Customer proximity and product diversity

In January 2010 Mitutoyo synchronised and strengthened the concerted pan-European activities by establishing the European headquarters in Neuss. The location of the Mitutoyo Europe GmbH is Neuss in the vicinity of Düsseldorf, Germany.

Mitutoyo Europe GmbH oversees all the activities of Mitutoyo’s sales, service and production facilities throughout Europe and adjacent markets, e.g., Turkey. It also plans and implements the medium and long term business strategies of such European operations. A Mitutoyo Europe GmbH key objective is to promote coordination amongst its European group companies in order to optimise its sales and technical support services in the best interests of customer satisfaction.

Some 266 employees work for our customers in development, service, sales and administration. They are joined by specialists of Mitutoyo CTL Germany GmbH in Oberndorf on the River Neckar, which focuses solely on developing software for three-coordinate measurement technology and, in doing so, sets global standards. The peripheral fields of coordinate measuring machines, jigging and loading systems and thermal cabins are covered by KOMEG company based in Saarland.

The range of products offered by Mitutoyo in Europe is divided into eight groups:

- Coordinate Measuring Machines
- Vision Measuring Systems
- Form Measurement
- Optical Measuring
- Sensor Systems
- Test Equipment and Seismometers
- Digital Scale and DRO Systems
- Small Tool Instruments and Data Management

In addition to measuring and testing equipment, the range of products also includes a wide selection of accessories and – as a further area of focus – sophisticated, high-performance software for coordinate measuring machines, vision measuring systems and form measurement.

The Information Center of Metrology (MIM) has been demonstrating Mitutoyo’s commitment to advanced training in all fields of length measurement technology since 1999. The MIM is open to anyone working in the fields of manufacturing, service, science and research. Mitutoyo Europe GmbH is, moreover, a corporate member of “Ausbildung Koordinatenmesstechnik e. V. (AUKOM)”. This association is dedicated to providing training schemes for coordinate measuring technology with the aim of ensuring a neutral, comprehensive and state of the art training concept.

Germany has also been home to the Mitutoyo M³ Solutions Europe division since 2004. The abbreviation M³ stands for Mitutoyo Measurement Metrology and, as such, for the concept of special measuring solutions developed by Mitutoyo to meet the particular requirements of its customers across the whole breadth of length, form and surface measurement technology. The Mitutoyo Europe GmbH in Neuss offers sample configurations in the 400 m² M³ Solution Center Europe to demonstrate the numerous possibilities. The center also presents peripheral systems, such as jigs or feed and climate control systems from KOMEG alongside the measuring equipment.
Highlights

- Micrometer MDH
- IDS Solar
- IDS Battery
- LH-602E
- MT Microscope
- SJ-310 / SJ-410
- CV-4500
- SV-C4500
- Mitutoyo
- Roughness Probe
- CNC CMM
- Surface Measure
- CMM Vision
- CNC Vision
- Fixtures
- Styl
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- Digimatic Mini Processor
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- Wireless Data Transmission etc.

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- Height Gauge Accessories
- Height Gauge with Data Processing Unit

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- Calibration Tools

## Depth Measuring Instruments
- Depth Measuring Instruments

## Gauge Blocks
- Steel Gauge Block Sets
- Steel Individual Gauge Blocks
- CERA Gauge Block Sets
- CERA Individual Gauge Blocks etc.
Offering Reliable Traceability Worldwide

Calibration laboratories worldwide
Mitutoyo has a system allowing comprehensive support for the calibration of precision measuring products in the global market. In order to provide calibration services on a global basis, Mitutoyo has calibration laboratories that have received ISO/IEC 17025 certification, which is an international standard, from the accredited organisations in each of the countries in which Mitutoyo operates and subsidiaries are located, both in Japan and overseas.
Offering High-level Calibration Services Worldwide
Based on highest measurement capabilities of the same level as national standards

Traceability system
Mitutoyo has a traceability system made possible through an in-house calibration organisation certified by the ISO/IEC 17025 international standard, with length standards directly related to national standards (atomic clock synchronised to UTC and the optical frequency comb) at the highest level.
National standards are mutually recognised by CIPM, and the certified calibration organisation is mutually recognised by ILAC, so that the establishment and maintenance of traceability for Mitutoyo products is achieved both in Japan and overseas.

Traceability of length
National Metrology Institute of Japan / National Institute of Advanced Industrial Science and Technology (NMIJ/AIST)
The atomic clock synchronized to UTC and the optical frequency comb <National (Primary) Standard>

Mitutoyo Utsunomiya Measurement Standards Calibration Center (JCSS Accredited Cal. Lab. No.0031)
633nm Iodine Stabilized He-Ne Laser <Secondary Standard>

Mitutoyo Miyazaki Plant
(JCSS Accredited Cal. Lab. No.0030)
633nm Stabilized He-Ne Laser <Laboratory Reference Standard>

Mitutoyo Utsunomiya Measurement Standards Calibration Center
(JCSS Accredited Cal. Lab. No.0031)
633nm Stabilized He-Ne Laser <Laboratory Reference Standard>

Mitutoyo Techno Service
Business Division
(JCSS Accredited Cal. Lab. No.0186) Standard Gauge Block/Step Gage

Mitutoyo Hiroshima Calibration Center

Mitutoyo Utsunomiya Measurement Standards Calibration Center (JCSS Accredited Cal. Lab. No.0031)
Standard Gauge Block <Laboratory Reference Standard>

Traceability of temperature

NMIJ/AIST
Temperature fixed points <National (Primary) Standard>

JEMIC
Temperature fixed point <National (Sub-Primary) Standard>

Mitutoyo Utsunomiya Measurement Standards Calibration Center (JCSS Accredited Cal. Lab. No.0031)
Temperature fixed point / Platinum resistance thermometer <Secondary Standard>

Mitutoyo Hiroshima Calibration Center

Mitutoyo Techno Service
Business Division
(JCSS Accredited Cal. Lab. No.0186) Standard Gauge Block/Step Gage

Mitutoyo Utsunomiya Measurement Standards Calibration Center (JCSS Accredited Cal. Lab. No.0031)
Standard Gauge Block <Laboratory Reference Standard>

Note: This chart is a simplified representation of Mitutoyo’s overall traceability system. Detailed traceability charts are published for each product.
Conformance to CE Marking

In order to improve safety, each plant has programs to comply with the Machinery Directives, the EMC Directives, and the Low Voltage Directives. Compliance to CE marking is also satisfactory. CE stands for "Conformité Européenne". CE marking indicates that a product complies with the essential requirements of the relevant European health, safety and environmental protection legislation.

*1 The scope of JCSS accreditation is from 20HRC up to 65HRC in Rockwell Hardness Testing Machines and Hardness Reference Blocks.

Note: This chart is a simplified representation of Mitutoyo’s overall traceability system. Detailed traceability charts are published for each product.
Meaning of Symbols

**ABSOLUTE Linear Encoder**

Mitutoyo’s technology has realised the absolute position method (absolute method). With this method, you do not have to reset the system to zero after turning it off and then turning it on. The position information recorded on the scale is read every time. The following three types of absolute encoders are available: electrostatic capacitance model, electromagnetic induction model and model combining the electrostatic capacitance and optical methods. These encoders are widely used in a variety of measuring instruments as the length measuring system that can generate highly reliable measurement data.

**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.
3. As this type of encoder can drive with less power than the incremental encoder, the battery life is prolonged to about 3.5 years (continuous operation of 20,000 hours) under normal use.

*1: Unless the battery is removed
*2: In the case of the ABSOLUTE Digimatic caliper (electrostatic capacitance model)

**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 instrument and issues, for a fee, a calibration certificate that proves traceability to the relevant standard.

**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. On the other hand, 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.

**IP Codes**

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: 2001) and JIS C 0920: 2003.

<table>
<thead>
<tr>
<th>First characteristic numeral</th>
<th>Degrees of protection against solid foreign objects</th>
<th>Brief description</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Unprotected</td>
<td></td>
<td>—</td>
</tr>
<tr>
<td>1</td>
<td>Protected against solid foreign objects of Sø0.5 mm and greater</td>
<td>A Sø0.5 mm object probe shall not fully penetrate enclosure*</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Protected against solid foreign objects of Sø2.5 mm and greater</td>
<td>A Sø2.5 mm object probe shall not fully penetrate enclosure*</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Protected against solid foreign objects of Sø5.0 mm and greater</td>
<td>A Sø5.0 mm object probe shall not fully penetrate enclosure*</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Protected against solid foreign objects of Sø12.5 mm and greater</td>
<td>A Sø12.5 mm object probe shall not fully penetrate enclosure*</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Protected against dust</td>
<td>Ingress of dust is not totally prevented, but dust that does penetrate must not interfere with satisfactory operation of the apparatus or impair safety.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dust-proof</td>
<td>No ingress of dust allowed.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>—</td>
<td></td>
<td>—</td>
</tr>
<tr>
<td>8</td>
<td>—</td>
<td></td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second characteristic numeral</th>
<th>Degrees of protection against water</th>
<th>Brief description</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Unprotected</td>
<td></td>
<td>—</td>
</tr>
<tr>
<td>1</td>
<td>Protected against vertical water drops</td>
<td>Vertically falling water drops shall have no harmful effects.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Protected against vertical water drops within a tilt angle of 15°</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Protected against splashing water</td>
<td>Water sprayed at an angle up to 60° either side of the vertical shall have no harmful effects.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Protected against splashing water</td>
<td>Water splashed against the enclosure from any direction shall have no harmful effects.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Protected against water jets</td>
<td>Water projected in jets against the enclosure from any direction shall have no harmful effects.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Protected against powerful water jets</td>
<td>Water projected in powerful jets against the enclosure from any direction shall have no harmful effects.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Protection against water penetration</td>
<td>Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under standardised conditions of pressure and time.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Protected against the effects of continuous immersion in water</td>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

* For details of the test conditions used in evaluating each degree of protection, please refer to the original standard.
Independent Confirmation of Compliance

IP65, IP66 and IP67 protection level ratings for applicable Mitutoyo products have been independently confirmed by the German accreditation organisation, TÜV Rheinland.

Metric/Inch
Mitutoyo offers this quality product also in an switchable Metric/Inch version. Please refer to your local Mitutoyo website for detailed information.

Inch/Metric
Mitutoyo offers this quality product also in an switchable Inch/Metric version. Please refer to your local Mitutoyo website for detailed information.

Inch
Mitutoyo offers this quality product also in an Inch version. Please refer to your local Mitutoyo website for detailed information.
Example of Measurement Data Management System Design

A system for recording and analysing measurement results from various Mitutoyo measuring instruments for quality assurance purposes.

**Implementation Step 1**

**Recording measurement results**

- No more handwriting
- Measurement data can be printed easily. Data can be output to a PC for statistics calculations.

**Direct data input to a PC**

- USB Input Tool Series
- Lineups of three models with different output specifications (IT-012/IT-005D/IT-007R)
- Connectable to a RS-232C interface PC with 4 channels and a sequencer

**Multiplexer MUX-10F**

**Wireless**

**Implementation Step 2**

**Software dedicated to inspection and quality control**

- Inspection certificate creation

- Statistical process control

- Measurement data from calipers and micrometers are imported into an Excel spreadsheet.

- GOING judgment, process capability, control charts are displayed in real time.

- Commercial USB hub 4 SUB-FSW cables 4 foot switches

The prices listed are suggested retail prices (valid until 31st May 2014). All products to be sold to commercial customers. Therefore VAT is not included. Product illustrations are without obligation. Product descriptions, in particular any and all technical specifications, are only binding when explicitly agreed upon.
Implementation Step 3

Creating a quality control network covering a wide area within the factory

Unify management of the quality test using the network in the factory

The quality control section monitors results from the inspection room and worksite, handles statistical analysis of stored data and issues forms.

Database server
- Centralises inspection results
- Storage of database
- Generation of inspection certificates

Office
- Terminal of the quality controller
- Quality control
- LAN inside factory
- Database server

Production line
- MeasurLink A-15

LAN inside factory
- Digitical gages
- Optical measuring device
- Vision measuring machine
- CMM
- MCOSMOS
- Inspection room
- Database server centralises inspection results
- Office
- Quality control
- LAN inside factory
- Production line

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MeasurLink 7

An Integrated Solution for Quality Data Management

Most of Mitutoyo’s electronic instruments can output data via optional connecting cables or wireless transmitters & receivers in the form of the Digimatic code. The Digimatic code can also be converted in RS-232C format by any of several available gage multiplexers. In this way, digital data can be sent to PCs for data acquisition and advanced statistical analysis.

As a client/server application, MeasurLink gives you the performance you need through distributed processing. Combined with a multi-user relational database, MeasurLink delivers a safe and organized data warehousing system making quality data available for viewing and analysis by any member of the production, engineering and managerial staff throughout your company. Inspection in the factory produces data for analysis, corrective action, and various reporting needs. As the backbone of your quality efforts, MeasurLink is guaranteed to reduce your production costs and increase your bottom line.

MeasurLink is capable of linking and managing multiple “islands” of inspection into a common database of part information, statistical data, gage information, process, etc. Information is shared across an entire manufacturing facility.

Group Licensing

MeasurLink is available in several modules offering you a wide range of solutions, from data acquisition to manager views and gage management. Details about all modules can be found on the next pages. However, you can create your own package and combine modules by choosing one of the following license bundles:

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64AAB184R</td>
<td>MeasurLink 7 State License - 30 Pack</td>
</tr>
<tr>
<td>64AAB185R</td>
<td>MeasurLink 7 Workgroup License - 15 Pack</td>
</tr>
<tr>
<td>64AAB263R</td>
<td>MeasurLink 7 Workgroup License - 10 Pack</td>
</tr>
<tr>
<td>64AAB264R</td>
<td>MeasurLink 7 Workgroup License - 5 Pack</td>
</tr>
<tr>
<td>64AAB265R</td>
<td>MeasurLink 7 Academic License - 20 Pack</td>
</tr>
</tbody>
</table>

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MeasurLink 7

MeasurLink Real-Time Standard Edition
Designed for customers who want to acquire and analyze data in real-time from Small Tools like calipers and micrometers.

Features:
• Variable and attributive inspection
• Real-time graphics
• Run charts
• Control charts
• Histograms
• Statistics
• Customized Info View
• Full Reporting Template

Supported data sources: keyboard, RS232-C, USB devices

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<tbody>
<tr>
<td>64AAB177R</td>
<td>MeasurLink 7 Real-Time Standard Edition</td>
</tr>
</tbody>
</table>

MeasurLink Real-Time Professional Edition
On-line Real-Time Data Collection

Acquire data directly from Mitutoyo devices such as:
• Coordinate Measuring Machines
• Form Measuring Instruments
• Vision Measurement Machines
Import data from other devices via:
• ASCII
• QMD (xml based)

Features:
• Variable and attributive inspection
• Real-time graphics
• Run charts
• Control charts
• Histograms
• Statistics
• Customized Info View
• Full Reporting Template
• Data filter

Supported data sources: keyboard, RS232, USB devices, Mitutoyo DDE, ASCII, QMD.

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>64AAB178R</td>
<td>MeasurLink 7 Real-Time Professional Edition</td>
</tr>
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</table>

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MeasurLink 7

MeasurLink Real-Time Professional 3D Edition
On-line Real-Time Data Collection

Designed for customers who wish to collect data using the Hoops 3D graphics view. Hoops 3D files can be exported from most CAD systems and provide the operator with a real view of the part. Acquire data directly from Mitutoyo devices such as:
- Coordinate Measuring Machines
- Form Measuring Instruments
- Vision Measurement Machines

Import data from other devices via:
- ASCII
- QMD (xml based)

Features:
- Variable and attributive inspection
- Real-time graphics
- Run charts
- Control charts
- Histograms
- Statistics
- Customized Info View
- Full Reporting Template
- Data filter
- 3D View
- Flexible callout design
- Guided sequence

Supported data sources: keyboard, RS232, USB devices, Mitutoyo DDE, ASCII, QMD.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64AAB179R</td>
<td>MeasurLink 7 Real-Time Professional 3D Edition</td>
</tr>
</tbody>
</table>

MeasurLink Process Analyzer Lite Edition
Data Analysis Software

Designed for offline viewing of Real-Time data in a networked environment. The invaluable tool for your quality team!
- Analyze your process
- Identify problem areas
- Take corrective action
- Improve your product's quality!

Features:
- Review inspection data
- Switch between databases
- Tree control navigation
- Reporting

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>64AAB180R</td>
<td>MeasurLink 7 Process Analyzer Lite Edition</td>
</tr>
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MeasurLink 7

MeasurLink Process Analyzer Professional Edition

Data Analysis Software

Designed for more robust manipulation of Real-Time data in a networked environment.
- Slice and dice data in meaningful ways
- Contribute to quality control initiatives!
- Analyze your process
- Identify problem areas
- Take corrective action
- Improve your product's quality!

Features:
- Review inspection data
- Switch between databases
- Tree control navigation
- Reporting
- Group, search and sort data
- Merge data
- Scatter plots
- Electronic signatures

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64AAB181R</td>
<td>MeasurLink 7 Process Analyzer Professional Edition</td>
</tr>
</tbody>
</table>

MeasurLink Process Manager Standard Edition

Network Monitoring Software

Real-time monitoring of data as it is collected.
The perfect tool for QC and Production Managers!

- Organize and maintain a shop-wide quality program at a glance.
- Audit the entire shop floor inspection activity from a single PC
- Get process information without leaving the office
- View current production across all machines
- Show clients your quality operation for the entire facility
- Establish C_p thresholds for acceptability
- Stay up to the minute on production problems

Drill down for details on certain
- traceability
- assignable cause
- failed tests
- serial numbers

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64AAB182R</td>
<td>MeasurLink 7 Process Manager Standard Edition</td>
</tr>
</tbody>
</table>
MeasurLink 7

MeasurLink Gage R&R
Measurement Systems Analysis

Designed according to standard ISO/TS 16949, Gage R&R allows you to use the methods of study AIAG:
• Range
• Average and Range
• Average and Range including part variation
• Variance analysis
• Short method for attributive gages
• Bias study
• Linearity study
• Stability study

Features:
Graphical analysis tools:
• Xbar R chart
• Part by appraiser plot

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64AAS941DR</td>
<td>MeasurLink Gage R&amp;R 6</td>
</tr>
</tbody>
</table>

MeasurLink Gage Management
Gage Inventory and Calibration Control

MeasurLink Gage Management allows customers to build a complete gage and fixture inventory. Calibration is made simple by supporting digital gages for both, variable and attributive features. Achieve optimal calibration frequencies - set-up individual calendars with:
• Gage in-service dates
• Calibration recall dates
• Gage R&R dates

Features:
• Vendor contact lists
• User lists
• Print and archive calibration certificates
• Incremental response methods
• Customized gage label printing

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64AAS007DR</td>
<td>MeasurLink Gage Management 6</td>
</tr>
</tbody>
</table>

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Digimatic Printer/Statistic Processor DP1-VR

Series 264

This DP-1VR printer allows you to print statistical evaluations, and is so compact it fits right in the palm of your hand.

The DP-1VR offers the following benefits:

- You can print data from calipers, micrometers and other measuring devices equipped with a Digimatic port, and even perform statistical evaluations.
- Printing speed is excellent, it prints from a one-touch start and with the built-in thermal line printer there’s almost no noise. The thermosensitive paper has outstanding durability and chemical resistance for long-term storage.
- The DP-1VR even lets you transmit the data to a computer using an RS-232C connecting cable.
- Clock function for loading measurement data.
- Processing capacity for up to 9999 data subgroups.

Specifications

<table>
<thead>
<tr>
<th>Printer type</th>
<th>Thermal line printer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printing method</td>
<td>384 dot (8 dot / mm)</td>
</tr>
<tr>
<td>Print speed</td>
<td>6,5 mm/s (using AC adapter)</td>
</tr>
<tr>
<td>Printing paper</td>
<td>48 m per roll</td>
</tr>
<tr>
<td>Capacity</td>
<td>ca. 6,500 lines for large characters, 12,000 lines for normal characters</td>
</tr>
<tr>
<td>Processing capacity</td>
<td>Mode 1/2/3: 9,999 data subgroups; Mode 0: 100,000 data subgroups</td>
</tr>
<tr>
<td>Printable data</td>
<td>Measurement data, GO/NG GO judgement, number of data, maximum/minimum value, range, average, standard deviation, number of defective, fraction defective, process capability, index, histogram, D-chart, control chart, generation for X-d-bar and control limit data, date and time</td>
</tr>
<tr>
<td>Output function</td>
<td>Outputs the measurement data (RS-232C) or GO/NG GO judgement</td>
</tr>
<tr>
<td>Power</td>
<td>AC adapter 6V, battery: LR6 x 4 (alkaline), NiMH (rechargeable, battery is not charged in the device)</td>
</tr>
<tr>
<td>Timer function</td>
<td>0,25 s; 1 s; 5 s; 30 s; 1 min; 30 min; 60 min (0,25 s only statistical function)</td>
</tr>
</tbody>
</table>

Standard accessories

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>06AEG180D</td>
<td>AC Adapter 6V DC, 2A</td>
</tr>
<tr>
<td>09EAA069D</td>
<td>Printer paper (1 roll)</td>
</tr>
</tbody>
</table>

Optional accessories

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>937179T</td>
<td>Footswitch</td>
</tr>
<tr>
<td>09EAA084</td>
<td>RS-232C Data cable 1 m (9-pin) for connection DP-1 VR to PC</td>
</tr>
<tr>
<td>09EAA094</td>
<td>RS-232C Data cable 1 m (25-pin) for connecting DP-1VR to Linear Scale KA counter</td>
</tr>
<tr>
<td>965516</td>
<td>GO/NG Cable for sending the GO/NG judgement to an external device e.g. red/green signal</td>
</tr>
</tbody>
</table>

Consumable spares

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>011037</td>
<td>4 batteries LR-6 (AA)</td>
</tr>
<tr>
<td>011348</td>
<td>Ni-MH Batteries (rechargeable)</td>
</tr>
<tr>
<td>09EAA065D</td>
<td>Printer paper (1 roll)</td>
</tr>
</tbody>
</table>

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Digimatic Data Cables

These data cables allow you to connect measuring instruments with a Digimatic output to a PC or dedicated data processor.

Digimatic Data Cables offer you the following benefits:

- Connecting Mitutoyo measuring instruments that feature a Digimatic interface.
- You can also connect one or more Digimatic measuring instrument to an additional device, such as a DP-1VR, Counter or DMX Interface (PC).

<table>
<thead>
<tr>
<th>No. /</th>
<th>For use with</th>
<th>Measuring instrument plugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 m</td>
<td>IP65/66/67 ABSOLUTE DIGIMATIC Thickness Gauge (Series 547)</td>
<td>With data key and screws</td>
</tr>
<tr>
<td></td>
<td>IP65/66/67 ABSOLUTE DIGIMATIC Caliper (Series 500, 550, 551, 573)</td>
<td>Straight</td>
</tr>
<tr>
<td></td>
<td>IP65/66/67 ABSOLUTE DIGIMATIC Scale (Series 572)</td>
<td>Back side</td>
</tr>
<tr>
<td></td>
<td>IP65/66/67 ABSOLUTE DIGIMATIC Depth Gauge (Series 571)</td>
<td>Right</td>
</tr>
<tr>
<td>2 m</td>
<td>IP65/66/67 ABSOLUTE DIGIMATIC Thickness Gauge (Series 547)</td>
<td>Left</td>
</tr>
<tr>
<td></td>
<td>ABSOLUTE DIGIMATIC Dial Indicator IDS/IDC (Series 543)</td>
<td>With data key</td>
</tr>
<tr>
<td></td>
<td>ABSOLUTE DIGIMATIC Dial Indicator IDU (Series 575)</td>
<td></td>
</tr>
<tr>
<td>05CZA662 05CZA663</td>
<td>Digimatic micrometer IP65 (Series 293, 331, 340, 342, 695) Three-point Inside Micrometer DIGIMATIC Holtest (Series 468)</td>
<td>6 pin</td>
</tr>
<tr>
<td>937387 965013</td>
<td>ABSOLUTE DIGIMATIC Quick Micrometer (Series 227, 233) DIGIMATIC Micrometers (Series 293, 314, 377, 323, 324, 326, 331, 340, 342, 343, 369, 389, 395, 406, 422) DIGIMATIC Micrometer Heads (Series 164, 350) DIGIMATIC Standard Micrometer (Series 121) DIGIMATIC Depth Micrometer (Series 328) DIGIMATIC Inside Micrometer with jaws (Series 345) DIGIMATIC Inside Micrometer (Series 337, 339) ABSOLUTE DIGIMATIC Borematic (Series 568) Height Micrometer Heightmaster (Series 515) Hardness Tester Wizard (Series 810) Hardness Tester Micro Vickers HM/HV (Series 810)</td>
<td>Identical connectors on both ends</td>
</tr>
<tr>
<td>936397 965014</td>
<td>ABSOLUTE DIGIMATIC Indicator ID-F/ID-H (Series 543) Portable Surface Roughness Tester SF-210/301/401/402 (Series 178) Profile Projector PJ-Series (Series 303) Profile Projector PH-Series (Series 172) Height Micrometer CERA Heightmaster (Series 515) Linear Height and Height Gauge QM-Series (Series 518) Linear Gauge Counter (Series 542) LSM-6000 Counter for Laser Scan Micrometer (Series 544) Laser Scan Micrometer LSM-9506 DIGIMATIC Multi-unit (Series 572) MVK-H Hardness Tester (Series 810) DIGIMATIC Port for Linear-Scale Counter</td>
<td></td>
</tr>
<tr>
<td>21EAA194 21EAA190</td>
<td>ABSOLUTE DIGIMATIC Indicator ID-N/ID-B (Series 543)</td>
<td></td>
</tr>
<tr>
<td>21EAA211</td>
<td>ABSOLUTE DIGIMATIC Indicator ID-N/ID-B (Series 543) with zero-setting terminal</td>
<td></td>
</tr>
</tbody>
</table>
Digimatic Extension Cables

Series 011 / 936

- These extension cables allow you to extend Digimatic data cables up to 14 metres, extending the working distance between a measuring instrument and an external device such as a PC or DP-1VR.

Optional accessories

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>936937</td>
<td>Digimatic cable (1 m)</td>
</tr>
<tr>
<td>965014</td>
<td>Digimatic cable (2 m)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>011391</td>
<td>5 m</td>
</tr>
<tr>
<td>011392</td>
<td>8 m</td>
</tr>
<tr>
<td>011393</td>
<td>10 m</td>
</tr>
</tbody>
</table>
## Specifications

**Cable length**: 2 m  
**Output**: USB (MID/VC/P)  
**OS compatibility**: Windows® 2000 Professional (≥ SP4), Windows® XP Professional (≥ SP2), Windows® XP Home Edition (≥ SP2), Windows® Vista®/7 (32bit, 64bit)

**Max connectable devices**: Windows® XP/2000: 108 devices (18 hubs with 7 ports and 1 software Dongle)  
Windows® Vista®/7: 20 devices

### Optional accessories

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>937179T</td>
<td>Footswitch</td>
</tr>
<tr>
<td>06ADV386</td>
<td>Software USB-ITPAK with Dongle</td>
</tr>
</tbody>
</table>

### Typical USB cable

- Footswitch connection for USB
- Typical commercially available USB Hub

### Data cable USB

<table>
<thead>
<tr>
<th>No.</th>
<th>Model</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>06ADV380A</td>
<td>A</td>
<td>IP USB Input Tool Direct Cable Straight With Data Switch (2m) e.g. for IP67 Caliper</td>
</tr>
<tr>
<td>06ADV380B</td>
<td>B</td>
<td>IP USB Input Tool Direct Cable Back Side With Data Switch (2m) e.g. for IP65 Micrometer</td>
</tr>
<tr>
<td>06ADV380C</td>
<td>C</td>
<td>USB Input Tool Direct Cable Straight With Data Switch (2m) e.g. for Standard Absolute Caliper</td>
</tr>
<tr>
<td>06ADV380D</td>
<td>D</td>
<td>USB Input Tool Direct Cable Plain (2m) e.g. for IDH/IDF Indicator</td>
</tr>
<tr>
<td>06ADV380E</td>
<td>E</td>
<td>USB Input Tool Direct Cable Round (2m) e.g. for Quick Micrometer</td>
</tr>
<tr>
<td>06ADV380F</td>
<td>F</td>
<td>USB Input Tool Direct Cable Straight (2m) e.g. for IDC/IDS Indidator</td>
</tr>
<tr>
<td>06ADV380G</td>
<td>G</td>
<td>IP USB Input Tool Direct Cable IDN/IDB (2m)</td>
</tr>
</tbody>
</table>

### Advantages of the new Digimatic USB connections

#### Application

- Arbitrary software, which expects a keyboard code
- Commercial statistics software like e.g. Mitutoyo MeasurLink

#### Situation

- Only a USB Input tools signal cable required.
- A USB input tools signal cable and the software USB ITPAK are required.

#### Software USB-ITPAK

- Software is not needed.
- For each measuring instrument (cable) a fixedly assigned virtual COM-Port is generated once; afterwards Software USB ITPAK becomes inactive.

#### Data format

- Measured value as keyboard format (HID = Human Interface Device)
- Transmission of a measured value in text format (VCP = as virtual COM port)

#### Remarks

- Foot switch can not be connected.
- MUX-10 Specification (e.g. 01A+138.626) with fixed COM assignment as channel identification
- Transmission of a measured value in text format (VCP = as virtual COM port)

#### Microsoft® Excel®

- Measuring report Microsoft® Excel®-format and character sequence of max. 31 characters (e.g. text input)
USB ITPAK

Series 06AEN

- USB-ITPAK is a setting and data collection software for collection data from measuring instruments with Digimatic output for entry to Microsoft® Excel®.
- USB Input Tool Direct cable, U-WAVE Wireless communication system and USB Footswitch adapter can be used to send the data to a Microsoft® Excel® worksheet.

<table>
<thead>
<tr>
<th>No.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>06AEN846</td>
<td>Software USB-ITPAK with Dongle</td>
</tr>
</tbody>
</table>

**Specifications**

**OS compatibility**
- Windows® 2000 Professional (≥SP4),
- Windows® XP Professional (≥SP2),
- Windows® XP Home Edition (≥SP2),
- Windows Vista®/7 (32bit,64bit),
- Windows® 8

**Applicable MS Excel Version**

**Functions**
- setting of Microsoft® Excel® input (workbook, worksheet, cell range a.a.o.)
- data collection: USB Input Tool Direct cable wireless communication system U-WAVE
- selection of measuring input (sequential, simultaneous, individual)
- control of data input (mouse, foot switch, keyboard)
- character string input by foot switch
- timer function
- measurement time input

**Language for display**
- English, German, French, Italian, Spanish, Turkish, Czech, Polish, Hungarian, Swedish, Russian, Japanese, Korean, Simplified Chinese, Traditional Chinese

**Delivered with USB dongle**

**Sequential Measurement**
1: Micrometer for diameters X and Y; 2: Caliper for height measurement H; 3: Inspection by attributes OK/NG with foot switch e.g. scratches in the surface; 4: standard USB-Hub; 5 Measurement direction; 6: Workpiece No. 7: Measuring result X/Y; 8: Measuring result H; 9: OK/NG judgement (e.g. scratches)

**Simultaneous Measurement**

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Wireless Communication System: U-WAVE

Specifications

<table>
<thead>
<tr>
<th>Protocol</th>
<th>IEEE 802.15.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modulation method</td>
<td>DS-SS (Direct Sequence Spread Spectrum)</td>
</tr>
<tr>
<td>Communication distance</td>
<td>Approx. 20 m line of sight</td>
</tr>
<tr>
<td>Communication speed (kbps)</td>
<td>250</td>
</tr>
<tr>
<td>Communication frequency (GHz)</td>
<td>2.4 GHz (ISM: universal frequency band)</td>
</tr>
<tr>
<td>User band (channels)</td>
<td>15 channels (2.405 to 2.475GHz at intervals of 5 MHz)</td>
</tr>
<tr>
<td>OS compatibility</td>
<td>Windows® 2000 Professional (&gt;SP4), Windows® XP Professional (&gt;SP2), Windows Vista®, Windows® 7 (32 bit, 64 bit)</td>
</tr>
</tbody>
</table>

Standard accessories

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>02AZD770</td>
<td>Clip for Cable fixing</td>
</tr>
<tr>
<td>05CZA619</td>
<td>Screw driver</td>
</tr>
<tr>
<td>05SAA217D</td>
<td>Lithium battery CR-2032</td>
</tr>
</tbody>
</table>

Optional accessories

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>937179T</td>
<td>Footswitch</td>
</tr>
<tr>
<td>02AZE200</td>
<td>Holder for U-WAVE T. Contents: support plate, fixing pads, screws</td>
</tr>
</tbody>
</table>

Consumable spares

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>05SAA217D</td>
<td>Lithium battery CR-2032</td>
</tr>
</tbody>
</table>

Series 02AZD

This wireless communication system transfers data directly from a Digimatic measuring instrument to a PC, meaning no more cables are needed.

The U-WAVE offers the following benefits:

- 20 metre communication distance.
- It allows easy data export straight to Microsoft® Excel® or other applications, using the bundled data interface software.
- Data transfer is confirmed by the transmitter through a buzzer or LED.
- An IP67 transmitter is available.
- You can make 400,000 data transmissions with a single battery.
- By using special software it will also support a data request from a PC (Event Drive mode). This is ideal if there is no one operating the measuring tool, or if it is installed at an inaccessible side.

Receiver U-WAVE R

<table>
<thead>
<tr>
<th>No.</th>
<th>Software</th>
<th>Remarks</th>
<th>Number of U-WAVE-R units that can be connected to PC</th>
<th>Number of U-Wave-T units that can be connected</th>
<th>USB Cable length (m)</th>
<th>Power supply</th>
<th>Dimensions (WxDxH) (mm)</th>
<th>Mass (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02AZD810D</td>
<td>U-WAVE PAK + Software</td>
<td>Up to 16</td>
<td>Up to 100</td>
<td>1</td>
<td>USB bus power system</td>
<td>140 x 80 x 31.6</td>
<td>130</td>
<td></td>
</tr>
</tbody>
</table>

Transmitter U-WAVE T

<table>
<thead>
<tr>
<th>No.</th>
<th>Data reception indication</th>
<th>Remarks</th>
<th>Power supply</th>
<th>Battery life</th>
<th>Dimensions (WxDxH) (mm)</th>
<th>Mass (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02AZD730D</td>
<td>LED</td>
<td>IP67 model</td>
<td>Battery CR2032</td>
<td>400.000 transmissions</td>
<td>44 x 29.6 x 18.5</td>
<td>23</td>
</tr>
<tr>
<td>02AZD880D</td>
<td>LED and buzzer</td>
<td>Standard model</td>
<td>Battery CR2032</td>
<td>400.000 transmissions</td>
<td>44 x 29.6 x 18.5</td>
<td>23</td>
</tr>
</tbody>
</table>
Wireless Communication System: U-WAVE

Series 02AZD / 02AZE

- The is a short cable that connects a measuring tool to its U-WAVE T unit. Choose the appropriate cable for your measuring tool from the seven types below, A to G.

<table>
<thead>
<tr>
<th>No.</th>
<th>Model</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>02AZD790A</td>
<td>A</td>
<td>IP U-WAVE Data Cable Straight With Data Switch e.g. for IP67 Caliper</td>
</tr>
<tr>
<td>02AZD790B</td>
<td>B</td>
<td>IP U-WAVE Data Cable Back Side With Data Switch e.g. for IP65 Micrometer</td>
</tr>
<tr>
<td>02AZD790C</td>
<td>C</td>
<td>U-WAVE Data Cable Straight With Data Switch e.g. for Standard Absolute Caliper</td>
</tr>
<tr>
<td>02AZD790D</td>
<td>D</td>
<td>U-WAVE Data Cable Plain e.g. for IDH/IDF Indicator</td>
</tr>
<tr>
<td>02AZD790E</td>
<td>E</td>
<td>U-WAVE Data Cable Round e.g. for Quick Micrometer</td>
</tr>
<tr>
<td>02AZD790F</td>
<td>F</td>
<td>U-WAVE Data Cable Straight e.g. for IDC/IDS Indicator</td>
</tr>
<tr>
<td>02AZD790G</td>
<td>G</td>
<td>IP U-WAVE Data Cable e.g. for IDN/IDB Indicator</td>
</tr>
</tbody>
</table>

1 Cable without footswitch connection

(C) (G)

2 Cable with footswitch connection

<table>
<thead>
<tr>
<th>No.</th>
<th>Model</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>02AZE140A</td>
<td>A</td>
<td>IP U-WAVE Data Cable Straight With Switch/FootSwitch Connector e.g. for IP67 Caliper</td>
</tr>
<tr>
<td>02AZE140B</td>
<td>B</td>
<td>IP U-WAVE Data Cable Back Side With Switch/FootSwitch Connector e.g. for IP65 Micrometer</td>
</tr>
<tr>
<td>02AZE140C</td>
<td>C</td>
<td>U-WAVE Data Cable Straight With Switch/FootSwitch Connector e.g. for standard Absolute Caliper</td>
</tr>
<tr>
<td>02AZE140D</td>
<td>D</td>
<td>U-WAVE Data Cable Plain With FootSwitch Connector e.g. for IDH/IDF Indicator</td>
</tr>
<tr>
<td>02AZE140E</td>
<td>E</td>
<td>U-WAVE Data Cable Round With FootSwitch Connector e.g. for Quick Micrometer</td>
</tr>
<tr>
<td>02AZE140F</td>
<td>F</td>
<td>U-WAVE Data Cable Straight With FootSwitch Connector e.g. for IDC/IDS Indicator</td>
</tr>
<tr>
<td>02AZE140G</td>
<td>G</td>
<td>IP U-WAVE Data Cable With FootSwitch Connector e.g. for IDN/IDB Indicator</td>
</tr>
</tbody>
</table>

7 types of connector

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**USB Input Tool**

**Series 264 - Keyboard Interface**

- This USB input tool is a keyboard interface for transmitting data from measuring instruments equipped with Digimatic interfaces to a PC. Measurement data is converted into keyboard codes, allowing you to easily access it with any program working with keyboard entries, regardless of the operating system. The USB and data conversation interfaces also allow you to directly input the measurement data into a spreadsheet.

**Specifications**
- Cable length: 0.9 m
- Dimensions (WxDxH): 72 x 44 x 23.5 mm
- Power supply: 5V from the USB
- OS compatibility: Microsoft® Windows® 98, 2000, XP, Windows Vista®, 7 (32 bit), Pocket PC 2002

**Optional accessories**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>937179T</td>
<td>Footswitch</td>
</tr>
</tbody>
</table>

**DMX-3T / FS2 USB**

**Series 011**

**Keyboard interface**

- The DMX-3 T/FS2 USB is a keyboard interface that transmits measurement data from measuring instruments equipped with Digimatic interfaces to a PC. Measurement data is converted into keyboard codes, allowing you to easily access it with any program working with keyboard entries, regardless of the operating system. The USB and data conversation interfaces also allow you to directly input the measurement data into a spreadsheet.

**Specifications**
- Dimensions (WxDxH): 112 x 122 x 45 mm
- Power supply: 5V from the USB
- Timer function: 0-99s (1s step) or 0-99min
- OS compatibility: Microsoft® Windows® 2000, XP, Vista, 7
- Max. no. of cascadable interface: 3 via optional link cable

**Optional accessories**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>937179T</td>
<td>Footswitch</td>
</tr>
<tr>
<td>011538</td>
<td>Interface Link cable (300 mm)</td>
</tr>
</tbody>
</table>
DMX-1
Series 011

This DMX-1 D-SUB9 serial interface is a microcontrolled interface for connecting one single measurement device, with Digimatic output, to the RS-232C interface of a computer. The DMX-1 offers the following benefits:

- Easily connect a measuring device to a computer’s RS-232C serial port.
- No external power supply is needed, as the small level of power needed is supplied by the handshake lines RTS and DTR.

<table>
<thead>
<tr>
<th>No.</th>
<th>Data input</th>
<th>Data output</th>
<th>Interface cable connection</th>
<th>Footswitch connector</th>
<th>Baud rate</th>
<th>Data bits</th>
<th>Stop bits</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>011216</td>
<td>1 x Digimatic</td>
<td>RS-232C</td>
<td>D-SUB 9</td>
<td>Yes</td>
<td>9600</td>
<td>8</td>
<td>1</td>
<td>none</td>
</tr>
</tbody>
</table>

**Specifications**

Dimensions (WxDxH) | 58 x 62 x 18 mm

**Optional accessories**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>937179T</td>
<td>Footswitch</td>
</tr>
<tr>
<td>011196</td>
<td>Signal cable RS-232C D-SUB9 to D-SUB9 (2 m)</td>
</tr>
</tbody>
</table>

DMX-1 USB
Series 011

The DMX-1 USB is a micro-controlled interface for connecting 1 Digimatic-output measurement device to the USB interface of a computer. The device appears as a virtual COM-PORT (VCP) to the computer.

<table>
<thead>
<tr>
<th>No.</th>
<th>Data input</th>
<th>Data output</th>
<th>Interface cable connection</th>
<th>Footswitch connector</th>
<th>Baud rate</th>
<th>Data bits</th>
<th>Stop bits</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>011506</td>
<td>1 x Digimatic</td>
<td>USB</td>
<td>virtual COM-Port (VCP)</td>
<td>USB</td>
<td>Yes</td>
<td>9600</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

**Specifications**

Dimensions (WxDxH) | 33 x 57 x 20 mm

**Optional accessories**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>937179T</td>
<td>Footswitch</td>
</tr>
</tbody>
</table>

DMX-2 S
Series 011

This DMX-2 S D-SUB5 serial interface is a microcontrolled interface for connecting two measurement devices, with Digimatic output, to the RS-232C serial port of a computer. The DMX-2 S offers the following benefits:

- Easily connect two measuring devices to a computer’s RS-232C serial port.
- No external power supply is needed, as the small level of power needed is supplied by the handshake lines RTS and DTR.

<table>
<thead>
<tr>
<th>No.</th>
<th>Data input</th>
<th>Data output</th>
<th>Interface cable connection</th>
<th>Footswitch connector</th>
<th>Baud rate</th>
<th>Data bits</th>
<th>Stop bits</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>011466</td>
<td>2 x Digimatic</td>
<td>RS-232C</td>
<td>D-SUB 25</td>
<td>Yes</td>
<td>9600</td>
<td>8</td>
<td>1</td>
<td>none</td>
</tr>
</tbody>
</table>

**Specifications**

Dimensions (WxDxH) | 58 x 62 x 18 mm

**Optional accessories**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>011197</td>
<td>Adapter D-SUB25 to D-SUB9 (0,2 m)</td>
</tr>
<tr>
<td>937179T</td>
<td>Footswitch</td>
</tr>
<tr>
<td>011119</td>
<td>Signal cable RS-232C D-SUB25 to D-SUB9 (2 m)</td>
</tr>
</tbody>
</table>

Sample application with footswitch (optional accessory)
**DMX-2 USB**

### Specifications

**Dimensions**
61 x 76 x 35 mm

**OS compatibility**
Microsoft® Windows® 2000, XP, Vista, 7 (32 bit, 64 bit)

**Output decimal mark (HID)**
point or comma

**Delivered**
USB cable (1.8 m)

**Driver software**
Optional accessories

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>937179T</td>
<td>Footswitch</td>
</tr>
</tbody>
</table>

**Series 011**

ing two measurement devices, with Digimatic output, to a USB port.

The DMX-2 USB offers the following benefits:

- It appears either as a virtual COM-Port (VCP) or as a keyboard (HID) on the computer.
- It has a mode switch available to easily swap between keyboard format (HID) and virtual COM-Port (VCP).

**Rear panel**

<table>
<thead>
<tr>
<th>No.</th>
<th>Data input</th>
<th>Data output</th>
<th>Interface cable connection</th>
<th>Footswitch connector</th>
<th>Baud rate</th>
<th>Data bits</th>
<th>Stop bits</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>011443</td>
<td>2 x Digimatic</td>
<td>USB virtual COM-Port (VCP)</td>
<td>USB keyboard signal (HID) (switchable on the box)</td>
<td>Yes</td>
<td>9600</td>
<td>8</td>
<td>1</td>
<td>none</td>
</tr>
</tbody>
</table>

**DMX-3 USB**

### Specifications

**Dimensions**
170 x 128 x 55 mm

**OS compatibility**
Microsoft® Windows® 2000, XP, Vista, 7 (32 bit, 64 bit)

**Delivered**
USB cable (1.8 m)

**Driver Software**

**AC Adapter (only for serial cable D-Sub 9 connection)**

**Optional accessories**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>937179T</td>
<td>Footswitch</td>
</tr>
<tr>
<td>011196</td>
<td>Signal cable RS-232C DSub9-DSub9 (2 m)</td>
</tr>
</tbody>
</table>

**Series 011**

The DMX-3 3 channel USB VCP interface/ D-SUB9 serial interface is a microcontrolled interface that connects three measurement devices, with Digimatic output, to either the RS-232C serial port or USB port of a computer.

The DMX-3 offers the following benefits:

- If the USB output is used, the measuring device will appear as a virtual COM-Port (VCP) on the computer.
- Power is supplied by an AC/DC adapter, which is a standard accessory only required for serial cable D-Sub 9 connection.

**Rear panel**

<table>
<thead>
<tr>
<th>No.</th>
<th>Data input</th>
<th>Data output</th>
<th>Interface cable connection</th>
<th>Footswitch connector</th>
<th>Baud rate</th>
<th>Data bits</th>
<th>Stop bits</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>011505</td>
<td>3 x Digimatic</td>
<td>USB virtual COM-Port (VCP), RS-232C</td>
<td>For serial cable: D-SUB 9 for USB: cable type B</td>
<td>Yes</td>
<td>1200/9600 (adjustable with jumper)</td>
<td>8</td>
<td>1</td>
<td>none</td>
</tr>
</tbody>
</table>

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MUX-10F
Series 264
The MUX-10F 4 channel D-SUB9 serial interface is a microcontrolled interface that connects four measurement devices, with Digimatic output, to the RS-232C serial port of a computer. The MUX-10F offers the following benefits:
• You can connect four measurement devices to an RS-232C serial port.

<table>
<thead>
<tr>
<th>No.</th>
<th>Data input</th>
<th>Data output</th>
<th>Interface cable connection</th>
<th>Footswitch connector</th>
<th>Baud rate</th>
<th>Data bits</th>
<th>Stop bits</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>264-002</td>
<td>4 x Digimatic</td>
<td>RS-232C</td>
<td>D-SUB 9</td>
<td>Yes</td>
<td>300, 600, 1200, 2400, 9600, 19200</td>
<td>8</td>
<td>1</td>
<td>none</td>
</tr>
</tbody>
</table>

DMX-8/2
Series 011
The DMX-8/2 8 channel D-SUB9 serial interface is a microcontrolled interface for connecting eight measurement devices, with Digimatic output, to the RS-232C serial port of a computer. The DMX-8/2 offers the following benefits:
• It comes with a 220-240V 50 Hz power supply.

<table>
<thead>
<tr>
<th>No.</th>
<th>Data input</th>
<th>Data output</th>
<th>Interface cable connection</th>
<th>Footswitch connector</th>
<th>Baud rate</th>
<th>Data bits</th>
<th>Stop bits</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>011318</td>
<td>8 x Digimatic</td>
<td>RS-232C</td>
<td>D-SUB 9</td>
<td>Yes</td>
<td>9600</td>
<td>8</td>
<td>1</td>
<td>none</td>
</tr>
</tbody>
</table>

DMX-16 / DMX-16C
Series 011
The DMX-16/16C offers the following benefits:
• It features integrated microprocessors for data processing, which means simultaneous input and output from all measurement instruments, as well as faster data processing speeds.

<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>Data input</th>
<th>Data output</th>
<th>Interface cable connection</th>
<th>Footswitch connector</th>
<th>Baud rate</th>
<th>Data bits</th>
<th>Stop bits</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>011191</td>
<td>DMX-16</td>
<td>16 x Digimatic</td>
<td>RS-232C</td>
<td>D-SUB 9</td>
<td>Yes</td>
<td>9600</td>
<td>8</td>
<td>1</td>
<td>none</td>
</tr>
<tr>
<td>011255</td>
<td>DMX-16C</td>
<td>16 x Digimatic</td>
<td>RS-232C</td>
<td>D-SUB 9</td>
<td>Yes</td>
<td>9600</td>
<td>8</td>
<td>1</td>
<td>none</td>
</tr>
</tbody>
</table>

Specifications
- Dimensions (WxDxH): 91,4 x 92,5 x 50,4 mm
- Delivered: AC Adapter

Optional accessories
- Footswitch 937179T
- Signal cable RS-232C DSub9-DSub9 (2 m) 011196

Specifications
- Dimensions (WxDxH): 158 x 204 x 66 mm
- Delivered: Power cable

Optional accessories
- Footswitch 937179T
- Signal cable RS-232C DSub9-DSub9 (2 m) 011196

Specifications
- Dimensions (WxDxH): 225 x 204 x 75 mm
- Delivered: Power cable

Optional accessories
- Footswitch 937179T
- Signal cable RS-232C DSub9-DSub9 (2 m) 011196
DMX-3-2 USB

Series 011

This DMX-3-2 USB is a three channel USB interface for connecting three measurement devices, with Digimatic output, and two devices with RS232C output (such as the Mitutoyo QM-Data 200) to the USB interface of a computer.

The DMX-3-2 USB offers the following benefits:

- It can connect more than 70 different measuring instruments with RS232C output, including Mitutoyo devices as well as other brands (a list is available on request).
- The interface converts the different signals from the connected measuring instruments into the same format: keyboard signal (HID) or virtual COM-Port MUX-10 or MUX-50 (VCP).

Optional accessories

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>937179T</td>
<td>Footswitch</td>
</tr>
<tr>
<td>011538</td>
<td>Interface Link cable (300 mm)</td>
</tr>
</tbody>
</table>

Digimatic Timerbox

Series 011

This timerbox allows you to connect to the footswitch connector of a Mitutoyo interface to trigger data transfer, based on a time interval.

The Digimatic Timerbox offers the following benefits:

- Software neutral for all applications.
- It can be used with all Mitutoyo interfaces featuring 3.5mm TRS Foot switch connectors (Mono) such as USB Input Tool Direct.
- It works as a time-controlled footswitch.

Specifications

<table>
<thead>
<tr>
<th>Dimensions (WxDxH)</th>
<th>55 x 58 x 31 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>AC-Adapter 10 V, 120mA or USB bus power</td>
</tr>
<tr>
<td>Timer function</td>
<td>1s-99h 59 min 59s (100h)</td>
</tr>
<tr>
<td>Timer tolerance</td>
<td>±0.24h</td>
</tr>
<tr>
<td>Delivered</td>
<td>USB connection cable (0.8 m) AC adaptor Footswitch cable TTB1 (0.52 m)</td>
</tr>
<tr>
<td>Mass</td>
<td>84 g</td>
</tr>
</tbody>
</table>

No. Data input Data output Interface cable connection Footswitch connector Baud rate Data bits Stop bits Parity

| 011552   | 3 x Digimatic 2 x RS232C USB virtual COM-Port (VCP) USB keyboard signal (HID) | USB | Yes | 9,600 | 8  | 1 | none |

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Digimatic Display Unit
Series 542
For devices equipped with SPC Digimatic output:
- Micrometer
- Indicator
- Caliper
- etc...

Digimatic Data Logger
Series 011
The Digimatic DL-1000 and 1000 M are data loggers designed for storing measurement data recorded by a Digimatic measuring instrument for subsequent output to a computer. They allow you to collect data when away from a PC, and transfer it later. These Digimatic Data Loggers offer the following benefits:
- The measuring device is connected to the I/O port of the DL-1000/1000 M with a data cable, and you can transmit data either using the data button on the measuring device or on the DL-1000/1000 M.
- For data transfer the devices are connected via an interface to the target computer.
- Data transfer from the DL-1000/1000 M is executed with the data button or footswitch of an interface or upon request from the respective software. The DL-1000/1000 M is recognised by the measurement device as a Digimatic measurement instrument.
- You can output data directly to a printer equipped with a Digimatic interface.

Specifications
Memory
DL-1000/1000 M: Up to 999 measurement values can be stored by these data loggers.
DL-1000 M: Sample or feature-related operation is possible. A maximum of 100 features from 9 samples can be stored. If the number of features is reduced the number of samples available is increased. Based on the number of features, the DL-1000 M will automatically calculate how many samples are available. For example, 10 measured features mean that a maximum of 99 samples can be stored.

Data format
All data are loaded or output in Mitutoyo Digimatic compatible format.

Connection to measuring instrument
To output measurement values, a DL-1000/1000 M can be connected to any interface or protocol printer which allows connection to Mitutoyo Digimatic compatible measuring instruments.

Delivered
1 x 9V lithium battery
Data cable 10-pole to 10-pole (0.25m)

Optional accessories
No. | Description
--- | ---
936937 | Digimatic cable (1 m)
965014 | Digimatic cable (2 m)
06ADV380D | USB Input Tool Direct cable (2 m)
**Digimatic Switch Box**

**Specifications**

This switch box is a distribution box that connects 3-5 Digimatic tools to one channel interface (for example a DMX-1 USB).

- It can connect 3-5 Digimatic tools to a single channel interface.
- This can be either a single Digimatic display unit or an interface box.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Data output</th>
<th>Data input</th>
<th>Footswitch connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>011235</td>
<td>1 x Digimatic (1 channel)</td>
<td>5 x Digimatic</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>939039</td>
<td>1 x Digimatic (1 channel)</td>
<td>3 x Digimatic</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

**Optional accessories**

- 936937: Digimatic cable (1 m)
- 965014: Digimatic cable (2 m)
- 937179T: Footswitch

- 937179T only for 011235

1 - cable 936937 (1m), 965014 (2m)

---

**Digimatic Tolerance Box**

**Specifications**

This tolerance box allows you to connect Digimatic measuring instruments for visual GO/NG evaluations.

- Simple connection to Digimatic measuring instruments.
- Simple representation of a tolerance evaluation -NG/GO/+NG.
- It can be powered by AC adapter (as a standard accessory) or two LR6 batteries.
- Tolerance setting with the measuring instrument.

**Optional accessories**

| No.    | Description     | 011037 | 4 batteries LR-6 (AA) |

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■ Quality control (QC)
A system for economically producing products or services of a quality that meets customer requirements.

■ Process quality control
Activities to reduce variation in product output by a process and keep this variation low. Process improvement and standardization as well as technology accumulation are promoted through these activities.

■ Statistical process control (SPC)
Process quality control through statistical methods.

■ Population
A group of all items that have characteristics to be considered for improving and controlling processes and quality of product. A group which is treated based on samples is usually the population represented by the samples.

■ Lot
Collection of product produced under the same conditions.

■ Sample
An item of product (or items) taken out of the population to investigate its characteristics.

■ Sample size
Number of product items in the sample.

■ Bias
Value calculated by subtracting the true value from the mean of measured values when multiple measurements are performed.

■ Dispersion
Variation in the values of a target characteristic in relation to the mean value. Standard deviation is usually used to represent the dispersion of values around the mean.

■ Histogram
A diagram that divides the range between the maximum and the minimum measured values into several divisions and shows the number of values (appearance frequency) in each division in the form of a bar graph. This makes it easier to understand the rough average or the approximate extent of dispersion. A bell-shaped symmetric distribution is called the normal distribution and is much used in theoretical examples on account of its easily calculable characteristics. However, caution should be observed because many real processes do not conform to the normal distribution, and error will result if it is assumed that they do.

■ Process capability
Process-specific performance demonstrated when the process is sufficiently standardized, any causes of malfunctions are eliminated, and the process is in a state of statistical control. The process capability is represented by mean ±3 σ or 6σ when the quality characteristic output from the process shows normal distribution. σ (sigma) indicates standard deviation.

■ Process capability index (PCI or Cp)
A measure of how well the process can operate within the tolerance limits of the target characteristic. It should always be significantly greater than one. The index value is calculated by dividing the tolerance of a target characteristic by the process capability (6σ). The value calculated by dividing the difference between the mean (X) and the standard value by 3σ may be used to represent this index in cases of a unilateral tolerance. The process capability index assumes that a characteristic follows the normal distribution.

Notes: If a characteristic follows the normal distribution, 99.74% data is within the range ±3σ from the mean.

- Bilateral tolerance
  \[ C_p = \frac{USL - LSL}{6\sigma} \]
  USL: Upper specification limit
  LSL: Lower specification limit

- Unilateral tolerance ... If only the upper limit is stipulated
  \[ C_p = \frac{-USL - X}{3\sigma} \]

- Unilateral tolerance ... If only the lower limit is stipulated
  \[ C_p = \frac{X - LSL}{3\sigma} \]
Specific examples of a process capability index (Cp) (bilateral tolerance)

- **Cp = 1**
  - The process capability is barely achieved as the 6 sigma process limits coincident with the tolerance limits.
- **Cp = 1.33**
  - The process capability is the minimum value that can be generally accepted as it is no closer than 1 sigma to the tolerance limits.
- **Cp = 1.67**
  - The process capability is sufficient as it is no closer than 2 sigma to the tolerance limits.

Note that Cp only represents the relationship between the tolerance limits and the process dispersion and does not consider the position of the process mean.

**Notes:** A process capability index that takes the difference between the process mean from the target process mean into consideration is generally called Cpk, which is the upper tolerance (USL minus the mean) divided by 3σ (half of process capability) or the lower tolerance (the mean value minus LSL) divided by 3σ, whichever is smaller.

**Control chart**

Used to control the process by separating the process variation into that due to chance causes and that due to a malfunction. The control chart consists of one center line (CL) and the control limit lines (rationally determined above and below it) (UCL and LCL). It can be said that the process is in a state of statistical control if all points are within the upper and lower control limit lines without notable trends when the characteristic values that represent the process output are plotted. The control chart is a useful tool for controlling process output, and therefore quality.

**Chance causes**

These causes of variation are of relatively low importance. Chance causes are technologically or economically impossible to eliminate even if they can be identified.

**X-R control chart**

A control chart used for process control that provides the most information on the process. The X-R control chart consists of the X control chart that uses the mean of each subgroup for control to monitor abnormal bias of the process mean and the R control chart that uses the range for control to monitor abnormal variation. Usually, both charts are used together.

**How to read the control chart**

Typical trends of successive point position in the control chart that are considered undesirable are shown below. These trends are taken to mean that a ‘special cause’ is affecting the process output and that action from the process operator is required to remedy the situation. These determination rules only provide a guideline. Take the process-specific variation into consideration when actually making determination rules. Assuming that the upper and lower control limits are 3σ away from the center line, divide the control chart into six regions at intervals of 1σ to apply the following rules. These rules are applicable to the X control chart and the R control chart. Note that these 'trend rules for action' were formulated assuming a normal distribution. Rules can be formulated to suit any other distribution.