 0.04 $\mu\text{m}$                                                                                                                                                 | Gauge blocks<br>/CP801-10204-1                                                                |
| Dial/cylinder gauge testers                       | 10206         | (0 ~ 100) mm                              | $\sqrt{0.16^2 + (2 \times 10^{-3} \times l)^2} \mu\text{m}$<br>(l unit : mm)                                                                                       | Gauge blocks<br>/CP801-10206-1                                                                |
| Doctor blades                                     | 10207         | (0 ~ 10) mm                               | 1.0 $\mu\text{m}$                                                                                                                                                  | Electronic<br>micrometers<br>/CP801-10207-1                                                   |
| Distance meters;<br>electrooptic/laser/ultrasonic | 10208         | (0 ~ 45) m                                | $\sqrt{1^2 + (0.1 \times 10^{-6} \times l)^2} \text{ mm}$<br>(l unit : mm)                                                                                         | Laser interferometers<br>/CP801-10208-1                                                       |
| End bars                                          | 10209         | (25 ~ 1 000) mm<br><br>(1 000 ~ 2 000) mm | $\sqrt{0.5^2 + (1.9 \times 10^{-3} \times l)^2} \mu\text{m}$<br>(l unit : mm)<br><br>$\sqrt{0.6^2 + (2.0 \times 10^{-3} \times l)^2} \mu\text{m}$<br>(l unit : mm) | Gauge blocks,<br>Contact coordinate<br>measuring machines<br>/CP801-10209-1                   |
| Extensometers, linear<br>displacement transducers | 10210         | (0 ~ 5 000) mm                            | $\sqrt{0.11^2 + (0.7 \times 10^{-3} \times l)^2} \mu\text{m}$<br>(l unit : mm)                                                                                     | Laser interferometers<br>/CP801-10210-1                                                       |
| Filler gauges                                     | 10211         | (0 ~ 10) mm                               | 0.2 $\mu\text{m}$                                                                                                                                                  | Standard measuring<br>machines<br>/CP801-10211-1                                              |
| Film applicators                                  | 10212         | (0 ~ 10) mm                               | 1 $\mu\text{m}$                                                                                                                                                    | Electronic<br>micrometers<br>/CP801-10212-1                                                   |
| Gap gauges                                        | 10213         | (1 ~ 300) mm<br><br>(300 ~ 1 000) mm      | $\sqrt{0.7^2 + (2.0 \times 10^{-3} \times l)^2} \mu\text{m}$<br>(l unit : mm)<br><br>$\sqrt{1.2^2 + (2.1 \times 10^{-3} \times l)^2} \mu\text{m}$<br>(l unit : mm) | Standard measuring<br>machines, Contact<br>coordinate measuring<br>machines<br>/CP801-10213-1 |
| Gauge blocks, by comparison                       | 10214         | (0.5 ~ 100) mm<br><br>(100 ~ 500) mm      | $\sqrt{68^2 + 1.3^2 \times l^2} \text{ nm}$<br>(l unit : mm)<br><br>$\sqrt{76^2 + 1.4^2 \times l^2} \text{ nm}$<br>(l unit : mm)                                   | Gauge block<br>comparators<br>/CP801-10214-1                                                  |

## 102. Linear dimension

| Measured Quantity<br>Instrument or Gauge                        | Field<br>Code | Range                          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                     | Standard/Method of<br>Measurement etc.                     |
|-----------------------------------------------------------------|---------------|--------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------|
| Height gauges/measuring<br>machines                             | 10216         | (0 ~ 1 000) mm                 | $\sqrt{0.4^2 + (1.9 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)  | Gauge blocks,<br>End bars<br>/CP801-10216-1                |
| Linear scales                                                   | 10219         | (0 ~ 2 000) mm                 | $\sqrt{0.2^2 + (1.5 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)  | Laser interferometers<br>/CP801-10219-1                    |
| Standard measuring machines                                     | 10220         | (0 ~ 600) mm                   | $\sqrt{70^2 + 0.74^2 \times l^2} \text{ nm}$<br>( <i>l</i> unit : mm)                  | Laser interferometers<br>/CP801-10220-1                    |
| Micro scales/standard scales                                    | 10221         | (0 ~ 600) mm                   | $\sqrt{0.3^2 + (0.8 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)  | Laser interferometers<br>/CP801-10221-1                    |
| Electronic micrometers                                          | 10223         | ±2 mm                          | 0.10 μm                                                                                | Gauge blocks<br>/CP801-10223-1                             |
| Height micrometers, riser<br>blocks                             | 10224         | (0 ~ 25) mm                    | 0.6 μm                                                                                 | Gauge blocks<br>/CP801-10224-1                             |
| Head calibration                                                |               | (0 ~ 1 000) mm                 | $\sqrt{0.5^2 + (1.9 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)  |                                                            |
| Block calibration                                               |               | (0 ~ 600) mm                   | 0.6 μm                                                                                 |                                                            |
| Parallelism of riser blocks                                     |               |                                |                                                                                        |                                                            |
| Laser scan micrometers                                          | 10225         | (Ø0 ~ Ø5) mm<br>(Ø5 ~ Ø100) mm | 0.22 μm<br>0.34 μm                                                                     | Cylindrical plug/<br>pin gauges<br>/CP801-10225-1          |
| Standard tape rules,<br>peripheral gauges                       | 10227         | (0 ~ 50) m                     | $\sqrt{74^2 + (10 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)    | Laser interferometers<br>/CP801-10227-1                    |
| Cylindrical plug/pin gauges,<br>thread measuring wire<br>gauges | 10228         | (Ø0.1 ~ Ø310) mm               | $\sqrt{0.13^2 + (2.0 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm) | Standard measuring<br>machines<br>/CP801-10228-1           |
| Cylindrical plug/pin gauges                                     |               | (Ø0.1 ~ Ø10) mm                | $\sqrt{0.13^2 + (1.4 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm) | /CP801-10228-2                                             |
| Thread measuring wire gauges                                    |               |                                |                                                                                        |                                                            |
| Radius gauges                                                   | 10229         | (0 ~ 100) mm                   | 1.5 μm                                                                                 | Contact coordinate<br>measuring machines<br>/CP801-10229-1 |
| Cylindrical ring gauges                                         | 10230         | (Ø0.4 ~ Ø310) mm               | $\sqrt{0.29^2 + (2.0 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm) | Standard measuring<br>machines<br>/CP801-10230-1           |
| Step blocks                                                     | 10231         | (0 ~ 400) μm                   | 0.19 μm                                                                                | Gauge block<br>comparators<br>/CP801-10231-1               |
| Step gauges                                                     | 10232         | (0 ~ 1 000) mm                 | $\sqrt{0.5^2 + (1.9 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)  | Gauge blocks<br>/CP801-10232-1                             |
|                                                                 |               | (1 000 ~ 1 500) mm             | $\sqrt{2.0^2 + (1.4 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)  |                                                            |

| Measured Quantity<br>Instrument or Gauge  | Field<br>Code | Range                          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)   | Standard/Method of<br>Measurement etc.                     |
|-------------------------------------------|---------------|--------------------------------|----------------------------------------------------------------------|------------------------------------------------------------|
| Taper thickness gauges                    | 10233         | (1 ~ 100) mm                   | 0.03 mm                                                              | Measuring<br>microscopes<br>/CP801-10233-1                 |
| Ultrasonic thickness gauges               | 10234         | (0 ~ 100) mm<br>(100 ~ 500) mm | 3 μm<br>0.020 mm                                                     | Ultrasonic specimens<br>/CP801-10234-1                     |
| Ultrasonic/coating thickness<br>specimens | 10235         | (0 ~ 4) mm<br>(4 ~ 500) mm     | 0.2 μm<br>1.0 μm                                                     | Electronic<br>micrometers<br>/CP801-10235-1                |
| Coating thickness testers                 | 10236         | (0 ~ 25) mm                    | 2.0 μm                                                               | Gauge blocks<br>/CP801-10236-1                             |
| Torque arms                               | 10237         | (0 ~ 2 000) mm                 | 6 μm                                                                 | Contact coordinate<br>measuring machines<br>/CP801-10237-1 |
| Width Measuring Specimens                 | 10238         | (0.01 ~ 1) mm                  | $\sqrt{0.4^2 + (3.0 \times 10^{-3} \times l)^2}$ μm<br>(l unit : mm) | Contact coordinate<br>measuring machines<br>/CP801-10238-1 |
|                                           |               | (1 ~ 2 000) mm                 | $\sqrt{1.2^2 + (2.1 \times 10^{-3} \times l)^2}$ μm<br>(l unit : mm) |                                                            |

## 103. Angle

| Measured Quantity<br>Instrument or Gauge    | Field<br>Code | Range        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                        |
|---------------------------------------------|---------------|--------------|--------------------------------------------------------------------|---------------------------------------------------------------|
| Angle gauge blocks                          | 10302         | 0° ~ 360°    | 0.45"                                                              | Indexing tables<br>/CP801-10302-1                             |
| Autocollimators                             | 10303         | ±1°          | 0.3"                                                               | Fine angle generators<br>/CP801-10303-1                       |
| Bevel protractors                           | 10304         | 0° ~ 360°    | 1'                                                                 | Measuring<br>microscopes<br>/CP801-10304-1                    |
| Angle of accuracy                           |               | 0° ~ 360°    | 1'                                                                 |                                                               |
| Angle of accessories                        |               | 0° ~ 360°    | 2'                                                                 |                                                               |
| Straightness                                |               | (0 ~ 300) mm | 1 μm                                                               |                                                               |
| Parallelism                                 |               | (0 ~ 300) mm | 1 μm                                                               |                                                               |
| Scale accuracy                              |               | (0 ~ 300) mm | 10 μm                                                              |                                                               |
| Clinometers                                 | 10306         | ±90°         | 3.6"                                                               | Rotary tables<br>/CP801-10306-1                               |
| Fine angle generators,<br>level comparators | 10308         | ±(0° ~ 2.0°) | 0.4"                                                               | Laser interferometers<br>/CP801-10308-1                       |
| Plate/square/electric levels                | 10311         | ±1°          | 0.5"                                                               | Fine angle generators<br>/CP801-10311-1<br><br>/CP801-10311-2 |
| Precision flat                              |               | ±1°          | 0.5"                                                               |                                                               |
| Electrical                                  |               | ±2°          | 0.3"                                                               |                                                               |
| Squareness                                  |               | 300 mm       | 2 μm                                                               |                                                               |



| Measured Quantity<br>Instrument or Gauge           | Field<br>Code | Range          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                     | Standard/Method of<br>Measurement etc.                                |
|----------------------------------------------------|---------------|----------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Auto levels                                        | 10312         |                |                                                                                        | Standard scales,<br>theodolite calibrators<br>/CP801-10312-1          |
| Accuracy of level                                  |               | 0 m ~ ∞        | 0.2 mm                                                                                 |                                                                       |
| Straightness of line of sight                      |               | 0 m ~ ∞        | 2"                                                                                     |                                                                       |
| Repeatability                                      |               | (0 ~ 60) m     | 0.2 mm                                                                                 |                                                                       |
| Polygons                                           | 10315         | 0° ~ 360°      | 0.4"                                                                                   | Indexing tables<br>/CP801-10315-1                                     |
| Rotary tables                                      | 10316         | 0° ~ 360°      | 0.5"                                                                                   | Indexing tables<br>/CP801-10316-1                                     |
| Sine bars, plates, tables,<br>centers              | 10317         |                |                                                                                        | Standard measuring<br>machines<br>/CP801-10317-1                      |
| Center length of both rollers                      |               | (100 ~ 500) mm | $\sqrt{0.5^2 + (2.2 \times 10^{-3} \times l)^2} \text{ } \mu\text{m}$<br>(l unit : mm) |                                                                       |
| Parallelism of the measuring<br>face and 2 rollers |               | (100 ~ 500) mm | 0.9 μm                                                                                 |                                                                       |
| Squareness testers,<br>right angle testers         | 10318         | (0 ~ 1 000) mm | 1.0 μm                                                                                 | Precision squares<br>/CP801-10318-1                                   |
| Cylindrical squares                                | 10319         | (0 ~ 1 000) mm | 1.0 μm                                                                                 | Precision squares<br>/CP801-10319-1                                   |
| Precision squares                                  | 10320         |                |                                                                                        | Precision squares,<br>Electronic<br>micrometers<br>/CP801-10320-1     |
| Squareness                                         |               | (0 ~ 1 000) mm | 1.0 μm                                                                                 |                                                                       |
| Straightness                                       |               | (0 ~ 1 000) mm | 0.5 μm                                                                                 |                                                                       |
| Parallelism                                        |               | (0 ~ 1 000) mm | 0.8 μm                                                                                 |                                                                       |
| Theodolites, transits                              | 10321         |                |                                                                                        | Theodolite calibrators<br>/CP801-10321-1                              |
| Straightness of line of sight                      |               | 0 m ~ ∞        | 2"                                                                                     |                                                                       |
| Horizontal angle                                   |               | (0 ~ 360)°     | 2"                                                                                     |                                                                       |
| Vertical angle                                     |               | (0 ~ 360)°     | 6"                                                                                     |                                                                       |
| Angular displacement<br>transducers                | 10322         | 0° ~ 360°      | 3.6"                                                                                   | Rotary tables<br>/CP801-10322-1                                       |
| Alignment telescopes, line of<br>sight collimators | 10323         |                |                                                                                        | Line of sight<br>collimators,<br>Height micrometers<br>/CP801-10323-1 |
| Straightness of line of sight                      |               | 0 m ~ ∞        | 0.05 mm                                                                                |                                                                       |
| Scale accuracy of<br>optical micrometer            |               | ±2.5 mm        | 0.01 mm                                                                                |                                                                       |

| Measured Quantity<br>Instrument or Gauge        | Field<br>Code | Range                                       | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                              | Standard/Method of<br>Measurement etc.            |
|-------------------------------------------------|---------------|---------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Form testers                                    | 10401         |                                             |                                                                                                 | Form standard<br>specimens<br>/CP801-10401-1      |
| Vertical accuracy                               |               | (0 ~ 200) mm                                | $\sqrt{0.09^2 + (1.2 \times 10^{-3} \times l)^2} \text{ } \mu\text{m}$<br>( <i>l</i> unit : mm) |                                                   |
| Horizontal accuracy                             |               | (0 ~ 200) mm                                | 0.7 $\mu\text{m}$                                                                               |                                                   |
| Angle                                           |               | 0° ~ 180°                                   | 2"                                                                                              |                                                   |
| Radius                                          |               | (0 ~ 50) mm                                 | 0.7 $\mu\text{m}$                                                                               |                                                   |
| Optical flats                                   | 10404         |                                             |                                                                                                 | Optical flats<br>/CP801-10404-1                   |
| Flatness                                        |               | ( $\varnothing$ 0 ~ $\varnothing$ 100) mm   | 0.05 $\mu\text{m}$                                                                              |                                                   |
|                                                 |               | ( $\varnothing$ 100 ~ $\varnothing$ 150) mm | 0.10 $\mu\text{m}$                                                                              |                                                   |
| Optical parallels                               | 10405         |                                             |                                                                                                 | Optical flats<br>/CP801-10405-1                   |
| Flatness                                        |               | ( $\varnothing$ 0 ~ $\varnothing$ 50) mm    | 0.06 $\mu\text{m}$                                                                              |                                                   |
| Parallelism                                     |               | ( $\varnothing$ 0 ~ $\varnothing$ 50) mm    | 0.09 $\mu\text{m}$                                                                              |                                                   |
| Parallel blocks                                 | 10406         |                                             |                                                                                                 | Electronic<br>micrometers<br>/CP801-10406-1       |
| Parallelism                                     |               | (0 ~ 1 000) mm                              | 0.8 $\mu\text{m}$                                                                               |                                                   |
| Difference of both blocks                       |               | (0 ~ 1 000) mm                              | 0.8 $\mu\text{m}$                                                                               |                                                   |
| Precision surface plates                        | 10407         | (0 ~ 18) m <sup>2</sup>                     | 1.5 $\mu\text{m}$                                                                               | Electrical levels<br>/CP801-10407-1               |
| Profile gauges                                  | 10408         | (0 ~ 5) mm                                  | 0.3 $\mu\text{m}$                                                                               | Dial gauge testers<br>/CP801-10408-1              |
| Roundness measurement<br>instruments            | 10409         |                                             |                                                                                                 | Roundness standard<br>specimens<br>/CP801-10409-1 |
| Rotation accuracy of<br>circumference direction |               | 360°                                        | 13 nm                                                                                           |                                                   |
| Rotation accuracy of shaft<br>direction         |               | 360°                                        | 19 nm                                                                                           |                                                   |
| Accuracy of detector                            |               | (0 ~ 1 000) $\mu\text{m}$                   | $\sqrt{0.12^2 + (1.1 \times 10^{-3} \times l)^2} \text{ } \mu\text{m}$<br>( <i>l</i> unit : mm) |                                                   |
| Form standard specimens                         | 10410         |                                             |                                                                                                 | Standard measuring<br>machines<br>/CP801-10410-1  |
| Height                                          |               | (0 ~ 100) mm                                | 0.3 $\mu\text{m}$                                                                               |                                                   |
| Pitch                                           |               | (0 ~ 100) mm                                | 0.4 $\mu\text{m}$                                                                               |                                                   |
| Radius                                          |               | (0 ~ 100) mm                                | 0.3 $\mu\text{m}$                                                                               |                                                   |
| Angle                                           |               | 0° ~ 180°                                   | 7.2"                                                                                            |                                                   |

| Measured Quantity<br>Instrument or Gauge                                                                                                                         | Field<br>Code | Range                                                                                                                    | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                 | Standard/Method of<br>Measurement etc.                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Roundness standard/<br>roundness magnification<br>standard specimens<br><br>Roundness standard<br>specimens<br><br>Roundness magnification<br>standard specimens | 10411         | 360°<br><br>(0 ~ 300) μm                                                                                                 | 13 nm<br><br>$\sqrt{0.23^2 + (4.8 \times 10^{-3} \times l)^2}$ μm<br>(l unit : μm) | Roundness<br>measurement<br>instruments<br>/CP801-10411-1 |
| Straight edges<br><br>Straightness<br><br><br><br><br><br>Parallelism                                                                                            | 10412         | (0 ~ 1 000) mm<br>(1 000 ~ 2 000) mm<br>(2 000 ~ 3 000) mm<br>(0 ~ 1 000) mm<br>(1 000 ~ 2 000) mm<br>(2 000 ~ 3 000) mm | 0.5 μm<br>1.0 μm<br>2.0 μm<br>0.5 μm<br>1.0 μm<br>2.0 μm                           | Electronic<br>micrometers<br>/CP801-10412-1               |
| Straight rules                                                                                                                                                   | 10413         | (0 ~ 3 000) mm                                                                                                           | 0.03 mm                                                                            | Laser interferometers<br>/CP801-10413-1                   |
| Test bars<br><br>Angle<br><br>Roundness<br><br>Cylindricity<br><br>Run-out                                                                                       | 10415         | 0° ~ 30°<br>(0 ~ 800) mm<br>(0 ~ 800) mm<br>(0 ~ 800) mm                                                                 | 0.4"<br>0.05 μm<br>2.2 μm<br>0.7 μm                                                | Standard measuring<br>machines<br>/CP801-10415-1          |

## 105. Complex geometry

| Measured Quantity<br>Instrument or Gauge                                   | Field<br>Code | Range                        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)     | Standard/Method of<br>Measurement etc.      |
|----------------------------------------------------------------------------|---------------|------------------------------|------------------------------------------------------------------------|---------------------------------------------|
| Bench centers<br><br>Difference of both center<br><br>Flatness of both bed | 10502         | (0 ~ 800) mm<br>(0 ~ 800) mm | 1.7 μm<br>0.9 μm                                                       | Electronic<br>micrometers<br>/CP801-10502-1 |
| Contact coordinate measuring<br>machines                                   | 10503         | (0 ~ 10 000) mm              | $\sqrt{0.13^2 + (0.74 \times 10^{-3} \times l)^2}$ μm<br>(l unit : mm) | Laser interferometers<br>/CP801-10503-1     |

## 105. Complex geometry

| Measured Quantity<br>Instrument or Gauge     | Field<br>Code | Range               | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                              | Standard/Method of<br>Measurement etc.                            |
|----------------------------------------------|---------------|---------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| Non-contact coordinate<br>measuring machines | 10504         |                     |                                                                                                 | Laser interferometers<br>/CP801-10504-1                           |
| Length                                       |               | (0 ~ 2 500) mm      | $\sqrt{0.2^2 + (8.4 \times 10^{-4} \times l)^2} \text{ } \mu\text{m}$<br>( <i>l</i> unit : mm)  |                                                                   |
|                                              |               | (2 500 ~ 5 000) mm  | $\sqrt{3.1^2 + (9.0 \times 10^{-4} \times l)^2} \text{ } \mu\text{m}$<br>( <i>l</i> unit : mm)  |                                                                   |
|                                              |               | (5 000 ~ 10 000) mm | $\sqrt{5.7^2 + (9.0 \times 10^{-4} \times l)^2} \text{ } \mu\text{m}$<br>( <i>l</i> unit : mm)  |                                                                   |
| Angle                                        |               | 0° ~ 360°           | 2"                                                                                              |                                                                   |
| Gauge block accessories                      | 10505         |                     |                                                                                                 | Electronic<br>micrometers<br>/CP801-10505-1                       |
| Round type jaw                               |               | (0 ~ 20) mm         | 0.4 $\mu\text{m}$                                                                               |                                                                   |
| Parallel jaw (A type)                        |               | (0 ~ 20) mm         | 0.4 $\mu\text{m}$                                                                               |                                                                   |
| Parallel jaw (B type)                        |               | (0 ~ 20) mm         | 0.2 $\mu\text{m}$                                                                               |                                                                   |
| Scriber point                                |               | (0 ~ 20) mm         | 0.2 $\mu\text{m}$                                                                               |                                                                   |
| Center point                                 |               | (0 ~ 20) mm         | 1.0 $\mu\text{m}$                                                                               |                                                                   |
| Base block                                   |               | (0 ~ 50) mm         | 0.5 $\mu\text{m}$                                                                               |                                                                   |
| Edge of triangle type                        |               | (0 ~ 300) mm        | 0.3 $\mu\text{m}$                                                                               |                                                                   |
| Hardness indenters                           | 10508         |                     |                                                                                                 | Non-contact<br>coordinate measuring<br>machines<br>/CP801-10508-1 |
| Angle                                        |               | 0° ~ 180°           | 11"                                                                                             |                                                                   |
| Radius                                       |               | (0 ~ 7) mm          | 1.0 $\mu\text{m}$                                                                               |                                                                   |
| Diameter                                     |               | (0 ~ 15) mm         | 0.2 $\mu\text{m}$                                                                               |                                                                   |
| Length                                       |               | (0 ~ 5) mm          | 1.0 $\mu\text{m}$                                                                               |                                                                   |
| Laser trackers                               | 10510         |                     |                                                                                                 | Laser interferometers<br>/CP801-10510-1                           |
| Volumetric system tests                      |               | 2.3 m               | 1.1 $\mu\text{m}$                                                                               |                                                                   |
| Two face tests                               |               | (1 ~ 6) m           | 1 $\mu\text{m}$                                                                                 |                                                                   |
| Range tests                                  |               | (1 ~ 45) m          | $\sqrt{1.2^2 + (0.27 \times 10^{-3} \times l)^2} \text{ } \mu\text{m}$<br>( <i>l</i> unit : mm) |                                                                   |
| Measuring microscopes,<br>profile projectors | 10511         |                     |                                                                                                 | Standard scale<br>/CP801-10511-1                                  |
| Length                                       |               | (0 ~ 600) mm        | $\sqrt{0.46^2 + (2 \times 10^{-3} \times l)^2} \text{ } \mu\text{m}$<br>( <i>l</i> unit : mm)   |                                                                   |
| Angle                                        |               | 0° ~ 360°           | 2"                                                                                              |                                                                   |
| Micro measuring microscopes                  | 10512         | (0 ~ 50) mm         | 3 $\mu\text{m}$                                                                                 | Standard scale<br>/CP801-10512-1                                  |

## 105. Complex geometry

| Measured Quantity<br>Instrument or Gauge    | Field<br>Code                  | Range                          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                     |                      |                                                    |
|---------------------------------------------|--------------------------------|--------------------------------|--------------------------------------------------------------------|------------------------------------------------------------|----------------------|----------------------------------------------------|
| Taper plug gauges                           | 10514                          |                                |                                                                    | Contact coordinate<br>measuring machines<br>/CP801-10514-1 |                      |                                                    |
| Outside dia. of small part                  |                                | (Ø0.5 ~ Ø500) mm               | 2.5 μm                                                             |                                                            |                      |                                                    |
| Outside dia. of large part                  |                                | (Ø0.5 ~ Ø500) mm               | 3.1 μm                                                             |                                                            |                      |                                                    |
| Taper angle                                 |                                | 0° ~ 180°                      | 0.001°                                                             |                                                            |                      |                                                    |
| Taper ring gauges                           | 10515                          |                                |                                                                    | Contact coordinate<br>measuring machines<br>/CP801-10515-1 |                      |                                                    |
| Inside dia. of small part                   |                                | (Ø0.5 ~ Ø250) mm               | 2.3 μm                                                             |                                                            |                      |                                                    |
| Inside dia. of large part                   |                                | (Ø0.5 ~ Ø250) mm               | 1.8 μm                                                             |                                                            |                      |                                                    |
| Taper angle                                 |                                | 0° ~ 180°                      | 0.001°                                                             |                                                            |                      |                                                    |
| Stylus type roughness testers               | 10517                          |                                |                                                                    | Roughness standard<br>specimens<br>/CP801-10517-1          |                      |                                                    |
| Arithmetic mean(Ra)                         |                                | (0 ~ 2) μm<br>(2 ~ 10) μm      | 0.007 μm<br>0.040 μm                                               |                                                            |                      |                                                    |
| Max. height(Rz)                             |                                | (0 ~ 10) μm<br>(10 ~ 1 000) μm | 0.024 μm<br>0.11 μm                                                |                                                            |                      |                                                    |
| Depth(d)                                    |                                | (0 ~ 10) μm<br>(10 ~ 1 000) μm | 0.021 μm<br>0.14 μm                                                |                                                            |                      |                                                    |
| Roughness standard<br>/comparison specimens |                                | 10519                          |                                                                    |                                                            |                      | Stylus type roughness<br>testers<br>/CP801-10519-1 |
| Roughness standard specimens                |                                |                                |                                                                    |                                                            |                      |                                                    |
| Arithmetic mean(Ra)                         |                                |                                | (0 ~ 2) μm<br>(2 ~ 10) μm                                          |                                                            | 0.010 μm<br>0.042 μm |                                                    |
| Max. height(Rz)                             | (0 ~ 10) μm<br>(10 ~ 20) μm    |                                | 0.026 μm<br>0.15 μm                                                |                                                            |                      |                                                    |
| Depth(d)                                    | (0 ~ 10) μm<br>(10 ~ 1 000) μm |                                | 0.026 μm<br>0.17 μm                                                |                                                            |                      |                                                    |
| Roughness comparison specimens              |                                |                                |                                                                    |                                                            |                      |                                                    |
| Max. height(Rz)                             | (0 ~ 10) μm<br>(10 ~ 1 000) μm |                                | 0.027 μm<br>0.15 μm                                                |                                                            |                      |                                                    |
| Thread plug gauges                          | 10525                          |                                |                                                                    | Standard measuring<br>machines<br>/CP801-10525-1           |                      |                                                    |
| Outside dia.                                |                                | (Ø0.4 ~ Ø300) mm               | 0.8 μm                                                             |                                                            |                      |                                                    |
| Effective dia.                              |                                | (Ø0.4 ~ Ø300) mm               | 1.0 μm                                                             |                                                            |                      |                                                    |
| Pitch                                       |                                | (0.1 ~ 10) mm                  | 0.8 μm                                                             |                                                            |                      |                                                    |
| Half angle of thread                        |                                | 0° ~ 80°                       | 2′                                                                 |                                                            |                      |                                                    |

## 105. Complex geometry

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range               | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                     |
|------------------------------------------|---------------|---------------------|--------------------------------------------------------------------|------------------------------------------------------------|
| Taper thread plug gauges                 | 10526         |                     |                                                                    | Standard measuring<br>machines<br>/CP801-10526-1           |
| Outside dia.                             |               | (Ø0.4 ~ Ø350) mm    | 0.8 µm                                                             |                                                            |
| Effective dia.                           |               | (Ø0.4 ~ Ø350) mm    | 1.6 µm                                                             |                                                            |
| Pitch                                    |               | (0.1 ~ 10) mm       | 0.8 µm                                                             |                                                            |
| Length                                   |               | (0.1 ~ 300) mm      | 1.5 µm                                                             |                                                            |
| Half angle of thread                     |               | 0° ~ 45°            | 2'                                                                 |                                                            |
| Thread ring gauges                       | 10527         |                     |                                                                    | Contact coordinate<br>measuring machines<br>/CP801-10527-1 |
| Inside dia.                              |               | (Ø3.0 ~ Ø150) mm    | 1.0 µm                                                             |                                                            |
| Effective dia.                           |               | (Ø3.0 ~ Ø150) mm    | 2.3 µm                                                             |                                                            |
| Pitch                                    |               | (0.7 ~ 10) mm       | 1.0 µm                                                             |                                                            |
| Taper thread ring gauges                 | 10528         |                     |                                                                    | Contact coordinate<br>measuring machines<br>/CP801-10528-1 |
| Alternation of Inside dia.               |               | ±3 mm               | 2 µm                                                               |                                                            |
| Alternation of Effective dia.            |               | ±3 mm               | 2 µm                                                               |                                                            |
| Length                                   |               | (0 ~ 100) mm        | 1 µm                                                               |                                                            |
| V-blocks, box blocks                     | 10529         |                     |                                                                    | Electronic<br>micrometers<br>/CP801-10529-1                |
| Flatness                                 |               | (0 ~ 300) mm        | 1.0 µm                                                             |                                                            |
| Gradient                                 |               | (0 ~ 300) mm        | 1.0 µm                                                             |                                                            |
| Difference of both part                  |               | (0 ~ 300) mm        | 1.3 µm                                                             |                                                            |
| Parallelism                              |               | (0 ~ 300) mm        | 1.3 µm                                                             |                                                            |
| Squareness                               |               | (0 ~ 300) mm        | 1.8 µm                                                             |                                                            |
| SEM/TEM/SPM/AFM<br>microscopes           | 10531         | 1 000 × ~ 500 000 × | $2.4 \times 10^{-2}$                                               | MRS<br>/CP801-10531-1                                      |

## 106. Various dimensional

| Measured Quantity<br>Instrument or Gauge              | Field<br>Code | Range          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|-------------------------------------------------------|---------------|----------------|--------------------------------------------------------------------|----------------------------------------|
| Inside/outside/gear tooth<br>calipers, caliper gauges | 10601         | (0 ~ 2 000) mm | $\sqrt{9^2 + (2 \times 10^{-3} \times l)^2}$ µm<br>(l unit : mm)   | Step gauges<br>/CP801-10601-1          |
| Cylinder/bore gauges                                  | 10603         | (0 ~ 1 000) mm | 0.6 µm                                                             | Dial gauge testers<br>/CP801-10603-1   |

## 106. Various dimensional

| Measured Quantity<br>Instrument or Gauge                                         | Field<br>Code | Range                                                                              | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                                                                                           | Standard/Method of<br>Measurement etc.                                                  |
|----------------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Depth gauges, depth<br>micrometers                                               | 10604         | (0 ~ 300) mm<br><br>(300 ~ 1 000) mm                                               | $\sqrt{1^2 + (2 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)<br><br>$\sqrt{9^2 + (2 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)                                                                                                                                                                                   | Gauge blocks<br>/CP801-10604-1                                                          |
| Dial/digital gauges                                                              | 10605         | (0 ~ 100) mm                                                                       | 0.3 $\mu\text{m}$                                                                                                                                                                                                                                                                                                                                            | Gauge blocks<br>/CP801-10605-1                                                          |
| Grind gauges<br><br>Depth of inclined plane<br><br>Straightness of scraper       | 10608         | (0 ~ 1) mm<br><br>(0 ~ 150) mm                                                     | 1.0 $\mu\text{m}$<br><br>0.5 $\mu\text{m}$                                                                                                                                                                                                                                                                                                                   | Electronic<br>micrometers<br>/CP801-10608-1                                             |
| Micro indicators,<br>test indicators                                             | 10609         | (0 ~ 5) mm                                                                         | 0.5 $\mu\text{m}$                                                                                                                                                                                                                                                                                                                                            | Dial gauge testers<br>/CP801-10609-1                                                    |
| Micrometer heads                                                                 | 10610         | (0 ~ 100) mm                                                                       | $\sqrt{0.7^2 + (1.8 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)                                                                                                                                                                                                                                                                        | Gauge blocks<br>/CP801-10610-1                                                          |
| 3-Point micrometers                                                              | 10611         | ( $\varnothing 2 \sim \varnothing 300$ ) mm                                        | 1.0 $\mu\text{m}$                                                                                                                                                                                                                                                                                                                                            | Cylindrical ring<br>gauges<br>/CP801-10611-1                                            |
| Inside micrometers<br><br>Caliper type<br><br>Bar type<br><br><br>Extension rods | 10612         | (4 ~ 300) mm<br><br>(25 ~ 300) mm<br><br>(300 ~ 1 100) mm<br><br>(13 ~ 1 000) mm   | $\sqrt{1^2 + (2 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)<br><br>$\sqrt{1^2 + (2 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)<br><br>$\sqrt{2^2 + (2 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)<br><br>$\sqrt{1^2 + (2 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm) | Gauge blocks<br>/CP801-10612-1                                                          |
| Outside micrometers<br><br>Outside micrometers<br><br><br>V-anvil micrometers    | 10613         | (0 ~ 25) mm<br><br>(25 ~ 1 000) mm<br><br>(1 000 ~ 2 000) mm<br><br>(0.2 ~ 100) mm | $\sqrt{0.2^2 + (1.9 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)<br><br>$\sqrt{0.9^2 + (1.9 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)<br><br>$\sqrt{3.0^2 + (1.4 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)<br><br>1.0 $\mu\text{m}$                                                     | Gauge blocks,<br>cylindrical plug<br>gauges<br>/CP801-10613-1<br><br><br>/CP801-10613-2 |
| Offset of retroreflectors                                                        | 10614         | (0 ~ 40) mm                                                                        | 0.05 mm                                                                                                                                                                                                                                                                                                                                                      | Laser trackers<br>/CP801-10614-1                                                        |

## 106. Various dimensional

| Measured Quantity<br>Instrument or Gauge | Field<br>Code     | Range               | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                    |
|------------------------------------------|-------------------|---------------------|--------------------------------------------------------------------|-----------------------------------------------------------|
| Particle counters                        | 10615             |                     |                                                                    | Particle counters,<br>Liquid flowmeters<br>/CP801-10615-1 |
| [Airborne]                               |                   |                     |                                                                    |                                                           |
| Counting efficiency                      |                   | (0.1 ~ 1) μm        | 5.3 %                                                              |                                                           |
| Flow rate                                |                   | (0 ~ 2.83) L/min    | 0.05 L/min                                                         |                                                           |
|                                          |                   | (2.83 ~ 28.3) L/min | 0.34 L/min                                                         |                                                           |
|                                          |                   | (28.3 ~ 50) L/min   | 0.60 L/min                                                         |                                                           |
|                                          |                   | (50 ~ 75) L/min     | 0.89 L/min                                                         |                                                           |
|                                          |                   | (75 ~ 100) L/min    | 1.2 L/min                                                          |                                                           |
| Threshold voltage                        |                   | (0 ~ 10) V          | 0.003 V                                                            |                                                           |
| [Liquid]                                 |                   |                     |                                                                    |                                                           |
| Flow rate                                | (10 ~ 50) mL/min  | 7.3 mL/min          |                                                                    |                                                           |
|                                          | (50 ~ 100) mL/min | 8.3 mL/min          |                                                                    |                                                           |
| Threshold voltage                        | (0 ~ 10) V        | 0.003 V             |                                                                    |                                                           |
| Standard sieves                          | 10617             |                     |                                                                    | Measuring<br>microscopes<br>/CP801-10617-1                |
| wire                                     |                   | (0.01 ~ 10) mm      | 3 μm                                                               |                                                           |
| sieve                                    |                   | (0.01 ~ 150) mm     | 4 μm                                                               |                                                           |
| Water level meters                       | 10619             |                     |                                                                    | Laser interferometers<br>/CP801-10619-1                   |
| Non-contact type                         |                   | (0 ~ 9.3) m         | 2.8 mm                                                             |                                                           |
| Contact type                             |                   | (0 ~ 9) m           | 1.6 mm                                                             |                                                           |
|                                          |                   | (9 ~ 18) m          | 2.0 mm                                                             |                                                           |
|                                          |                   | (18 ~ 27) m         | 2.4 mm                                                             |                                                           |
|                                          |                   | (27 ~ 36) m         | 2.7 mm                                                             |                                                           |
|                                          |                   | (36 ~ 45) m         | 3.0 mm                                                             |                                                           |
| Welding gauges                           | 10620             |                     |                                                                    | Measuring<br>microscopes<br>/CP801-10620-1                |
| Length calibration                       |                   | (0 ~ 100) mm        | 0.1 mm                                                             |                                                           |
| Angle calibration                        |                   | 0° ~ 180°           | 4′                                                                 |                                                           |

## 201. Mass

| Measured Quantity<br>Instrument or Gauge            | Field<br>Code | Range                                                                               | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.         |
|-----------------------------------------------------|---------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------|
| Auto-hopper scale balances                          | 20102         | (0 ~ 200) kg                                                                        | 48 g                                                               | Weight<br>/CP801-20102-1                       |
| Auto-packer scale balances                          | 20103         | (0 ~ 10) kg<br>(10 ~ 40) kg                                                         | 1.0 g<br>10 g                                                      | Weight<br>/CP801-20103-1                       |
| Axle weigher balances<br>Portable axle load weigher | 20104         | (500 ~ 1 000) kg<br>(1 000 ~ 2 000) kg<br>(2 000 ~ 5 000) kg<br>(5 000 ~ 20 000) kg | 1.0 kg<br>4 kg<br>6 kg<br>20 kg                                    | Force calibration<br>machine<br>/CP801-20104-1 |



## 201. Mass

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                                                                                                                        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                  | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Counter beam balances                    | 20105         | (0 ~ 311) g<br>(311 ~ 2 610) g<br>2 610 g ~ 5 kg                                                                                                                                                                                                                                                                                                                                                                                             | 9.0 mg<br>91 mg<br>0.8 g                                                                                                                                                                                                                                            | Weight<br>/CP801-20105-1               |
| Dial platform scale balances             | 20106         | (0 ~ 10) kg<br>(10 ~ 50) kg<br>(50 ~ 200) kg                                                                                                                                                                                                                                                                                                                                                                                                 | 2.8 mg<br>10 g<br>0.1 kg                                                                                                                                                                                                                                            | Weight<br>/CP801-20106-1               |
| Swing Dial Scales                        | 20107         | (0 ~ 25) kg                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.1 kg                                                                                                                                                                                                                                                              | Weight<br>/CP801-20107-1               |
| Electric balances                        | 20109         | (0 ~ 2) mg<br>(2 ~ 5) mg<br>(5 ~ 10) mg<br>(10 ~ 20) mg<br>(20 ~ 50) mg<br>(50 ~ 100) mg<br>(100 ~ 200) mg<br>(200 ~ 500) mg<br>500 mg ~ 1 g<br>(1 ~ 2) g<br>(2 ~ 5) g<br>(5 ~ 10) g<br>(10 ~ 20) g<br>(20 ~ 50) g<br>(50 ~ 100) g<br>(100 ~ 200) g<br>(200 ~ 500) g<br>500 g ~ 1 kg<br>(1 ~ 2) kg<br>(2 ~ 5) kg<br>(5 ~ 10) kg<br>(10 ~ 20) kg<br>(20 ~ 30) kg<br>(30 ~ 100) kg<br>(100 ~ 300) kg<br>(300 ~ 1 000) kg<br>(1 000 ~ 2 000) kg | 1.2 µg<br>1.2 µg<br>1.2 µg<br>1.2 µg<br>1.5 µg<br>1.9 µg<br>2.4 µg<br>3.0 µg<br>3.9 µg<br>4.7 µg<br>6.2 µg<br>8.0 µg<br>10 µg<br>13 µg<br>20 µg<br>50 µg<br>0.1 mg<br>0.2 mg<br>0.5 mg<br>2.0 mg<br>3.0 mg<br>5.0 mg<br>20 mg<br>0.3 g<br>0.7 g<br>0.1 kg<br>0.2 kg | Weight<br>/CP801-20109-1               |
| Platform scale balances                  | 20112         | (0 ~ 10) kg<br>(10 ~ 50) kg<br>(50 ~ 200) kg                                                                                                                                                                                                                                                                                                                                                                                                 | 2.8 mg<br>10 g<br>0.1 kg                                                                                                                                                                                                                                            | Weight<br>/CP801-20112-1               |
| Spring scale balances                    | 20113         | (0 ~ 1) kg<br>(1 ~ 10) kg<br>(10 ~ 50) kg                                                                                                                                                                                                                                                                                                                                                                                                    | 1.0 g<br>9.0 g<br>0.1 kg                                                                                                                                                                                                                                            | Weight<br>/CP801-20113-1               |

## 201. Mass

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|--------------|--------------------------------------------------------------------|----------------------------------------|
| Weights                                  | 20116         | 1 mg ~ 20 kg | (E2 class)                                                         | Weight<br>/CP801-20116-1               |
|                                          |               | 1 mg         | 1.8 $\mu$ g                                                        |                                        |
|                                          |               | 2 mg         | 1.8 $\mu$ g                                                        |                                        |
|                                          |               | 5 mg         | 1.8 $\mu$ g                                                        |                                        |
|                                          |               | 10 mg        | 2.4 $\mu$ g                                                        |                                        |
|                                          |               | 20 mg        | 3.0 $\mu$ g                                                        |                                        |
|                                          |               | 50 mg        | 4.0 $\mu$ g                                                        |                                        |
|                                          |               | 100 mg       | 5.0 $\mu$ g                                                        |                                        |
|                                          |               | 200 mg       | 6.0 $\mu$ g                                                        |                                        |
|                                          |               | 500 mg       | 8.0 $\mu$ g                                                        |                                        |
|                                          |               | 1 g          | 9.0 $\mu$ g                                                        |                                        |
|                                          |               | 2 g          | 12 $\mu$ g                                                         |                                        |
|                                          |               | 5 g          | 15 $\mu$ g                                                         |                                        |
|                                          |               | 10 g         | 18 $\mu$ g                                                         |                                        |
|                                          |               | 20 g         | 24 $\mu$ g                                                         |                                        |
|                                          |               | 50 g         | 30 $\mu$ g                                                         |                                        |
|                                          |               | 100 g        | 50 $\mu$ g                                                         |                                        |
|                                          |               | 200 g        | 90 $\mu$ g                                                         |                                        |
|                                          |               | 500 g        | 0.24 mg                                                            |                                        |
|                                          |               | 1 kg         | 0.48 mg                                                            |                                        |
|                                          |               | 2 kg         | 0.90 mg                                                            |                                        |
|                                          |               | 5 kg         | 2.4 mg                                                             |                                        |
|                                          |               | 10 kg        | 4.8 mg                                                             |                                        |
|                                          |               | 20 kg        | 9.0 mg                                                             |                                        |

## 202. Force

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.         |
|------------------------------------------|---------------|--------------|--------------------------------------------------------------------|------------------------------------------------|
| Force measuring devices                  | 20202         |              |                                                                    | Force calibration<br>machine<br>/CP801-20202-1 |
| Case A                                   |               | (1 ~ 50) N   | $1.2 \times 10^{-4}$                                               |                                                |
|                                          |               | 50 N ~ 20 kN | $6.0 \times 10^{-5}$                                               |                                                |
|                                          |               | 20 kN ~ 5 MN | $5.1 \times 10^{-4}$                                               |                                                |
| Case B                                   |               | (1 ~ 50) N   | $1.4 \times 10^{-4}$                                               |                                                |
|                                          |               | 50 N ~ 20 kN | $7.0 \times 10^{-5}$                                               |                                                |
|                                          |               | 20 kN ~ 5 MN | $5.1 \times 10^{-4}$                                               |                                                |
| Case C                                   |               | (10 ~ 50) N  | $1.7 \times 10^{-4}$                                               |                                                |
|                                          |               | 50 N ~ 20 kN | $7.1 \times 10^{-5}$                                               |                                                |
|                                          |               | 20 kN ~ 5 MN | $5.3 \times 10^{-4}$                                               |                                                |
| Case D                                   |               | (1 ~ 50) N   | $1.7 \times 10^{-4}$                                               |                                                |
|                                          |               | 50 N ~ 20 kN | $7.8 \times 10^{-5}$                                               |                                                |
|                                          |               | 20 kN ~ 5 MN | $5.4 \times 10^{-4}$                                               |                                                |

## 202. Force

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.       |
|------------------------------------------|---------------|----------------|--------------------------------------------------------------------|----------------------------------------------|
| Tension/compression testing<br>machines  | 20203         |                |                                                                    | Force measuring<br>devices<br>/CP801-20203-1 |
| (Tension/compression)                    |               | (1 ~ 500) N    | $2.2 \times 10^{-4}$                                               |                                              |
| (Tension/compression)                    |               | 500 N ~ 1 kN   | $5.6 \times 10^{-4}$                                               |                                              |
| (Tension/compression)                    |               | (1 ~ 2) kN     | $9.5 \times 10^{-4}$                                               |                                              |
| (Tension/compression)                    |               | (2 ~ 5) kN     | $8.5 \times 10^{-4}$                                               |                                              |
| (Tension/compression)                    |               | (5 ~ 10) kN    | $4.0 \times 10^{-4}$                                               |                                              |
| (Tension/compression)                    |               | (10 ~ 20) kN   | $5.8 \times 10^{-4}$                                               |                                              |
| (Compression)                            |               | (20 ~ 50) kN   | $5.9 \times 10^{-4}$                                               |                                              |
| (Tension)                                |               | (20 ~ 50) kN   | $7.5 \times 10^{-4}$                                               |                                              |
| (Compression)                            |               | (50 ~ 100) kN  | $7.5 \times 10^{-4}$                                               |                                              |
| (Tension)                                |               | (50 ~ 100) kN  | $7.5 \times 10^{-4}$                                               |                                              |
| (Compression)                            |               | (100 ~ 200) kN | $3.6 \times 10^{-4}$                                               |                                              |
| (Tension)                                |               | (100 ~ 200) kN | $7.5 \times 10^{-4}$                                               |                                              |
| (Compression)                            |               | (200 ~ 500) kN | $3.5 \times 10^{-4}$                                               |                                              |
| (Tension)                                |               | (200 ~ 500) kN | $9.4 \times 10^{-4}$                                               |                                              |
| (Compression)                            |               | 500 kN ~ 1 MN  | $4.8 \times 10^{-4}$                                               |                                              |
| (Tension)                                |               | 500 kN ~ 1 MN  | $8.1 \times 10^{-4}$                                               |                                              |
| (Tension)                                |               | (1 ~ 2) MN     | $1.0 \times 10^{-3}$                                               |                                              |
| (Compression)                            |               | (1 ~ 3) MN     | $1.5 \times 10^{-3}$                                               |                                              |
| (Compression)                            |               | (3 ~ 10) MN    | $1.9 \times 10^{-3}$                                               |                                              |
| Push-pull gauges                         | 20204         |                |                                                                    | Force measuring<br>devices<br>/CP801-20204-1 |
|                                          |               | (0.049 ~ 2) N  | $1.9 \times 10^{-2}$                                               |                                              |
|                                          |               | (2 ~ 25) N     | $5.9 \times 10^{-4}$                                               |                                              |
|                                          |               | 25 N ~ 5 kN    | $5.8 \times 10^{-4}$                                               |                                              |

## 203. Torque

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range              | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.           |
|------------------------------------------|---------------|--------------------|--------------------------------------------------------------------|--------------------------------------------------|
| Torque measuring devices                 | 20302         |                    |                                                                    | Torque calibration<br>machines<br>/CP801-20302-1 |
|                                          |               | (0.002 ~ 0.05) N·m | $6.8 \times 10^{-3}$                                               |                                                  |
|                                          |               | (0.05 ~ 0.5) N·m   | $1.9 \times 10^{-3}$                                               |                                                  |
|                                          |               | (0.5 ~ 1) N·m      | $9.9 \times 10^{-4}$                                               |                                                  |
|                                          |               | (1 ~ 2) N·m        | $7.1 \times 10^{-4}$                                               |                                                  |
|                                          |               | (2 ~ 5) N·m        | $6.1 \times 10^{-4}$                                               |                                                  |
|                                          |               | (5 ~ 10) N·m       | $4.6 \times 10^{-4}$                                               |                                                  |
|                                          |               | (10 ~ 20) N·m      | $4.6 \times 10^{-4}$                                               |                                                  |
|                                          |               | (20 ~ 50) N·m      | $3.1 \times 10^{-4}$                                               |                                                  |
|                                          |               | (50 ~ 100) N·m     | $3.5 \times 10^{-4}$                                               |                                                  |
|                                          |               | (100 ~ 200) N·m    | $2.7 \times 10^{-4}$                                               |                                                  |
|                                          |               | (200 ~ 500) N·m    | $1.6 \times 10^{-4}$                                               |                                                  |
|                                          |               | (500 ~ 1 000) N·m  | $6.6 \times 10^{-4}$                                               |                                                  |
|                                          |               | (1 ~ 2) kN·m       | $7.1 \times 10^{-4}$                                               |                                                  |
|                                          |               | (2 ~ 5) kN·m       | $7.7 \times 10^{-4}$                                               |                                                  |
|                                          |               | (5 ~ 10) kN·m      | $5.1 \times 10^{-4}$                                               |                                                  |
|                                          |               | (10 ~ 25) kN·m     | $4.8 \times 10^{-4}$                                               |                                                  |
|                                          |               | (25 ~ 50) kN·m     | $5.0 \times 10^{-4}$                                               |                                                  |

## 203. Torque

| Measured Quantity<br>Instrument or Gauge       | Field<br>Code | Range                                                                                                                                                                                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                   | Standard/Method of<br>Measurement etc.        |
|------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| Torque wrenches/drivers                        | 20303         | (0.01 ~ 0.09) N·m<br>(0.09 ~ 0.6) N·m<br>(0.6 ~ 2) N·m<br>(2 ~ 6) N·m<br>(6 ~ 20) N·m<br>(20 ~ 50) N·m<br>(50 ~ 100) N·m<br>(100 ~ 200) N·m<br>(200 ~ 500) N·m<br>(500 ~ 700) N·m<br>(700 ~ 2 000) N·m | $1.5 \times 10^{-2}$<br>$1.2 \times 10^{-2}$<br>$1.2 \times 10^{-2}$<br>$7.0 \times 10^{-3}$<br>$1.0 \times 10^{-2}$<br>$1.0 \times 10^{-2}$<br>$2.9 \times 10^{-3}$<br>$2.7 \times 10^{-3}$<br>$5.0 \times 10^{-3}$<br>$9.0 \times 10^{-3}$<br>$6.0 \times 10^{-3}$ | Torque measuring<br>devices<br>/CP801-20303-1 |
| Others; Nut runners<br>Electrically Controlled | 20399         | (1 ~ 10) N·m<br>(10 ~ 50) N·m<br>(50 ~ 250) N·m                                                                                                                                                        | $7.3 \times 10^{-3}$<br>$2.3 \times 10^{-3}$<br>$3.4 \times 10^{-3}$                                                                                                                                                                                                 | Torque measuring<br>devices<br>/CP801-20399-1 |
| Electric                                       |               | (0.2 ~ 25) N·m<br>(25 ~ 60) N·m<br>(60 ~ 180) N·m<br>(180 ~ 500) N·m<br>(500 ~ 2 000) N·m<br>(2 000 ~ 6 600) N·m                                                                                       | $3.9 \times 10^{-3}$<br>$4.8 \times 10^{-3}$<br>$7.7 \times 10^{-3}$<br>$5.8 \times 10^{-3}$<br>$5.0 \times 10^{-3}$<br>$2.0 \times 10^{-3}$                                                                                                                         | Torque measuring<br>devices<br>/CP801-20399-2 |
| Hydraulic                                      |               | (667 ~ 2 000) N·m<br>(2 000 ~ 6 600) N·m<br>(6 600 ~ 50 000) N·m                                                                                                                                       | $5.0 \times 10^{-3}$<br>$2.0 \times 10^{-3}$<br>$4.8 \times 10^{-3}$                                                                                                                                                                                                 |                                               |
| Pneumatic                                      |               | (0.2 ~ 25) N·m<br>(25 ~ 60) N·m<br>(60 ~ 180) N·m<br>(180 ~ 500) N·m<br>(500 ~ 2 000) N·m<br>(2 000 ~ 6 600) N·m                                                                                       | $2.6 \times 10^{-3}$<br>$4.8 \times 10^{-3}$<br>$7.4 \times 10^{-3}$<br>$5.5 \times 10^{-3}$<br>$5.0 \times 10^{-3}$<br>$2.0 \times 10^{-3}$                                                                                                                         |                                               |

## 204. Pressure

| Measured Quantity<br>Instrument or Gauge       | Field<br>Code | Range                              | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.        |
|------------------------------------------------|---------------|------------------------------------|--------------------------------------------------------------------|-----------------------------------------------|
| Altimeters                                     | 20401         | ( 0 ~ 32) km<br>(32 ~ 55) km       | 12 m<br>$1.5 \times 10^{-3}$                                       | DHI PG7601<br>/CP801-20401-1                  |
| Manometers<br>Inclined tube, U tube, Well type | 20402         | (0 ~ 200) kPa                      | $5.0 \times 10^{-4}$                                               | DHI PG7601<br>/CP801-20402-1                  |
| Pneumatic pressure ballances                   | 20403         | 4.9 kPa ~ 7.2 MPa                  | $5.2 \times 10^{-5}$                                               | DHI PG7601<br>/CP801-20403-1                  |
| Hydraulic pressure ballances                   | 20404         | (0.5 ~ 200) MPa<br>(200 ~ 500) MPa | $6.2 \times 10^{-5}$<br>$1.7 \times 10^{-4}$                       | DHI PG7302<br>/CP801-20404-1                  |
| Air data test systems                          | 20405         | (1.4~350) kPa abs                  | $5.5 \times 10^{-5}$                                               | Reference Pressure<br>Gauge<br>/CP801-20405-1 |

## 204. Pressure

| Measured Quantity<br>Instrument or Gauge                        | Field<br>Code | Range                                                                           | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                           | Standard/Method of<br>Measurement etc.        |
|-----------------------------------------------------------------|---------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------------|
| Absolute pressure gauges                                        | 20406         | 1.4 kPa abs. ~ 7 MPa abs.<br>(7.0 ~ 100) MPa abs.                               | $5.5 \times 10^{-5}$<br>$6.2 \times 10^{-5}$                                                 | DHI PG7601<br>DHI PG7302<br>/CP801-20406-1    |
| Blood Pressure gauges                                           | 20407         | (0 ~ 40) kPa                                                                    | $5.0 \times 10^{-4}$                                                                         | DHI PG7601<br>/CP801-20407-1                  |
| Compound pressure gauges                                        | 20408         | -100 kPa ~ 7.0 MPa                                                              | $5.0 \times 10^{-4}$                                                                         | DHI PG7601<br>/CP801-20408-1                  |
| Differential pressure gauges                                    | 20409         | -100 kPa ~ 7 MPa<br>(7 ~ 100) MPa                                               | $5.5 \times 10^{-5}$<br>$6.2 \times 10^{-5}$                                                 | DHI PG7601<br>DHI PG7302<br>/CP801-20409-1    |
| Gauge pressure gauges                                           | 20411         | -100 kPa ~ 7 MPa<br>(7 ~ 200) MPa<br>(200 ~ 500) MPa                            | $5.5 \times 10^{-5}$<br>$6.2 \times 10^{-5}$<br>$1.7 \times 10^{-4}$                         | Reference Pressure<br>Gauge<br>/CP801-20411-1 |
| Pressure transducers<br>/ transmitters<br><br>Absolute<br>Gauge | 20412         | 0 kPa abs. ~ 7 MPa abs.<br>-100 kPa ~ 7 MPa<br>(7 ~ 200) MPa<br>(200 ~ 500) MPa | $5.5 \times 10^{-5}$<br>$5.5 \times 10^{-5}$<br>$6.2 \times 10^{-5}$<br>$1.7 \times 10^{-4}$ | Reference Pressure<br>Gauge<br>/CP801-20412-1 |
| Dial type vacuum gauges                                         | 20413         | (-100 ~ 0) kPa                                                                  | $1.0 \times 10^{-3}$                                                                         | Reference Pressure<br>Gauge<br>/CP801-20413-1 |
| Water depth meters                                              | 20414         | (0 ~ 100) m                                                                     | $1.5 \times 10^{-4}$                                                                         | Reference Pressure<br>Gauge<br>/CP801-20414-1 |

## 205. Vacuum

| Measured Quantity<br>Instrument or Gauge                                                           | Field<br>Code | Range                                                                                                    | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                                                             |
|----------------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Capacitance diaphragm<br>gauges                                                                    | 20501         | (0.1 ~ 133) Pa abs.<br>133 Pa abs. ~ 1.33 kPa abs.<br>(1.33 ~ 10) kPa abs.                               | 0.03 Pa<br>0.8 Pa<br>10 Pa                                         | MKS 690A<br>/CP801-20501-1                                                                                         |
| Spinning rotor gauges                                                                              | 20502         | 0.5 mPa abs. ~ 0.5 Pa abs.                                                                               | 0.1 mPa                                                            | Reference Vacuum<br>Gauge<br>/CP801-20502-1                                                                        |
| Ionization gauges                                                                                  | 20503         | 0.05 $\mu$ Pa abs. ~ 0.1 Pa abs.                                                                         | 0.01 $\mu$ Pa                                                      | Reference Vacuum<br>Gauge<br>/CP801-20503-1                                                                        |
| Thermal conductivity gauges                                                                        | 20504         | (0.1 ~ 133.3) Pa abs.<br>133.3 Pa abs. ~ 1.333 kPa abs.<br>(1.333 ~ 10) kPa abs.                         | 0.03 Pa<br>0.8 Pa<br>0.13 kPa                                      | Reference Vacuum<br>/CP801-20504-1                                                                                 |
| Standard leaks, Helium leak<br>detectors<br><br>Helium leak detectors<br><br>Helium standard leaks | 20505         | (0.000 1 ~ 1) $\mu$ Pa $\cdot$ m <sup>3</sup> /s<br><br>(0.000 1 ~ 1) $\mu$ Pa $\cdot$ m <sup>3</sup> /s | $2.1 \times 10^{-1}$<br><br>$2.1 \times 10^{-1}$                   | Standard Calibrated<br>leak, Detector<br>/CP801-20505-1<br>Standard Calibrated<br>leak, Detector<br>/CP801-20505-2 |

## 206. Volume

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                                                                                                                                       | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                         | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Volumetric glasswares                    | 20601         | (0 ~ 0.5) mL<br>(0.5 ~ 1) mL<br>(1 ~ 2) mL<br>(2 ~ 5) mL<br>(5 ~ 10) mL<br>(10 ~ 25) mL<br>(25 ~ 50) mL<br>(50 ~ 100) mL<br>(100 ~ 250) mL<br>(250 ~ 500) mL<br>(500 ~ 1 000) mL<br>(1 000 ~ 2 000) mL                                                                                                      | 0.68 $\mu$ L<br>1.2 $\mu$ L<br>1.6 $\mu$ L<br>2.2 $\mu$ L<br>2.8 $\mu$ L<br>3.5 $\mu$ L<br>4.6 $\mu$ L<br>9.0 $\mu$ L<br>36 $\mu$ L<br>59 $\mu$ L<br>99 $\mu$ L<br>0.16 mL                                                 | Balance<br>/CP801-20601                |
| Pycnometers                              | 20602         | (0 ~ 50) mL<br>(50 ~ 100) mL<br>(100 ~ 500) mL                                                                                                                                                                                                                                                              | 1.0 $\mu$ L<br>1.4 $\mu$ L<br>17 $\mu$ L                                                                                                                                                                                   | Balance<br>/CP801-20602-1              |
| Rain gauges                              | 20603         | (10 ~ 200) mm                                                                                                                                                                                                                                                                                               | 0.3 mm                                                                                                                                                                                                                     | Balance<br>/CP801-20603-1              |
| Standard volume vessels                  | 20604         | (0 ~ 0.5) L<br>(0.5 ~ 200) L                                                                                                                                                                                                                                                                                | $4.4 \times 10^{-5}$<br>$1.5 \times 10^{-4}$                                                                                                                                                                               | Balance<br>/CP801-20604-1              |
| Concrete air content meters              | 20605         | (0 ~ 10) %                                                                                                                                                                                                                                                                                                  | 0.1 %                                                                                                                                                                                                                      | Balance<br>/CP801-20605-1              |
| Piston type volume meters                | 20606         | (0 ~ 1) $\mu$ L<br>(1 ~ 2) $\mu$ L<br>(2 ~ 5) $\mu$ L<br>(5 ~ 10) $\mu$ L<br>(10 ~ 20) $\mu$ L<br>(20 ~ 50) $\mu$ L<br>(50 ~ 100) $\mu$ L<br>(100 ~ 200) $\mu$ L<br>(200 ~ 500) $\mu$ L<br>(500 ~ 1000) $\mu$ L<br>(1 ~ 2) mL<br>(2 ~ 5) mL<br>(5 ~ 10) mL<br>(10 ~ 25) mL<br>(25 ~ 50) mL<br>(50 ~ 100) mL | 5.0 nL<br>5.3 nL<br>6.5 nL<br>7.2 nL<br>9.6 nL<br>0.033 $\mu$ L<br>0.066 $\mu$ L<br>0.090 $\mu$ L<br>0.17 $\mu$ L<br>0.36 $\mu$ L<br>0.77 $\mu$ L<br>1.5 $\mu$ L<br>3.0 $\mu$ L<br>4.4 $\mu$ L<br>15 $\mu$ L<br>62 $\mu$ L | Balance<br>/CP801-20606-1              |

## 207. Density

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                     | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|-------------------------------------------|--------------------------------------------------------------------|----------------------------------------|
| Liquid density meters                    | 20702         | (0.650 ~ 1.850) g/cm <sup>3</sup>         | 0.000 063 g/cm <sup>3</sup>                                        | STD density<br>/CP801-20702-1          |
| Salinity meters                          | 20704         | (0.5 ~ 25) %                              | 0.012 %                                                            | NaCl<br>/CP801-20704-1                 |
| Sucrose meters                           | 20705         | (0.000 ~ 60.000) %<br>(60.000 ~ 82.319) % | 0.027 %<br>0.031 %                                                 | Sucrose<br>/CP801-20705-1              |

## 207. Density

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.  |
|------------------------------------------|---------------|-----------------------------------|--------------------------------------------------------------------|-----------------------------------------|
| Hydrometers                              | 20706         |                                   |                                                                    |                                         |
| Density hydrometers                      |               | (0.650 ~ 2.000) g/cm <sup>3</sup> | $1.7 \times 10^{-4}$ g/cm <sup>3</sup>                             | STD density<br>/CP801-20706-1           |
| Specific gravity hydrometers             |               | 0.650 ~ 2.000                     | $1.7 \times 10^{-4}$                                               | STD density<br>/CP801-20706-2           |
| Alcohol hydrometers                      |               | (0 ~ 100) %                       | 0.12 %                                                             | STD density<br>/CP801-20706-3           |
| API hydrometers                          |               | 0 ~ 70                            | 0.14                                                               | STD density<br>/CP801-20706-4           |
| Baume hydrometers                        |               | 0 ~ 70                            | 0.013                                                              | STD density<br>/CP801-20706-5           |
| Sugar hydrometers                        |               | 0 ~ 60                            | 0.12                                                               | STD density<br>/CP801-20706-6           |
| Chloride meters                          | 20707         | (0.0 ~ 1.5) %                     | 0.000 8 %                                                          | Cl <sup>-</sup> sol'n<br>/CP801-20707-1 |

## 208. Viscosity

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                 | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|---------------------------------------|--------------------------------------------------------------------|----------------------------------------|
| Kinetic viscometers;<br>capillary, etc   | 20801         |                                       |                                                                    |                                        |
| Ford cup viscometers                     |               | (10 ~ 1 000) mm <sup>2</sup> /s       | $2.8 \times 10^{-2}$                                               | Viscosity sol'n<br>/CP801-20801-1      |
| Zahn cup viscometers                     |               | (10 ~ 1 000) mm <sup>2</sup> /s       | $3.0 \times 10^{-2}$                                               | Viscosity sol'n<br>/CP801-20801-2      |
| Capillary viscometers                    |               | (2.5~ 100 000) mm <sup>2</sup> /s     | $0.8 \times 10^{-2}$                                               | Viscosity son'n<br>/CP801-20801-3      |
|                                          |               | (100 000~ 200 000) mm <sup>2</sup> /s | $1.0 \times 10^{-2}$                                               |                                        |
| Dynamic viscometers;<br>rotational, etc  | 20802         |                                       |                                                                    |                                        |
| Viscometers, rotational                  |               | (10 ~ 200 000) mPa·s                  | $1.6 \times 10^{-2}$                                               | Viscosity sol'n<br>/CP801-20802-1      |
| Viscometers, stomer                      |               | (500 ~ 5 000) mPa·s                   | $2.8 \times 10^{-2}$                                               | Viscosity sol'n<br>/CP801-20802-2      |

## 209. Fluid flow

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|---------------------------------------------------|--------------------------------------------------------------------|----------------------------------------|
| Anemometers; hot-wire                    | 20901         | (2 ~ 35) m/s                                      | $1.5 \times 10^{-2}$                                               | WIND TUNNEL<br>/CP801-20901-1          |
| Anemometers; pitot tube, etc.            | 20902         | (2 ~ 35) m/s                                      | $1.5 \times 10^{-2}$                                               | WIND TUNNEL<br>/CP801-20902-1          |
| Gas flowmeters; differential<br>pressure | 20908         | $(1.2 \times 10^{-3} \sim 60)$ m <sup>3</sup> /h  | $2.5 \times 10^{-3}$                                               | SONIC NOZZLE<br>/CP801-20908-1         |
|                                          |               | (1.2 ~ 10) m <sup>3</sup> /h                      | $2.4 \times 10^{-3}$                                               | BELL PROVER<br>/CP801-20908-2          |
|                                          |               | $(1.2 \times 10^{-4} \sim 2.4)$ m <sup>3</sup> /h | $2.8 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20908-3         |

## 209. Fluid flow

| Measured Quantity<br>Instrument or Gauge    | Field<br>Code | Range                                           | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.         |
|---------------------------------------------|---------------|-------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------|
| Liquid flowmeters;<br>differential pressure | 20909         | (1.2 ~ 120) m <sup>3</sup> /h                   | $4.0 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20909-1                 |
| Liquid flowmeters;<br>electromagnetic       | 20910         | (1.2 ~ 120) m <sup>3</sup> /h                   | $4.0 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20915-2                 |
| Gas flowmeters; thermal<br>mass, etc.       | 20911         | ( $1.2 \times 10^{-3}$ ~ 60) m <sup>3</sup> /h  | $2.5 \times 10^{-3}$                                               | SONIC NOZZLE<br>/CP801-20911-1                 |
|                                             |               | (1.2 ~ 10) m <sup>3</sup> /h                    | $2.4 \times 10^{-3}$                                               | BELL PROVER<br>/CP801-20911-2                  |
|                                             |               | ( $1.2 \times 10^{-4}$ ~ 2.4) m <sup>3</sup> /h | $2.8 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20911-3                 |
| Liquid flowmeters; Coriolis,<br>etc.        | 20912         | ( $1.2 \times 10^3$ ~ $1.2 \times 10^5$ ) kg/h  | $4.0 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20912-1                 |
| Liquid flowmeters; open<br>channel, etc.    | 20913         | (5 ~ 150) m <sup>3</sup> /h                     | $4.0 \times 10^{-3}$                                               | ELECTROMAGNETIC<br>FLOWMETER<br>/CP801-20913-1 |
| Gas flowmeters; positive<br>displacement    | 20914         | (1.2 ~ 10) m <sup>3</sup> /h                    | $2.4 \times 10^{-3}$                                               | BELL PROVER<br>/CP801-20914-1                  |
|                                             |               | ( $1.2 \times 10^{-3}$ ~ 60) m <sup>3</sup> /h  | $2.5 \times 10^{-3}$                                               | SONIC NOZZLE<br>/CP801-20914-2                 |
|                                             |               | ( $1.2 \times 10^{-4}$ ~ 2.4) m <sup>3</sup> /h | $2.8 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20914-3                 |
| Liquid flowmeters; positive<br>displacement | 20915         | (1.2 ~ 120) m <sup>3</sup> /h                   | $4.0 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20915-2                 |
| Gas flowmeters; turbine                     | 20916         | ( $1.2 \times 10^{-3}$ ~ 60) m <sup>3</sup> /h  | $2.5 \times 10^{-3}$                                               | SONIC NOZZLE<br>/CP801-20916-1                 |
|                                             |               | (1.2 ~ 10) m <sup>3</sup> /h                    | $2.4 \times 10^{-3}$                                               | BELL PROVER<br>/CP801-20916-2                  |
|                                             |               | ( $1.2 \times 10^{-4}$ ~ 2.4) m <sup>3</sup> /h | $2.8 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20916-3                 |
| Liquid flowmeters; turbine                  | 20917         | (1.2 ~ 120) m <sup>3</sup> /h                   | $4.0 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20917-1                 |
| Gas flowmeters; ultrasonic                  | 20918         | ( $1.2 \times 10^{-3}$ ~ 60) m <sup>3</sup> /h  | $2.5 \times 10^{-3}$                                               | SONIC NOZZLE<br>/CP801-20918-1                 |
|                                             |               | (1.2 ~ 10) m <sup>3</sup> /h                    | $2.4 \times 10^{-3}$                                               | BELL PROVER<br>/CP801-20918-2                  |
|                                             |               | ( $1.2 \times 10^{-4}$ ~ 2.4) m <sup>3</sup> /h | $2.8 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20918-3                 |
| Liquid flowmeters; ultrasonic               | 20919         | (1.2 ~ 120) m <sup>3</sup> /h                   | $4.0 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20919-1                 |
| Gas flowmeters; variable area               | 20920         | ( $1.2 \times 10^{-3}$ ~ 60) m <sup>3</sup> /h  | $2.5 \times 10^{-3}$                                               | SONIC NOZZLE<br>/CP801-20920-1                 |
|                                             |               | (1.2 ~ 10) m <sup>3</sup> /h                    | $2.4 \times 10^{-3}$                                               | BELL PROVER<br>/CP801-20920-2                  |
|                                             |               | ( $1.2 \times 10^{-4}$ ~ 2.4) m <sup>3</sup> /h | $2.8 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20920-3                 |
| Liquid flowmeters; variable<br>area         | 20921         | (1.2 ~ 120) m <sup>3</sup> /h                   | $4.0 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20921-1                 |
| Liquid flowmeters; vortex                   | 20923         | (1.2 ~ 120) m <sup>3</sup> /h                   | $4.0 \times 10^{-3}$                                               | MASTER METER<br>/CP801-20923-1                 |
| Anemometers; vane, etc.                     | 20925         | (2 ~ 35) m/s                                    | $1.5 \times 10^{-2}$                                               | WIND TUNNEL<br>/CP801-20925-1                  |



## 210. Hardness

| Measured Quantity<br>Instrument or Guage                                            | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                                                                                                     | Standard/Method of<br>Measurement etc.                                                                                    |
|-------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Brinell hardness testers<br>Brinell hardness testers<br><br>Brinell hardness CRM    | 21001         | (75 ~ 250) HBW 10/500<br>(250 ~ 450) HBW 10/500<br>(95 ~ 250) HBW 10/3 000<br>(250~ 450) HBW 10/3 000<br>(450~ 653) HBW 10/3 000<br>(75 ~ 250) HBW 10/500<br>(250 ~ 450) HBW 10/500<br>(95 ~ 250) HBW 10/3 000<br>(250 ~ 450) HBW 10/3 000<br>(450 ~ 653) HBW 10/3 000                                                                                                                                                                                                                                                                           | 3.0 HBW 10/500<br>6.2 HBW 10/500<br>2.5 HBW 10/3 000<br>4.4 HBW 10/3 000<br>6.9 HBW 10/3 000<br>2.9 HBW 10/500<br>6.2 HBW 10/500<br>2.5 HBW 10/3 000<br>4.4 HBW 10/3 000<br>6.3 HBW 10/3 000                                                                                                                                                                           | CRM<br>/CP801-21001-1<br><br>Brinell hardness testers,<br>Non contact coordinate<br>measuring machines<br>/CP-801-21001-2 |
| Rockwell hardness testers<br>Rockwell hardness testers<br><br>Rockwell hardness CRM | 21002         | (20 ~ 95) HRA<br>(10 ~ 100) HRBW<br>(10 ~ 70) HRC<br>(70 ~ 102) HREW<br>(60 ~ 100) HRFW<br>(80 ~ 100) HRHW<br>(60 ~ 120) HRMW<br>(100 ~ 130) HRRW<br>(65 ~ 94) HR15N<br>(35 ~ 86) HR30N<br>(15 ~ 77) HR45N<br>(67 ~ 93) HR15TW<br>(29 ~ 82) HR30TW<br>(10 ~ 72) HR45TW<br>(20 ~ 95) HRA<br>(10 ~ 100) HRBW<br>(10 ~ 70) HRC<br>(70 ~ 102) HREW<br>(60 ~ 100) HRFW<br>(80 ~ 100) HRHW<br>(60 ~ 120) HRMW<br>(100 ~ 130) HRRW<br>(65 ~ 94) HR15N<br>(35 ~ 86) HR30N<br>(15 ~ 77) HR45N<br>(67 ~ 93) HR15TW<br>(29 ~ 82) HR30TW<br>(10 ~ 72) HR45TW | 0.37 HRA<br>0.63 HRBW<br>0.33 HRC<br>1.3 HREW<br>1.3 HRFW<br>1.4 HRHW<br>1.4 HRMW<br>1.3 HRRW<br>0.63 HR15N<br>0.63 HR30N<br>0.63 HR45N<br>1.1 HR15TW<br>1.1 HR30TW<br>1.1 HR45TW<br>0.37 HRA<br>0.63 HRBW<br>0.33 HRC<br>1.3 HREW<br>1.3 HRFW<br>1.4 HRHW<br>1.4 HRMW<br>1.3 HRRW<br>0.63 HR15N<br>0.63 HR30N<br>0.63 HR45N<br>1.1 HR15TW<br>1.1 HR30TW<br>1.1 HR45TW | CRM<br>/CP801-21002-1<br><br>Rockwell hardness<br>testers<br>/CP801-21002-2                                               |
| Shore hardness testers<br>Shore hardness testers<br>Shore hardness CRM              | 21003         | (30 ~ 100) HS<br>(25 ~ 35) HS<br>(45~ 55) HS<br>(55 ~ 65) HS<br>(75 ~ 85) HS<br>(90 ~ 100) HS                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1.0 HS<br>0.9 HS<br>0.9 HS<br>0.9 HS<br>1.0 HS<br>1.2 HS                                                                                                                                                                                                                                                                                                               | CRM<br>/CP801-21003-1<br>Vickers hardness<br>testers<br>/CP801-21003-2                                                    |

## 210. Hardness

| Measured Quantity<br>Instrument or Guage             | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                                                                                                                                                                                     | Standard/Method of<br>Measurement etc.        |
|------------------------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| Vickers hardness testers<br>Vickers hardness testers | 21004         | (30 ~ 250) HV 0.1<br>(250 ~ 650) HV 0.1<br>(650 ~ 1 000) HV 0.1<br>(30 ~ 250) HV 0.2<br>(250 ~ 650) HV 0.2<br>(650 ~ 1 000) HV 0.2<br>(30 ~ 250) HV 0.3<br>(250 ~ 650) HV 0.3<br>(650 ~ 1 000) HV 0.3<br>(30 ~ 250) HV 0.5<br>(250 ~ 650) HV 0.5<br>(650 ~ 1 000) HV 0.5<br>(30 ~ 250) HV 1<br>(250 ~ 650) HV 1<br>(650 ~ 850) HV 1<br>(850 ~ 1 200) HV 1<br>(1 200 ~ 2 000) HV 1<br>(30 ~ 250) HV 2<br>(250 ~ 650) HV 2<br>(650 ~ 1 000) HV 2<br>(30 ~ 250) HV 5<br>(250 ~ 650) HV 5<br>(650 ~ 1 000) HV 5<br>(30 ~ 250) HV 10<br>(250 ~ 650) HV 10<br>(650 ~ 1 000) HV 10<br>(30 ~ 250) HV 20<br>(250 ~ 650) HV 20<br>(650 ~ 1 000) HV 20<br>(30 ~ 250) HV 30<br>(250 ~ 650) HV 30<br>(650 ~ 1 000) HV 30<br>(30 ~ 250) HV 50<br>(250 ~ 650) HV 50<br>(650 ~ 1 000) HV 50 | 5.0 HV 0.1<br>13 HV 0.1<br>19 HV 0.1<br>4.3 HV 0.2<br>13 HV 0.2<br>19 HV 0.2<br>4.3 HV 0.3<br>14 HV 0.3<br>18 HV 0.3<br>4.1 HV 0.5<br>12 HV 0.5<br>18 HV 0.5<br>4.8 HV 1<br>14 HV 1<br>18 HV 1<br>22 HV 1<br>31 HV 1<br>2.8 HV 2<br>7.7 HV 2<br>11 HV 2<br>3.1 HV 5<br>6.0 HV 5<br>9.9 HV 5<br>2.4 HV 10<br>8.0 HV 10<br>9.5 HV 10<br>2.2 HV 20<br>6.2 HV 20<br>8.8 HV 20<br>3.1 HV 30<br>6.2 HV 30<br>8.7 HV 30<br>3.4 HV 50<br>5.1 HV 50<br>11 HV 50 | CRM<br>/CP801-21004-1                         |
| Vickers hardness CRM                                 |               | (30 ~ 250) HV 0.1<br>(250 ~ 650) HV 0.1<br>(650 ~ 1 000) HV 0.1<br>(30 ~ 250) HV 0.2<br>(250 ~ 650) HV 0.2<br>(650 ~ 1 000) HV 0.2<br>(30 ~ 250) HV 0.3<br>(250 ~ 650) HV 0.3<br>(650 ~ 1 000) HV 0.3<br>(30 ~ 250) HV 0.5<br>(250 ~ 650) HV 0.5<br>(650 ~ 1 000) HV 0.5<br>(30 ~ 250) HV 1<br>(250 ~ 650) HV 1<br>(650 ~ 850) HV 1<br>(850 ~ 1 200) HV 1<br>(1 200 ~ 2 000) HV 1                                                                                                                                                                                                                                                                                                                                                                                           | 8.5 HV 0.1<br>20 HV 0.1<br>31 HV 0.1<br>6.6 HV 0.2<br>20 HV 0.2<br>25 HV 0.2<br>5.3 HV 0.3<br>16 HV 0.3<br>23 HV 0.3<br>5.7 HV 0.5<br>14 HV 0.5<br>20 HV 0.5<br>5.9 HV 1<br>14 HV 1<br>19 HV 1<br>22 HV 1<br>40 HV 1                                                                                                                                                                                                                                   | Vickers hardness<br>testers<br>/CP801-21004-2 |

## 210. Hardness

[illegible]

## 211. Impact

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                    |
|------------------------------------------|---------------|--------------|--------------------------------------------------------------------|-----------------------------------------------------------|
| Charpy impact testers<br>Metal           | 21102         | (50 ~ 900) J | —                                                                  | Non contact height<br>measuring machine<br>/CP801-21102-1 |
| Plastic                                  |               | (0.5 ~ 50) J | —                                                                  | Height gauge<br>/CP801-21102-2                            |
| Izod impact testers<br>Metal             | 21103         | (50 ~ 900) J | —                                                                  | Non contact height<br>measuring machine<br>/CP801-21103-1 |
| Plastic                                  |               | (0.5 ~ 50) J | —                                                                  | Height gauge<br>/CP801-21103-2                            |

## 301. Time / frequency

| Measured Quantity<br>Instrument or Gauge                        | Field<br>Code | Range                                 | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)      | Standard/Method of<br>Measurement etc.          |
|-----------------------------------------------------------------|---------------|---------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------|
| Frequency standards<br>Frequency                                | 30102         | 1 MHz<br>5 MHz<br>10 MHz              | $4.4 \times 10^{-13}$<br>$4.4 \times 10^{-13}$<br>$4.4 \times 10^{-13}$ | Cesium Frequency<br>Standard<br>/ CP801-30102-1 |
| Voltage                                                         |               | 10 mV ~ 10 V                          | 6.5 mV/V                                                                |                                                 |
| General frequency sources<br>Frequency                          | 30103         | DC ~ 10 MHz                           | $5.8 \times 10^{-9}$                                                    | Frequency Counter<br>/ CP801-30103-1            |
| Voltage                                                         |               | 10 mV ~ 10 V                          | 6.5 mV/V                                                                |                                                 |
| Frequency meters / counters<br>Time base output frequency       | 30104         | 1 MHz, 5 MHz, 10 MHz                  | $6.2 \times 10^{-13}$                                                   | Cesium Frequency<br>Standard<br>/ CP801-30104-1 |
| Input frequency                                                 |               | 1 MHz, 5 MHz, 10 MHz                  | $5.8 \times 10^{-12}$                                                   |                                                 |
| Sensitivity voltage                                             |               | (DC ~ 1 GHz)<br>10 mV ~ 10 V          | 30 mV/V                                                                 |                                                 |
| Sensitivity decibel (dB)                                        |               | (50 kHz ~ 40 GHz)<br>(+ 10 ~ -50) dBm | 0.30 dB                                                                 |                                                 |
| frequency difference                                            |               | 10 kHz ~ 10 MHz                       | $2.8 \times 10^{-12}$                                                   |                                                 |
| Time interval sources<br>Reference frequency                    | 30105         | 1 MHz, 10 MHz                         | $5.8 \times 10^{-10}$                                                   | Frequency Counter<br>/ CP801-30105-1            |
| Time interval                                                   |               | 10 $\mu$ s ~ 10 s                     | $5.8 \times 10^{-8}$                                                    |                                                 |
| Time interval meters<br>/ stop watches/ Timers<br>Time interval | 30106         | (0.01 ~ 1 000) s<br>$\geq 1$ 000 s    | 67 $\mu$ s<br>$6.7 \times 10^{-8}$                                      | Frequency Counter<br>/ CP801-30106-1            |
| Count                                                           |               | $\geq 1$                              | 0.58                                                                    |                                                 |
| Stop watch calibrator<br>Reference frequency                    |               | 100 kHz ~ 10 MHz                      | $7.2 \times 10^{-8}$                                                    |                                                 |
| Accuracy/day                                                    |               | (+ 9.99 ~ -9.99) s/d                  | 5.8 ms/d                                                                |                                                 |

## 302. Velocity &amp; revolution

| Measured Quantity<br>Instrument or Gauge                                       | Field<br>Code | Range                                                                          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                       | Standard/Method of<br>Measurement etc.                        |
|--------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Standard RPM generators<br>Frequency                                           | 30201         | 1 Hz ~ 10 MHz                                                                  | $2.0 \times 10^{-8}$                                                                                                                                                                                     | Frequency Counter<br>/ CP801-30201-1                          |
| Optical type RPM                                                               |               | (1 ~ 10 000) $\text{min}^{-1}$<br>(10 000 ~ 600 000) $\text{min}^{-1}$         | $1.0 \times 10^{-3} \text{ min}^{-1}$<br>$5.8 \times 10^{-3} \text{ min}^{-1}$                                                                                                                           |                                                               |
| Contact type RPM                                                               |               | (1 ~ 10 000) $\text{min}^{-1}$<br>(10 000 ~ 30 000) $\text{min}^{-1}$          | $1.0 \times 10^{-2} \text{ min}^{-1}$<br>$5.8 \times 10^{-2} \text{ min}^{-1}$                                                                                                                           |                                                               |
| Contact type tachometers<br>RPM                                                | 30202         | (1 ~ 4 000) $\text{min}^{-1}$<br>(4 000 ~ 10 000) $\text{min}^{-1}$            | $5.9 \times 10^{-2} \text{ min}^{-1}$<br>$8.7 \times 10^{-2} \text{ min}^{-1}$                                                                                                                           | Standard RPM Source<br>/ CP801-30202-1                        |
| Photo tachometers /<br>stroboscopes                                            | 30203         | (1 ~ 10 000) $\text{min}^{-1}$<br>(10 000 ~ 200 000) $\text{min}^{-1}$         | $1.0 \times 10^{-2} \text{ min}^{-1}$<br>$5.8 \times 10^{-2} \text{ min}^{-1}$                                                                                                                           | Standard RPM Source<br>/ CP801-30203-1                        |
| RPM<br>(Tachometers)                                                           |               | (30 ~ 10 000) $\text{min}^{-1}$<br>(10 000 ~ 100 000) $\text{min}^{-1}$        | $1.0 \times 10^{-2} \text{ min}^{-1}$<br>$5.8 \times 10^{-2} \text{ min}^{-1}$                                                                                                                           |                                                               |
| RPM<br>(Stroboscope)                                                           |               | 10 mHz ~ 1 kHz<br>(1 ~ 200) kHz                                                | 0.59 mHz<br>5.8 mHz                                                                                                                                                                                      |                                                               |
| Speed meters<br>Velocity                                                       | 30204         | 10 m/h ~ 1 000 km/h<br>(2 cm ~ 50 cm)<br>10 m/h ~ 1 000 km/h<br>(0.5 m ~ 10 m) | $3.8 \times 10^{-3}$<br>$1.2 \times 10^{-3}$                                                                                                                                                             | Frequency Counter,<br>Time Delay Generator<br>/ CP801-30204-1 |
| Velocity (Main Frame)                                                          |               | 0.1 cm/s ~ 500 m/s                                                             | $5.8 \times 10^{-5}$                                                                                                                                                                                     |                                                               |
| Wow-flutter generators<br>Wow-flutter Deviation<br>(JIS, NAB, CCIR, DIN, etc.) | 30205         | (0.01 ~ 3) %                                                                   | $1.9 \times 10^{-4} \text{ % (abs.)}$                                                                                                                                                                    | Wow Flutter Meter<br>/ CP801-30205-1                          |
| CCIR pulse                                                                     |               | (1 ~ 100) ms                                                                   | 0.58 $\mu\text{s}$                                                                                                                                                                                       |                                                               |
| Frequency                                                                      |               | 1 Hz ~ 1 kHz<br>(1 ~ 100) kHz                                                  | 5.8 mHz<br>58 mHz                                                                                                                                                                                        |                                                               |
| Wow-flutter meters<br>Wow-flutter deviation<br>(JIS, NAB, CCIR, DIN, etc.)     | 30206         | 0.01 %<br>0.03 %<br>0.1 %<br>0.3 %<br>1 %<br>3 %                               | $1.2 \times 10^{-4} \text{ %}$<br>$3.6 \times 10^{-4} \text{ %}$<br>$1.2 \times 10^{-3} \text{ %}$<br>$3.6 \times 10^{-3} \text{ %}$<br>$1.2 \times 10^{-2} \text{ %}$<br>$3.6 \times 10^{-2} \text{ %}$ | Wow Flutter Gen.<br>/ CP801-30206-1                           |
| CCIR pulse                                                                     |               | (10 ~ 100) ms                                                                  | 1.2 ms                                                                                                                                                                                                   |                                                               |
| Frequency                                                                      |               | 1 Hz ~ 1 kHz<br>(1 ~ 10) kHz                                                   | 5.8 mHz<br>58 mHz                                                                                                                                                                                        |                                                               |

## 401. DC volatage &amp; current

| Measured Quantity<br>Instrument or Gauge                       | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                 | Standard/Method of<br>Measurement etc.                                |
|----------------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| DC ammeters<br>DC Current                                      | 40101         | $\pm(1 \text{ nA} \sim 1 \text{ mA})$<br>$\pm(1 \text{ mA} \sim 1 \text{ A})$<br>$\pm(1 \sim 10) \text{ A}$<br>$\pm(10 \sim 100) \text{ A}$                                                                                                                                                                                                                                                                                                                      | $17 \text{ } \mu\text{A/A}$<br>$3.4 \text{ } \mu\text{A/A}$<br>$6.6 \text{ } \mu\text{A/A}$<br>$0.58 \text{ mA/A}$                                                                                                                                                 | Calibrator<br>/ CP801-40101-1                                         |
| Transconductance amplifiers<br>DC Current<br>AC Current        | 40102         | $\pm(100 \text{ } \mu\text{A} \sim 10 \text{ A})$<br>$\pm(10 \sim 100) \text{ A}$<br><br>$(10 \text{ Hz} \sim 1 \text{ kHz})$<br>$100 \text{ } \mu\text{A} \sim 10 \text{ A}$<br>$(10 \sim 100) \text{ A}$<br>$(50 \text{ Hz} \sim 1 \text{ kHz})$<br>$(100 \sim 360) \text{ A}$<br>$(1 \text{ kHz} \sim 10 \text{ kHz})$<br>$100 \text{ } \mu\text{A} \sim 10 \text{ A}$<br>$(10 \sim 100) \text{ A}$<br>$100 \text{ kHz}$<br>$1 \text{ mA}$<br>$100 \text{ A}$ | $10 \text{ } \mu\text{A/A}$<br>$28 \text{ } \mu\text{A/A}$<br><br>$68 \text{ } \mu\text{A/A}$<br>$0.31 \text{ mA/A}$<br><br>$0.1 \text{ mA/A}$<br><br>$84 \text{ } \mu\text{A/A}$<br>$0.31 \text{ mA/A}$<br><br>$78 \text{ } \mu\text{A/A}$<br>$0.33 \text{ mA/A}$ | Calibrator, DMM,<br>STD. Resistor<br>/ CP801-40102-1                  |
| DC voltage/current<br>calibrators<br>DC Voltage<br>DC Current  | 40103         | $\pm(100 \text{ } \mu\text{V} \sim 100 \text{ mV})$<br>$\pm(100 \text{ mV} \sim 10 \text{ V})$<br>$\pm(10 \sim 1 \text{ 000}) \text{ V}$<br><br>$\pm(100 \text{ } \mu\text{A} \sim 1 \text{ A})$<br>$\pm(1 \sim 10) \text{ A}$                                                                                                                                                                                                                                   | $1.6 \text{ } \mu\text{V/V}$<br>$0.96 \text{ } \mu\text{V/V}$<br>$1.3 \text{ } \mu\text{V/V}$<br><br>$3.0 \text{ } \mu\text{A/A}$<br>$6.4 \text{ } \mu\text{A/A}$                                                                                                  | DMM, STD. Resistor<br>/ CP801-40103-1                                 |
| Electrical temperature<br>calibrators<br>Resistance<br>Voltage | 40104         | $(0 \sim 1) \text{ } \Omega$<br>$(1 \sim 10) \text{ } \Omega$<br>$(10 \sim 100) \text{ } \Omega$<br>$100 \text{ } \Omega \sim 1 \text{ k}\Omega$<br>$(1 \sim 10) \text{ k}\Omega$<br><br>$(-10 \sim 100) \text{ mV}$<br>$100 \text{ mV} \sim 1 \text{ V}$                                                                                                                                                                                                        | $5.9 \text{ } \mu\Omega/\Omega$<br>$3.1 \text{ } \mu\Omega/\Omega$<br>$1.4 \text{ } \mu\Omega/\Omega$<br>$1.5 \text{ } \mu\Omega/\Omega$<br>$3.1 \text{ } \mu\Omega/\Omega$<br><br>$1.3 \text{ } \mu\text{V}$<br>$6.1 \text{ } \mu\text{V/V}$                      | STD. Resistor<br>/ CP801-40104-1<br><br>Calibrator<br>/ CP801-40104-2 |
| DC current shunts<br>DC                                        | 40105         | $(1 \sim 100) \text{ } \mu\Omega$<br>$(0.1 \sim 1) \text{ m}\Omega$<br>$(1 \sim 10) \text{ m}\Omega$<br>$10 \text{ m}\Omega \sim 1 \text{ k}\Omega$<br>$(1 \sim 10) \text{ k}\Omega$                                                                                                                                                                                                                                                                             | $0.22 \text{ m}\Omega/\Omega$<br>$24 \text{ } \mu\Omega/\Omega$<br>$16 \text{ } \mu\Omega/\Omega$<br>$14 \text{ } \mu\Omega/\Omega$<br>$22 \text{ } \mu\Omega/\Omega$                                                                                              | Calibrator, DMM<br>/ CP801-40105-1                                    |
| Galvanometers/null<br>detectors<br>DC Voltage                  | 40106         | 0 mV $\sim$ 1 000 V                                                                                                                                                                                                                                                                                                                                                                                                                                              | 5.8 mV/V                                                                                                                                                                                                                                                           | Calibrator<br>/ CP801-40106-1                                         |
| Potentiometers<br>DC Voltage                                   | 40107         | 1 mV $\sim$ 1 000 V                                                                                                                                                                                                                                                                                                                                                                                                                                              | 6.2 $\mu\text{V/V}$                                                                                                                                                                                                                                                | Calibrator, DMM<br>/ CP801-40107-1                                    |

## 401. DC volatage &amp; current

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)       | Standard/Method of<br>Measurement etc.                    |
|------------------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------|
| DC power supplies                        | 40108         |                                                                                                                   |                                                                          | DMM, Electric load,<br>AC power source<br>/ CP801-40108-1 |
| DC Voltage                               |               | $\pm(0 \text{ mV} \sim 1 \text{ kV})$<br>$\pm(1 \sim 10) \text{ kV}$                                              | $82 \text{ } \mu\text{V/V}$<br>$0.8 \text{ mV/V}$                        |                                                           |
| DC Current                               |               | $\pm(0 \text{ mA} \sim 100 \text{ A})$<br>$\pm(100 \sim 1\,000) \text{ A}$<br>$\pm(1\,000 \sim 8\,000) \text{ A}$ | $82 \text{ } \mu\text{A/A}$<br>$0.14 \text{ mA/A}$<br>$1.5 \text{ mA/A}$ |                                                           |
| Rising time                              |               | $100 \text{ } \mu\text{s} \sim 1 \text{ ms}$<br>$1 \text{ ms} \sim 1 \text{ s}$<br>$(1 \sim 5) \text{ s}$         | $4.4 \text{ } \mu\text{s}$<br>$2.1 \text{ ms/s}$<br>$0.9 \text{ ms/s}$   |                                                           |
| Resistance                               |               | $0 \text{ } \Omega \sim 500 \text{ M}\Omega$                                                                      | $1.3 \text{ m}\Omega/\Omega$                                             |                                                           |
| PARD rms<br>$V_{p-p}$                    |               | $(0 \sim 10) \text{ V}$<br>$(0 \sim 30) \text{ V}$                                                                | $0.62 \text{ mV/V}$<br>$1.6 \text{ mV/V}$                                |                                                           |
| Line regulation                          |               | $(-10 \sim 10) \%$                                                                                                | $0.013 \%$                                                               |                                                           |
| Load regulation                          |               | $(-10 \sim 10) \%$                                                                                                | $0.013 \%$                                                               |                                                           |
| Standard cells                           | 40109         |                                                                                                                   |                                                                          |                                                           |
| Standard cells, Saturated                |               | $1.018 \text{ V}$                                                                                                 | $0.6 \text{ } \mu\text{V/V}$                                             | STD. cell<br>/ CP801-40109-1                              |
| Standard cells, Unsaturated              |               | $1.019 \text{ V}$                                                                                                 | $0.6 \text{ } \mu\text{V/V}$                                             | STD. cell<br>/ CP801-40109-2                              |
| DC voltage dividers                      | 40110         |                                                                                                                   |                                                                          | Calibrator,<br>Null detector<br>/ CP801-40110-1           |
| DC Voltage                               |               | $10 \text{ mV} \sim 1 \text{ kV}$                                                                                 |                                                                          |                                                           |
| Ratio                                    |               | $0.01 \sim 1$                                                                                                     | $2.0 \times 10^{-7}$                                                     |                                                           |
| DC voltage standards                     | 40111         |                                                                                                                   |                                                                          | DC STD.<br>/ CP801-40111-1                                |
| DC Voltage                               |               | $1 \text{ V}$                                                                                                     | $0.6 \text{ } \mu\text{V/V}$                                             |                                                           |
|                                          |               | $1.018 \text{ V}$                                                                                                 | $0.6 \text{ } \mu\text{V/V}$                                             |                                                           |
|                                          |               | $10 \text{ V}$                                                                                                    | $0.6 \text{ } \mu\text{V/V}$                                             |                                                           |
| DC voltmeters                            | 40112         |                                                                                                                   |                                                                          | Calibrator<br>/ CP801-40112-1                             |
| DC Voltmeter                             |               | $0 \text{ mV}$                                                                                                    | $0.17 \text{ } \mu\text{V}$                                              |                                                           |
|                                          |               | $\pm(0 \sim 1) \text{ mV}$                                                                                        | $0.21 \text{ } \mu\text{V}$                                              |                                                           |
|                                          |               | $\pm(1 \sim 10) \text{ mV}$                                                                                       | $22 \text{ } \mu\text{V/V}$                                              |                                                           |
|                                          |               | $\pm(10 \sim 100) \text{ mV}$                                                                                     | $5.4 \text{ } \mu\text{V/V}$                                             |                                                           |
|                                          |               | $\pm(100 \text{ mV} \sim 1 \text{ V})$                                                                            | $5.1 \text{ } \mu\text{V/V}$                                             |                                                           |
|                                          |               | $\pm(1 \sim 10) \text{ V}$                                                                                        | $2.9 \text{ } \mu\text{V/V}$                                             |                                                           |
|                                          |               | $\pm(10 \sim 100) \text{ V}$<br>$\pm(100 \sim 1\,000) \text{ V}$                                                  | $4.6 \text{ } \mu\text{V/V}$<br>$5.9 \text{ } \mu\text{V/V}$             |                                                           |
| Static/Ionic voltmeter                   | 40113         |                                                                                                                   |                                                                          | Hi voltage<br>power supply, STD C,R<br>/ CP801-40113-1    |
| DC Voltage                               |               | $\pm(0 \sim 50) \text{ kV}$                                                                                       | $17 \text{ mV/V}$                                                        |                                                           |

## 402. Resistance, Capacitance, and Inductance

| Measured Quantity<br>Instrument or Gauge                                          | Field<br>Code | Range                                                                                                                                                                                                                                                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                               | Standard/Method of<br>Measurement etc.               |
|-----------------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Capacitance bridges<br>/indicators<br>Capacitance Bridge/Indicator<br>Capacitance | 40201         | (100 Hz / 1 kHz)<br>(0 ~ 1) pF<br>1 pF ~ 1 nF<br>1 nF ~ 1 μF<br>1 μF ~ 10 mF<br>(10 ~ 100) mF<br>(1 kHz ~ 100 kHz)<br>0 pF ~ 1 μF<br>1 μF ~ 10 mF                                                                                                                      | 98 μF/F<br>24 μF/F<br>96 μF/F<br>1.4 mF/F<br>3.2 mF/F<br>0.30 mF/F<br>1.4 mF/F                                                   | STD. Capacitor<br>/ CP801-40201-1<br>/ CP801-40201-2 |
| AC Voltage                                                                        |               | (0 ~ 10) MHz<br>(0 ~ 100) V                                                                                                                                                                                                                                            | 3.7 mV/V                                                                                                                         |                                                      |
| Frequency                                                                         |               | 0 Hz ~ 10 MHz                                                                                                                                                                                                                                                          | $6.5 \times 10^{-5}$                                                                                                             |                                                      |
| tanδ                                                                              |               | (0 ~ 100) %                                                                                                                                                                                                                                                            | $2.6 \times 10^{-3}$                                                                                                             |                                                      |
| Schering Bridge<br>Capacitance                                                    |               | (50 Hz ~ 60 Hz )<br>1 nF ~ 100 μF                                                                                                                                                                                                                                      | 0.6 mF/F                                                                                                                         | STD. Capacitor<br>/ CP801-40201-3                    |
| tanδ                                                                              |               | (0 ~ 100) %                                                                                                                                                                                                                                                            | $2.6 \times 10^{-3}$                                                                                                             |                                                      |
| Decade capacitors<br>Capacitance                                                  | 40202         | (100 Hz/120 Hz)<br>0 pF ~ 10 μF<br>(1 kHz)<br>0 pF ~ 10 μF                                                                                                                                                                                                             | 65 μF/F<br>62 μF/F                                                                                                               | Capacitance<br>indicator<br>/ CP801-40202-1          |
| Standard capacitors<br>Capacitance                                                | 40204         | (20 Hz ~ 1 kHz)<br>(0 ~ 1) pF<br>1 pF ~ 1 nF<br>1 nF ~ 1 μF<br>1 μF ~ 10 mF<br>(10 ~ 100) mF<br>(1 kHz ~ 100 kHz )<br>0 pF ~ 1 μF<br>(1 ~ 10) μF<br>(100 kHz ~ 1 MHz)<br>(0 ~ 1) pF<br>1 pF ~ 1 μF<br>(1 ~ 5) MHz<br>(1 ~ 1 000) pF<br>(5 ~ 13) MHz<br>(1 ~ 1 000 ) pF | 13 μF/F<br>7.6 μF/F<br>12 μF/F<br>1.4 mF/F<br>3.2 mF/F<br>12 μF/F<br>1.4 mF/F<br>0.31 mF/F<br>0.30 mF/F<br>0.90 mF/F<br>3.9 mF/F | Capacitance Bridge<br>/ CP801-40204-1                |



## 402. Resistance, Capacitance, and Inductance

| Measured Quantity<br>Instrument or Gauge                                                                                                                    | Field<br>Code | Range                                                                                                                                                                                     | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                 | Standard/Method of<br>Measurement etc.                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Earth testers<br><br>Resistance<br><br><br><br>AC Voltage<br>AC Current                                                                                     | 40205         | (1 ~ 100) mΩ<br>(0.1 ~ 1) Ω<br>(1 ~ 100) Ω<br>(0.1 ~ 10) kΩ<br>0 V ~ 1 kV<br>0 A ~ 100 A                                                                                                  | 5.8 mΩ/Ω<br>0.83 mΩ/Ω<br>0.59 mΩ/Ω<br>0.59 mΩ/Ω<br>0.59 mV/V<br>0.59 mA/A                                                          | Calibrator,<br>Decade box<br>/ CP801-40205-1                                                           |
| Inductance bridges /<br>indicators<br><br>Inductance Bridge /<br>Inductance Tester<br>Inductance<br><br><br><br><br><br><br>AC Voltage<br><br><br>Frequency | 40206         | (100 Hz/120 Hz)<br>(0 ~ 100) μH<br>100 μH ~ 1 H<br>(1 ~ 10) H<br>(1 kHz)<br>(0 ~ 100) μH<br>100 μH ~ 1 H<br>(1 ~ 10) H<br><br>(0 Hz ~ 100 kHz)<br>(0 ~ 100) V<br><br>0 Hz ~ 100 kHz       | <br><br>0.61 mH/H<br>0.23 mH/H<br>0.23 mH/H<br><br>0.42 mH/H<br>0.16 mH/H<br>0.16 mH/H<br><br>3.7 mV/V<br><br>6.5×10 <sup>-5</sup> | STD. Inductor<br>Frequency Counter<br>/ CP801-40206-1<br>/ CP801-40206-2                               |
| Inductors<br><br>Standard Inductor /<br>Inductance<br><br><br><br><br><br>Decade Inductor /<br>Inductance                                                   | 40208         | (100 Hz/120 Hz)<br>(0 ~ 100) μH<br>100 μH ~ 1 H<br>(1 ~ 10) H<br>(1 kHz)<br>(0 ~ 100) μH<br>100 μH ~ 10 H<br><br>(100 Hz/120 Hz)<br>(0 ~ 100) μH<br>100 μH ~ 1 H<br>(1 kHz)<br>0 μH ~ 1 H | <br><br>1.4 mH/H<br>0.88 mH/H<br>1.1 mH/H<br><br>0.42 mH/H<br>0.28 mH/H<br><br><br>1.9 mH/H<br>1.3 mH/H<br><br>0.45 mH/H           | Inductance Bridge<br>/ CP801-40208-1<br><br><br><br><br><br>Inductance<br>Indicator<br>/ CP801-40208-2 |
| Mutual inductors<br><br>Mutual Inductance                                                                                                                   | 40209         | (1 ~ 200) mH                                                                                                                                                                              | 4.0 mH/H                                                                                                                           | Inductance Indicator<br>/ CP801-40209-1                                                                |

## 402. Resistance, Capacitance, and Inductance

| Measured Quantity<br>Instrument or Gauge    | Field<br>Code | Range                                                        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                                             |
|---------------------------------------------|---------------|--------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Insulation testers                          | 40210         |                                                              |                                                                    | Calibrator,<br>Decade box<br>/ CP801-40210-1                                                       |
| Resistance                                  |               | 0 Ω ~ 10 MΩ<br>(10 ~ 100) MΩ<br>100 MΩ ~ 1 GΩ<br>(1 ~ 10) GΩ | 1.3 mΩ/Ω<br>1.4 mΩ/Ω<br>3.0 mΩ/Ω<br>3.1 mΩ/Ω                       |                                                                                                    |
| AC Voltage                                  |               | 0 V ~ 1 kV                                                   | 5.8 mV/V                                                           |                                                                                                    |
| Test Voltage                                |               | 10 V ~ 10 kV                                                 | 8.2 mV/V                                                           |                                                                                                    |
| Q-meters                                    | 40211         |                                                              |                                                                    | Frequency Counter<br>Capacitance Indicator<br>/ CP801-40211-1                                      |
| Quality Factor                              |               | 5 ~ 1 000                                                    | 6.5×10 <sup>-3</sup>                                               |                                                                                                    |
| Frequency                                   |               | 0 Hz ~ 100 MHz                                               | 6.5×10 <sup>-5</sup>                                               |                                                                                                    |
| Capacitance                                 |               | (1 kHz)<br>0 pF ~ 10 μF                                      | 62 μF/F                                                            |                                                                                                    |
| Direct reading ratio sets                   | 40212         |                                                              |                                                                    | STD. Resistor<br>/ CP801-40212-1                                                                   |
| Measuring Arm                               |               | 1 mΩ ~ 10 kΩ                                                 | 1.1 μΩ/Ω                                                           |                                                                                                    |
| Ratio Arm                                   |               | 1 mΩ ~ 10 kΩ                                                 | 1.1 μΩ/Ω                                                           |                                                                                                    |
| Resistance bridges &<br>Similar instruments | 40213         |                                                              |                                                                    | STD. Resistor<br>/ CP801-40213-1                                                                   |
| Measuring Arm                               |               | 1 mΩ ~ 100 Ω                                                 | 1.1 μΩ/Ω                                                           |                                                                                                    |
|                                             |               | 100 Ω ~ 100 MΩ                                               | 1.3 μΩ/Ω                                                           |                                                                                                    |
| Ratio Arm                                   |               | 1 mΩ ~ 100 Ω                                                 | 1.1 μΩ/Ω                                                           |                                                                                                    |
|                                             |               | 100 Ω ~ 100 MΩ                                               | 1.3 μΩ/Ω                                                           |                                                                                                    |
| Resistance meters                           | 40214         |                                                              |                                                                    | Decade resistor,<br>Hi voltage meter,<br>Standard Resistor,<br>DMM, AC Resistor<br>/ CP801-40214-1 |
| Ohmmeters<br>DC                             |               | 10 μΩ                                                        | 1.4 mΩ/Ω                                                           |                                                                                                    |
|                                             |               | (10 ~ 100) μΩ                                                | 0.20 mΩ/Ω                                                          |                                                                                                    |
|                                             |               | (0.1 ~ 1) mΩ                                                 | 35 μΩ/Ω                                                            |                                                                                                    |
|                                             |               | (1 ~ 10) mΩ                                                  | 17 μΩ/Ω                                                            |                                                                                                    |
|                                             |               | (10 ~ 100) mΩ                                                | 5.9 μΩ/Ω                                                           |                                                                                                    |
|                                             |               | (0.1 ~ 1) Ω                                                  | 3.7 μΩ/Ω                                                           |                                                                                                    |
|                                             |               | (1 ~ 10) Ω                                                   | 3.2 μΩ/Ω                                                           |                                                                                                    |
|                                             |               | (10 ~ 100) Ω                                                 | 3.2 μΩ/Ω                                                           |                                                                                                    |
|                                             |               | (0.1 ~ 1) kΩ                                                 | 3.2 μΩ/Ω                                                           |                                                                                                    |
|                                             |               | (1 ~ 10) kΩ                                                  | 2.6 μΩ/Ω                                                           |                                                                                                    |
|                                             |               | (10 ~ 100) kΩ                                                | 4.9 μΩ/Ω                                                           |                                                                                                    |
|                                             |               | AC                                                           | (50 Hz ~ 1 kHz)                                                    |                                                                                                    |
| 1 mΩ                                        |               |                                                              | 0.80 mΩ/Ω                                                          |                                                                                                    |
| (1 ~ 10) mΩ                                 |               |                                                              | 0.60 mΩ/Ω                                                          |                                                                                                    |
| (10 ~ 100) mΩ                               |               |                                                              | 0.18 mΩ/Ω                                                          |                                                                                                    |
| 100 mΩ ~ 10 kΩ                              |               |                                                              | 0.16 mΩ/Ω                                                          |                                                                                                    |
| (10 ~ 100) kΩ                               |               |                                                              | 0.18 mΩ/Ω                                                          |                                                                                                    |
| (1 kHz ~ 1 MHz)                             |               |                                                              |                                                                    |                                                                                                    |
| 10 Ω ~ 100 kΩ                               |               |                                                              | 0.50 mΩ/Ω                                                          |                                                                                                    |
| 10 mA ~ 600 A                               |               |                                                              | 0.20 mA/A                                                          |                                                                                                    |
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## 402. Resistance, Capacitance, and Inductance

| Measured Quantity<br>Instrument or Gauge  | Field<br>Code | Range                                                                                                                                                                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                          | Standard/Method of<br>Measurement etc.                    |
|-------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Resistance meters<br>Tera Ohmmeters<br>DC | 40214         | (0.1 ~ 1) MΩ<br>(1 ~ 10) MΩ<br>(10 ~ 100) MΩ<br>(0.1 ~ 1) GΩ<br>(1 ~ 10) GΩ<br>(10 ~ 100) GΩ<br>(0.1 ~ 1) TΩ<br>(1 ~ 10) TΩ                                                            | 4.3 μΩ/Ω<br>6.8 μΩ/Ω<br>17 μΩ/Ω<br>0.29 mΩ/Ω<br>0.41 mΩ/Ω<br>0.61 mΩ/Ω<br>1.2 mΩ/Ω<br>1.8 mΩ/Ω                                                                                                              | Decade resistor,<br>Hi resistor<br>DMM<br>/ CP801-40214-2 |
| Resistors<br>Standard Resistor<br>DC      | 40215         | 1 μΩ<br>10 μΩ<br>0.1 mΩ<br>1 mΩ<br>10 mΩ<br>100 mΩ<br>1 Ω<br>10 Ω<br>100 Ω<br>1 kΩ<br>10 kΩ<br>100 kΩ<br>1 MΩ<br>10 MΩ<br>100 MΩ<br>1 GΩ<br>10 GΩ<br>100 GΩ<br>1 TΩ<br>10 TΩ<br>100 TΩ | 0.3 nΩ<br>3 nΩ<br>0.083 nΩ<br>0.81 nΩ<br>7.9 nΩ<br>78 nΩ<br>0.78 μΩ<br>7.8 μΩ<br>83 μΩ<br>0.88 mΩ<br>11 mΩ<br>0.11 Ω<br>1.1 Ω<br>52 Ω<br>0.98 kΩ<br>11 kΩ<br>3.4 MΩ<br>46 MΩ<br>0.58 GΩ<br>20 GΩ<br>0.46 TΩ | Bridge Teraohmmeter<br>/ CP801-40215-1                    |
| AC<br><br>High Resistor                   |               | (1 kHz)<br>1 mΩ ~ 1 MΩ<br>(10 ~ 100) MΩ<br>(0.1 ~ 1) GΩ<br>(1 ~ 10) GΩ<br>(10 ~ 100) GΩ<br>(0.1 ~ 1) TΩ<br>(1 ~ 10) TΩ<br>(10 ~ 100) TΩ                                                | 60 μΩ/Ω<br>9.0 kΩ<br>0.12 MΩ<br>3.6 MΩ<br>46 MΩ<br>0.60 GΩ<br>20 GΩ<br>0.46 TΩ                                                                                                                              | Teraohmmeter<br>/ CP801-40215-2                           |

## 402. Resistance, Capacitance, and Inductance

| Measured Quantity<br>Instrument or Gauge                                              | Field<br>Code | Range                                                                                                                                                                                                                                                                                        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                          | Standard/Method of<br>Measurement etc.                                      |
|---------------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Resistance meters<br>Decade Resistor                                                  | 40214         | (1 ~ 10) mΩ<br>(10 ~ 100) mΩ<br>(0.1 ~ 1) Ω<br>(1 ~ 10) Ω<br>(10 ~ 100) Ω<br>(0.1 ~ 1) kΩ<br>(1 ~ 10) kΩ<br>(10 ~ 100) kΩ<br>(0.1 ~ 1) MΩ<br>(1 ~ 10) MΩ<br>(10 ~ 100) MΩ<br>(0.1 ~ 1) GΩ<br>(1 ~ 10) GΩ<br>(10 ~ 100) GΩ<br>(0.1 ~ 1) TΩ<br>(1 ~ 10) TΩ<br>(10 ~ 100) TΩ<br>Zero Resistance | 12 mΩ/Ω<br>1.2 mΩ/Ω<br>0.13 mΩ/Ω<br>28 μΩ/Ω<br>19 μΩ/Ω<br>19 μΩ/Ω<br>19 μΩ/Ω<br>19 μΩ/Ω<br>19 μΩ/Ω<br>36 μΩ/Ω<br>70 μΩ/Ω<br>0.59 mΩ/Ω<br>0.64 mΩ/Ω<br>0.86 mΩ/Ω<br>2.4 mΩ/Ω<br>4.3 mΩ/Ω<br>8.5 mΩ/Ω<br>9 μΩ | DMM<br>Teraohmmeter<br>/ CP801-40215-3                                      |
| Electrical conductivity meter<br>Electrical conductivity meters                       | 40216         | 59.21 MS/m<br>36.00 MS/m<br>28.14 MS/m<br>13.12 MS/m                                                                                                                                                                                                                                         | 0.49 MS/m<br>0.36 MS/m<br>0.32 MS/m<br>0.32 MS/m                                                                                                                                                            | Conductivity STD.<br>/ CP801-40216-1                                        |
| Electrical conductivity                                                               |               | (22 ~ 30) MS/m<br>(30 ~ 40) MS/m<br>(40 ~ 60) MS/m                                                                                                                                                                                                                                           | 0.15 MS/m<br>0.19 MS/m<br>0.33 MS/m                                                                                                                                                                         | Electrical<br>conductivity meter<br>/ CP801-40216-2                         |
| Surface resistivity meters<br>(Sheet resistance meters)                               |               | 10 mΩ<br>(10 ~ 100) mΩ<br>(0.1 ~ 1) Ω<br>(1 ~ 100) Ω<br>(0.1 ~ 10) kΩ<br>(0.01 ~ 1) MΩ<br>(1 ~ 100) MΩ<br>(0.1 ~ 1) GΩ                                                                                                                                                                       | 12 mΩ/Ω<br>6.3 mΩ/Ω<br>6.0 mΩ/Ω<br>6.3 mΩ/Ω<br>7.0 mΩ/Ω<br>6.2 mΩ/Ω<br>8.1 mΩ/Ω<br>16 mΩ/Ω                                                                                                                  | Multimeter, Surface<br>resistivity standard<br>specimens<br>/ CP801-40216-3 |
| Surface resistivity standard<br>specimens<br>(Sheet resistance standard<br>specimens) |               | 10 mΩ<br>(10 ~ 100) mΩ<br>(0.1 ~ 1) Ω<br>(1 ~ 100) Ω<br>(0.1 ~ 10) kΩ<br>(0.01 ~ 1) MΩ<br>(1 ~ 100) MΩ<br>(0.1 ~ 1) GΩ                                                                                                                                                                       | 11 mΩ/Ω<br>4.3 mΩ/Ω<br>3.9 mΩ/Ω<br>4.2 mΩ/Ω<br>5.3 mΩ/Ω<br>4.1 mΩ/Ω<br>6.7 mΩ/Ω<br>15 mΩ/Ω                                                                                                                  | Multimeter<br>/ CP801-40216-4                                               |

## 402. Resistance, Capacitance, and Inductance

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                     | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                                                   | Standard/Method of<br>Measurement etc.                             |
|------------------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Impedance bridges/LCR<br>meters          | 40217         |                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                      | STD Capacitor,<br>STD Inductor,<br>STD Resistor<br>/ CP801-40217-1 |
| Capacitance                              |               | (20 Hz ~ 1 kHz)<br>(0 ~ 1) pF<br>1 pF ~ 1 nF<br>1 nF ~ 1 $\mu$ F<br>1 $\mu$ F ~ 10 mF<br>10 mF ~ 100 mF<br>(1 ~ 10) kHz<br>(0 ~ 1) pF<br>1 pF ~ 1 nF<br>1 nF ~ 1 $\mu$ F<br>1 $\mu$ F ~ 10 mF<br>10 mF ~ 100 mF<br>(10 kHz ~ 1 MHz)<br>(0 ~ 1) pF<br>1 pF ~ 1 $\mu$ F<br>(1 ~ 5) MHz<br>(1 ~ 1 000) pF<br>(5 ~ 13) MHz<br>(1 ~ 1 000 ) pF | 0.12 mF/F<br>66 $\mu$ F/F<br>0.11 mF/F<br>1.4 mF/F<br>3.2 mF/F<br><br>87 $\mu$ F/F<br>59 $\mu$ F/F<br>82 $\mu$ F/F<br>1.4 mF/F<br>3.2 mF/F<br><br>0.31 mF/F<br>0.30 mF/F<br><br>0.90 mF/F<br>3.9 mF/F                                                                                                                |                                                                    |
| Inductance                               |               | (100 Hz/120 Hz)<br>(0 ~ 100) $\mu$ H<br>100 $\mu$ H ~ 1 H<br>(1 ~ 10) H<br>(1 kHz)<br>(0 ~ 100) $\mu$ H<br>100 $\mu$ H ~ 10 H<br>(10 kHz)<br>(0 ~ 100) $\mu$ H<br>100 $\mu$ H ~ 10 mH                                                                                                                                                     | 0.40 mH/H<br>0.20 mH/H<br>1.2 mH/H<br><br>0.40 mH/H<br>0.20 mH/H<br><br>1.8 mH/H<br>0.88 mH/H                                                                                                                                                                                                                        |                                                                    |
| Resistance                               |               | 1 $\Omega$<br>60 Hz ~ 1 kHz<br>(1 ~ 10) kHz<br><br>(1 ~ 10) $\Omega$<br>60 Hz ~ 10 kHz<br>10 kHz ~ 1 MHz<br>(1 ~ 5) MHz<br>(5 ~ 10) MHz<br>(10 ~ 13) MHz<br><br>(10 ~ 100) $\Omega$<br>60 Hz ~ 10 kHz<br>10 kHz ~ 1 MHz<br>(1 ~ 5) MHz<br>(5 ~ 10) MHz<br>(10 ~ 13) MHz                                                                   | 82 $\mu\Omega/\Omega$<br>0.32 m $\Omega/\Omega$<br><br>82 $\mu\Omega/\Omega$<br>0.31 m $\Omega/\Omega$<br>1.0 m $\Omega/\Omega$<br>4.0 m $\Omega/\Omega$<br>6.0 m $\Omega/\Omega$<br><br>82 $\mu\Omega/\Omega$<br>0.31 m $\Omega/\Omega$<br>0.50 m $\Omega/\Omega$<br>2.0 m $\Omega/\Omega$<br>3.0 m $\Omega/\Omega$ |                                                                    |

## 402. Resistance, Capacitance, and Inductance

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                                                                                                           | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                             | Standard/Method of<br>Measurement etc.                             |
|------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Impedance bridges/LCR<br>meters          | 40217         |                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                |                                                                    |
| Resistance                               |               | 100 $\Omega$ ~ 1 k $\Omega$<br>60 Hz ~ 10 kHz<br>(10 ~ 100) kHz<br>100 kHz ~ 5 MHz<br>(5 ~ 10) MHz<br>(10 ~ 13) MHz<br><br>(1 ~ 10) k $\Omega$<br>60 Hz ~ 10 kHz<br>(10 ~ 100) kHz<br>100 kHz ~ 1 MHz<br><br>(10 ~ 100) k $\Omega$<br>1 kHz<br>(1 ~ 100) kHz<br>100 kHz ~ 1 MHz | 82 $\mu\Omega/\Omega$<br>0.31 m $\Omega/\Omega$<br>0.51 m $\Omega/\Omega$<br>2.1 m $\Omega/\Omega$<br>3.0 m $\Omega/\Omega$<br><br>82 $\mu\Omega/\Omega$<br>0.21 m $\Omega/\Omega$<br>0.31 m $\Omega/\Omega$<br><br>0.11 m $\Omega/\Omega$<br>0.31 m $\Omega/\Omega$<br>0.31 m $\Omega/\Omega$ | STD Capacitor,<br>STD Inductor,<br>STD Resistor<br>/ CP801-40217-1 |
| AC Voltage                               |               | (0 ~ 10) GHz<br>(0 ~ 10) V                                                                                                                                                                                                                                                      | 3.7 mV/V                                                                                                                                                                                                                                                                                       |                                                                    |
| Frequency                                |               | 0 Hz ~ 10 GHz                                                                                                                                                                                                                                                                   | $6.5 \times 10^{-5}$                                                                                                                                                                                                                                                                           |                                                                    |
| tan $\delta$                             |               | (0 ~ 100) %                                                                                                                                                                                                                                                                     | $2.6 \times 10^{-3}$                                                                                                                                                                                                                                                                           |                                                                    |

## 403. AC voltage, current &amp; power

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                   | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.       |
|------------------------------------------|---------------|-------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------|
| AC ammeters                              | 40301         |                                                                         |                                                                    | Calibrator<br>/ CP801-40301-1                |
| AC Current                               |               | (40 Hz ~ 10 kHz)<br>100 $\mu$ A ~ 10 mA<br>10 mA ~ 10 A<br>(10 ~ 100) A | 68 $\mu$ A/A<br>0.22 mA/A<br>0.70 mA/A                             |                                              |
| Clamp ammeters/voltmeters                | 40302         |                                                                         |                                                                    | Calibrator,<br>Decade box<br>/ CP801-40302-1 |
| DC Voltage                               |               | (0 ~ 1 000) V                                                           | 60 $\mu$ V/V                                                       |                                              |
| DC Current                               |               | 0 mA ~ 5 000 A                                                          | 1.6 mA/A                                                           |                                              |
| AC Current                               |               | (10 Hz ~ 10 kHz )<br>0 mA ~ 5 000 A                                     | 2.4 mA/A                                                           |                                              |
| AC Voltage                               |               | (10 Hz ~ 10 kHz)<br>(0 ~ 1 000) V                                       | 0.6 mV/V                                                           |                                              |
| Resistance                               |               | (0 ~ 10) M $\Omega$                                                     | 6.2 $\mu\Omega/\Omega$                                             |                                              |
| Frequency                                |               | 10 Hz ~ 10 MHz                                                          | 1.9 mHz/Hz                                                         |                                              |
| Turn Current Coil                        |               |                                                                         |                                                                    | Calibrator<br>/ CP801-40302-2                |
| DC Ratio                                 |               | 2 ~ 50                                                                  | 0.12 %                                                             |                                              |
| AC Ratio                                 |               | (60 Hz)<br>2 ~ 50                                                       | 0.15 %                                                             |                                              |

## 403. AC voltage, current &amp; power

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                 | Standard/Method of<br>Measurement etc.                                                  |
|------------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| AC voltage/current<br>Calibrators        | 40303         |                                                                                                                                                                                   |                                                                                                    | AC Current shunt,<br>DMM<br>/ CP801-40303-1                                             |
| AC Voltage                               |               | (10 Hz ~ 1 kHz)<br>(1 ~ 100) mV<br>100 mV ~ 10 V<br>(10 ~ 1 000) V<br>(1 kHz ~ 100 kHz )<br>(1 ~ 100) mV<br>100 mV ~ 10 V<br>(10 ~ 1 000) V<br>(100 kHz ~ 1 MHz )<br>10 mV ~ 10 V | 94 $\mu$ V/V<br>19 $\mu$ V/V<br>44 $\mu$ V/V<br>0.28 mV/V<br>56 $\mu$ V/V<br>0.23 mV/V<br>3.0 mV/V |                                                                                         |
| AC Current                               |               | (10 Hz ~ 1 kHz)<br>100 $\mu$ A ~ 1 A<br>(1 ~ 10) A<br>(10 ~ 100) A<br>(1 ~ 10) kHz<br>100 $\mu$ A ~ 1 A<br>(1 ~ 10) A<br>(10 ~ 100) A                                             | 31 $\mu$ A/A<br>35 $\mu$ A/A<br>0.10 mA/A<br>31 $\mu$ A/A<br>92 $\mu$ A/A<br>0.11 mA/A             |                                                                                         |
| Wattmeter calibrators                    | 40304         |                                                                                                                                                                                   |                                                                                                    | Power meter,DMM,<br>Shunt, CT,<br>STD Resistance,<br>Voltage Divider<br>/ CP801-40304-1 |
| Active power                             |               | (50 ~ 60) Hz<br>0.24 mW ~ 38 kW                                                                                                                                                   | $1.0 \times 10^{-4}$                                                                               |                                                                                         |
| Apparent Power                           |               | (50 ~ 60) Hz<br>0.24 mVA ~ 38 kVA                                                                                                                                                 | $1.0 \times 10^{-4}$                                                                               |                                                                                         |
| Reactive power                           |               | (50 ~ 60) Hz<br>0.24 mvar ~ 38 kvar                                                                                                                                               | $1.0 \times 10^{-4}$                                                                               |                                                                                         |
| Power factor                             |               | (50 ~ 60) Hz<br>-1 ~ 1                                                                                                                                                            | $1.1 \times 10^{-4}$                                                                               |                                                                                         |
| Total Harmonic Distortion<br>(Voltage)   |               | (50 ~ 3 000) Hz<br>(0.5 ~ 20) %                                                                                                                                                   | 0.042 %                                                                                            |                                                                                         |
| (Current)                                |               | (50 ~ 3 000) Hz<br>(0.5 ~ 20) %                                                                                                                                                   | 0.042 %                                                                                            |                                                                                         |
| AC Voltage                               |               | (40 ~ 1 000) Hz<br>(1 ~ 1 000) V                                                                                                                                                  | $1.5 \times 10^{-4}$                                                                               |                                                                                         |
| AC Current                               |               | (40 ~ 10 000) Hz<br>1 mA ~ 100 A<br>(50 ~ 5 000) Hz<br>100 A ~ 300 A                                                                                                              | $1.2 \times 10^{-4}$<br>$1.7 \times 10^{-4}$                                                       |                                                                                         |

## 403. AC voltage, current &amp; power

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                       | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                                  |
|------------------------------------------|---------------|-----------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Wattmeter calibrators                    | 40304         |                             |                                                                    | Power meter,DMM,<br>Shunt, CT,<br>STD Resistance,<br>Voltage Divider<br>/ CP801-40304-1 |
| Total Harmonic Distortion                |               |                             |                                                                    |                                                                                         |
| Frequency                                |               | (10 ~ 1 000) Hz             | $0.9 \times 10^{-5}$                                               |                                                                                         |
| DC Power                                 |               | 0.01 mW ~ 2 kW              | $1.2 \times 10^{-4}$                                               |                                                                                         |
|                                          |               | (2 ~ 200) kW                | $1.7 \times 10^{-4}$                                               |                                                                                         |
|                                          |               | (200 ~ 300) kW              | $1.8 \times 10^{-4}$                                               |                                                                                         |
| DC Voltage                               |               | (0.1 ~ 1 000) V             | $1.7 \times 10^{-5}$                                               |                                                                                         |
| DC Current                               |               | 0.1 mA ~ 100 A              | $1.1 \times 10^{-5}$                                               |                                                                                         |
|                                          |               | (100 ~ 1 000) A             | $2.1 \times 10^{-4}$                                               |                                                                                         |
| P <sub>inst</sub> (Sine)                 |               | (0.5 ~ 33.333) Hz           |                                                                    |                                                                                         |
|                                          |               | 0.25 ~ 5                    | $1.9 \times 10^{-3}$                                               |                                                                                         |
| P <sub>inst</sub> (Squire)               |               | (0.5 ~ 28) Hz               |                                                                    |                                                                                         |
|                                          |               | 0.25 ~ 5                    | $2.4 \times 10^{-3}$                                               |                                                                                         |
|                                          |               | 30.5 Hz                     |                                                                    |                                                                                         |
|                                          |               | 0.25 ~ 5                    | $1.1 \times 10^{-2}$                                               |                                                                                         |
|                                          |               | 33.333 Hz                   |                                                                    |                                                                                         |
|                                          |               | 0.25 ~ 5                    | $2.4 \times 10^{-3}$                                               |                                                                                         |
| P <sub>st</sub>                          |               | (1 ~ 4 000) cpm             |                                                                    |                                                                                         |
|                                          |               | 0.25 ~ 5                    | $2.7 \times 10^{-3}$                                               |                                                                                         |
| AC current shunts                        | 40305         |                             |                                                                    | AC/DC Transfer STD.<br>/ CP801-40305-1                                                  |
| AC Current Shunt                         |               |                             |                                                                    |                                                                                         |
| AC Current                               |               | (10 Hz ~ 1 kHz)             |                                                                    |                                                                                         |
|                                          |               | 10 mA                       | 18 $\mu$ A/A                                                       |                                                                                         |
|                                          |               | 100 mA                      | 20 $\mu$ A/A                                                       |                                                                                         |
|                                          |               | 1 A                         | 24 $\mu$ A/A                                                       |                                                                                         |
|                                          |               | 10 A                        | 35 $\mu$ A/A                                                       |                                                                                         |
|                                          |               | (1 kHz ~ 10 kHz)            |                                                                    |                                                                                         |
|                                          |               | 10 mA                       | 18 $\mu$ A/A                                                       |                                                                                         |
|                                          |               | 100 mA                      | 20 $\mu$ A/A                                                       |                                                                                         |
|                                          |               | 1 A                         | 26 $\mu$ A/A                                                       |                                                                                         |
|                                          |               | 10 A                        | 92 $\mu$ A/A                                                       |                                                                                         |
| AC Resistance                            |               | (10 Hz ~ 1 kHz )            |                                                                    |                                                                                         |
|                                          |               | (1 ~ 10) m $\Omega$         | 0.22 m $\Omega/\Omega$                                             |                                                                                         |
|                                          |               | (10 ~ 100) m $\Omega$       | 0.18 m $\Omega/\Omega$                                             |                                                                                         |
|                                          |               | 100 m $\Omega$ ~ 1 $\Omega$ | 0.12 m $\Omega/\Omega$                                             |                                                                                         |
|                                          |               | (1 ~ 10) $\Omega$           | 96 $\mu\Omega/\Omega$                                              |                                                                                         |
|                                          |               | 10 $\Omega$ ~ 10 k $\Omega$ | 92 $\mu\Omega/\Omega$                                              |                                                                                         |



## 403. AC voltage, current &amp; power

| Measured Quantity<br>Instrument or Gauge                                                                                                                        | Field<br>Code | Range                                                                                                                         | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                      | Standard/Method of<br>Measurement etc.                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase angle generators,<br>synchro resolve generators<br>Phase<br>Power factor                                                                                  | 40306         | (-360 ~ 360)°<br>-1 ~ 1                                                                                                       | 0.003 5°<br>$1.1 \times 10^{-4}$                                                        | Power calibrator<br>/ CP801-40306-1                                                                                                                                       |
| Voltage/Current Phase angle<br>meters/synchro resolve<br>meters<br>Phase                                                                                        | 40307         | (-360 ~ 360)°                                                                                                                 | 0.003 5°                                                                                | Power calibrator<br>/ CP801-40307-1                                                                                                                                       |
| Potential transformer test sets<br>Potential transformer test sets<br>Ratio error<br>Phase Angle error<br>Burden<br>VA<br>Power Factor<br>Ratio Tester<br>Ratio | 40308         | (110 ~ 110 000) V<br>(-19.99 ~ + 19.99) %<br>(110 ~ 110 000) V<br>(-680 ~ + 680)'<br>(0.125 ~ 600) VA<br>0.8 ~ 1.0<br>5 ~ 700 | 0.018 %<br>0.9'<br>$7.0 \times 10^{-3}$<br>$1.0 \times 10^{-3}$<br>$2.0 \times 10^{-4}$ | Wide ratio<br>transformer, STD PT,<br>PT Compomator,<br>/ CP801-40308-1<br><br>Precision power<br>analyzer<br>/ CP801-40308-2<br><br>Ratio Transformer<br>/ CP801-40308-3 |
| Potential transformer<br>Ratio<br>Phase Angle                                                                                                                   | 40309         | 110 V ~ 110 000 V<br>(-100 ~ 1 000) %<br>(-1 000 ~ 1 000)'                                                                    | 0.016 %<br>0.75'                                                                        | PT Compomator<br>/ CP801-40309-1                                                                                                                                          |
| Power factor meters<br>Power factor meter<br>Reactive factor meter                                                                                              | 40310         | -1 ~ 1<br>-1 ~ 1                                                                                                              | $1.2 \times 10^{-4}$<br>$1.2 \times 10^{-4}$                                            | Power calibrator<br>/ CP801-40310-1<br><br>Power calibrator<br>/ CP801-40310-2                                                                                            |

## 403. AC voltage, current &amp; power

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                           | Standard/Method of<br>Measurement etc.                                          |
|------------------------------------------|---------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| AC power meters                          | 40311         |                                                                                        |                                                                                              |                                                                                 |
| AC power meters                          |               |                                                                                        |                                                                                              |                                                                                 |
| Active power                             |               | (50 ~ 60) Hz<br>0.24 mW ~ 38 kW<br>(38 ~ 100) kW<br>(100 ~ 300) kW<br>(300 ~ 5 000) kW | $1.2 \times 10^{-4}$<br>$3.4 \times 10^{-4}$<br>$5.2 \times 10^{-4}$<br>$1.6 \times 10^{-3}$ | Power calibrator,<br>Trans. Amp., Calibrator,<br>Power Meter<br>/ CP801-40311-1 |
| Power factor                             |               | (50 ~ 60) Hz<br>-1 ~ 1                                                                 | $1.2 \times 10^{-4}$                                                                         |                                                                                 |
| Total Harmonic<br>Distortion(Voltage)    |               | (50 ~ 3 000) Hz<br>(0.5 ~ 20) %                                                        | 0.041 %                                                                                      |                                                                                 |
| (Current)                                |               | (50 ~ 3 000) Hz<br>(0.5 ~ 20) %                                                        | 0.041 %                                                                                      |                                                                                 |
| AC voltage                               |               | (50 ~ 60) Hz<br>5 V ~ 1 kV                                                             | $1.3 \times 10^{-4}$                                                                         |                                                                                 |
| AC current                               |               | (50 ~ 60) Hz<br>1 mA ~ 20 A<br>(20 ~ 100) A<br>(100 ~ 300) A<br>(300 ~ 5 000) A        | $2.4 \times 10^{-4}$<br>$3.0 \times 10^{-4}$<br>$4.9 \times 10^{-4}$<br>$1.6 \times 10^{-3}$ |                                                                                 |
| Frequency                                |               | 10 Hz ~ 1 MHz                                                                          | $0.8 \times 10^{-4}$                                                                         |                                                                                 |
| DC voltage                               |               | (0.1 ~ 1 000) V                                                                        | $1.7 \times 10^{-5}$                                                                         |                                                                                 |
| DC current                               |               | 0.1 mA ~ 2 A<br>(2 ~ 300) A<br>(300 ~ 5 000) A                                         | $1.0 \times 10^{-4}$<br>$1.5 \times 10^{-4}$<br>$1.6 \times 10^{-3}$                         |                                                                                 |
| DC Power                                 |               | 0.01 mW ~ 2 kW<br>(2 ~ 300) kW<br>(300 ~ 5 000) kW                                     | $1.1 \times 10^{-4}$<br>$1.6 \times 10^{-4}$<br>$1.6 \times 10^{-3}$                         |                                                                                 |
| P <sub>inst</sub> (Sine)                 |               | (0.5 ~ 33.333) Hz<br>0.25 ~ 5                                                          | $1.9 \times 10^{-3}$                                                                         |                                                                                 |
| P <sub>inst</sub> (Squire)               |               | (0.5 ~ 28) Hz<br>0.25 ~ 5<br>30.5 Hz<br>0.25 ~ 5<br>33.333 Hz<br>0.25 ~ 5              | $2.4 \times 10^{-3}$<br>$1.1 \times 10^{-2}$<br>$2.4 \times 10^{-3}$                         |                                                                                 |
| P <sub>st</sub>                          |               | (1 ~ 4 000) cpm<br>0.25 ~ 5                                                            | $2.7 \times 10^{-3}$                                                                         |                                                                                 |

## 403. AC voltage, current &amp; power

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                         | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                           |
|------------------------------------------|---------------|-------------------------------|--------------------------------------------------------------------|------------------------------------------------------------------|
| AC power meters                          | 40311         |                               |                                                                    |                                                                  |
| Apparent power meters                    |               | (50 ~ 60) Hz                  |                                                                    | Power calibrator,<br>Trans. Amp., Calibrator,<br>/ CP801-40311-2 |
| Apparent power                           |               | 0.24 mW ~ 38 kW               | $1.2 \times 10^{-4}$                                               |                                                                  |
|                                          |               | (38 ~ 100) kW                 | $3.4 \times 10^{-4}$                                               |                                                                  |
|                                          |               | (100 ~ 300) kW                | $5.2 \times 10^{-4}$                                               |                                                                  |
|                                          |               | (300 ~ 5 000) kW              | $1.6 \times 10^{-3}$                                               |                                                                  |
| Reactive power meters                    |               | (50 ~ 60) Hz                  |                                                                    | Power calibrator,<br>Trans. Amp., Calibrator,<br>/ CP801-40311-3 |
| Reactive power                           |               | 0.24 mW ~ 38 kW               | $1.2 \times 10^{-4}$                                               |                                                                  |
|                                          |               | (38 ~ 100) kW                 | $3.4 \times 10^{-4}$                                               |                                                                  |
|                                          |               | (100 ~ 300) kW                | $5.2 \times 10^{-4}$                                               |                                                                  |
|                                          |               | (300 ~ 5 000) kW              | $1.6 \times 10^{-3}$                                               |                                                                  |
| Power signal converter                   |               |                               |                                                                    | Power calibrator,DMM<br>/ CP801-40311-4                          |
| Output Current                           |               | (-10 ~ 10)A                   | $4.6 \times 10^{-4}$                                               |                                                                  |
| AC power supplies                        | 40312         |                               |                                                                    |                                                                  |
| AC power supplies                        |               | (10 Hz ~ 1 kHz)               |                                                                    | DMM<br>/ CP801-40312-1                                           |
| AC Voltage                               |               | (1 ~ 1 000) V                 | 0.58 mV/V                                                          |                                                                  |
|                                          |               |                               |                                                                    |                                                                  |
| AC Current                               |               | (10 Hz ~ 1 kHz)               |                                                                    | DMM, Current<br>Transformer<br>/ CP801-40312-2                   |
|                                          |               | 1 mA ~ 20 A                   | 0.73 mA/A                                                          |                                                                  |
| Frequency                                |               | (10 ~ 1 000) Hz               | 10 $\mu$ Hz/Hz                                                     |                                                                  |
| AC Current Source                        | 40313         | (50 ~ 60) Hz                  |                                                                    | High Voltage Meter,<br>Decade box<br>/ CP801-40313-1             |
| AC Current                               |               | 100 A ~ 10 kA                 | 3.0 mA/A                                                           |                                                                  |
|                                          |               |                               |                                                                    |                                                                  |
| Puncture/ safety testers                 | 40313         |                               |                                                                    |                                                                  |
| DC voltage                               |               | 0 V                           | 0.58 V                                                             |                                                                  |
|                                          |               | (0 ~ 20) kV                   | 0.52 V/kV                                                          |                                                                  |
|                                          |               | (20 ~ 60) kV                  | 1.5 V/kV                                                           |                                                                  |
|                                          |               | (60 ~ 100) kV                 | 6.2 V/kV                                                           |                                                                  |
|                                          |               | (100 ~ 375) kV                | 31 V/kV                                                            |                                                                  |
| AC voltage                               |               | 0 V                           | 0.58 V                                                             |                                                                  |
| (60 Hz)                                  |               | (0 ~ 40) kV                   | 1.1 V/kV                                                           |                                                                  |
|                                          |               | (40 ~ 100) kV                 | 10 V/kV                                                            |                                                                  |
|                                          |               | (100 ~ 250) kV                | 35 V/kV                                                            |                                                                  |
| Breaking current                         |               | 0.5 mA                        | 5.4 $\mu$ A                                                        |                                                                  |
|                                          |               | 1.0 mA                        | 11 $\mu$ A                                                         |                                                                  |
|                                          |               | 2.0 mA                        | 22 $\mu$ A                                                         |                                                                  |
|                                          |               | 5.0 mA                        | 54 $\mu$ A                                                         |                                                                  |
|                                          |               | 10.0 mA                       | 0.11 mA                                                            |                                                                  |
|                                          |               | 100 mA                        | 1.1 mA                                                             |                                                                  |
| Insulation resistance                    |               | 0 $\Omega$ ~ 10 M $\Omega$    | 1.3 m $\Omega/\Omega$                                              |                                                                  |
|                                          |               | (10 ~ 100) M $\Omega$         | 1.4 m $\Omega/\Omega$                                              |                                                                  |
|                                          |               | 100 M $\Omega$ ~ 1 G $\Omega$ | 3.0 m $\Omega/\Omega$                                              |                                                                  |
|                                          |               | (1 ~ 10) G $\Omega$           | 3.1 m $\Omega/\Omega$                                              |                                                                  |
| Operating time                           |               | (0 ~ 60) s                    | 0.07 s                                                             |                                                                  |

## 403. AC voltage, current &amp; power

| Measured Quantity<br>Instrument or Gauge                                                                                                                                    | Field<br>Code | Range                                                                                                                                                                                                            | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                     | Standard/Method of<br>Measurement etc.                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power recorders<br>AC power/analogue<br><br>AC power/digital                                                                                                                | 40314         | 60 W<br>600 W<br>6 kW<br>30 kW<br><br>60 W<br>600 W<br>6 kW<br>30 kW                                                                                                                                             | 10 mW<br>0.11 W<br>1.2 W<br>16 W<br><br>7.7 mW<br>67 mW<br>0.83 W<br>5.7 W                                             | Power calibrator<br>/ CP801-40314-1                                                                                                                            |
| Current transformer test sets<br>Current transformer test sets<br>Ratio error<br><br>Phase Angle error<br><br>Burden<br>VA<br><br>Power Factor<br><br>Ratio Tester<br>Ratio | 40315         | (5 ~ 50) A<br>(-19.99 ~ + 19.99) %<br>(50 ~ 10 000) A<br>(-19.99 ~ + 19.99) %<br><br>(5 ~ 50) A<br>(-680 ~ + 680)'<br>(50 ~ 10 000) A<br>(-680 ~ + 680)'<br><br>(0.125 ~ 600) VA<br><br>0.8 ~ 1.0<br><br>5 ~ 700 | 0.018 %<br><br>0.011 %<br><br>0.9'<br>0.7'<br><br>$7.0 \times 10^{-3}$<br>$1.0 \times 10^{-3}$<br>$2.0 \times 10^{-4}$ | Wide ratio CT, STD.<br>CT, CT Compomator,<br>/ CP801-40315-1<br><br>Precision power<br>analyzer<br>/ CP801-40315-2<br><br>Ratio Transformer<br>/ CP801-40315-3 |
| Current / turn current coil<br>transformers<br>Ratio error<br><br>Phase Angle error                                                                                         | 40316         | (5 ~ 50) A<br>(-19.99 ~ + 19.99) %<br>(50 ~ 10 000) A<br>(-19.99 ~ + 19.99) %<br><br>(5 ~ 50) A<br>(-680 ~ + 680)'<br>(50 ~ 10 000) A<br>(-680 ~ + 680)'                                                         | 0.016 %<br><br>0.008 %<br><br>0.80'<br>0.55'                                                                           | CT Compomator<br>/ CP801-40316-1                                                                                                                               |
| LF thermal voltage<br>converters<br>AC Voltage                                                                                                                              | 40317         | (10 Hz ~ 10 kHz)<br>100 mV<br>1 V<br>10 V<br>100 V<br>1 000 V                                                                                                                                                    | 32 $\mu$ V/V<br>12 $\mu$ V/V<br>16 $\mu$ V/V<br>26 $\mu$ V/V<br>34 $\mu$ V/V                                           | AC/DC Transfer STD.<br>/ CP801-40317-1                                                                                                                         |

## 403. AC voltage, current &amp; power

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|-------------------|--------------------------------------------------------------------|----------------------------------------|
| AC voltmeters                            | 40318         | (10 Hz ~ 1 kHz)   |                                                                    |                                        |
| AC Voltmeter                             |               | (10 ~ 100) mV     | 1.5 mV/V                                                           | Calibrator<br>/ CP801-40318-1          |
|                                          |               | 100 mV ~ 1 V      | 44 $\mu$ V/V                                                       |                                        |
|                                          |               | (1 ~ 10) V        | 71 $\mu$ V/V                                                       |                                        |
|                                          |               | (10 ~ 100) V      | 52 $\mu$ V/V                                                       |                                        |
|                                          |               | 10 mV ~ 1 000 V   | 47 $\mu$ V/V                                                       |                                        |
| AC Differential Voltmeter                |               | (40 Hz ~ 1 kHz)   |                                                                    | Calibrator                             |
|                                          |               | (1 ~ 10) V        | 69 $\mu$ V/V                                                       | / CP801-40318-2                        |
|                                          |               | (10 ~ 100) V      | 83 $\mu$ V/V                                                       |                                        |
|                                          |               | (100 ~ 1 000) V   | 0.10 mV/V                                                          |                                        |
| AC RMS voltmeter                         |               |                   |                                                                    | Calibrator                             |
| Voltage                                  |               | (10 Hz)           |                                                                    | / CP801-40318-3                        |
|                                          |               | (0 ~ 1) mV        | 5.8 mV/V                                                           |                                        |
|                                          |               | (1 ~ 10) mV       | 0.85 mV/V                                                          |                                        |
|                                          |               | 10 mV ~ 1 000 V   | 0.40 mV/V                                                          |                                        |
|                                          |               | (10 Hz ~ 10 kHz)  |                                                                    |                                        |
|                                          |               | (0 ~ 1) mV        | 4.9 mV/V                                                           |                                        |
|                                          |               | (1 ~ 10) mV       | 0.67 mV/V                                                          |                                        |
|                                          |               | 10 mV ~ 1 000 V   | 0.20 mV/V                                                          |                                        |
|                                          |               | (10 ~ 100) kHz    |                                                                    |                                        |
|                                          |               | (0 ~ 1) mV        | 7.6 mV/V                                                           |                                        |
|                                          |               | (1 ~ 10) mV       | 1.0 mV/V                                                           |                                        |
|                                          |               | 10 mV ~ 100 V     | 0.42 mV/V                                                          |                                        |
|                                          |               | (100 kHz ~ 1 MHz) |                                                                    |                                        |
|                                          |               | (1 ~ 100) mV      | 4.2 mV/V                                                           |                                        |
|                                          |               | 100 mV ~ 10 V     | 3.1 mV/V                                                           |                                        |
|                                          |               | (1 ~ 30) MHz      |                                                                    |                                        |
|                                          |               | 100 mV ~ 1 V      | 21 mV/V                                                            |                                        |
| Level                                    |               | (10 Hz ~ 1 kHz)   |                                                                    |                                        |
|                                          |               | (+ 50 ~ -50) dBm  | 0.016 dB                                                           |                                        |
|                                          |               | (-50 ~ -60) dBm   | 0.038 dB                                                           |                                        |
|                                          |               | (-60 ~ -80) dBm   | 0.055 dB                                                           |                                        |
|                                          |               | (1 ~ 100) kHz     |                                                                    |                                        |
|                                          |               | (+ 40 ~ -50) dBm  | 0.016 dB                                                           |                                        |
|                                          |               | (-50 ~ -60) dBm   | 0.042 dB                                                           |                                        |
|                                          |               | (-60 ~ -80) dBm   | 0.058 dB                                                           |                                        |
|                                          |               | (100 kHz ~ 1 MHz) |                                                                    |                                        |
|                                          |               | (+ 20 ~ -40) dBm  | 0.034 dB                                                           |                                        |
|                                          |               | (-40 ~ -80) dBm   | 0.077 dB                                                           |                                        |
|                                          |               | (1 ~ 30) MHz      |                                                                    |                                        |
|                                          |               | (+ 10 ~ 0) dBm    | 0.090 dB                                                           |                                        |

## 403. AC voltage, current &amp; power

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|------------------------|--------------------------------------------------------------------|----------------------------------------|
| Watt hour meters                         | 40319         | (50 ~ 60) Hz           |                                                                    | Watt hour meter                        |
| Watt hour meters                         |               | (0 ~ 527.8) Wh         | $1.5 \times 10^{-4}$                                               | / CP801-40319-1                        |
|                                          |               | (527.8 ~ 1 266.7) Wh   | $1.7 \times 10^{-4}$                                               |                                        |
| VA hour meter                            |               | (50 ~ 60) Hz           |                                                                    | VA hour meter                          |
|                                          |               | (0 ~ 527.8) VAh        | $1.5 \times 10^{-4}$                                               | / CP801-40319-2                        |
|                                          |               | (527.8 ~ 1 266.7) VAh  | $1.7 \times 10^{-4}$                                               |                                        |
| Var hour meters                          |               | (50 ~ 60) Hz           |                                                                    | Var hour meter                         |
|                                          |               | (0 ~ 527.8) varh       | $1.5 \times 10^{-4}$                                               | / CP801-40319-3                        |
|                                          |               | (527.8 ~ 1 266.7) varh | $1.7 \times 10^{-4}$                                               |                                        |
| Reference watt hour meters               |               |                        |                                                                    | Reference watt hour                    |
| Active Power                             |               | (50 ~ 60) Hz           |                                                                    | meter                                  |
|                                          |               | (60 ~ 440) V           |                                                                    | / CP801-40319-4                        |
|                                          |               | (0.05 ~ 120) A         |                                                                    |                                        |
|                                          |               | (0.25 ~ 1)             |                                                                    |                                        |
|                                          |               | (-100 ~ 100) %         | 0.010 %                                                            |                                        |
|                                          |               | (50 ~ 60) Hz           |                                                                    |                                        |
|                                          |               | (60 ~ 440) V           |                                                                    |                                        |
|                                          |               | (0.05 ~ 120) A         |                                                                    |                                        |
|                                          |               | (-1 ~ 0.25)            |                                                                    |                                        |
|                                          |               | (-100 ~ 100) %         | 0.021 %                                                            |                                        |
| Reactive Power                           |               | 60 Hz                  |                                                                    |                                        |
|                                          |               | (120 ~ 600) V          |                                                                    |                                        |
|                                          |               | (0.2 ~ 200) A          |                                                                    |                                        |
|                                          |               | (0.5 ~ 1)              |                                                                    |                                        |
|                                          |               | (0 ~ 60)°              |                                                                    |                                        |
|                                          |               | (-100 ~ 100) %         | 0.003 %                                                            |                                        |
|                                          |               | 60 Hz                  |                                                                    |                                        |
|                                          |               | (60 ~ 440) V           |                                                                    |                                        |
|                                          |               | (0.05 ~ 0.5) A         |                                                                    |                                        |
|                                          |               | (-1 ~ 1)               |                                                                    |                                        |
|                                          |               | (-100 ~ 100) %         | 0.031 %                                                            |                                        |
|                                          |               | 60 Hz                  |                                                                    |                                        |
|                                          |               | (60 ~ 440) V           |                                                                    |                                        |
|                                          |               | (0.5 ~ 120) A          |                                                                    |                                        |
|                                          |               | (-1 ~ 1)               |                                                                    |                                        |
|                                          |               | (-100 ~ 100) %         | 0.021 %                                                            |                                        |
|                                          |               | (120 ~ 600) V          |                                                                    |                                        |
|                                          |               | (0.2 ~ 200) A          |                                                                    |                                        |
|                                          |               | (0.5 ~ 1)              |                                                                    |                                        |
|                                          |               | (30 ~ 90)°             |                                                                    |                                        |
|                                          |               | (-100 ~ 100) %         | 0.003 %                                                            |                                        |
| Apparent Power                           |               | 60 Hz                  |                                                                    |                                        |
|                                          |               | (120 ~ 600) V          |                                                                    |                                        |
|                                          |               | (0.2 ~ 200) A          |                                                                    |                                        |
|                                          |               | (0.5 ~ 1)              |                                                                    |                                        |
|                                          |               | (0 ~ 60)°              |                                                                    |                                        |
|                                          |               | (-100 ~ 100) %         | 0.003 %                                                            |                                        |

## 403. AC voltage, current &amp; power

| Measured Quantity<br>Instrument or Gauge                   | Field<br>Code | Range                                                                                | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.          |
|------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------|
| Watt hour meters<br>Reference watt hour meters<br>DC Power | 40319         | (30 ~ 1 000) V<br>1 mA ~ 900 A<br>(-100 ~ 100) %                                     | 0.023 %                                                            | Reference watt hour<br>meter<br>/ CP801-40319-4 |
| Watthour meter test systems<br>Active Power                |               | (50 ~ 60) Hz<br>(63.51 ~ 380) V<br>(0.05 ~ 120) A<br>(0.25 ~ 1)<br>(-100 ~ 100) %    | 0.010 %                                                            | Reference watt hour<br>meter<br>/ CP801-40319-5 |
|                                                            |               | (50 ~ 60) Hz<br>(63.51 ~ 380) V<br>(0.05 ~ 120) A<br>(-1 ~ 0.25)<br>(-100 ~ 100) %   | 0.021 %                                                            |                                                 |
|                                                            |               | 60 Hz<br>(120 ~ 600) V<br>(0.2 ~ 200) A<br>(0.5 ~ 1)<br>(0 ~ 60)°<br>(-100 ~ 100) %  | 0.003 %                                                            |                                                 |
| Reactive Power                                             |               | 60 Hz<br>(120 ~ 600) V<br>(0.2 ~ 200) A<br>(0.5 ~ 1)<br>(30 ~ 90)°<br>(-100 ~ 100) % | 0.003 %                                                            |                                                 |
| Apparent Power                                             |               | 60 Hz<br>(120 ~ 600) V<br>(0.2 ~ 200) A<br>(0.5 ~ 1)<br>(0 ~ 60)°<br>(-100 ~ 100) %  | 0.003 %                                                            |                                                 |
| DC Power                                                   |               | (30 ~ 500) V<br>5 A<br>(-100 ~ 100) %<br>200 V<br>1 mA~ 120 A<br>(-100 ~ 100) %      | 0.039 %<br><br>0.080 %                                             |                                                 |
|                                                            |               |                                                                                      |                                                                    |                                                 |
|                                                            |               |                                                                                      |                                                                    |                                                 |
|                                                            |               |                                                                                      |                                                                    |                                                 |

## 403. AC voltage, current &amp; power

| Measured Quantity<br>Instrument or Gauge                                                                                                                                                                                                                                                                                                                                                                                  | Field<br>Code | Range                                                                                                                                                                                                                                                    | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                        | Standard/Method of<br>Measurement etc.                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Pulsed high voltage &<br>current meters/Welding<br>current meters<br>Resistance Welding Current<br>Meter<br>AC Resistance Welding<br>Current<br><br>AC Resistance Welding<br>Voltage<br><br>DC Resistance Welding<br>Current<br><br>DC Resistance Welding<br>Voltage<br><br>Arc Welding Current meter<br>AC Arc Welding Current<br><br>AC Arc Welding Voltage<br><br>DC Arc Welding Current<br><br>DC Arc Welding Voltage | 40320         | (40 Hz ~ 1 kHz)<br><br>1 A ~ 15 kA<br>(15 ~ 25) kA<br><br>(40 Hz ~ 1 kHz)<br>0 mV ~ 10 V<br><br>1 A ~ 20 kA<br><br>0 mV ~ 10 V<br><br>(10 Hz ~ 10 kHz)<br>(1 ~ 1 000) A<br><br>(10 Hz ~ 10 kHz)<br>0 mV ~ 100 V<br><br>(1 ~ 1 000) A<br><br>0 mV ~ 100 V | <br><br>10 mA/A<br>12 mA/A<br><br>0.6 mV/V<br><br>10 mA/A<br><br>0.6 mV/V<br><br>2.4 mA/A<br><br>0.6 mV/V<br><br>1.6 mA/A<br><br>0.6 mV/V | Monitoring sys.<br>Calibrator<br>/ CP801-40320-1<br><br><br><br><br><br><br><br>Monitoring sys.,<br>Calibrator<br>/ CP801-40320-2 |
| Ratio transformers<br><br>Ratio                                                                                                                                                                                                                                                                                                                                                                                           | 40321         | (0 ~ 1 000)                                                                                                                                                                                                                                              | <br><br>$4.0 \times 10^{-5}$                                                                                                              | Calibrator,DMM<br>null detector<br>bridge<br>/ CP801-40321-1                                                                      |



## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                                           | Field<br>Code | Range              | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                           |
|------------------------------------------------------------------------------------|---------------|--------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------|
| LF amplifiers                                                                      | 40401         |                    |                                                                    |                                                                                  |
| LF amplifier<br>Gain(DC)                                                           |               | (0 ~ 60) dB        | 0.005 dB                                                           | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>Calibrator<br>/ CP801-40401-1 |
| Gain(AC)                                                                           |               | 0.5 Hz<br>1 mV     |                                                                    |                                                                                  |
|                                                                                    |               | (0 ~ 60) dB        | 0.035 dB                                                           |                                                                                  |
|                                                                                    |               | (1 mV ~ 10 V)      |                                                                    |                                                                                  |
|                                                                                    |               | (0 ~ 60) dB        | 0.008 dB                                                           |                                                                                  |
|                                                                                    |               | 0.5 Hz ~ 100 kHz   |                                                                    |                                                                                  |
|                                                                                    |               | 1 mV               |                                                                    |                                                                                  |
|                                                                                    |               | (0 ~ 60) dB        | 0.045 dB                                                           |                                                                                  |
|                                                                                    |               | (1 mV ~ 100 V)     |                                                                    |                                                                                  |
|                                                                                    |               | (0 ~ 60) dB        | 0.009 dB                                                           |                                                                                  |
|                                                                                    |               | 100 kHz ~ 1 MHz    |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40401-2               |
|                                                                                    |               | 1 mV ~ 10 V        |                                                                    |                                                                                  |
|                                                                                    |               | (0 ~ 60) dB        | 0.040 dB                                                           |                                                                                  |
|                                                                                    |               | 1 MHz ~ 10 MHz     |                                                                    |                                                                                  |
|                                                                                    |               | (1 mV ~ 3.162 3 V) |                                                                    |                                                                                  |
|                                                                                    |               | (0 ~ 60) dB        | 0.052 dB                                                           |                                                                                  |
| Frequency                                                                          |               | (1 Hz ~ 10 MHz)    | $6.0 \times 10^{-7}$                                               |                                                                                  |
| Charge/voltage Amplifier<br>Gain                                                   |               | 20 Hz              |                                                                    |                                                                                  |
|                                                                                    |               | (-30 ~ 0) dB       | 0.010 dB                                                           |                                                                                  |
|                                                                                    |               | (0 ~ 60) dB        | 0.045 dB                                                           |                                                                                  |
|                                                                                    |               | (20 Hz ~ 10 kHz)   |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40401-3               |
|                                                                                    |               | (-30 ~ 0) dB       | 0.009 dB                                                           |                                                                                  |
|                                                                                    |               | (0 ~ 60) dB        | 0.036 dB                                                           |                                                                                  |
|                                                                                    |               | (10 ~ 100) kHz     |                                                                    |                                                                                  |
|                                                                                    |               | (-30 ~ 0) dB       | 0.011 dB                                                           |                                                                                  |
|                                                                                    |               | (0 ~ 60) dB        | 0.041 dB                                                           |                                                                                  |
| Current probe and current<br>probe amplifier for<br>oscilloscope<br>Current (Ap-p) |               | (DC ~ 1 kHz)       |                                                                    |                                                                                  |
|                                                                                    |               | (1 ~ 100) mA       | 7.5 mA/A                                                           |                                                                                  |
|                                                                                    |               | 100 mA ~ 1 A       | 6.5 mA/A                                                           |                                                                                  |
|                                                                                    |               | (1 ~ 20) A         | 7.7 mA/A                                                           |                                                                                  |
|                                                                                    |               | (20 ~ 150) A       | 7.8 mA/A                                                           |                                                                                  |
| Bandwidth                                                                          |               | (DC ~ 100 kHz)     |                                                                    |                                                                                  |
|                                                                                    |               | (1 ~ 100) mA       | 6.8 mA/A                                                           |                                                                                  |
|                                                                                    |               | (100 kHz ~ 1 MHz)  |                                                                    |                                                                                  |
|                                                                                    |               | (1 ~ 100) mA       | 9.8 mA/A                                                           |                                                                                  |
|                                                                                    |               | (1 ~ 30) MHz       |                                                                    |                                                                                  |
|                                                                                    |               | (1 ~ 100) mA       | 11 mA/A                                                            |                                                                                  |
|                                                                                    |               | (30 ~ 50) MHz      |                                                                    |                                                                                  |
|                                                                                    |               | (1 ~ 100) mA       | 13 mA/A                                                            |                                                                                  |
| Rise time                                                                          |               | $\leq 7$ ns        | 0.64 ns                                                            |                                                                                  |

(49/124)

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                                                                                                                                                                                                            | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                                                                                                                         | Standard/Method of<br>Measurement etc.                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Multimeter calibrators<br>Multi Function Calibrator<br>Frequency (output)<br>AC Voltage (output)<br>DC Voltage (input)<br>DC Current (input)<br>Resistance (input)<br>Frequency (input)<br>AC Voltage (input)                                       | 40403         | 10 Hz ~ 1 MHz<br>(10 Hz ~ 1 kHz)<br>100 mV ~ 1 000 V<br>(1 ~ 100) kHz<br>100 mV ~ 1 000 V<br>$\pm(0 \sim 100)$ mV<br>$\pm(100 \text{ mV} \sim 10 \text{ V})$<br>$\pm(10 \sim 1 000)$ V<br>$\pm(0 \sim 1)$ A<br>1 $\Omega$ ~ 100 k $\Omega$<br>100 k $\Omega$ ~ 1 M $\Omega$<br>10 Hz ~ 100 kHz<br>(10 Hz ~ 1 kHz)<br>(1 ~ 1 000) V<br>(1 kHz ~ 100 kHz)<br>(1 ~ 1 000 V)                                                                                                                                                                                       | 10 $\mu\text{Hz/Hz}$<br>0.11 mV/V<br>0.19 mV/V<br>10 $\mu\text{V/V}$<br>9.7 $\mu\text{V/V}$<br>10 $\mu\text{V/V}$<br>12 $\mu\text{A/A}$<br>9.8 $\mu\Omega/\Omega$<br>9.8 $\mu\Omega/\Omega$<br>84 $\mu\text{Hz/Hz}$<br>93 $\mu\text{V/V}$<br>0.13 mV/V                                                                                                                                     | DC STD, AC/DC<br>Transfer STD,<br>STD. Resistor,<br>DMM, calibrator<br>/ CP801-40403-2 |
| Oscilloscope calibrators<br>Reference frequency<br>Output frequency<br>DC voltage<br>DC current<br>AC voltage(Vp-p)<br>Time marker period<br>Flatness voltage (Vp-p)<br>Flatness decibel (dB)<br>Rising time, falling time<br>Impedance Measurement | 40404         | 1 MHz, 10 MHz<br>100 Hz ~ 6 GHz<br>(1 ~ 10) mV<br>10 mV ~ 200 V<br>100 $\mu\text{A}$ ~ 100 mA<br>100 mA ~ 10 A<br>(100 Hz ~ 10 kHz)<br>(1 ~ 10) mV<br>10 mV ~ 100 V<br>(100 ~ 200) V<br>1 ns ~ 5 s<br>(50 ~ 100) kHz<br>100 mV ~ 1 V<br>(100 kHz ~ 1 MHz)<br>100 mV ~ 1 V<br>(1 MHz ~ 1 GHz)<br>100 mV ~ 1 V<br>(1 GHz ~ 6 GHz)<br>100 mV ~ 1 V<br>(50 ~ 100) kHz<br>(+10 ~ -10) dB<br>(100 kHz ~ 1 MHz)<br>(+10 ~ -10) dB<br>(1 MHz ~ 1 GHz)<br>(+10 ~ -10) dB<br>(1 ~ 6) GHz<br>(+10 ~ -10) dB<br>$\geq 100$ ps<br>(1 ~ 100) $\Omega$<br>(1 ~ 19) M $\Omega$ | $6.1 \times 10^{-11}$<br>$6.1 \times 10^{-10}$<br>0.65 $\mu\text{V/V}$<br>12 $\mu\text{V/V}$<br>59 $\mu\text{A/A}$<br>0.25 mA/A<br>75 $\mu\text{V/V}$<br>17 $\mu\text{V/V}$<br>59 $\mu\text{V/V}$<br>$6.1 \times 10^{-8}$<br>2.6 mV/V<br>7.1 mV/V<br>14 mV/V<br>17 mV/V<br>0.013 dB<br>0.031 dB<br>0.063 dB<br>0.074 dB<br>$6.0 \times 10^{-3}$<br>10 m $\Omega$<br>0.25 m $\Omega/\Omega$ | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40404-1                     |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                  |
|------------------------------------------|---------------|-----------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------------|
| Video signal generators                  | 40406         |                                   |                                                                    | Frequency Couter,<br>Video Analyzer,<br>Oscilloscope<br>/ CP801-40406-1 |
| Color pattern generators                 |               |                                   |                                                                    |                                                                         |
| Frequency<br>(NTSC/PAL/SECAM)            |               | 1 MHz ~ 1.3 GHz<br>50 Hz ~ 20 kHz | $5.8 \times 10^{-8}$<br>$5.8 \times 10^{-5}$                       |                                                                         |
| Luminance<br>(NTSC/PAL)                  |               | (0.05 ~ 0.1) V<br>(0.1 ~ 0.95) V  | $7.0 \times 10^{-3}$<br>$6.6 \times 10^{-3}$                       |                                                                         |
| Chrominance<br>(NTSC/PAL)                |               | (0.05 ~ 0.1) V<br>(0.1 ~ 0.95) V  | $9.0 \times 10^{-3}$<br>$8.4 \times 10^{-3}$                       |                                                                         |
| Time                                     |               | (10 ~ 100) ns<br>100 ns ~ 1 ms    | $6.0 \times 10^{-3}$<br>$6.0 \times 10^{-3}$                       |                                                                         |
| Phase                                    |               | (0 ~ 360)°                        | 0.80°                                                              |                                                                         |
| Video signal generators                  |               |                                   |                                                                    | Frequency Couter,<br>Video Analyzer,<br>Oscilloscope<br>/ CP801-40406-2 |
| VGA/SD/HD                                |               |                                   |                                                                    |                                                                         |
| Y Level                                  |               | (0 ~ 0.1) V<br>(0.1 ~ 1) V        | $7.0 \times 10^{-3}$<br>$6.6 \times 10^{-3}$                       |                                                                         |
| Pb Pr Level(Positive)                    |               | (0 ~ 0.1) V<br>(0.1 ~ 1) V        | $7.0 \times 10^{-3}$<br>$6.6 \times 10^{-3}$                       |                                                                         |
| Pb Pr Level(Negative)                    |               | (0 ~ 0.1) V<br>(0.1 ~ 1) V        | $7.0 \times 10^{-3}$<br>$6.6 \times 10^{-3}$                       |                                                                         |
| Positive Sync Level                      |               | (0.2 ~ 0.4) V                     | 0.6 mV                                                             |                                                                         |
| Negative Sync Level                      |               | (0.2 ~ 0.4) V                     | 0.6 mV                                                             |                                                                         |
| R G B Level                              |               | (0.5 ~ 1) V                       | 0.6 mV                                                             |                                                                         |
| R G B Sync Level                         |               | (4 ~ 6) V                         | 6 mV                                                               |                                                                         |
| Frequency                                |               | 1 MHz ~ 1.3 GHz                   | $5.8 \times 10^{-8}$                                               |                                                                         |
| Time                                     |               | 10 ns ~ 100 ns<br>100 ns ~ 1 ms   | $6.0 \times 10^{-3}$<br>$6.0 \times 10^{-3}$                       |                                                                         |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range              | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                             |
|------------------------------------------|---------------|--------------------|--------------------------------------------------------------------|--------------------------------------------------------------------|
| Audio distortion analyzers/<br>meters    | 40407         |                    |                                                                    |                                                                    |
| Audio distortion analyzers               |               | (10 Hz ~ 1 kHz)    |                                                                    | Calibrator,<br>Distortion Meter<br>Calibrator<br>/ CP801-40407-1   |
| Voltage                                  |               | (0.1 ~ 10) mV      | 4.8 mV/V                                                           |                                                                    |
|                                          |               | (1 kHz ~ 100 kHz)  |                                                                    |                                                                    |
|                                          |               | (0.1 ~ 10) mV      | 3.2 mV/V                                                           |                                                                    |
|                                          |               | (10 Hz ~ 1 kHz)    |                                                                    |                                                                    |
|                                          |               | 10 mV ~ 10 V       | 2.8 mV/V                                                           |                                                                    |
|                                          |               | (1 ~ 100) kHz      |                                                                    |                                                                    |
|                                          |               | 10 mV ~ 10 V       | 2.2 mV/V                                                           |                                                                    |
|                                          |               | (100 kHz ~ 10 MHz) |                                                                    |                                                                    |
|                                          |               | 10 mV ~ 10 V       | 8.8 mV/V                                                           |                                                                    |
|                                          |               | (20 Hz ~ 1 kHz)    |                                                                    |                                                                    |
|                                          |               | (10 ~ 1 000) V     | 7.7 mV/V                                                           |                                                                    |
|                                          |               | (1 ~ 100) kHz      |                                                                    |                                                                    |
|                                          |               | (10 ~ 1 000) V     | 9.8 mV/V                                                           |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               | (10 Hz ~ 10 kHz)   |                                                                    |                                                                    |
|                                          |               | (+ 50 ~ + 20) dB   | 0.055 dB                                                           |                                                                    |
|                                          |               | (10 Hz ~ 10 kHz)   |                                                                    |                                                                    |
|                                          |               | (+ 20 ~ -50) dB    | 0.025 dB                                                           |                                                                    |
|                                          |               | (10 Hz ~ 10 kHz)   |                                                                    |                                                                    |
|                                          |               | (-50 ~ -80) dB     | 0.068 dB                                                           |                                                                    |
|                                          |               | (10 kHz ~ 10 MHz)  |                                                                    |                                                                    |
|                                          |               | (+ 20 ~ -50) dB    | 0.033 dB                                                           |                                                                    |
|                                          |               | (10 kHz ~ 10 MHz)  |                                                                    |                                                                    |
|                                          |               | (-50 ~ -80) dB     | 0.077 dB                                                           |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               | (10 Hz ~ 1 kHz)    |                                                                    |                                                                    |
|                                          |               | (0 ~ -40) dB       | 0.029 dB                                                           |                                                                    |
|                                          |               | (-40 ~ -60) dB     | 0.037 dB                                                           |                                                                    |
|                                          |               | (-60 ~ -90) dB     | 0.063 dB                                                           |                                                                    |
|                                          |               | (1 kHz ~ 100 kHz)  |                                                                    |                                                                    |
|                                          |               | (0 ~ -40) dB       | 0.037 dB                                                           |                                                                    |
|                                          |               | (-40 ~ -60) dB     | 0.057 dB                                                           |                                                                    |
|                                          |               | (-60 ~ -90) dB     | 0.073 dB                                                           |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               | (20 Hz ~ 1 MHz)    |                                                                    |                                                                    |
|                                          |               | (+ 10 ~ -10) dBc   | 0.038 dB                                                           |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               | (10 Hz ~ 10 kHz)   |                                                                    |                                                                    |
|                                          |               | (+ 20 ~ -50) dB    | 0.018 dB                                                           |                                                                    |
|                                          |               | (10 kHz ~ 100 kHz) |                                                                    |                                                                    |
|                                          |               | (+ 20 ~ -50) dB    | 0.022 dB                                                           |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               | (10 Hz ~ 100 kHz)  |                                                                    |                                                                    |
|                                          |               | (0 ~ -40) dB       | 0.025 dB                                                           |                                                                    |
|                                          |               | (10 Hz ~ 100 kHz)  |                                                                    |                                                                    |
|                                          |               | (-40 ~ -50) dB     | 0.033 dB                                                           |                                                                    |
|                                          |               | (10 Hz ~ 100 kHz)  |                                                                    |                                                                    |
|                                          |               | (-50 ~ -80) dB     | 0.055 dB                                                           |                                                                    |
| Distortion meter calibrators             |               |                    |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40407-2 |
| Level                                    |               |                    |                                                                    |                                                                    |
|                                          |               | (10 Hz ~ 10 kHz)   |                                                                    |                                                                    |
|                                          |               | (+ 20 ~ -50) dB    | 0.018 dB                                                           |                                                                    |
|                                          |               | (10 kHz ~ 100 kHz) |                                                                    |                                                                    |
|                                          |               | (+ 20 ~ -50) dB    | 0.022 dB                                                           |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               | (10 Hz ~ 100 kHz)  |                                                                    |                                                                    |
|                                          |               | (0 ~ -40) dB       | 0.025 dB                                                           |                                                                    |
|                                          |               | (10 Hz ~ 100 kHz)  |                                                                    |                                                                    |
|                                          |               | (-40 ~ -50) dB     | 0.033 dB                                                           |                                                                    |
|                                          |               | (10 Hz ~ 100 kHz)  |                                                                    |                                                                    |
|                                          |               | (-50 ~ -80) dB     | 0.055 dB                                                           |                                                                    |
| Distortion                               |               |                    |                                                                    |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |
|                                          |               |                    |                                                                    |                                                                    |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                                 | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                      | Standard/Method of<br>Measurement etc.                             |
|--------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Audio distortion analyzers/<br>meters<br><br>Distortion meter<br>Voltage | 40407         | (10 Hz ~ 1 kHz)<br>(0.1 ~ 10) mV<br>(1 ~ 100) kHz<br>(0.1 ~ 10) mV<br>(10 Hz ~ 1 kHz)<br>10 mV ~ 10 V<br>(1 kHz ~ 100 kHz)<br>10 mV ~ 10 V<br>(100 kHz ~ 10 MHz)<br>10 mV ~ 10 V<br>(20 Hz ~ 1 kHz)<br>(10 ~ 1 000) V<br>(1 kHz ~ 100 kHz)<br>(10 ~ 1 000) V                                                                           | 4.8 mV/V<br>3.2 mV/V<br>2.8 mV/V<br>2.2 mV/V<br>8.8 mV/V<br>7.7 mV/V<br>9.8 mV/V                        | Calibrator,<br>Distortion Meter<br>Calibrator<br>/ CP801-40407-3   |
| dB                                                                       |               | (10 Hz ~ 1 kHz)<br>(+ 50 ~ + 20) dB<br>(10 Hz ~ 1 kHz)<br>(+ 20 ~ -50) dB<br>(10 Hz ~ 1 kHz)<br>(-50 ~ -80) dB<br>(10 kHz ~ 10 MHz)<br>(+ 20 ~ -50) dB<br>(10 kHz ~ 10 MHz)<br>(-50 ~ -80) dB                                                                                                                                          | 0.055 dB<br>0.025 dB<br>0.068 dB<br>0.033 dB<br>0.077 dB                                                |                                                                    |
| Distortion                                                               |               | (10 Hz ~ 1 kHz)<br>(0 ~ -40) dB<br>(-40 ~ -60) dB<br>(-60 ~ -90) dB<br>(1 kHz ~ 160 kHz)<br>(0 ~ -40) dB<br>(-40 ~ -60) dB<br>(-60 ~ -70) dB                                                                                                                                                                                           | 0.029 dB<br>0.037 dB<br>0.063 dB<br>0.037 dB<br>0.057 dB<br>0.073 dB                                    |                                                                    |
| LF filters<br>Filter characteristics                                     | 40408         | (10 Hz ~ 1 kHz)<br>(0 ~ -40) dB<br>(10 Hz ~ 1 kHz)<br>(-40 ~ -60) dB<br>(10 Hz ~ 1 kHz)<br>(-60 ~ -80) dB<br>(1 ~ 100) kHz<br>(0 ~ -40) dB<br>(1 ~ 100) kHz<br>(-40 ~ -60) dB<br>(1 ~ 100) kHz<br>(-60 ~ -80) dB<br>(100 kHz ~ 30 MHz)<br>(0 ~ -40) dB<br>(100 kHz ~ 30 MHz)<br>(-40 ~ -60) dB<br>(100 kHz ~ 30 MHz)<br>(-60 ~ -80) dB | 0.025 dB<br>0.033 dB<br>0.075 dB<br>0.028 dB<br>0.055 dB<br>0.088 dB<br>0.055 dB<br>0.083 dB<br>0.12 dB | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40408-1 |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                                                                         | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                     | Standard/Method of<br>Measurement etc.                                    |
|------------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| LF/Audio signal analyzers                | 40409         |                                                                                                                                                                                                                                               |                                                                                                                                        |                                                                           |
| LF signal analyzers                      |               |                                                                                                                                                                                                                                               |                                                                                                                                        | Frequency Couter,<br>Calibrator,<br>True RMS Voltmeter<br>/ CP801-40409-1 |
| Output frequency                         |               | 1 Hz ~ 1 MHz                                                                                                                                                                                                                                  | $6.1 \times 10^{-6}$                                                                                                                   |                                                                           |
| Output voltage                           |               | (10 Hz)<br>(1 ~ 10) mV<br>(10 ~ 100) mV<br>100 mV ~ 10 V<br>(10 ~ 30) V<br>(10 Hz ~ 10 kHz)<br>(1 ~ 10) mV<br>10 mV ~ 10 V<br>(10 ~ 30) V<br>(10 ~ 100) kHz<br>(1 ~ 10) mV<br>10 mV ~ 10 V<br>(10 ~ 30) V<br>(100 kHz ~ 1 MHz)<br>1 mV ~ 30 V | 1.2 mV/V<br>0.58 mV/V<br>0.39 mV/V<br>0.42 mV/V<br>0.86 mV/V<br>0.22 mV/V<br>0.32 mV/V<br>6.0 mV/V<br>1.0 mV/V<br>1.4 mV/V<br>7.1 mV/V |                                                                           |
| Output level                             |               | (10 Hz ~ 100 kHz)<br>(+ 30 ~ -50) dBm<br>(-50 ~ -60) dBm<br>(-60 ~ -80) dBm<br>(100 kHz ~ 1 MHz)<br>(+ 30 ~ -60) dBm<br>(-60 ~ -80) dBm                                                                                                       | 0.017 dB<br>0.038 dB<br>0.068 dB<br>0.063 dB<br>0.084 dB                                                                               |                                                                           |
| Input frequency                          |               | 1 Hz ~ 100 kHz                                                                                                                                                                                                                                | $6.1 \times 10^{-6}$                                                                                                                   |                                                                           |
| Input voltage                            |               | (10 Hz)<br>(0.1 ~ 1) mV<br>(1 ~ 10) mV<br>10 mV ~ 150 V<br>(10 Hz ~ 10 kHz)<br>(0.1 ~ 1) mV<br>(1 ~ 10) mV<br>10 mV ~ 150 V<br>(10 ~ 100) kHz<br>(0.1 ~ 1) mV<br>(1 ~ 10) mV<br>10 mV ~ 150 V<br>(100 kHz ~ 2 MHz)<br>10 mV ~ 10 V            | 5.8 mV/V<br>0.85 mV/V<br>0.40 mV/V<br>4.9 mV/V<br>0.67 mV/V<br>0.20 mV/V<br>7.6 mV/V<br>1.0 mV/V<br>0.42 mV/V<br>4.2 mV/V              |                                                                           |
| Input level                              |               | (10 Hz ~ 1 kHz)<br>(+ 50 ~ -50) dBm<br>(-50 ~ -60) dBm<br>(-60 ~ -80) dBm<br>(1 ~ 100) kHz<br>(+ 40 ~ -50) dBm<br>(-50 ~ -60) dBm<br>(-60 ~ -80) dBm<br>(100 kHz ~ 2 MHz)<br>(+ 20 ~ -60) dBm<br>(-60 ~ -80) dBm                              | 0.015 dB<br>0.038 dB<br>0.055 dB<br>0.016 dB<br>0.043 dB<br>0.058 dB<br>0.066 dB<br>0.077 dB                                           |                                                                           |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                                                                             | Field<br>Code | Range                                                                                                                                                                                                                                       | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                     | Standard/Method of<br>Measurement etc.                                    |
|----------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| LF/Audio signal analyzers<br>LF signal analyzers<br>Filter characteristics<br>(weight, low pass, high pass,<br>etc.) | 40409         | (10 Hz ~ 2 MHz)<br>(+ 10 ~ -40) dB<br>(-40 ~ -80) dB                                                                                                                                                                                        | 0.034 dB<br>0.077 dB                                                                                                                   | Frequency Couter,<br>Calibrator,<br>True RMS Voltmeter<br>/ CP801-40409-1 |
| Audio frequency analyzers<br>Output frequency                                                                        |               | 1 Hz ~ 500kHz                                                                                                                                                                                                                               | $6.1 \times 10^{-6}$                                                                                                                   | True RMS Voltmeter<br>/ CP801-40409-2                                     |
| Output voltage                                                                                                       |               | (10 Hz)<br>(1 ~ 10) mV<br>(10 ~ 100) mV<br>100 mV ~ 10 V<br>(10 ~ 30) V<br>(10 Hz ~ 10 kHz)<br>(1 ~ 10) mV<br>10 mV ~ 10 V<br>(10 ~ 30) V<br>(10 ~ 100) kHz<br>(1 ~ 10) mV<br>10 mV ~ 10 V<br>(10 ~ 30) V<br>(100 ~ 160) kHz<br>1 mV ~ 30 V | 1.2 mV/V<br>0.58 mV/V<br>0.39 mV/V<br>0.42 mV/V<br>0.86 mV/V<br>0.22 mV/V<br>0.32 mV/V<br>6.0 mV/V<br>1.0 mV/V<br>1.4 mV/V<br>7.1 mV/V |                                                                           |
| Output level                                                                                                         |               | (10 Hz ~ 100 kHz)<br>(+ 30 ~ -50) dBm<br>(-50 ~ -60) dBm<br>(-60 ~ -80) dBm<br>(100 ~ 160) kHz<br>(+ 30 ~ -60) dBm<br>(-60 ~ -80) dBm                                                                                                       | 0.017 dB<br>0.038 dB<br>0.068 dB<br>0.063 dB<br>0.084 dB                                                                               |                                                                           |
| Input Frequency                                                                                                      |               | 1 Hz ~ 500 kHz                                                                                                                                                                                                                              | $6.1 \times 10^{-6}$                                                                                                                   |                                                                           |
| Input voltage                                                                                                        |               | (10 Hz)<br>(0.1 ~ 1) mV<br>(1 ~ 10) mV<br>10 mV ~ 150 V<br>(10 Hz ~ 10 kHz)<br>(0.1 ~ 1) mV<br>(1 ~ 10) mV<br>10 mV ~ 150 V<br>(10 ~ 100) kHz<br>(0.1 ~ 1) mV<br>(1 ~ 10) mV<br>10 mV ~ 150 V<br>(100 ~ 500) kHz<br>10 mV ~ 10 V            | 5.8 mV/V<br>0.85 mV/V<br>0.40 mV/V<br>4.9 mV/V<br>0.67 mV/V<br>0.20 mV/V<br>7.6 mV/V<br>1.0 mV/V<br>0.42 mV/V<br>4.2 mV/V              |                                                                           |
| Input level                                                                                                          |               | (10 Hz ~ 1 kHz)<br>(+ 50 ~ -50) dBm<br>(-50 ~ -60) dBm<br>(-60 ~ -80) dBm<br>(1 ~ 100) kHz<br>(+ 40 ~ -50) dBm<br>(-50 ~ -60) dBm<br>(-60 ~ -80) dBm<br>(100 ~ 500) kHz<br>(+ 20 ~ -60) dBm<br>(-60 ~ -80) dBm                              | 0.015 dB<br>0.038 dB<br>0.055 dB<br>0.016 dB<br>0.043 dB<br>0.058 dB<br>0.066 dB<br>0.077 dB                                           |                                                                           |



## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                                                                                                                                                 | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                                             | Standard/Method of<br>Measurement etc.                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| LF/Audio signal analyzers<br>Audio frequency analyzers<br>Input DC voltage<br>Distortion<br><br>SINAD<br><br>S/N<br><br>Filter characteristics<br>(weight, low pass, high pass,<br>etc.) | 40409         | (-300 ~ +300) V<br><br>(10 Hz ~ 1 kHz)<br>(0 ~ -40) dB<br>(-40 ~ -50) dB<br>(-50 ~ -90) dB<br>(1 ~ 160) kHz<br>(0 ~ -40) dB<br>(-40 ~ -60) dB<br><br>(10 Hz ~ 301.5 kHz)<br>(+20 ~ -20) dB<br><br>(10 Hz ~ 10 kHz)<br>(0 ~ 50) dB<br>(50 ~ 90) dB<br>(10 ~ 500) kHz<br>(0 ~ 50) dB<br>(50 ~ 90) dB<br><br>(10 Hz ~ 500 kHz)<br>(+10 ~ -40) dB<br>(-40 ~ -80) dB                                                                                                        | 85 $\mu$ V/V<br><br>0.029 dB<br>0.037 dB<br>0.063 dB<br><br>0.037 dB<br>0.057 dB<br><br>0.055 dB<br><br>0.055 dB<br>0.025 dB<br><br>0.077 dB<br>0.034 dB<br><br>0.034 dB<br>0.077 dB                                                                                                                           | True RMS Voltmeter<br>/ CP801-40409-2                              |
| Line frequency meters                                                                                                                                                                    | 40410         | (10 ~ 400) V<br>10 Hz ~ 1 kHz                                                                                                                                                                                                                                                                                                                                                                                                                                          | <br>1.9 mHz/Hz                                                                                                                                                                                                                                                                                                 | Calibrator<br>/ CP801-40410-1                                      |
| Function generators<br>Function generators<br>Reference frequency<br><br>Frequency<br>(Analogue)<br>(Digital)<br><br>Voltage<br><br><br><br><br><br><br><br><br><br>Level                | 40411         | 1 MHz, 10 MHz<br><br>1 mHz ~ 50 MHz<br>1 mHz ~ 50 MHz<br><br>(10 Hz)<br>(1 ~ 10) mV<br>(10 ~ 100) mV<br>100 mV ~ 20 V<br>(10 Hz ~ 10 kHz)<br>(1 ~ 10) mV<br>10 mV ~ 10 V<br>(10 ~ 20) V<br>(10 ~ 100) kHz<br>(1 ~ 10) mV<br>10 mV ~ 10 V<br>(10 ~ 20) V<br>(100 kHz ~ 1 MHz)<br>1 mV ~ 7 V<br>(1 ~ 50) MHz<br>1 mV ~ 7 V<br><br>(10 Hz ~ 100 kHz)<br>(+30 ~ -40) dBm<br>(-40 ~ -60) dBm<br>(-60 ~ -80) dBm<br>(100 kHz ~ 50 MHz)<br>(+30 ~ -60) dBm<br>(-60 ~ -80) dBm | <br><br>$6.1 \times 10^{-11}$<br><br>$6.1 \times 10^{-5}$<br>$6.1 \times 10^{-10}$<br><br>1.2 mV/V<br>0.58 mV/V<br>0.49 mV/V<br><br>0.86 mV/V<br>0.26 mV/V<br>0.39 mV/V<br><br>6.0 mV/V<br>1.0 mV/V<br>1.5 mV/V<br><br>7.6 mV/V<br>14 mV/V<br><br>0.017 dB<br>0.043 dB<br>0.072 dB<br><br>0.065 dB<br>0.084 dB | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40411-1 |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                             |
|------------------------------------------|---------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------|
| Function generators                      | 40411         |                                                                                                      |                                                                    |                                                                    |
| Function generators<br>Attenuation       |               | (100 Hz ~ 100 kHz)<br>(+ 30 ~ -70) dB                                                                | 0.06 dB                                                            | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40411-1 |
| Amplitude modulation                     |               | (0 ~ 100) %                                                                                          | $1.6 \times 10^{-2}$                                               |                                                                    |
| Frequency modulation                     |               | 1 Hz ~ 400 kHz                                                                                       | $1.6 \times 10^{-2}$                                               |                                                                    |
| Phase modulation                         |               | (-360 ~ + 360)°                                                                                      | 0.06°                                                              |                                                                    |
| DC offset                                |               | (-20 ~ 20) V                                                                                         | 84 $\mu$ V/V                                                       |                                                                    |
| rise time, fall time                     |               | 100 ps ~ 10 s                                                                                        | $6.1 \times 10^{-3}$                                               |                                                                    |
| Symmetry                                 |               | (0 ~ 100) %                                                                                          | $6.1 \times 10^{-2}$                                               |                                                                    |
| Sawtooth wave linearity                  |               | (0 ~ 100) %                                                                                          | $1.4 \times 10^{-3}$                                               |                                                                    |
| sync. TTL output( $V_{D-D}$ )            |               | (-20 ~ 20) V                                                                                         | $1.1 \times 10^{-3}$                                               |                                                                    |
| Sweep flatness                           |               | (DC ~ 50 MHz)<br>(-10 ~ 10) dB                                                                       | 0.66 dB                                                            |                                                                    |
| Distortion                               |               | (10 Hz ~ 1 kHz)<br>(0 ~ -40) dB<br>(-40 ~ -70) dB<br>(1 ~ 100) kHz<br>(0 ~ -40) dB<br>(-40 ~ -70) dB | 0.026 dB<br>0.071 dB<br>0.038 dB<br>0.081 dB                       |                                                                    |
| Harmonics                                |               | (10 Hz ~ 50 MHz)<br>(-10 ~ -80) dBc                                                                  | 0.56 dB                                                            |                                                                    |
| Square wave generators                   |               |                                                                                                      |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40411-2 |
| Period                                   |               |                                                                                                      |                                                                    |                                                                    |
| (Analogue)                               |               | 100 ps ~ 10 s                                                                                        | 8.4 ms/s                                                           |                                                                    |
| (Digital)                                |               | 100 ps ~ 10 s                                                                                        | $5.8 \times 10^{-9}$                                               |                                                                    |
| Pulse width                              |               | 100 ps ~ 10 s                                                                                        | 8.4 ms/s                                                           |                                                                    |
| rise time, fall time                     |               | 100 ps ~ 10 s                                                                                        | 8.4 ms/s                                                           |                                                                    |
| Overshoot                                |               | (0 ~ 100) %                                                                                          | 0.035                                                              |                                                                    |
| Undershoot                               |               | (0 ~ 100) %                                                                                          | 0.035                                                              |                                                                    |
| Settling Time                            |               | 100 ps ~ 10 s                                                                                        | 8.4 ms/s                                                           |                                                                    |
| Duty Ratio                               |               | (0 ~ 100) %                                                                                          | 0.058                                                              |                                                                    |
| Voltage ( $V_{D-D}$ )                    |               | 10 mV ~ 100 V                                                                                        | 10 mV/V                                                            |                                                                    |
| Function<br>generators, synthesizer      |               |                                                                                                      |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40411-3 |
| Reference frequency                      |               | 1 MHz, 10 MHz                                                                                        | $6.1 \times 10^{-11}$                                              |                                                                    |
| Frequency                                |               | 1 mHz ~ 100 MHz                                                                                      | $6.1 \times 10^{-10}$                                              |                                                                    |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                              | Field<br>Code | Range               | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                             |
|-----------------------------------------------------------------------|---------------|---------------------|--------------------------------------------------------------------|--------------------------------------------------------------------|
| Function generators<br>Function<br>generators, synthesizer<br>Voltage | 40411         | (10 Hz)             |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40411-3 |
|                                                                       |               | (1 ~ 10) mV         | 1.2 mV/V                                                           |                                                                    |
|                                                                       |               | (10 ~ 100) mV       | 0.58 mV/V                                                          |                                                                    |
|                                                                       |               | 100 mV ~ 20 V       | 0.49 mV/V                                                          |                                                                    |
|                                                                       |               | (10 Hz ~ 10 kHz)    |                                                                    |                                                                    |
|                                                                       |               | (1 ~ 10) mV         | 0.86 mV/V                                                          |                                                                    |
|                                                                       |               | 10 mV ~ 10 V        | 0.26 mV/V                                                          |                                                                    |
|                                                                       |               | (10 ~ 20) V         | 0.39 mV/V                                                          |                                                                    |
|                                                                       |               | (10 ~ 100) kHz      |                                                                    |                                                                    |
|                                                                       |               | (1 ~ 10) mV         | 6.0 mV/V                                                           |                                                                    |
|                                                                       |               | 10 mV ~ 10 V        | 1.0 mV/V                                                           |                                                                    |
|                                                                       |               | (10 ~ 20) V         | 1.5 mV/V                                                           |                                                                    |
|                                                                       |               | (100 kHz ~ 1 MHz)   |                                                                    |                                                                    |
|                                                                       |               | 1 mV ~ 7 V          | 7.6 mV/V                                                           |                                                                    |
|                                                                       |               | (1 ~ 100) MHz       |                                                                    |                                                                    |
|                                                                       |               | 1 mV ~ 7 V          | 14 mV/V                                                            |                                                                    |
| Level                                                                 |               | (10 Hz ~ 100 kHz)   |                                                                    |                                                                    |
|                                                                       |               | (+ 30 ~ -40) dBm    | 0.017 dB                                                           |                                                                    |
|                                                                       |               | (-40 ~ -60) dBm     | 0.043 dB                                                           |                                                                    |
|                                                                       |               | (-60 ~ -80) dBm     | 0.072 dB                                                           |                                                                    |
|                                                                       |               | (100 kHz ~ 100 MHz) |                                                                    |                                                                    |
|                                                                       |               | (+ 30 ~ -60) dBm    | 0.065 dB                                                           |                                                                    |
|                                                                       |               | (-60 ~ -80) dBm     | 0.084 dB                                                           |                                                                    |
| Attenuation                                                           |               | (100 Hz ~ 100 kHz)  |                                                                    |                                                                    |
|                                                                       |               | (+ 30 ~ -70) dB     | 0.06 dB                                                            |                                                                    |
| Amplitude modulation                                                  |               | (0 ~ 100) %         | $1.6 \times 10^{-2}$                                               |                                                                    |
| Frequency modulation                                                  |               | 1 Hz ~ 400 kHz      | $1.6 \times 10^{-2}$                                               |                                                                    |
| Phase modulation                                                      |               | (-360 ~ + 360)°     | 0.06°                                                              |                                                                    |
| DC offset                                                             |               | (-20 ~ 20) V        | 84 $\mu$ V/V                                                       |                                                                    |
| Rise time, fall time                                                  |               | 100 ps ~ 10 s       | $6.1 \times 10^{-3}$                                               |                                                                    |
| Symmetry                                                              |               | (0 ~ 100) %         | $6.1 \times 10^{-2}$                                               |                                                                    |
| Sawtooth wave linearity                                               |               | (0 ~ 100) %         | $1.4 \times 10^{-3}$                                               |                                                                    |
| Sync. TTL output( $V_{o-p}$ )                                         |               | (-20 ~ 20) V        | $1.1 \times 10^{-3}$                                               |                                                                    |
| Sweep flatness                                                        |               | (DC ~ 100 MHz)      |                                                                    |                                                                    |
|                                                                       |               | (-10 ~ 10) dB       | 0.66 dB                                                            |                                                                    |
| Distortion                                                            |               | (10 Hz ~ 1 kHz)     |                                                                    |                                                                    |
|                                                                       |               | (0 ~ -40) dB        | 0.026 dB                                                           |                                                                    |
|                                                                       |               | (-40 ~ -70) dB      | 0.071 dB                                                           |                                                                    |
|                                                                       |               | (1 ~ 100) kHz       |                                                                    |                                                                    |
|                                                                       |               | (0 ~ -40) dB        | 0.036 dB                                                           |                                                                    |
|                                                                       |               | (-40 ~ -70) dB      | 0.081 dB                                                           |                                                                    |
| Harmonics                                                             |               | (10 Hz ~ 100 MHz)   |                                                                    |                                                                    |
|                                                                       |               | (-10 ~ -80) dBc     | 0.56 dB                                                            |                                                                    |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                        |
|------------------------------------------|---------------|------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Function generators                      | 40411         |                              |                                                                    | Frequency Couter,<br>DMM<br>Oscilloacope<br>Low Noise Amp.<br>/ CP801-40411-4 |
| ECG Simulator                            |               |                              |                                                                    |                                                                               |
| Frequency                                |               | 0.5 Hz ~ 100 kHz             | $6.1 \times 10^{-5}$                                               |                                                                               |
| DC Voltage                               |               | (-20 ~ +20) V                | 0.61 mV/V                                                          |                                                                               |
| AC Voltage                               |               | (1 Hz ~ 10 kHz)              |                                                                    |                                                                               |
|                                          |               | (1 ~ 10) mV                  | 2.5 mV/V                                                           |                                                                               |
|                                          |               | 10 mV ~ 50 V                 | 0.70 mV/V                                                          |                                                                               |
| Resistance                               |               | 10 $\Omega$ ~ 100 k $\Omega$ | 60 $\mu\Omega/\Omega$                                              |                                                                               |
| ECG Amplitudes<br>( $V_{pp}$ )           |               | (0.5 ~ 10) Hz                |                                                                    |                                                                               |
|                                          |               | (0.05 ~ 2) mV                | 3.5 mV/V                                                           |                                                                               |
|                                          |               | 2 mV ~ 10 V                  | 2.8 mV/V                                                           |                                                                               |
| Normal Sinus Rate                        | 40412         | (30 ~ 600) BPM               |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40412-1            |
|                                          |               | (2 ~ 0.1) s                  | $1.9 \times 10^{-3}$                                               |                                                                               |
|                                          |               | (30 ~ 600) BPM               |                                                                    |                                                                               |
|                                          |               | (0.5 ~ 10) Hz                | $1.9 \times 10^{-3}$                                               |                                                                               |
| Time                                     |               | 1 $\mu$ s ~ 5 s              | $1.3 \times 10^{-3}$                                               |                                                                               |
| Period                                   |               | 1 ns ~ 5 s                   | $1.3 \times 10^{-3}$                                               |                                                                               |
| Pulse width                              |               | 1 ns ~ 5 s                   | $1.3 \times 10^{-3}$                                               |                                                                               |
| Genescopes                               | 40412         |                              |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40412-1            |
| Output frequency                         |               |                              |                                                                    |                                                                               |
| (Analogue)                               |               | 10 Hz ~ 100 MHz              | 12 mHz/Hz                                                          |                                                                               |
| (Digital)                                |               | 10 Hz ~ 100 MHz              | $5.8 \times 10^{-9}$                                               |                                                                               |
| Output level                             |               | (10 Hz ~ 100 kHz)            |                                                                    |                                                                               |
|                                          |               | (-20 ~ 0) dB $\mu$ V         | 0.077 dB                                                           |                                                                               |
|                                          |               | (10 Hz ~ 100 kHz)            |                                                                    |                                                                               |
|                                          |               | (0 ~ 120) dB $\mu$ V         | 0.058 dB                                                           |                                                                               |
|                                          |               | (100 kHz ~ 100 MHz)          |                                                                    |                                                                               |
|                                          |               | (-20 ~ 0) dB $\mu$ V         | 0.098 dB                                                           |                                                                               |
|                                          |               | (100 kHz ~ 100 MHz)          |                                                                    |                                                                               |
|                                          |               | (0 ~ 120) dB $\mu$ V         | 0.061 dB                                                           |                                                                               |
| Input voltage                            | 40412         | (10 Hz ~ 100 MHz)            |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40412-1            |
|                                          |               | 10 mV ~ 100 V                | 6.4 mV/V                                                           |                                                                               |
| Input level                              |               | (10 Hz ~ 100 MHz)            |                                                                    |                                                                               |
|                                          |               | (-20 ~ 0) dB                 | 0.098 dB                                                           |                                                                               |
|                                          | 40412         | (10 Hz ~ 100 MHz)            |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40412-1            |
|                                          |               | (0 ~ 90) dB                  | 0.061 dB                                                           |                                                                               |
| Horizontal axis input                    | 40412         | 10 ns ~ 5 s                  | 5.8 ms/s                                                           |                                                                               |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                              |
|------------------------------------------|---------------|----------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| AC/DC high voltages<br>volt meters       | 40413         |                                        |                                                                    |                                                                                     |
| AC/DC high voltages<br>volt meters       |               |                                        |                                                                    | High Voltage Power<br>Supply, DC High<br>Voltage Divider,                           |
| DC Voltage                               |               | $\pm(0.01 \sim 10) \text{ kV}$         | $1.9 \times 10^{-4}$                                               | Potential Transformer,                                                              |
|                                          |               | $\pm(10 \sim 50) \text{ kV}$           | $6.0 \times 10^{-4}$                                               | DC Power Supply,                                                                    |
|                                          |               | $\pm(50 \sim 100) \text{ kV}$          | $1.2 \times 10^{-3}$                                               | Digital multimeter                                                                  |
| AC Voltage                               |               | $(0.01 \sim 10) \text{ kV}$            | $9.8 \times 10^{-3}$                                               | / CP801-40413-1                                                                     |
| (60 Hz)                                  |               | $(10 \sim 20) \text{ kV}$              | $1.1 \times 10^{-3}$                                               |                                                                                     |
|                                          |               | $(20 \sim 100) \text{ kV}$             | $1.2 \times 10^{-3}$                                               |                                                                                     |
| Oscilloscope High Voltage<br>Probe       |               |                                        |                                                                    | Hi voltage power<br>supply,                                                         |
| Attenuation ratio                        |               |                                        |                                                                    | Digital multimeter                                                                  |
| (DC)                                     |               | $(0.01 \sim 1) \text{ kV}$             |                                                                    | RF Power Meter                                                                      |
| (AC)                                     |               | $1:1 \sim 1\,000:1$                    | $2.6 \times 10^{-3}$                                               | RMS Voltmeter                                                                       |
| (60 Hz ~ 1 kHz )                         |               | $(0.01 \sim 1) \text{ kV}$             |                                                                    | / CP801-40413-2                                                                     |
|                                          |               | $1:1 \sim 1\,000:1$                    | $4.0 \times 10^{-3}$                                               |                                                                                     |
| Bandwidth                                |               | $(\text{DC} \sim 100 \text{ kHz})$     |                                                                    |                                                                                     |
|                                          |               | $1 \text{ mV} \sim 3.5 \text{ V}$      | $4.0 \times 10^{-3}$                                               |                                                                                     |
|                                          |               | $(100 \text{ kHz} \sim 1 \text{ MHz})$ |                                                                    |                                                                                     |
|                                          |               | $1 \text{ mV} \sim 3.5 \text{ V}$      | $9.2 \times 10^{-3}$                                               |                                                                                     |
|                                          |               | $(1 \sim 75) \text{ MHz}$              |                                                                    |                                                                                     |
|                                          |               | $1 \text{ mV} \sim 3.5 \text{ V}$      | $1.3 \times 10^{-2}$                                               |                                                                                     |
|                                          |               | $(75 \sim 500) \text{ MHz}$            |                                                                    |                                                                                     |
|                                          |               | $1 \text{ mV} \sim 2 \text{ V}$        | $5.3 \times 10^{-2}$                                               |                                                                                     |
|                                          |               | $(500 \sim 3\,500) \text{ MHz}$        |                                                                    |                                                                                     |
|                                          |               | $1 \text{ mV} \sim 2 \text{ V}$        | $5.3 \times 10^{-2}$                                               |                                                                                     |
| kVp Meters                               | 40414         |                                        |                                                                    | High Voltage Power<br>Supply, DC High<br>Voltage Divider, AC<br>Voltage Current STD |
| DC Voltage                               |               | $\pm(1 \sim 60) \text{ kV}$            | $3.0 \times 10^{-3}$                                               | Digital multimeter                                                                  |
| AC Current                               |               | $(1 \sim 10) \text{ A}$                | $8.0 \times 10^{-3}$                                               | / CP801-40413-3                                                                     |
| (60 Hz)                                  |               |                                        |                                                                    |                                                                                     |
| DC Current                               |               | $(100 \sim 300) \text{ mA}$            | $2.1 \times 10^{-2}$                                               |                                                                                     |
| LF Impulse generators                    | 40414         |                                        |                                                                    | Oscilloscope                                                                        |
| Pulse voltage                            |               | $0 \text{ V} \sim 40 \text{ kV}$       | 0.016                                                              | / CP801-40414-1                                                                     |
| Pulse rise time                          |               | $20 \text{ ns} \sim 100 \text{ ms}$    | $5.8 \times 10^{-3}$                                               |                                                                                     |
| Pulse width                              |               | $50 \text{ ns} \sim 100 \text{ ms}$    | $5.8 \times 10^{-3}$                                               |                                                                                     |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                      | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                               |
|------------------------------------------|---------------|----------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------|
| Leakage current testers                  | 40416         |                                                                            |                                                                    |                                                                      |
| Leakage current tester                   |               |                                                                            |                                                                    | Calibrator,DMM<br>/ CP801-40416-1                                    |
| DC Voltage                               |               | 0 V ~ 1 kV                                                                 | 4.4 $\mu$ V/V                                                      |                                                                      |
| DC Current                               |               | (0 ~ 100) mA                                                               | 3.4 $\mu$ A/A                                                      |                                                                      |
| AC Voltage                               |               | (20 Hz ~ 1 kHz )<br>0 V ~ 1 kV                                             | 0.37 mV/V                                                          |                                                                      |
| AC Current                               |               | (10 Hz ~ 1 kHz )<br>(0 ~ 100) mA                                           | 0.1 mA/A                                                           |                                                                      |
| Resistance                               |               | 0 $\Omega$ ~ 100 k $\Omega$                                                | 14 $\mu\Omega/\Omega$                                              |                                                                      |
| Safety Analyzer                          |               |                                                                            |                                                                    | Calibrator,DMM,<br>Hi voltger meter<br>decade box<br>/ CP801-40416-2 |
| leakage current                          |               |                                                                            |                                                                    |                                                                      |
| DC                                       |               | (0 ~ 100) mA                                                               | 3.4 $\mu$ A/A                                                      |                                                                      |
| AC                                       |               | (10 Hz ~ 1 kHz)<br>(0 ~ 100) mA                                            | 0.1 mA/A                                                           |                                                                      |
| insulation test                          |               |                                                                            |                                                                    |                                                                      |
| Resistance                               |               | 0 $\Omega$ ~ 100 M $\Omega$                                                | 1.4 m $\Omega/\Omega$                                              |                                                                      |
| Test Voltage                             |               | 10 V ~ 1 kV                                                                | 8.2 mV/V                                                           |                                                                      |
| Earth Resistance                         |               |                                                                            |                                                                    |                                                                      |
| Resistance                               |               | 10 m $\Omega$ ~ 10 k $\Omega$                                              | 0.59 m $\Omega/\Omega$                                             |                                                                      |
| AC Current                               |               | (50 ~ 60) Hz<br>(0 ~ 100) A                                                | 0.59 mA/A                                                          |                                                                      |
| withstand voltage Test                   |               |                                                                            |                                                                    |                                                                      |
| DC Voltage                               |               | 0 V ~ 20 kV<br>(20 ~ 60) kV                                                | 0.52 V/kV<br>1.5 V/kV                                              |                                                                      |
| AC Voltage                               |               | (50 ~ 60) Hz<br>0 V ~ 40 kV                                                | 1.1 V/kV                                                           |                                                                      |
| AC Voltmeter                             |               | (20 Hz ~ 1 kHz)                                                            |                                                                    |                                                                      |
| AC Voltage                               |               | 0 V ~ 1 kV                                                                 | 0.37 mV/V                                                          |                                                                      |
| DC Voltmeter                             |               |                                                                            |                                                                    |                                                                      |
| DC Voltage                               |               | 0 V ~ 1 kV                                                                 | 4.4 $\mu$ V/V                                                      |                                                                      |
| mAs Meter                                |               |                                                                            |                                                                    | Calibrator,<br>mAs Meter calibrator<br>/ CP801-40416-3               |
| DC Current                               |               | (1 ~ 20) mA<br>(20 ~ 200) mA<br>(200 ~ 2 000) mA                           | 0.70 $\mu$ A/A<br>0.45 $\mu$ A/A<br>0.44 $\mu$ A/A                 |                                                                      |
| AC Current                               |               | (50 ~ 60) Hz<br>(1 ~ 20) mA<br>(20 ~ 200) mA<br>(200 ~ 2 000) mA           | 1.7 $\mu$ A/A<br>0.90 $\mu$ A/A<br>0.90 $\mu$ A/A                  |                                                                      |
| DC Current Time Product                  |               | (1 ~180) mAs<br>(180 ~ 1 800) mAs<br>(1 800 ~ 18 000) mAs                  | 1.7 $\mu$ As/mAs<br>1.7 $\mu$ As/mAs<br>1.7 $\mu$ As/mAs           |                                                                      |
| AC Current Time Product                  |               | (50 ~ 60) Hz<br>(1 ~ 180) mAs<br>(180 ~ 1 800) mAs<br>(1 800 ~ 18 000) mAs | 1.9 $\mu$ As/mAs<br>1.9 $\mu$ As/mAs<br>1.9 $\mu$ As/mAs           |                                                                      |

#### 404. Other DC & LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|---------------------------------------------------|--------------------------------------------------------------------|----------------------------------------|
| Leakage current testers                  | 40416         |                                                   |                                                                    |                                        |
| Touch current tester                     |               |                                                   |                                                                    | Calibrator,DMM                         |
| Input Voltage to Output                  |               |                                                   |                                                                    | / CP801-40416-4                        |
| Voltage Ratio                            |               |                                                   |                                                                    |                                        |
|                                          |               | Unweighted touch current<br>measuring network(U1) |                                                                    |                                        |
|                                          |               | 4.00 (20 Hz)                                      | $1.5 \times 10^{-3}$                                               |                                        |
|                                          |               | 3.98 (50 Hz)                                      | $1.5 \times 10^{-3}$                                               |                                        |
|                                          |               | 3.97 (60 Hz)                                      | $1.5 \times 10^{-3}$                                               |                                        |
|                                          |               | 3.92 (100 Hz)                                     | $8.7 \times 10^{-4}$                                               |                                        |
|                                          |               | 3.72 (200 Hz)                                     | $8.2 \times 10^{-4}$                                               |                                        |
|                                          |               | 2.87 (500 Hz)                                     | $6.4 \times 10^{-4}$                                               |                                        |
|                                          |               | 1.96 (1 kHz)                                      | $4.4 \times 10^{-4}$                                               |                                        |
|                                          |               | 1.35 (2 kHz)                                      | $3.1 \times 10^{-4}$                                               |                                        |
|                                          |               | 1.07 (5 kHz)                                      | $2.5 \times 10^{-4}$                                               |                                        |
|                                          |               | 1.02 (10 kHz)                                     | $2.4 \times 10^{-4}$                                               |                                        |
|                                          |               | 1.00 (20 kHz)                                     | $2.4 \times 10^{-4}$                                               |                                        |
|                                          |               | 1.00 (50 kHz)                                     | $4.3 \times 10^{-4}$                                               |                                        |
|                                          |               | 1.00 (100 kHz)                                    | $5.1 \times 10^{-4}$                                               |                                        |
|                                          |               | 1.00 (200 kHz)                                    | $1.8 \times 10^{-3}$                                               |                                        |
|                                          |               | 1.00 (500 kHz)                                    | $0.7 \times 10^{-2}$                                               |                                        |
|                                          |               | 1.00 (1 MHz)                                      | $1.0 \times 10^{-2}$                                               |                                        |
|                                          |               | Perception or reaction<br>measuring network(U2)   |                                                                    |                                        |
|                                          |               | 4.00 (20 Hz)                                      | $1.5 \times 10^{-3}$                                               |                                        |
|                                          |               | 3.99 (50 Hz)                                      | $1.5 \times 10^{-3}$                                               |                                        |
|                                          |               | 3.99 (60 Hz)                                      | $1.5 \times 10^{-3}$                                               |                                        |
|                                          |               | 3.96 (100 Hz)                                     | $8.8 \times 10^{-4}$                                               |                                        |
|                                          |               | 3.87 (200 Hz)                                     | $8.6 \times 10^{-4}$                                               |                                        |
|                                          |               | 3.54 (500 Hz)                                     | $7.8 \times 10^{-4}$                                               |                                        |
|                                          |               | 3.43 (1 kHz)                                      | $7.6 \times 10^{-4}$                                               |                                        |
|                                          |               | 4.06 (2 kHz)                                      | $9.0 \times 10^{-4}$                                               |                                        |
|                                          |               | 7.50 (5 kHz)                                      | $1.7 \times 10^{-3}$                                               |                                        |
|                                          |               | 14.1 (10 kHz)                                     | $3.1 \times 10^{-3}$                                               |                                        |
|                                          |               | 27.8 (20 kHz)                                     | $6.2 \times 10^{-3}$                                               |                                        |
|                                          |               | 69.2 (50 kHz)                                     | $2.5 \times 10^{-2}$                                               |                                        |
|                                          |               | 138 (100 kHz)                                     | $1.4 \times 10^{-2}$                                               |                                        |
|                                          |               | 277 (200 kHz)                                     | $2.3 \times 10^{-2}$                                               |                                        |
|                                          |               | 691 (500 kHz)                                     | $5.6 \times 10^{-2}$                                               |                                        |
|                                          |               | 1 382 (1 MHz)                                     | $9.1 \times 10^{-2}$                                               |                                        |
|                                          |               | Let-go measuring<br>network(U3)                   |                                                                    |                                        |
|                                          |               | 4.00 (20 Hz)                                      | $1.5 \times 10^{-3}$                                               |                                        |
|                                          |               | 3.99 (50 Hz)                                      | $1.5 \times 10^{-3}$                                               |                                        |
|                                          |               | 3.98 (60 Hz)                                      | $1.5 \times 10^{-3}$                                               |                                        |
|                                          |               | 3.95 (100 Hz)                                     | $8.7 \times 10^{-4}$                                               |                                        |
|                                          |               | 3.83 (200 Hz)                                     | $8.5 \times 10^{-4}$                                               |                                        |
|                                          |               | 3.36 (500 Hz)                                     | $7.4 \times 10^{-4}$                                               |                                        |
|                                          |               | 2.87 (1 kHz)                                      | $6.4 \times 10^{-4}$                                               |                                        |
|                                          |               | 2.65 (2 kHz)                                      | $5.9 \times 10^{-4}$                                               |                                        |
|                                          |               | 3.57 (5 kHz)                                      | $7.9 \times 10^{-4}$                                               |                                        |
|                                          |               | 6.09 (10 kHz)                                     | $1.4 \times 10^{-3}$                                               |                                        |
|                                          |               | 11.6 (20 kHz)                                     | $2.6 \times 10^{-3}$                                               |                                        |
|                                          |               | 28.7 (50 kHz)                                     | $1.0 \times 10^{-2}$                                               |                                        |
|                                          |               | 57.2 (100 kHz)                                    | $2.6 \times 10^{-2}$                                               |                                        |
|                                          |               | 114 (200 kHz)                                     | $1.2 \times 10^{-2}$                                               |                                        |
|                                          |               | 286 (500 kHz)                                     | $2.4 \times 10^{-2}$                                               |                                        |
|                                          |               | 572 (1 MHz)                                       | $4.6 \times 10^{-2}$                                               |                                        |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge      | Field<br>Code | Range                                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|-----------------------------------------------|---------------|---------------------------------------------------|--------------------------------------------------------------------|----------------------------------------|
| Leakage current testers                       | 40416         |                                                   |                                                                    | Calibrator,DMM<br>/ CP801-40416-4      |
| Touch current tester                          |               |                                                   |                                                                    |                                        |
| Resistance                                    |               | 500 $\Omega$                                      | 0.1 $\Omega$                                                       |                                        |
| Input Voltage to Output<br>Current Indication |               | Unweighted touch current<br>measuring network(U1) |                                                                    |                                        |
|                                               |               | 20 Hz                                             |                                                                    |                                        |
|                                               |               | (4.75 ~ 5.25)mA                                   | 0.03 mA                                                            |                                        |
|                                               |               | 50 Hz                                             |                                                                    |                                        |
|                                               |               | (4.77 ~ 5.27)mA                                   | 0.03 mA                                                            |                                        |
|                                               |               | 60 Hz                                             |                                                                    |                                        |
|                                               |               | (4.79 ~ 5.29)mA                                   | 0.03 mA                                                            |                                        |
|                                               |               | 100 Hz                                            |                                                                    |                                        |
|                                               |               | (4.85 ~ 5.36)mA                                   | 0.03 mA                                                            |                                        |
|                                               |               | 200 Hz                                            |                                                                    |                                        |
|                                               |               | (5.11 ~ 5.65)mA                                   | 0.03 mA                                                            |                                        |
|                                               |               | 500 Hz                                            |                                                                    |                                        |
|                                               |               | (6.63 ~ 7.33)mA                                   | 0.03 mA                                                            |                                        |
|                                               |               | 1 kHz                                             |                                                                    |                                        |
|                                               |               | (9.71 ~ 10.73)mA                                  | 0.04 mA                                                            |                                        |
|                                               |               | 2 kHz                                             |                                                                    |                                        |
|                                               |               | (14.06 ~ 15.54)mA                                 | 0.05 mA                                                            |                                        |
|                                               |               | 5 kHz                                             |                                                                    |                                        |
|                                               |               | (17.80 ~ 19.68)mA                                 | 0.06 mA                                                            |                                        |
|                                               |               | 10 kHz                                            |                                                                    |                                        |
|                                               |               | (18.68 ~ 20.64)mA                                 | 0.06 mA                                                            |                                        |
|                                               |               | 20 kHz                                            |                                                                    |                                        |
|                                               |               | (18.92 ~ 20.92)mA                                 | 0.06 mA                                                            |                                        |
|                                               |               | 50 kHz                                            |                                                                    |                                        |
|                                               |               | (18.98 ~ 20.98)mA                                 | 0.06 mA                                                            |                                        |
|                                               |               | 100 kHz                                           |                                                                    |                                        |
|                                               |               | (19.00 ~ 21.00)mA                                 | 0.06 mA                                                            |                                        |
|                                               |               | 200 kHz                                           |                                                                    |                                        |
|                                               |               | (19.00 ~ 21.00)mA                                 | 0.06 mA                                                            |                                        |
|                                               |               | 500 kHz                                           |                                                                    |                                        |
|                                               |               | (19.00 ~ 21.00)mA                                 | 0.06 mA                                                            |                                        |
|                                               |               | 1 MHz                                             |                                                                    |                                        |
|                                               |               | (19.00 ~ 21.00)mA                                 | 0.06 mA                                                            |                                        |



## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                                                         | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                              | Standard/Method of<br>Measurement etc. |
|--------------------------------------------------------------------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Leakage current testers<br>Touch current tester<br>Input Voltage to Output<br>Current Indication | 40416         | Perception or reaction<br>measuring network(U2)<br>20 Hz<br>(4.75 ~ 5.25)mA<br>50 Hz<br>(4.77 ~ 5.27)mA<br>60 Hz<br>(4.77 ~ 5.27)mA<br>100 Hz<br>(4.79 ~ 5.29)mA<br>200 Hz<br>(4.92 ~ 5.44)mA<br>500 Hz<br>(5.36 ~ 5.92)mA<br>1 kHz<br>(5.55 ~ 6.13)mA<br>2 kHz<br>(4.674 ~ 5.166)mA<br>5 kHz<br>(2.527 ~ 2.793)mA<br>10 kHz<br>(1.345 ~ 1.487)mA<br>20 kHz<br>(0.684 ~ 0.756)mA<br>50 kHz<br>(275.5 ~ 304.5) $\mu$ A<br>100 kHz<br>(137.4 ~ 151.8) $\mu$ A<br>200 kHz<br>(68.8 ~ 76.0) $\mu$ A<br>500 kHz<br>(27.6 ~ 30.5) $\mu$ A<br>1 MHz<br>(13.7 ~ 15.2) $\mu$ A | 0.03 mA<br><br>0.03 mA<br>0.03 mA<br>0.03 mA<br>0.03 mA<br>0.03 mA<br>0.03 mA<br>19 $\mu$ A<br>14 $\mu$ A<br>11 $\mu$ A<br>9 $\mu$ A<br>0.7 $\mu$ A<br>0.4 $\mu$ A<br>0.2 $\mu$ A<br>0.2 $\mu$ A<br>0.1 $\mu$ A | Calibrator,DMM<br>/ CP801-40416-4      |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                                                         | Field<br>Code | Range                              | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|--------------------------------------------------------------------------------------------------|---------------|------------------------------------|--------------------------------------------------------------------|----------------------------------------|
| Leakage current testers<br>Touch current tester<br>Input Voltage to Output<br>Current Indication | 40416         | Let-go measuring<br>network(U3)    |                                                                    | Calibrator,DMM<br>/ CP801-40416-4      |
|                                                                                                  |               | 20 Hz<br>(4.75 ~ 5.25)mA           | 0.03 mA                                                            |                                        |
|                                                                                                  |               | 50 Hz<br>(4.77 ~ 5.27)mA           | 0.02 mA                                                            |                                        |
|                                                                                                  |               | 60 Hz<br>(4.77 ~ 5.27)mA           | 0.02 mA                                                            |                                        |
|                                                                                                  |               | 100 Hz<br>(4.81 ~ 5.31)mA          | 0.03 mA                                                            |                                        |
|                                                                                                  |               | 200 Hz<br>(4.96 ~ 5.48)mA          | 0.03 mA                                                            |                                        |
|                                                                                                  |               | 500 Hz<br>(5.66 ~ 6.26)mA          | 0.03 mA                                                            |                                        |
|                                                                                                  |               | 1 kHz<br>(6.61 ~ 7.31)mA           | 0.03 mA                                                            |                                        |
|                                                                                                  |               | 2 kHz<br>(7.16 ~ 7.92)mA           | 0.03 mA                                                            |                                        |
|                                                                                                  |               | 5 kHz<br>(5.32 ~ 5.88)mA           | 0.03 mA                                                            |                                        |
|                                                                                                  |               | 10 kHz<br>(3.116 ~ 3.444)mA        | 15 $\mu$ A                                                         |                                        |
|                                                                                                  |               | 20 kHz<br>(1.634 ~ 1.806)mA        | 11 $\mu$ A                                                         |                                        |
|                                                                                                  |               | 50 kHz<br>(0.663 ~ 0.733) $\mu$ A  | 9 $\mu$ A                                                          |                                        |
|                                                                                                  |               | 100 kHz<br>(332.5 ~ 367.5) $\mu$ A | 0.9 $\mu$ A                                                        |                                        |
|                                                                                                  |               | 200 kHz<br>(166.1 ~ 183.5) $\mu$ A | 0.5 $\mu$ A                                                        |                                        |
|                                                                                                  |               | 500 kHz<br>(66.5 ~ 73.5) $\mu$ A   | 0.2 $\mu$ A                                                        |                                        |
|                                                                                                  |               | 1 MHz<br>(33.3 ~ 36.8) $\mu$ A     | 0.2 $\mu$ A                                                        |                                        |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                       | Field<br>Code | Range                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                       | Standard/Method of<br>Measurement etc.                                                                          |
|----------------------------------------------------------------|---------------|----------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Electronic AC/DC loads<br>Electronic AC/DC loads<br>DC Voltage | 40417         | (0 ~ 1) V<br>(1 ~ 800) V               | 0.08 mV<br>82 $\mu$ V/V                                                                                  | Power supply, DMM,<br>STD Resistor<br>/ CP801-40417-1                                                           |
| DC Current                                                     |               | (0 ~ 2) A<br>(2 ~ 100) A               | 0.17 mA<br>86 $\mu$ A/A                                                                                  |                                                                                                                 |
| AC Voltage                                                     |               | (50 ~ 400) Hz<br>(1 ~ 350) V           | 0.12 V                                                                                                   |                                                                                                                 |
| AC Current                                                     |               | (50 ~ 400) Hz<br>(1 ~ 20) A            | 0.07 A                                                                                                   |                                                                                                                 |
| I-V TESTER<br>DC Voltage                                       |               | (0 ~ 300) V<br>(300 ~ 1 000) V         | 24 $\mu$ V/V<br>35 $\mu$ V/V                                                                             | Power supply, DMM,<br>STD Resistor<br>/ CP801-40417-2                                                           |
| AC Voltage                                                     |               | (0 ~ 20) A<br>(20 ~ 30) A              | 66 $\mu$ A/A<br>0.21 mA/A                                                                                |                                                                                                                 |
| Modulation meters<br>Amplitude modulation                      | 40418         | (50 kHz ~ 100 MHz )<br>(0 ~ 100) %     | 0.016                                                                                                    | AM/FM Test Source<br>/ CP801-40418-1                                                                            |
| Frequency modulation                                           |               | (150 kHz ~ 100 MHz )<br>1 Hz ~ 400 kHz | 0.016                                                                                                    |                                                                                                                 |
| Phase modulation                                               |               | (150 kHz ~ 100 MHz )<br>(0 ~ 100) rad  | 0.016                                                                                                    |                                                                                                                 |
| Analogue/digital<br>Multimeters                                | 40419         | DC Voltage                             | 0 mV<br>$\pm$ (0 ~ 10) mV<br>$\pm$ (10 ~ 100) mV<br>$\pm$ (100 mV ~ 10 V)<br>$\pm$ (10 ~ 1 000) V        | Calibrator,<br>STD Resistor,<br>Resistance Indicator<br>Frequency Counter<br>/ CP801-40419-1<br>/ CP801-40419-2 |
|                                                                |               | AC Voltage                             | (1 ~ 10) mV<br>0.5 Hz ~ 10 Hz<br>10 Hz ~ 1 kHz<br>1 kHz ~ 100 kHz                                        |                                                                                                                 |
|                                                                |               |                                        | (10 ~ 100) mV<br>0.5 Hz ~ 10 Hz<br>10 Hz ~ 1 kHz<br>1 kHz ~ 100 kHz                                      |                                                                                                                 |
|                                                                |               |                                        | 100 mV ~ 1 V<br>0.5 Hz ~ 1 Hz<br>1 Hz ~ 10 Hz<br>10 Hz ~ 1 kHz<br>1 kHz ~ 100 kHz                        |                                                                                                                 |
|                                                                |               |                                        | (1 ~ 10) V<br>0.5 Hz ~ 10 Hz<br>10 Hz ~ 1 kHz<br>1 kHz ~ 100 kHz<br>100 kHz ~ 500 kHz<br>500 kHz ~ 1 MHz |                                                                                                                 |
|                                                                |               |                                        | 0.19 $\mu$ V<br>3.2 $\mu$ V/V<br>2.0 $\mu$ V/V<br>1.2 $\mu$ V/V<br>2.6 $\mu$ V/V                         |                                                                                                                 |
|                                                                |               |                                        | 1.5 mV/V<br>0.10 mV/V<br>0.28 mV/V                                                                       |                                                                                                                 |
|                                                                |               |                                        | 74 $\mu$ V/V<br>44 $\mu$ V/V<br>0.13 mV/V                                                                |                                                                                                                 |
|                                                                |               |                                        | 66 $\mu$ V/V<br>43 $\mu$ V/V<br>22 $\mu$ V/V<br>60 $\mu$ V/V                                             |                                                                                                                 |
|                                                                |               |                                        | 69 $\mu$ V/V<br>23 $\mu$ V/V<br>59 $\mu$ V/V<br>0.19 mV/V<br>0.80 mV/V                                   |                                                                                                                 |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                   | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                         | Standard/Method of<br>Measurement etc.                                                           |
|------------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Analogue/digital<br>Multimeters          | 40419         |                                                                                                                                                                                         |                                                                                                                                                                            | STD Resistor,<br>Resistance Indicator<br>Frequency Counter<br>/ CP801-40419-1<br>/ CP801-40419-2 |
| AC Voltage                               |               | (10 ~ 100) V<br>10 Hz ~ 1 kHz<br>1 kHz ~ 100 kHz                                                                                                                                        | 36 $\mu$ V/V<br>88 $\mu$ V/V                                                                                                                                               |                                                                                                  |
|                                          |               | (100 ~ 1 000) V<br>10 Hz ~ 1 kHz<br>1 kHz ~ 100 kHz                                                                                                                                     | 52 $\mu$ V/V<br>0.23 mV/V                                                                                                                                                  |                                                                                                  |
| DC Current                               |               | 0 nA<br>$\pm$ (0 ~ 100) nA<br>$\pm$ (100 nA ~ 1 $\mu$ A)<br>$\pm$ (1 ~ 10) $\mu$ A<br>$\pm$ (10 $\mu$ A ~ 100 mA)<br>$\pm$ (100 mA ~ 1 A)<br>$\pm$ (1 ~ 20) A                           | 0.36 nA<br>82 $\mu$ A/A<br>17 $\mu$ A/A<br>6.0 $\mu$ A/A<br>3.4 $\mu$ A/A<br>6.6 $\mu$ A/A<br>58 $\mu$ A/A                                                                 |                                                                                                  |
| AC Current                               |               | 20 $\mu$ A<br>1 kHz<br>10 kHz                                                                                                                                                           | 5.1 nA<br>14 nA                                                                                                                                                            |                                                                                                  |
|                                          |               | 20 $\mu$ A ~ 100 $\mu$ A<br>10 Hz ~ 1 kHz<br>1 kHz ~ 10 kHz                                                                                                                             | 68 $\mu$ A/A<br>91 $\mu$ A/A                                                                                                                                               |                                                                                                  |
|                                          |               | 100 $\mu$ A ~ 10 mA<br>10 Hz ~ 10 kHz                                                                                                                                                   | 76 $\mu$ A/A                                                                                                                                                               |                                                                                                  |
|                                          |               | (10 ~ 100) mA<br>10 Hz ~ 10 kHz                                                                                                                                                         | 0.10 mA/A                                                                                                                                                                  |                                                                                                  |
|                                          |               | 100 mA ~ 1 A<br>10 Hz ~ 10 kHz                                                                                                                                                          | 0.17 mA/A                                                                                                                                                                  |                                                                                                  |
|                                          |               | (1 ~ 20) A<br>10 Hz ~ 10 kHz                                                                                                                                                            | 0.31 mA/A                                                                                                                                                                  |                                                                                                  |
| Resistance                               |               | (0 ~ 1) $\Omega$<br>(1 ~ 10) $\Omega$<br>10 $\Omega$ ~ 100 k $\Omega$<br>100 k $\Omega$ ~ 1 M $\Omega$<br>(1 ~ 10) M $\Omega$<br>(10 ~ 100) M $\Omega$<br>100 M $\Omega$ ~ 1 G $\Omega$ | 6.6 $\mu\Omega$<br>3.0 $\mu\Omega/\Omega$<br>2.2 $\mu\Omega/\Omega$<br>3.4 $\mu\Omega/\Omega$<br>6.6 $\mu\Omega/\Omega$<br>58 $\mu\Omega/\Omega$<br>0.17 m $\Omega/\Omega$ |                                                                                                  |
| Frequency                                |               | 10 Hz ~ 10 MHz                                                                                                                                                                          | $5.8 \times 10^{-7}$                                                                                                                                                       |                                                                                                  |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                  | Field<br>Code | Range                                                                                                                                                                                                                                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                   | Standard/Method of<br>Measurement etc.     |
|-----------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Noise meters                                              | 40420         |                                                                                                                                                                                                                                                   |                                                                                                                                                                      | Calibrator<br>/ CP801-40420-1              |
| Voltage                                                   |               | (10 Hz ~ 1 kHz)<br>(0.1 ~ 10) mV<br>(1 ~ 100) kHz<br>(0.1 ~ 10) mV<br>(10 Hz ~ 1 kHz)<br>10 mV ~ 10 V<br>(1 ~ 100) kHz<br>10 mV ~ 10 V<br>(100 kHz ~ 10 MHz)<br>10 mV ~ 10 V                                                                      | 4.8 mV/V<br>3.2 mV/V<br>2.8 mV/V<br>2.2 mV/V<br>8.8 mV/V                                                                                                             |                                            |
| Voltage                                                   |               | (20 Hz ~ 1 kHz)<br>(10 ~ 1 000) V<br>(1 ~ 100) kHz<br>(10 ~ 1 000) V                                                                                                                                                                              | 7.7 mV/V<br>9.8 mV/V                                                                                                                                                 |                                            |
| dB                                                        |               | (10 Hz ~ 10 kHz)<br>(+ 50 ~ + 20) dB<br>(10 Hz ~ 10 kHz)<br>(+ 20 ~ -50) dB<br>(10 Hz ~ 10 kHz)<br>(-50 ~ -80) dB<br>(10 kHz ~ 10 MHz)<br>(+ 20 ~ -50) dB<br>(10 kHz ~ 10 MHz)<br>(-50 ~ -80) dB                                                  | 0.055 dB<br>0.025 dB<br>0.068 dB<br>0.033 dB<br>0.077 dB                                                                                                             |                                            |
| Weighting filter<br>(JIS, NAB, CCIR, DIN, CCITT,<br>etc.) |               | (20 Hz ~ 100 kHz)<br>(+ 10 ~ -50) dB<br>(20 Hz ~ 100 kHz)<br>(-50 ~ -80) dB                                                                                                                                                                       | 0.055 dB<br>0.077 dB                                                                                                                                                 |                                            |
| Oscilloscopes                                             | 40421         |                                                                                                                                                                                                                                                   |                                                                                                                                                                      | Oscilloscope Calibrator<br>/ CP801-40421-1 |
| Vertical axis (voltage)                                   |               | 1 mV ~ 100 V                                                                                                                                                                                                                                      | $6.6 \times 10^{-4}$                                                                                                                                                 |                                            |
| Horizontal axis (time)                                    |               | 1 ns ~ 5 s                                                                                                                                                                                                                                        | $6.0 \times 10^{-4}$                                                                                                                                                 |                                            |
| Bandwidth                                                 |               | (50 kHz ~ 100 MHz)<br>100 mV ~ 1 V<br>(100 ~ 600) MHz<br>100 mV ~ 1 V<br>(600 MHz ~ 3 GHz)<br>100 mV ~ 1 V<br>(3 ~ 10) GHz<br>100 mV ~ 1 V<br>(10 ~ 18) GHz<br>100 mV ~ 1 V<br>(18 ~ 26.5) GHz<br>100 mV ~ 1 V<br>(26.5 ~ 40) GHz<br>100 mV ~ 1 V | $3.2 \times 10^{-2}$<br>$4.2 \times 10^{-2}$<br>$3.2 \times 10^{-2}$<br>$4.3 \times 10^{-2}$<br>$4.7 \times 10^{-2}$<br>$5.6 \times 10^{-2}$<br>$7.2 \times 10^{-2}$ |                                            |
| Timebase output frequency                                 |               | 1 MHz, 5 MHz, 10 MHz                                                                                                                                                                                                                              | $6.2 \times 10^{-10}$                                                                                                                                                |                                            |
| Input impedance                                           |               | 50 $\Omega$ , 1 M $\Omega$                                                                                                                                                                                                                        | 5.2 $\mu\Omega/\Omega$                                                                                                                                               |                                            |
| REF Signal OUT(Voltage)                                   |               | (0.1 ~ 100) kHz<br>0.1 V ~ 5 V                                                                                                                                                                                                                    | $1.5 \times 10^{-2}$                                                                                                                                                 |                                            |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                     | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|-------------------------------------------|--------------------------------------------------------------------|----------------------------------------|
| LF phase meters<br>Voltage               | 40422         | (10 Hz ~ 1 kHz)<br>10 mV ~ 20 V           | 7.5 mV/V                                                           | Frequency Counter<br>/ CP801-40422-1   |
|                                          |               | (1 kHz ~ 100 kHz)<br>10 mV ~ 20 V         | 6.0 mV/V                                                           |                                        |
|                                          |               | (100 kHz ~ 10 MHz)<br>10 mV ~ 20 V        | 11 mV/V                                                            |                                        |
| Phase                                    |               | (10 Hz ~ 2 MHz)<br>(-360 ~ +360)°         | 0.062°                                                             |                                        |
| Random wave generators<br>Frequency      | 40423         | 0.1 Hz ~ 30 MHz                           | $5.8 \times 10^{-9}$                                               | Oscilloscope<br>/ CP801-40423-1        |
|                                          |               | (10 Hz ~ 10 kHz)                          |                                                                    |                                        |
|                                          |               | (+30 ~ -50) dB                            | 0.028 dB                                                           |                                        |
|                                          |               | (10 Hz ~ 10 kHz)                          |                                                                    |                                        |
|                                          |               | (-50 ~ -80) dB                            | 0.072 dB                                                           |                                        |
|                                          |               | (10 kHz ~ 10 MHz)                         |                                                                    |                                        |
|                                          |               | (+30 ~ -50) dB                            | 0.039 dB                                                           |                                        |
|                                          |               | (10 kHz ~ 10 MHz)                         |                                                                    |                                        |
|                                          |               | (-50 ~ -80) dB                            | 0.082 dB                                                           |                                        |
|                                          |               | (10 MHz ~ 30 MHz)                         |                                                                    |                                        |
|                                          |               | (+30 ~ -50) dB                            | 0.045 dB                                                           |                                        |
|                                          |               | (10 MHz ~ 30 MHz)                         |                                                                    |                                        |
|                                          |               | (-50 ~ -80) dB                            | 0.097 dB                                                           |                                        |
| Volt/Current recorders<br>DC Voltage     | 40424         | $\pm(0 \text{ mV} \sim 1\,000 \text{ V})$ | 75 $\mu\text{V/V}$                                                 | Calibrator<br>/ CP801-40424-1          |
|                                          |               |                                           |                                                                    |                                        |
| AC Voltage                               |               | (10 Hz ~ 10 kHz)<br>0 mV ~ 1 000 V        | 0.68 mV/V                                                          |                                        |
|                                          |               |                                           |                                                                    |                                        |
| DC Current                               |               | $\pm(0 \text{ mA} \sim 10 \text{ A})$     | 90 $\mu\text{A/A}$                                                 |                                        |
|                                          |               |                                           |                                                                    |                                        |
| AC Current                               |               | (10 Hz ~ 10 kHz)<br>0 mA ~ 10 A           | 0.93 mA/A                                                          |                                        |
|                                          |               |                                           |                                                                    |                                        |
| Vertical axis (voltage)                  |               | 1 mV ~ 50 V                               | $1.6 \times 10^{-3}$                                               |                                        |
|                                          |               |                                           |                                                                    |                                        |
| Horizontal axis (time)                   |               | 5 $\mu\text{s}$ ~ 5 s                     | $2.4 \times 10^{-3}$                                               |                                        |
|                                          |               |                                           |                                                                    |                                        |
| Bandwidth                                |               | (10 kHz ~ 100 MHz)<br>100 mV ~ 1 V        | $7.6 \times 10^{-2}$                                               |                                        |
|                                          |               |                                           |                                                                    |                                        |
| Level                                    |               | (10 Hz ~ 10 kHz)<br>(+50 ~ +20) dBm       | 0.042 dB                                                           |                                        |
|                                          |               | (10 Hz ~ 10 kHz)<br>(+20 ~ -50) dBm       | 0.016 dB                                                           |                                        |
|                                          |               | (10 Hz ~ 10 kHz)<br>(-50 ~ -80) dBm       | 0.028 dB                                                           |                                        |
|                                          |               | (10 kHz ~ 10 MHz)<br>(+20 ~ -50) dBm      | 0.018 dB                                                           |                                        |
|                                          |               | (10 kHz ~ 10 MHz)<br>(-50 ~ -80) dBm      | 0.042 dB                                                           |                                        |
| Resistance                               |               | (0 ~ 10) $\Omega$                         | 7.6 $\mu\Omega/\Omega$                                             |                                        |
|                                          |               | 10 $\Omega$ ~ 100 k $\Omega$              | 4.2 $\mu\Omega/\Omega$                                             |                                        |
|                                          |               | 100 k $\Omega$ ~ 1 M $\Omega$             | 6.0 $\mu\Omega/\Omega$                                             |                                        |
|                                          |               | (1 ~ 10) M $\Omega$                       | 8.4 $\mu\Omega/\Omega$                                             |                                        |
|                                          |               | (10 ~ 100) M $\Omega$                     | 59 $\mu\Omega/\Omega$                                              |                                        |
| Frequency                                |               | 10 Hz ~ 300 kHz                           | $6.0 \times 10^{-5}$                                               |                                        |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                    | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)   | Standard/Method of<br>Measurement etc.                             |
|------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------|
| Relay test sets                          | 40425         |                                                                                                                                                          |                                                                      | Calibrator, DMM,<br>CT, Power Meter,<br>Counter<br>/ CP801-40425-1 |
| AC Voltage                               |               | (10 Hz ~ 1 kHz)<br>0 mV ~ 1 000 V                                                                                                                        | 0.58 mV/V                                                            |                                                                    |
| AC Current                               |               | (10 Hz ~ 1 kHz)<br>(0 ~ 1 500) A<br>(1 500 ~ 6 000) A                                                                                                    | 0.62 mA/A<br>2.4 mA/A                                                |                                                                    |
| DC Voltage                               |               | 0 mV ~ 1 000 V                                                                                                                                           | 0.58 mV/V                                                            |                                                                    |
| AC Voltage                               |               | (0 ~ 100) A<br>(100 ~ 1 000) A                                                                                                                           | 0.58 mA/A<br>3 mA/A                                                  |                                                                    |
| Time interval                            |               | (0 ~ 100) s                                                                                                                                              | 0.58 ms/s                                                            |                                                                    |
| Phase                                    |               | (0 ~ 360)°                                                                                                                                               | 0.058°                                                               |                                                                    |
| Frequency                                |               | 10 Hz ~ 1 kHz                                                                                                                                            | 5.8 mHz                                                              |                                                                    |
| Resistance                               |               | (1 ~ 100) mΩ<br>100 mΩ ~ 10 kΩ                                                                                                                           | 1 mΩ/Ω<br>32 μΩ/Ω                                                    |                                                                    |
| LF signal generators                     | 40426         |                                                                                                                                                          |                                                                      | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40426-1 |
| Frequency<br>(Analogue)<br>(Digital)     |               | 1 mHz ~ 10 MHz<br>1 mHz ~ 10 MHz                                                                                                                         | 12 mHz/Hz<br>$5.8 \times 10^{-9}$                                    |                                                                    |
| Level                                    |               | (10 Hz ~ 10 kHz)<br>(+ 20 ~ -50) dB<br>(10 Hz ~ 10 kHz)<br>(-50 ~ -80) dB<br>(10 kHz ~ 10 MHz)<br>(+ 30 ~ -50) dB<br>(10 kHz ~ 10 MHz)<br>(-50 ~ -80) dB | 0.025 dB<br>0.068 dB<br>0.033 dB<br>0.077 dB                         |                                                                    |
| Distortion                               |               | (10 Hz ~ 1 kHz)<br>(0 ~ -40) dB<br>(-40 ~ -60) dB<br>(-60 ~ -70) dB<br>(1 ~ 100) kHz<br>(0 ~ -40) dB<br>(-40 ~ -60) dB<br>(-60 ~ -70) dB                 | 0.029 dB<br>0.037 dB<br>0.063 dB<br>0.037 dB<br>0.057 dB<br>0.073 dB |                                                                    |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                    | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                             |
|------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------|
| LF spectrum analyzers                    | 40427         |                                                                                                                                                          |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40427-1 |
| Reference frequency                      |               | 1 MHz, 10 MHz                                                                                                                                            | $5.8 \times 10^{-9}$                                               |                                                                    |
| Readout frequency<br>(Marker frequency)  |               | (1 ~ 100) Hz<br>100 Hz ~ 1 kHz<br>(1 ~ 10) kHz<br>(10 ~ 100) kHz<br>100 kHz ~ 1 MHz<br>(1 ~ 10) MHz                                                      | 99 $\mu$ Hz<br>0.99 mHz<br>9.9 mHz<br>99 mHz<br>0.99 Hz<br>9.9 Hz  |                                                                    |
| Frequency response                       |               | (10 Hz ~ 10 MHz)<br>(+ 10 ~ -10) dBm                                                                                                                     | 0.13 dB                                                            |                                                                    |
| Span                                     |               | 10 Hz ~ 1 MHz                                                                                                                                            | $8.8 \times 10^{-3}$                                               |                                                                    |
| Reference level                          |               | (10 Hz ~ 10 MHz)<br>(+ 30 ~ -80) dB<br>(10 Hz ~ 10 MHz)<br>(-80 ~ -120) dB                                                                               | 0.10 dB<br>0.13 dB                                                 |                                                                    |
| Input attenuation                        |               | (10 Hz ~ 10 MHz)<br>(+ 30 ~ -80) dB<br>(10 Hz ~ 10 MHz)<br>(-80 ~ -120) dB                                                                               | 0.10 dB<br>0.13 dB                                                 |                                                                    |
| Cal. signal level                        |               | (0 ~ -30) dBm                                                                                                                                            | 0.055 dB                                                           |                                                                    |
| Resolution bandwidth                     |               | 1 Hz ~ 1 MHz                                                                                                                                             | $1.1 \times 10^{-3}$                                               |                                                                    |
| Absolute amplitude                       |               | (10 Hz ~ 10 MHz)<br>(+ 30 ~ -70) dBm                                                                                                                     | 0.10 dB                                                            |                                                                    |
| Average noise level                      |               | (10 Hz ~ 10 MHz)<br>(-50 ~ -120) dB                                                                                                                      | 0.13 dB                                                            |                                                                    |
| Sweep generators                         | 40429         |                                                                                                                                                          |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40429-1 |
| Frequency                                |               | 0.1 Hz ~ 10 MHz                                                                                                                                          | 12 mHz/Hz                                                          |                                                                    |
| Voltage                                  |               | (10 Hz ~ 1 kHz)<br>10 mV ~ 20 V<br>(1 kHz ~ 100 kHz)<br>10 mV ~ 20 V<br>(100 kHz ~ 10 MHz)<br>10 mV ~ 20 V                                               | 7.5 mV/V<br>6.0 mV/V<br>11 mV/V                                    |                                                                    |
| dB                                       |               | (10 Hz ~ 10 kHz)<br>(+ 30 ~ -50) dB<br>(10 Hz ~ 10 kHz)<br>(-50 ~ -80) dB<br>(10 kHz ~ 10 MHz)<br>(+ 30 ~ -50) dB<br>(10 kHz ~ 10 MHz)<br>(-50 ~ -80) dB | 0.025 dB<br>0.068 dB<br>0.033 dB<br>0.077 dB                       |                                                                    |
| Distortion                               |               | (10 Hz ~ 1 kHz)<br>(0 ~ -70) dB<br>(1 kHz ~ 100 kHz)<br>(0 ~ -70) dB                                                                                     | 0.071 dB<br>0.081 dB                                               |                                                                    |



## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                                  | Field<br>Code | Range                                                                                                                                                                | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                                                                                                                                    |
|---------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Signal transducers<br>Signal transducers                                  | 40430         | (Input voltage : DC ~ 100 kHz, 10 V ~ 600 V)<br>(Input current : DC ~ 10 kHz, 10 mA ~ 50 A)<br>(Input frequency : DC ~ 100 kHz)                                      |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40430-1                                                                                                                        |
| Output voltage                                                            |               | 200 mV ~ 300 V                                                                                                                                                       | 0.95 mV/V                                                          |                                                                                                                                                                                           |
| Output current                                                            |               | 4 mA ~ 50 A                                                                                                                                                          | 0.95 mA/A                                                          |                                                                                                                                                                                           |
| Output frequency                                                          |               | (1 ~ 100) Hz<br>100 Hz ~ 1 kHz<br>(1 ~ 20) kHz                                                                                                                       | 0.58 mHz<br>5.8 mHz<br>58 mHz                                      |                                                                                                                                                                                           |
| Current transducers, Current<br>Sensors, etc.<br>Transduction Ratio Error |               | (Input Current : (1 ~ 100) A, 40 Hz ~ 1 kHz)<br>(Output Current : 2 mA ~ 20 A)<br>(-19.999 ~ +19.999) %<br>(Output Voltage : 100 mV ~ 20 V)<br>(-19.999 ~ +19.999) % | 5.5 x 10 <sup>-4</sup><br>4.9 x 10 <sup>-4</sup>                   | CT Test System,<br>Calibrator, Shunt,<br>Transconductance<br>Amplifier, Resistance<br>Multimeter, Current<br>Multimeter, Current<br>Transformer, Current<br>Transducer<br>/ CP801-40430-2 |
| AC                                                                        |               | (Input Current: 100 A ~ 5 kA, 60 Hz)<br>(Output Current : 2 mA ~ 20 A)<br>(-19.999 ~ +19.999) %<br>(Output Voltage : 100 mV ~ 20 V)<br>(-19.999 ~ +19.999) %         | 2.5 x 10 <sup>-3</sup><br>2.2 x 10 <sup>-3</sup>                   |                                                                                                                                                                                           |
|                                                                           |               | (Input Current: (5 ~ 10) kA, 60 Hz)<br>(Output Current : 2 mA ~ 20 A)<br>(-19.999 ~ +19.999) %<br>(Output Voltage : 100 mV ~ 20 V)<br>(-19.999 ~ +19.999) %          | 3.4 x 10 <sup>-3</sup><br>3.3 x 10 <sup>-3</sup>                   |                                                                                                                                                                                           |
|                                                                           |               | (Input Current : (1 ~ 100) A)<br>(Output Current : 2 mA ~ 20 A)<br>(-19.999 ~ +19.999) %<br>(Output Voltage : 100 mV ~ 20 V)<br>(-19.999 ~ +19.999) %                | 9.6 x 10 <sup>-5</sup><br>7.6 x 10 <sup>-5</sup>                   |                                                                                                                                                                                           |
|                                                                           |               | (Input Current: 100 A ~ 3 kA)<br>(Output Current : 2 mA ~ 20 A)<br>(-19.999 ~ +19.999) %<br>(Output Voltage : 100 mV ~ 20 V)<br>(-19.999 ~ +19.999) %                | 3.0 x 10 <sup>-4</sup><br>2.5 x 10 <sup>-4</sup>                   |                                                                                                                                                                                           |
|                                                                           |               | (Input Current: 3 kA ~ 6 kA)<br>(Output Current : 2 mA ~ 20 A)<br>(-19.999 ~ +19.999) %<br>(Output Voltage : 100 mV ~ 20 V)<br>(-19.999 ~ +19.999) %                 | 3.4 x 10 <sup>-4</sup><br>3.0 x 10 <sup>-4</sup>                   |                                                                                                                                                                                           |
|                                                                           |               | (Input Current: 6 kA ~ 9 kA)<br>(Output Current : 2 mA ~ 20 A)<br>(-19.999 ~ +19.999) %<br>(Output Voltage : 100 mV ~ 20 V)<br>(-19.999 ~ +19.999) %                 | 3.9 x 10 <sup>-4</sup><br>3.6 x 10 <sup>-4</sup>                   |                                                                                                                                                                                           |
| DC                                                                        |               |                                                                                                                                                                      |                                                                    |                                                                                                                                                                                           |
|                                                                           |               |                                                                                                                                                                      |                                                                    |                                                                                                                                                                                           |
|                                                                           |               |                                                                                                                                                                      |                                                                    |                                                                                                                                                                                           |
|                                                                           |               |                                                                                                                                                                      |                                                                    |                                                                                                                                                                                           |
|                                                                           |               |                                                                                                                                                                      |                                                                    |                                                                                                                                                                                           |
|                                                                           |               |                                                                                                                                                                      |                                                                    |                                                                                                                                                                                           |
|                                                                           |               |                                                                                                                                                                      |                                                                    |                                                                                                                                                                                           |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                                                                                                                | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                  | Standard/Method of<br>Measurement etc.                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| AC-DC transfer standards<br>AC Voltage                                                                                                                  | 40431         | (10 Hz ~ 1 kHz)<br>(1 ~ 10) mV<br>(10 ~ 100) mV<br>100 mV ~ 10 V<br>(10 ~ 1 000) V<br>(1 ~ 100) kHz<br>(1 ~ 10) mV<br>(10 ~ 100) mV<br>100 mV ~ 10 V<br>(10 ~ 1 000) V<br>(100 kHz ~ 1 MHz )<br>10 mV ~ 1 V<br>(1 ~ 10) V                                                                                                                                                                                                                                  | 82 $\mu$ V/V<br>32 $\mu$ V/V<br>16 $\mu$ V/V<br>34 $\mu$ V/V<br><br>0.26 mV/V<br>88 $\mu$ V/V<br>44 $\mu$ V/V<br>82 $\mu$ V/V<br><br>0.78 mV/V<br>85 $\mu$ V/V                                                      | Calibrator, DMM,<br>AC/DC Transfer STD.<br>/ CP801-40431-1         |
| Transistor curve tracers<br>Input voltage<br><br>Input current<br><br>Output voltage<br><br>Output current<br><br>Output current(Pulse)                 | 40432         | (0 ~ 1 000) V<br><br>(0 ~ 20) A<br><br>(0 ~ 1 000) V<br><br>(0 ~ 20) A<br><br>100 mA ~ 1 000 A                                                                                                                                                                                                                                                                                                                                                             | 6.3 mV/V<br><br>6.6 mA/A<br><br>6.3 mV/V<br><br>6.6 mA/A<br><br>9.4 mA/A                                                                                                                                            | Frequency Couter,<br>DMM, STD. Resistor<br>/ CP801-40432-1         |
| Waveform analyzers<br>Output frequency<br><br><br><br><br><br>Output voltage<br><br><br><br><br><br>Output level<br><br><br><br><br><br>Input frequency | 40433         | (1 ~ 100) Hz<br>100 Hz ~ 1 kHz<br>(1 ~ 10) kHz<br>(10 ~ 100) kHz<br>100 kHz ~ 1 MHz<br><br>(10 Hz ~ 1 kHz)<br>1 mV ~ 30 V<br>(1 kHz ~ 100 kHz)<br>1 mV ~ 30 V<br>(100 kHz ~ 1 MHz)<br>1 mV ~ 30 V<br><br>(10 Hz ~ 10 kHz)<br>(+ 30 ~ -50) dB<br>(10 Hz ~ 10 kHz)<br>(-50 ~ -80) dB<br>(10 kHz ~ 1 MHz)<br>(+ 30 ~ -50) dB<br>(10 kHz ~ 1 MHz)<br>(-50 ~ -80) dB<br><br>(1 ~ 100) Hz<br>100 Hz ~ 1 kHz<br>(1 ~ 10) kHz<br>(10 ~ 100) kHz<br>100 kHz ~ 2 MHz | 0.58 mHz<br>5.8 mHz<br>58 mHz<br>0.58 Hz<br>5.8 Hz<br><br>7.5 mV/V<br><br>6.0 mV/V<br><br>13 mV/V<br><br>0.025 dB<br>0.068 dB<br><br>0.040 dB<br>0.096 dB<br><br>0.58 mHz<br>5.8 mHz<br>58 mHz<br>0.58 Hz<br>5.8 Hz | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40433-1 |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                         | Field<br>Code | Range                 | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                             |
|------------------------------------------------------------------|---------------|-----------------------|--------------------------------------------------------------------|--------------------------------------------------------------------|
| Waveform analyzers                                               | 40433         |                       |                                                                    | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40433-1 |
| Input voltage                                                    |               | (10 Hz ~ 1 kHz)       |                                                                    |                                                                    |
|                                                                  |               | (0.1 ~ 10) mV         | 4.8 mV/V                                                           |                                                                    |
|                                                                  |               | (1 ~ 100) kHz         |                                                                    |                                                                    |
|                                                                  |               | (0.1 ~ 10) mV         | 3.2 mV/V                                                           |                                                                    |
|                                                                  |               | (10 Hz ~ 1 kHz)       |                                                                    |                                                                    |
|                                                                  |               | 10 mV ~ 10 V          | 2.8 mV/V                                                           |                                                                    |
|                                                                  |               | (1 ~ 100) kHz         |                                                                    |                                                                    |
|                                                                  |               | 10 mV ~ 10 V          | 2.2 mV/V                                                           |                                                                    |
|                                                                  |               | (100 kHz ~ 2 MHz)     |                                                                    |                                                                    |
|                                                                  |               | 10 mV ~ 10 V          | 11 mV/V                                                            |                                                                    |
|                                                                  |               | (20 Hz ~ 1 kHz)       |                                                                    |                                                                    |
|                                                                  |               | (10 ~ 150) V          | 7.7 mV/V                                                           |                                                                    |
|                                                                  |               | (1 ~ 100) kHz         |                                                                    |                                                                    |
|                                                                  |               | (10 ~ 150) V          | 9.8 mV/V                                                           |                                                                    |
| Input level                                                      |               | (10 Hz ~ 10 kHz)      |                                                                    |                                                                    |
|                                                                  |               | (+ 50 ~ + 20) dB      | 0.055 dB                                                           |                                                                    |
|                                                                  |               | (10 Hz ~ 10 kHz)      |                                                                    |                                                                    |
|                                                                  |               | (+ 20 ~ -50) dB       | 0.025 dB                                                           |                                                                    |
|                                                                  |               | (10 Hz ~ 10 kHz)      |                                                                    |                                                                    |
|                                                                  |               | (-50 ~ -80) dB        | 0.068 dB                                                           |                                                                    |
|                                                                  |               | (10 kHz ~ 2 MHz)      |                                                                    |                                                                    |
|                                                                  |               | (+ 20 ~ -50) dB       | 0.036 dB                                                           |                                                                    |
|                                                                  |               | (10 kHz ~ 2 MHz)      |                                                                    |                                                                    |
|                                                                  |               | (-50 ~ -80) dB        | 0.080 dB                                                           |                                                                    |
| Input DC voltage                                                 |               | (-50 ~ + 50) V        | 0.70 mV/V                                                          |                                                                    |
| Filter characteristics<br>(weight, low pass, high pass,<br>etc.) |               | (10 Hz ~ 2 MHz)       |                                                                    |                                                                    |
|                                                                  |               | (+ 10 ~ -50) dB       | 0.058 dB                                                           |                                                                    |
|                                                                  |               | (10 Hz ~ 2 MHz)       |                                                                    |                                                                    |
|                                                                  |               | (-50 ~ -80) dB        | 0.080 dB                                                           |                                                                    |
| Distortion                                                       |               | (10 Hz ~ 1 kHz)       |                                                                    |                                                                    |
|                                                                  |               | (0 ~ -40) dB          | 0.029 dB                                                           |                                                                    |
|                                                                  |               | (-40 ~ -60) dB        | 0.037 dB                                                           |                                                                    |
|                                                                  |               | (-60 ~ -90) dB        | 0.063 dB                                                           |                                                                    |
|                                                                  |               | (1 ~ 100) kHz         |                                                                    |                                                                    |
|                                                                  |               | (0 ~ -40) dB          | 0.037 dB                                                           |                                                                    |
|                                                                  |               | (-40 ~ -60) dB        | 0.057 dB                                                           |                                                                    |
|                                                                  |               | (-60 ~ -90) dB        | 0.073 dB                                                           |                                                                    |
| AC/DC high voltage<br>generators                                 | 40434         |                       |                                                                    | Voltage divider<br>/ CP801-40434-1                                 |
| DC Voltage                                                       |               | $\pm(0 \sim 10)$ kV   | $6.1 \times 10^{-4}$                                               |                                                                    |
|                                                                  |               | $\pm(10 \sim 50)$ kV  | $6.1 \times 10^{-4}$                                               |                                                                    |
|                                                                  |               | $\pm(50 \sim 100)$ kV | $1.2 \times 10^{-3}$                                               |                                                                    |
| AC Voltage                                                       |               | (0 ~ 5) kV            | $1.2 \times 10^{-2}$                                               |                                                                    |
|                                                                  |               | (5 ~ 20) kV           | $0.6 \times 10^{-3}$                                               |                                                                    |
|                                                                  |               | (20 ~ 60) kV          | $0.6 \times 10^{-3}$                                               |                                                                    |
|                                                                  |               | (60 ~ 100) kV         | $1.3 \times 10^{-3}$                                               |                                                                    |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge                                                                                                                                                                                                                                                                                                                                                                                                                                              | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                                              | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                                                                                                                                                                                                 | Standard/Method of<br>Measurement etc.                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC/DC High voltage probes<br>Ratio<br>(DC)<br><br>Ratio<br>(AC)                                                                                                                                                                                                                                                                                                                                                                                                                       | 40435         | (-100 kV ~ 100 kV)<br>100 ~ 100 000 :1<br><br>(0 V ~ 50 kV)<br>100 ~ 100 000 :1                                                                                                                                                                                                                                                                                    | 0.03 %<br><br>0.14 %                                                                                                                                                                                                                                                                                                                                                                                                                                               | Calibrator<br>/ CP801-40435-1                                                                                                                                                            |
| Logic analyzers<br>Threshold voltage (Vp-p)<br><br>AC voltage (Vp-p)<br><br>Time<br><br>Bandwidth (Vp-p)                                                                                                                                                                                                                                                                                                                                                                              | 40436         | (-10 ~ +10) V<br>1 mV ~ 200 V<br>1 ns ~ 5 s<br>(DC ~ 100 MHz)<br>100 mV ~ 1 V                                                                                                                                                                                                                                                                                      | 6.4 mV/V<br>6.5 mV/V<br>5.8 ms/s<br>20 mV/V                                                                                                                                                                                                                                                                                                                                                                                                                        | Frequency Couter,<br>DMM,<br>True RMS Voltmeter<br>/ CP801-40436-1                                                                                                                       |
| Telephone testers<br>Tone frequency<br><br>Tone level<br><br>Bell Frequency<br><br>Bell Voltage<br><br>Loop Current<br><br>Loop Voltage                                                                                                                                                                                                                                                                                                                                               | 40437         | (500 ~ 1 500) Hz<br>(+5 ~ -15) dBm<br>(10 ~ 100) Hz<br>(10 ~ 150) V<br>(10 ~ 100) mA<br>(20 ~ 100) V                                                                                                                                                                                                                                                               | $5.8 \times 10^{-4}$<br>0.022 dB<br>$5.8 \times 10^{-3}$<br>$5.8 \times 10^{-3}$<br>$5.8 \times 10^{-3}$<br>$5.8 \times 10^{-3}$                                                                                                                                                                                                                                                                                                                                   | Tone Pulse Simulator,<br>DMM<br><br>/ CP801-40437-1                                                                                                                                      |
| Video signal analyzers<br>Vector scopes<br>Chrominance<br>(NTSC/PAL)<br><br>Phase<br><br>Video signal analyzers<br>Squarewave voltage<br>(NTSC/PAL)<br><br>Sinewave voltage<br>(NTSC/PAL)<br><br>Sinewave (50 kHz)<br>Sinewave (3.6 MHz)<br>Sinewave (4.43 MHz)<br>Sinewave (5.8 MHz)<br><br>Time<br><br>Phase<br><br>Burst Frequency<br><br>Video signal monitors<br>Luminance<br>(NTSC/PAL)<br><br>Chrominance<br>(NTSC/PAL)<br><br>Frequency response (50 kHz ~ 5 MHz)<br><br>Time | 40438         | 60 mV ~ 1 V<br><br>(0 ~ 360)°<br><br>(60 ~ 100) mV<br>100 mV ~ 0.95 V<br><br>(60 ~ 100) mV<br>100 mV ~ 0.95 V<br><br>(0.4 ~ 0.6) V<br>(0.4 ~ 0.6) V<br>(0.4 ~ 0.6) V<br>(0.4 ~ 0.6) V<br><br>10 ns ~ 100 ns<br>100 ns ~ 1 ms<br><br>(0 ~ 360)°<br><br>(3 ~ 5) MHz<br><br>(0.1 ~ 1) V<br><br>(0.1 ~ 1) V<br><br>(0.4 ~ 0.6) V<br><br>(10 ~ 100) ns<br>100 ns ~ 1 ms | $6.2 \times 10^{-3}$<br>0.80°<br><br>$3.6 \times 10^{-3}$<br>$3.5 \times 10^{-3}$<br><br>$6.2 \times 10^{-3}$<br>$6.1 \times 10^{-3}$<br><br>$6.1 \times 10^{-3}$<br>$1.0 \times 10^{-2}$<br>$1.0 \times 10^{-2}$<br>$1.0 \times 10^{-2}$<br><br>$5.8 \times 10^{-3}$<br>$5.8 \times 10^{-4}$<br><br>0.80°<br><br>0.058 Hz<br><br>$3.6 \times 10^{-3}$<br><br>$6.2 \times 10^{-3}$<br><br>$1.0 \times 10^{-2}$<br><br>$5.8 \times 10^{-3}$<br>$5.8 \times 10^{-4}$ | Video Signal<br>Generator<br>/ CP801-40438-1<br><br><br>Video Signal<br>Generator<br>/ CP801-40438-2<br><br><br><br><br><br><br><br><br><br>Video Signal<br>Generator<br>/ CP801-40438-3 |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge  | Field<br>Code | Range                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                 |
|-------------------------------------------|---------------|-----------------------------------|--------------------------------------------------------------------|------------------------------------------------------------------------|
| Ultrasonic Flow Detector<br>Pulse Voltage | 40499         | (50 ~ 500) V                      | $2.6 \times 10^{-2}$                                               | Oscilloscope,<br>Attenuator, Frequency<br>Counter, Signal<br>Generator |
| Pulse Time<br>(Rise/Fall/Width)           |               | 1 ns<br>1 ns ~ 1 $\mu$ s          | $2.1 \times 10^{-2}$<br>$1.3 \times 10^{-2}$                       | / CP801-40499                                                          |
| Pulse Repetition Rate                     |               | 5 Hz ~ 10 kHz                     | $2.2 \times 10^{-3}$                                               |                                                                        |
| Vertical Linearity                        |               | (100 kHz ~ 30 MHz)<br>(0 ~ 26) dB | 0.2 dB                                                             |                                                                        |
| Gain Accuracy                             |               | (100 kHz ~ 30 MHz)<br>(0 ~ 60) dB | 0.2 dB                                                             |                                                                        |
| Receiver Frequency Response               |               | (100 kHz ~ 30 MHz)<br>(0 ~ 26) dB | 0.1 dB                                                             |                                                                        |
| Linearity of Time base                    |               | 100 ns ~ 5 ms                     | $3.0 \times 10^{-3}$                                               |                                                                        |

## 405. Low frequency electric &amp; magnetic fields

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                      |
|------------------------------------------|---------------|--------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Flux meters                              | 40503         | 0.1 mWb ~ 10 Wb                | 0.7 mWb/Wb                                                         | Volt second<br>Generator, DMM<br>/ CP801-40503-1                            |
| Flux sources<br>Flux                     |               | (0.1 ~ 1) mWb<br>1 mWb ~ 10 Wb | 0.1 mWb/Wb<br>20 $\mu$ Wb/Wb                                       | Universal counter,<br>Digital multimeter,<br>Oscilloscope<br>/CP801-40504-1 |
| Time interval                            |               | (0.01 ~ 10) s                  | 10 $\mu$ s/S                                                       |                                                                             |
| Magnetometers                            | 40508         | (0 ~ 0.1) mT                   | 2 $\mu$ T                                                          | Magnet, Tesla Meter,<br>Helmholtz coil<br><br>/ CP801-40508-1               |
|                                          |               | (0.1 ~ 1) mT                   | 6.5 mT/T                                                           |                                                                             |
|                                          |               | (1 ~ 25) mT                    | 2.3 mT/T                                                           |                                                                             |
|                                          |               | (0.046 ~ 1.7) T                | 0.4 mT/T                                                           |                                                                             |
| Reference/standard<br>Magnets            | 40510         | (1 ~ 25) mT                    | 3.0 mT/T                                                           | Magnet, Tesla Meter,<br>Gauss Meter<br>/ CP801-40510-1                      |
|                                          |               | (0.046 ~ 1.7) T                | 2.3 mT/T                                                           |                                                                             |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                                                                                                              | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                        | Standard/Method of<br>Measurement etc.                                                          |
|------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| RF amplifiers                            | 40601         |                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                           | RF Signal Gen,<br>Thermocouple power<br>sensors,<br>RF spectrum<br>analyzers<br>/ CP801-40601-1 |
| Gain                                     |               | (0 ~ 30) dB<br>9 kHz ~ 1 GHz<br>(1 ~ 10) GHz<br>(10 ~ 18) GHz<br>(18 ~ 26.5) GHz<br>(26.5 ~ 40) GHz<br>(40 ~ 50) GHz<br>(50 ~ 67) GHz<br>(67 ~ 80) GHz<br>(80 ~ 95) GHz<br>(95 ~ 110) GHz<br>(30 ~ 60) dB<br>9 kHz ~ 1 GHz<br>(1 ~ 10) GHz<br>(10 ~ 18) GHz<br>(18 ~ 26.5) GHz<br>(26.5 ~ 40) GHz<br>(40 ~ 50) GHz<br>(50 ~ 67) GHz<br>(67 ~ 80) GHz<br>(80 ~ 95) GHz<br>(95 ~ 110) GHz                                            | 0.085 dB<br>0.13 dB<br>0.18 dB<br>0.30 dB<br>0.49 dB<br>0.49 dB<br>0.58 dB<br>0.69 dB<br>0.78 dB<br>0.87 dB<br>0.11 dB<br>0.15 dB<br>0.20 dB<br>0.31 dB<br>0.50 dB<br>0.51 dB<br>0.60 dB<br>0.71 dB<br>0.80 dB<br>0.90 dB |                                                                                                 |
| Harmonic                                 | 40602         |                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                           | Network Analyzer<br>/ CP801-40602-1                                                             |
| Attenuation                              |               | (20 ~ 100) dBc<br>9 kHz ~ 500 MHz<br>500 MHz ~ 5 GHz<br>(5 ~ 9) GHz<br>(9 ~ 13.25) GHz<br>(13.25 ~ 20) GHz<br>(20 ~ 25) GHz<br>(25 ~ 33.5) GHz<br>(33.5 ~ 40) GHz<br>(40 ~ 47.5) GHz<br>(47.5 ~ 55) GHz                                                                                                                                                                                                                            | 0.52 dB<br>0.59 dB<br>0.67 dB<br>0.87 dB<br>1.2 dB<br>1.2 dB<br>1.4 dB<br>1.6 dB<br>1.7 dB<br>1.9 dB                                                                                                                      |                                                                                                 |
| Coaxial attenuators                      | 40602         |                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                           | Network Analyzer<br>/ CP801-40602-1                                                             |
| Attenuation                              |               | (0 ~ 10) dB<br>9 kHz ~ 3 GHz<br>(3 ~ 18) GHz<br>(18 ~ 26.5) GHz<br>(26.5 ~ 50) GHz<br>(50 ~ 67) GHz<br>(10 ~ 30) dB<br>9 kHz ~ 3 GHz<br>(3 ~ 18) GHz<br>(18 ~ 26.5) GHz<br>(26.5 ~ 50) GHz<br>(50 ~ 67) GHz<br>(30 ~ 60) dB<br>9 kHz ~ 3 GHz<br>(3 ~ 18) GHz<br>(18 ~ 26.5) GHz<br>(26.5 ~ 50) GHz<br>(50 ~ 67) GHz<br>(60 ~ 110) dB<br>100 kHz ~ 4.2 GHz<br>(4.2 ~ 8) GHz<br>(8 ~ 12.4) GHz<br>(12.4 ~ 18) GHz<br>(18 ~ 26.5) GHz | 0.06 dB<br>0.08 dB<br>0.16 dB<br>0.36 dB<br>0.44 dB<br>0.06 dB<br>0.09 dB<br>0.23 dB<br>0.44 dB<br>0.52 dB<br>0.09 dB<br>0.10 dB<br>0.49 dB<br>0.56 dB<br>0.64 dB<br>0.35 dB<br>0.38 dB<br>0.40 dB<br>0.43 dB<br>0.65 dB  |                                                                                                 |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge                                                                                                                                                                                                                                                              | Field<br>Code | Range                                                                                                                                                                                                                                                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                                                                                            | Standard/Method of<br>Measurement etc.       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Coaxial attenuators<br>Reflection Coefficient                                                                                                                                                                                                                                                         | 40602         | 9 kHz ~ 100 MHz<br>100 MHz ~ 3 GHz<br>(3 ~ 18) GHz<br>(18 ~ 26) GHz<br>(26 ~ 40) GHz<br>(40 ~ 50) GHz<br>(50 ~ 67) GHz                                                                                                                                            | $4.1 \times 10^{-3}$<br>$5.8 \times 10^{-3}$<br>$7.3 \times 10^{-3}$<br>$8.5 \times 10^{-3}$<br>$8.5 \times 10^{-3}$<br>$1.6 \times 10^{-2}$<br>$2.3 \times 10^{-2}$                                                                                                                                                                                          | Network Analyzer<br>/ CP801-40602-1          |
| Waveguide attenuators<br>Attenuation                                                                                                                                                                                                                                                                  | 40603         | (0 ~ 40) dB<br>(40 ~ 110) GHz                                                                                                                                                                                                                                     | 0.20 dB                                                                                                                                                                                                                                                                                                                                                       | Network Analyzer<br>/ CP801-40603-1          |
| BER(Bit Error Rate) testers<br>Communication frequency                                                                                                                                                                                                                                                | 40604         | (1.544 ~ 155) MHz                                                                                                                                                                                                                                                 | $5.8 \times 10^{-9}$                                                                                                                                                                                                                                                                                                                                          | Rubidium Frequency<br>STD<br>/ CP801-40604-1 |
| Pulse width                                                                                                                                                                                                                                                                                           |               | 5 ns ~ 100 $\mu$ s                                                                                                                                                                                                                                                | $5.8 \times 10^{-3}$                                                                                                                                                                                                                                                                                                                                          |                                              |
| Burst pulse generators<br>Positive Burst voltage<br>(50 $\Omega$ )<br><br>Negative Burst voltage<br>(50 $\Omega$ )<br><br>Positive Burst voltage<br>(1 000 $\Omega$ )<br><br>Negative Burst voltage<br>(1 000 $\Omega$ )<br><br>Time<br>(Rise/Fall/Width/Period<br>/Duration/Repetition<br>frequency) | 40605         | 10 V<br>(10 ~ 100) V<br>100 V ~ 1 kV<br>(1 ~ 8) kV<br><br>-10 V<br>(-10 ~ -100) V<br>-100 V ~ -1 kV<br>(-1 ~ -8) kV<br><br>100 V<br>100 V ~ 1 kV<br>(1 ~ 8) kV<br><br>-100 V<br>-100 V ~ -1 kV<br>(-1 ~ -8) kV<br><br>1 ns<br>1 ns ~ 1 $\mu$ s<br>1 $\mu$ s ~ 1 s | 0.29 V<br>$2.6 \times 10^{-2}$<br>$2.5 \times 10^{-2}$<br>$2.4 \times 10^{-2}$<br><br>0.29 V<br>$2.6 \times 10^{-2}$<br>$2.5 \times 10^{-2}$<br>$2.4 \times 10^{-2}$<br><br>2.6 V<br>$2.5 \times 10^{-2}$<br>$2.4 \times 10^{-2}$<br><br>2.6 V<br>$2.5 \times 10^{-2}$<br>$2.4 \times 10^{-2}$<br><br>0.02 ns<br>$1.3 \times 10^{-2}$<br>$7.8 \times 10^{-3}$ | Oscilloscope,<br>/ CP801-40605-1             |
| RF power meter calibrators<br>Power                                                                                                                                                                                                                                                                   | 40607         | 100 mW<br>10 mW<br>1 mW<br>100 $\mu$ W<br>10 $\mu$ W                                                                                                                                                                                                              | $1.1 \times 10^{-4}$<br>$7.6 \times 10^{-5}$<br>$9.0 \times 10^{-5}$<br>$1.3 \times 10^{-4}$<br>$3.0 \times 10^{-3}$                                                                                                                                                                                                                                          | DMM<br>/ CP801-40607-1                       |
| EMC transducers; current<br>probes, absorbing clamps,<br>etc.<br>Transfor impedance                                                                                                                                                                                                                   | 40608         | 5 Hz ~ 1 GHz                                                                                                                                                                                                                                                      | 1.2 dB                                                                                                                                                                                                                                                                                                                                                        | Network analyzer<br>/ CP801-40608-1          |
| Delay lines                                                                                                                                                                                                                                                                                           | 40609         | (1 MHz ~ 18 GHz)<br>100 ps ~ 1 ms                                                                                                                                                                                                                                 | 0.011                                                                                                                                                                                                                                                                                                                                                         | Network Analyzer<br>/ CP801-40609-1          |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge                               | Field<br>Code | Range                                                                                                                                                                                                                                                                        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                           | Standard/Method of<br>Measurement etc.         |
|------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Coaxial directional<br>couplers/splitters<br>Coupling ratio            | 40610         | (10 ~ 30) dB<br>(9 ~ 100) kHz<br>100 kHz ~ 3 GHz<br>(3 ~ 18) GHz<br>(18 ~ 26) GHz<br>(26 ~ 40) GHz<br>(40 ~ 50) GHz<br>(50 ~ 67) GHz<br>(30 ~ 70) dB<br>(9 ~ 100) kHz<br>100 kHz ~ 3 GHz<br>(3 ~ 18) GHz<br>(18 ~ 26) GHz<br>(26 ~ 40) GHz<br>(40 ~ 50) GHz<br>(50 ~ 67) GHz | 0.06 dB<br>0.07 dB<br>0.10 dB<br>0.11 dB<br>0.12 dB<br>0.44 dB<br>0.52 dB<br>0.08 dB<br>0.09 dB<br>0.13 dB<br>0.14 dB<br>0.14 dB<br>0.56 dB<br>0.64 dB                                                                                                                                       | Network Analyzer<br>/ CP801-40610-1            |
| Reflection coefficient                                                 |               | 9 kHz ~ 100 MHz<br>100 MHz ~ 3 GHz<br>(3 ~ 18) GHz<br>(18 ~ 26) GHz<br>(26 ~ 40) GHz<br>(40 ~ 50) GHz<br>(50 ~ 67) GHz                                                                                                                                                       | $4.1 \times 10^{-3}$<br>$5.8 \times 10^{-3}$<br>$7.3 \times 10^{-3}$<br>$8.5 \times 10^{-3}$<br>$8.5 \times 10^{-3}$<br>$1.6 \times 10^{-2}$<br>$2.3 \times 10^{-2}$                                                                                                                         |                                                |
| Waveguide directional<br>couplers<br>Coupling ratio                    | 40611         | (3 ~ 60) dB<br>(40 ~ 110) GHz                                                                                                                                                                                                                                                | 0.20 dB                                                                                                                                                                                                                                                                                      | Network Analyzer<br>/ CP801-40611-1            |
| DS1/DS3 communications<br>systems<br>Communication frequency           | 40612         | (1.544 ~ 155) MHz                                                                                                                                                                                                                                                            | $5.8 \times 10^{-9}$                                                                                                                                                                                                                                                                         | Oscilloscope<br>/ CP801-40612-1                |
| Pulse width                                                            |               | 5 ns ~ 100 $\mu$ s                                                                                                                                                                                                                                                           | $5.8 \times 10^{-3}$                                                                                                                                                                                                                                                                         |                                                |
| Electrostatic discharge<br>generators<br>Discharge current (1st order) | 40613         | 2 kV/ 7.5 A<br>4 kV/ 15 A<br>6 kV/ 22.5 A<br>8 kV/ 30 A<br>15 kV/ 56 A<br>30 kV/ 112 A<br>-2 kV/ -7.5 A<br>-4 kV/ -15 A<br>-6 kV/ -22.5 A<br>-8 kV/ -30 A<br>-15 kV/ -56 A<br>-30 kV/ -112 A                                                                                 | $2.8 \times 10^{-2}$<br>$2.8 \times 10^{-2}$<br>$2.8 \times 10^{-2}$<br>$2.8 \times 10^{-2}$<br>$2.8 \times 10^{-2}$<br>$2.8 \times 10^{-2}$<br>$2.8 \times 10^{-2}$<br>$2.8 \times 10^{-2}$<br>$2.8 \times 10^{-2}$<br>$2.8 \times 10^{-2}$<br>$2.8 \times 10^{-2}$<br>$2.8 \times 10^{-2}$ | Oscilloscope,<br>Attenuator<br>/ CP801-40613-1 |
| Discharge current (30 ns)                                              |               | 2 kV/ 4 A<br>4 kV/ 8 A<br>6 kV/ 12 A<br>8 kV/ 16 A<br>15 kV/ 30 A<br>30 kV/ 60 A<br>-2 kV/ 4 A<br>-4 kV/ 8 A<br>-6 kV/ 12 A<br>-8 kV/ 16 A<br>-15 kV/ -30 A<br>-30 kV/ -60 A                                                                                                 | $5.1 \times 10^{-2}$<br>$5.1 \times 10^{-2}$<br>$5.1 \times 10^{-2}$<br>$5.1 \times 10^{-2}$<br>$5.1 \times 10^{-2}$<br>$5.1 \times 10^{-2}$<br>$5.1 \times 10^{-2}$<br>$5.1 \times 10^{-2}$<br>$5.1 \times 10^{-2}$<br>$5.1 \times 10^{-2}$<br>$5.1 \times 10^{-2}$<br>$5.1 \times 10^{-2}$ |                                                |



## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge                           | Field<br>Code | Range            | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                |
|--------------------------------------------------------------------|---------------|------------------|--------------------------------------------------------------------|-------------------------------------------------------|
| Electrostatic discharge<br>generators<br>Discharge current (60 ns) | 40613         | 2 kV/ 2 A        | $9.9 \times 10^{-2}$                                               | Oscilloscope,<br>Attenuator<br>/ CP801-40613-1        |
|                                                                    |               | 4 kV/ 4 A        | $9.9 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | 6 kV/ 6 A        | $9.9 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | 8 kV/ 8 A        | $9.9 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | 15 kV/ 15 A      | $9.9 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | 30 kV/ 30 A      | $9.9 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | -2 kV/ 2 A       | $9.9 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | -4 kV/ 4 A       | $9.9 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | -6 kV/ 6 A       | $9.9 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | -8 kV/ 8 A       | $9.9 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | -15 kV/ -15 A    | $9.9 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | -30 kV/ -30 A    | $9.9 \times 10^{-2}$                                               |                                                       |
| Rising time (1st order)                                            |               | (0.5 ~ 1) ns     | $5.8 \times 10^{-3}$                                               |                                                       |
|                                                                    |               | (1 ~ 10) ns      | $5.8 \times 10^{-3}$                                               |                                                       |
|                                                                    |               | (10 ~ 200) ns    | $5.8 \times 10^{-3}$                                               |                                                       |
| Discharge voltage                                                  |               | (100 ~ 1 000) V  | $2.8 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | (1 ~ 8) kV       | $2.8 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | (8 ~ 30) kV      | $2.8 \times 10^{-2}$                                               |                                                       |
| Discharge current                                                  |               | (0.1 ~ 1) A      | $2.8 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | (1 ~ 20) A       | $2.8 \times 10^{-2}$                                               |                                                       |
|                                                                    |               | (20 ~ 100) A     | $2.8 \times 10^{-2}$                                               |                                                       |
| EMC receivers                                                      | 40614         |                  |                                                                    | EMI calibration pulse<br>generator<br>/ CP801-40614-1 |
| Frequency Accuracy                                                 |               | (5 ~ 100) MHz    | $5.8 \times 10^{-10}$                                              |                                                       |
| Input Impedance (VSWR)                                             |               | 10 Hz ~ 10 MHz   | 0.008 5                                                            |                                                       |
|                                                                    |               | 10 MHz ~ 20 GHz  | 0.019                                                              |                                                       |
|                                                                    |               | (20 ~ 50) GHz    | 0.030                                                              |                                                       |
| Frequency Respose<br>(sine wave)                                   |               | 10 Hz ~ 100 kHz  | 0.082 dB                                                           |                                                       |
|                                                                    |               | 100 kHz ~ 10 GHz | 0.20 dB                                                            |                                                       |
|                                                                    |               | (10 ~ 18) GHz    | 0.23 dB                                                            |                                                       |
|                                                                    |               | (18 ~ 26) GHz    | 0.32 dB                                                            |                                                       |
|                                                                    |               | (26 ~ 50) GHz    | 0.39 dB                                                            |                                                       |
| Quasi peak amplitude<br>relationship<br>(absolute calibration)     |               | 9 kHz ~ 1 GHz    | 0.55 dB                                                            |                                                       |
| Variation with repetition<br>(CISPR Band)                          |               | (9 ~ 150) kHz    | 0.09 dB                                                            |                                                       |
|                                                                    |               | 150 kHz ~ 30 MHz | 0.10 dB                                                            |                                                       |
|                                                                    |               | (30 ~ 300) MHz   | 0.13 dB                                                            |                                                       |
|                                                                    |               | 300 MHz ~ 1 GHz  | 0.14 dB                                                            |                                                       |
| Overall selectivity                                                |               | 100 kHz ~ 50 GHz | 0.18 dB                                                            |                                                       |
| intermediate frequency<br>rejection ratio                          |               | 100 kHz ~ 50 GHz | 0.18 dB                                                            |                                                       |
| image frequency rejection<br>ratio                                 |               | 100 kHz ~ 50 GHz | 0.18 dB                                                            |                                                       |
| Spurious response                                                  |               | 100 kHz ~ 50 GHz | 0.18 dB                                                            |                                                       |
| Random noise                                                       |               | 100 kHz ~ 50 GHz | 0.19 dB                                                            |                                                       |
| Resolution Bandwidth                                               |               | 10 Hz ~ 20 MHz   | $1.1 \times 10^{-2}$                                               |                                                       |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge                                                                                                                                                                                                                                                                                                                                                                                  | Field<br>Code | Range                                                                                                                                                                                                                                                                                       | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                  | Standard/Method of<br>Measurement etc.                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RF filters<br>Insertion loss                                                                                                                                                                                                                                                                                                                                                                                              | 40615         | (9 ~ 300) kHz<br>300 kHz ~ 3 GHz<br>(3 ~ 10) GHz<br>(10 ~ 18) GHz<br>(18 ~ 26) GHz<br>(26 ~ 50) GHz<br>(50 ~ 67) GHz                                                                                                                                                                        | 0.21 dB<br>0.21 dB<br>0.26 dB<br>0.32 dB<br>0.32 dB<br>0.36 dB<br>0.44 dB                                                                                                                                           | Network Analyzer<br>/ CP801-40615-1                                                                                                                                                            |
| RF impedance meters<br>Reference frequency<br><br>Level<br><br><br>Impedance                                                                                                                                                                                                                                                                                                                                              | 40616         | 1 MHz ~ 18 GHz<br><br>(9 kHz ~ 3 GHz)<br>(0 ~ -20) dBm<br>(3 ~ 6) GHz<br>(0 ~ -20) dBm<br>(6 ~ 18) GHz<br>(0 ~ -20) dBm<br><br>1 MHz ~ 3 GHz<br>(3 ~ 18) GHz                                                                                                                                | $5.8 \times 10^{-10}$<br><br>0.078 dB<br>0.10 dB<br>0.15 dB<br><br>0.60 $\Omega$<br>1.0 $\Omega$                                                                                                                    | Calibration Kit<br>/ CP801-40616-1                                                                                                                                                             |
| Line impedance<br>stabilization networks ;<br>LISN, CDN, ISN, etc.<br><br>LISN<br>Impedance<br>Voltage Division Factor<br>Phase Angle<br>Isolation<br><br>Absorbing clamp<br>Insertion Loss<br>Reflection coefficient<br><br>CDN<br>Impedance<br>Phase Angle<br>Voltage Division Factor<br>Longitudinal conversion loss<br><br>ISN<br>Impedance<br>Phase Angle<br>Voltage division factor<br>Isolation<br>Conversion loss | 40618         | <br><br>5 Hz ~ 1 GHz<br>5 Hz ~ 1 GHz<br>5 Hz ~ 1 GHz<br>5 Hz ~ 1 GHz<br><br>9 kHz ~ 1 GHz<br>9 kHz ~ 1 GHz<br><br>5 Hz ~ 1 GHz<br>5 Hz ~ 1 GHz<br>5 Hz ~ 1 GHz<br>5 Hz ~ 1 GHz<br><br>100 kHz ~ 100 MHz<br>100 kHz ~ 100 MHz<br>100 kHz ~ 100 MHz<br>100 kHz ~ 100 MHz<br>100 kHz ~ 100 MHz | <br><br>0.60 $\Omega$<br>0.15 dB<br>0.88°<br>0.21 dB<br><br>0.9 dB<br>$1.6 \times 10^{-2}$<br><br>$1.7 \times 10^{-2}$<br>0.19°<br>0.15 dB<br>0.28 dB<br><br>0.74 $\Omega$<br>1.8°<br>0.12 dB<br>0.24 dB<br>0.28 dB | Impedance Meter<br>/ CP801-40618-1<br><br><br><br><br><br>Network analyzer<br>/ CP801-40618-2<br><br><br>Impedance Meter<br>/ CP801-40618-3<br><br><br><br>Network analyzer<br>/ CP801-40618-4 |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge                          | Field<br>Code | Range                                                                                                                                                                                                                                                                       | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                     | Standard/Method of<br>Measurement etc. |
|-------------------------------------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------|
| Coaxial standard mismatches<br>Coaxial standard mismatches<br>SWR | 40619         | 1.0 ~ 1.1<br>(10 MHz ~ 2 GHz)<br>(2 ~ 26.5) GHz<br><br>1.1 ~ 1.2<br>(10 MHz ~ 2 GHz)<br>(2 ~ 26.5) GHz<br><br>1.2 ~ 1.3<br>(10 MHz ~ 2 GHz)<br>(2 ~ 26.5) GHz<br><br>1.3 ~ 1.5<br>(10 MHz ~ 2 GHz)<br>(2 ~ 26.5) GHz<br><br>1.5 ~ 2.0<br>(10 MHz ~ 2 GHz)<br>(2 ~ 26.5) GHz | 0.011<br>0.018<br><br>0.012<br>0.020<br><br>0.013<br>0.022<br><br>0.017<br>0.031<br><br>0.028<br>0.057 | Network analyzer<br>/ CP801-40619-1    |
| Calibration kit<br>Magnitude of reflection<br>coefficient         |               | (Termination)<br>45 MHz ~ 2 GHz<br>(2 ~ 7) GHz<br>(7 ~ 19) GHz<br>(19 ~ 34) GHz<br>(34 ~ 50) GHz<br>(Short circuit, open circuit)<br>45 MHz ~ 10 GHz<br>(10 ~ 34) GHz<br>(34 ~ 50) GHz                                                                                      | 0.008 2<br>0.008 9<br>0.009 6<br>0.014<br>0.015<br><br>0.024<br>0.029<br>0.033                         | Network analyzer<br>/ CP801-40619-2    |
| Phase of reflection<br>coefficient                                |               | (Short circuit, open circuit)<br>45 MHz ~ 2 GHz<br>(2 ~ 10) GHz<br>(10 ~ 34) GHz<br>(34 ~ 50) GHz                                                                                                                                                                           | 1.4°<br>1.8°<br>3.4°<br>4.5°                                                                           |                                        |
| Waveguide standard mismatches<br>SWR                              | 40620         | 1.0 ~ 2.0<br>(40 GHz ~ 110 GHz)                                                                                                                                                                                                                                             | 0.12                                                                                                   | Network analyzer<br>/ CP801-40619-1    |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|-------------------|--------------------------------------------------------------------|----------------------------------------|
| Mobile communication test<br>sets        | 40621         | 9 kHz ~ 40 GHz    | $5.8 \times 10^{-10}$                                              | RF Power Meter<br>/ CP801-40621-1      |
| Frequency                                |               | (+ 20 ~ -20) dBm  |                                                                    |                                        |
| Output level                             |               | 9 kHz ~ 3 GHz     | 0.078 dB                                                           |                                        |
|                                          |               | (3 ~ 6) GHz       | 0.10 dB                                                            |                                        |
|                                          |               | (6 ~ 18) GHz      | 0.15 dB                                                            |                                        |
|                                          |               | (18 ~ 26) GHz     | 0.23 dB                                                            |                                        |
|                                          |               | (26 ~ 40) GHz     | 0.28 dB                                                            |                                        |
|                                          |               | (40 ~ 50) GHz     | 0.33 dB                                                            |                                        |
|                                          |               | (-20 ~ -60) dBm   |                                                                    |                                        |
|                                          |               | 9 kHz ~ 3 GHz     | 0.10 dB                                                            |                                        |
|                                          |               | (3 ~ 6) GHz       | 0.14 dB                                                            |                                        |
|                                          |               | (6 ~ 18) GHz      | 0.18 dB                                                            |                                        |
|                                          |               | (18 ~ 26) GHz     | 0.26 dB                                                            |                                        |
|                                          |               | (26 ~ 34) GHz     | 0.31 dB                                                            |                                        |
|                                          |               | (34 ~ 40) GHz     | 0.41 dB                                                            |                                        |
|                                          |               | (40 ~ 50) GHz     | 0.57 dB                                                            |                                        |
|                                          |               | (-60 ~ -80) dBm   |                                                                    |                                        |
|                                          |               | 9 kHz ~ 2 GHz     | 0.20 dB                                                            |                                        |
|                                          |               | (2 ~ 4.2) GHz     | 0.23 dB                                                            |                                        |
|                                          |               | (4.2 ~ 8) GHz     | 0.28 dB                                                            |                                        |
|                                          |               | (8 ~ 12.4) GHz    | 0.30 dB                                                            |                                        |
|                                          |               | (12.4 ~ 18) GHz   | 0.35 dB                                                            |                                        |
|                                          |               | (18 ~ 26.5) GHz   | 0.48 dB                                                            |                                        |
|                                          |               | (-80 ~ -100) dBm  |                                                                    |                                        |
|                                          |               | 9 kHz ~ 2 GHz     | 0.22 dB                                                            |                                        |
|                                          |               | (2 ~ 4.2) GHz     | 0.25 dB                                                            |                                        |
|                                          |               | (4.2 ~ 8) GHz     | 0.30 dB                                                            |                                        |
|                                          |               | (8 ~ 12.4) GHz    | 0.32 dB                                                            |                                        |
|                                          |               | (12.4 ~ 18) GHz   | 0.36 dB                                                            |                                        |
|                                          |               | (18 ~ 26.5) GHz   | 0.49 dB                                                            |                                        |
|                                          |               | (-100 ~ -110) dBm |                                                                    |                                        |
|                                          |               | 9 kHz ~ 2 GHz     | 0.33 dB                                                            |                                        |
|                                          |               | (2 ~ 4.2) GHz     | 0.35 dB                                                            |                                        |
|                                          |               | (4.2 ~ 8) GHz     | 0.39 dB                                                            |                                        |
|                                          |               | (8 ~ 12.4) GHz    | 0.41 dB                                                            |                                        |
|                                          |               | (12.4 ~ 18) GHz   | 0.45 dB                                                            |                                        |
|                                          |               | (18 ~ 26.5) GHz   | 0.56 dB                                                            |                                        |
|                                          |               | (-110 ~ -120) dBm |                                                                    |                                        |
|                                          |               | 9 kHz ~ 2 GHz     | 0.85 dB                                                            |                                        |
|                                          |               | (2 ~ 4.2) GHz     | 0.87 dB                                                            |                                        |
|                                          |               | (4.2 ~ 8) GHz     | 0.89 dB                                                            |                                        |
|                                          |               | (8 ~ 12.4) GHz    | 0.90 dB                                                            |                                        |
|                                          |               | (12.4 ~ 18) GHz   | 0.91 dB                                                            |                                        |
|                                          |               | (18 ~ 26.5) GHz   | 0.97 dB                                                            |                                        |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                    | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|------------------------------------------|--------------------------------------------------------------------|----------------------------------------|
| Mobile communication test<br>sets        | 40621         |                                          |                                                                    | RF Power Meter<br>/ CP801-40621-1      |
| Output frequency modulation              |               | (Rate; 100 Hz ~ 10 kHz)<br>(1 ~ 100) kHz | 0.016                                                              |                                        |
| Amplitude modulation                     |               | (Rate; 100 Hz ~ 10 kHz)<br>(0 ~ 100) %   | 0.016                                                              |                                        |
| Output AC level                          |               | (10 Hz ~ 1 kHz)<br>(10 ~ 100) mV         | 0.15 mV                                                            |                                        |
|                                          |               | (1 kHz ~ 25 kHz)<br>(10 ~ 100) mV        | 0.21 mV                                                            |                                        |
|                                          |               | (10 Hz ~ 1 kHz)<br>100 mV ~ 1 V          | 14 mV                                                              |                                        |
|                                          |               | (1 ~ 25) kHz<br>100 mV ~ 1 V             | 21 mV                                                              |                                        |
|                                          |               | (10 Hz ~ 1 kHz)<br>(1 ~ 5) V             | 53 mV                                                              |                                        |
|                                          |               | (1 ~ 25) kHz<br>(1 ~ 5) V                | 97 mV                                                              |                                        |
| Input AC level                           |               | (50 Hz ~ 1 kHz)<br>100 mV ~ 1 V          | 0.98 mV                                                            |                                        |
|                                          |               | (1 ~ 25) kHz<br>100 mV ~ 1 V             | 2.2 mV                                                             |                                        |
|                                          |               | (50 Hz ~ 1 kHz)<br>(1 ~ 10) V            | 10 mV                                                              |                                        |
|                                          |               | (1 ~ 25) kHz<br>(1 ~ 10) V               | 29 mV                                                              |                                        |
|                                          |               | (50 Hz ~ 1 kHz)<br>(10 ~ 30) V           | 17 mV                                                              |                                        |
|                                          |               | (1 ~ 25) kHz<br>(10 ~ 30) V              | 68 mV                                                              |                                        |
| Input level                              |               | (+ 20 ~ -20) dBm<br>9 kHz ~ 3 GHz        | 0.10 dB                                                            |                                        |
|                                          |               | (3 ~ 6) GHz                              | 0.14 dB                                                            |                                        |
|                                          |               | (6 ~ 18) GHz                             | 0.18 dB                                                            |                                        |
|                                          |               | (18 ~ 26) GHz                            | 0.29 dB                                                            |                                        |
|                                          |               | (26 ~ 40) GHz                            | 0.43 dB                                                            |                                        |
|                                          |               | (40 ~ 50) GHz                            | 0.47 dB                                                            |                                        |
|                                          |               | (-20 ~ -60) dBm<br>9 kHz ~ 3 GHz         | 0.12 dB                                                            |                                        |
|                                          |               | (3 ~ 6) GHz                              | 0.16 dB                                                            |                                        |
|                                          |               | (6 ~ 18) GHz                             | 0.21 dB                                                            |                                        |
|                                          |               | (18 ~ 26) GHz                            | 0.29 dB                                                            |                                        |
|                                          |               | (26 ~ 34) GHz                            | 0.44 dB                                                            |                                        |
|                                          |               | (34 ~ 40) GHz                            | 0.55 dB                                                            |                                        |
|                                          |               | (40 ~ 50) GHz                            | 0.69 dB                                                            |                                        |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|-------------------|--------------------------------------------------------------------|----------------------------------------|
| Mobile communication test<br>sets        | 40621         |                   |                                                                    | RF Power Meter<br>/ CP801-40621-1      |
| Input level                              |               | (-60 ~ -80) dBm   |                                                                    |                                        |
|                                          |               | 9 kHz ~ 2 GHz     | 0.21 dB                                                            |                                        |
|                                          |               | (2 ~ 4.2) GHz     | 0.25 dB                                                            |                                        |
|                                          |               | (4.2 ~ 8) GHz     | 0.30 dB                                                            |                                        |
|                                          |               | (8 ~ 12.4) GHz    | 0.33 dB                                                            |                                        |
|                                          |               | (12.4 ~ 18) GHz   | 0.38 dB                                                            |                                        |
|                                          |               | (18 ~ 26.5) GHz   | 0.52 dB                                                            |                                        |
|                                          |               | (-80 ~ -100) dBm  |                                                                    |                                        |
|                                          |               | 9 kHz ~ 2 GHz     | 0.23 dB                                                            |                                        |
|                                          |               | (2 ~ 4.2) GHz     | 0.27 dB                                                            |                                        |
|                                          |               | (4.2 ~ 8) GHz     | 0.31 dB                                                            |                                        |
|                                          |               | (8 ~ 12.4) GHz    | 0.34 dB                                                            |                                        |
|                                          |               | (12.4 ~ 18) GHz   | 0.38 dB                                                            |                                        |
|                                          |               | (18 ~ 26.5) GHz   | 0.54 dB                                                            |                                        |
|                                          |               | (-100 ~ -110) dBm |                                                                    |                                        |
|                                          |               | 9 kHz ~ 2 GHz     | 0.34 dB                                                            |                                        |
|                                          |               | (2 ~ 4.2) GHz     | 0.36 dB                                                            |                                        |
|                                          |               | (4.2 ~ 8) GHz     | 0.40 dB                                                            |                                        |
|                                          |               | (8 ~ 12.4) GHz    | 0.42 dB                                                            |                                        |
|                                          |               | (12.4 ~ 18) GHz   | 0.47 dB                                                            |                                        |
|                                          |               | (18 ~ 26.5) GHz   | 0.59 dB                                                            |                                        |
|                                          |               | (-110 ~ -120) dBm |                                                                    |                                        |
|                                          |               | 9 kHz ~ 2 GHz     | 0.86 dB                                                            |                                        |
|                                          |               | (2 ~ 4.2) GHz     | 0.88 dB                                                            |                                        |
|                                          |               | (4.2 ~ 8) GHz     | 0.90 dB                                                            |                                        |
|                                          |               | (8 ~ 12.4) GHz    | 0.92 dB                                                            |                                        |
|                                          |               | (12.4 ~ 18) GHz   | 0.93 dB                                                            |                                        |
|                                          |               | (18 ~ 26.5) GHz   | 0.99 dB                                                            |                                        |
| Input frequency modulation               |               | (1 ~ 100) kHz     | 0.016                                                              |                                        |
| Input amplitude modulation               |               | (0 ~ 100) %       | 0.016                                                              |                                        |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                            | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)              | Standard/Method of<br>Measurement etc.                                                                      |
|------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Modulation meters                        | 40622         |                                                                                                                  |                                                                                 | AM/FM Test source<br>/ CP801-40622-1                                                                        |
| Amplitude modulation                     |               | (CW; 150 kHz ~ 1 GHz)<br>(0 ~ 100) %                                                                             | 0.016                                                                           |                                                                                                             |
| Frequency modulation                     |               | (CW; 150 kHz ~ 1 GHz)<br>(1 ~ 100) kHz                                                                           | 0.016                                                                           |                                                                                                             |
| Phase modulation                         |               | (CW; 150 kHz ~ 1 GHz)<br>(-360 ~ 360)°                                                                           | 0.064°                                                                          |                                                                                                             |
| Amplitude modulation<br>distortion       |               | (0 ~ 100) %                                                                                                      | 0.015                                                                           |                                                                                                             |
| Frequency modulation<br>distortion       |               | (0 ~ 100) %                                                                                                      | 0.015                                                                           |                                                                                                             |
| Input frequency                          |               | (1 ~ 100) Hz<br>100 Hz ~ 1 kHz<br>(1 ~ 10) kHz<br>(10 ~ 100) kHz                                                 | 0.58 mHz<br>5.8 mHz<br>58 mHz<br>0.58 Hz                                        |                                                                                                             |
| Input voltage                            |               | (50 Hz ~ 1 kHz)<br>100 mV ~ 3 V<br>(1 ~ 40) kHz<br>100 mV ~ 3 V                                                  | 4.8 mV/V<br>3.2 mV/V                                                            |                                                                                                             |
| Power                                    |               | (150 kHz ~ 18 GHz)<br>10 μW ~ 100 mW                                                                             | 3.4×10 <sup>-3</sup>                                                            |                                                                                                             |
| Tuned RF Level                           |               | (0 ~ 30) dB<br>(30 ~ 60) dB<br>(60 ~ 80) dB<br>(80 ~ 90) dB<br>(90 ~ 100) dB<br>(100 ~ 110) dB<br>(110 ~ 120) dB | 0.037 dB<br>0.041 dB<br>0.045 dB<br>0.054 dB<br>0.080 dB<br>0.091 dB<br>0.11 dB |                                                                                                             |
| Network analyzers                        | 40623         |                                                                                                                  |                                                                                 | Frequency Counter,<br>Thermocouple power<br>sensors,<br>Calibration kit,<br>STD Mismatch<br>/ CP801-40623-1 |
| Frequency                                |               | 5 Hz ~ 110 GHz                                                                                                   | 5.8×10 <sup>-10</sup>                                                           |                                                                                                             |
| Source power                             |               | (+ 20 ~ -20) dBm                                                                                                 |                                                                                 |                                                                                                             |
|                                          |               | 9 kHz ~ 1 GHz                                                                                                    | 0.082 dB                                                                        |                                                                                                             |
|                                          |               | (1 ~ 10) GHz                                                                                                     | 0.098 dB                                                                        |                                                                                                             |
|                                          |               | (10 ~ 18) GHz                                                                                                    | 0.13 dB                                                                         |                                                                                                             |
|                                          |               | (18 ~ 26) GHz                                                                                                    | 0.21 dB                                                                         |                                                                                                             |
|                                          |               | (26 ~ 40) GHz                                                                                                    | 0.23 dB                                                                         |                                                                                                             |
|                                          |               | (40 ~ 50) GHz                                                                                                    | 0.35 dB                                                                         |                                                                                                             |
|                                          |               | (50 ~ 67) GHz                                                                                                    | 0.44 dB                                                                         |                                                                                                             |
|                                          |               | (67 ~ 80) GHz                                                                                                    | 0.53 dB                                                                         |                                                                                                             |
|                                          |               | (80 ~ 95) GHz                                                                                                    | 0.61 dB                                                                         |                                                                                                             |
|                                          |               | (95 ~ 110) GHz                                                                                                   | 0.73 dB                                                                         |                                                                                                             |
|                                          |               | (-20 ~ -40) dBm                                                                                                  |                                                                                 |                                                                                                             |
|                                          |               | 9 kHz ~ 1 GHz                                                                                                    | 0.13 dB                                                                         |                                                                                                             |
|                                          |               | (1 ~ 10) GHz                                                                                                     | 0.14 dB                                                                         |                                                                                                             |
|                                          |               | (10 ~ 18) GHz                                                                                                    | 0.16 dB                                                                         |                                                                                                             |
|                                          |               | (18 ~ 26) GHz                                                                                                    | 0.23 dB                                                                         |                                                                                                             |
|                                          |               | (26 ~ 40) GHz                                                                                                    | 0.26 dB                                                                         |                                                                                                             |
|                                          |               | (40 ~ 50) GHz                                                                                                    | 0.36 dB                                                                         |                                                                                                             |
|                                          |               | (-40 ~ -70) dBm                                                                                                  |                                                                                 |                                                                                                             |
|                                          |               | 9 kHz ~ 1 GHz                                                                                                    | 0.17 dB                                                                         |                                                                                                             |
|                                          |               | (1 ~ 10) GHz                                                                                                     | 0.18 dB                                                                         |                                                                                                             |
|                                          |               | (10 ~ 18) GHz                                                                                                    | 0.19 dB                                                                         |                                                                                                             |
|                                          |               | (18 ~ 26) GHz                                                                                                    | 0.25 dB                                                                         |                                                                                                             |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range           | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                                                      |
|------------------------------------------|---------------|-----------------|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Network analyzers                        | 40623         | (0 ~ 30) dB     |                                                                    | Frequency Counter,<br>Thermocouple power<br>sensors,<br>Calibration kit,<br>STD Mismatch<br>/ CP801-40623-1 |
| Dynamic Range                            |               | 150 kHz ~ 1 GHz | 0.14 dB                                                            |                                                                                                             |
|                                          |               | (1 ~ 2) GHz     | 0.15 dB                                                            |                                                                                                             |
|                                          |               | (30 ~ 60) dB    |                                                                    |                                                                                                             |
|                                          |               | 150 kHz ~ 1 GHz | 0.16 dB                                                            |                                                                                                             |
|                                          |               | (1 ~ 2) GHz     | 0.20 dB                                                            |                                                                                                             |
|                                          |               | (60 ~ 90) dB    |                                                                    |                                                                                                             |
|                                          |               | 150 kHz ~ 1 GHz | 0.23 dB                                                            |                                                                                                             |
|                                          |               | (1 ~ 2) GHz     | 0.27 dB                                                            |                                                                                                             |
| Voltage standing wave ratio              |               | 1.1             |                                                                    |                                                                                                             |
|                                          |               | 10 MHz ~ 2 GHz  | 0.012                                                              |                                                                                                             |
|                                          |               | (2 ~ 18) GHz    | 0.019                                                              |                                                                                                             |
|                                          |               | (18 ~ 26.5) GHz | 0.021                                                              |                                                                                                             |
|                                          |               | 1.2             |                                                                    |                                                                                                             |
|                                          |               | 10 MHz ~ 2 GHz  | 0.013                                                              |                                                                                                             |
|                                          |               | (2 ~ 18) GHz    | 0.017                                                              |                                                                                                             |
|                                          |               | (18 ~ 26.5) GHz | 0.020                                                              |                                                                                                             |
|                                          |               | (26.5 ~ 40) GHz | 0.040                                                              |                                                                                                             |
|                                          |               | (40 ~ 50) GHz   | 0.049                                                              |                                                                                                             |
|                                          |               | 1.3             |                                                                    |                                                                                                             |
|                                          |               | 10 MHz ~ 2 GHz  | 0.014                                                              |                                                                                                             |
|                                          |               | (2 ~ 18) GHz    | 0.023                                                              |                                                                                                             |
|                                          |               | (18 ~ 26.5) GHz | 0.025                                                              |                                                                                                             |
|                                          |               | 1.5             |                                                                    |                                                                                                             |
|                                          |               | 10 MHz ~ 2 GHz  | 0.018                                                              |                                                                                                             |
|                                          |               | (2 ~ 18) GHz    | 0.032                                                              |                                                                                                             |
|                                          |               | (18 ~ 26.5) GHz | 0.033                                                              |                                                                                                             |
|                                          |               | (26.5 ~ 40) GHz | 0.055                                                              |                                                                                                             |
|                                          |               | (40 ~ 50) GHz   | 0.071                                                              |                                                                                                             |
|                                          |               | 2.0             |                                                                    |                                                                                                             |
|                                          |               | 10 MHz ~ 2 GHz  | 0.029                                                              |                                                                                                             |
|                                          |               | (2 ~ 18) GHz    | 0.058                                                              |                                                                                                             |
|                                          |               | (18 ~ 26.5) GHz | 0.058                                                              |                                                                                                             |
|                                          |               | (26.5 ~ 40) GHz | 0.092                                                              |                                                                                                             |
|                                          |               | (40 ~ 50) GHz   | 0.12                                                               |                                                                                                             |



## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                                                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                    | Standard/Method of<br>Measurement etc.             |           |                                     |
|------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-----------|-------------------------------------|
| Noise figure meters                      | 40624         |                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                       | Noise Source<br>/ CP801-40624-1                    |           |                                     |
| Reference frequency                      |               | 10 MHz                                                                                                                                                                                                                                                                                                                                                                                 | $5.8\times10^{-10}$                                                                                                                                                                                                   |                                                    |           |                                     |
| Noise source                             |               | 0 V<br>28 V                                                                                                                                                                                                                                                                                                                                                                            | 7.2 μV<br>1.1 mV                                                                                                                                                                                                      |                                                    |           |                                     |
| Input VSWR                               |               | 10 MHz ~ 3 GHz<br>(3 ~ 18) GHz<br>(18 ~ 26.5) GHz                                                                                                                                                                                                                                                                                                                                      | 0.058<br>0.084<br>0.094                                                                                                                                                                                               |                                                    |           |                                     |
| Noise figure Accuracy                    |               | 10 MHz ~ 10 GHz<br>(10 ~ 18) GHz<br>(18 ~ 26.5) GHz                                                                                                                                                                                                                                                                                                                                    | 0.15 dB<br>0.17 dB<br>0.19 dB                                                                                                                                                                                         |                                                    |           |                                     |
| Gain measurement                         |               | IF ATT 0 dB ~ 70 dB                                                                                                                                                                                                                                                                                                                                                                    | 0.12 dB                                                                                                                                                                                                               |                                                    |           |                                     |
| Noise impulse simulators                 | 40626         |                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                       | Oscilloscope,<br>Attenuator<br><br>/ CP801-40626-1 |           |                                     |
| Positive Impulse voltage                 |               | (0 ~ 4) kV                                                                                                                                                                                                                                                                                                                                                                             | $1.5\times10^{-2}$                                                                                                                                                                                                    |                                                    |           |                                     |
| Negative Impulse voltage                 |               | (0 ~ 4) kV                                                                                                                                                                                                                                                                                                                                                                             | $1.5\times10^{-2}$                                                                                                                                                                                                    |                                                    |           |                                     |
| Impulse width                            |               | 50 ns ~ 1 ms                                                                                                                                                                                                                                                                                                                                                                           | $6.0\times10^{-3}$                                                                                                                                                                                                    |                                                    |           |                                     |
| Impulse rising Time                      |               | (0.5 ~ 5) ns                                                                                                                                                                                                                                                                                                                                                                           | $6.0\times10^{-3}$                                                                                                                                                                                                    |                                                    |           |                                     |
| Impulse repetition                       |               | (1 ~ 100) ms                                                                                                                                                                                                                                                                                                                                                                           | $6.0\times10^{-3}$                                                                                                                                                                                                    |                                                    |           |                                     |
| Coaxial noise sources                    | 40628         |                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                       | Noise source test set<br>/ CP801-40628-1           |           |                                     |
| ENR                                      |               | (4.5 dB ~ 6.5 dB)<br>(10 ~ 100) MHz<br>100 MHz ~ 2 GHz<br>(2 ~ 6) GHz<br>(6 ~ 8) GHz<br>(8 ~ 12) GHz<br>(12 ~ 18) GHz<br>(14 dB ~ 16 dB)<br>(10 ~ 100) MHz<br>100 MHz ~ 2 GHz<br>(2 ~ 6) GHz<br>(6 ~ 8) GHz<br>(8 ~ 12) GHz<br>(12 ~ 18) GHz<br>(12 dB ~ 17 dB)<br>(10 ~ 100) MHz<br>100 MHz ~ 2 GHz<br>(2 ~ 6) GHz<br>(6 ~ 8) GHz<br>(8 ~ 12) GHz<br>(12 ~ 18) GHz<br>(18 ~ 26.5) GHz | 0.25 dB<br>0.26 dB<br>0.25 dB<br>0.26 dB<br>0.28 dB<br>0.30 dB<br><br>0.25 dB<br>0.25 dB<br>0.26 dB<br>0.25 dB<br>0.31 dB<br>0.33 dB<br><br>0.25 dB<br>0.25 dB<br>0.28 dB<br>0.25 dB<br>0.31 dB<br>0.35 dB<br>0.36 dB |                                                    |           |                                     |
| Reflection coefficient                   |               | (0 ~ 1)<br>10 MHz ~ 2 GHz<br>(2 ~ 18) GHz<br>(18 ~ 26.5) GHz                                                                                                                                                                                                                                                                                                                           | <br>0.004 8<br>0.007 3<br>0.007 4                                                                                                                                                                                     |                                                    |           |                                     |
| RF phase meters                          |               | 40631                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                       |                                                    |           | Signal Generator<br>/ CP801-40631-1 |
| Phase                                    |               |                                                                                                                                                                                                                                                                                                                                                                                        | (1 MHz ~ 18 GHz)<br>(0 ~ 360)°                                                                                                                                                                                        |                                                    | <br>0.21° |                                     |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge                                                                                                                                                          | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                   | Standard/Method of<br>Measurement etc.          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| RF power meters<br>Power<br><br>CAL factor                                                                                                                                                        | 40635         | (1 MHz ~ 18 GHz)<br>10 $\mu$ W ~ 100 mW<br><br>(100 kHz ~ 1 GHz)<br>100 mW ~ 100 W<br>(100 ~ 500) W                                                                                                                                                                                                                          | $3.4 \times 10^{-3}$<br><br>0.022<br>0.023                                                                                                                                                                                                                                           | RF Power Meter<br>Calibrator<br>/ CP801-40635-1 |
| Diode power sensors<br>CAL Factor                                                                                                                                                                 | 40636         | (100 kHz ~ 10 MHz )<br>1 $\mu$ W ~ 1 mW<br>(10 MHz ~ 10 GHz)<br>1 $\mu$ W ~ 1 mW<br>(10 ~ 18) GHz<br>1 $\mu$ W ~ 1 mW<br>(18 ~ 26.5) GHz<br>1 $\mu$ W ~ 1 mW                                                                                                                                                                 | 0.020<br><br>0.026<br><br>0.031<br><br>0.043                                                                                                                                                                                                                                         | Sensor Calibrator<br>/ CP801-40636-1            |
| Thermocouple power sensors<br>CAL Factor<br><br><br><br><br><br><br><br><br><br>Reflection Coefficient                                                                                            | 40637         | (9 kHz ~ 1 GHz)<br>100 $\mu$ W ~ 10 mW<br>(1 ~ 10) GHz<br>100 $\mu$ W ~ 10 mW<br>(10 ~ 18) GHz<br>100 $\mu$ W ~ 10 mW<br>(18 ~ 26.5) GHz<br>100 $\mu$ W ~ 10 mW<br>(26.5 ~ 40) GHz<br>100 $\mu$ W ~ 10 mW<br>(40 ~ 50) GHz<br>100 $\mu$ W ~ 10 mW<br><br>9 kHz ~ 2 GHz<br>(2 ~ 26.5) GHz<br>(26.5 ~ 40) GHz<br>(40 ~ 50) GHz | $1.3 \times 10^{-2}$<br><br><br>$1.5 \times 10^{-2}$<br><br>$1.8 \times 10^{-2}$<br><br>$3.6 \times 10^{-2}$<br><br>$4.0 \times 10^{-2}$<br><br>$6.8 \times 10^{-2}$<br><br>$5.2 \times 10^{-3}$<br>$8.9 \times 10^{-3}$<br>$1.6 \times 10^{-2}$<br>$2.1 \times 10^{-2}$             | Sensor Calibrator<br>/ CP801-40637-1            |
| Pulse generators<br>Period<br>(Analogue)<br>(Digital)<br>Delay time<br>Pulse width<br>Rise time, fall time<br><br><br>Overshoot<br>Undershoot<br>Settling Time<br><br>Duty Ratio<br>Voltage(Vp-p) | 40638         | 100 ps ~10 s<br>100 ps ~10 s<br>100 ps ~10 s<br>100 ps ~10 s<br>100 ps<br>200 ps<br>300 ps<br>400 ps<br>500 ps<br>600 ps ~10 s<br><br>(0 ~ 100) %<br>(0 ~ 100) %<br>100 ps<br>200 ps<br>300 ps<br>400 ps<br>500 ps<br>600 ps ~ 10 s<br>(0 ~ 100) %<br>10 mV ~ 100 V                                                          | $6.0 \times 10^{-3}$<br>$5.8 \times 10^{-9}$<br>$6.0 \times 10^{-3}$<br>$6.0 \times 10^{-3}$<br>25 ps<br>13 ps<br>10 ps<br>7.0 ps<br>5.6 ps<br>$6.0 \times 10^{-3}$<br><br>0.035<br>0.035<br>25 ps<br>13 ps<br>10 ps<br>7.0 ps<br>5.6 ps<br>$6.0 \times 10^{-3}$<br>0.058<br>10 mV/V | Oscilloscope<br>/ CP801-40638-1                 |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                   |
|------------------------------------------|---------------|-------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------|
| Radar test sets                          | 40639         |                   |                                                                    | Power Meter,<br>Signal Geneator,<br>Frequency Counter<br>/ CP801-40639-1 |
| Output Frequency                         |               | 10 Hz ~ 18 GHz    | $6.1\times10^{-10}$                                                |                                                                          |
| Output level                             |               | (+ 20 ~ -20) dBm  |                                                                    |                                                                          |
|                                          |               | 9 kHz ~ 3 GHz     | 0.09 dB                                                            |                                                                          |
|                                          |               | (3 ~ 6) GHz       | 0.10 dB                                                            |                                                                          |
|                                          |               | (6 ~ 18) GHz      | 0.15 dB                                                            |                                                                          |
|                                          |               | (-20 ~ -60) dBm   |                                                                    |                                                                          |
|                                          |               | 9 kHz ~ 3 GHz     | 0.10 dB                                                            |                                                                          |
|                                          |               | (3 ~ 6) GHz       | 0.14 dB                                                            |                                                                          |
|                                          |               | (6 ~ 18) GHz      | 0.18 dB                                                            |                                                                          |
|                                          |               | (-60 ~ -80) dBm   |                                                                    |                                                                          |
|                                          |               | 150 kHz ~ 1.3 GHz | 0.33 dB                                                            |                                                                          |
|                                          |               | (1.3 ~ 10) GHz    | 0.38 dB                                                            |                                                                          |
|                                          |               | (10 ~ 18) GHz     | 0.43 dB                                                            |                                                                          |
|                                          |               | (-80 ~ -100) dBm  |                                                                    |                                                                          |
|                                          |               | 150 kHz ~ 1.3 GHz | 0.54 dB                                                            |                                                                          |
|                                          |               | (1.3 ~ 10) GHz    | 0.58 dB                                                            |                                                                          |
|                                          |               | (10 ~ 18) GHz     | 0.63 dB                                                            |                                                                          |
|                                          |               | (-100 ~ -120) dBm |                                                                    |                                                                          |
|                                          |               | 150 kHz ~ 1.3 GHz | 0.65 dB                                                            |                                                                          |
|                                          |               | (1.3 ~ 10) GHz    | 0.69 dB                                                            |                                                                          |
|                                          |               | (10 ~ 18) GHz     | 0.70 dB                                                            |                                                                          |
| Harmonics                                |               | 9 kHz ~ 18 GHz    |                                                                    |                                                                          |
|                                          |               | (-10 ~ -110) dBc  | 0.37 dB                                                            |                                                                          |
| Frequency modulation<br>(Output)         |               | (0.1 ~ 500) kHz   | $1.6\times10^{-2}$                                                 |                                                                          |
| Amplitude modulation<br>(Output)         |               | (0.1 ~ 100) %     | $1.6\times10^{-2}$                                                 |                                                                          |
| Phase (Output)                           |               | (0 ~ 360) °       | $3.5\times10^{-2}$ (degree)                                        |                                                                          |
| DDM (Output)                             |               | -1 ~ 1            | $2.8\times10^{-3}$                                                 |                                                                          |
| SDM (Output)                             |               | 0.1 ~ 1           | $2.8\times10^{-3}$                                                 |                                                                          |
| Input Frequency                          |               | 9 kHz ~ 18 GHz    | $5.8\times10^{-8}$                                                 |                                                                          |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                    |
|------------------------------------------|---------------|-------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------|
| Radar test sets                          | 40639         |                   |                                                                    | Power Meter,<br>Signal Generator,<br>Frequency Counter<br>/ CP801-40639-1 |
| Input Level                              |               | (+ 20 ~ -20) dBm  |                                                                    |                                                                           |
|                                          |               | 9 kHz ~ 3 GHz     | 0.11 dB                                                            |                                                                           |
|                                          |               | (3 ~ 6) GHz       | 0.13 dB                                                            |                                                                           |
|                                          |               | (6 ~ 18) GHz      | 0.17 dB                                                            |                                                                           |
|                                          |               | (-20 ~ -60) dBm   |                                                                    |                                                                           |
|                                          |               | 9 kHz ~ 3 GHz     | 0.12 dB                                                            |                                                                           |
|                                          |               | (3 ~ 6) GHz       | 0.16 dB                                                            |                                                                           |
|                                          |               | (6 ~ 18) GHz      | 0.19 dB                                                            |                                                                           |
|                                          |               | (-60 ~ -80) dBm   |                                                                    |                                                                           |
|                                          |               | 150 kHz ~ 1.3 GHz | 0.36 dB                                                            |                                                                           |
|                                          |               | (1.3 ~ 10) GHz    | 0.39 dB                                                            |                                                                           |
|                                          |               | (10 ~ 18) GHz     | 0.44 dB                                                            |                                                                           |
|                                          |               | (-80 ~ -100) dBm  |                                                                    |                                                                           |
|                                          |               | 150 kHz ~ 1.3 GHz | 0.55 dB                                                            |                                                                           |
|                                          |               | (1.3 ~ 10) GHz    | 0.59 dB                                                            |                                                                           |
|                                          |               | (10 ~ 18) GHz     | 0.64 dB                                                            |                                                                           |
|                                          |               | (-100 ~ -120) dBm |                                                                    |                                                                           |
|                                          |               | 150 kHz ~ 1.3 GHz | 0.66 dB                                                            |                                                                           |
|                                          |               | (1.3 ~ 10) GHz    | 0.67 dB                                                            |                                                                           |
|                                          |               | (10 ~ 18) GHz     | 0.71 dB                                                            |                                                                           |
| Frequency modulation<br>(Input)          |               | (0.1 ~ 500) kHz   | $1.6 \times 10^{-2}$                                               |                                                                           |
| Amplitude modulation<br>(Input)          |               | (0.1 ~ 100) %     | $1.6 \times 10^{-2}$                                               |                                                                           |
| Phase (Input)                            |               | (0 ~ 360) °       | $3.5 \times 10^{-2}$ (degree)                                      |                                                                           |
| DDM (Input)                              |               | -1 ~ 1            | $2.8 \times 10^{-3}$                                               |                                                                           |
| SDM (Input)                              |               | 0.1 ~ 1           | $2.8 \times 10^{-3}$                                               |                                                                           |
| Input Power                              |               | 9 kHz ~ 1 GHz     |                                                                    |                                                                           |
|                                          |               | 100 mW ~ 100 W    | $2.2 \times 10^{-3}$                                               |                                                                           |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|-------------------|--------------------------------------------------------------------|----------------------------------------|
| RF signal generators                     | 40640         | 100 kHz ~ 40 GHz  | $5.8 \times 10^{-10}$                                              | Power meter<br>/ CP801-40640-1         |
| Frequency                                |               |                   |                                                                    |                                        |
| Level                                    |               | (+ 20 ~ -20) dBm  |                                                                    |                                        |
|                                          |               | 9 kHz ~ 3 GHz     | 0.078 dB                                                           |                                        |
|                                          |               | (3 ~ 6) GHz       | 0.10 dB                                                            |                                        |
|                                          |               | (6 ~ 18) GHz      | 0.15 dB                                                            |                                        |
|                                          |               | (18 ~ 26) GHz     | 0.23 dB                                                            |                                        |
|                                          |               | (26 ~ 40) GHz     | 0.28 dB                                                            |                                        |
|                                          |               | (40 ~ 50) GHz     | 0.33 dB                                                            |                                        |
|                                          |               | (50 ~ 67) GHz     | 0.42 dB                                                            |                                        |
|                                          |               | (67 ~ 80) GHz     | 0.50 dB                                                            |                                        |
|                                          |               | (80 ~ 95) GHz     | 0.58 dB                                                            |                                        |
|                                          |               | (95 ~ 110) GHz    | 0.70 dB                                                            |                                        |
|                                          |               | (-20 ~ -60) dBm   |                                                                    |                                        |
|                                          |               | 9 kHz ~ 3 GHz     | 0.10 dB                                                            |                                        |
|                                          |               | (3 ~ 6) GHz       | 0.14 dB                                                            |                                        |
|                                          |               | (6 ~ 18) GHz      | 0.18 dB                                                            |                                        |
|                                          |               | (18 ~ 26) GHz     | 0.26 dB                                                            |                                        |
|                                          |               | (26 ~ 34) GHz     | 0.31 dB                                                            |                                        |
|                                          |               | (34 ~ 40) GHz     | 0.41 dB                                                            |                                        |
|                                          |               | (40 ~ 50) GHz     | 0.57 dB                                                            |                                        |
|                                          |               | (-60 ~ -80) dBm   |                                                                    |                                        |
|                                          |               | 9 kHz ~ 2 GHz     | 0.20 dB                                                            |                                        |
|                                          |               | (2 ~ 4.2) GHz     | 0.23 dB                                                            |                                        |
|                                          |               | (4.2 ~ 8) GHz     | 0.28 dB                                                            |                                        |
|                                          |               | (8 ~ 12.4) GHz    | 0.30 dB                                                            |                                        |
|                                          |               | (12.4 ~ 18) GHz   | 0.35 dB                                                            |                                        |
|                                          |               | (18 ~ 26.5) GHz   | 0.48 dB                                                            |                                        |
|                                          |               | (-80 ~ -100) dBm  |                                                                    |                                        |
|                                          |               | 9 kHz ~ 2 GHz     | 0.22 dB                                                            |                                        |
|                                          |               | (2 ~ 4.2) GHz     | 0.25 dB                                                            |                                        |
|                                          |               | (4.2 ~ 8) GHz     | 0.30 dB                                                            |                                        |
|                                          |               | (8 ~ 12.4) GHz    | 0.32 dB                                                            |                                        |
|                                          |               | (12.4 ~ 18) GHz   | 0.36 dB                                                            |                                        |
|                                          |               | (18 ~ 26.5) GHz   | 0.49 dB                                                            |                                        |
|                                          |               | (-100 ~ -110) dBm |                                                                    |                                        |
|                                          |               | 9 kHz ~ 2 GHz     | 0.33 dB                                                            |                                        |
|                                          |               | (2 ~ 4.2) GHz     | 0.35 dB                                                            |                                        |
|                                          |               | (4.2 ~ 8) GHz     | 0.39 dB                                                            |                                        |
|                                          |               | (8 ~ 12.4) GHz    | 0.41 dB                                                            |                                        |
|                                          |               | (12.4 ~ 18) GHz   | 0.45 dB                                                            |                                        |
|                                          |               | (18 ~ 26.5) GHz   | 0.56 dB                                                            |                                        |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|------------------------|--------------------------------------------------------------------|----------------------------------------|
| RF signal generators                     | 40640         |                        |                                                                    | Power meter<br>/ CP801-40640-1         |
| Level                                    |               | (-110 ~ -120) dBm      |                                                                    |                                        |
|                                          |               | 9 kHz ~ 2 GHz          | 0.85 dB                                                            |                                        |
|                                          |               | (2 ~ 4.2) GHz          | 0.87 dB                                                            |                                        |
|                                          |               | (4.2 ~ 8) GHz          | 0.89 dB                                                            |                                        |
|                                          |               | (8 ~ 12.4) GHz         | 0.89 dB                                                            |                                        |
|                                          |               | (12.4 ~ 18) GHz        | 0.91 dB                                                            |                                        |
|                                          |               | (18 ~ 26.5) GHz        | 0.97 dB                                                            |                                        |
| Frequency modulation                     |               | Rate : 100 Hz ~ 10 kHz |                                                                    |                                        |
|                                          |               | DC ~ 300 kHz           | $1.6 \times 10^{-2}$                                               |                                        |
| Amplitude modulation                     |               | Rate : 100 Hz ~ 10 kHz |                                                                    |                                        |
|                                          |               | (0 ~ 100) %            | $1.6 \times 10^{-2}$                                               |                                        |
| Phase modulation                         |               | Rate : 100 Hz ~ 10 kHz |                                                                    |                                        |
|                                          |               | (0 ~ 80) rad           | $1.6 \times 10^{-2}$                                               |                                        |
| Frequency modulation<br>distortion       |               | (0 ~ 100) %            | $1.5 \times 10^{-2}$                                               |                                        |
| Amplitude modulation<br>distortion       |               | (0 ~ 100) %            | $1.5 \times 10^{-2}$                                               |                                        |
| Phase modulation distortion              |               | (0 ~ 100) %            | $1.5 \times 10^{-2}$                                               |                                        |
| Harmonic                                 |               | 100 kHz ~ 18 GHz       |                                                                    |                                        |
|                                          |               | (-10 ~ -110) dBc       | 0.37 dB                                                            |                                        |
| Spurious                                 |               | 100 kHz ~ 18 GHz       |                                                                    |                                        |
|                                          |               | (-10 ~ -110) dBc       | 0.40 dB                                                            |                                        |
| Pulse modulation                         |               | 1 $\mu$ s ~ 1 s        | $1.6 \times 10^{-2}$                                               |                                        |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code   | Range            | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|-----------------|------------------|--------------------------------------------------------------------|----------------------------------------|
| RF spectrum analyzers                    | 40641           |                  |                                                                    | RF signal generator<br>/ CP801-40641-1 |
| Reference frequency                      |                 | 10 MHz           | $5.8 \times 10^{-10}$                                              |                                        |
| Frequency<br>(Frequency Readout)         |                 | 9 kHz ~ 110 GHz  | $7.3 \times 10^{-9}$                                               |                                        |
| Frequency<br>(Frequency Marker Count)    |                 | 9 kHz ~ 110 GHz  | $1.3 \times 10^{-9}$                                               |                                        |
| Frequency Response Level                 |                 | 9 kHz ~ 3 GHz    | 0.10 dB                                                            |                                        |
|                                          |                 | (3 ~ 6) GHz      | 0.14 dB                                                            |                                        |
|                                          |                 | (6 ~ 18) GHz     | 0.18 dB                                                            |                                        |
|                                          |                 | (18 ~ 26) GHz    | 0.29 dB                                                            |                                        |
|                                          |                 | (26 ~ 40) GHz    | 0.43 dB                                                            |                                        |
|                                          |                 | (40 ~ 50) GHz    | 0.47 dB                                                            |                                        |
|                                          |                 | (50 ~ 67) GHz    | 0.56 dB                                                            |                                        |
|                                          |                 | (67 ~ 80) GHz    | 0.67 dB                                                            |                                        |
|                                          |                 | (80 ~ 95) GHz    | 0.75 dB                                                            |                                        |
|                                          |                 | (95 ~ 110) GHz   | 0.84 dB                                                            |                                        |
| Frequency Span                           |                 | 800 Hz ~ 2.4 GHz | $1.4 \times 10^{-3}$                                               |                                        |
| Reference level                          |                 | (-30 ~ 0) dBm    | 0.11 dB                                                            |                                        |
|                                          |                 | (-70 ~ -30) dBm  | 0.32 dB                                                            |                                        |
| Input Attenuation Switching              |                 | (0 ~ 30) dB      | 0.11 dB                                                            |                                        |
|                                          |                 | (30 ~ 70) dB     | 0.40 dB                                                            |                                        |
| Resolution bandwidth                     |                 | 10 Hz ~ 100 MHz  | $1.1 \times 10^{-3}$                                               |                                        |
| Resolution bandwidth<br>selectivity      |                 | 10 Hz ~ 100 MHz  | $3.1 \times 10^{-3}$                                               |                                        |
| Resolution bandwidth<br>switching error  |                 | 10 Hz ~ 100 MHz  | 0.11 dB                                                            |                                        |
| Absolute Level                           |                 | 10 MHz ~ 1 GHz   |                                                                    |                                        |
|                                          |                 | (-20 ~ 0) dBm    | 0.11 dB                                                            |                                        |
|                                          |                 | (-50 ~ -20) dBm  | 0.16 dB                                                            |                                        |
| Average noise level                      | 9 kHz ~ 18 GHz  | 0.97 dB          |                                                                    |                                        |
|                                          | (18 ~ 26) GHz   | 1.4 dB           |                                                                    |                                        |
|                                          | (26 ~ 40) GHz   | 1.7 dB           |                                                                    |                                        |
|                                          | (40 ~ 50) GHz   | 2.1 dB           |                                                                    |                                        |
| Sideband noise level                     | 9 kHz ~ 18 GHz  | 1.7 dB           |                                                                    |                                        |
| Scale Fidelity                           | (0 ~ 100) dB    | 0.09 dB          |                                                                    |                                        |
| Reference signal level                   | (-30 ~ -10) dBm | 0.13 dB          |                                                                    |                                        |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge                        | Field<br>Code | Range                                                        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                           | Standard/Method of<br>Measurement etc.                      |
|-----------------------------------------------------------------|---------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| RF Speed guns<br>Speed                                          | 40642         | (5 ~ 3 000) m/s                                              | 0.03 m/s                                                                                     | Function Generator,<br>Spectrum Analyzer<br>/ CP801-40642-1 |
| Surge generators<br>Surge generators<br>Positive Surge voltage  | 40643         | (1 ~ 100) V<br>(0.1 ~ 1) kV<br>(1 ~ 40) kV<br>(40 ~ 120) kV  | $3.5 \times 10^{-2}$<br>$3.6 \times 10^{-2}$<br>$3.8 \times 10^{-2}$<br>$4.0 \times 10^{-2}$ | Oscilloscope,<br>High voltage probe<br>/ CP801-40643-1      |
| Negative Surge voltage                                          |               | (1 ~ 100) V<br>(0.1 ~ 1) kV<br>(1 ~ 40) kV<br>(40 ~ 120) kV  | $3.5 \times 10^{-2}$<br>$3.6 \times 10^{-2}$<br>$3.8 \times 10^{-2}$<br>$4.0 \times 10^{-2}$ |                                                             |
| Positive Surge current                                          |               | 1 A ~ 1 kA<br>(1 ~ 50) kA<br>(50 ~ 100) kA<br>(100 ~ 200) kA | $3.3 \times 10^{-2}$<br>$3.5 \times 10^{-2}$<br>$3.8 \times 10^{-2}$<br>$3.8 \times 10^{-2}$ |                                                             |
| Negative Surge current                                          |               | 1 A ~ 1 kA<br>(1 ~ 50) kA<br>(50 ~ 100) kA<br>(100 ~ 200) kA | $3.3 \times 10^{-2}$<br>$3.5 \times 10^{-2}$<br>$3.8 \times 10^{-2}$<br>$3.8 \times 10^{-2}$ |                                                             |
| Surge rise time                                                 |               | 5 ns ~ 1 s                                                   | $7.8 \times 10^{-3}$                                                                         |                                                             |
| Surge width                                                     |               | 20 ns ~ 10 s                                                 | $7.8 \times 10^{-3}$                                                                         |                                                             |
| Impulse generators<br>Switching Impulse Positive<br>Voltage(SI) |               | (100 ~ 600) kV                                               | $1.4 \times 10^{-2}$                                                                         | Impulse Analyzing<br>System<br>/ CP801-40643-2              |
| Switching Impulse Negative<br>Voltage(SI)                       |               | (100 ~ 600) kV                                               | $1.4 \times 10^{-2}$                                                                         |                                                             |
| Full Lightning Impulse Positive<br>Voltage(LI)                  |               | (100 ~ 800) kV                                               | $1.5 \times 10^{-2}$                                                                         |                                                             |
| Full Lightning Impulse<br>Negative Voltage(LI)                  |               | (100 ~ 800) kV                                               | $1.5 \times 10^{-2}$                                                                         |                                                             |
| Chopped Lightning Impulse<br>Positive Voltage(LIC)              |               | (100 ~ 800) kV                                               | $1.5 \times 10^{-2}$                                                                         |                                                             |
| Chopped Lightning Impulse<br>Negative Voltage(LIC)              |               | (100 ~ 800) kV                                               | $1.5 \times 10^{-2}$                                                                         |                                                             |
| Switching Impulse Time to<br>Peak( $T_p$ )                      |               | (200 ~ 300) $\mu$ s                                          | $3.1 \times 10^{-2}$                                                                         |                                                             |
| Switching Impulse Time to<br>Half Value( $T_2$ )                |               | (1 000 ~ 4 000) $\mu$ s                                      | $2.4 \times 10^{-2}$                                                                         |                                                             |
| Full Lightning Impulse Front<br>Time( $T_1$ )                   |               | (0.84 ~ 1.56) $\mu$ s                                        | $2.9 \times 10^{-2}$                                                                         |                                                             |
| Full Lightning Impulse Time<br>to Half Value( $T_2$ )           |               | (40 ~ 60) $\mu$ s                                            | $2.2 \times 10^{-2}$                                                                         |                                                             |
| Chopped Lightning Impulse<br>Time to Chopping( $T_c$ )          |               | (2 ~ 6) $\mu$ s                                              | $2.2 \times 10^{-2}$                                                                         |                                                             |



## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range               | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|---------------------|--------------------------------------------------------------------|----------------------------------------|
| SWR meters                               | 40644         |                     |                                                                    | STD Mismatch<br>/ CP801-40644-1        |
| SWR meter                                |               |                     |                                                                    |                                        |
| Sensitivity                              |               | 10 MHz ~ 18 GHz     | 34 mV                                                              |                                        |
| Level                                    |               | 10 MHz ~ 18 GHz     | 0.14 dB                                                            |                                        |
| Site master                              |               |                     |                                                                    | STD Mismatch<br>/ CP801-40644-2        |
| Frequency                                |               | 25 MHz ~ 4 GHz      | $1.4 \times 10^{-7}$                                               |                                        |
| Standing wave ratio                      |               | (25 MHz ~ 1 GHz)    |                                                                    |                                        |
|                                          |               | 1.1                 | 0.016                                                              |                                        |
|                                          |               | 1.2                 | 0.018                                                              |                                        |
|                                          |               | 1.3                 | 0.022                                                              |                                        |
|                                          |               | 1.5                 | 0.026                                                              |                                        |
|                                          |               | 2.0                 | 0.044                                                              |                                        |
|                                          |               | (1 GHz ~ 4 GHz)     |                                                                    |                                        |
|                                          |               | 1.1                 | 0.024                                                              |                                        |
|                                          |               | 1.2                 | 0.027                                                              |                                        |
|                                          |               | 1.3                 | 0.032                                                              |                                        |
|                                          |               | 1.5                 | 0.042                                                              |                                        |
|                                          |               | 2.0                 | 0.068                                                              |                                        |
| RF terminations                          | 40645         |                     |                                                                    | Network Analyzer<br>/ CP801-40645-1    |
| Reflection Coefficient                   |               | 5 Hz ~ 100 MHz      | $4.1 \times 10^{-3}$                                               |                                        |
|                                          |               | 100 MHz ~ 3 GHz     | $5.8 \times 10^{-3}$                                               |                                        |
|                                          |               | (3 ~ 18) GHz        | $7.3 \times 10^{-3}$                                               |                                        |
|                                          |               | (18 ~ 26) GHz       | $8.5 \times 10^{-3}$                                               |                                        |
|                                          |               | (26 ~ 40) GHz       | $1.5 \times 10^{-2}$                                               |                                        |
|                                          |               | (40 ~ 110) GHz      | $1.2 \times 10^{-2}$                                               |                                        |
| Coaxial thermistor mounts                | 40646         |                     |                                                                    | Sensor Calibrator<br>/ CP801-40646-1   |
| CAL Factor                               |               | (100 kHz ~ 10 MHz)  |                                                                    |                                        |
|                                          |               | 100 $\mu$ W ~ 10 mW | 0.011                                                              |                                        |
|                                          |               | (10 MHz ~ 10 GHz)   |                                                                    |                                        |
|                                          |               | 100 $\mu$ W ~ 10 mW | 0.015                                                              |                                        |
|                                          |               | (10 GHz ~ 18 GHz)   |                                                                    |                                        |
|                                          |               | 100 $\mu$ W ~ 10 mW | 0.020                                                              |                                        |
|                                          |               | (18 ~ 26.5) GHz     |                                                                    |                                        |
|                                          |               | 100 $\mu$ W ~ 10 mW | 0.040                                                              |                                        |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge                                 | Field<br>Code | Range             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.        |
|--------------------------------------------------------------------------|---------------|-------------------|--------------------------------------------------------------------|-----------------------------------------------|
| Transmssion trouble testers<br>Transmission analyzer<br>Output frequency | 40648         | 10 Hz ~ 100 Hz    | 0.58 mHz                                                           | Oscilloscope<br>/ CP801-40648-1               |
|                                                                          |               | 100 Hz ~ 1 kHz    | 5.8 mHz                                                            |                                               |
|                                                                          |               | (1 ~ 10) kHz      | 58 mHz                                                             |                                               |
|                                                                          |               | (10 ~ 100) kHz    | 0.58 Hz                                                            |                                               |
|                                                                          |               | 100 kHz ~ 1 MHz   | 5.8 Hz                                                             |                                               |
| Output level                                                             |               | (10 Hz ~ 10 kHz)  |                                                                    |                                               |
|                                                                          |               | (+ 10 ~ -50) dBm  | 0.025 dB                                                           |                                               |
|                                                                          |               | (10 Hz ~ 10 kHz)  |                                                                    |                                               |
|                                                                          |               | (-50 ~ -100) dBm  | 0.068 dB                                                           |                                               |
|                                                                          |               | (10 kHz ~ 1 MHz)  |                                                                    |                                               |
|                                                                          |               | (+ 10 ~ -50) dBm  | 0.040 dB                                                           |                                               |
|                                                                          |               | (10 kHz ~ 1 MHz)  |                                                                    |                                               |
|                                                                          |               | (-50 ~ -100) dBm  | 0.096 dB                                                           |                                               |
| Input frequency                                                          |               | (10 ~ 100) Hz     | 0.58 mHz                                                           |                                               |
|                                                                          |               | 100 Hz ~ 1 kHz    | 5.8 mHz                                                            |                                               |
|                                                                          |               | (1 ~ 10) kHz      | 58 mHz                                                             |                                               |
|                                                                          |               | (10 ~ 100) kHz    | 0.58 Hz                                                            |                                               |
|                                                                          |               | 100 kHz ~ 1 MHz   | 5.8 Hz                                                             |                                               |
| Input level                                                              |               | (10 Hz ~ 10 kHz)  |                                                                    | Lan Analyzer<br>/ CP801-40648-2               |
|                                                                          |               | (+ 10 ~ -50) dBm  | 0.022 dB                                                           |                                               |
|                                                                          |               | (10 Hz ~ 10 kHz)  |                                                                    |                                               |
|                                                                          |               | (-50 ~ -100) dBm  | 0.025 dB                                                           |                                               |
|                                                                          |               | (10 kHz ~ 1 MHz)  |                                                                    |                                               |
|                                                                          |               | (+ 10 ~ -50) dBm  | 0.036 dB                                                           |                                               |
|                                                                          |               | (10 kHz ~ 1 MHz)  |                                                                    |                                               |
|                                                                          |               | (-50 ~ -100) dBm  | 0.080 dB                                                           |                                               |
| LAN analyzer<br>Delay Time(100m)                                         |               | 466 ns            | 0.6 ns                                                             |                                               |
| Impedance                                                                |               | (50 ~ 150) Ω      | 1.0 Ω                                                              |                                               |
| Resistance                                                               |               | 825 Ω             | 0.6 Ω                                                              |                                               |
|                                                                          |               | 453 Ω             | 0.6 Ω                                                              |                                               |
|                                                                          |               | 953 Ω             | 0.6 Ω                                                              |                                               |
| Frequency                                                                |               | (1 ~ 500) MHz     | $5.8 \times 10^{-8}$                                               |                                               |
| Insertion loss                                                           |               | (1 ~ 500) MHz     | 0.2 dB                                                             |                                               |
| RF voltmeters<br>Voltage                                                 | 40650         | (1 ~ 100) MHz     |                                                                    | RF Voltmeter<br>Calibrator<br>/ CP801-40650-1 |
|                                                                          |               | 1 mV ~ 10 V       | $9.9 \times 10^{-3}$                                               |                                               |
|                                                                          |               | (100 MHz ~ 1 GHz) |                                                                    |                                               |
|                                                                          |               | 1 mV ~ 10 V       | 0.020                                                              |                                               |

## 406. Radio frequency measurements

| Measured Quantity<br>Instrument or Gauge                            | Field<br>Code | Range                                                                                                               | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                                      |
|---------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Vector voltmeters<br>Voltage                                        | 40651         | (1 ~ 100) MHz<br>1 mV ~ 10 V<br>(100 MHz ~ 1 GHz)<br>1 mV ~ 10 V                                                    | 0.026<br>0.040                                                     | RF Signal Generator<br>/ CP801-40651-1                                      |
| Phase                                                               |               | (0 ~ 360)°                                                                                                          | 0.21°                                                              |                                                                             |
| Field strength meters<br>Frequency                                  |               | 100 kHz ~ 3 GHz                                                                                                     | $1.1 \times 10^{-5}$                                               |                                                                             |
| Power                                                               | 40652         | (100 kHz ~ 1 GHz)<br>(-20 ~ +15) dBm<br>(-60 ~ -20) dBm<br>(-80 ~ -60) dBm<br>(-100 ~ -80) dBm                      | 0.17 dB<br>0.19 dB<br>0.34 dB<br>0.56 dB                           | RF Signal Gen.<br>/ CP801-40652-1                                           |
|                                                                     |               | (1 ~ 3) GHz<br>(-20 ~ +15) dBm<br>(-60 ~ -20) dBm<br>(-80 ~ -60) dBm<br>(-100 ~ -80) dBm                            | 0.18 dB<br>0.19 dB<br>0.42 dB<br>0.60 dB                           |                                                                             |
| AM/FM test sources<br>Frequency                                     |               | 1 MHz ~ 1 GHz                                                                                                       | $5.8 \times 10^{-10}$                                              |                                                                             |
| Residual FM                                                         |               | Bandwidth(50 Hz ~ 3 kHz)                                                                                            | $5.9 \times 10^{-3}$                                               |                                                                             |
| Residual AM                                                         |               | Bandwidth(50 Hz ~ 3 kHz)                                                                                            | $5.7 \times 10^{-5}$                                               |                                                                             |
| FM Distortion                                                       |               | Deviation<br>(12.5 kHz ~ 400 kHz)                                                                                   | 0.012                                                              |                                                                             |
| FM Flatness                                                         |               | Rate(DC ~ 200 kHz)                                                                                                  | $1.5 \times 10^{-3}$                                               |                                                                             |
| AM Flatness                                                         |               | Rate(50 Hz ~ 100 kHz)                                                                                               | $2.2 \times 10^{-3}$                                               |                                                                             |
| DIP simulators<br>DIP                                               | 40654         | (0 ~ 10) %<br>(10 ~ 50) %<br>(50 ~ 120) %                                                                           | 0.1 %<br>0.3 %<br>0.6 %                                            | Oscilloscope, DMM<br>/ CP801-40654-1                                        |
| DIP Voltage                                                         |               | (1 ~ 456) V                                                                                                         | $0.82 \times 10^{-3}$                                              |                                                                             |
| Duration time                                                       |               | 1 ms ~ 10 s                                                                                                         | $7.8 \times 10^{-3}$                                               |                                                                             |
| Rising & Falling time                                               |               | (0.1 ~ 10.0) $\mu$ s                                                                                                | $7.8 \times 10^{-3}$                                               |                                                                             |
| Permittivity meters<br>Dielectric constant                          | 40699         | (1 kHz ~ 15 GHz)<br>2 ~ 80                                                                                          | 3 %                                                                | LCR meters,<br>Impedance analyzers,<br>Network analyzer,<br>/ CP801-40699-1 |
| Loss tangent                                                        |               | (1 kHz ~ 15 GHz)<br>0.001 ~ 1                                                                                       | 10 %                                                               |                                                                             |
| Transit time                                                        |               | (0.1 ~ 5) ns                                                                                                        | 1.2 %                                                              |                                                                             |
| Waveguide calibration kit<br>Magnitude of reflection<br>coefficient | 40699         | (Termination)<br>(40 ~ 110) GHz<br>(Linear waveguide domain)<br>(40 ~ 110) GHz<br>(Short circuit)<br>(40 ~ 110) GHz | 0.007 1<br>0.007 0<br>0.056                                        | Waveguide calibration kit<br>/ CP801-40699-2                                |

## 407. Field strength &amp; antennas

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|------------------------|--------------------------------------------------------------------|----------------------------------------|
| Probes                                   | 40702         | (10 Hz ~ 10 kHz)       |                                                                    | RF Power Meter<br>/ CP801-40702-1      |
| Field Strength Probe                     |               | (1 ~ 200) V/m          | 0.12                                                               |                                        |
|                                          |               | (10 kHz ~ 80 MHz)      |                                                                    |                                        |
|                                          |               | (1 ~ 400) V/m          | 0.13                                                               |                                        |
|                                          |               | (80 ~ 400) MHz         |                                                                    |                                        |
|                                          |               | (1 ~ 600) V/m          | 0.13                                                               |                                        |
|                                          |               | (400 MHz ~ 1 GHz)      |                                                                    |                                        |
|                                          |               | (1 ~ 200) V/m          | 0.15                                                               |                                        |
|                                          |               | (1 ~ 18) GHz           |                                                                    |                                        |
|                                          |               | (1 ~ 200) V/m          | 0.15                                                               |                                        |
| Magnetic Flux Density Probe              |               | (10 Hz ~ 60 Hz)        |                                                                    | DMM<br>/ CP801-40702-2                 |
|                                          |               | (2.65 ~ 390) mA/m      | 0.12                                                               |                                        |
|                                          |               | (0.39 ~ 715) A/m       | 0.06                                                               |                                        |
|                                          |               | (60 Hz ~ 1 kHz)        |                                                                    |                                        |
|                                          |               | (2.65 ~ 390) mA/m      | 0.12                                                               |                                        |
|                                          |               | (0.39 ~ 240) A/m       | 0.06                                                               |                                        |
|                                          |               | (1 ~ 10) kHz           |                                                                    |                                        |
|                                          |               | (2.65 ~ 390) mA/m      | 0.12                                                               |                                        |
|                                          |               | (0.39 ~ 8.2) A/m       | 0.06                                                               |                                        |
|                                          |               | (10 ~ 400) kHz         |                                                                    |                                        |
|                                          |               | (2.65 ~ 390) mA/m      | 0.13                                                               |                                        |
|                                          |               | (0.39 ~ 8.2) A/m       | 0.06                                                               |                                        |
|                                          |               | (400 kHz ~ 1 MHz)      |                                                                    |                                        |
|                                          |               | (2.65 ~ 390) mA/m      | 0.13                                                               |                                        |
|                                          |               | (0.39 ~ 2.67) A/m      | 0.06                                                               |                                        |
|                                          |               | (1 MHz ~ 80 MHz)       |                                                                    |                                        |
|                                          |               | (2.65 mA/m ~ 1.06 A/m) | 0.13                                                               |                                        |
|                                          |               | (80 MHz ~ 400 MHz)     |                                                                    |                                        |
|                                          |               | (2.65 mA/m ~ 1.6 A/m)  | 0.13                                                               |                                        |
|                                          |               | (400 MHz ~ 1 GHz)      |                                                                    |                                        |
|                                          |               | (2.65 ~ 80) mA/m       | 0.15                                                               |                                        |
| Dipole Antennas                          | 40703         |                        |                                                                    | Network Analyzer<br>/ CP801-40703-1    |
| Dipole Antenna                           |               | (1 ~ 18) GHz           | 1.1 dB                                                             |                                        |
| Antenna Factor                           |               | (1 ~ 18) GHz           | 1.3 dB                                                             |                                        |
| Antenna Pattern                          |               | 20 MHz ~ 18 GHz        | 0.02                                                               | Network Analyzer<br>/ CP801-40703-2    |
| VSWR                                     |               |                        |                                                                    |                                        |
| Biconical Antenna                        |               |                        |                                                                    |                                        |
| Antenna Factor                           |               | (1 ~ 18) GHz           | 1.3 dB                                                             | Network Analyzer<br>/ CP801-40703-3    |
| Antenna Pattern                          |               | (1 ~ 18) GHz           | 1.3 dB                                                             |                                        |
| VSWR                                     |               | 20 MHz ~ 18 GHz        | 0.02                                                               |                                        |
| Log-Periodic Antenna                     |               |                        |                                                                    |                                        |
| Antenna Factor                           |               | (1 ~ 18) GHz           | 1.3 dB                                                             |                                        |
| Antenna Pattern                          |               | (1 ~ 18) GHz           | 1.3 dB                                                             |                                        |
| VSWR                                     |               | 20 MHz ~ 18 GHz        | 0.02                                                               |                                        |
| Loop antennas                            | 40704         |                        |                                                                    | Network Analyzer<br>/ CP801-40704-1    |
| Antenna Factor                           |               | (10 Hz ~ 400 MHz)      | 1.3 dB                                                             |                                        |
| Monopole antennas                        | 40705         |                        |                                                                    | Network Analyzer<br>/ CP801-40705-1    |
| Antenna Factor                           |               | (1 kHz ~ 30 MHz)       | 1.3 dB                                                             |                                        |

## 407. Field strength &amp; antennas

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range            | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|------------------|--------------------------------------------------------------------|----------------------------------------|
| Horn antennas                            | 40707         |                  |                                                                    | Network Analyzer<br>/ CP801-40707-1    |
| Antenna Factor                           |               | 200 MHz ~ 18 GHz | 0.9 dB                                                             |                                        |
|                                          |               | (18 ~ 40) GHz    | 1.4 dB                                                             |                                        |
|                                          |               | (40 ~ 110) GHz   | 1.2 dB                                                             |                                        |
| Antenna Pattern                          |               | (1 ~ 18) GHz     | 1.3 dB                                                             |                                        |
| VSWR                                     |               | 200 MHz ~ 18 GHz | 0.02                                                               |                                        |
|                                          |               | (18 ~ 110) GHz   | 0.04                                                               |                                        |

## 501. Contact Thermometry

| Measured Quantity<br>Instrument or Gauge                                                                          | Field<br>Code | Range              | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|-------------------------------------------------------------------------------------------------------------------|---------------|--------------------|--------------------------------------------------------------------|----------------------------------------|
| Temperature generators;<br>ovens, furnaces, isothermal<br>liquid baths, ice-point baths,<br>dry-block calibrators | 50101         |                    |                                                                    |                                        |
| Temperature Chambers                                                                                              |               | (-180 ~ 250) °C    | 0.5 °C                                                             | IPRT, TC-T<br>/CP801-50101-1           |
|                                                                                                                   |               | (250 ~ 650) °C     | 1.0 °C                                                             | TC-K<br>/CP801-50101-1                 |
| Incubators                                                                                                        |               | (-10 ~ 60) °C      | 0.5 °C                                                             | IPRT, TC-T<br>/CP801-50101-2           |
| Freezers                                                                                                          |               | (-195 ~ 0) °C      | 0.5 °C                                                             | IPRT, TC-T<br>/CP801-50101-3           |
| Autoclaves                                                                                                        |               | (50 ~ 140) °C      | 0.5 °C                                                             | IPRT, TC-T<br>/CP801-50101-4           |
| PCT                                                                                                               |               | (50 ~ 140) °C      | 0.5 °C                                                             | IPRT, TC-T<br>/CP801-50101-5           |
| Liquid Baths                                                                                                      |               | (-196 ~ -80) °C    | 0.1 °C                                                             | SPRT, TC-T, TC-K<br>/CP801-50101-6     |
|                                                                                                                   |               | (-80 ~ 550) °C     | 0.02 °C                                                            | SPRT, TC-T, TC-K<br>/CP801-50101-6     |
| Furnaces                                                                                                          |               | (50 ~ 600) °C      | 0.2 °C                                                             | SPRT, TC-T, TC-K<br>/CP801-50101-7     |
|                                                                                                                   |               | (600 ~ 1 100) °C   | 1.3 °C                                                             | TC-S<br>/CP801-50101-7                 |
|                                                                                                                   |               | (1 100 ~ 1 500) °C | 2.7 °C                                                             | TC-S<br>/CP801-50101-7                 |
|                                                                                                                   |               | (1 500 ~ 1 600) °C | 3.2 °C                                                             | TC-B<br>/CP801-50101-7                 |
| Ice-point baths                                                                                                   |               | 0 °C               | 0.006 °C                                                           | SPRT<br>/CP801-50101-8                 |
| Dry-block calibrators                                                                                             |               | (-100 ~ 660) °C    | 0.013 °C                                                           | SPRT, TC-S<br>/CP801-50101-9           |
|                                                                                                                   |               | (660 ~ 1 100) °C   | 1.0 °C                                                             |                                        |
|                                                                                                                   |               | (1 100 ~ 1 200) °C | 2.2 °C                                                             |                                        |

## 501. Contact thermometry

| Measured Quantity<br>Instrument or Gauge                             | Field<br>Code | Range                                                                                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.       |
|----------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------|
| Temperature indicators/<br>recorders/controllers<br>(with sensor)    | 50102         |                                                                                                   |                                                                    |                                              |
| Thermoelectric recorders /<br>indicators / controllers               |               | (-196 ~ -95) °C<br>(-95 ~ 660) °C<br>(660 ~ 1 100) °C<br>(1 100 ~ 1 500) °C<br>(1 500 ~ 1 600) °C | 0.07 °C<br>0.02 °C<br>1.0 °C<br>2.2 °C<br>2.7 °C                   | SPRT . TC-S, TC-B<br>/CP801-50102-1          |
| Resistance type recorders /<br>indicators / controllers              |               | (-196 ~ -95) °C<br>(-95 ~ 660) °C                                                                 | 0.07 °C<br>0.02                                                    | SPRT<br>/CP801-50102-2                       |
| Electric temperature<br>calibrators                                  |               | (-196 ~ 660) °C<br>(660 ~ 1 600) °C                                                               | 0.005 °C<br>0.19 °C                                                | CALIBRATOR,<br>Thermometer<br>/CP801-50102-9 |
| Temperature indicators/<br>recorders/controllers<br>(without sensor) |               |                                                                                                   |                                                                    |                                              |
| Thermoelectric recorders /<br>indicators / controllers               |               | (-196 ~ 1 600) °C                                                                                 | 0.29 °C                                                            | CALIBRATOR<br>/CP801-50102-10                |
| Resistance type recorders /<br>indicators / controllers              |               | (-196 ~ 660) °C                                                                                   | 0.014 °C                                                           | CALIBRATOR<br>/CP801-50102-13                |
| Glass thermometers; liquid-<br>in-glass, Beckmann                    | 50103         |                                                                                                   |                                                                    |                                              |
| Beckmann thermometers                                                |               | (-20 ~ 160) °C                                                                                    | 0.02 °C                                                            | SPRT<br>/CP801-50103-1                       |
| Liquid-in-glass<br>thermometers                                      |               | (-80 ~ 360) °C                                                                                    | 0.04 °C                                                            | SPRT<br>/CP801-50103-2                       |
| Resistance thermometers;<br>SPRT, TPRT, thermistors, etc.            | 50104         |                                                                                                   |                                                                    |                                              |
| Industrial resistance<br>thermometers                                |               | (-196 ~ 200) °C<br>(200 ~ 660) °C                                                                 | 0.02 °C<br>0.05 °C                                                 | SPRT<br>/CP801-50104-1                       |
| Thermistors                                                          |               | (-80 ~ 200) °C                                                                                    | 0.03 °C                                                            | SPRT<br>/CP801-50104-2                       |
| Standard Platinum Resistance<br>Thermometers                         |               | (-200 ~ 0) °C<br>(0 ~ 420) °C<br>(420 ~ 660) °C                                                   | 1.8 mK<br>1.9 mK<br>2.8 mK                                         | ITS-90 Fixed Point Cells<br>/CP801-50104-3   |
| Thermal expansion<br>thermometers; bimetal, gas<br>or liquid type    | 50105         |                                                                                                   |                                                                    |                                              |
| Bimetal thermometers                                                 |               | (-50 ~ 500) °C                                                                                    | 0.2 °C                                                             | /CP801-50105-1                               |
| Thermal expansion<br>thermometer                                     |               | (-50 ~ 500) °C                                                                                    | 0.2 °C                                                             | /CP801-50105-2                               |

## 501. Contact thermometry

| Measured Quantity<br>Instrument or Gauge                                                                                                                                | Field<br>Code | Range                                                                                                                                       | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)     | Standard/Method of<br>Measurement etc.                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------|
| Thermocouples; noble metal,<br>base metal, pure metal,<br>special type, etc.<br>Noble-metal thermocouple<br>thermometers<br><br>Base-metal Thermocouple<br>thermometers | 50106         | (0 ~ 1 100) °C<br>(1 100 ~ 1 500) °C<br>(1 500 ~ 1 600) °C<br><br>(-196 ~ -100) °C<br>(-100 ~ 200) °C<br>(200 ~ 500) °C<br>(500 ~ 1 100) °C | 0.9 °C<br>2.2 °C<br>2.6 °C<br><br>0.5 °C<br>0.2 °C<br>0.4 °C<br>1.2 °C | TC-S, TC-B<br>/CP801-50106-1<br><br>SPRT, TC-S<br>/CP801-50106-2 |
| Temperature transducers<br>Temperature transducers<br>(with sensor)<br><br>Temperature transducers<br>(without sensor)                                                  | 50107         | (-196 ~ 660) °C<br>(660 ~ 1 100) °C<br>(1 100 ~ 1 600) °C<br><br>(-196 ~ 660) °C<br>(660 ~ 1 600) °C                                        | 0.16 °C<br>1.6 °C<br>2.9 °C<br><br>0.15 °C<br>0.39 °C                  | SPRT, TC, CALIBRATION<br>, MULTIMETER<br>/CP801-50107-1          |
| Primary fixe-point cells and<br>apparatus<br>Ar T.P. Cell<br>Hg T.P. Cell<br>Water T.P. Cell<br>Ga M.P. Cell<br>Sn F.P. Cell<br>Zn F.P. Cell<br>Al F.P. Cell            | 50108         | -189.3442 °C<br>-38.8344 °C<br>0.01 °C<br>29.7646 °C<br>231.928 °C<br>419.527 °C<br>660.323 °C                                              | 0.7 mK<br>1.3 mK<br>0.6 mK<br>0.9 mK<br>1.3 mK<br>1.6 mK<br>2.6 mK     | ITS-90 Fixed Point Cells<br>/CP801-50108-1                       |

## 502. Non contact thermometry

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                    | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.              |
|------------------------------------------|---------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------|
| Optical pyrometers                       | 50203         | (900 ~ 1 500) °C                                                                         | 4 °C                                                               | STRIP LAMPS<br>/CP801-50203-1                       |
| Radiation thermometers                   | 50204         | (0 ~ 50) °C<br>(50 ~ 200) °C<br>(200 ~ 800) °C<br>(800 ~ 1 600) °C<br>(1 600 ~ 2 600) °C | 0.6 °C<br>0.7 °C<br>1.2 °C<br>1.4 °C<br>4.7 °C                     | Standard Radiation<br>Thermometer<br>/CP801-50204-1 |
| Thermal image apparatus                  | 50205         | (0 ~ 50) °C<br>(50 ~ 200) °C<br>(200 ~ 800) °C<br>(800 ~ 1 200) °C                       | 0.6 °C<br>0.7 °C<br>1.4 °C<br>1.8 °C                               | Standard Radiation<br>thermometer<br>/CP801-50205-1 |
| Blackbody furnaces                       | 50206         | (0 ~ 50) °C<br>(50 ~ 200) °C<br>(200 ~ 800) °C<br>(800 ~ 1 600) °C<br>(1 600 ~ 2 600) °C | 0.6 °C<br>0.7 °C<br>1.2 °C<br>1.4 °C<br>4.4 °C                     | Standard Radiation<br>thermometer<br>/CP801-50206-1 |
| Ear thermometers                         | 50207         | (34 ~ 42) °C                                                                             | 0.1 °C                                                             | SPRT , IR bath<br>/CP801-50207-1                    |

## 503. Humidity

| Measured Quantity<br>Instrument or Gauge                         | Field<br>Code | Range               | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                |
|------------------------------------------------------------------|---------------|---------------------|--------------------------------------------------------------------|-------------------------------------------------------|
| Dew-point hygrometers<br>chilled mirror dew-point<br>hygrometers | 50301         | (-80 ~ -60) °C D.P. | 0.35 °C D.P.                                                       | Dew-point<br>hygrometers<br>/CP801-50301-1            |
|                                                                  |               | (-60 ~ 20) °C D.P.  | 0.30 °C D.P.                                                       |                                                       |
| Alumina thin film dew-point<br>hygrometers                       |               | (-80 ~ 20) °C D.P.  | 1.9 °C D.P.                                                        | Dew-point<br>hygrometers<br>/CP801-50301-2            |
| Relative humidity<br>hygrometers                                 | 50302         | (3 ~ 80) % R.H.     | 1.3 % R.H.                                                         | Dew-point<br>hygrometers<br>/CP801-50302-1            |
| Polymer thin film<br>hygrometers                                 |               | (80 ~ 98) % R.H.    | 1.6 % R.H.                                                         |                                                       |
|                                                                  |               | (-40 ~ 0) °C        | 0.55 °C                                                            |                                                       |
| Digital Thermo-hygrometers                                       |               | (0 ~ 60) °C         | 0.30 °C                                                            | Dew-point<br>hygrometers<br>/CP801-50302-2            |
|                                                                  |               | (60 ~ 120) °C       | 0.55 °C                                                            |                                                       |
|                                                                  |               | (3 ~ 80) % R.H.     | 1.3 % R.H.                                                         |                                                       |
|                                                                  |               | (80 ~ 98) % R.H.    | 1.6 % R.H.                                                         |                                                       |
|                                                                  |               | (-40 ~ 0) °C        | 0.55 °C                                                            |                                                       |
|                                                                  |               | (0 ~ 60) °C         | 0.30 °C                                                            |                                                       |
| Hair hygrometers                                                 |               | (60 ~ 120) °C       | 0.55 °C                                                            |                                                       |
|                                                                  |               | (20 ~ 95) % R.H.    | 3 % R.H.                                                           | Dew-point<br>hygrometers<br>/CP801-50302-3            |
|                                                                  |               | (-20 ~ 80) °C       | 0.6 °C                                                             |                                                       |
| Psychrometers                                                    | 50303         | (20 ~ 95) % R.H.    | 2.5 % R.H.                                                         | Dew-point<br>hygrometers<br>/CP801-50303-1            |
|                                                                  |               | (0 ~ 60) °C         | 0.6 °C                                                             |                                                       |
| Temperature humidity<br>recorders                                | 50304         |                     |                                                                    | Dew-point<br>hygrometers<br>/CP801-50304-1            |
| Temperature humidity<br>recorders                                |               | (20 ~ 95) % R.H.    | 3 % R.H.                                                           |                                                       |
| -Polymer Thin Film                                               |               | (-20 ~ 80) °C       | 2 °C                                                               | Dew-point<br>hygrometers<br>/CP801-50304-2            |
| Hygrothermograph                                                 |               | (20 ~ 95) % R.H.    | 3 % R.H.                                                           |                                                       |
|                                                                  | (-20 ~ 80) °C | 2 °C                |                                                                    |                                                       |
| Transducers; dew-<br>point/relative humidity                     | 50305         |                     |                                                                    | Dew-point<br>hygrometers<br>/CP801-50305-1            |
| Humidity transducers                                             |               | (3 ~ 80) % R.H.     | 1.3 % R.H.                                                         |                                                       |
|                                                                  |               | (80 ~ 98) % R.H.    | 1.6 % R.H.                                                         |                                                       |
|                                                                  |               | (-40 ~ 0) °C        | 0.6 °C                                                             |                                                       |
|                                                                  |               | (0 ~ 60) °C         | 0.3 °C                                                             |                                                       |
|                                                                  |               | (60 ~ 120) °C       | 0.6 °C                                                             |                                                       |
| Humidity generators                                              | 50306         |                     |                                                                    | DATA LOGGER,<br>Humidity transducer<br>/CP801-50306-1 |
| Constant temperature<br>and humidity chamber                     |               | (5 ~ 90) % R.H.     | 2.5 % R.H.                                                         |                                                       |
|                                                                  |               | (90 ~ 98) % R.H.    | 2.8 % R.H.                                                         |                                                       |
| Two-pressure humidity<br>generators                              |               | (-80 ~ 200) °C      | 0.5 °C                                                             | Dew-point<br>hygrometers, IPRT<br>/CP801-50306-2      |
|                                                                  |               | (10 ~ 80) % R.H.    | 1.6 % R.H.                                                         |                                                       |
|                                                                  |               | (80 ~ 95) % R.H.    | 1.9 % R.H.                                                         |                                                       |
|                                                                  |               | (0 ~ 60) °C         | 0.21 °C                                                            |                                                       |
| Flow mixing humidity<br>generators                               |               | (3 ~ 25) % R.H.     | 1.0 % R.H.                                                         | Dew-point<br>hygrometers, IPRT<br>/CP801-50306-3      |
|                                                                  |               | (25 ~ 80) % R.H.    | 1.5 % R.H.                                                         |                                                       |
|                                                                  |               | (80 ~ 98) % R.H.    | 1.9 % R.H.                                                         |                                                       |
|                                                                  |               |                     |                                                                    |                                                       |



## 504. Moisture

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range           | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|-----------------|--------------------------------------------------------------------|----------------------------------------|
| Cereal moisture meters                   | 50401         | (9 ~ 25) % M.C. | 0.5 % M.C.                                                         | Balance, Dry oven<br>/CP801-50401-1    |
| Wood moisture meters                     | 50402         | (8 ~ 25) % M.C. | 3.2 % M.C.                                                         | Balance, Dry oven<br>/CP801-50402-1    |
| Paper moisture meters                    | 50403         | (5 ~ 20) % M.C. | 3.4 % M.C.                                                         | Balance, Dry oven<br>/CP801-50403-1    |

## 601. Sound in air

| Measured Quantity<br>Instrument or Gauge                                 | Field<br>Code | Range                | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|--------------------------------------------------------------------------|---------------|----------------------|--------------------------------------------------------------------|----------------------------------------|
| Sound calibrators<br>Pistonphones                                        | 60102         | 250 Hz               | 0.11 dB                                                            | Microphone<br>/CP801-60102-1           |
| Sound pressure level calibrators<br>(Multi function calibrator included) |               | 31.5 Hz              | 0.13 dB                                                            |                                        |
|                                                                          |               | (31.5 ~ 63) Hz       | 0.10 dB                                                            |                                        |
|                                                                          |               | (63 ~ 4 000) Hz      | 0.09 dB                                                            |                                        |
|                                                                          |               | (4 000 ~ 8 000) Hz   | 0.13 dB                                                            |                                        |
|                                                                          |               | (8 000 ~ 12 500) Hz  | 0.23 dB                                                            |                                        |
|                                                                          |               | (12 500 ~ 16 000) Hz | 0.36 dB                                                            |                                        |
| Microphones                                                              | 60104         | 20 Hz                | 0.16 dB                                                            | Microphone<br>/CP801-60104-1           |
| (20 ~ 25) Hz                                                             |               | 0.14 dB              |                                                                    |                                        |
| (25 ~ 31.5) Hz                                                           |               | 0.13 dB              |                                                                    |                                        |
| (31.5 ~ 40) Hz                                                           |               | 0.12 dB              |                                                                    |                                        |
| (40 ~ 50) Hz                                                             |               | 0.11 dB              |                                                                    |                                        |
| (50 ~ 8 000) Hz                                                          |               | 0.10 dB              |                                                                    |                                        |
| (8 000 ~ 10 000) Hz                                                      |               | 0.12 dB              |                                                                    |                                        |
| (10 000 ~ 12 500) Hz                                                     |               | 0.13 dB              |                                                                    |                                        |
| (12 500 ~ 16 000) Hz                                                     |               | 0.16 dB              |                                                                    |                                        |
| (16 000 ~ 20 000) Hz                                                     |               | 0.21 dB              |                                                                    |                                        |
| Sound level meters                                                       | 60106         | 31.5 Hz              | 0.5 dB                                                             | Microphone<br>/CP801-60106-1           |
| (31.5 ~ 100) Hz                                                          |               | 0.4 dB               |                                                                    |                                        |
| (100 ~ 125) Hz                                                           |               | 0.3 dB               |                                                                    |                                        |
| (125 ~ 3 150) Hz                                                         |               | 0.2 dB               |                                                                    |                                        |
| (3 150 ~ 8 000) Hz                                                       |               | 0.3 dB               |                                                                    |                                        |
| (8 000 ~ 12 500) Hz                                                      |               | 0.6 dB               |                                                                    |                                        |

## 603. Vibration

| Measured Quantity<br>Instrument or Gauge                                                                                                            | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                                                                                                                                                               | Standard/Method of<br>Measurement etc.                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Vibration calibrators<br>Acceleration                                                                                                               | 60301         | 10 Hz<br>(10 ~ 20) Hz<br>(20 ~ 2 500) Hz<br>(2.5 ~ 5) kHz                                                                                                                                                                                                                                                                                         | $2.7 \times 10^{-2}$<br>$2.2 \times 10^{-2}$<br>$2.1 \times 10^{-2}$<br>$3.0 \times 10^{-2}$                                                                                                                                                                                                                                                                                                                                     | Vibration transducer<br>/CP801-60301-1                                                                                           |
| Vibration transducers<br>Vibration transducers<br><br>Shock transducers                                                                             | 60302         | 0.5 Hz<br>(0.5 ~ 10) Hz<br>(10 ~ 2 500) Hz<br>(2.5 ~ 5) kHz<br>(5 ~ 10) kHz<br>(10 ~ 15) kHz<br>(15 ~ 20) kHz<br><br>(200 ~ 100 000) m/s <sup>2</sup><br>(Pulse duration : (0.5 ~ 2) ms)                                                                                                                                                          | $2.1 \times 10^{-2}$<br>$2.1 \times 10^{-2}$<br>$1.1 \times 10^{-2}$<br>$2.4 \times 10^{-2}$<br>$2.9 \times 10^{-2}$<br>$3.6 \times 10^{-2}$<br>$4.3 \times 10^{-2}$<br><br>$3.1 \times 10^{-2}$                                                                                                                                                                                                                                 | Vibration transducer<br>/CP801-60302-1<br><br>Vibration transducer<br>/CP801-60302-2                                             |
| Vibration measuring<br>instruments<br>Vibration measuring<br>instruments<br>Acceleration<br><br>Velocity<br><br>Displacement<br><br>Shock recorders | 60303         | 0.5 Hz<br>(0.5 ~ 2.5) Hz<br>(2.5 ~ 10) Hz<br>(10 ~ 1 250) Hz<br>(1.25 ~ 5) kHz<br><br>0.5 Hz<br>(0.5 ~ 2.5) Hz<br>(2.5 ~ 10) Hz<br>(10 ~ 630) Hz<br>(630 ~ 2 500) Hz<br><br>0.5 Hz<br>(0.5 ~ 2.5) Hz<br>(2.5 ~ 10) Hz<br>(10 ~ 100) Hz<br>(100 ~ 630) Hz<br>(630 ~ 1 250) Hz<br><br>(5 ~ 200) m/s <sup>2</sup><br>(Pulse duration : (10 ~ 30) ms) | $3.2 \times 10^{-2}$<br>$2.5 \times 10^{-2}$<br>$2.4 \times 10^{-2}$<br>$2.1 \times 10^{-2}$<br>$2.2 \times 10^{-2}$<br><br>$2.9 \times 10^{-2}$<br>$2.5 \times 10^{-2}$<br>$2.4 \times 10^{-2}$<br>$2.1 \times 10^{-2}$<br>$2.2 \times 10^{-2}$<br><br>$2.9 \times 10^{-2}$<br>$2.5 \times 10^{-2}$<br>$2.4 \times 10^{-2}$<br>$2.0 \times 10^{-2}$<br>$2.1 \times 10^{-2}$<br>$3.4 \times 10^{-2}$<br><br>$2.5 \times 10^{-2}$ | Vibration transducer<br>/CP801-60303-1<br><br><br><br><br><br><br><br><br><br><br><br><br>Vibration transducer<br>/CP801-60303-2 |

## 701. Photometry

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.      |
|------------------------------------------|---------------|--------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------|
| Illuminance meters                       | 70101         | (0.5 ~ 10) lx<br>(10 ~ 20 000) lx                            | 2.0 %<br>1.7 %                                                     | Illuminance meters<br>/CP801-70101-1        |
| Luminance meters                         | 70102         | (5 ~ 50) cd/m <sup>2</sup><br>(50 ~ 3 000) cd/m <sup>2</sup> | 1.6 %<br>1.4 %                                                     | Luminance meters<br>/CP801-70102-1          |
| Total luminous flux meters               | 70103         | (360 ~ 380) lm<br>(548.6 ~ 2 280) lm                         | 3.1 %<br>1.7 %                                                     | Total luminous flux<br>meters/CP801-70103-1 |
| Luminous intensity meters                | 70104         | (1 005 ~ 1 065) cd                                           | 1.7 %                                                              | Luminous intensity<br>meters/CP801-70104-1  |

## 702. Properties of detector &amp; sources

| Measured Quantity<br>Instrument or Gauge     | Field<br>Code | Range                                                                                                                                                                                                                                          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                               | Standard/Method of<br>Measurement etc.                |
|----------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Color temperature meters                     | 70202         | (1 969 ~ 3 224) K<br>(5 403 ~ 5 817) K                                                                                                                                                                                                         | 22 K<br>180 K                                                                                                    | Color temperature<br>standard lamps<br>/CP801-70202-1 |
| Color temperature standard<br>lamps          | 70203         | (2 000 ~ 3 200) K                                                                                                                                                                                                                              | 26 K                                                                                                             | Color temperature<br>standard lamps<br>/CP801-70203-1 |
| Colorimeters; source color                   | 70204         | CIE 1931 x, y<br>(Red)<br>x : (0.690 ~ 0.710)<br>y : (0.290 ~ 0.309)<br>(Green)<br>x : (0.169 ~ 0.226)<br>y : (0.700 ~ 0.714)<br>(Blue)<br>x : (0.124 ~ 0.143)<br>y : (0.046 ~ 0.086)<br>(White)<br>x : (0.325 ~ 0.335)<br>y : (0.345 ~ 0.365) | x : 0.006<br>y : 0.005<br><br>x : 0.006<br>y : 0.006<br><br>x : 0.005<br>y : 0.005<br><br>x : 0.006<br>y : 0.006 | Standard lamps<br>/CP801-70204-1                      |
| Laser power meters                           | 70207         | 408 nm<br>(1 ~ 40) mW<br>660 nm<br>(1 ~ 40) mW<br>785 nm<br>(1 ~ 40) mW                                                                                                                                                                        | 1.1 %<br><br>1.1 %<br><br>1.1 %                                                                                  | Standard Laser<br>power meters<br>/CP801-70207-1      |
| Total luminous flux standard<br>lamps        | 70209         | (360 ~ 2 280) lm                                                                                                                                                                                                                               | 1.7 %                                                                                                            | Standard Lamps<br>/CP801-70209-1                      |
| Pyranometers and pyrhemimeters<br>irradiance | 70211         | (250 ~ 2 500) nm<br>(1 000 ± 150) W/m <sup>2</sup>                                                                                                                                                                                             | 3.2 %                                                                                                            | Pyranometers and<br>pyrhemimeters<br>/CP801-70211-1   |

## 702. Properties of detector &amp; sources

| Measured Quantity<br>Instrument or Gauge                                                                         | Field<br>Code | Range                                                                                                                                                                                                                                                                                                          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                     | Standard/Method of<br>Measurement etc.                                    |
|------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Display color analyzers;<br>luminance, chromaticity,<br>white balance, etc.<br><br>Luminance<br><br>Chromaticity | 70213         | (5 ~ 50) cd/m <sup>2</sup><br>(50 ~ 3 000) cd/m <sup>2</sup><br>CIE 1931 x, y<br>(Red)<br>x : (0.690 ~ 0.710)<br>y : (0.290 ~ 0.309)<br>(Green)<br>x : (0.169 ~ 0.226)<br>y : (0.700 ~ 0.714)<br>(Blue)<br>x : (0.124 ~ 0.143)<br>y : (0.046 ~ 0.086)<br>(White)<br>x : (0.325 ~ 0.335)<br>y : (0.345 ~ 0.365) | 1.6 %<br>1.4 %<br><br>x : 0.006<br>y : 0.005<br><br>x : 0.006<br>y : 0.006<br><br>x : 0.005<br>y : 0.005<br><br>x : 0.006<br>y : 0.006 | Luminance meters,<br>standard lamps<br>/ CP801-70213-1                    |
| Luminous intensity standard<br>lamps                                                                             | 70214         | (2 ~ 3 000) cd                                                                                                                                                                                                                                                                                                 | 1.9 %                                                                                                                                  | Luminance meters<br>/CP801-70214-1                                        |
| Spectral irradiance standard<br>lamps<br><br>Spectral irradiance                                                 | 70215         | (250 ~ 1 050) nm<br>250 nm<br>(255 ~ 260) nm<br>(265 ~ 275) nm<br>(280 ~ 290) nm<br>(295 ~ 305) nm<br>(310 ~ 345) nm<br>(350 ~ 405) nm<br>(410 ~ 575) nm<br>(580 ~ 1 050) nm                                                                                                                                   | 6.3 %<br>5.5 %<br>5.1 %<br>4.6 %<br>4.2 %<br>3.8 %<br>3.3 %<br>2.8 %<br>2.5 %                                                          | Standard Lamps<br>Spectral irradiance<br>meters<br>/CP801-70215-1         |
| Total spectral radiant flux<br>standard lamps<br><br>Total spectral radiant                                      | 70216         | (380 ~ 840) nm<br>(380 ~ 385) nm<br>(390 ~ 445) nm<br>(450 ~ 455) nm<br>(460 ~ 500) nm<br>(505 ~ 555) nm<br>(560 ~ 705) nm<br>(710 ~ 840) nm                                                                                                                                                                   | 4.8 %<br>3.7 %<br>3.4 %<br>3.0 %<br>2.9 %<br>2.7 %<br>2.5 %                                                                            | Standard Lamps<br>Total spectral radiant<br>flux meters<br>/CP801-70216-1 |
| Luminance standard sources<br><br>Luminance                                                                      | 70217         | (5 ~ 3 000) cd/m <sup>2</sup>                                                                                                                                                                                                                                                                                  | 1.9%                                                                                                                                   | Luminance meters,<br>/CP801-70217-1                                       |

## 702. Properties of detector &amp; sources

| Measured Quantity<br>Instrument or Gauge                                                                            | Field<br>Code | Range                                                                                                                                                                                                                                                                                                      | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                  | Standard/Method of<br>Measurement etc.                            |
|---------------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| Spectral radiance standard<br>sources<br>Spectral radiance                                                          | 70218         | (380 ~ 1 039) nm<br>380 nm<br>(385 ~ 395) nm<br>(400 ~ 405) nm<br>(410 ~ 420) nm<br>(425 ~ 430) nm<br>(435 ~ 450) nm<br>(455 ~ 480) nm<br>(485 ~ 545) nm<br>(550 ~ 615) nm<br>(620 ~ 670) nm<br>(675 ~ 1 039) nm                                                                                           | 6.2 %<br>5.3 %<br>4.7 %<br>4.1 %<br>3.8 %<br>3.5 %<br>3.2 %<br>2.8 %<br>2.3 %<br>2.1 %<br>2.0 %                                     | Standard sources<br>Spectral radiance<br>meters<br>/CP801-70218-1 |
| UV irradiance meters                                                                                                | 70219         | 254 nm<br>(0.05 ~ 2.5) mW/cm <sup>2</sup><br>365 nm<br>(0.07 ~ 140) mW/cm <sup>2</sup><br>405 nm<br>(0.2 ~ 70) mW/cm <sup>2</sup>                                                                                                                                                                          | 4.0 %<br>3.6 %<br>3.4 %                                                                                                             | UV Sensor<br>/CP801-70219-1                                       |
| Spectral irradiance meters<br>Wavelength<br>Spectral irradiance<br>Color temperature<br>Chromaticity<br>Illuminance | 70220         | (250 ~ 1 050) nm<br>(250 ~ 1 050) nm<br>250 nm<br>(255 ~ 265) nm<br>(265 ~ 280) nm<br>(280 ~ 300) nm<br>(300 ~ 330) nm<br>(330 ~ 365) nm<br>(365 ~ 455) nm<br>(455 ~ 595) nm<br>(595 ~ 1 050) nm<br>(3 008 ~ 3 199) K<br>CIE 1931 x, y<br>x : (0.427 ~ 0.438)<br>y : (0.399 ~ 0.407)<br>(6 241 ~ 7 029) lx | 0.25 nm<br>6.1 %<br>5.0 %<br>4.6 %<br>4.0 %<br>3.5 %<br>3.0 %<br>2.5 %<br>2.0 %<br>1.7 %<br>24 K<br>x : 0.004<br>y : 0.004<br>1.9 % | Spectral irradiance<br>standard lamps<br>/ CP801-70220-1          |

## 702. Properties of detector &amp; sources

| Measured Quantity<br>Instrument or Gauge | Field<br>Code                                               | Range                                                       | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                          |
|------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------|
| Total spectral radiant flux meters       | 70221                                                       |                                                             |                                                                    | Total spectral radiant<br>flux standard lamps<br>/CP801-70221-1 |
| Wavelength                               |                                                             | (350 ~ 850) nm                                              | 0.25 nm                                                            |                                                                 |
| Total spectral radiant                   |                                                             | (350 ~ 850) nm                                              |                                                                    |                                                                 |
|                                          |                                                             | 350 nm                                                      | 4.0 %                                                              |                                                                 |
|                                          |                                                             | 355 nm                                                      | 3.4 %                                                              |                                                                 |
|                                          |                                                             | 360 nm                                                      | 3.1 %                                                              |                                                                 |
|                                          |                                                             | 365 nm                                                      | 2.7 %                                                              |                                                                 |
|                                          |                                                             | (370 ~ 375) nm                                              | 2.4 %                                                              |                                                                 |
|                                          |                                                             | (380 ~ 400) nm                                              | 2.2 %                                                              |                                                                 |
|                                          |                                                             | (405 ~ 410) nm                                              | 2.0 %                                                              |                                                                 |
|                                          |                                                             | (415 ~ 450) nm                                              | 1.9 %                                                              |                                                                 |
| Color temperature                        |                                                             | (455 ~ 850) nm                                              | 1.8 %                                                              |                                                                 |
|                                          |                                                             | (3 046 ~ 2 774) K                                           | 22 K                                                               |                                                                 |
| Chromaticity                             | CIE 1931 x, y<br>x : (0.433 ~ 0.456)<br>y : (0.402 ~ 0.412) | x : 0.004<br>y : 0.004                                      |                                                                    |                                                                 |
| Total luminous flux                      | (549 ~ 2 280) lm                                            | 1.7 %                                                       |                                                                    |                                                                 |
| Spectral radiance meters                 | 70222                                                       |                                                             |                                                                    | Spectral radiance<br>light source<br>/CP801-70222-1             |
| Wavelength                               |                                                             | (380 ~ 1 039) nm                                            | 0.25 nm                                                            |                                                                 |
| Spectral radiance                        |                                                             | (380 ~ 1 039) nm                                            |                                                                    |                                                                 |
|                                          |                                                             | 380 nm                                                      | 4.9 %                                                              |                                                                 |
|                                          |                                                             | (385 ~ 395) nm                                              | 4.5 %                                                              |                                                                 |
|                                          |                                                             | (400 ~ 410) nm                                              | 3.7 %                                                              |                                                                 |
|                                          |                                                             | (415 ~ 425) nm                                              | 3.3 %                                                              |                                                                 |
|                                          |                                                             | (430 ~ 440) nm                                              | 2.9 %                                                              |                                                                 |
|                                          |                                                             | (445 ~ 455) nm                                              | 2.6 %                                                              |                                                                 |
|                                          |                                                             | (460 ~ 490) nm                                              | 2.3 %                                                              |                                                                 |
|                                          |                                                             | (495 ~ 925) nm                                              | 2.0 %                                                              |                                                                 |
|                                          |                                                             | (930 ~ 990) nm                                              | 2.2 %                                                              |                                                                 |
|                                          |                                                             | (995 ~ 1039) nm                                             | 2.0 %                                                              |                                                                 |
| Color temperature                        |                                                             | (2 880 ~ 2 920) K                                           | 22 K                                                               |                                                                 |
|                                          |                                                             | (9 001 ~ 9 241) cd/m <sup>2</sup>                           | 1.6 %                                                              |                                                                 |
| Chromaticity                             |                                                             | CIE 1931 x, y<br>x : (0.446 ~ 0.450)<br>y : (0.412 ~ 0.416) | x : 0.003<br>y : 0.003                                             |                                                                 |
| Luminance                                |                                                             | (9 001 ~ 9 241) cd/m <sup>2</sup>                           | 1.6 %                                                              |                                                                 |
| Wavelength                               |                                                             | (380 ~ 1 039) nm                                            | 0.25 nm                                                            | Spectral radiance<br>meters<br>/CP801-70222-2                   |
| Spectral radiance                        |                                                             | (380 ~ 1 039) nm                                            |                                                                    |                                                                 |
|                                          |                                                             | (380 ~ 385) nm                                              | 5.3 %                                                              |                                                                 |
|                                          |                                                             | (390 ~ 405) nm                                              | 4.2 %                                                              |                                                                 |
|                                          |                                                             | (410 ~ 425) nm                                              | 3.9 %                                                              |                                                                 |
|                                          |                                                             | (430 ~ 445) nm                                              | 3.6 %                                                              |                                                                 |
|                                          |                                                             | (450 ~ 460) nm                                              | 3.2 %                                                              |                                                                 |
|                                          |                                                             | (465 ~ 475) nm                                              | 2.9 %                                                              |                                                                 |
|                                          |                                                             | (480 ~ 495) nm                                              | 2.5 %                                                              |                                                                 |
|                                          |                                                             | (500 ~ 515) nm                                              | 2.1 %                                                              |                                                                 |
|                                          |                                                             | (520 ~ 1 039) nm                                            | 2.0 %                                                              |                                                                 |

## 703. Properties of materials

| Measured Quantity<br>Instrument or Gauge                                                                                           | Field<br>Code | Range | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------------------------------------------------------------------------------------------------|---------------|-------|--------------------------------------------------------------------|----------------------------------------|
| Colorimeters; material color<br>(Including Specular Component<br>Standard Illuminant<br>: A, C, D65<br>Standard Observe : 2°, 10°) | 70301         |       |                                                                    | Color standard tiles<br>/CP801-70301-1 |
| Red                                                                                                                                |               | X     | 0.37                                                               |                                        |
|                                                                                                                                    |               | Y     | 0.22                                                               |                                        |
|                                                                                                                                    |               | Z     | 0.15                                                               |                                        |
| Yellow                                                                                                                             |               | X     | 0.79                                                               |                                        |
|                                                                                                                                    |               | Y     | 0.68                                                               |                                        |
|                                                                                                                                    |               | Z     | 0.21                                                               |                                        |
| Blue                                                                                                                               |               | X     | 0.21                                                               |                                        |
|                                                                                                                                    |               | Y     | 0.24                                                               |                                        |
|                                                                                                                                    |               | Z     | 0.50                                                               |                                        |
| Green                                                                                                                              |               | X     | 0.19                                                               |                                        |
|                                                                                                                                    |               | Y     | 0.24                                                               |                                        |
|                                                                                                                                    |               | Z     | 0.21                                                               |                                        |
| Pale Grey                                                                                                                          |               | X     | 0.67                                                               |                                        |
|                                                                                                                                    |               | Y     | 0.60                                                               |                                        |
|                                                                                                                                    |               | Z     | 0.70                                                               |                                        |
| Mid Grey                                                                                                                           |               | X     | 0.30                                                               |                                        |
|                                                                                                                                    |               | Y     | 0.27                                                               |                                        |
|                                                                                                                                    |               | Z     | 0.32                                                               |                                        |
| Deep Grey                                                                                                                          |               | X     | 0.11                                                               |                                        |
|                                                                                                                                    |               | Y     | 0.10                                                               |                                        |
|                                                                                                                                    |               | Z     | 0.11                                                               |                                        |
| White                                                                                                                              |               | X     | 0.95                                                               |                                        |
|                                                                                                                                    |               | Y     | 0.86                                                               |                                        |
|                                                                                                                                    |               | Z     | 0.98                                                               |                                        |
| (Excluding Specular Component<br>Standard Illuminant<br>: A, C, D65<br>Standard Observe : 2°, 10°)                                 |               |       |                                                                    |                                        |
| Red                                                                                                                                |               | X     | 0.32                                                               |                                        |
|                                                                                                                                    |               | Y     | 0.18                                                               |                                        |
|                                                                                                                                    |               | Z     | 0.12                                                               |                                        |
| Yellow                                                                                                                             |               | X     | 0.75                                                               |                                        |
|                                                                                                                                    |               | Y     | 0.65                                                               |                                        |
|                                                                                                                                    |               | Z     | 0.19                                                               |                                        |

## 703. Properties of materials

| Measured Quantity<br>Instrument or Gauge                                                                                                                                                                               | Field<br>Code | Range                                                                                   | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                               | Standard/Method of<br>Measurement etc. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Colorimeters; material color<br>(Excluding Specular Component<br>Standard Illuminant<br>: A, C, D65<br>Standard Observe : 2°, 10°)<br>Blue<br><br>Green<br><br>Pale Grey<br><br>Mid Grey<br><br>Deep Grey<br><br>White | 70301         | X<br>Y<br>Z<br><br>X<br>Y<br>Z<br><br>X<br>Y<br>Z<br><br>X<br>Y<br>Z<br><br>X<br>Y<br>Z | 0.17<br>0.21<br>0.45<br><br>0.15<br>0.20<br>0.17<br><br>0.63<br>0.57<br>0.66<br><br>0.28<br>0.25<br>0.27<br><br>0.07<br>0.06<br>0.08<br><br>0.91<br>0.82<br>0.94 | Color standard tiles<br>/CP801-70301-1 |
| Color standard filters<br>Standard Illuminant<br>: A, C, D65<br>Standard Observe : 2°, 10°<br>(380 nm ~ 780 nm)                                                                                                        | 70302         | X<br>Y<br>Z                                                                             | $1.1 \times 10^{-2}$<br>$1.1 \times 10^{-2}$<br>$1.1 \times 10^{-2}$                                                                                             | Spectrophotometer<br>/CP801-70302-1    |



## 703. Properties of materials

| Measured Quantity<br>Instrument or Gauge                                                                                                                                        | Field<br>Code | Range                 | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------|--------------------------------------------------------------------|-----------------------------------------|
| Color standard tiles<br>(Including Specular Component<br>Excluding Specular Component<br>Standard Illuminant<br>: A, C, D65<br>Standard Observe : 2°, 10°)<br>(380 nm ~ 780 nm) | 70304         |                       |                                                                    | Color standard tiles<br>/CP801-70304-1  |
| Red                                                                                                                                                                             |               | X<br>Y<br>Z           | 0.38<br>0.23<br>0.16                                               |                                         |
| Yellow                                                                                                                                                                          |               | X<br>Y<br>Z           | 0.80<br>0.69<br>0.22                                               |                                         |
| Blue                                                                                                                                                                            |               | X<br>Y<br>Z           | 0.21<br>0.25<br>0.51                                               |                                         |
| Green                                                                                                                                                                           |               | X<br>Y<br>Z           | 0.20<br>0.25<br>0.22                                               |                                         |
| Pale Grey                                                                                                                                                                       |               | X<br>Y<br>Z           | 0.68<br>0.61<br>0.71                                               |                                         |
| Mid Grey                                                                                                                                                                        |               | X<br>Y<br>Z           | 0.31<br>0.28<br>0.33                                               |                                         |
| Deep Grey                                                                                                                                                                       |               | X<br>Y<br>Z           | 0.12<br>0.11<br>0.12                                               |                                         |
| White                                                                                                                                                                           |               | X<br>Y<br>Z<br>x<br>y | 0.96<br>0.87<br>0.99<br>0.002<br>0.002                             |                                         |
| Dioptrimeters                                                                                                                                                                   | 70305         | (0.0 ~ ± 20.0) D      | 0.1 D                                                              | Standard lens<br>/CP801-70305-1         |
| Gloss meters                                                                                                                                                                    | 70306         | 20°<br>60°<br>85°     | 0.5<br>0.5<br>0.5                                                  | Gloss standard plates<br>/CP801-70306-1 |

## 703. Properties of materials

| Measured Quantity<br>Instrument or Gauge                                                                                                                                                                                                                | Field<br>Code | Range                                                                                                                                                     | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                               | Standard/Method of<br>Measurement etc.                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| Gloss standard plates                                                                                                                                                                                                                                   | 70307         | 20°<br>60°<br>85°                                                                                                                                         | 0.8<br>0.7<br>0.7                                                                                | Gloss meters<br>/CP801-70307-1                                    |
| Haze meters<br>(H-1)<br>(H-5)<br>(H-10)<br>(H-20)<br>(H-30)                                                                                                                                                                                             | 70308         | 1<br>5<br>10<br>20<br>30                                                                                                                                  | 0.21<br>0.16<br>0.2<br>0.3<br>0.5                                                                | Haze standard plates<br>/CP801-70308-1                            |
| Haze standard plates<br>(H-1)<br>(H-5)<br>(H-10)<br>(H-20)<br>(H-30)                                                                                                                                                                                    | 70309         | 1<br>5<br>10<br>20<br>30                                                                                                                                  | 0.15<br>0.14<br>0.2<br>0.3<br>0.4                                                                | Haze meters<br>/ CP801-70309-1                                    |
| Lens meters                                                                                                                                                                                                                                             | 70312         | (0.00 ~ ± 25.00) D<br>25 D<br>20 D<br>15 D<br>10 D<br>5 D<br>-5 D<br>-10 D<br>-15 D<br>-20 D<br>-25 D                                                     | 0.07 D<br>0.06 D<br>0.04 D<br>0.03 D<br>0.02 D<br>0.02 D<br>0.03 D<br>0.04 D<br>0.06 D<br>0.08 D | Standard lens<br>/CP801-70312-1                                   |
| Optical densitometers<br><br>Transmission Densitometer<br>(1 STEP ~ 15 STEP)<br><br>Reflection Densitometer<br>(Including Specular Component,<br>Excluding Specular Component<br>Standard Illuminant : A<br>Standard Observe : 2°)<br>(380 nm ~ 780 nm) | 70315         | 1 Step ~ 11 Step<br>12 Step ~ 14 Step<br>15 Step<br><br>White<br>Pale Grey<br>Mid Grey<br>Deep Grey<br>Black<br>Red<br>Yellow<br>Green<br>Cyan<br>Magenta | 0.03<br>0.06<br>0.11<br><br>0.02<br>0.02<br>0.02<br>0.02<br>0.02<br>0.02<br>0.02<br>0.02<br>0.02 | X-ray film step tablet<br>,Color standard tiles<br>/CP801-70315-1 |
| Optical filters<br>luminous transmittance<br>(380 nm ~ 780 nm)                                                                                                                                                                                          | 70316         | (0 ~ 100) %                                                                                                                                               | $5.1 \times 10^{-3}$                                                                             | Spectrophotometer<br>/ CP801-70316-1                              |

### 703. Properties of materials

| Measured Quantity<br>Instrument or Gauge                                                                          | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Standard/Method of<br>Measurement etc.                                            |
|-------------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Polarimeters                                                                                                      | 70317         | 633 nm                                                                                                                                                                                                                                                                                                                 | 0.002°                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Standard polarization<br>plate / CP801-70317-1                                    |
| Reflectance meters<br>spectral reflectance<br>(380 nm ~ 780 nm)                                                   | 70319         | (0 ~ 100) %                                                                                                                                                                                                                                                                                                            | $1.1 \times 10^{-2}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Visible absolute<br>spectral reflectance<br>plate / CP801-70319-1                 |
| Diffuse-reflectance meters<br>Pale Grey<br>Mid Grey<br>Deep Grey                                                  | 70320         | Y<br>Y<br>Y                                                                                                                                                                                                                                                                                                            | 0.57<br>0.23<br>0.09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Color standard tiles<br>/CP801-70320-1                                            |
| Refractometers                                                                                                    | 70321         | (1.332 99 ~ 1.444 77) nD<br>1.469 67 nD<br>1.496 71 nD                                                                                                                                                                                                                                                                 | 0.000 06 nD<br>0.000 07 nD<br>0.000 09 nD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Refractometers<br>/ CP801-70321-1                                                 |
| Refractometers                                                                                                    | 70321         | (1.332 99 ~ 1.496 71) nD                                                                                                                                                                                                                                                                                               | 0.000 16 nD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Refractometers<br>/ CP801-70321-1                                                 |
| Transmittance meters                                                                                              | 70323         | ND 20<br>ND 50<br>ND 70                                                                                                                                                                                                                                                                                                | 0.06<br>0.11<br>0.16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Transmittance filter<br>/CP801-70323-1                                            |
| Spectrophotometers including<br>FT-IR spectrophotometers<br>Spectrophotometers<br>Wavelength<br><br>Transmittance | 70325         | (250 ~ 780) nm<br>(900 ~ 2 500) nm<br><br>(250 ~ 750) nm<br>(0.1 ~ 0.3)<br>250 nm<br>300 nm<br>350 nm<br>400 nm<br>450 nm<br>500 nm<br>550 nm<br>600 nm<br>650 nm<br>700 nm<br>750 nm<br><br>(0.3 ~ 0.6)<br>250 nm<br>300 nm<br>350 nm<br>400 nm<br>450 nm<br>500 nm<br>550 nm<br>600 nm<br>650 nm<br>700 nm<br>750 nm | 0.4 nm<br>0.5 nm<br><br><br><br>$8.2 \times 10^{-3}$<br>$8.4 \times 10^{-3}$<br>$7.8 \times 10^{-3}$<br>$5.6 \times 10^{-3}$<br>$5.5 \times 10^{-3}$<br>$5.6 \times 10^{-3}$<br>$5.4 \times 10^{-3}$<br>$5.7 \times 10^{-3}$<br>$5.5 \times 10^{-3}$<br>$5.4 \times 10^{-3}$<br>$5.5 \times 10^{-3}$<br><br>$8.1 \times 10^{-3}$<br>$8.1 \times 10^{-3}$<br>$7.9 \times 10^{-3}$<br>$5.2 \times 10^{-3}$<br>$5.2 \times 10^{-3}$<br>$5.2 \times 10^{-3}$<br>$5.2 \times 10^{-3}$<br>$5.3 \times 10^{-3}$<br>$5.2 \times 10^{-3}$<br>$5.3 \times 10^{-3}$<br>$5.3 \times 10^{-3}$ | Wavelength filter<br>/CP801-70325-1<br><br>Transmittance filter<br>/CP801-70325-1 |

## 703. Properties of materials

| Measured Quantity<br>Instrument or Gauge                 | Field<br>Code | Range          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|----------------------------------------------------------|---------------|----------------|--------------------------------------------------------------------|----------------------------------------|
| Spectrophotometers including<br>FT-IR spectrophotometers | 70325         |                |                                                                    |                                        |
| Spectrophotometers                                       |               |                |                                                                    |                                        |
| Transmittance                                            |               | (0.6 ~ 0.9)    |                                                                    | Transmittance filter<br>/CP801-70325-1 |
|                                                          |               | 250 nm         | $8.1 \times 10^{-3}$                                               |                                        |
|                                                          |               | 300 nm         | $8.1 \times 10^{-3}$                                               |                                        |
|                                                          |               | 350 nm         | $7.7 \times 10^{-3}$                                               |                                        |
|                                                          |               | 400 nm         | $5.2 \times 10^{-3}$                                               |                                        |
|                                                          |               | 450 nm         | $5.2 \times 10^{-3}$                                               |                                        |
|                                                          |               | 500 nm         | $5.1 \times 10^{-3}$                                               |                                        |
|                                                          |               | 550 nm         | $5.1 \times 10^{-3}$                                               |                                        |
|                                                          |               | 600 nm         | $5.1 \times 10^{-3}$                                               |                                        |
|                                                          |               | 650 nm         | $5.1 \times 10^{-3}$                                               |                                        |
|                                                          |               | 700 nm         | $5.2 \times 10^{-3}$                                               |                                        |
|                                                          |               | 750 nm         | $5.2 \times 10^{-3}$                                               |                                        |
| Absorbance                                               |               | (250 ~ 750) nm |                                                                    |                                        |
|                                                          |               | (0.1 ~ 0.3)    |                                                                    |                                        |
|                                                          |               | 250 nm         | 0.003 6                                                            |                                        |
|                                                          |               | 300 nm         | 0.003 7                                                            |                                        |
|                                                          |               | 350 nm         | 0.003 4                                                            |                                        |
|                                                          |               | 400 nm         | 0.002 5                                                            |                                        |
|                                                          |               | 450 nm         | 0.002 4                                                            |                                        |
|                                                          |               | 500 nm         | 0.002 4                                                            |                                        |
|                                                          |               | 550 nm         | 0.002 4                                                            |                                        |
|                                                          |               | 600 nm         | 0.002 5                                                            |                                        |
|                                                          |               | 650 nm         | 0.002 4                                                            |                                        |
|                                                          |               | 700 nm         | 0.002 4                                                            |                                        |
|                                                          |               | 750 nm         | 0.002 4                                                            |                                        |
|                                                          |               | (0.3 ~ 0.6)    |                                                                    |                                        |
|                                                          |               | 250 nm         | 0.003 6                                                            |                                        |
|                                                          |               | 300 nm         | 0.003 6                                                            |                                        |
|                                                          |               | 350 nm         | 0.003 5                                                            |                                        |
|                                                          |               | 400 nm         | 0.002 3                                                            |                                        |
|                                                          |               | 450 nm         | 0.002 3                                                            |                                        |
|                                                          |               | 500 nm         | 0.002 3                                                            |                                        |
|                                                          |               | 550 nm         | 0.002 3                                                            |                                        |
|                                                          |               | 600 nm         | 0.002 4                                                            |                                        |
|                                                          |               | 650 nm         | 0.002 3                                                            |                                        |
|                                                          |               | 700 nm         | 0.002 3                                                            |                                        |
|                                                          |               | 750 nm         | 0.002 3                                                            |                                        |

## 703. Properties of materials

| Measured Quantity<br>Instrument or Gauge                         | Field<br>Code | Range                          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------------------------------|---------------|--------------------------------|--------------------------------------------------------------------|----------------------------------------|
| Spectrophotometers including<br>FT-IR spectrophotometers         | 70325         |                                |                                                                    |                                        |
| Spectrophotometers                                               |               | (0.6 ~ 0.9)                    |                                                                    | Transmittance filter<br>/CP801-70325-1 |
| Absorbance                                                       |               | 250 nm                         | 0.003 6                                                            |                                        |
|                                                                  |               | 300 nm                         | 0.003 6                                                            |                                        |
|                                                                  |               | 350 nm                         | 0.003 4                                                            |                                        |
|                                                                  |               | 400 nm                         | 0.002 3                                                            |                                        |
|                                                                  |               | 450 nm                         | 0.002 3                                                            |                                        |
|                                                                  |               | 500 nm                         | 0.002 3                                                            |                                        |
|                                                                  |               | 550 nm                         | 0.002 3                                                            |                                        |
|                                                                  |               | 600 nm                         | 0.002 3                                                            |                                        |
|                                                                  |               | 650 nm                         | 0.002 3                                                            |                                        |
|                                                                  |               | 700 nm                         | 0.002 3                                                            |                                        |
|                                                                  |               | 750 nm                         | 0.002 3                                                            |                                        |
|                                                                  |               | (1 100 ~ 2 500) nm             |                                                                    |                                        |
|                                                                  |               | 1 100 nm                       | 0.008 6                                                            |                                        |
|                                                                  |               | 1 700 nm                       | 0.008 6                                                            |                                        |
|                                                                  |               | 2 210 nm                       | 0.008 6                                                            |                                        |
|                                                                  |               | 2 500 nm                       | 0.008 6                                                            |                                        |
| Reflectance                                                      |               | (250 ~ 2 500) nm               |                                                                    | White standard<br>/CP801-70325-1       |
| (Including Specular Component &<br>Excluding Specular Component) |               | (250 ~ 380) nm                 | $1.3 \times 10^{-2}$                                               |                                        |
|                                                                  |               | (380 ~ 780) nm                 | $9.2 \times 10^{-3}$                                               |                                        |
|                                                                  |               | (800 ~ 2 500) nm               | $1.2 \times 10^{-2}$                                               |                                        |
| FT-IR spectrophotometers                                         |               | (400 ~ 4 000) $\text{cm}^{-1}$ |                                                                    | Standard filter<br>/CP801-70325-2      |
|                                                                  |               | 906.82 $\text{cm}^{-1}$        | 0.11 $\text{cm}^{-1}$                                              |                                        |
|                                                                  |               | 1 028.42 $\text{cm}^{-1}$      | 0.28 $\text{cm}^{-1}$                                              |                                        |
|                                                                  |               | 1 069.27 $\text{cm}^{-1}$      | 0.78 $\text{cm}^{-1}$                                              |                                        |
|                                                                  |               | 1 154.62 $\text{cm}^{-1}$      | 0.10 $\text{cm}^{-1}$                                              |                                        |
|                                                                  |               | 1 583.04 $\text{cm}^{-1}$      | 0.10 $\text{cm}^{-1}$                                              |                                        |
|                                                                  |               | 1 601.38 $\text{cm}^{-1}$      | 0.12 $\text{cm}^{-1}$                                              |                                        |
|                                                                  |               | 2 850.20 $\text{cm}^{-1}$      | 0.13 $\text{cm}^{-1}$                                              |                                        |
|                                                                  |               | 3 001.40 $\text{cm}^{-1}$      | 0.10 $\text{cm}^{-1}$                                              |                                        |
|                                                                  |               | 3 026.44 $\text{cm}^{-1}$      | 0.10 $\text{cm}^{-1}$                                              |                                        |
|                                                                  |               | 3 060.14 $\text{cm}^{-1}$      | 0.10 $\text{cm}^{-1}$                                              |                                        |
|                                                                  |               | 3 082.22 $\text{cm}^{-1}$      | 0.10 $\text{cm}^{-1}$                                              |                                        |

## 703. Properties of materials

| Measured Quantity<br>Instrument or Gauge                                    | Field<br>Code | Range          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|-----------------------------------------------------------------------------|---------------|----------------|--------------------------------------------------------------------|----------------------------------------|
| Wavelength reference materials;<br>absorption cell, bandpass<br>filter, etc | 70326         |                |                                                                    | Standard filter<br>/ CP801-70326-1     |
| Wavelength                                                                  |               | (250 ~ 780) nm | 0.5 nm                                                             |                                        |
| Transmittance                                                               |               | (250 ~ 750) nm |                                                                    |                                        |
|                                                                             |               | 250 nm         | $8.3 \times 10^{-3}$                                               |                                        |
|                                                                             |               | 300 nm         | $8.5 \times 10^{-3}$                                               |                                        |
|                                                                             |               | 350 nm         | $8.0 \times 10^{-3}$                                               |                                        |
|                                                                             |               | 400 nm         | $5.7 \times 10^{-3}$                                               |                                        |
|                                                                             |               | 450 nm         | $5.6 \times 10^{-3}$                                               |                                        |
|                                                                             |               | 500 nm         | $5.8 \times 10^{-3}$                                               |                                        |
|                                                                             |               | 550 nm         | $5.6 \times 10^{-3}$                                               |                                        |
|                                                                             |               | 600 nm         | $5.8 \times 10^{-3}$                                               |                                        |
|                                                                             |               | 650 nm         | $5.6 \times 10^{-3}$                                               |                                        |
|                                                                             |               | 700 nm         | $5.5 \times 10^{-3}$                                               |                                        |
|                                                                             |               | 750 nm         | $5.6 \times 10^{-3}$                                               |                                        |
| Absorbance                                                                  |               | (250 ~ 750) nm |                                                                    |                                        |
|                                                                             |               | 250 nm         | 0.003 7                                                            |                                        |
|                                                                             |               | 300 nm         | 0.003 8                                                            |                                        |
|                                                                             |               | 350 nm         | 0.003 6                                                            |                                        |
|                                                                             |               | 400 nm         | 0.002 6                                                            |                                        |
|                                                                             |               | 450 nm         | 0.002 5                                                            |                                        |
|                                                                             |               | 500 nm         | 0.002 5                                                            |                                        |
|                                                                             |               | 550 nm         | 0.002 5                                                            |                                        |
|                                                                             |               | 600 nm         | 0.002 6                                                            |                                        |
|                                                                             |               | 650 nm         | 0.002 5                                                            |                                        |
|                                                                             |               | 700 nm         | 0.002 5                                                            |                                        |
|                                                                             |               | 750 nm         | 0.002 5                                                            |                                        |

## 703. Properties of materials

| Measured Quantity<br>Instrument or Gauge                                               | Field<br>Code | Range          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|----------------------------------------------------------------------------------------|---------------|----------------|--------------------------------------------------------------------|----------------------------------------|
| Wavelength reference materials;<br>absorption cell, bandpass<br>filter, etc            | 70326         |                |                                                                    | White standard<br>/ CP801-70326-1      |
| Reflectance<br>(Including Specular<br>Reflectance & Excluding<br>Specular Reflectance) |               | (380 ~ 780) nm |                                                                    |                                        |
|                                                                                        |               | 380 nm         | $7.9 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 390 nm         | $7.9 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 400 nm         | $7.7 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 410 nm         | $7.9 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 420 nm         | $8.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 430 nm         | $8.3 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 440 nm         | $8.5 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 450 nm         | $8.7 \times 10^{-2}$                                               |                                        |
|                                                                                        |               | 460 nm         | $8.3 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 470 nm         | $7.9 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 480 nm         | $7.5 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 490 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 500 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 510 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 520 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 530 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 540 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 550 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 560 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 570 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 580 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 590 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 600 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 610 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 620 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 630 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 640 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 650 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 660 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 670 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 680 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 690 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 700 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 710 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 720 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 730 nm         | $7.2 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 740 nm         | $7.3 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 750 nm         | $7.2 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 760 nm         | $7.4 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 770 nm         | $7.1 \times 10^{-3}$                                               |                                        |
|                                                                                        |               | 780 nm         | $7.2 \times 10^{-3}$                                               |                                        |

## 704. Fiber optics

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                   | Standard/Method of<br>Measurement etc.                      |
|------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Broadband optical light<br>sources       | 70402         |                                                                                                                                                                                        |                                                                                                                      | Wavelength Meter,<br>Optical Power Meter<br>/ CP801-70402-1 |
| Output wavelength                        |               | 1 310 nm<br>1 550 nm                                                                                                                                                                   | 0.15 nm<br>0.15 nm                                                                                                   |                                                             |
| Output stability                         |               | (1 310 nm)<br>(0 ~ 3) dB<br>(1 550 nm)<br>(0 ~ 3) dB                                                                                                                                   | 0.001 5 dB<br>0.001 5 dB                                                                                             |                                                             |
| Output power                             |               | (1 310 nm)<br>(10 ~ -20) dBm<br>(1 550 nm)<br>(10 ~ -20) dBm                                                                                                                           | 0.13 dB<br>0.13 dB                                                                                                   |                                                             |
| Laser sources, multichannel              | 70408         |                                                                                                                                                                                        |                                                                                                                      | Wavelength Meter,<br>Optical Power Meter<br>/ CP801-70408-1 |
| Output wavelength                        |               | 1 310 nm<br>1 550 nm                                                                                                                                                                   | $7.3 \times 10^{-7}$<br>$7.3 \times 10^{-7}$                                                                         |                                                             |
| Output stability                         |               | (1 310 nm)<br>(0 ~ 3) dB<br>(1 550 nm)<br>(0 ~ 3) dB                                                                                                                                   | 0.001 5 dB<br>0.001 5 dB                                                                                             |                                                             |
| Output power                             |               | (1 310 nm)<br>(10 ~ -20) dBm<br>(1 550 nm)<br>(10 ~ -20) dBm                                                                                                                           | 0.13 dB<br>0.13 dB                                                                                                   |                                                             |
| Optical attenuators                      | 70410         |                                                                                                                                                                                        |                                                                                                                      | Optical Power Meter<br>/ CP801-70410-1                      |
| Insertion loss                           |               | 1 310 nm<br>1 550 nm                                                                                                                                                                   | 0.029 dB<br>0.029 dB                                                                                                 |                                                             |
| Attenuation                              |               | (1 310 nm)<br>(0 ~ 10) dB<br>(10 ~ 20) dB<br>(20 ~ 30) dB<br>(30 ~ 40) dB<br>(40 ~ 50) dB<br>(1 550 nm)<br>(0 ~ 10) dB<br>(10 ~ 20) dB<br>(20 ~ 30) dB<br>(30 ~ 40) dB<br>(40 ~ 50) dB | 0.012 dB<br>0.012 dB<br>0.016 dB<br>0.019 dB<br>0.021 dB<br>0.012 dB<br>0.012 dB<br>0.016 dB<br>0.019 dB<br>0.021 dB |                                                             |
| Optical couplers                         | 70411         |                                                                                                                                                                                        |                                                                                                                      | Optical Power Meter<br>/ CP801-70411-1                      |
| Coupling ratio                           |               | 1 310 nm<br>1 550 nm                                                                                                                                                                   | 0.012 dB<br>0.012 dB                                                                                                 |                                                             |



## 704. Fiber optics

| Measured Quantity<br>Instrument or Gauge           | Field<br>Code | Range           | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                      |
|----------------------------------------------------|---------------|-----------------|--------------------------------------------------------------------|-------------------------------------------------------------|
| Fiber-optic power meters<br>absolute optical power | 70412         | 1 310 nm        | 0.071 dB                                                           | Optical Power Meter<br>/ CP801-70412-1                      |
|                                                    |               | 1 550 nm        | 0.071 dB                                                           |                                                             |
| Linearity measurement                              |               | (1 310 nm)      |                                                                    |                                                             |
|                                                    |               | (0 ~ -10) dBm   | 0.012 dB                                                           |                                                             |
|                                                    |               | (-10 ~ -20) dBm | 0.012 dB                                                           |                                                             |
|                                                    |               | (-20 ~ -30) dBm | 0.015 dB                                                           |                                                             |
|                                                    |               | (-30 ~ -40) dBm | 0.018 dB                                                           |                                                             |
|                                                    |               | (-40 ~ -50) dBm | 0.020 dB                                                           |                                                             |
|                                                    |               | (1 550 nm)      |                                                                    |                                                             |
|                                                    |               | (0 ~ -10) dBm   | 0.012 dB                                                           |                                                             |
|                                                    |               | (-10 ~ -20) dBm | 0.012 dB                                                           |                                                             |
|                                                    |               | (-20 ~ -30) dBm | 0.015 dB                                                           |                                                             |
|                                                    |               | (-30 ~ -40) dBm | 0.018 dB                                                           |                                                             |
|                                                    |               | (-40 ~ -50) dBm | 0.020 dB                                                           |                                                             |
| Optical loss testers                               | 70413         |                 |                                                                    | Wavelength Meter,<br>Optical Power Meter<br>/ CP801-70413-1 |
| Absolute optical power                             |               | 1 310 nm        | 0.071 dB                                                           |                                                             |
|                                                    |               | 1 550 nm        | 0.071 dB                                                           |                                                             |
| Linearity measurement                              |               | (1 310 nm)      |                                                                    |                                                             |
|                                                    |               | (0 ~ -10) dBm   | 0.012 dB                                                           |                                                             |
|                                                    |               | (-10 ~ -20) dBm | 0.012 dB                                                           |                                                             |
|                                                    |               | (-20 ~ -30) dBm | 0.015 dB                                                           |                                                             |
|                                                    |               | (-30 ~ -40) dBm | 0.018 dB                                                           |                                                             |
|                                                    |               | (-40 ~ -50) dBm | 0.020 dB                                                           |                                                             |
|                                                    |               | (1 550 nm)      |                                                                    |                                                             |
|                                                    |               | (0 ~ -10) dBm   | 0.012 dB                                                           |                                                             |
|                                                    |               | (-10 ~ -20) dBm | 0.012 dB                                                           |                                                             |
|                                                    |               | (-20 ~ -30) dBm | 0.015 dB                                                           |                                                             |
|                                                    |               | (-30 ~ -40) dBm | 0.018 dB                                                           |                                                             |
|                                                    |               | (-40 ~ -50) dBm | 0.020 dB                                                           |                                                             |
| Output wavelength                                  |               | 1 310 nm        | $7.3 \times 10^{-7}$                                               |                                                             |
|                                                    |               | 1 550 nm        | $7.3 \times 10^{-7}$                                               |                                                             |
| Output stability                                   |               | (1 310 nm)      |                                                                    |                                                             |
|                                                    |               | (0 ~ 3) dB      | 0.001 5 dB                                                         |                                                             |
|                                                    |               | (1 550 nm)      |                                                                    |                                                             |
|                                                    |               | (0 ~ 3) dB      | 0.001 5 dB                                                         |                                                             |
| Output power                                       |               | (1 310 nm)      |                                                                    |                                                             |
|                                                    |               | (10 ~ -20) dBm  | 0.13 dB                                                            |                                                             |
|                                                    |               | (1 550 nm)      |                                                                    |                                                             |
|                                                    |               | (10 ~ -20) dBm  | 0.13 dB                                                            |                                                             |

## 704. Fiber optics

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                                              | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                   | Standard/Method of<br>Measurement etc.                                    |
|------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Optical multimeters                      | 70415         |                                                                                                                                                                                                                    |                                                                                                                      | Wavelength Meter,<br>Optical Power Meter<br>/ CP801-70415-1               |
| Absolute optical power                   |               | 1 310 nm<br>1 550 nm                                                                                                                                                                                               | 0.071 dB<br>0.071 dB                                                                                                 |                                                                           |
| Linearity measurement                    |               | (1 310 nm)<br>(0 ~ -10) dBm<br>(-10 ~ -20) dBm<br>(-20 ~ -30) dBm<br>(-30 ~ -40) dBm<br>(-40 ~ -50) dBm<br>(1 550 nm)<br>(0 ~ -10) dBm<br>(-10 ~ -20) dBm<br>(-20 ~ -30) dBm<br>(-30 ~ -40) dBm<br>(-40 ~ -50) dBm | 0.012 dB<br>0.012 dB<br>0.015 dB<br>0.018 dB<br>0.020 dB<br>0.012 dB<br>0.012 dB<br>0.015 dB<br>0.018 dB<br>0.020 dB |                                                                           |
| Output wavelength                        |               | 1 310 nm<br>1 550 nm                                                                                                                                                                                               | $7.3 \times 10^{-7}$<br>$7.3 \times 10^{-7}$                                                                         |                                                                           |
| Output stability                         |               | (1 310 nm)<br>(0 ~ 3) dB<br>(1 550 nm)<br>(0 ~ 3) dB                                                                                                                                                               | 0.001 5 dB<br>0.001 5 dB                                                                                             |                                                                           |
| Output power                             |               | (1 310 nm)<br>(10 ~ -20) dBm<br>(1 550 nm)<br>(10 ~ -20) dBm                                                                                                                                                       | 0.13 dB<br>0.13 dB                                                                                                   |                                                                           |
| Optical spectrum analyzers               | 70417         |                                                                                                                                                                                                                    |                                                                                                                      | Wavelength<br>reference Source,<br>Optical Power Meter<br>/ CP801-70417-1 |
| Wavelength accuracy                      |               | 1 310 nm<br>1 550 nm                                                                                                                                                                                               | $3.2 \times 10^{-5}$<br>$2.7 \times 10^{-5}$                                                                         |                                                                           |
| Linearity                                |               | (1 310 nm)<br>(0 ~ -10) dBm<br>(-10 ~ -20) dBm<br>(-20 ~ -30) dBm<br>(-30 ~ -40) dBm<br>(-40 ~ -50) dBm<br>(1 550 nm)<br>(0 ~ -10) dBm<br>(-10 ~ -20) dBm<br>(-20 ~ -30) dBm<br>(-30 ~ -40) dBm<br>(-40 ~ -50) dBm | 0.015 dB<br>0.017 dB<br>0.019 dB<br>0.021 dB<br>0.027 dB<br>0.017 dB<br>0.016 dB<br>0.020 dB<br>0.023 dB<br>0.024 dB |                                                                           |

## 704. Fiber optics

| Measured Quantity<br>Instrument or Gauge       | Field<br>Code | Range                                                                                                                                                                        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                           | Standard/Method of<br>Measurement etc.            |
|------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------|
| Optical time domain<br>reflectors, OTDR        | 70418         |                                                                                                                                                                              |                                                                                              | STD Fiber, OSA<br>/ CP801-70418-1                 |
| Output wavelength                              |               | 1 310 nm<br>1 550 nm                                                                                                                                                         | 0.092 nm<br>0.092 nm                                                                         |                                                   |
| Length                                         |               | (1 310 nm)<br>10 km<br>(1 550 nm)<br>10 km                                                                                                                                   | 2.9 m<br>2.9 m                                                                               |                                                   |
| Return loss                                    |               | (1 310 nm)<br>30 dB<br>50 dB<br>(1 550 nm)<br>30 dB<br>50 dB                                                                                                                 | 0.70 dB<br>2.1 dB<br>0.70 dB<br>2.1 dB                                                       |                                                   |
| Return loss detection linearity                |               | (1 310 nm)<br>(0 ~ -10) dBm<br>(-10 ~ -20) dBm<br>(-20 ~ -30) dBm<br>(-30 ~ -40) dBm<br>(1 550 nm)<br>(0 ~ -10) dBm<br>(-10 ~ -20) dBm<br>(-20 ~ -30) dBm<br>(-30 ~ -40) dBm | 0.015 dB<br>0.017 dB<br>0.019 dB<br>0.021 dB<br>0.017 dB<br>0.016 dB<br>0.020 dB<br>0.023 dB |                                                   |
| PDH/SDH Analyzers<br>Communication frequency   | 70419         | 1.544 MHz ~ 2.5 GHz                                                                                                                                                          | $5.8 \times 10^{-9}$                                                                         | Frequency Counter<br>/ CP801-70419-1              |
| Return loss meters<br>RL reference fiber       | 70423         | 1 310 nm<br>1 550 nm                                                                                                                                                         | 0.22 dB<br>0.22 dB                                                                           | Optical Power Meter<br>/ CP801-70423-1            |
| Linearity                                      |               | (1 310 nm)<br>(0 ~ -20) dBm<br>(-20 ~ -40) dBm<br>(-40 ~ -50) dBm<br>(1 550 nm)<br>(0 ~ -20) dBm<br>(-20 ~ -40) dBm<br>(-40 ~ -50) dBm                                       | 0.061 dB<br>0.063 dB<br>0.086 dB<br>0.061 dB<br>0.063 dB<br>0.086 dB                         |                                                   |
| SDH/SONET Analyzers<br>Communication frequency | 70424         | 1.544 MHz ~ 2.5 GHz                                                                                                                                                          | $5.8 \times 10^{-9}$                                                                         | Frequency Counter<br>/ CP801-70424-1              |
| Multi-laser wavelength<br>meters               | 70426         | 1 310 nm<br>1 550 nm                                                                                                                                                         | $5.4 \times 10^{-7}$<br>$4.9 \times 10^{-7}$                                                 | Wavelength<br>reference Source<br>/ CP801-70426-1 |

## 704. Fiber optics

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                            | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                      |
|------------------------------------------|---------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------|
| Frequency stabilized laser<br>and LDs    | 70429         |                                                                                                  |                                                                    |                                                             |
| Frequency stabilized laser               |               |                                                                                                  |                                                                    |                                                             |
| Wavelength accuracy                      |               | 1 310 nm<br>1 550 nm                                                                             | $4.0 \times 10^{-7}$<br>$4.0 \times 10^{-7}$                       | Wavelength Meter<br>/ CP801-70429-1                         |
| Tunable laser sources                    |               |                                                                                                  |                                                                    |                                                             |
| Output wavelength                        |               | 1 310 nm<br>1 550 nm                                                                             | $1.7 \times 10^{-6}$<br>$1.7 \times 10^{-6}$                       | Wavelength Meter,<br>Optical Power Meter<br>/ CP801-70429-2 |
| Output stability                         |               | (1 310 nm)<br>(0 ~ 3) dB<br>(1 550 nm)<br>(0 ~ 3) dB                                             | 0.001 5 dB<br>0.001 5 dB                                           |                                                             |
| Output linearity                         |               | (1 310 nm)<br>(0 ~ -15) dBm<br>(-15 ~ -20) dBm<br>(1 550 nm)<br>(0 ~ -15) dBm<br>(-15 ~ -20) dBm | 0.015 dB<br>0.020 dB<br>0.015 dB<br>0.020 dB                       |                                                             |
| LD sources                               |               |                                                                                                  |                                                                    |                                                             |
| Output wavelength                        |               | 1 310 nm<br>1 550 nm                                                                             | $7.3 \times 10^{-7}$<br>$7.3 \times 10^{-7}$                       | Wavelength Meter,<br>Optical Power Meter<br>/ CP801-70429-3 |
| Output stability                         |               | (1 310 nm)<br>(0 ~ 3) dB<br>(1 550 nm)<br>(0 ~ 3) dB                                             | 0.001 5 dB<br>0.001 5 dB                                           |                                                             |
| Output power                             |               | (1 310 nm)<br>(10 ~ -20) dBm<br>(1 550 nm)<br>(10 ~ -20) dBm                                     | 0.13 dB<br>0.13 dB                                                 |                                                             |
| ASE light sources                        | 70430         |                                                                                                  |                                                                    |                                                             |
| Output wavelength                        |               | 1 550 nm                                                                                         | 0.15 nm                                                            | Wavelength Meter,<br>Optical Power Meter<br>/ CP801-70430-1 |
| Output stability                         |               | (1 550 nm)<br>(0 ~ 3) dB                                                                         | 0.001 5 dB                                                         |                                                             |
| Output power                             |               | (1 550 nm)<br>(10 ~ -20) dBm                                                                     | 0.13 dB                                                            |                                                             |
| CW-laser Wavelength meters               | 70431         |                                                                                                  |                                                                    |                                                             |
| Wavelength accuracy                      |               | 1 310 nm<br>1 550 nm                                                                             | $3.3 \times 10^{-7}$<br>$3.3 \times 10^{-7}$                       | Wavelength<br>reference Source<br>/ CP801-70431-1           |

## 901. Chemical analysis

| Measured Quantity<br>Instrument or Gauge            | Field<br>Code | Range                            | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|-----------------------------------------------------|---------------|----------------------------------|--------------------------------------------------------------------|----------------------------------------|
| Breath alcohol analyzers                            | 90101         | (0.000 ~ 0.100) % BAC            | $1.9 \times 10^{-2}$                                               | Alcohol gas<br>/CP801-90101-1          |
| Environmental air quality<br>monitoring instruments | 90102         |                                  |                                                                    | Standard gas<br>/CP801-90102-1         |
| CO                                                  |               | (0 ~ 100) $\mu\text{mol/mol}$    | $2.0 \times 10^{-2}$                                               |                                        |
| C <sub>4</sub> H <sub>8</sub>                       |               | (0 ~ 100) $\mu\text{mol/mol}$    | $1.0 \times 10^{-2}$                                               |                                        |
| H <sub>2</sub> S                                    |               | (0 ~ 30) $\mu\text{mol/mol}$     | $3.9 \times 10^{-2}$                                               |                                        |
| O <sub>2</sub>                                      |               | (0 ~ 20) $\text{cmol/mol}$       | $2.0 \times 10^{-2}$                                               |                                        |
| NO                                                  |               | (0 ~ 250) $\mu\text{mol/mol}$    | $2.0 \times 10^{-2}$                                               |                                        |
| SO <sub>2</sub>                                     |               | (0 ~ 100) $\mu\text{mol/mol}$    | $2.0 \times 10^{-2}$                                               |                                        |
| CH <sub>4</sub>                                     |               | (0 ~ 2) $\text{cmol/mol}$        | $2.0 \times 10^{-2}$                                               |                                        |
| CO <sub>2</sub>                                     |               | (0 ~ 5 000) $\mu\text{mol/mol}$  | $2.0 \times 10^{-2}$                                               |                                        |
| NH <sub>3</sub>                                     |               | (0 ~ 50) $\mu\text{mol/mol}$     | $4.7 \times 10^{-2}$                                               |                                        |
| C <sub>4</sub> H <sub>10</sub>                      |               | (0 ~ 1) $\text{cmol/mol}$        | $2.0 \times 10^{-2}$                                               |                                        |
| H <sub>2</sub>                                      |               | (0 ~ 2) $\text{cmol/mol}$        | $2.1 \times 10^{-2}$                                               |                                        |
| C <sub>3</sub> H <sub>8</sub>                       |               | (0 ~ 1) $\text{cmol/mol}$        | $2.0 \times 10^{-2}$                                               |                                        |
| Gas analyzers                                       | 90103         |                                  |                                                                    | Standard gas<br>/CP801-90103-1         |
| CO                                                  |               | (0 ~ 100) $\mu\text{mol/mol}$    | $2.0 \times 10^{-2}$                                               |                                        |
| C <sub>4</sub> H <sub>8</sub>                       |               | (0 ~ 100) $\mu\text{mol/mol}$    | $1.0 \times 10^{-2}$                                               |                                        |
| H <sub>2</sub> S                                    |               | (0 ~ 30) $\mu\text{mol/mol}$     | $3.9 \times 10^{-2}$                                               |                                        |
| O <sub>2</sub>                                      |               | (0 ~ 20) $\text{cmol/mol}$       | $2.0 \times 10^{-2}$                                               |                                        |
| NO                                                  |               | (0 ~ 250) $\mu\text{mol/mol}$    | $2.0 \times 10^{-2}$                                               |                                        |
| SO <sub>2</sub>                                     |               | (0 ~ 100) $\mu\text{mol/mol}$    | $2.0 \times 10^{-2}$                                               |                                        |
| CH <sub>4</sub>                                     |               | (0 ~ 2) $\text{cmol/mol}$        | $2.0 \times 10^{-2}$                                               |                                        |
| CO <sub>2</sub>                                     |               | (0 ~ 5 000) $\mu\text{mol/mol}$  | $2.0 \times 10^{-2}$                                               |                                        |
| NH <sub>3</sub>                                     |               | (0 ~ 50) $\mu\text{mol/mol}$     | $4.7 \times 10^{-2}$                                               |                                        |
| C <sub>4</sub> H <sub>10</sub>                      |               | (0 ~ 1) $\text{cmol/mol}$        | $2.0 \times 10^{-2}$                                               |                                        |
| H <sub>2</sub>                                      |               | (0 ~ 2) $\text{cmol/mol}$        | $2.1 \times 10^{-2}$                                               |                                        |
| C <sub>3</sub> H <sub>8</sub>                       |               | (0 ~ 1) $\text{cmol/mol}$        | $2.0 \times 10^{-2}$                                               |                                        |
| Exhaust Gas test Instruments                        | 90104         |                                  |                                                                    | Standard gas<br>/CP801-90104-1         |
| CO                                                  |               | (0 ~ 10 000) $\mu\text{mol/mol}$ | $2.0 \times 10^{-2}$                                               |                                        |
| CO <sub>2</sub>                                     |               | (0 ~ 6) $\text{cmol/mol}$        | $3.0 \times 10^{-2}$                                               |                                        |
| NOx(NO)                                             |               | (0 ~ 2 000) $\mu\text{mol/mol}$  | $2.0 \times 10^{-2}$                                               |                                        |
| C <sub>3</sub> H <sub>8</sub>                       |               | (0 ~ 1) $\text{cmol/mol}$        | $2.0 \times 10^{-2}$                                               |                                        |
| C <sub>4</sub> H <sub>10</sub>                      |               | (0 ~ 1) $\text{cmol/mol}$        | $2.0 \times 10^{-2}$                                               |                                        |
| O <sub>2</sub>                                      |               | (0 ~ 20) $\text{cmol/mol}$       | $2.0 \times 10^{-2}$                                               |                                        |
| NH <sub>3</sub>                                     |               | (0 ~ 50) $\mu\text{mol/mol}$     | $4.7 \times 10^{-2}$                                               |                                        |
| SO <sub>2</sub>                                     |               | (0 ~ 1 000) $\mu\text{mol/mol}$  | $2.0 \times 10^{-2}$                                               |                                        |

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017 & KS Q ISO/IEC 17025:2017

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CALIBRATION

Valid To : Dec. 08, 2025.

Accreditation No : KC01-028

In recognition of the successful completion of the KOLAS evaluation process,  
accreditation is granted to this laboratory to perform the following calibrations

| Field Code               | Item of Calibration                                | on-site | Field Code    | Item of Calibration                                        | on-site | Field Code                      | Item of Calibration                                                                                      | on-site |
|--------------------------|----------------------------------------------------|---------|---------------|------------------------------------------------------------|---------|---------------------------------|----------------------------------------------------------------------------------------------------------|---------|
| 102. Linear dimension    |                                                    |         | 201. Mass     |                                                            |         | 209. Fluid flow                 |                                                                                                          |         |
| 10204                    | Gauge block comparators                            | Y       | 20102         | Auto-hopper scale balances                                 | Y       | 20909                           | Liquid flowmeters; differential pressure                                                                 | N       |
| 10206                    | Dial/cylinder gauge testers                        | Y       | 20103         | Auto-packer scale balances                                 | Y       |                                 |                                                                                                          |         |
| 10210                    | Extensometers, linear displacement transducers     | Y       | 20109         | Electric balances                                          | Y       | 20910                           | Liquid flowmeters; electromagnetic                                                                       | Y       |
|                          |                                                    |         | 20112         | Platform scale balances                                    | Y       |                                 |                                                                                                          |         |
| 10213                    | Gap gauges                                         | N       | 20113         | Spring scale balances                                      | Y       | 20912                           | Liquid flowmeters; Coriolis, etc.                                                                        | N       |
| 10216                    | Height gauges/measuring machines                   | Y       | 20116         | Weights                                                    | Y       |                                 |                                                                                                          |         |
| 10219                    | Linear scales                                      | Y       | 202. Force    |                                                            |         | 20915                           | Liquid flowmeters; positive displacement                                                                 | Y       |
| 10220                    | Standard measuring machines                        | Y       | 20203         | Tension/compression testing machines                       | Y       | 20917                           | Liquid flowmeters; turbine                                                                               | N       |
| 10225                    | Laser scan micrometers                             | Y       |               |                                                            |         | 20919                           | Liquid flowmeters; ultrasonic                                                                            | N       |
| 10237                    | Torque arms                                        | Y       | 20204         | Push-pull gauges                                           | N       | 20921                           | Liquid flowmeters; area                                                                                  | N       |
| 103. Angle               |                                                    |         | 203. Torque   |                                                            |         |                                 |                                                                                                          |         |
| 10306                    | Clinometers                                        | N       | 20303         | Torque wrenches/drivers                                    | N       | 20923                           | Liquid flowmeters; vortex                                                                                | N       |
| 10322                    | Angular displacement transducers                   | Y       | 204. Pressure |                                                            |         | 210. Hardness                   |                                                                                                          |         |
| 104. Form                |                                                    |         | 20401         | Altimeters                                                 | Y       | 21001                           | Brinell hardness testers                                                                                 | Y       |
|                          |                                                    |         | 20406         | Absolute pressure gauges                                   | Y       | 21002                           | Rockwell hardness testers                                                                                | Y       |
| 10401                    | Form testers                                       | Y       | 20408         | Compound pressure gauges                                   | Y       | 21003                           | Shore hardness testers                                                                                   | Y       |
| 10407                    | Precision surface plates                           | Y       | 20409         | Differential pressure gauges                               | Y       | 21004                           | Vickers hardness testers                                                                                 | Y       |
| 10409                    | Roundness measurement instruments                  | Y       | 20411         | Gauge pressure gauges                                      | Y       | 21005                           | Durometer hardness testers                                                                               | N       |
|                          |                                                    |         | 20412         | Pressure transducers/transmitters                          | Y       | 21006                           | Leeb hardness testers                                                                                    | N       |
| 105. Complex geometry    |                                                    |         | 20413         | Dial type vacuum gauges                                    | Y       | 401. DC volatage & current      |                                                                                                          |         |
| 10503                    | Contact coordinate measuring machines              | Y       | 205. Vacuum   |                                                            |         | 40101                           | DC ammeters                                                                                              | Y       |
| 10504                    | Non-contact coordinate measuring machines          | Y       | 20501         | Capacitance diaphragm gauges                               | N       | 40112                           | DC voltmeters                                                                                            | Y       |
|                          |                                                    |         | 20502         | Spinning rotor gauges                                      | N       | 404. Other DC & AC Measurements |                                                                                                          |         |
| 10511                    | Measuring microscopes, profile projectors          | Y       | 20503         | Ionization gauges                                          | N       | 40424                           | Volt/Current recorders                                                                                   | Y       |
| 10517                    | Stylus type roughness testers                      | Y       | 20504         | Thermal conductivity pirani, thermocouple, convectron etc. | N       | 501. Contact thermometry        |                                                                                                          |         |
|                          |                                                    |         |               |                                                            |         | 50101                           | Temperature generators; ovens, furnaces, isothermal liquid baths, ice-point baths, dry-block calibrators | Y       |
| 10531                    | SEM/TEM/SPM/AFM microscopes                        | Y       | 206. Volume   |                                                            |         | 50102                           | Temperature indicators/ recorders/controllers, temperature calibrators                                   | Y       |
| 106. Various dimensional |                                                    |         | 20601         | Volumetric glasswares                                      | N       |                                 |                                                                                                          |         |
| 10601                    | Inside/outside/gear tooth calipers, caliper gauges | Y       | 20602         | Pycnometers                                                | N       | 50104                           | Resistance thermometers; SPRT, IPRT, thermistors,etc                                                     | Y       |
| 10603                    | Cylinder/bore gauges                               | Y       | 20604         | Standard volume vessels                                    | Y       |                                 |                                                                                                          |         |
| 10604                    | Depth gauges, depth micrometers                    | Y       | 20606         | Piston type volume meters                                  | N       | 50105                           | Thermal expansion thermometers; bimetal, gas or liquid type                                              | Y       |
| 10605                    | Dial/digital gauges                                | Y       | 207. Density  |                                                            |         |                                 |                                                                                                          |         |
| 10609                    | Micro indicators, test indicators                  | Y       | 20704         | Salinity meters                                            | N       |                                 |                                                                                                          |         |
| 10610                    | Micrometer heads                                   | Y       | 20705         | Sucrose meters                                             | N       |                                 |                                                                                                          |         |
| 10612                    | Inside micrometers                                 | Y       | 20707         | Chloride meters                                            | N       |                                 |                                                                                                          |         |
| 10613                    | Outside micrometers                                | Y       |               |                                                            |         |                                 |                                                                                                          |         |

| Field Code                            | Item of Calibration                                                                                                                | on-site | Field Code | Item of Calibration | on-site | Field Code | Item of Calibration | on-site |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------|------------|---------------------|---------|------------|---------------------|---------|
| 50106                                 | Thermocouples; noble metal, base metal, pure metal, special type, etc                                                              | Y       |            |                     |         |            |                     |         |
| 50107                                 | Temperature transducers                                                                                                            | Y       |            |                     |         |            |                     |         |
| 503. Humidity                         |                                                                                                                                    |         |            |                     |         |            |                     |         |
| 50302                                 | Relative humidity hygrometers;polymer thinfilm, hair, etc.                                                                         | Y       |            |                     |         |            |                     |         |
| 50304                                 | Temperature humidity recorders;Hygrothermograph, etc.                                                                              | Y       |            |                     |         |            |                     |         |
| 50305                                 | Transducers; dew-point/relative humidity                                                                                           | Y       |            |                     |         |            |                     |         |
| 50306                                 | Humidity generators;two-pressure, two-temperature, flow mixing humidity generator, constant temperature and humidity chamber, etc. | Y       |            |                     |         |            |                     |         |
| 504. Moisture                         |                                                                                                                                    |         |            |                     |         |            |                     |         |
| 50401                                 | Cereal moisture meters                                                                                                             | Y       |            |                     |         |            |                     |         |
| 701. Photometry                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
| 70101                                 | Illuminance meters                                                                                                                 | N       |            |                     |         |            |                     |         |
| 70103                                 | Total luminous flux meters                                                                                                         | Y       |            |                     |         |            |                     |         |
| 70104                                 | Luminous intensity meters                                                                                                          | Y       |            |                     |         |            |                     |         |
| 702. Properties of detector & sources |                                                                                                                                    |         |            |                     |         |            |                     |         |
| 70204                                 | Colorimeters; source color                                                                                                         | Y       |            |                     |         |            |                     |         |
| 70221                                 | Total spectral radiant flux meters                                                                                                 | Y       |            |                     |         |            |                     |         |
| 703. Properties of materials          |                                                                                                                                    |         |            |                     |         |            |                     |         |
| 70301                                 | Colorimeters; material color                                                                                                       | Y       |            |                     |         |            |                     |         |
| 70306                                 | Gloss meters                                                                                                                       | Y       |            |                     |         |            |                     |         |
| 70308                                 | Haze meters                                                                                                                        | Y       |            |                     |         |            |                     |         |
| 70325                                 | Spectrophotometers including FT-IR spectrophotometers                                                                              | Y       |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
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|                                       |                                                                                                                                    |         |            |                     |         |            |                     |         |
|                                       |                                                                                                                                    | </      |            |                     |         |            |                     |         |

Note

1. This laboratory provides calibration services in permanent standard laboratory and at on-site.
2. Laboratory conducts on-site calibration should meet requirements of KOLAS-SR-007.
3. On-site calibration is allowed to items with marking 'Y', not allowed to items with marking 'N'.
4. Measurement uncertainty normally is quoted as an expanded uncertainty at a coverage probability of 95 %, which usually requires the use of a coverage factor of  $k=2$ . It expresses the lowest uncertainty of measurement that can be provided by accredited calibration laboratories in normal conditions.
5. Due to the calibration environment such as reference standards or customers' facilities, it is note that uncertainty of measurement on a calibration certificate may be expressed larger than measurement uncertainty on scope of accreditation in general.

## 102. Linear dimension

| Measured Quantity<br>Instrument or Gauge          | Field<br>Code | Range                                      | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                       | Standard/Method of<br>Measurement etc.                     |
|---------------------------------------------------|---------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Gauge block comparators                           | 10204         | (0 ~ 500) mm                               | 0.04 $\mu\text{m}$                                                                                       | Gauge blocks<br>/CP801-10204-1                             |
| Dial/cylinder gauge testers                       | 10206         | (0 ~ 100) mm                               | $\sqrt{0.24^2 + (3 \times 10^{-3} \times l)^2}$ $\mu\text{m}$<br>(l unit : mm)                           | Gauge blocks<br>/CP801-10206-1                             |
| Extensometers, linear<br>displacement transducers | 10210         | (0 ~ 5 000) mm                             | $\sqrt{0.13^2 + (0.7 \times 10^{-3} \times l)^2}$ $\mu\text{m}$<br>(l unit : mm)                         | Laser interferometers<br>/CP801-10210-1                    |
| Gap gauges                                        | 10213         | (5 ~ 300) mm<br><br>(300 ~ 1 000) mm       | 1.6 $\mu\text{m}$<br><br>$\sqrt{2.4^2 + (3.3 \times 10^{-3} \times l)^2}$ $\mu\text{m}$<br>(l unit : mm) | Contact coordinate<br>measuring machines<br>/CP801-10213-1 |
| Height gauges/measuring<br>machines               | 10216         | (0 ~ 1 000) mm                             | $\sqrt{1.6^2 + (2.6 \times 10^{-3} \times l)^2}$ $\mu\text{m}$<br>(l unit : mm)                          | Gauge blocks<br>/CP801-10216-1                             |
| Linear scales                                     | 10219         | (0 ~ 2 000) mm                             | $\sqrt{0.2^2 + (1.5 \times 10^{-3} \times l)^2}$ $\mu\text{m}$<br>(l unit : mm)                          | Laser interferometers<br>/CP801-10219-1                    |
| Standard measuring machines                       | 10220         | (0 ~ 600) mm                               | $\sqrt{70^2 + 0.74^2 \times l^2}$ nm<br>(l unit : mm)                                                    | Laser interferometers<br>/CP801-10220-1                    |
| Laser scan micrometers                            | 10225         | ( $\varnothing 0 \sim \varnothing 15$ ) mm | 1.0 $\mu\text{m}$                                                                                        | Pin gauges<br>/CP801-10225-1                               |
| Torque arms                                       | 10237         | (0 ~ 2 000) mm                             | 10 $\mu\text{m}$                                                                                         | Contact coordinate<br>measuring machines<br>/CP801-10237-1 |

## 103. Angle

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|----------------|--------------------------------------------------------------------|----------------------------------------|
| Clinometers<br>Angle                     | 10306         | $\pm 90^\circ$ | 0.010°                                                             | Rotary tables<br>/CP801-10306-1        |
| Angular displacement<br>transducers      | 10322         | (0 ~ 360)°     | 0.010°                                                             | Rotary tables<br>/CP801-10322-1        |

## 104. Form

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)              | Standard/Method of<br>Measurement etc.       |
|------------------------------------------|---------------|--------------|---------------------------------------------------------------------------------|----------------------------------------------|
| Form testers                             | 10401         |              |                                                                                 |                                              |
| Vertical accuracy                        |               | (0 ~ 200) mm | $\sqrt{0.3^2 + (2.0 \times 10^{-3} \times l)^2}$ $\mu\text{m}$<br>(l unit : mm) | Gauge blocks<br>/CP801-10401-1               |
| Horizontal accuracy                      |               | (0 ~ 50) mm  | 1.2 $\mu\text{m}$                                                               | Form standard<br>specimens<br>/CP801-10401-1 |
| Angle                                    |               | 0° ~ 180°    | 4"                                                                              |                                              |
| Radius                                   |               | (0 ~ 7.5) mm | 1.5 $\mu\text{m}$                                                               |                                              |



## 104. Form

| Measured Quantity<br>Instrument or Gauge        | Field<br>Code | Range                                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)    | Standard/Method of<br>Measurement etc.            |
|-------------------------------------------------|---------------|---------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------|
| Precision surface plates                        | 10407         | (0 ~ 3) m <sup>2</sup><br>(3 ~ 18) m <sup>2</sup> | 1.2 μm<br>1.5 μm                                                      | Electrical levels<br>/CP801-10407-1               |
| Roundness measurement<br>instruments            | 10409         | 360°                                              | 18 nm                                                                 | Roundness standard<br>specimens<br>/CP801-10409-1 |
| Rotation accuracy of<br>circumference direction |               | 360°                                              | 65 nm                                                                 | Optical flats<br>/CP801-10409-1                   |
| Rotation accuracy of shaft<br>direction         |               | (0 ~ 1 000) μm                                    | $\sqrt{0.13^2 + (1.3 \times 10^{-3} \times l)^2}$ μm<br>(l unit : mm) | Gauge blocks<br>/CP801-10409-1                    |
| Accuracy of detector                            |               |                                                   |                                                                       |                                                   |

## 105. Complex geometry

| Measured Quantity<br>Instrument or Gauge     | Field<br>Code | Range                           | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)   | Standard/Method of<br>Measurement etc.            |
|----------------------------------------------|---------------|---------------------------------|----------------------------------------------------------------------|---------------------------------------------------|
| Contact coordinate measuring<br>machines     | 10503         | (0 ~ 1 500) mm                  | $\sqrt{0.9^2 + (5.4 \times 10^{-3} \times l)^2}$ μm<br>(l unit : mm) | Step gauges<br>/CP801-10503-1                     |
| Non-contact coordinate<br>measuring machines | 10504         | (0 ~ 1 000) mm                  | $\sqrt{0.6^2 + (5.0 \times 10^{-3} \times l)^2}$ μm<br>(l unit : mm) | Laser interferometers<br>/CP801-10504-1           |
| Length                                       |               | 0° ~ 360°                       | 4"                                                                   |                                                   |
| Angle                                        |               |                                 |                                                                      |                                                   |
| Measuring microscopes,<br>profile projectors | 10511         | (0 ~ 500) mm                    | $\sqrt{0.6^2 + (1.6 \times 10^{-3} \times l)^2}$ μm<br>(l unit : mm) | Standard scale<br>/CP801-10511-1                  |
| Length                                       |               | 0° ~ 360°                       | 4"                                                                   | Angle gauge blocks<br>/CP801-10511-1              |
| Angle                                        |               | (10 ~ 100) X<br>(100 ~ 1 000) X | $3.2 \times 10^{-2}$<br>$1.7 \times 10^{-2}$                         | Standard scale<br>/CP801-10511-1                  |
| Scale                                        |               |                                 |                                                                      |                                                   |
| Stylus type roughness testers                | 10517         | (0 ~ 2) μm<br>(2 ~ 10) μm       | 0.008 μm<br>0.044 μm                                                 | Roughness standard<br>specimens<br>/CP801-10517-1 |
| Arithmetic mean(Ra)                          |               | (0 ~ 10) μm                     | 0.16 μm                                                              |                                                   |
| Max. height(Rz)                              |               | (0 ~ 10) μm                     | 0.021 μm                                                             |                                                   |
| Depth(H)                                     |               |                                 |                                                                      |                                                   |
| SEM/TEM/SPM/AFM<br>microscopes               | 10531         | 1 000 X ~ 500 000 X             | $2.4 \times 10^{-2}$                                                 | MRS<br>/CP801-10531-1                             |

## 106. Various dimensional

| Measured Quantity<br>Instrument or Gauge              | Field<br>Code | Range                            | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                             | Standard/Method of<br>Measurement etc. |
|-------------------------------------------------------|---------------|----------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Inside/outside/gear tooth<br>calipers, caliper gauges | 10601         | (0 ~ 600) mm                     | $\sqrt{9^2 + (2 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)                              | Caliper testers<br>/CP801-10601-1      |
| Cylinder/bore gauges                                  | 10603         | (0 ~ 1 000) mm                   | 0.6 $\mu\text{m}$                                                                                              | Dial gauge testers<br>/CP801-10603-1   |
| Depth gauges, depth<br>micrometers                    | 10604         | (0 ~ 500) mm                     | $\sqrt{9^2 + (2 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)                              | Gauge blocks<br>/CP801-10604-1         |
| Dial/digital gauges                                   | 10605         | (0 ~ 100) mm                     | 0.3 $\mu\text{m}$                                                                                              | Gauge blocks<br>/CP801-10605-1         |
| Micro indicators,<br>test indicators                  | 10609         | (0 ~ 5) mm                       | 0.6 $\mu\text{m}$                                                                                              | Dial gauge testers<br>/CP801-10609-1   |
| Micrometer heads                                      | 10610         | (0 ~ 100) mm                     | $\sqrt{0.7^2 + (1.8 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)                          | Gauge blocks<br>/CP801-10610-1         |
| Inside micrometers<br><br>Caliper type                | 10612         | (4 ~ 300) mm                     | $\sqrt{1^2 + (2 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm)                              | Gauge blocks<br>/CP801-10612-1         |
| Outside micrometers<br><br>Outside micrometers        | 10613         | (0 ~ 25) mm<br><br>(25 ~ 500) mm | 0.2 $\mu\text{m}$<br><br>$\sqrt{0.9^2 + (3.1 \times 10^{-3} \times l)^2} \mu\text{m}$<br>( <i>l</i> unit : mm) | Gauge blocks<br>/CP801-10613-1         |

## 201. Mass

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                                                                                                                                                                                                                                                                        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                            | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Auto-hopper scale balances               | 20102         | (0 ~ 200) kg                                                                                                                                                                                                                                                                                                                                                                                                                                 | 48 g                                                                                                                                                                                                                                                          | Weight<br>/CP801-20102-1               |
| Auto-packer scale balances               | 20103         | (0 ~ 10) kg<br>(10 ~ 40) kg                                                                                                                                                                                                                                                                                                                                                                                                                  | 1.0 g<br>10 g                                                                                                                                                                                                                                                 | Weight<br>/CP801-20103-1               |
| Electric balances                        | 20109         | (0 ~ 2) mg<br>(2 ~ 5) mg<br>(5 ~ 10) mg<br>(10 ~ 20) mg<br>(20 ~ 50) mg<br>(50 ~ 100) mg<br>(100 ~ 200) mg<br>(200 ~ 500) mg<br>500 mg ~ 1 g<br>(1 ~ 2) g<br>(2 ~ 5) g<br>(5 ~ 10) g<br>(10 ~ 20) g<br>(20 ~ 50) g<br>(50 ~ 100) g<br>(100 ~ 200) g<br>(200 ~ 500) g<br>500 g ~ 1 kg<br>(1 ~ 2) kg<br>(2 ~ 5) kg<br>(5 ~ 10) kg<br>(10 ~ 20) kg<br>(20 ~ 30) kg<br>(30 ~ 100) kg<br>(100 ~ 300) kg<br>(300 ~ 1 000) kg<br>(1 000 ~ 2 000) kg | 1.2 µg<br>1.2 µg<br>1.2 µg<br>1.2 µg<br>1.5 µg<br>1.9 µg<br>2.4 µg<br>3.0 µg<br>3.9 µg<br>4.7 µg<br>6.2 µg<br>8 µg<br>10 µg<br>13 µg<br>20 µg<br>50 µg<br>0.10 mg<br>0.20 mg<br>0.5 mg<br>2 mg<br>3 mg<br>5 mg<br>20 mg<br>0.3 g<br>0.7 g<br>0.1 kg<br>0.2 kg | Weight<br>/CP801-20109-1               |
| Platform scale balances                  | 20112         | (0 ~ 10) kg<br>(10 ~ 50) kg<br>(50 ~ 200) kg                                                                                                                                                                                                                                                                                                                                                                                                 | 2.8 mg<br>10 g<br>0.1 kg                                                                                                                                                                                                                                      | Weight<br>/CP801-20112-1               |
| Spring scale balances                    | 20113         | (0 ~ 1) kg<br>(1 ~ 10) kg<br>(10 ~ 50) kg                                                                                                                                                                                                                                                                                                                                                                                                    | 1.0 g<br>9.0 g<br>0.1 kg                                                                                                                                                                                                                                      | Weight<br>/CP801-20113-1               |

## 201. Mass

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|--------------|--------------------------------------------------------------------|----------------------------------------|
| Weights                                  | 20116         | 1 mg ~ 20 kg | (F1 class)                                                         | Weight<br>/CP801-20116-1               |
|                                          |               | 1 mg         | 6.0 $\mu$ g                                                        |                                        |
|                                          |               | 2 mg         | 6.0 $\mu$ g                                                        |                                        |
|                                          |               | 5 mg         | 6.0 $\mu$ g                                                        |                                        |
|                                          |               | 10 mg        | 8.0 $\mu$ g                                                        |                                        |
|                                          |               | 20 mg        | 9.0 $\mu$ g                                                        |                                        |
|                                          |               | 50 mg        | 12 $\mu$ g                                                         |                                        |
|                                          |               | 100 mg       | 15 $\mu$ g                                                         |                                        |
|                                          |               | 200 mg       | 18 $\mu$ g                                                         |                                        |
|                                          |               | 500 mg       | 24 $\mu$ g                                                         |                                        |
|                                          |               | 1 g          | 30 $\mu$ g                                                         |                                        |
|                                          |               | 2 g          | 40 $\mu$ g                                                         |                                        |
|                                          |               | 5 g          | 50 $\mu$ g                                                         |                                        |
|                                          |               | 10 g         | 60 $\mu$ g                                                         |                                        |
|                                          |               | 20 g         | 80 $\mu$ g                                                         |                                        |
|                                          |               | 50 g         | 90 $\mu$ g                                                         |                                        |
|                                          |               | 100 g        | 0.15 mg                                                            |                                        |
|                                          |               | 200 g        | 0.30 mg                                                            |                                        |
|                                          |               | 500 g        | 0.75 mg                                                            |                                        |
|                                          |               | 1 kg         | 1.5 mg                                                             |                                        |
|                                          |               | 2 kg         | 3.0 mg                                                             |                                        |
|                                          |               | 5 kg         | 7.5 mg                                                             |                                        |
|                                          |               | 10 kg        | 15 mg                                                              |                                        |
|                                          |               | 20 kg        | 30 mg                                                              |                                        |

## 202. Force

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.                    |
|------------------------------------------|---------------|----------------|--------------------------------------------------------------------|-----------------------------------------------------------|
| Tension/compression testing<br>machines  | 20203         |                |                                                                    | Force measuring<br>devices(Electronics)<br>/CP801-20203-1 |
| (Tension/compression)                    |               | (0.1 ~ 200) N  | $2.8 \times 10^{-4}$                                               |                                                           |
| (Tension/compression)                    |               | (200 ~ 500) N  | $7.8 \times 10^{-4}$                                               |                                                           |
| (Tension/compression)                    |               | 500 N ~ 1 kN   | $8.5 \times 10^{-4}$                                               |                                                           |
| (Tension/compression)                    |               | (1 ~ 2) kN     | $8.5 \times 10^{-4}$                                               |                                                           |
| (Tension/compression)                    |               | (2 ~ 5) kN     | $7.1 \times 10^{-4}$                                               |                                                           |
| (Tension/compression)                    |               | (5 ~ 10) kN    | $8.5 \times 10^{-4}$                                               |                                                           |
| (Tension/compression)                    |               | (10 ~ 20) kN   | $8.8 \times 10^{-4}$                                               |                                                           |
| (Tension/compression)                    |               | (20 ~ 50) kN   | $9.2 \times 10^{-4}$                                               |                                                           |
| (Tension/compression)                    |               | (50 ~ 100) kN  | $6.6 \times 10^{-4}$                                               |                                                           |
| (Tension/compression)                    |               | (100 ~ 200) kN | $9.3 \times 10^{-4}$                                               |                                                           |
| (Tension/compression)                    |               | (200 ~ 500) kN | $1.2 \times 10^{-3}$                                               |                                                           |
| (Tension/compression)                    |               | 500 kN ~ 1 MN  | $1.5 \times 10^{-3}$                                               |                                                           |
| (Compression)                            |               | (1 ~ 3) MN     | $1.6 \times 10^{-3}$                                               |                                                           |
| (Compression)                            |               | (3 ~ 10) MN    | $2.0 \times 10^{-3}$                                               |                                                           |
| Push-pull gauges                         | 20204         | (2 ~ 30) N     | $5.9 \times 10^{-4}$                                               | Weight                                                    |
|                                          |               | (30 ~ 1 000) N | $5.8 \times 10^{-4}$                                               | /CP801-20204-1                                            |

## 203. Torque

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.        |
|------------------------------------------|---------------|-------------------|--------------------------------------------------------------------|-----------------------------------------------|
| Torque wrenches/drivers                  | 20303         | (0.3 ~ 0.6) N·m   | $1.1 \times 10^{-2}$                                               | Torque measuring<br>devices<br>/CP801-20303-1 |
|                                          |               | (0.6 ~ 1.8) N·m   | $1.2 \times 10^{-2}$                                               |                                               |
|                                          |               | (1.8 ~ 4.5) N·m   | $1.1 \times 10^{-2}$                                               |                                               |
|                                          |               | (4.5 ~ 6) N·m     | $6.5 \times 10^{-3}$                                               |                                               |
|                                          |               | (6 ~ 20) N·m      | $1.1 \times 10^{-2}$                                               |                                               |
|                                          |               | (20 ~ 50) N·m     | $8.1 \times 10^{-3}$                                               |                                               |
|                                          |               | (50 ~ 100) N·m    | $5.1 \times 10^{-3}$                                               |                                               |
|                                          |               | (100 ~ 200) N·m   | $3.5 \times 10^{-3}$                                               |                                               |
|                                          |               | (200 ~ 360) N·m   | $4.6 \times 10^{-3}$                                               |                                               |
|                                          |               | (360 ~ 1 000) N·m | $9.9 \times 10^{-3}$                                               |                                               |

## 204. Pressure

| Measured Quantity<br>Instrument or Gauge                            | Field<br>Code | Range                | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|---------------------------------------------------------------------|---------------|----------------------|--------------------------------------------------------------------|----------------------------------------|
| Altimeters                                                          | 20401         | (0 ~ 32) km          | 16 m                                                               | RPM4                                   |
|                                                                     |               | (32 ~ 55) km         | $2.2 \times 10^{-3}$                                               | /CP801-20401-1                         |
| Absolute pressure gauges<br>Pneumatic                               | 20406         | (4 ~ 7 000) kPa abs. | $7.5 \times 10^{-5}$                                               | Laon LPB-G<br>/CP801-20406-1           |
| Compound pressure gauges                                            | 20408         | (-95 ~ 7 000) kPa    | $7.5 \times 10^{-5}$                                               | Laon LPB-G<br>/CP801-20408-1           |
| Differential pressure gauges<br>Pneumatic                           | 20409         | (0 ~ 2) kPa          | $2.0 \times 10^{-3}$                                               | PPC3, ADT761<br>/CP801-20409-1         |
|                                                                     |               | (2 ~ 250) kPa        | $8.0 \times 10^{-4}$                                               |                                        |
| Gauge pressure gauges                                               | 20411         | (0 ~ 100) MPa        | $7.9 \times 10^{-5}$                                               | Laon LPB-H<br>/CP801-20411-1           |
| Pressure transducers<br>/ transmitters<br><br>Absolute<br><br>Gauge | 20412         | (4 ~ 7 000) kPa abs. | $7.5 \times 10^{-5}$                                               | Laon LPB-G<br>/CP801-20412-1           |
|                                                                     |               | (0 ~ 100) MPa        | $7.9 \times 10^{-5}$                                               | Laon LPB-H<br>/CP801-20412-2           |
| Dial type vacuum gauges                                             | 20413         | (-95 ~ 0) kPa        | $1.4 \times 10^{-3}$                                               | Laon LPB-G<br>/CP801-20413-1           |

## 205. Vacuum

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                   | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|-------------------------|--------------------------------------------------------------------|----------------------------------------|
| Capacitance diaphragm<br>gauges          | 20501         | (0.9 ~ 133) Pa abs.     | 0.04 Pa                                                            | INFICON CDGsci<br>/CP801-20501-1       |
|                                          |               | (0.133 ~ 1.33) kPa abs. | 0.9 Pa                                                             |                                        |
|                                          |               | (1.33 ~ 10) kPa abs.    | 11 Pa                                                              |                                        |

## 205. Vacuum

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.      |
|------------------------------------------|---------------|------------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------|
| Spinning rotor gauges                    | 20502         | 0.4 mPa abs. ~ 0.01 Pa abs.                                            | 0.012 mPa                                                          | Reference Vacuum<br>Gauge<br>/CP801-20502-1 |
| Ionization gauges                        | 20503         | 0.1 mPa abs. ~ 0.006 Pa abs.                                           | 3.7 $\mu$ Pa                                                       | Reference Vacuum<br>Gauge<br>/CP801-20503-1 |
| Thermal conductivity gauges              | 20504         | (0.9 ~ 133) Pa abs.<br>(0.133 ~ 1.33) kPa abs.<br>(1.33 ~ 10) kPa abs. | 0.04 Pa<br>0.9 Pa<br>0.18 kPa                                      | INFICON CDGsci<br>/CP801-20504-1            |

## 206. Volume

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                                                                                                                                        | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                                                                                                      | Standard/Method of<br>Measurement etc.                      |
|------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Volumetric glasswares                    | 20601         | (0 ~ 0.5) mL<br>(0.5 ~ 1) mL<br>(1 ~ 2) mL<br>(2 ~ 5) mL<br>(5 ~ 10) mL<br>(10 ~ 25) mL<br>(25 ~ 50) mL<br>(50 ~ 100) mL<br>(100 ~ 250) mL<br>(250 ~ 500) mL<br>(500 ~ 1 000) mL<br>(1 000 ~ 2 000) mL                                                                                                       | 0.73 $\mu$ L<br>1.4 $\mu$ L<br>1.9 $\mu$ L<br>2.5 $\mu$ L<br>3.1 $\mu$ L<br>3.8 $\mu$ L<br>4.9 $\mu$ L<br>9.9 $\mu$ L<br>47 $\mu$ L<br>72 $\mu$ L<br>0.13 mL<br>0.18 mL                                                                                                 | Balance<br>/CP801-20601-1                                   |
| Pycnometers                              | 20602         | (0 ~ 50) mL<br>(50 ~ 100) mL<br>(100 ~ 500) mL                                                                                                                                                                                                                                                               | 1.9 $\mu$ L<br>3.8 $\mu$ L<br>28 $\mu$ L                                                                                                                                                                                                                                | Balance<br>/CP801-20602-1                                   |
| Standard volume vessels                  | 20604         | (0 ~ 500) mL<br><br>(10 ~ 10 000) L                                                                                                                                                                                                                                                                          | $4.8 \times 10^{-5}$<br><br>0.18 %                                                                                                                                                                                                                                      | Balance<br>/CP801-20604-1<br>Master meter<br>/CP801-20604-3 |
| Piston type volume meters                | 20606         | (0 ~ 1) $\mu$ L<br>(1 ~ 2) $\mu$ L<br>(2 ~ 5) $\mu$ L<br>(5 ~ 10) $\mu$ L<br>(10 ~ 20) $\mu$ L<br>(20 ~ 50) $\mu$ L<br>(50 ~ 100) $\mu$ L<br>(100 ~ 200) $\mu$ L<br>(200 ~ 500) $\mu$ L<br>(500 ~ 1 000) $\mu$ L<br>(1 ~ 2) mL<br>(2 ~ 5) mL<br>(5 ~ 10) mL<br>(10 ~ 25) mL<br>(25 ~ 50) mL<br>(50 ~ 100) mL | 0.006 0 $\mu$ L<br>0.006 1 $\mu$ L<br>0.007 1 $\mu$ L<br>0.008 5 $\mu$ L<br>0.009 9 $\mu$ L<br>0.040 $\mu$ L<br>0.073 $\mu$ L<br>0.097 $\mu$ L<br>0.21 $\mu$ L<br>0.39 $\mu$ L<br>0.78 $\mu$ L<br>1.8 $\mu$ L<br>3.4 $\mu$ L<br>4.8 $\mu$ L<br>19 $\mu$ L<br>71 $\mu$ L | Balance<br>/CP801-20606-1                                   |

## 207. Density

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.  |
|------------------------------------------|---------------|-----------------------------------|--------------------------------------------------------------------|-----------------------------------------|
| Salinity meters                          | 20704         | (0.5 ~ 25) %                      | 0.012 %                                                            | NaCl<br>/CP801-20704-1                  |
| Sucrose meters                           | 20705         | (0 ~ 60) %<br>(60.000 ~ 82.319) % | 0.027 %<br>0.031 %                                                 | Sucrose<br>/CP801-20705-1               |
| Chloride meters                          | 20707         | (0 ~ 1.5) %                       | 0.000 8 %                                                          | Cl <sup>-</sup> sol'n<br>/CP801-20707-1 |

## 209. Fluid flow

| Measured Quantity<br>Instrument or Gauge    | Field<br>Code | Range                       | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|---------------------------------------------|---------------|-----------------------------|--------------------------------------------------------------------|----------------------------------------|
| Liquid flowmeters;<br>differential pressure | 20909         | (10 ~ 80) m <sup>3</sup> /h | 0.14 %                                                             | Electric balances<br>/CP801-20909-2    |
| Liquid flowmeters;<br>electromagnetic       | 20910         | (10 ~ 80) m <sup>3</sup> /h | 0.14 %                                                             | Electric balances<br>/CP801-20910-2    |
| Liquid flowmeters; Coriolis,<br>etc.        | 20912         | (10 ~ 80) m <sup>3</sup> /h | 0.14 %                                                             | Electric balances<br>/CP801-20912-2    |
| Liquid flowmeters; positive<br>displacement | 20915         | (10 ~ 80) m <sup>3</sup> /h | 0.14 %                                                             | Electric balances<br>/CP801-20915-2    |
| Liquid flowmeters; turbine                  | 20917         | (10 ~ 80) m <sup>3</sup> /h | 0.14 %                                                             | Electric balances<br>/CP801-20917-2    |
| Liquid flowmeters; ultrasonic               | 20919         | (10 ~ 80) m <sup>3</sup> /h | 0.14 %                                                             | Electric balances<br>/CP801-20919-2    |
| Liquid flowmeters; variable<br>area         | 20921         | (10 ~ 80) m <sup>3</sup> /h | 0.14 %                                                             | Electric balances<br>/CP801-20921-2    |
| Liquid flowmeters; vortex                   | 20923         | (10 ~ 80) m <sup>3</sup> /h | 0.14 %                                                             | Electric balances<br>/CP801-20923-2    |

## 210. Hardness

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                                         | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                            | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Brinell hardness testers                 | 21001         | (75 ~ 250) HBW 10/500<br>(95 ~ 250) HBW 10/3 000<br>(250 ~ 450) HBW 10/3 000<br>(450 ~ 653) HBW 10/3 000                                                                                                      | 3.0 HBW 10/500<br>2.5 HBW 10/3 000<br>4.4 HBW 10/3 000<br>6.9 HBW 10/3 000                                                                    | CRM<br>/CP801-21001-1                  |
| Rockwell hardness testers                | 21002         | (20 ~ 95) HRA<br>(10 ~ 100) HRBW<br>(10 ~ 70) HRC<br>(60 ~ 120) HRMW<br>(100 ~ 130) HRRW<br>(65 ~ 94) HR15N<br>(35 ~ 86) HR30N<br>(15 ~ 77) HR45N<br>(67 ~ 93) HR15TW<br>(29 ~ 82) HR30TW<br>(10 ~ 72) HR45TW | 0.37 HRA<br>0.63 HRBW<br>0.33 HRC<br>1.4 HRMW<br>1.3 HRRW<br>0.63 HR15N<br>0.63 HR30N<br>0.63 HR45N<br>1.1 HR15TW<br>1.1 HR30TW<br>1.1 HR45TW | CRM<br>/CP801-21002-1                  |

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                                                                                                                                                                                                                   | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                                                                                                  | Standard/Method of<br>Measurement etc.            |
|------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Shore hardness testers                   | 21003         | (30 ~ 100) HS                                                                                                                                                                                                                                                                                           | 1.0 HS                                                                                                                                                                              | CRM<br>/CP801-21003-1                             |
| Vickers hardness testers                 | 21004         | (50 ~ 300) HV 0.2<br>(300 ~ 600) HV 0.2<br>(600 ~ 850) HV 0.2<br>(50 ~ 300) HV 0.3<br>(300 ~ 600) HV 0.3<br>(600 ~ 850) HV 0.5<br>(50 ~ 300) HV 0.5<br>(300 ~ 600) HV 0.5<br>(600 ~ 850) HV 1.0<br>(50 ~ 300) HV 10<br>(300 ~ 600) HV 10<br>(600 ~ 850) HV 10<br>(300 ~ 600) HV 20<br>(600 ~ 850) HV 30 | 5.1 HV 0.2<br>13 HV 0.2<br>20 HV 0.2<br>4.7 HV 0.3<br>12 HV 0.3<br>20 HV 0.5<br>6.0 HV 0.5<br>12 HV 0.5<br>20 HV 1.0<br>2.2 HV 10<br>7.7 HV 10<br>12 HV 10<br>5.9 HV 20<br>11 HV 20 | CRM<br>/CP801-21004-1                             |
| Durometer hardness testers               | 21005         | (0 ~ 100) HDA<br>(0 ~ 100) HDD                                                                                                                                                                                                                                                                          | 0.5 HDA<br>0.5 HDD                                                                                                                                                                  | Durometer calibration<br>device<br>/CP801-21005-1 |
| Leeb hardness testers                    | 21006         | (400 ~ 1 000) HLD<br>(350 ~ 750) HLG                                                                                                                                                                                                                                                                    | 5.2 HLD<br>5.4 HLG                                                                                                                                                                  | CRM<br>/CP801-21006-1<br>CRM<br>/CP801-21006-2    |

## 401. DC volatage &amp; current

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                                                | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------|
| DC ammeters<br>DC Current                | 40101         | $\pm(2 \sim 20)$ mA<br>$\pm(20 \text{ mA} \sim 2 \text{ A})$                                         | 2.0 $\mu$ A<br>0.7 mA                                              | Calibrator<br>/CP801-40101-1           |
| DC voltmeters<br>DC Voltmeter            | 40112         | $\pm(190 \text{ mV} \sim 1 \text{ V})$<br>$\pm(1 \sim 10) \text{ V}$<br>$\pm(10 \sim 190) \text{ V}$ | 20 $\mu$ V<br>0.2 mV<br>10 mV                                      | Calibrator<br>/CP801-40112-1           |

## 404. Other DC &amp; LF Measurements

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                                | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|----------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------|
| Volt/Current recorders<br>DC Voltage     | 40424         | $\pm(190 \text{ mV} \sim 1 \text{ V})$<br>$\pm(1 \sim 10) \text{ V}$ | 20 $\mu$ V<br>0.2 mV                                               | Calibrator<br>/CP801-40424-1           |



## 501. Contact Thermometry

| Measured Quantity<br>Instrument or Gauge                                                                          | Field<br>Code | Range              | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.       |
|-------------------------------------------------------------------------------------------------------------------|---------------|--------------------|--------------------------------------------------------------------|----------------------------------------------|
| Temperature generators;<br>ovens, furnaces, isothermal<br>liquid baths, ice-point baths,<br>dry-block calibrators | 50101         |                    |                                                                    |                                              |
| Temperature Chambers                                                                                              |               | (-180 ~ 250) °C    | 0.5 °C                                                             | IPRT, TC-T<br>/CP801-50101-1                 |
|                                                                                                                   |               | (250 ~ 650) °C     | 1.0 °C                                                             | TC-K<br>/CP801-50101-1                       |
| Incubators                                                                                                        |               | (-10 ~ 60) °C      | 0.5 °C                                                             | IPRT, TC-T<br>/CP801-50101-2                 |
| Freezers                                                                                                          |               | (-195 ~ 0) °C      | 0.5 °C                                                             | IPRT, TC-T<br>/CP801-50101-3                 |
| Autoclaves                                                                                                        |               | (50 ~ 140) °C      | 0.5 °C                                                             | IPRT, TC-T<br>/CP801-50101-4                 |
| PCT                                                                                                               |               | (50 ~ 140) °C      | 0.5 °C                                                             | IPRT, TC-T<br>/CP801-50101-5                 |
| Liquid Baths                                                                                                      |               | (-196 ~ -80) °C    | 0.1 °C                                                             | SPRT, TC-T, TC-K<br>/CP801-50101-6           |
|                                                                                                                   |               | (-80 ~ 550) °C     | 0.02 °C                                                            | SPRT, TC-T, TC-K<br>/CP801-50101-6           |
| Furnaces                                                                                                          |               | (50 ~ 600) °C      | 0.2 °C                                                             | SPRT, TC-T, TC-K<br>/CP801-50101-7           |
|                                                                                                                   |               | (600 ~ 1 100) °C   | 1.3 °C                                                             | TC-S<br>/CP801-50101-7                       |
|                                                                                                                   |               | (1 100 ~ 1 500) °C | 2.7 °C                                                             | TC-S<br>/CP801-50101-7                       |
| Dry-block calibrators                                                                                             |               | (-90 ~ 660) °C     | 0.016 °C                                                           | SPRT, TC-S                                   |
|                                                                                                                   |               | (660 ~ 1 100) °C   | 1.2 °C                                                             | /CP801-50101-9                               |
| Temperature indicators/<br>recorders/controllers<br>(with sensor)                                                 | 50102         |                    |                                                                    |                                              |
| Thermoelectric recorders /<br>indicators / controllers                                                            |               | (-90 ~ 250) °C     | 0.03 °C                                                            | SPRT, TC-S<br>/CP801-50102-1                 |
|                                                                                                                   |               | (250 ~ 660) °C     | 0.13 °C                                                            |                                              |
|                                                                                                                   |               | (660 ~ 1 100) °C   | 1.4 °C                                                             |                                              |
|                                                                                                                   |               | (1 100 ~ 1 500) °C | 2.4 °C                                                             |                                              |
| Resistance type recorders /<br>indicators / controllers                                                           |               | (-90 ~ 250) °C     | 0.03 °C                                                            | SPRT<br>/CP801-50102-2                       |
|                                                                                                                   |               | (250 ~ 660) °C     | 0.13 °C                                                            |                                              |
| Electric temperature<br>calibrators                                                                               |               | (-90 ~ 660) °C     | 0.005 °C                                                           | CALIBRATOR,<br>Thermometer<br>/CP801-50102-9 |
|                                                                                                                   |               | (660 ~ 1 500) °C   | 0.19 °C                                                            |                                              |
| (without sensor)                                                                                                  |               |                    |                                                                    |                                              |
| Thermoelectric recorders /<br>indicators / controllers                                                            |               | (-90 ~ 1 500) °C   | 0.29 °C                                                            | CALIBRATOR<br>/CP801-50102-10                |
| Resistance type recorders /<br>indicators / controllers                                                           |               | (-90 ~ 660) °C     | 0.015 °C                                                           | CALIBRATOR<br>/CP801-50102-13                |

## 501. Contact Thermometry

| Measured Quantity<br>Instrument or Gauge                                     | Field<br>Code | Range                                                    | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.              |
|------------------------------------------------------------------------------|---------------|----------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------|
| Resistance thermometers;<br>SPRT, TPRT, thermistors, etc.                    | 50104         |                                                          |                                                                    |                                                     |
| Industrial resistance<br>thermometers                                        |               | (-90 ~ 250) °C<br>(250 ~ 660) °C                         | 0.03 °C<br>0.13 °C                                                 | SPRT<br>/CP801-50104-1                              |
| Thermistors                                                                  |               | (-80 ~ 200) °C                                           | 0.04 °C                                                            | SPRT<br>/CP801-50104-2                              |
| Thermal expansion<br>thermometers; bimetal, gas<br>or liquid type            | 50105         |                                                          |                                                                    |                                                     |
| Bimetal thermometers                                                         |               | (-50 ~ 500) °C                                           | 0.2 °C                                                             | SPRT<br>/CP801-50105-1                              |
| Thermal expansion<br>thermometer                                             |               | (-50 ~ 500) °C                                           | 0.2 °C                                                             | SPRT<br>/CP801-50105-2                              |
| Thermocouples; noble metal,<br>base metal, pure metal,<br>special type, etc. | 50106         |                                                          |                                                                    |                                                     |
| Base-metal Thermocouple<br>thermometers                                      |               | (-90 ~ 660) °C<br>(660 ~ 1 100) °C                       | 0.2 °C<br>1.5 °C                                                   | SPRT, TC-S<br>/CP801-50106-2                        |
| Temperature transducers                                                      | 50107         |                                                          |                                                                    |                                                     |
| Temperature transducers<br>(with sensor)                                     |               | (-90 ~ 660) °C<br>(660 ~ 1 100) °C<br>(1 100 ~ 1 500) °C | 0.16 °C<br>1.7 °C<br>3.8 °C                                        | SPRT,TC,CALIBRATOR<br>,MULTIMETER<br>/CP801-50107-1 |
| Temperature transducers<br>(without sensor)                                  |               | (-90 ~ 660) °C<br>(660 ~ 1 500) °C                       | 0.16 °C<br>0.42 °C                                                 |                                                     |

## 503. Humidity

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                                                          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.  |
|------------------------------------------|---------------|----------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------|
| Relative humidity hygrometers            | 50302         |                                                                |                                                                    |                                         |
| Polymer thin film<br>hygrometers         |               | (3 ~ 98) % R.H.<br>(-40 ~ 0) °C<br>(0 ~ 40) °C<br>(40 ~ 80) °C | 1.6 % R.H.<br>0.8 °C<br>0.5 °C<br>0.7 °C                           | Dew-point hygrometers<br>/CP801-50302-1 |
| Digital Thermo-hygrometers               |               | (3 ~ 98) % R.H.<br>(-40 ~ 0) °C<br>(0 ~ 40) °C<br>(40 ~ 80) °C | 1.6 % R.H.<br>0.8 °C<br>0.5 °C<br>0.7 °C                           | Dew-point hygrometers<br>/CP801-50302-2 |
| Hair hygrometers                         |               | (20 ~ 95) % R.H.<br>(-20 ~ 80) °C                              | 3 % R.H.<br>0.8 °C                                                 | Dew-point hygrometers<br>/CP801-50302-3 |

## 503. Humidity

| Measured Quantity<br>Instrument or Gauge                             | Field<br>Code | Range                                                   | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.               |
|----------------------------------------------------------------------|---------------|---------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------|
| Temperature humidity<br>recorders                                    | 50304         |                                                         |                                                                    |                                                      |
| Temperature humidity<br>recorders                                    |               | (20 ~ 95) % R.H.<br>(-20 ~ 80) °C                       | 3 % R.H.<br>2 °C                                                   | Dew-point hygrometers<br>/CP801-50304-1              |
| -Polymer Thin Film<br><br>Hygrothermograph                           |               | (20 ~ 95) % R.H.<br>(-20 ~ 80) °C                       | 3 % R.H.<br>2 °C                                                   | Dew-point hygrometers<br>/CP801-50304-2              |
| Transducers; dew-<br>point/relative humidity<br>Humidity transducers | 50305         |                                                         |                                                                    |                                                      |
|                                                                      |               | (3 ~ 98) % R.H.                                         | 1.6 % R.H.                                                         | Dew-point hygrometers<br>/CP801-50305-1              |
|                                                                      |               | (-40 ~ 0) °C                                            | 0.8 °C                                                             |                                                      |
|                                                                      |               | (0 ~ 40) °C                                             | 0.5 °C                                                             |                                                      |
|                                                                      |               | (40 ~ 80) °C                                            | 0.7 °C                                                             |                                                      |
| Humidity generators                                                  | 50306         |                                                         |                                                                    |                                                      |
| Constant temperature<br>and humidity chamber                         |               | (5 ~ 90) % R.H.<br>(90 ~ 98) % R.H.<br>(-80 ~ 200) °C   | 2.5 % R.H.<br>2.8 % R.H.<br>0.5 °C                                 | DATALOGGER,<br>Humidity transducer<br>/CP801-50306-1 |
| Two-pressure humidity<br>generators                                  |               | (10 ~ 80) % R.H.<br>(80 ~ 95) % R.H.<br>(0 ~ 60) °C     | 1.8 % R.H.<br>2.1 % R.H.<br>0.21 °C                                |                                                      |
| Flow mixing humidity<br>generators                                   |               | (3 ~ 25) % R.H.<br>(25 ~ 80) % R.H.<br>(80 ~ 98) % R.H. | 1.3 % R.H.<br>1.6 % R.H.<br>1.9 % R.H.                             |                                                      |
|                                                                      |               |                                                         |                                                                    | Dew-point hygrometers,<br>IPRT<br>/CP801-50306-2     |
|                                                                      |               |                                                         |                                                                    | Dew-point hygrometers,<br>IPRT<br>/CP801-50306-3     |
|                                                                      |               |                                                         |                                                                    |                                                      |
|                                                                      |               |                                                         |                                                                    |                                                      |
|                                                                      |               |                                                         |                                                                    |                                                      |
|                                                                      |               |                                                         |                                                                    |                                                      |

## 504. Moisture

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range           | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|-----------------|--------------------------------------------------------------------|----------------------------------------|
| Cereal moisture meters                   | 50401         | (9 ~ 25) % M.C. | 0.5 % M.C.                                                         | Balance, Dry oven<br>/CP801-50401-1    |

## 701. Photometry

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range                             | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc.      |
|------------------------------------------|---------------|-----------------------------------|--------------------------------------------------------------------|---------------------------------------------|
| Illuminance meters                       | 70101         | (0.5 ~ 10) lx<br>(10 ~ 20 000) lx | 2.0 %<br>1.7 %                                                     | Illuminance meters<br>/CP801-70101-1        |
| Total luminous flux meters               | 70103         | (324.3 ~ 2 218) lm                | 1.7 %                                                              | Total luminous flux<br>meters/CP801-70103-1 |
| Luminous intensity meters                | 70104         | (409 ~ 1 069.2) cd                | 1.7 %                                                              | Luminous intensity<br>meters/CP801-70104-1  |

## 702. Properties of detector &amp; sources

| Measured Quantity<br>Instrument or Gauge         | Field<br>Code | Range                                                                                                                                                                                                                                  | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)                                               | Standard/Method of<br>Measurement etc.                          |
|--------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Colorimeters; source color                       | 70204         | CIE 1931 x, y<br>red<br>x : (0.690 ~ 0.698)<br>y : (0.303 ~ 0.309)<br>Green<br>x : (0.169 ~ 0.179)<br>y : (0.704 ~ 0.708)<br>Blue<br>x : (0.124 ~ 0.130)<br>y : (0.080 ~ 0.085)<br>White<br>x : (0.327 ~ 0.335)<br>y : (0.345 ~ 0.353) | x : 0.006<br>y : 0.005<br><br>x : 0.006<br>y : 0.006<br><br>x : 0.005<br>y : 0.005<br><br>x : 0.006<br>y : 0.006 | Standard lamps<br>/CP801-70204-1                                |
| Total spectral radiant flux meters<br>Wavelength | 70221         | (350 ~ 850)nm                                                                                                                                                                                                                          | 0.25 nm                                                                                                          | Total spectral radiant<br>flux standard lamps<br>/CP801-70221-1 |
| Total spectral radiant                           |               | (350 ~ 850) nm<br>350 nm<br>(355 ~ 365) nm<br>365 nm<br>(370 ~ 395) nm<br>(395 ~ 420) nm<br>(420 ~ 495) nm<br>(495 ~ 850) nm                                                                                                           | 3.9 %<br>3.8 %<br>3.2 %<br>3.1 %<br>2.2 %<br>1.9 %<br>1.7 %                                                      |                                                                 |
| Color temperature                                |               | (2 634 ~ 2 805) K                                                                                                                                                                                                                      | 22 K                                                                                                             |                                                                 |
| Chromaticity                                     |               | CIE 1931 x, y<br>x : (0.450 ~ 0.467)<br>y : (0.406 ~ 0.415)                                                                                                                                                                            | x : 0.004<br>y : 0.004                                                                                           |                                                                 |
| Total luminous flux                              |               | (594.2 ~ 2 218) lm                                                                                                                                                                                                                     | 1.7 %                                                                                                            |                                                                 |

703. Properties of materials

| Measured Quantity<br>Instrument or Gauge                                                                                           | Field<br>Code | Range       | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------|--------------------------------------------------------------------|----------------------------------------|
| Colorimeters; material color<br>(Including Specular Component<br>Standard Illuminant<br>: A, C, D65<br>Standard Observe : 2°, 10°) | 70301         |             |                                                                    | Color standard tiles<br>/CP801-70301-1 |
| Red                                                                                                                                |               | X<br>Y<br>Z | 0.37<br>0.23<br>0.16                                               |                                        |
| Yellow                                                                                                                             |               | X<br>Y<br>Z | 0.79<br>0.68<br>0.22                                               |                                        |
| Blue                                                                                                                               |               | X<br>Y<br>Z | 0.29<br>0.17<br>0.15                                               |                                        |
| Green                                                                                                                              |               | X<br>Y<br>Z | 0.32<br>0.28<br>0.21                                               |                                        |
| Pale Grey                                                                                                                          |               | X<br>Y<br>Z | 0.67<br>0.62<br>0.71                                               |                                        |
| Mid Grey                                                                                                                           |               | X<br>Y<br>Z | 0.38<br>0.31<br>0.32                                               |                                        |
| Deep Grey                                                                                                                          |               | X<br>Y<br>Z | 0.29<br>0.18<br>0.13                                               |                                        |
| White                                                                                                                              |               | X<br>Y<br>Z | 0.85<br>0.86<br>0.96                                               |                                        |

## 703. Properties of materials

| Measured Quantity<br>Instrument or Gauge                                                                                           | Field<br>Code | Range                    | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %)   | Standard/Method of<br>Measurement etc.  |
|------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------|----------------------------------------------------------------------|-----------------------------------------|
| Colorimeters; material color<br>(Excluding Specular Component<br>Standard Illuminant<br>: A, C, D65<br>Standard Observe : 2°, 10°) | 70301         |                          |                                                                      | Color standard tiles<br>/CP801-70301-1  |
| Red                                                                                                                                |               | X<br>Y<br>Z              | 0.33<br>0.20<br>0.14                                                 |                                         |
| Yellow                                                                                                                             |               | X<br>Y<br>Z              | 0.75<br>0.64<br>0.20                                                 |                                         |
| Blue                                                                                                                               |               | X<br>Y<br>Z              | 0.28<br>0.16<br>0.12                                                 |                                         |
| Green                                                                                                                              |               | X<br>Y<br>Z              | 0.31<br>0.24<br>0.17                                                 |                                         |
| Pale Grey                                                                                                                          |               | X<br>Y<br>Z              | 0.63<br>0.58<br>0.66                                                 |                                         |
| Mid Grey                                                                                                                           |               | X<br>Y<br>Z              | 0.35<br>0.27<br>0.27                                                 |                                         |
| Deep Grey                                                                                                                          |               | X<br>Y<br>Z              | 0.28<br>0.16<br>0.10                                                 |                                         |
| White                                                                                                                              |               | X<br>Y<br>Z              | 0.81<br>0.83<br>0.94                                                 |                                         |
| Gloss meters                                                                                                                       | 70306         | 20°<br>60°<br>85°        | $9.0 \times 10^{-3}$<br>$9.7 \times 10^{-3}$<br>$8.3 \times 10^{-3}$ | Gloss standard plates<br>/CP801-70306-1 |
| Haze meters<br>(H-1)<br>(H-5)<br>(H-10)<br>(H-20)<br>(H-30)                                                                        | 70308         | 1<br>5<br>10<br>20<br>30 | 0.86<br>0.72<br>0.9<br>1.2<br>1.9                                    | Haze standard plates<br>/CP801-70308-1  |

## 703. Properties of materials

| Measured Quantity<br>Instrument or Gauge                                       | Field<br>Code | Range                          | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|--------------------------------------------------------------------------------|---------------|--------------------------------|--------------------------------------------------------------------|----------------------------------------|
| Spectrophotometers including<br>FT-IR spectrophotometers<br>Spectrophotometers | 70325         |                                |                                                                    |                                        |
| Wavelength                                                                     |               | (250 ~ 780) nm                 | 0.4 nm                                                             | Wavelength filter<br>/CP801-70325-1    |
| Transmittance                                                                  |               | (250 ~ 750) nm                 |                                                                    | Transmittance filter<br>/CP801-70325-1 |
|                                                                                |               | 250 nm                         | $1.0 \times 10^{-2}$                                               |                                        |
|                                                                                |               | 300 nm                         | $0.9 \times 10^{-2}$                                               |                                        |
|                                                                                |               | 350 nm                         | $0.9 \times 10^{-2}$                                               |                                        |
|                                                                                |               | 400 nm                         | $0.7 \times 10^{-2}$                                               |                                        |
|                                                                                |               | 450 nm                         | $0.7 \times 10^{-2}$                                               |                                        |
|                                                                                |               | 500 nm                         | $0.8 \times 10^{-2}$                                               |                                        |
|                                                                                |               | 550 nm                         | $0.8 \times 10^{-2}$                                               |                                        |
|                                                                                |               | 600 nm                         | $0.8 \times 10^{-2}$                                               |                                        |
|                                                                                |               | 650 nm                         | $0.8 \times 10^{-2}$                                               |                                        |
|                                                                                |               | 700 nm                         | $0.8 \times 10^{-2}$                                               |                                        |
|                                                                                |               | 750 nm                         | $0.8 \times 10^{-2}$                                               |                                        |
| Absorbance                                                                     |               | (250 ~ 750) nm                 |                                                                    |                                        |
|                                                                                |               | 250 nm                         | 0.004 2                                                            |                                        |
|                                                                                |               | 300 nm                         | 0.004 0                                                            |                                        |
|                                                                                |               | 350 nm                         | 0.003 8                                                            |                                        |
|                                                                                |               | 400 nm                         | 0.002 8                                                            |                                        |
|                                                                                |               | 450 nm                         | 0.002 8                                                            |                                        |
|                                                                                |               | 500 nm                         | 0.003 0                                                            |                                        |
|                                                                                |               | 550 nm                         | 0.003 0                                                            |                                        |
|                                                                                |               | 600 nm                         | 0.003 0                                                            |                                        |
|                                                                                |               | 650 nm                         | 0.003 0                                                            |                                        |
|                                                                                |               | 700 nm                         | 0.003 2                                                            |                                        |
|                                                                                |               | 750 nm                         | 0.003 2                                                            |                                        |
| FT-IR spectrophotometers                                                       |               | (400 ~ 4 000) $\text{cm}^{-1}$ |                                                                    | Standard filter<br>/CP801-70325-2      |
|                                                                                |               | 906.82 $\text{cm}^{-1}$        | 0.11                                                               |                                        |
|                                                                                |               | 1 028.42 $\text{cm}^{-1}$      | 0.28                                                               |                                        |
|                                                                                |               | 1 069.27 $\text{cm}^{-1}$      | 0.78                                                               |                                        |
|                                                                                |               | 1 154.62 $\text{cm}^{-1}$      | 0.10                                                               |                                        |
|                                                                                |               | 1 583.04 $\text{cm}^{-1}$      | 0.10                                                               |                                        |
|                                                                                |               | 1 601.38 $\text{cm}^{-1}$      | 0.12                                                               |                                        |
|                                                                                |               | 2 850.20 $\text{cm}^{-1}$      | 0.13                                                               |                                        |
|                                                                                |               | 3 001.40 $\text{cm}^{-1}$      | 0.10                                                               |                                        |
|                                                                                |               | 3 026.44 $\text{cm}^{-1}$      | 0.10                                                               |                                        |
|                                                                                |               | 3 060.14 $\text{cm}^{-1}$      | 0.10                                                               |                                        |
|                                                                                |               | 3 082.22 $\text{cm}^{-1}$      | 0.10                                                               |                                        |

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## Valid To : Dec. 08, 2025.

In recognition of the successful completion of the KOLAS evaluation process, accreditation is granted to this laboratory to perform the following calibrations

[illegible]

1. This laboratory provides calibration services in permanent standard laboratory and at on-site.
2. Laboratory conducts on-site calibration should meet requirements of KOLAS-SR-007.
3. On-site calibration is allowed to items with marking 'Y', not allowed to items with marking 'N'.
4. Measurement uncertainty normally is quoted as an expanded uncertainty at a coverage probability of 95 %, which usually requires the use of a coverage factor of  $k=2$ . It expresses the lowest uncertainty of measurement that can be provided by accredited calibration laboratories in normal conditions.
5. Due to the calibration environment such as reference standards or customers' facilities, it is note that uncertainty of measurement on a calibration certificate may be expressed larger than measurement uncertainty on scope of accreditation in general.



## 407. Field strength &amp; antennas

| Measured Quantity<br>Instrument or Gauge | Field<br>Code | Range            | Measurement uncertainty<br>(The Confidence<br>Level is about 95 %) | Standard/Method of<br>Measurement etc. |
|------------------------------------------|---------------|------------------|--------------------------------------------------------------------|----------------------------------------|
| Dipole Antennas                          | 40703         |                  |                                                                    |                                        |
| Dipole Antenna                           |               | 20 MHz ~ 18 GHz  | 1.1 dB                                                             | Network Analyzer<br>/ CP801-40703-1    |
| Antenna Factor                           |               |                  |                                                                    |                                        |
| VSWR                                     |               | 20 MHz ~ 18 GHz  | 0.02                                                               |                                        |
| Biconical Antenna                        |               | 20 MHz ~ 300 MHz | 1.4 dB                                                             | Network Analyzer<br>/ CP801-40703-2    |
| Antenna Factor                           |               | 300 MHz ~ 18 GHz | 1.3 dB                                                             |                                        |
| VSWR                                     |               | 20 MHz ~ 18 GHz  | 0.02                                                               |                                        |
| Log-Periodic Antenna                     |               | 20 MHz ~ 18 GHz  | 1.3 dB                                                             | Network Analyzer<br>/ CP801-40703-3    |
| Antenna Factor                           |               |                  |                                                                    |                                        |
| VSWR                                     |               | 20 MHz ~ 18 GHz  | 0.02                                                               |                                        |
| Horn antennas                            | 40707         |                  |                                                                    |                                        |
| Antenna Factor                           |               | 200 MHz ~ 18 GHz | 0.9 dB                                                             | Network Analyzer<br>/ CP801-40707-1    |
|                                          |               | (18 ~ 40) GHz    | 1.4 dB                                                             |                                        |
|                                          |               |                  |                                                                    |                                        |
|                                          |               |                  |                                                                    |                                        |
| VSWR                                     |               | 200 MHz ~ 18 GHz | 0.02                                                               |                                        |
|                                          |               | (18 ~ 40) GHz    | 0.04                                                               |                                        |