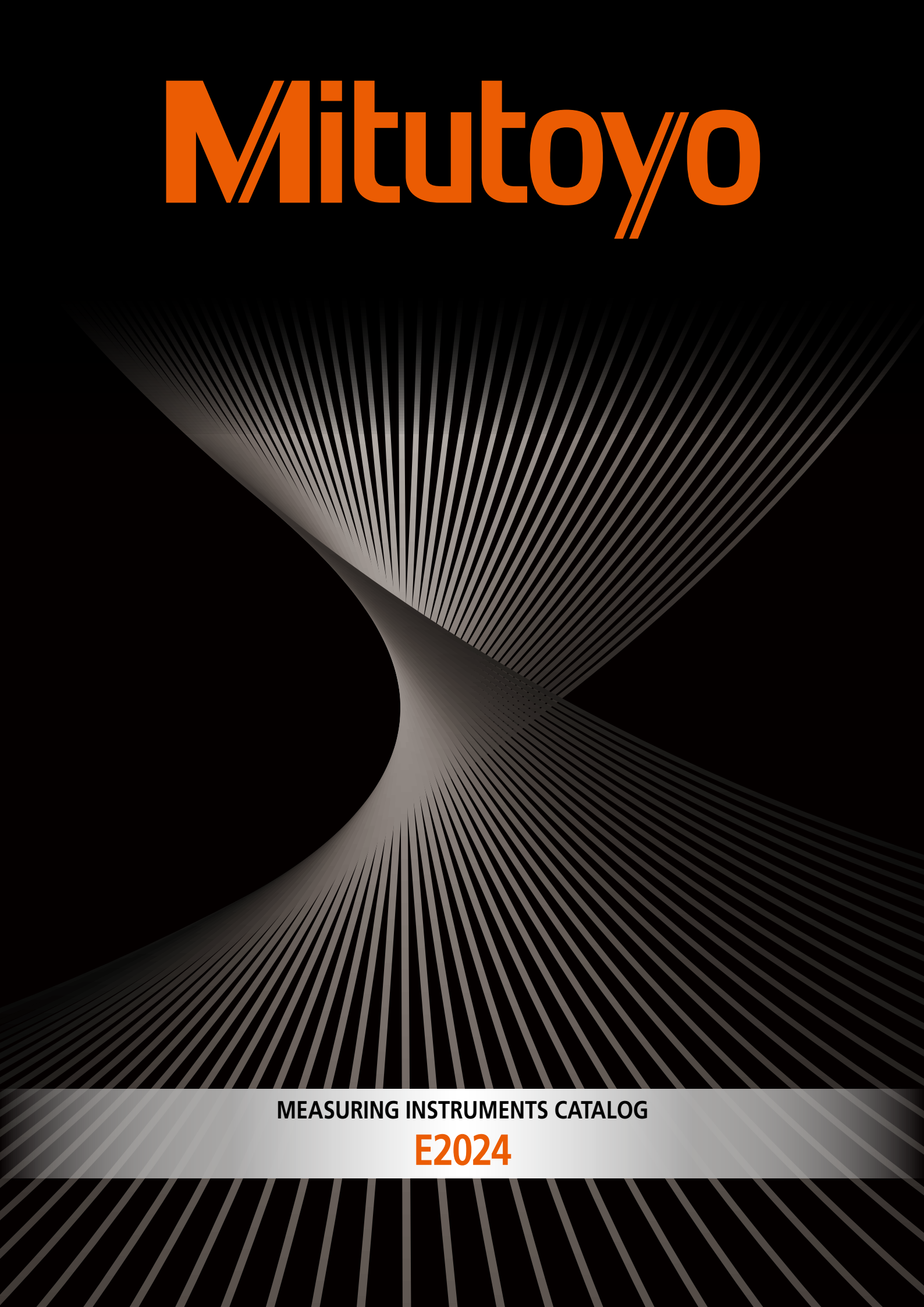
Mitutoyo



# MEASURING INSTRUMENTS CATALOG

## E2024

## Notes on Use

### Export Control

Do not commit an act, which could directly or indirectly, violate any law or regulation of Japan, your country or any other international treaty, relating to the export or re-export of any commodities.
Please consult our sales office near you before you export our products or you offer technical information to a nonresident.

### Safety Caution

Mitutoyo products are designed, manufactured and sold as industrial products that are intended for use at manufacturing sites.
Carefully read the specifications and functions in this catalog before selecting products.
Safety may be compromised if you use products for purposes other than those stated here.
Feel free to contact your nearest Mitutoyo sales center if you wish to use a product for other purposes or in a special environment.

### Sale of inch-model products

Sale of inch-model products in Japan is regulated by the Japanese laws and ordinances.
If you request to purchase inch-model products, contact your nearest Mitutoyo sales office.

### Appearance and Specifications

Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.
The product names in this catalog are registered trademarks or trademarks of Mitutoyo or their respective companies.

Mitutoyo

# Measuring Instruments Catalog

E2024

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Mitutoyo

# Meaning of Symbols

## ABSOLUTE Linear Encoder

ABSOLUTE™

ABSOLUTE is a trademark of Mitutoyo Corporation.

This is an electronic measuring scale that provides a direct readout of ABSOLUTE linear position when switched on, without needing to be zeroed or reset. Mitutoyo measuring instruments incorporating these scales provide the significant benefit of being always ready for measurement without the need of preliminary setting after switching on. There are three types of ABSOLUTE linear encoders depending on whether the method used is electrostatic, electromagnetic, or optical. They are widely used in various measuring instruments as measuring systems endowed with enhanced reliability of measured values.

**Advantages:**

1. No count error occurs even if you move the slider or spindle extremely rapidly.
2. You do not have to reset the system to zero when turning on the system after turning it off*1.
3. As this type of encoder can drive with less power than the incremental encoder, the battery life is prolonged to about 5 years (continuous operation of 18,000 hours)*2 under normal use.

*1 Unless the battery is removed.
*2 In the case of ABSOLUTE Digimatic calipers and ABSOLUTE coolant proof calipers.

## IP Codes

IP65

IP66

IP67

IP67 G

IP is a trademark of Mitutoyo Corporation. The numerals and letters indicate protection levels.

These are codes that indicate the degree of protection provided (by an enclosure) for the electrical function of a product against the ingress of foreign bodies, dust and water as defined in IEC standards (IEC 60529: 2013) and JIS C 0920: 2003. [IEC: International Electrotechnical Commission]

(IP: International Protection) **IP** □ □ □ (Supplementary letter)

| First characteristic numeral | Degrees of protection against solid foreign objects | |
|---|---|---|
| | Brief description | Definition |
| 0 | Unprotected | — |
| 1 | Protected against solid foreign objects of Sø50 mm and greater | A Sø50 mm object probe shall not fully penetrate enclosure* |
| 2 | Protected against solid foreign objects of Sø12.5 mm and greater | A Sø12.5 mm object probe shall not fully penetrate enclosure* |
| 3 | Protected against solid foreign objects of Sø2.5 mm and greater | A Sø2.5 mm object probe shall not fully penetrate enclosure* |
| 4 | Protected against solid foreign objects of Sø1.0 mm and greater | A Sø1.0 mm object probe shall not fully penetrate enclosure* |
| 5 | Protected against dust | Ingress of dust is not totally prevented, but dust that does penetrate must not interfere with satisfactory operation of the apparatus or impair safety. |
| 6 | Dust-proof | No ingress of dust allowed. |

* The full diameter of the object probe shall not pass through an opening of the enclosure.

For details of the test conditions used in evaluating each degree of protection, please refer to IEC 60529 (JIS C 0920).

| Second characteristic numeral | Degrees of protection against water | |
|---|---|---|
| | Brief description | Definition |
| 0 | Unprotected | — |
| 1 | Protected against vertical water drops | Vertically falling water drops shall have no harmful effects. |
| 2 | Protected against vertical water drops within a tilt angle of 15° | Vertically falling water drops shall have no harmful effects when the enclosure is tilted at any angle up to 15° on either side of the vertical. |
| 3 | Protected against spraying water | Water sprayed at an angle up to 60° either side of the vertical shall have no harmful effects. |
| 4 | Protected against splashing water | Water splashed against the enclosure from any direction shall have no harmful effects. |
| 5 | Protected against water jets | Water projected in jets against the enclosure from any direction shall have no harmful effects. |
| 6 | Protected against powerful water jets | Water projected in powerful jets against the enclosure from any direction shall have no harmful effects. |
| 7 | Protection against water penetration | Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under standardized conditions of pressure and time. |
| 8 | Protected against the effects of continuous immersion in water | Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is continuously immersed in water under conditions which shall be agreed between manufacturer and user but which are more severe than for IPX7. |

| Supplementary letter | Degrees of protection against oil | |
|---|---|---|
| | Abstract | |
| F | Oil-resistant | Drops or splashes of oil from any direction cause no harmful effects. |
| G | Oil-proof | Protection against entry of oil droplets or splashes from all directions. |

The protection levels against oil are specified only in the appendix of JIS C 0920.

## Digimatic S1

DIGIMATIC S1

Mitutoyo's proprietary bidirectional serial communication protocol enables a connected PC to execute measurement data output, setting and control of a measuring instrument, and capture of information of a specific measuring instrument.

## TÜV Rheinland certification marks


All products with the marks shown on the left have passed the IP test carried out by the German accreditation organization, TÜV Rheinland.

## Measuring Instruments Shipped with Inspection Certificate


Mitutoyo guarantees product quality as a leading precision measuring instrument manufacturer and ships measuring instruments with an inspection certificate that includes inspection data so that customers can use them with confidence. Mitutoyo also calibrates the purchased measuring instruments and issues a calibration certificate, for a fee, that proves traceability to the relevant standard.
Note: For the meaning of the inspection marks shown at left, refer to the detailed description of each product.

## MeasurLink® ENABLED marks


Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink®.
MeasurLink® is a registered trademark of Mitutoyo Corporation in Japan and Mitutoyo America Corporation in the United States.

## Installation of Main Unit Startup System


As a part of the enhancement of our export control system, the large CNC measuring machines (all the CNC Coordinate Measuring Machines, Vision Measuring Systems, and Form Measuring Machines) are now equipped with a Main Unit Startup System (relocation detecting system) before export.
This system is designed to take a machine out of operation upon detecting the mechanical shock that accompanies relocation. If you intend to relocate a measuring machine fitted with this system, please contact us beforehand so that our service engineers can assist you.
However, the system may be triggered in the event of a natural event such as a powerful earthquake. In this case, our service engineers will deal with the situation at the earliest opportunity.

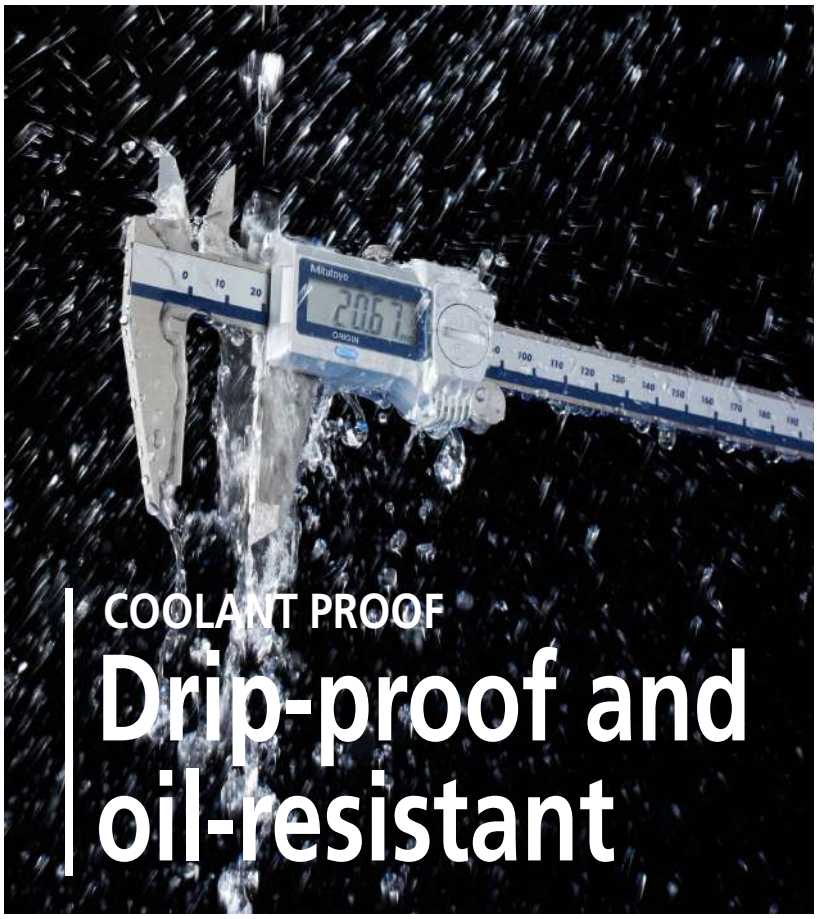
# Features of Mitutoyo Small Tool Instruments



Resolution: 0.0001 mm

## High Accuracy Digimatic Micrometer SERIES 293 with resolution of 0.0001 mm

The High-Accuracy Digimatic Micrometer utilizes Mitutoyo's innovative 0.1 µm resolution ABS (ABSOLUTE) rotary sensor and high-accuracy screw machining technology to achieve the MPE of ±0.5 µm, delivering 0.1 µm resolution measurements without sacrificing operability.




## COOLANT PROOF

COOLANT PROOF is the universal term for Mitutoyo Digimatic Small Tool Instruments that are not only resistant to dust and water ingress (rated to IP65 or better) but also to deterioration of materials due to contact with the cutting oil or coolant fluids in normal use.

Note: Some types of aggressive cutting oil or coolant may degrade the sealing materials over time.

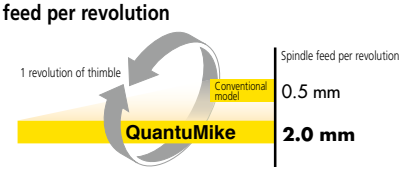
COOLANT PROOF™



## QuantuMike with 2 mm/rev Spindle Feed

Faster measurement is achieved by using a finer thread which feeds the spindle by 2 mm per revolution of the thimble instead of the standard 0.5 mm. This increase of spindle feed has been made possible thanks to new high precision thread-cutting and testing techniques.
In addition, the ratchet thimble mechanism helps ensure repeatable results and enables easy operation- even when making measurement one-handed.


**2 mm feed per revolution**



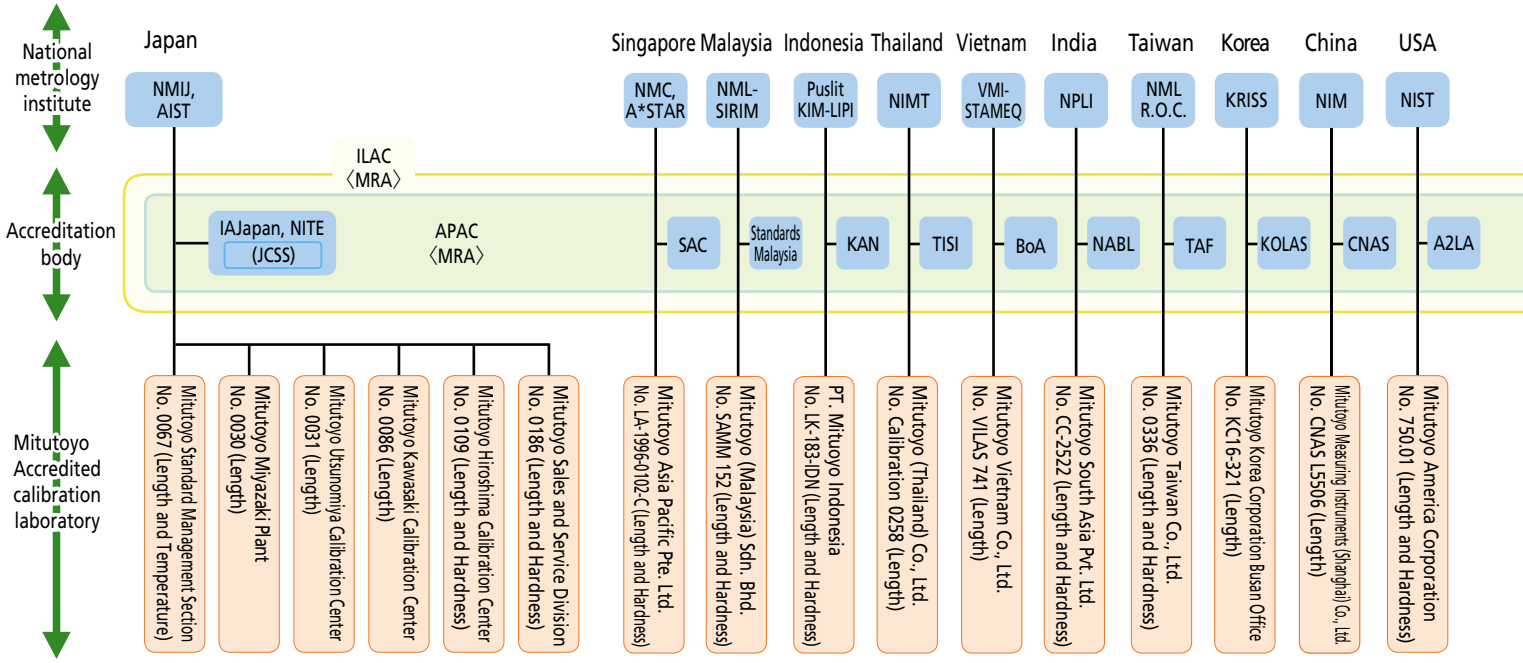




Mitutoyo

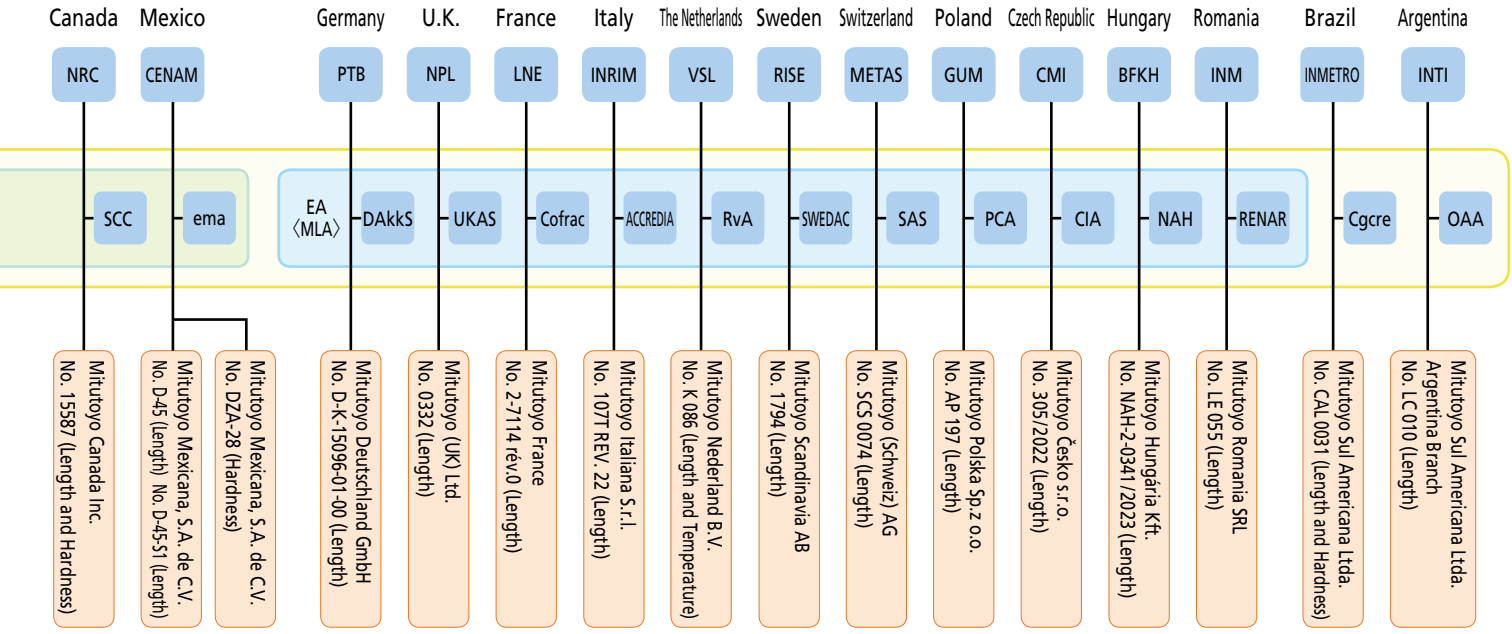
# Calibration Laboratories Worldwide

Mitutoyo has built a network for comprehensive calibration support of precision measuring products in the global market. To provide calibration services on a global scale, Mitutoyo has gained ISO/IEC 17025 certification from the accreditation body in each country, and has issued calibration certificates carrying the mark of each accreditation body. In addition, the calibration certificates issued by each calibration laboratory are mutually recognized in the countries and commercial areas signed in the MRA (Mutual Recognition Arrangement) of ILAC (International Laboratory Accreditation Cooperation) and APAC (Asia Pacific Accreditation Cooperation), or the MLA (Multilateral Agreement) of EA (European co-operation for Accreditation).




- Japan
  - AIST : National Institute of Advanced Industrial Science and Technology
  - NMIJ : National Metrology Institute of Japan
  - IAJapan : International Accreditation Japan
  - NITE : National Institute of Technology and Evaluation
  - JCSS : Japan Calibration Service System
- Singapore
  - NMC, A*STAR : National Metrology Centre/Agency for Science, Technology and Research
  - SAC : Singapore Accreditation Council
- Malaysia
  - NML-SIRIM : National Metrology Laboratory-Standards and Industrial Research Institute of Malaysia
  - Standards Malaysia : Standards Malaysia
- Indonesia
  - Puslit KIM-LIPI : Research Center for Calibration, Instrumentation and Metrology-Indonesian Institute of Science
  - KAN : Komite Akreditasi Nasional
- Thailand
  - NIMT : National Institute of Metrology (Thailand)
  - TISI : Thai Industrial Standard Institute
- Vietnam
  - VMI-STAMEQ : Vietnam Metrology Institute, Directorate for Standards and Quality
  - BoA : BUREAU OF ACCREDITATION
- India
  - NPLI : National Physical Laboratory of India
  - NABL : National Accreditation Board for Testing and Calibration Laboratories
- Taiwan
  - NML R.O.C. : National Measurement Laboratory R.O.C.
  - TAF : Taiwan Accreditation Foundation
- Korea
  - KRISS : Korea Research Institute of Standards and Science
  - KOLAS : Korea Laboratory Accreditation Scheme
- China
  - NIM : National Institute of Metrology
  - CNAS : China National Accreditation Service for Conformity Assesment
- U.S.A.
  - NIST : National Institute of Standards and Technology
  - A2LA : American Association for Laboratory Accreditation
- Canada
  - NRC : National Research Council Canada/Institute for National Measurement Standards
  - SCC : Calibration Laboratory Assessment Service/Standards Council of Canada
- Mexico
  - CENAM : Centro Nacional de Metrología
  - ema : Entidad Mexicana de Acreditación, a.c.
- Germany
  - PTB : Physikalisch-Technische Bundesanstalt
  - DAkkS : Deutsche Akkreditierungsstelle GmbH
- U.K.
  - NPL : National Physical Laboratory
  - UKAS : United Kingdom Accreditation Service
- France
  - LNE : Laboratorie national de metrologie et d'essaias
  - Cofrac : Comité français d'accréditation

Note: The above are domestic and international locations where Mitutoyo provides ISO/IEC 17025 accredited calibration services.
(As of July, 2024)




- Italy
  INRIM : Istituto Nazionale di Ricerca Metrologica
  ACCREDIA : L'ENTE ITALIANO DI ACCREDITAMENTO
- The Netherlands
  VSL : Van Swinden Laboratorium
  RvA : Raad voor Accreditatie
- Sweden
  RISE : RISE Research Institutes of Sweden AB
  SWEDAC : Swedish Board for Accreditation and Conformity Assessment
- Switzerland
  METAS : The Federal Institute of Metrology
  SAS : Swiss Accreditation Service
- Poland
  GUM : Główny Urząd Miar - the National Metrology Institute in Poland
  PCA : Polskie Centrum Akredytacji
- Czech Republic
  CMI : Český Metrologický Institut
  CIA : Český Institut pro Akreditaci
- Hungary
  BFKH : Government Office of the Capital City Budapest
  NAH : Nemzeti Akkreditáló Hatóság
- Romania
  INM : Institutul National de Metrologie
  RENAR : Asociaţia de Acreditare din România

ILAC : International Laboratory Accreditation Cooperation
APAC : Asia Pacific Accreditation Cooperation
MRA : Mutual Recognition Arrangement
EA : European co-operation for Accreditation
MLA : Multilateral Agreement

Name of each National metrology institutes and Accreditation bodies are based on our survey.
For the latest information, please refer to our website. **https://www.mitutoyo.co.jp**

- Brazil
  INMETRO : Instituto Nacional de Metrologia Qualidade e Tecnologia
  Cgcre : Coordenação Geral de Acreditação do INMETRO
- Argentina
  INTI : Instituto Nacional de Tecnologia Industrial
  OAA : Organismo Argentino de Acreditación

Certificate of DAkkS accredited laboratory (Mitutoyo Deutschland in Germany)

Cerificate of SAC accredited laboratory (Mitutoyo Asia Pacific in Singapore)

Certificate of A2LA accredited laboratory (Mitutoyo America in U.S.A.)


Certificate of RvA accredited laboratory (Mitutoyo Nederland in the Netherlands)

Certificate of CNAS accredited laboratory (Mitutoyo Measuring Instruments (Shanghai) in China)

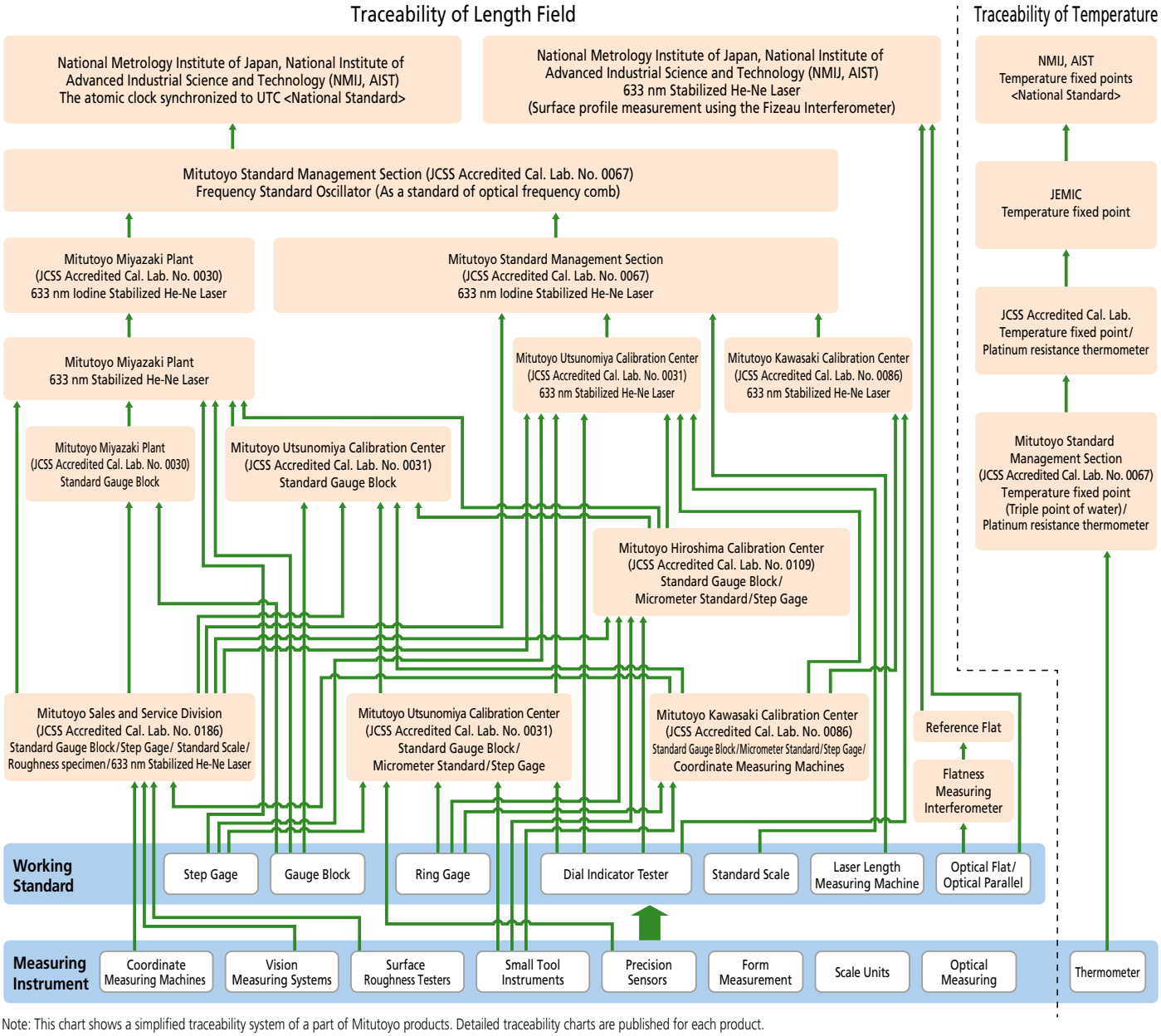
Certificate of Cgcre accredited laboratory (Mitutoyo Sul Americana in Brazil)

# Traceability of Mitutoyo Standards

Mitutoyo ensures and maintains traceability of various types of precision measuring instruments by holding standards of length and other physical quantities that are directly traceable to the national standards for use in calibrating the working standards used for the calibration of measuring instrument products supplied to industry. Furthermore, Mitutoyo offers a temperature calibration service which is indispensable for high-accuracy length measurement.

The Mitutoyo traceability system with the optical frequency comb at the top level, ensuring performance equivalent to that of the Japan's national standard, and the calibration technology supporting this system are the basis of highly accurate and reliable products offered to customers.

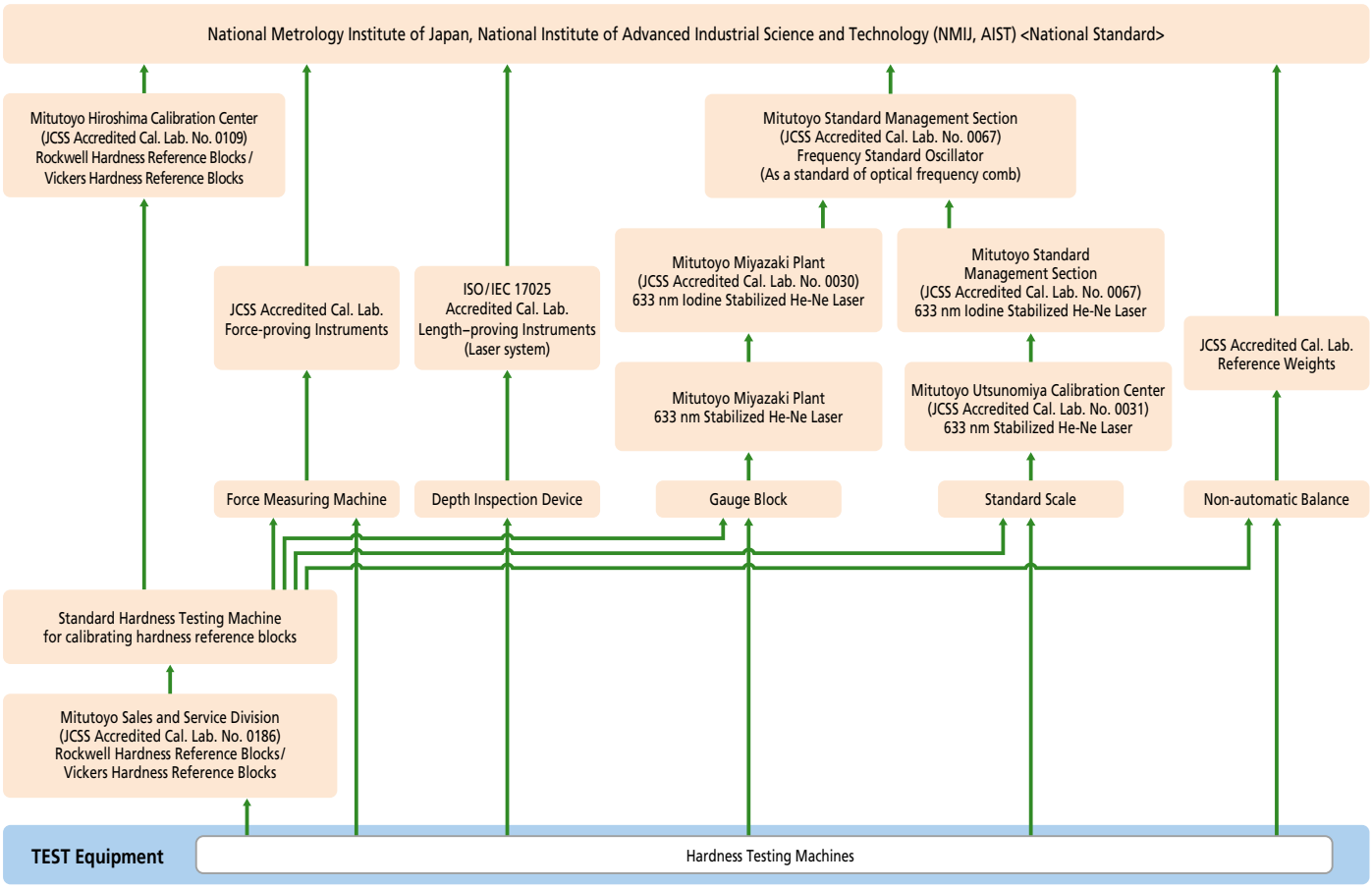

Certificate of JCSS accredited laboratory (Mitutoyo Standard Management Section)




Note: This chart shows a simplified traceability system of a part of Mitutoyo products. Detailed traceability charts are published for each product.
(As of July, 2024)

For the latest information, please refer to our website. **https://www.mitutoyo.co.jp**

## Traceability of Hardness Field

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(As of July, 2024)

For the latest information, please refer to our website. **https://www.mitutoyo.co.jp**

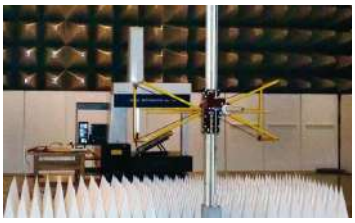
Video

# Response to Safety and Environmental Protection Regulations

To deliver safe and reliable products to our customers, Mitutoyo evaluates its products to ensure that they adhere to applicable product safety and environmental standards, including CE marking.

## CE Marking

CE marking indicates that a product complies with the essential requirements of the relevant European health, safety and environmental protection legislation.



Conformity evaluation for CE marking (EMC Directives)

### Major applicable Directives relating to Mitutoyo products

| Applicable Directives | Applicable range |
|---|---|
| Machinery Directive | At least one part of a machine that may cause injury to the human body if it moves due to movement of an actuator such as a motor. |
| EMC Directive (Electromagnetic Compatibility Directive) | A product that may produce electromagnetic radiation or which is influenced by electromagnetic radiation from outside. |
| Low Voltage Directive | Equipment (device) that uses AC voltage of 50 to 1000 V or DC voltage of 75 to 1500 V. |
| Radio Equipment Directive | All electrical and electronic equipment that intentionally transmits and receives radio waves at frequencies below 3000 GHz. |
| RoHS Directive | Restriction of the use of certain hazardous substances in electrical and electronic equipment.<br>Restricted substances and maximum concentration values tolerated by weight:<br>· Lead (0.1%)<br>· Cadmium (0.01%)<br>· Mercury (0.1%)<br>· Hexavalent chromium (0.1%)<br>· Polybrominated biphenyls (PBB) (0.1%)<br>· Polybrominated diphenyl ethers (PBDE) (0.1%)<br>· Bis (2-ethylhexyl) phthalate (DEHP) (0.1%)<br>· Butyl benzyl phthalate (BBP) (0.1%)<br>· Dibutyl phthalate (DBP) (0.1%)<br>· Diisobutyl phthalate (DIBP) (0.1%)<br>Note: Our products fall under Cat.9 "Monitoring and control instruments including industrial monitoring and control instruments". |

## UKCA Marking

UKCA marking indicates that the products conform to the applicable requirements for products sold in Great Britain.

## Response to WEEE Directive

The WEEE Directive*1 is a directive that mandates appropriate collection and recycling of electrical and electronic equipment waste. The purpose of this directive is to increase the reuse and recycling of these products. To differentiate between equipment waste and household waste, a crossed-out wheeled-bin symbol is marked on a product.

*1 WEEE Directive: Directive 2012/19/EU of the European Parliament and of the Council on waste electrical and electronic equipment.

## Response to REACH Regulation

REACH Regulation*2 is a regulation governing registration, evaluation, authorization and restriction of chemical substances in Europe, and all products such as substances, mixtures and molded products (including accessories and packaging materials) are regulated.
Chemical substances scientifically proven to be substances that are hazardous to human health and the global environment (Candidate List of substances of very high concern for Authorisation (CLS)) are prohibited to be sold or information concerning them disclosed is mandated in Europe.
We will actively disclose information about our products and provide replacement if we find our products contain any of the listed substances.

*2 REACH Regulation: Regulation (EC) No1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorization and Restriction of Chemicals

## Response to Management Methods for Restricted Use of Hazardous Substances in Electrical and Electronic Product (China RoHS 2)

We set the environmental protection use period regulated by China RoHS 2 per product and label with the marks shown on the right, together with a list of the contained substances.

"Environmental Protection Use Period" mark*3

*3 The environmental protection use period does not indicate the product warranty period.

## Precautions to be taken when handling button cells

**⚠ WARNING** Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

- KEEP batteries OUT OF REACH OF CHILDREN, ingestion can cause DEATH or serious injury.
  Seek immediate medical attention if you suspect that a battery is swallowed or inserted inside any part of the body.
- Do not dismantle, heat or throw the battery in a fire.
- If alkaline solution leaks from the battery and contacts your skin or clothes, immediately wash the affected area with water. IF IN EYES, immediately rinse eyes cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing and summon immediate assistance from a doctor.
- Do not solder directly to a battery.
- Ensure batteries are inserted without coming into contact with metal parts of equipment.
- In case of disposal, insulate (+) and (-) terminals of a battery by applying an insulating material.

**⚠ CAUTION** Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

- Do not try to charge the battery as it is not chargeable. Install the battery with correct polarity. Failure to do so can cause battery leakage or burst resulting in damage to the instrument or personal injury.

**NOTICE** Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

- Do not use new and used batteries together. Do not use different types of batteries together.
- Do not use nor leave batteries in direct sunlight nor in locations subject to high temperature or humidity.
- Avoid letting batteries contact water.
- Remove batteries from equipment that will not be used for a prolonged period.

Follow the regulations of each country when disposing of batteries.

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Mitutoyo


**Mitutoyo Corporation**

20-1, Sakado 1-Chome, Takatsu-ku, Kawasaki-shi,
Kanagawa 213-8533, Japan
T +81 (0) 44 813-8230
F +81 (0) 44 813-8231
https://www.mitutoyo.co.jp

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