09

Measurement Data Management

MeasurLink® ENABLED
Data Management Software by Mitutoyo

Measurement Data Network System

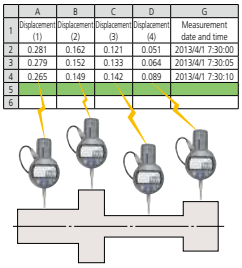
MeasurLink® is a measurement data management system based on databases (SQL Server). You can build a network to manage the measurement results and measuring instruments simply by combining the required functions.

Digimatic Gage/PC Data Input Device Input Tools

USB-ITN/IT-020U/IT-007R

Measurement Data Wireless Communication System

U-WAVE Series



	A	B	C	D	G
1	Displacement (1)	Displacement (2)	Displacement (3)	Displacement (4)	Measurement date and time
2	0.281	0.162	0.121	0.051	2013/4/1 7:30:00
3	0.279	0.152	0.133	0.064	2013/4/1 7:30:05
4	0.265	0.149	0.142	0.089	2013/4/1 7:30:10
5					
6					

Measurement Data Collection Software

USB-ITPAK V3.0/V2.1

Mini-Printer Equipped with Data Logging Function

DP-1VA LOGGER

Measurement Data Network System

MeasurLink®

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Measurement Data Input Unit

Measurement Data Wireless Communication System

Software

Data Logger/Multiplexer

SPC Software

Example of Measurement Data Management System Design

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

Recording measurement results

No more transcribing

Equipped with the data logger function, it allows batch transfer of stored data to a PC with a USB cable.

DP-1VA LOGGER 09-20

Direct data input to a PC

Connection cable-integrated **USB-ITN**

USB Input Tool Direct 09-5

Lineup of two models with different output specifications
IT-020U/IT-007R

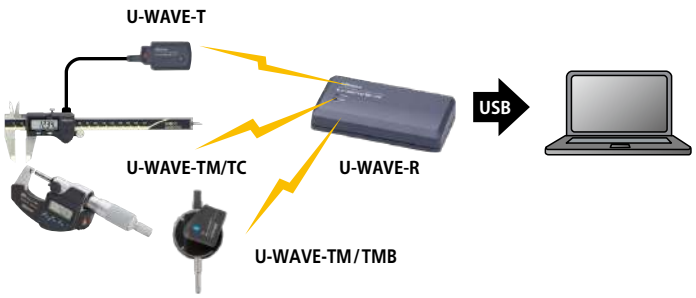
Input Tool SERIES 09-6

Connect to a RS-232C interface PC with 4 channels and a sequencer

Multiplexer MUX-10F 09-21

Wireless

..... 09-8

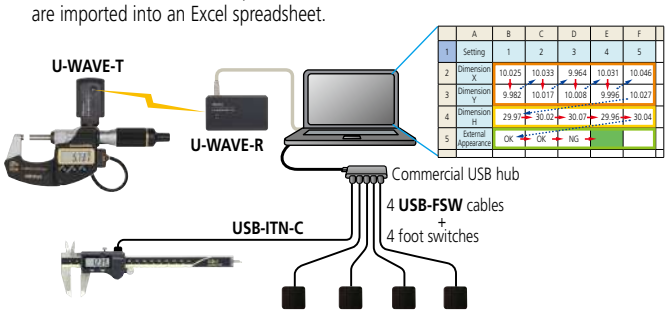


U-WAVE 09-9

Software dedicated to inspection and quality control

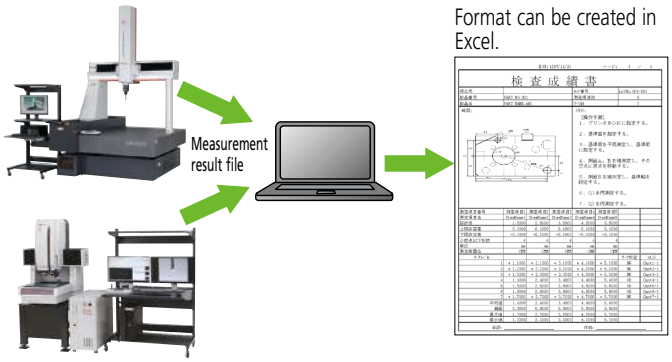
Inspection certificate creation

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



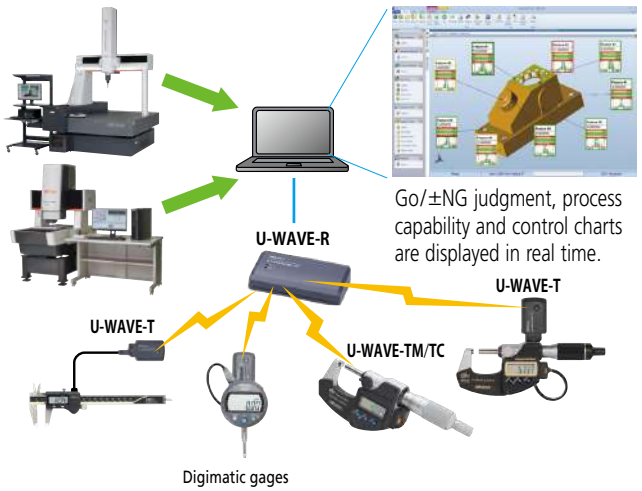
USB-ITPAK 09-15

Format can be created in Excel.



MeasureReport 09-19

Statistical Process Control

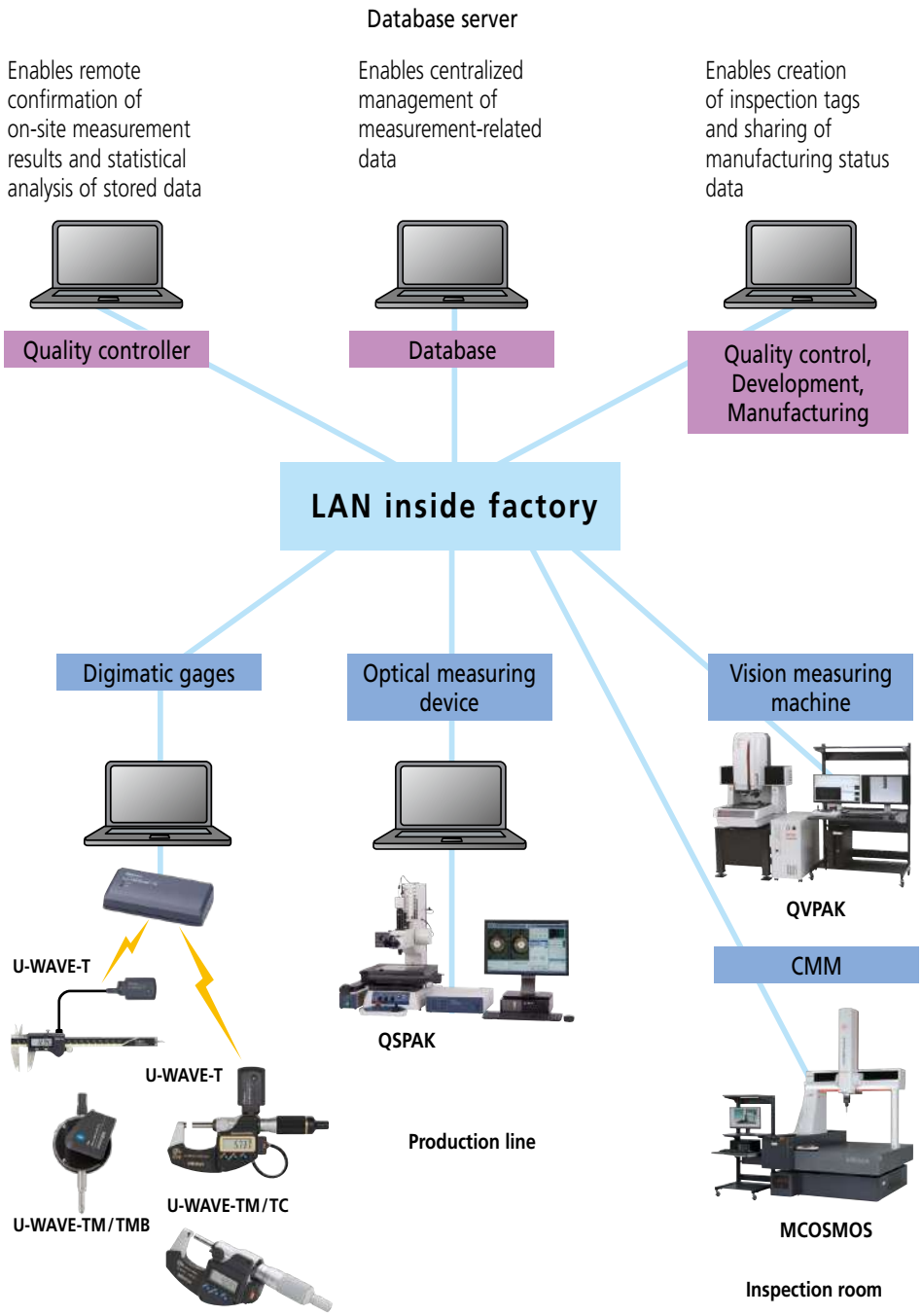


Go/±NG judgment, process capability and control charts are displayed in real time.

MeasurLink® 09-25

Network the quality control information of whole the factory

Unify and control the measurement results through the network



MeasurLink® 09-25

Other peripheral devices and software

Condition Monitor

Conduct preventive maintenance through CMM status monitoring

Status Monitor

Can remotely monitor measuring machines

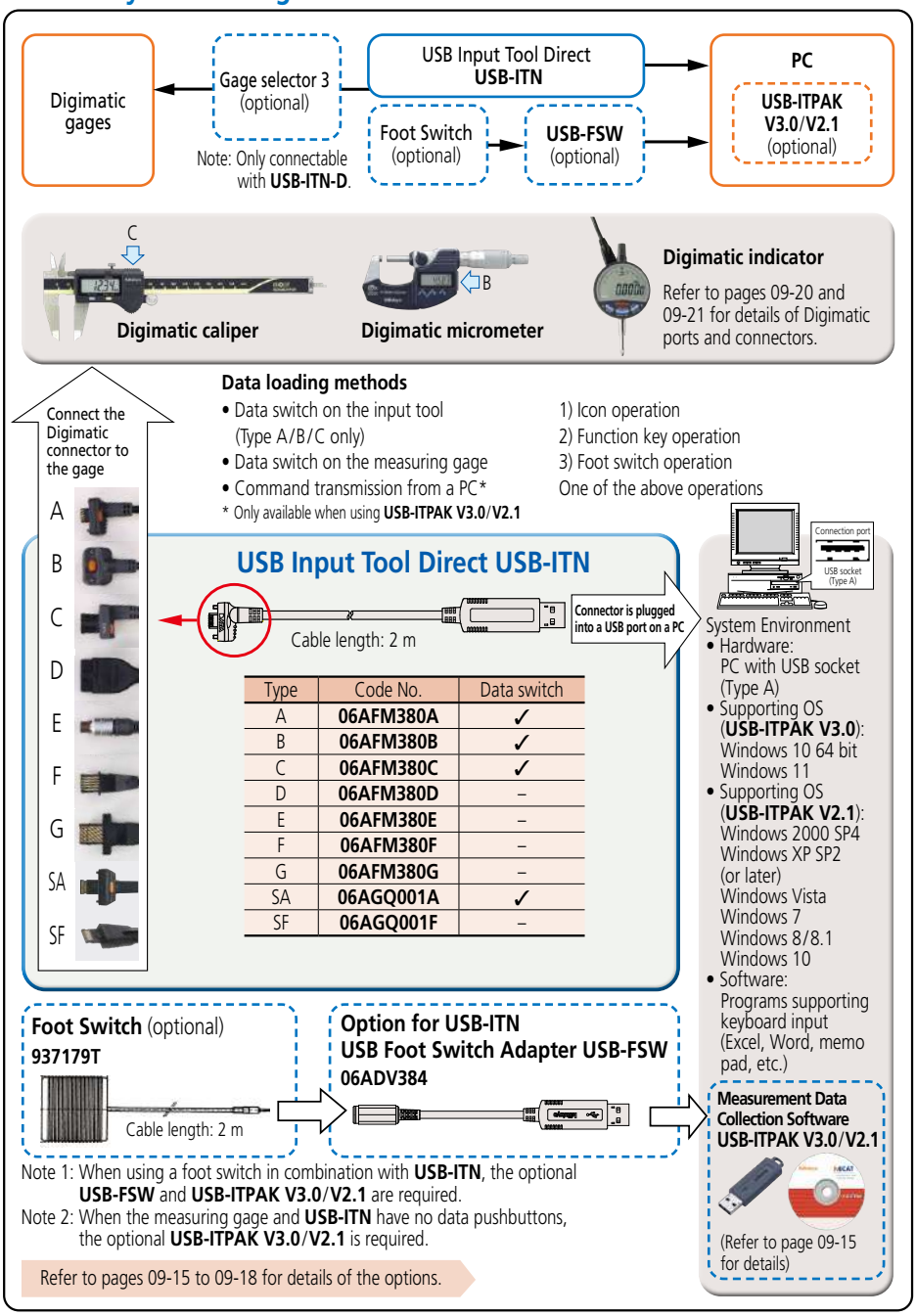
Note: For details on the above, contact your local Mitutoyo sales office.

Mitutoyo

Digimatic Gage/PC Data Input Device
USB Input Tool Direct USB-ITN

- Converts measurement data to keyboard signals and directly inputs them to spreadsheet software such as Excel and Notepad.
- When using with optionial software (refer to page 09-15), you can easily create Microsoft Excel worksheets, enabling further improvement of work efficiency.

USB-ITN System Configuration

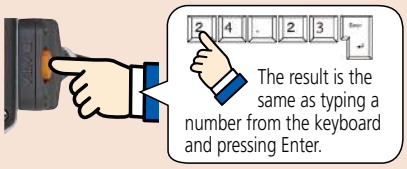


Type	Code No.	Data switch
A	06AFM380A	✓
B	06AFM380B	✓
C	06AFM380C	✓
D	06AFM380D	–
E	06AFM380E	–
F	06AFM380F	–
G	06AFM380G	–
SA	06AGQ001A	✓
SF	06AGQ001F	–

The input tool is automatically recognized as an HID* keyboard device (a standard Windows driver) just by connecting it to a USB port.

* HID (Human Interface Device)

Input data to the PC with the push of a button



Connection example

USB Input Tool Direct
USB-ITN-B

Main specification

- Output compatibility: USB2.0 or USB1.0
- Supporting driver software: Switchable between 2 items below
  1) When using standalone: HID keyboard device*
  2) When using with **USB-ITPAK V3.0/V2.1**: Virtual COM port (VCP)
- Communication speed: 12 Mbps (Full Speed)
- Power source: USB bus power
- Mass: 59 g
- USB2.0 certificate
- Conforms to EU EMC Directive

* Since this device is compatible with Windows standard driver software, dedicated driver software is not required.

Note: Information regarding **USB-ITPAK V3.0** can be downloaded from our website.

Measurement Data Input Tool
Input Tool SERIES IT-020U/IT-007R

Main Specifications of IT-020U

Output specification: USB2.0 or USB1.0
Supported driver software: Changeable between two types
1) Stand-alone: HID keyboard device*
2) Using **USB-ITPAK V3.0/V2.1**: Virtual COM port (VCP)
Communication speed: 12 Mbps (Full Speed)
Power source: USB bus power
USB2.0 certificate
Conforms to EMC Directive
* This product is compatible with the standard driver software for Windows. No dedicated driver software is required.

The input tool is automatically recognized as an HID* keyboard device (a standard Windows driver) just by connecting it to a USB port.

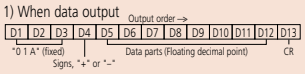
* HID (Human Interface Device)

Specifications of IT-007R RS-232C Communication

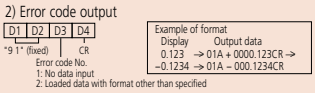
• **Output specification: RS-232C compliant**
Communication method: Full duplex
Communication speed: 2400 bps (fixed)
Bit configuration: Start bit 1
Data length 8
(Most significant bit, 0 (fixed))
Parity, None
Stop bit 1
Flow control: None
Home position: DCE (modem definition)

• **Data format**

1) When data output

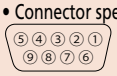


2) Error code output



• **Data request signal**
Data can be output by transmitting a character from the PC.

• **Connector specification and power supply from the PC**



This product operates while accumulating the power supplied from the PC. A second or more input interval is required.

Pin No.	Symbol	in/out	Description of functions
1	(N.C.)	—	No connection
2	RXD	OUT	Data output from this product to the PC
3	TXD	IN	Data input from the PC to this product
4	DTR	IN	+12 V power supply from the PC*
5	GND	—	Ground
6	DSR	OUT	Not used
7	RTS	IN	+12 V power supply from the PC*
8	CTS	OUT	Not used
9	(N.C.)	—	No connection

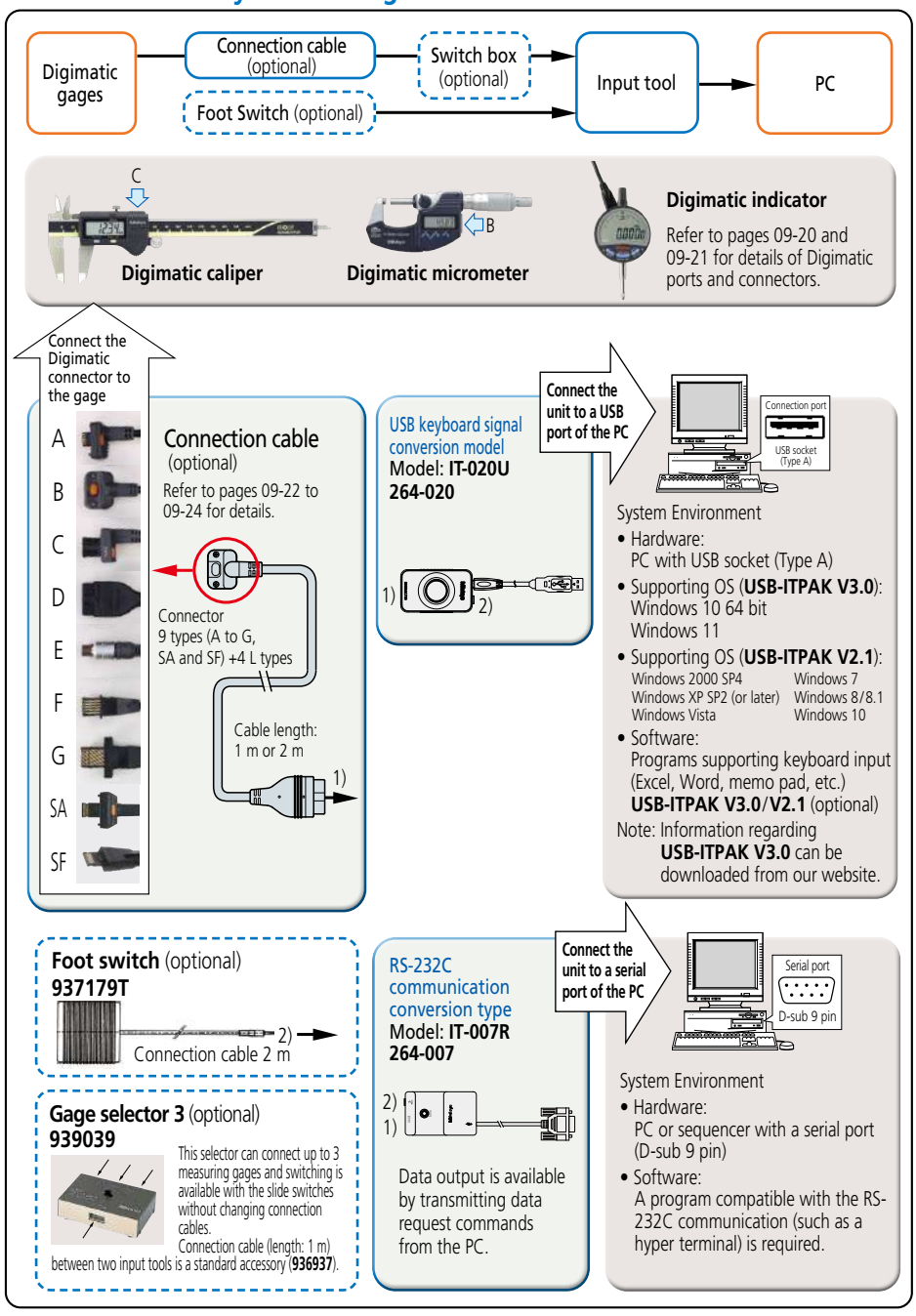
* When connecting to a sequencer, a power supply is required.
Input voltage: Supplied in the range 6 V to 16 V
Power supply terminal: Supplied to pins 4 and 7
Note: "4" and "6", "7" and "8" are connected with each other inside this product.

- **IT-020U** is an easy-to-use, expandable input tool with a large data switch and a foot switch connector. **IT-007R** is an RS-232C communication-type input tool that can be controlled by data request commands from a PC.
- It can be connected to various types of measuring instruments using optional connection cables.
- When using with optionial software (refer to page 09-15), you can easily create Microsoft Excel worksheets, enabling further improvement of work efficiency.


IT-020U


IT-007R

IT-020U/IT-007R System Configuration



Mitutoyo

Measurement Data Management

What is the U-WAVE Series?

- The **U-WAVE** Measurement Data Wireless Communication System quickly collects accurate measurement data from the on-site inspection process to help perform detailed analysis.
- Measurement results can be sent wirelessly and saved on a PC, smartphone or tablet. This is a smart system not requiring handwriting or manual input from a keyboard.

Acquire measurement data from various Digimatic gages equipped with U-WAVE. → **Instantly transfer data wirelessly to your PC, smartphone or tablet.**

You can choose from a variety of products and applications.

Stable communication is possible up to a maximum communication distance of 16-20 m*.
Efficiency is greatly improved by being able to work without worrying about cable length or snags, etc.

- Freedom of movement
- Human error during manual input is eliminated
- Flexible layout of measurement site
- Stable wireless communication

Digimatic gage + Transmitter

Receiver

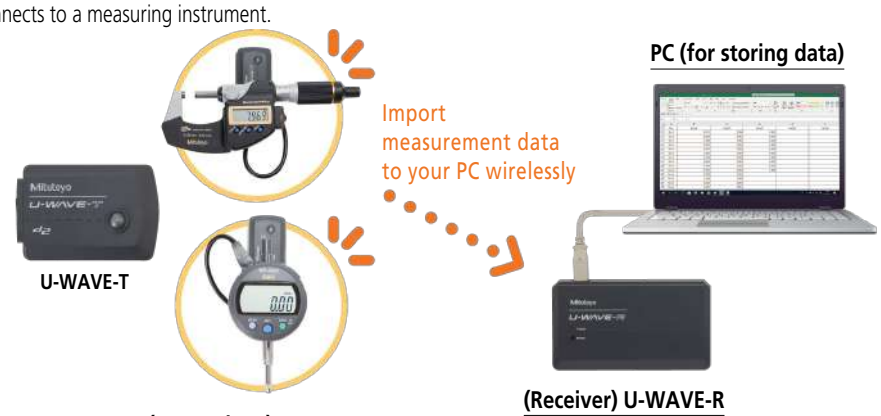
Note: Receiver not necessary when using with **Mitutoyo *Bluetooth*® U-WAVE fit**

*May be affected by the electromagnetic environment.

The following three types are currently available.

U-WAVE

The system consists of a "**U-WAVE-R**" receiver that connects to a PC and a "**U-WAVE-T**" transmitter that connects to a measuring instrument.



PC (for storing data)

U-WAVE-T

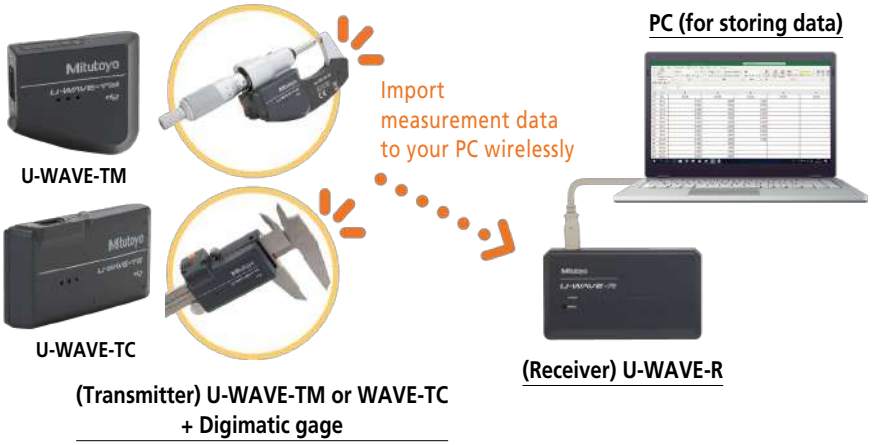
(Transmitter) U-WAVE-T + Digimatic gage

(Receiver) U-WAVE-R

Product catalog
E12051

U-WAVE fit

While inheriting the functions and performance of **U-WAVE**, these models have been made smaller and thinner, and have improved operability, being designed specifically for use with small digimatic gages.



U-WAVE fit *Bluetooth*®

This is a ***Bluetooth***® version of **U-WAVE fit**. It can connect to a ***Bluetooth***®-enabled device such as a PC, smartphone, or tablet without going through a **U-WAVE-R** or similar dedicated receiver.

Note: Connectivity of the dedicated Mitutoyo **U-WAVE fit *Bluetooth***® application and **U-WAVE-TMB/TCB** to every single Bluetooth® device is not guaranteed.

Function comparison table

	U-WAVE	U-WAVE fit*1	U-WAVE fit *Bluetooth*®*1
Transmission method	Original <based on IEEE802.15.4 (2.4 GHz)>		Bluetooth®
Communication distance	Approx. 20 m (line of sight)		Approx. 16 m (line of sight)
Connectible model	Digimatic gages	Digimatic small measuring instruments*3	
Dedicated application/ software	**U-WAVEPAK** (included with **U-WAVE** receiver) **USB-ITPAK***2		**U-WAVEPAK-BW** **U-WAVEPAK-BM** **U-WAVE Navi** **USB-ITPAK***2

*1 Please check the list of compatible models since the unit may not be attachable to some models.
*2 The device may not be recognised when using older versions of Windows OS.
*3 A Digimatic indicator (**ID-CNX**) can also be connected using a connecting unit.

Product catalog
E12051

Measurement Data Wireless Communication System

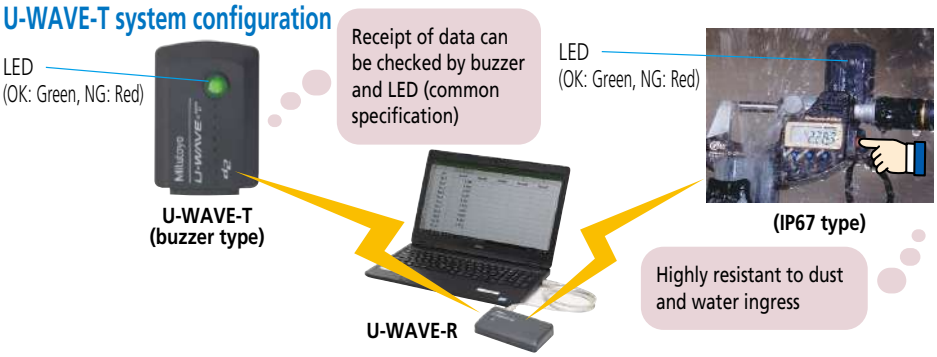
U-WAVE-T

- The system using our proprietary communication method features stable communication and low power consumption, resulting in improved work efficiency.
- It can be connected to various types of tools using optional special connection cables.

Model	U-WAVE-T (IP67 type)	U-WAVE-T (buzzer type)
Code No.*	**02AZD730G/02AZD730H/02AZD730J**	**02AZD880G/02AZD880H/02AZD880J**
Protection Rating	IP67	None
Data reception indication	LEDs	buzzer and LEDs
Power source	Lithium battery CR2032×1	
Battery life	Approx. 400,000 transmissions	
Dimensions (mm)	44×29.6×18.5	
Mass (g)	23	

* To use this product, conformity to the applicable radio law in each country is required. Code number differs depending on the destination country. Please contact your nearest Mitutoyo sales office.

U-WAVE-T system configuration



U-WAVE-T dedicated connection cable

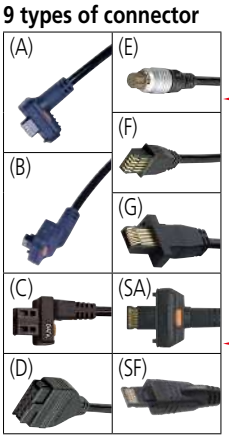
A dedicated cable connects a Digimatic gage to **U-WAVE-T**. Check the connector (A to G, SA and SF; refer to pages 09-23 and 09-24 for details) compatible with the Digimatic gage to be used and select either standard type (figure 1) or foot switch type (figure 2) according to your application.

Type	Standard connection cable Code No.	Connection cable for foot switch Code No.
(A) Water-proof model with output button	**02AZD790A**	**02AZE140A**
(B) Water-proof model with output button	**02AZD790B**	**02AZE140B**
(C) With data-out button	**02AZD790C**	**02AZE140C**
(D) 10-pin plain type	**02AZD790D**	**02AZE140D**
(E) 6-pin round type	**02AZD790E**	**02AZE140E**
(F) Plain type straight	**02AZD790F**	**02AZE140F**
(G) Plain type straight water-proof model	**02AZD790G**	**02AZE140G**
(SA) Water-proof straight model with data output button	**02AZF960**	**02AZF960**
(SF) Straight standard type	**02AZG011**	**02AZG021**

Standard accessory
Clip for cable fixing

Application example of the clip

9 types of connector



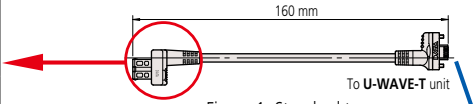


Figure 1. Standard type connection cable

Foot switch (optional)
937179T

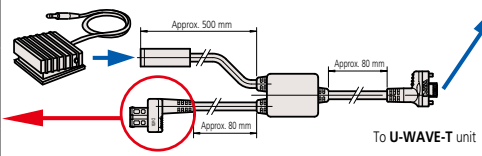
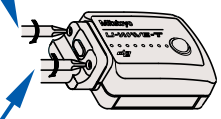


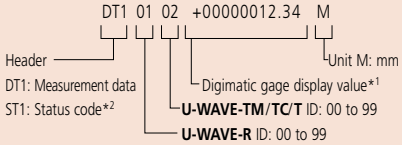
Figure 2. Connection cable for foot switch



Connector attached to **U-WAVE-T** by 2 screws

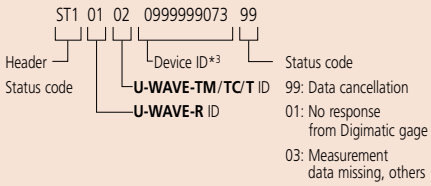
- Data format

Example of format when the Digimatic gage displays 12.34



*1 Data interface function is switchable to "Measurement value only" e.g.) 12.34

*2 Example of status code format



*3 Unique number assigned to **U-WAVE** at shipment

Notes on Identification of Measurement Data and Multiple Systems Operation

Following the above format, the **U-WAVE** data format starts with a 4-digit code where the first two digits represent receiver channels and the last two are transmitter channels. The large number of transmitter/receiver combinations possible with this scheme ensures that the receivers in a factory measurement system only accept data from the intended transmitters, even when several receivers are all within communication range of different transmitters using the same channel. Different frequency bands (up to 15 available) may also be used to further ensure that there are no communication problems between adjacent **U-WAVE-R** units.

U-WAVE-T (U-WAVE fit) System Communication Specifications

- Wireless communication

Wireless specifications	Original <based on IEEE802.15.4 (2.4 GHz)>
Wireless communication distance	Approx. 20 m (line of sight)
Wireless communication speed	250 kbps
Transmission output	0 mW (1 dBm) or less
Modulation method	DS-SS (Direct Sequence - Spread Spectrum) Resistant to interfering signals and noise
Communication frequency	2.405 to 2.475 GHz
Used band	15 channels (2.405 to 2.475 GHz at intervals of 5 MHz) The noise search function avoids interference with other communication devices.

Note: Please purchase **U-WAVE-T** in the country where you intend to use it.

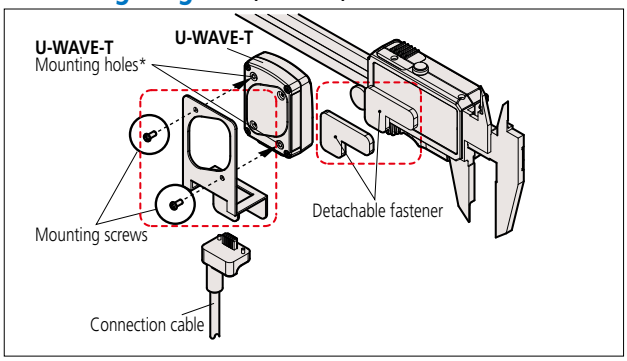
Optional Accessories for U-WAVE

U-WAVE-T mounting bracket

Supports the **U-WAVE-T** on a Digimatic gage by detachable fastener. Batteries can be replaced without needing to detach the **U-WAVE-T** from the gage.

U-WAVE-T mounting bracket
02AZE200
Standard accessories
• Detachable fasteners: 1 set
• Mounting screw: 2 pcs.

Mounting diagram (02AZE200)

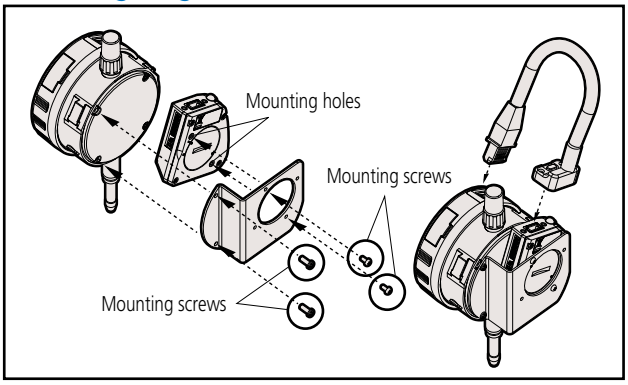


Note: In order to avoid loss of adhesion, do not allow oil or coolant to come into contact with the bonding surfaces of the detachable fasteners.

U-WAVE-TM/TMB mounting bracket for Digimatic indicator

U-WAVE-TM/TMB
mounting bracket for **Digimatic indicator**
02AZF670/02AZF675
Standard accessories
• Mounting screw: 4 pcs.

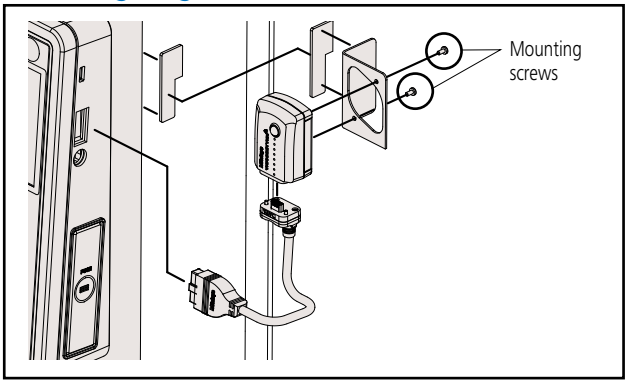
Mounting diagram (02AZF670)



U-WAVE-T mounting bracket for QM-Height

U-WAVE-T mounting bracket for **QM-Height**
02AZE990
Standard accessories
• Detachable fastener: 2 pcs. (mirror-imaged)
• Mounting screw: 2 pcs.

Mounting diagram (02AZE990)



* The two **U-WAVE-T** mounting holes are on a relatively fragile plastic part. Be careful not to apply too much force when tightening.

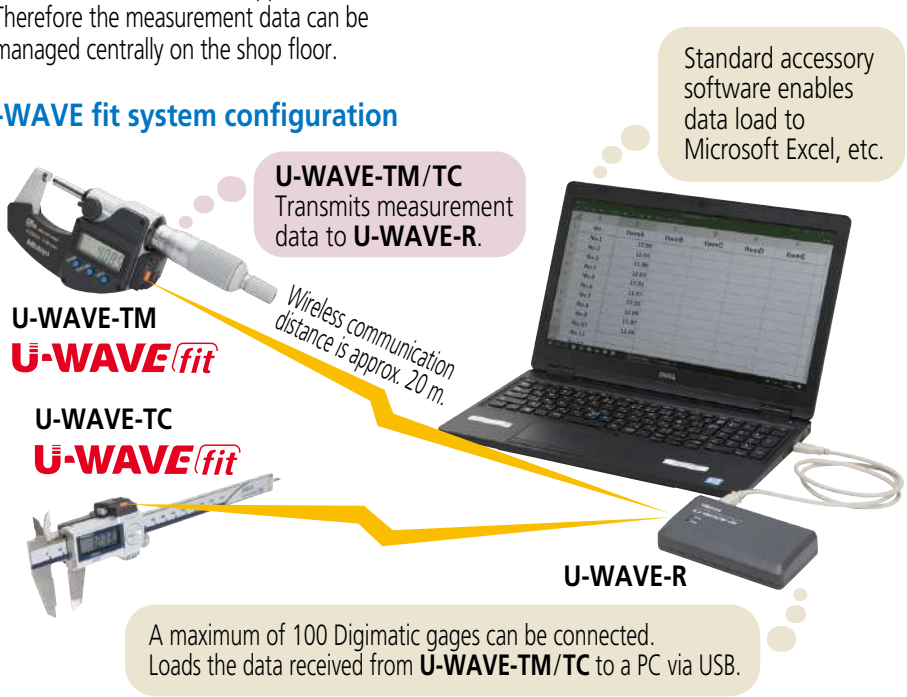
Product catalog
E12051

Mitutoyo

Measurement Data Wireless Communication System U-WAVE-TM/TC (U-WAVE fit)

- While inheriting the functions and performance of **U-WAVE**, these models have been made smaller and thinner, and have improved operability, being designed specifically for use with small Digimatic gages.
- The system using our proprietary transmission method features stable communication and low power consumption, resulting in improved work efficiency.
- Up to 100 Digimatic gages can be registered to a single **U-WAVE-R**, and wireless communication distance is approx. 20 m. Therefore the measurement data can be managed centrally on the shop floor.
- The wireless system without cabling can keep the workplace tidy and increase workability during measurement.
- Installing the optional **USB-ITPAK V3.0/V2.1** software enables the use of Excel to improve measurement efficiency. It makes it possible to populate the data from multiple measuring instruments into separate spreadsheets or input the data collectively at the same time.

U-WAVE fit system configuration



U-WAVE-R

Model	U-WAVE-R
Code No.*	02AZD810D/02AZD810E/02AZD810F
Power source	USB bus power system
Number of **U-WAVE-R** units that can be connected to one PC	Up to 15
Number of **U-WAVE-T** units that can be connected	Up to 100
External dimensions (mm)	140×80×31.6
Mass (g)	130

* Code number differs depending on the destination country.

U-WAVE-R main unit

USB2.0 cable (1 m) attached

U-WAVEPAK

U-WAVEPAK software (standard accessory)

System Environment: Compatible OS
Windows 2000 Professional (SP4 or later)
Windows XP Home Edition (SP2 or later)
Windows XP Professional (SP2 or later)*
Windows Vista*, Windows 7*, Windows 8/8.1*
Windows 10*
Windows 11 Version 1022B or later
* 32-bit, 64-bit OS supported
<Versions confirmed operational on Windows 10>
- **U-WAVEPAK Version1.020** or later

Connectability confirmed for tablet PC
- Microsoft Surface Pro 6 (the version whose operation on Windows 10 Professional is confirmed)
- Required environment: DVD drive (required for installation), USB port ×2 ports or more

Note: Cannot be connected to a device other than a PC (such as **DP-1VA LOGGER**, sequencer etc.).

U-WAVEPAK software can be downloaded here.

U-WAVE-TM/TC (U-WAVE fit) System Communication Specifications

- Wireless communication

Wireless specifications	Original <based on IEEE802.15.4 (2.4 GHz)>
Wireless communication distance	Approx. 20 m (line of sight)
Wireless communication speed	250 kbps
Transmission output	2.5 mW (4 dBm) or less
Modulation method	DS-SS (Direct Sequence - Spread Spectrum) Resistant to interfering signals and noise
Communication frequency	2.405-GHz band (ISM band: Universal frequency)
Used band	15 channels (2.405 to 2.475 GHz at intervals of 5 MHz) The noise search function avoids interference with other communication devices.

Note: Please purchase **U-WAVE-TM/TC/R** in the country where you intend to use it.

Main specifications of U-WAVEPAK

- Setup of dedicated driver software (USB and virtual COM port)
- Initial setting of ID number and frequency selection (required only once for the first time)
- Load data to Microsoft Excel or Notepad through the data interface function

Product catalog E12051

Video

Typical applications

U-WAVE-TM (264-622)

U-WAVE-TC (264-621)

Transmitter / connecting unit

264-622

02AZF310

264-621

02AZF300

SPECIFICATIONS

IP67 type is resistant to water and dust ingress. Buzzer type notifies data reception by buzzer sound and LED.

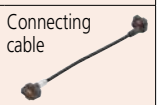
Connectable measuring instruments	Micrometer		Caliper	
Code No.	**264-622**	**264-623**	**264-620**	**264-621**
Model	**U-WAVE-TM** (IP67 type)	**U-WAVE-TM** (buzzer type)	**U-WAVE-TC** (IP67 type)	**U-WAVE-TC** (buzzer type)
Protection Rating	IP67	N/A	IP67	N/A
Data reception indication	LEDs	buzzer and LEDs	LEDs	buzzer and LEDs
Power source	Lithium battery CR2032×1			
Battery life	Approx. 400,000 times continuous data transmission			
External dimensions (mm)	41.9×12.9×38.8		56×11.45×30.4	
Mass (g)	18			

Fixed to transmission unit and inserted into output connector of Digimatic gage.

Code No.	**02AZF310**	**02AZF300**	**02AZF960**	**02AZF700**
Protection level	IP67	N/A	IP67	N/A
Mass (g)	6			10
Connectable transmitter	**U-WAVE-TM/TC** (IP67 type)	**U-WAVE-TC** (for standard type)	**U-WAVE-TM** (for **QuantuMike***)	**ID-CNX/ID-FNX** (12.7mm type only)

Note 1: **02AZF310** ensures water-proof performance only when attached to measuring instruments of IP67 type.
For information on supported connecting units, please contact your local Mitutoyo sales office.
Note 2: Water-proof performance is ensured only when attached to measuring instruments of IP67 type.
* **02AZF960** is applicable to new models (**293-14X-40**/**293-18X-40**). Refer to 02-5.

Compatibility of measuring tool and unit

Digimatic gage		Connecting unit/connecting cable		Transmitter		Receiver
Digimatic Micrometers		Standard type	 **02AZF310**		Buzzer type **U-WAVE-TM 264-623**	 **U-WAVE-R 02AZD810D**
		QuantuMike* (Refer to 02-5)	 **02AZF960**		IP67 type **U-WAVE-TM 264-622**	
Digimatic Calipers		Standard type	 **02AZF300**		Buzzer type **U-WAVE-TC 264-621**	
		Coolant-proof type	 **02AZF310**		IP67 type **U-WAVE-TC 264-620**	
Digimatic Indicators and Others		**ID-CNX/ ID-FNX** Series (12.7 mm type only)	 **02AZF700**		Buzzer type **U-WAVE-TM 264-623**	Design registered in Japan
					IP67 type **U-WAVE-TM 264-622**	
		Other	Connecting cable  Bracket 		Buzzer type **U-WAVE-T 02AZD880G**	
					IP67 type **U-WAVE-T 02AZD730G**	

* To use this product, conformity to the applicable radio law in each country is required. Code number differs depending on the destination country. Please contact your nearest Mitutoyo sales office.
* **02AZF960** is applicable to new models (**293-14X-40**/**293-18X-40**). Refer to 02-5.

Measurement Data Wireless Communication System U-WAVE-TMB/TCB (U-WAVE fit *Bluetooth*®)

- Bluetooth® communication allows for wireless transmission of measurement data from Digimatic micrometers and calipers to PCs, smartphones, tablets and other such terminals.
- Bluetooth® communication does not require a conventional receiver unit (**U-WAVE-R**) which improves operability and reduces costs. Use in outdoor locations where PCs cannot be used can now be easily realized.
- **U-WAVEPAK-BM** (free), the measurement support application software for smartphones is available for download from app stores (Google Play, Apple Store).
- **U-WAVEPAK-BW** (free), the communication software for transferring measurement data to optional computer software (**USB-ITPAK, MeasurLink®**) is available for download from our company's website.
https://www.mitutoyo.co.jp/eng/contact/products/u-wave/

U- WAVEPAK-BM

Get from Google Play

Download from App Store

U-WAVE fit *Bluetooth*® system configuration

No receiver is required, and one PC can connect up to seven units of **U-WAVE fit *Bluetooth*®**.

For Digimatic micrometers
U-WAVE-TMB

For Digimatic calipers
U-WAVE-TCB

Example of attaching the Digimatic indicator

Measurement Navigation Applications

Application	Mitutoyo U-WAVE Navi	U-WAVEPAK-BM	U-WAVEPAK-BW
Purpose	Using the application, create a measurement procedure, display and navigate the measurement, and manage the measurement results	Measure a workpiece to perform a simple trend management	Up to seven units of **U-WAVE-TCB/TMB** can be set up. Measuring results can be transferred to Excel spread sheet.
Possible actions (Functions)	• Create/perform a measurement procedure (including GO/NG judgement) • Navigate a measurement procedure • Manage/transfer a measurement procedure • Display a list of measurement results • Transfer a measurement result	• Go/±NG judgment • Data logging • Graphical display of measurement result • Display the histogram of measurement results • Transfer a measurement result (log data)	Identification of data origin Upper application (connection with **USB-ITPAK**, **MeasurLink**)
Display language	Japanese/English (Depends on the OS settings)	16 languages including English*	Japanese/English (Depends on the OS settings)
Compatible OS	Android 7.0 or later (iOS not supported) **Available from Google Play for free download.** Get from Google Play U-WAVE Navi	Android 7.0 or later/iOS 10.0 or later **U-WAVEPAK-BM (English version only) can be downloaded for free from each app store.** Get from Google Play / Download from App Store U-WAVEPAK-BM	Windows10 Pro 64bit **DL from the following URL** **https://www2.mitutoyo.co.jp/eng/contact/products/u-wave/index2.html**

* Japanese, English, German, French, Italian, Polish, Portuguese, Hungarian, Korean, Chinese (traditional/simplified), Vietnamese, Thai, Malay, Indonesian, Spanish

Note1: Google Play and the Google Play logo are trademarks of Google LLC. Apple and the Apple logo are trademarks of Apple Inc.
Note2: We cannot guarantee the operation of this application and **U-WAVE TMB/TCB** with all Bluetooth® equipped devices.

U-WAVE-TMB/TCB (U-WAVE fit *Bluetooth*®) System Communication Specifications

• Wireless Communication Specifications

Wireless communication	Bluetooth® 4.2 Low Energy
Wireless communication distance	Approx. 16 m (line of sight) Approx. 10 m (in a factory environment)
Transmission output	2.5 mW (5 dBm) or less (Class2)
Modulation method	FH-SS (Frequency-hopping spread spectrum)
Communication frequency	2.4 GHz band

Note 1: Please purchase **U-WAVE-TMB/TCB** in the country where you intend to use it.
Note 2: **U-WAVE-TMB/TCB** is not compatible with **U-WAVE fit**, for which communication specifications are different.
Note 3: Connectivity of **U-WAVE-TMB/TCB** to every single Bluetooth® device is not guaranteed.

USB-ITPAK V3.0

Download software

USB dongle

Allows for use of all functions of the software when connected to a PC

USB-ITPAK V2.1

USB dongle

Allows for use of the software when connected to a PC

Typical applications

U-WAVE-TMB (264-626)

U-WAVE-TCB (264-625)

Transmitter / connecting unit

264-626

02AZF310

264-625

02AZF300

SPECIFICATIONS

	For Digimatic micrometers		For Digimatic calipers	
Code No.	**264-626**	**264-627**	**264-624**	**264-625**
Model	**U-WAVE-TMB** (IP67 type)	**U-WAVE-TMB** (buzzer type)	**U-WAVE-TCB** (IP67 type)	**U-WAVE-TCB** (buzzer type)
Protection level	IP67	N/A	IP67	N/A
Data reception indication	LED	LED, buzzer	LED	LED, buzzer
Power source	Lithium battery CR2032×1			
Battery life	Windows OS: Approx. 3 months, iOS/Android: Approx. 1 year			
Mass (g)	18			

Choose a connecting unit compatible with your gage.

Code No.	**02AZF310**	**02AZF300**	**02AZF960**	**02AZF700**
Protection level	IP67	N/A	IP67	N/A
Mass (g)	6			10
Connectable transmitter	**U-WAVE-TMB/TCB** (IP67 type)	**U-WAVE-TCB** (for standard type)	**U-WAVE-TM** (for **QuantuMike***)	**ID-CNX/ID-FNX** (12.7mm type only)

Note: Water-proof performance is ensured only when attached to measuring instruments of IP67 type.
* **02AZF960** is applicable to new models (**293-14X-40**/**293-18X-40**). Refer to 02-5.

Compatibility of measuring tool and unit

Digimatic gage		Connecting unit/connecting cable		Transmitter	
Digimatic Micrometers		Standard type	 02AZF310		Buzzer type **U-WAVE-TMB 264-627**
		QuantuMike* (Refer to 02-5)	 02AZF960	IP67 	IP67 type **U-WAVE-TMB 264-626**
Digimatic Calipers		Standard type	 02AZF300		Buzzer type **U-WAVE-TCB 264-625**
		Coolant-proof type	 02AZF310	IP67 	IP67 type **U-WAVE-TCB 264-624**
Digimatic Indicators		**ID-CNX/ID-FNX** Series (12.7 mm type only)	 02AZF700		Buzzer type **U-WAVE-TMB 264-627**
				IP67 	IP67 type **U-WAVE-TMB 264-626**

* **02AZF960** is applicable to new models (**293-14X-40**/**293-18X-40**). Refer to 02-5.

Product catalog
E12051

Mitutoyo

Measurement Data Collection Software USB-ITPAK V3.0/V2.1

(**IT-016U**/**IT-020U**/**USB-ITN**/**U-WAVE**/**DP-1VA LOGGER** can be used to send the data to a Microsoft® Excel® worksheet.)

- **USB-ITPAK V3.0**/**V2.1** creates a procedure to input data from gages equipped with Digimatic output to Excel spreadsheets via **IT-016U**, **IT-020U**, **USB-ITN** or **U-WAVE**. This optional software facilitates the daily inspection work for mass-produced products.

V2.1	V3.0	Function
✓	✓	Sequential measurement: Inserts measurement data into the inspection certificate (Excel)
✓	✓	Simultaneous measurement: Simultaneously collects measurement data from multiple measuring instruments mounted on a jig
✓	✓	Individual measurement: Collects measurement data of separately conducted inspections into a single PC
—	✓	Simple measurement function: Automatically sorts measurement data and inserts the data into different columns in Excel
—	✓[1]	Setting of measuring instrument: Sets the calibration year and month, preset values, zero-setting, etc. for a measuring instrument
—	✓[1]	Measurement history: Records operators and measuring tools used in measurement data

Symbol: ✓[1]: Can be used only when connected with **USB-ITPAK V3.0**, **ID-CNX**/**ID-FNX** and **USB-ITN-SF**/**IT-020U**. ✓: Can be used —: Cannot be used

Note 1: **V3.0** can be downloaded from our website.
Note 2: For **V3.0**, features common with **V2.1** can be used by purchasing **V3.0** (**06AGR543**) and connecting a USB dongle to your PC.

Main features of USB-ITPAK V3.0/V2.1

- **Setting of Microsoft Excel input:**
  Designation of where to input (workbook, worksheet, cell range), cursor move (right, down), and others.
- **Selection of measuring method (3 modes available)**
  1) Sequential measurement 2) Simultaneous measurement 3) Individual measurement (refer to page 09-17 for details).
- **Control item and instruction at data input**

Control item	Mouse operation	Function key	Foot switch + USB-FSW	Data switch when using **U-WAVE**	Data switch other than **U-WAVE**
Data output request	✓*1	✓*1	✓	✓*2	✓
Data cancel	✓*1	✓*1	✓	✓ Press and hold*2	
Data skip	✓*1	✓*1	✓		
Character input (example: OK or NG etc.)			✓ Pre-registered character strings		

*1 Not available during individual measurement.
*2 Not available during simultaneous measurement in the event driven mode.

- **Number of connectable gages**

Available devices	Maximum number of connection (total of (1), (2), and (3))	Others
1) **IT-020U**/**USB-ITN**	For Windows 2000/XP: Up to 100 units*3 For Windows Vista/7/8/8.1/10/11: Up to 20 units*3 (For **U-WAVE-R**, plus 100 per unit in terms of available gages.)	• Maximum registration (total of (1), (2), and (3)) 400 units
2) **USB-FSW**		• Control/identification of connecting gage VCP (Virtual COM port) Switch from HID to VCP for (1) and (2). The VCP driver software is supplied with **USB-ITPAK**.
3) **U-WAVE-R** (Up to 100 gages connectable to each **U-WAVE-R**. **U-WAVE-T** ID: 00 to 99)		

- **Data loading time**: when using **IT-020U**/**USB-ITN**, 0.2 s to 0.3 s per gage unit
  U-WAVE event driven mode: 0.5 s data refresh interval
- **Timer input function** (only in simultaneous measurement)
  Input interval (time): 0.1 s*4 to 24 hours at maximum
- **Measurement date/time display function** (available in sequential and simultaneous measurements)
  The display format is subject to the setting of the Excel sheet.

*3 The actual number can be less depending on the system configuration.
*4 If a shorter time is set, a priority is given to the longer time compared with the actual communication time.

Optional Accessories for USB-ITPAK

USB Foot Switch Adapter USB-FSW

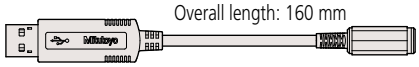
This USB adapter for connecting a PC is required when using the Foot Switch (**937179T**) in **USB-ITN**.
A dedicated VCP driver for this adapter is included in **USB-ITPAK**.

Main specification

- With **USB-ITPAK**, application of the foot switch can be set.
- Data control: "Data request", "Data cancel", "Data skip"
- Character string input (e.g. GO/NG, etc.)

Note: **USB-FSW** is used for installation of the VCP driver.

Foot Switch Adapter USB-FSW



Optional Accessories

Model	USB-ITPAK V3.0	USB-ITPAK V2.1
Code No.	**06AGR543** (USB dongle only)	**06AFM386** (Software+USB dongle)
Compatible OS (Windows)	Windows 10 64 bit only Windows 11	Windows 2000 SP4 to Windows 10
Compatible Excel version	Excel 2010, 2013, 2016, 2021, Microsoft 365	Excel 2002, 2003, 2007, 2010, 2013, 2016, Microsoft 365

Upgrading from **V1.0**/**V2.0** is not supported.

USB-ITPAK V3.0

Download software

USB dongle

Allows for use of all functions of the software when connected to a PC

USB-ITPAK V2.1

USB dongle

Allows for use of the software when connected to a PC

Operating environment

Compatible OS*1	**USB-ITPAK V3.0**: Windows 10 (64 bit only) Windows 11
	USB-ITPAK V2.1: Windows 2000 SP4 Windows XP SP2 or later Windows Vista Windows 7 Windows 8 Windows 8.1 Windows 10
Supported Excel versions*2	**USB-ITPAK V3.0**: 2010, 2013, 2016, 2021 Microsoft 365
	USB-ITPAK V2.1: 2002, 2003, 2007, 2010, 2013, 2016 Microsoft 365
Hard disk	**USB-ITPAK V3.0**: Free space of more than 15 MB **USB-ITPAK V2.1**: Free space of more than 10 MB
CD-ROM drive	For program installation*4
USB port*3	2 ports or more
Monitor resolution	**USB-ITPAK V3.0**: 1024×768, 256 colors or more **USB-ITPAK V2.1**: 800×600, 256 colors or more

*1 32-bit, 64-bit OS supported
*2 Operation with Excel for MAC OS is not guaranteed.
*3 A commercially available hub can be used.
(USB certified product is recommended)
*4 **V3.0** does not require a CD drive but does require an Internet connection for download.

Language support

- Operation language (17 languages)
  Japanese, English, German, French, Spanish, Italian, Czech, Swedish, Turkish, Polish, Hungarian, Russian, Korean, Chinese (traditional/simplified), Dutch, Portuguese
- Operation manual (PDF file)
  Japanese, English, German

Code No.

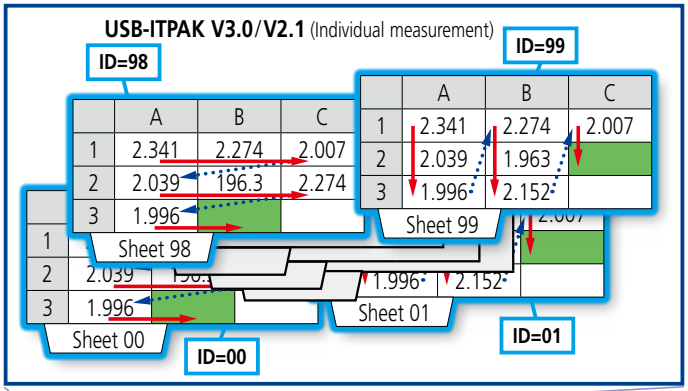
Model	USB-FSW
Code No.	**06ADV384**

Example of measurement using the U-WAVE Series wireless communication system

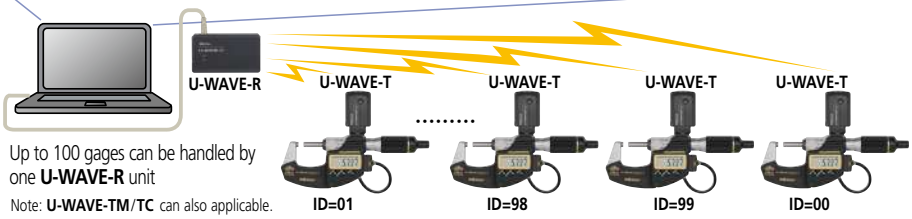
<Data sorting of individual measurements>

Data from multiple Digimatic gages sent to separate Excel sheets

Measurement data from multiple measuring instruments can easily be sorted and inserted into the respective sheets in Excel.



Entry point can be specified per **U-WAVE-T ID**.
- Specifying an Excel file
- Specifying data input cells (example: A1: C3)
- Specifying cursor move



Up to 100 gages can be handled by one **U-WAVE-R** unit

Note: **U-WAVE-TM/TC** can also applicable.

<timer input + measurement date/time display during simultaneous measurement>

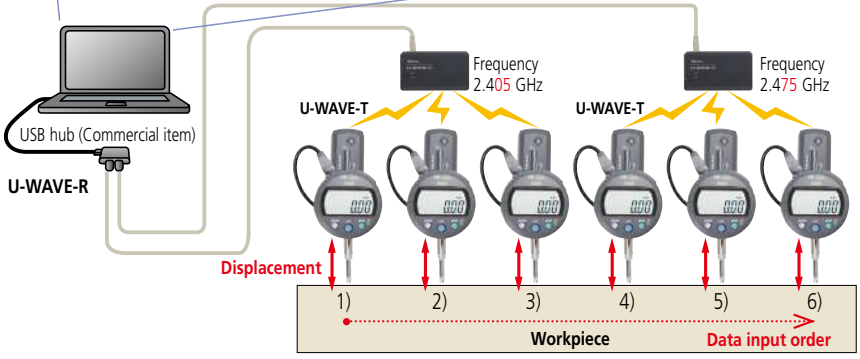
Automatically obtains displacement data in a certain input interval

The event-driven operation function of **U-WAVE** enables data collection at a preset time by timer.

USB-ITPAK V3.0/V2.1 simultaneous measurement + timer input (example: 5 s interval)

	A	B	C	D	E	F	G
1	Displacement 1)	Displacement 2)	Displacement 3)	Displacement 4)	Displacement 5)	Displacement 6)	Measurement date/time
2	0.281	0.162	0.121	0.051	0.011	–0.001	2013/4/1 7 30 00
3	0.279	0.152	0.133	0.064	0.018	–0.003	2013/4/1 7 30 05
4	0.265	0.149	0.142	0.089	0.021	–0.007	2013/4/1 7 30 10
5							
6							

5 s
5 s
5 s



The input interval can be arbitrarily set by 0.1 seconds intervals up to 24 hours. If a smaller value than the data loading time is set, the actual measurement time will be the input interval.
With **U-WAVE**, an error (no data) may occur if less than 0.5 seconds is set for the input interval. This is because the data request signal is issued before the data comes in, based on the event driven data refresh interval that is set to 0.5 seconds (fixed).

Measurement Data Management
USB-ITPAK V3.0/V2.1 (IT-016U/IT-020U/USB-ITN/U-WAVE/DP-1VA LOGGER connectable)

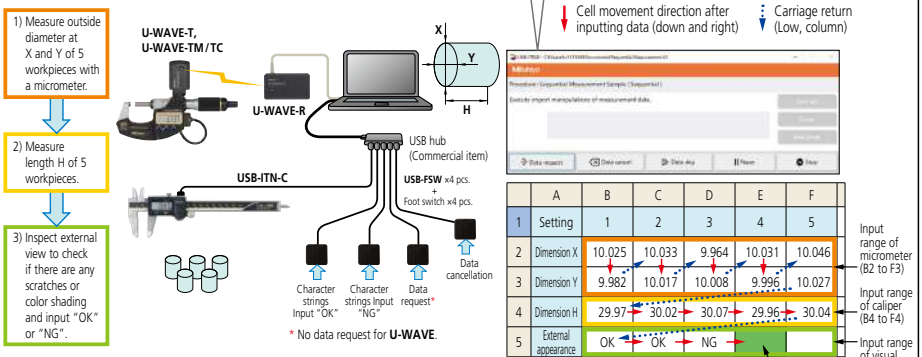
A desired measurement sequence to collect data into Excel can be created by using USB-ITPAK with an input tool or U-WAVE.

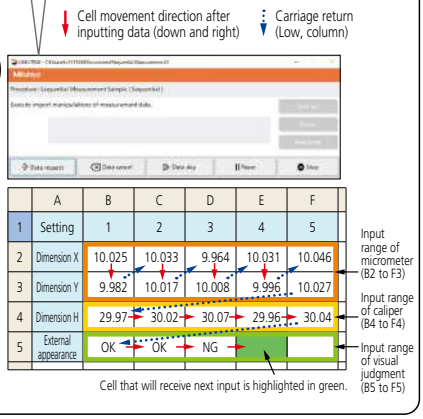
Measurement applications of USB-ITPAK (Three examples of how **USB-ITPAK** can be deployed are shown below)

Sequential measurement Example of measurement using input according to pre-registered procedures

(Measurement example) The outside diameters at X and Y and length (H) of 5 workpieces are measured in order, as shown below. Finally, a visual inspection is performed (for scratches, uneven coloring, etc.) to determine Go/±NG judgment.

When a measuring procedure is executed, a window is displayed. "Data request*", "Data cancel*", "Data skip*", "Aborting", "Complete" can be specified. * These operations can be allocated to the function key or foot switch (via **USB-FSW**).



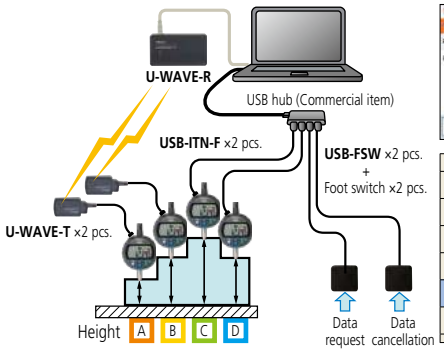


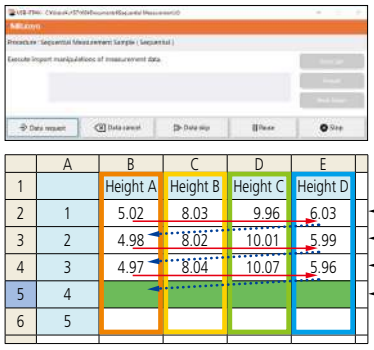
	A	B	C	D	E	F
1	Setting	1	2	3	4	5
2	Dimension X	10.025	10.033	9.964	10.031	10.046
3	Dimension Y	9.982	10.017	10.008	9.996	10.027
4	Dimension H	29.97	30.02	30.07	29.96	30.04
5	External appearance	OK	OK	NG		

* These are common options for **IT-020U**, **USB-ITN**, and **U-WAVE**. They cannot be used with **IT-007R**.

Simultaneous measurement Example of measurement involving importing data from multiple Digimatic gages at once

(Measurement example) Batch (simultaneous) measurement of 4 heights (A to D) of the workpiece shown below.





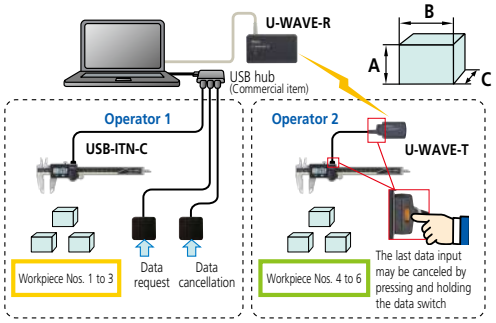
	A	B	C	D	E
1		Height A	Height B	Height C	Height D
2	1	5.02	8.03	9.96	6.03
3	2	4.98	8.02	10.01	5.99
4	3	4.97	8.04	10.07	5.96
5	4				
6	5				

First measurement (finished)
Second measurement (finished)
Third measurement (finished)
Fourth measurement (Wait for next input)

Note: When using **U-WAVE** for batch measurement, it will operate in "Event Drive mode."

Individual measurement Example of simultaneous work by multiple operators

(Measurement example) Two operators measure 6 workpieces 3 workpieces per operator



	A	B	C	D	E	F	G
1	Setting	1	2	3	4	5	6
2	Dimension A	10.02	10.03	9.96	10.15	10.23	10.04
3	Dimension B	9.98	10.01	10.07	9.99	9.78	
4	Dimension C	10.15	10.14		9.96	10.27	

Operator 1 Cell that will receive next input
Operator 2 Cell that will receive next input

USB-FSW ×2 pcs. + Foot switch ×2 pcs.

Notes on using USB-ITPAK V3.0/V2.1:

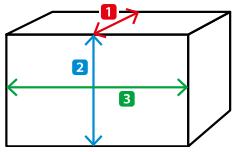
- Do not merge the cells in the specified range as a measurement data input.
- During measurement, the Microsoft Excel worksheet cannot be modified in any way apart from entering data. If you need to modify the sheet, it is necessary to abort or finish the measurement.
- If the OS build version is old, it may not be possible to use **U-WAVE fit *Bluetooth*®** and **U-WAVE fit** or **U-WAVE-T** together.

Bidirectional serial communication

With bidirectional serial communication (Digimatic S1) enabled measuring instruments, it is possible to use **USB-ITPAK V3.0** on a PC to control, configure, and collect information from the measuring instruments in addition to ordinary measurement data collection. This reduces labour and time for inspection and greatly increases efficiency.

Equipped with an automatic sorting function for sorting input measurement data [Easy input mode]

This function can be implemented even if the measuring instrument does not support bidirectional serial communication. After setting, measurement values are automatically sorted into an Excel sheet as needed.



Only the number of measurement items is preset.
(Example: number of measurement items = 3)

1 D: 10 mm
2 H: 20 mm
3 W: 30 mm

With normal input
(Entered into column A only.)

		A	B
1	1	10.11	
2	2	20.05	
3	3	29.99	
1	4	10.54	
2	5	20.45	

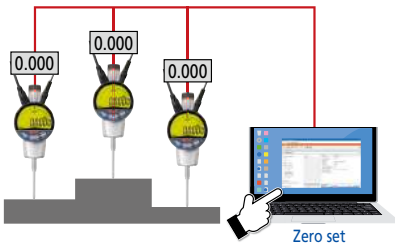
With automatic sorting function
(Once entered into column A, similar data is automatically classified.)

		A	B	C	D	E
1	1	10.11		10.11	20.05	29.99
2	2	20.05		10.54	20.45	29.5
3	3	29.99		9.78	20.3	30.4
1	4	10.54		9.99	20.07	30.22
2	5	20.45				

Digimatic S1 applicable model　Example of measurement using the **ID-CNX/ID-FNX**

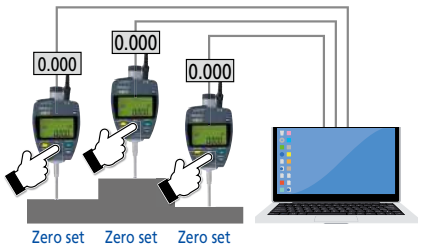
Function example (1)　Control of ID-C/ID-F from PC

ID-CNX/ID-FNX + USB-ITPAK V3.0



- It is possible to zero-set or preset measuring instruments collectively from **USB-ITPAK V3.0** on a PC.

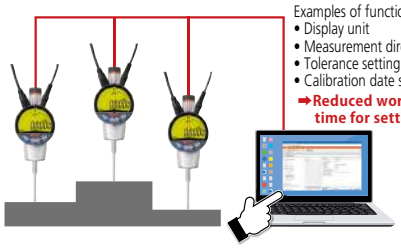
Instruments not supporting bidirectional serial communication + USB-ITPAK



- It is necessary to manually zero-set or preset measuring instruments individually.

Function example (2)　Measuring instrument setting

ID-CNX/ID-FNX + USB-ITPAK V3.0

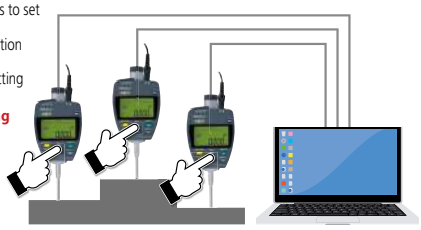


Examples of functions to set
- Display unit
- Measurement direction
- Tolerance setting
- Calibration date setting

➡**Reduced work time for setting**

- It is possible to set the functions of measuring instruments from **USB-ITPAK V3.0**.
- The settings of functions can be saved on a PC and copied to other measuring instruments.

Instruments not supporting bidirectional serial communication + USB-ITPAK



- It is necessary to manually change the settings.

Note: The above is possible only when bidirectional serial communication (Digimatic S1) enabled measuring instruments are used with USB Input Tool Direct or **IT-020U**. It is not possible with measuring instruments not supporting Digimatic S1 or **U-WAVE** Series.

Measurement Data Management

Data Conversion Program into Inspection Certificates in Excel Format MeasureReport

- Data from a measurement result file generated with a CMM, vision measuring machine or other machine can be output to an inspection certificate generated with Excel. Data from multiple measuring machines can be combined into a single inspection certificate (up to 200 measurement items).
- A customized format can be created for an inspection sheet using simple editing (copy & paste, etc.) by using a sample format as the template.
- The computation function is available for tolerance judgment, workpiece judgment, statistical calculation and other types of processing at inspection-certificate generation time.

Create inspection certificate from measurement result file for each measuring machine (PC data processing)

CMM
MCOSMOS, MICROPAK2700 MICROPAK700

Measurement result file

Vision Measuring Systems
QVPAK, QSPAK QIPAK

Measurement result file

Optical Instruments
Vision Unit QSPAK

Measurement result file

- File conversion: Supported file formats

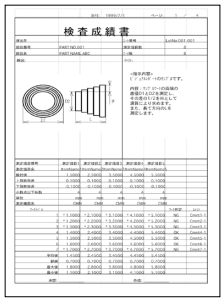
<CMM>
1) **MCOSMOS** ASCII file (**Geopak-3**)
2) **MPK2700** statistic file (Binary format)
3) **MPK2700** ASCII file (Text format)

<Vision Measuring Systems>
1) QUICK VISION **QVPAK-QV Report**
2) QUICK SCOPE **QSPAK** measurement result file
3) QUICK IMAGE **QIPAK** measurement result file

<Optical Instruments>
1) Vision Unit **QSPAK** measurement result file

Measurement result file conversion

Select and extract data, design value, tolerance value, etc., and output in specified Excel format.



Example of inspection certificate.

Excel inspection certificate creation macro program

- Measurement result file, data loaded from on-line communication, or data specified from database file of MeasurLink® can be output to an Excel table.
- Original format can be created by simple editing with sample style as a template.
  Desired template style can be automatically created by specifying required number of items and workpieces.
- Tolerance judgment (＊ marked in NG data), workpiece judgment (OK or NG is indicated in judgment column), statistical analysis, page break are automatically processed.
- Data from several measuring machines can be combined in one inspection certificate.

Main specifications of MeasureReport

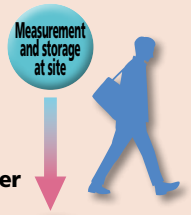
- Document creation:
  Automatic creation of template sample style (Number of items × number of workpieces specified)
- GO/±NG Judgment:
  Tolerance judgment (marked in NG value)
  Workpiece judgment (OK or NG in judgment column)
- Statistical analysis: mean, maximum, minimum, range, standard deviation, Cp, Cpk, fraction defective, number of defectives, etc. 15 items in total.
- Capacity:
  1) Measurement result file conversion
  2) On-line data input
  Max. 200 items × Max. 2,000 workpieces
  3) MeasurLink® database import
  Max. 200 items × Max. 2,000 workpieces or
  Max. 2,000 items × Max. 200 workpieces
- File combined:
  A maximum of 10 measurement files can be specified and both measurement items and workpieces can be combined respectively.
- Printing and saving of inspection certificate:
  Automatic printing and saving in Excel format
- Comment output to the inspection certificate:
  30 items including part number and lot number can be input.
- Workpiece drawing output to the inspection certificate:
  Image files (bmp, jpg) can be displayed in arbitrary positions.
- Others:
  Decimal point digit justification, error display, automatic page break

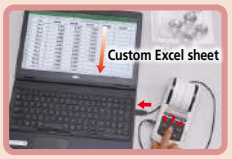
MeasureReport operation environment (recommended)

OS	Windows 2000 Windows XP Windows Vista (32-bit) Windows 7 (32-bit/64-bit) Windows 10 (64-bit)
Microsoft Excel	2000/2002/2003/2007/2010/2013/2016/2019 (Only 32-bit edition is available regardless of Windows version. It doesn't work on 64-bit Windows.)
CPU	Processor of 1 GHz or more
Memory	2 GB or more
Hard disk	3 GB or more free space
Display	1024×768 or larger
Drive	CD-ROM or DVD drive (required for installation)

Mini-Printer Equipped with Data Logging Function
SERIES 264 — Digimatic Mini-Processor DP-1VA LOGGER

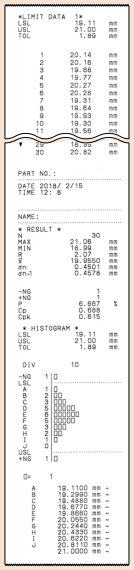
Typical application



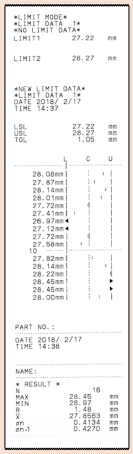


Example of printout

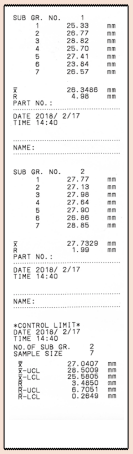
MODE1



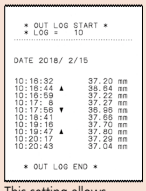
MODE2



MODE3

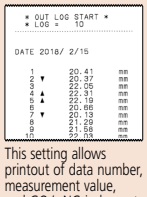


In OUT LOG Setting 1



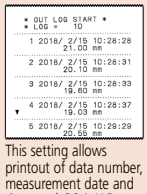
This setting allows printout of measurement time, measurement value, and GO/±NG judgment result.

In OUT LOG Setting 2



This setting allows printout of data number, measurement value, and GO/±NG judgment result.

In OUT LOG Setting 3



This setting allows printout of data number, measurement date and time, and GO/±NG judgment result.

Product catalog E12051

Video

In addition to the conventional (DP-1VR) printing and statistical calculation functions, data logging and USB output functions are added and enhanced.

- This is a palm-sized printer used to print measurement data from Digimatic gages or to perform statistical analysis.
- The versatile **DP-1VA LOGGER** printer not only prints measurement data, but performs a variety of statistical analyses, draws histograms and D-charts and also performs complex operations on Xbar-R control charts.
- The data logger function allows storage of up to 1,000 pieces of data in memory and batch transfer of stored data to an Excel-format inspection certificate, etc., by connecting to a PC via a USB cable (optional).

264-505
DP-1VA LOGGER

SPECIFICATIONS

Code No.	**264-505***
Model	**DP-1VA LOGGER**
Data input	Digimatic input, RS-232C input (specific to Mitutoyo **KA** counter)
Data processing capacity	Mode 0: 100,000 pcs. of data Modes 1, 2: 9,999 pcs. of data Mode 3: Sample size 10×9,999 subgroups=99,990 pcs. of data
GO/±NG judgment	Five sets can be defined
Output	1) USB output 2) RS-232C data output at TTL levels 3) GO/±NG judgment result output (+NG, GO, –NG)
Input timer	Input intervals: 0.25 s, 1 s, 5 s, 30 s, 1 min, 30 min, 60 min
Printing method	Thermal line printer
Printing speed	0.8 s per line (6.5 mm/s) (using AC adapter)
Printing line	10,000 lines of normal characters per roll 7,000 lines of large characters per roll
Printing paper	High durability thermo-sensitive paper, Width 58 mm × length 48 m Note: If it is to be used for official documents, or stored more than 5 years, it is recommended to make a more durable copy.
Power source	2 power methods 1) AC adapter 100 to 240 V 50/60 Hz AC adapter (6 V, 2 A) as a standard accessory. **06AGZ369JA** (JAPAN, US), **06AGZ369D** (EU), **06AGZ369E** (UK), **06AGZ369K** (Korea), **06AGZ369DC** (China) 2) 4 pcs. of LR6/AA size (alkaline or Ni-Mh) Note: Manganese dioxide batteries are not usable.
Battery life	About 10,000 lines* (if data is printed once every 5 seconds using 1,600 mA NiMH batteries at 20 °C) * This is a typical value and is not guaranteed.
External dimensions	94 (W) ×201 (D) ×75.2 (H) mm
Mass	390 g (main unit)
Optional Accessories	1) USB cable (A-microB) : **06AFZ050** (1 m) 2) RS-232C output cable: **09EAA084** (1 m, D-SUB 9-pin) 3) RS-232C counter cable: **09EAA094** Cable for **KA** counter (1 m, D-SUB 25-pin) 4) GO/±NG judgment cable: **965516** (2 m, 10 pin terminal/separate) 5) Foot switch: **937179T**
Consumable Items	Printing paper (10 rolls): **09EAA082**

* To denote your AC line voltage add the following suffixes. **A** for North America, **D** for Europe, **E** for UK, **K** for Korea, **DC** for China, and no suffix is required for Japan.

Example of printout

MODE1

Various statistical calculations are executed using all input data. If the tolerance limits have been set, GO/±NG judgment and histogram creation are also enabled.

MODE2

In addition to the MODE1 function, measurements within the tolerance limits are printed out as a D chart*. This chart allows you to identify the trend of variations in measurement data.
* D chart stands for Displacement chart.

MODE3

Only input of data automatically enables calculation processing of complex control limit values as well as calculation for creating an Xbar-R control chart.

Statistical calculation data

MODE0

GO/±NG judgment

MODE1, 2

N: Number of pieces of data
MAX: Maximum value
MIN: Minimum value
R: Range
$\bar{X}$: Mean value
σn: Standard deviation of a population (N)
σn-1: Sample standard deviation (N-1)
–NG: For the number of pieces of data smaller than the lower limit
+NG: For the number of pieces of data larger than the upper limit
P: Percentage of rejects
Cp: Maximum process capability potential
Cpk: Actual process capability achieved

MODE3

N: Number of pieces of data
MAX: Maximum value
MIN: Minimum value
n: Number of subgroups (up to 10)
$\bar{X}$: Mean value in a subgroup
R: Range of a subgroup
$\bar{\bar{X}}$: Mean value
$\bar{X}$-UCL: Upper control limit
$\bar{X}$-LCL: Lower control limit
$\bar{R}$: Center (R control)
R-UCL: Upper control limit (R control)
R-LCL: Lower control limit (R control)

Mitutoyo

Digimatic/RS-232C Interface Unit Multiplexer MUX-10F

- Multiplexer **MUX-10F** is a measurement data transfer device that converts incoming Digimatic output measurement data to RS-232C and outputs it to other devices such as a PC and sequencer.
- Up to four measuring instruments with Digimatic output can be connected.

264-002
MUX-10F

SPECIFICATIONS

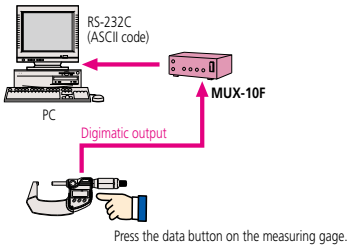
Code No.	**264-002***
Model	**MUX-10F**
Data input port	4 channels for Digimatic gages
Output: (RS-232C)	Data transmission method: Half-duplex, Data transmission code: ASCII/JIS, Data length: 8 bits Parity check: None, Stop bit: 1, Data transmission speed: 300/600/1200/2400/4800/9600/19200 bps
Power source	AC adapter (9 V, 500 mA)
External dimensions	91.4 (W) ×92.5 (D) ×50.4 (H) mm

* To denote your AC line voltage add the following suffixes. **A** for North America, **D** for Europe, **E** for UK, **K** for Korea, **DC** for China, and no suffix is required for Japan.
Note 1: Communication software is not included.
Note 2: Separately purchase the cables. Refer to pages 09-23 and 09-24 for cable types.

Typical Application

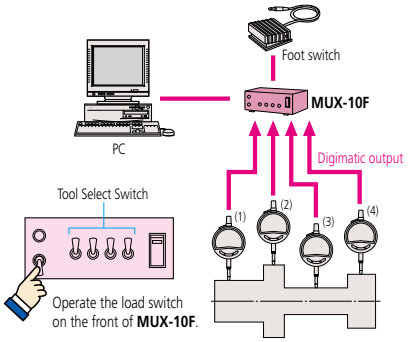
Data input using the data button on the Digimatic gage

- If the Digimatic gage has a data button, data is sent to the **MUX-10F** from the gage, converted to RS-232C and sent out.



Data input using the load switch

- If the Digimatic gage does not have a data button, or when simultaneous measurements are performed, the **MUX-10F** load switch is used to poll data from the measuring gage(s) selected by the tool selection switch (es), converted to RS-232C, and sent out.
- If multiple measuring gages are selected by the tool selection switch, data is input in the order of channels 1 through 4.
- Optional foot switch (**937179T**) is available for quick data entry.

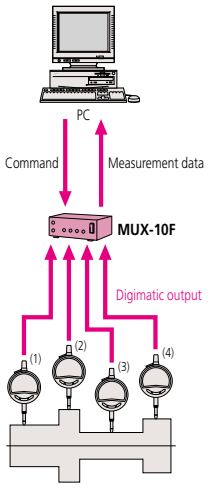


Data input using the external commands

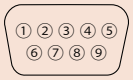
- Data from a specified measuring gage connected to **MUX-10F** can be polled (ch 1 to 4) by inputting a command from the PC.

Commands (ASCII)	Transfer channels
1 (ASCII code31) CR	1
2 (ASCII code32) CR	2
3 (ASCII code33) CR	3
4 (ASCII code34) CR	4
*A (ASCII code41) CR	1, 2, 3, 4
*B (ASCII code42) CR	1, 2, 4
*C (ASCII code43) CR	1, 3, 4
*D (ASCII code44) CR	2, 3, 4
E (ASCII code45) CR	1, 2, 3
F (ASCII code46) CR	1, 2
G (ASCII code47) CR	1, 3
H (ASCII code48) CR	1, 4
I (ASCII code49) CR	2, 3
J (ASCII code50) CR	2, 4
K (ASCII code51) CR	3, 4

* Command will operate the same as previous **MUX-10** when 4-channel mode is turned off.



Connector specification



Pin No.	Signal	Function	in/out
1	CD		out
2	RD	Received data	out
3	TD	Communication data	in
4			
5	GND	Ground	
6	DR		out
7			
8	CS		out
9			

Note: For connection with a PC, use a commercially available RS-232C straight cable.

Data format

1) When data output

D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13
- D1: Data format code No.: 0
- D2: Channel No.: 1 to 4
- D3: Measurement item: A
- D4: Model: + or –
- D5 D6 D7 D8 D9: LSD (Floating decimal point)
- D10 D11 D12 D13: CR

2) Example of format

Display (CH1)	Display (CH2)
-0.018	0.1234
↓	↓
Output data 01 A - 0000.018 CR	Output data 02 A+000.1234 CR

The smallest input channel number data is output first in the output stream, with the others following in ascending order.

3) Error code output

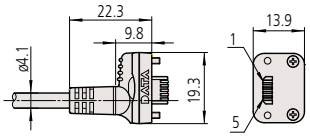
D1 D2 D3 D4
- D1: Error format: 9
- D2: Channel No.: 1 to 4
- D3: Error code No.
  - 1: No data input
  - 2: Loaded data with format other than specified
- D4: CR

Digimatic data cable specifications (Dimensions)

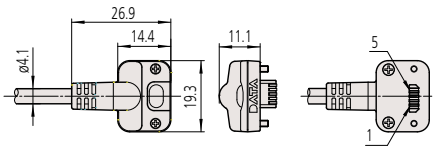
Gage connector dimensions

Unit: mm

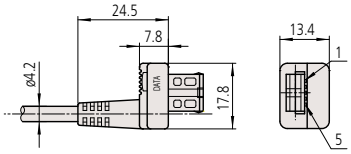
A) 1) **06AFM380A**
2) **05CZA624** (1 m)
05CZA625 (2 m)
3) **02AZD790A** (Standard)
02AZE140A (FSW)



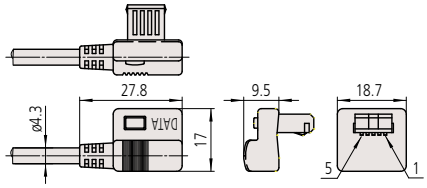
B) 1) **06AFM380B**
2) **05CZA662** (1 m)
05CZA663 (2 m)
3) **02AZD790B** (Standard)
02AZE140B (FSW)



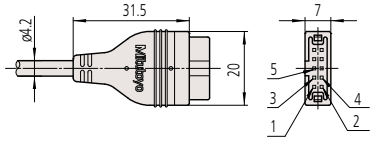
C) 1) **06AFM380C**
2) **959149** (1 m)
959150 (2 m)
3) **02AZD790C** (Standard)
02AZE140C (FSW)



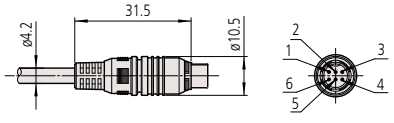
CR) 1) No applicable models
2) **04AZB512** (1 m)
04AZB513 (2 m)
3) No applicable models



D) 1) **06AFM380D**
2) **936937** (1 m)
965014 (2 m)
3) **02AZD790D** (Standard)
02AZE140D (FSW)

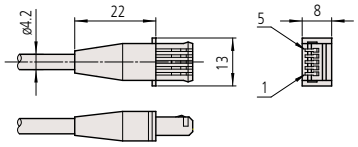


E) 1) **06AFM380E**
2) **937387** (1 m)
965013 (2 m)
3) **02AZD790E** (Standard)
02AZE140E (FSW)

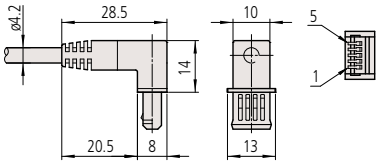


Note: (1), (2) and (3) are for connecting cables listed in 09-23 and 09-24.

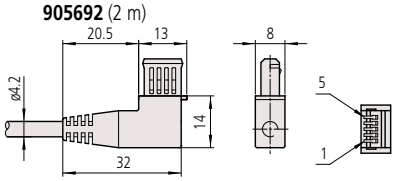
F) 1) **06AFM380F**
2) **905338** (1 m)
905409 (2 m)
3) **02AZD790F** (Standard)
02AZE140F (FSW)



FB) 1) No applicable models
2) **905689** (1 m)
905690 (2 m)
3) No applicable models

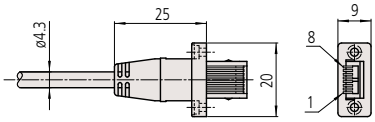


FR) 1) No applicable models
2) **905691** (1 m)
905692 (2 m)
3) No applicable models

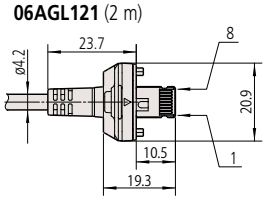


FL) and FR) is symmetrical and the same size.

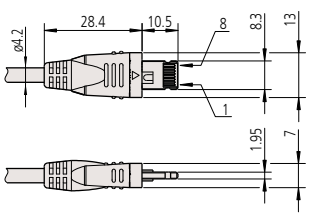
G) 1) **06AFM380G**
2) **21EAA194** (1 m)
21EAA190 (2 m)
3) **02AZD790G** (Standard)
02AZE140G (FSW)



SA) 1) **06AGQ001A**
2) **06AGL111** (1 m)
06AGL121 (2 m)
3) No applicable models



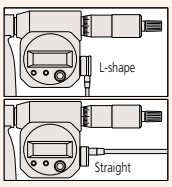
SF) 1) **06AGQ001F**
2) **06AGL011** (1 m)
06AGL021 (2 m)
3) **02AZG011** (Standard)
02AZG021 (FSW)



Connection cables and applicable models

1) USB Input Tool Direct USB-ITN 	Connector type	**A)** Water-proof type with output button	**B)** Water-proof type with output button	**C)** Straight type with output button	**CR)** L-shape type with output button, cable outlet on right	**D)** Flat 10-pin type
	Model Code No.	**USB-ITN-A 06AFM380A**	**USB-ITN-B 06AFM380B**	**USB-ITN-C 06AFM380C**	No applicable models **USB-ITN-C** can be used. See figure below	**USB-ITN-D 06AFM380D**
2) IT-020U/IT-007R/DP-1VA LOGGER/ MUX-10F/EC Counter  Connector (13 types, A to G, SA and SF) Type D on the other end for all models	Connector type	**A)** Water-proof type with output button	**B)** Water-proof type with output button	**C)** Straight type with output button	**CR)** L-shape type with output button, cable outlet on right	**D)** Flat 10-pin type
	Code No. 1 m	**05CZA624**	**05CZA662**	**959149**	**04AZB512**	**936937**
	Code No. 2 m	**05CZA625**	**05CZA663**	**959150**	**04AZB513**	**965014**
3) U-WAVE-T 	Connector type	**A)** Water-proof type with output button	**B)** Water-proof type with output button	**C)** Straight type with output button	**CR)** L-shape type with output button, cable outlet on right	**D)** Flat 10-pin type
	Standard	**02AZD790A**	**02AZD790B**	**02AZD790C**	No applicable models Type C can be used, but be careful of the cable when operating the thimble. (See figure below)	**02AZD790D**
	For foot switch	**02AZE140A**	**02AZE140B**	**02AZE140C**		**02AZE140D**

For connector types (circled in broken lines), select the model (A to G, SA,SF) that matches the connector shape of the Digimatic gage you are using.

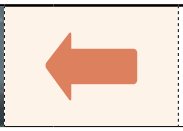
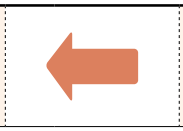
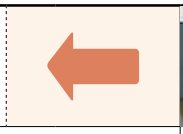
Gage connectors on data cable The connector dimensions are given on page 09-22.	Connector type	**A)** Water-proof type with output button	**B)** Water-proof type with output button	**C)** Straight type with output button	**CR)** L-shape type with output button, cable outlet on right	**D)** Flat 10-pin type
	Cable Connector shape on Digimatic gage side					
	Data switch	Available	Available	Available	Available	N/A
Digimatic ports on gage Please note that some high-precision Digimatic gages are capable of displaying the measurement result to more than 6 digits. However, according to the Digimatic output specification, the result may be output in 6 digits only. Digimatic gages whose display may exceed 6 digits • Laser Scan Micrometers • Litematic • Linear gage counter (**EH**)	Picture of Digimatic port					
	Applicable models	• Digimatic caliper **500-776/500-777**, etc. **500-712-20/500-713-20**, etc. **500-712** etc. **550-301-10/550-331-10**, etc. **551-301-10/551-331-10**, etc. **552-302-10/552-303-10**, etc. **552-150-10/552-151-10**, etc. **552-155-10/552-156-10**, etc. **552-181-10/552-182-10**, etc. **573-601/573-602**, etc. • Digimatic depth gage **571-251-10/571-252-10**, etc. • Digimatic scale unit **572-600, 572-601**, etc.	• Digimatic micrometer **293-140-30/293-141-30**, etc. **293-230-30** etc. **340-251-30/340-252-30 293-666-20/293-667-20**, etc. **227-201-20/227-203-20**, etc. **227-205-20/227-206-20**, etc. **227-221-20** etc. **227-223-20** etc. **422-230-30/422-231-30**, etc. **406-250-30/406-251-30**, etc. **343-250-30/343-251-30**, etc. **369-250-30/369-251-30**, etc. **345-250-30/345-251-30**, etc. **314-251-30/314-252-30**, etc. • Digimatic micrometer head **350-251-30/350-261-30**, etc. • Digimatic holtest **468-161/468-162**, etc. • Digimatic depth gage **329-250-30/329-251-30**, etc.	• Digimatic caliper **500-150-30/500-151-30**, etc. **500-500-10/500-501-10**, etc. **500-443** etc. **573-118-10/573-119-10**, etc. **573-116-10/573-117-10**, etc. **573-191-30/573-291-30 573-181-30/573-182-30**, etc. • Digimatic depth gage **571-201-30/571-202-30**, etc. • Digimatic micrometer head **164-163/164-164** • Digimatic scale unit **572-203-10/572-213-10 572-300-10/572-301-10**, etc.	• Digimatic micrometer **293-582/293-583**, etc. **389-514/389-714**  Type C straight connectors are available, but may interfere with thimble operation.	• Digimatic indicator **ID-H** **ID-F** (Note 1) • High-precision height gage **QMH-AX/BX** • Mu-checker Digital Mu Checker (Note 1) • Laser scan micrometer **LSM-9506** • Linear gage counter **EF/EH** (Note 2) **EB** (Note 1) and (Note 4), **EC-101D** (Note 1) • Litematic **VL-B/S-B** (Note 2) • Surface roughness measuring machine **SJ-210** (Note 4)/ **310/410** **SJ-500/SV-2100** (Note 3) • Hardness testing machines **HM-210/220** **HV-110/120** **HR-530** **HR-600**

E) Round 6-pin type	**F)** Flat straight type	**FB)** Flat L-shape (cable outlet is back)	**FR)** Flat L-shape (cable outlet is right)	**FL)** Flat L-shape (cable outlet is left)	**G)** Flat straight water-proof type	**SA)** Water-proof straight model with output button	**SF)** Straight standard type
USB-ITN-E 06AFM380E	**USB-ITN-F 06AFM380F**	No applicable models **USB-ITN-F** is available.			**USB-ITN-G 06AFM380G**	**USB-ITN-SA 06AGQ001A**	**USB-ITN-SF 06AGQ001F**

E) Round 6-pin type	**F)** Flat straight type	**FB)** Flat L-shape (cable outlet is back)	**FR)** Flat L-shape (cable outlet is right)	**FL)** Flat L-shape (cable outlet is left)	**G)** Flat straight water-proof type	**SA)** Water-proof straight model with output button	**SF)** Straight standard type
937387	**905338**	**905689**	**905691**	**905693**	**21EAA194**	**06AGL111**	**06AGL011**
965013	**905409**	**905690**	**905692**	**905694**	**21EAA190**	**06AGL121**	**06AGL021**

E) Round 6-pin type	**F)** Flat straight type	**FB)** Flat L-shape (cable outlet is back)	**FR)** Flat L-shape (cable outlet is right)	**FL)** Flat L-shape (cable outlet is left)	**G)** Flat straight water-proof type	**SA)** Water-proof straight model with output button	**SF)** Straight standard type
02AZD790E	**02AZD790F**	No applicable models Use **02AZD790F** or **02AZE140F**.			**02AZD790G**	No applicable models Use **02AZG011** or **02AZG021**.	**02AZG011**
02AZE140E	**02AZE140F**				**02AZE140G**		**02AZG021**

Note 1: **USB-ITN** is required to use in the combination with **USB-ITPAK**, when connected to D) **ID-F**, D) digital Mu-checker, **EB**, **EC-101D**, and F) **ID-U**, **ID-SS**, **ID-SX**.
Note 2: **USB-ITN**, **IT-020U**, and **U-WAVE-T** cannot be used with D) **EF**/**EH** and D) **VL-B**/**S-B**.
Note 3: **USB-ITN** and **U-WAVE-T** cannot be used with D) **SJ-500**/**SV-2100**.
Note 4: **IT-020U** and **USB-ITN-SF** cannot be used with D) **SJ-210** and D) **EB**.

E) Round 6-pin type	**F)** Flat straight type	**FB)** Flat L-shape (cable outlet is back)	**FR)** Flat L-shape (cable outlet is right)	**FL)** Flat L-shape (cable outlet is left)	**G)** Flat straight water-proof type	**SA)** Water-proof straight model with output button	**SF)** Straight standard type
							
N/A	N/A	N/A	N/A	N/A	N/A	Available	N/A
							
[Hardness testing machines] **HM-102** **HM-103** **HM-320** **HM-430** **HM-411**	• Digimatic indicator **ID-CX**, **ID-C112AX**, **ID-C112RXB**, **ID-C112GXB**, **ID-U** (Note 1), **ID-SS** (Note 1), **ID-SX** (Note 1) **HDM-AX**, **HD-AX**, **HDS-HC**, **HDS-C** • ABS borematic **568-361**/**568-362**, etc. • Digimatic bore gage **511-501**/**511-502**, etc. • Scale unit **SD-E**, **SDV-E**, **SD-F**, **SDV-F** • Hardness testing machines **HH-300** • Digimatic depth gage **Digimatic type (ID-CX)**				• Digimatic indicator **ID-N** **ID-B**	• Digimatic micrometer **QuantuMike** **(293-14X-40**/**293-18X-40)**	• Digimatic indicator **ID-CNX** **ID-FNX** • Digimatic depth gage **Digimatic type (ID-CNX)** • Digimatic thickness gage **Digimatic type (ID-CNX)**

[How to check the code No. of the connecting cable used for the measuring instrument]

• For models currently being sold
Please check the optional accessories for the applicable Digimatic gage in the general catalog.
The general catalog can also be viewed on the Mitutoyo website. Web address: **https://www.mitutoyo.co.jp/**

• Regarding discontinued models not listed in the general catalog
(1) How to look for items from the general catalog
For a digimatic indicator, you can check the "New and Old Product Compatibility Table" for compatible connecting cables.
(2) How to look for items from the Mitutoyo website
You can search the "Parts List". Enter the code number of the Digimatic gage you want to search for.
Example: **293-421**, **500-151**, etc.

Measurement Data Management

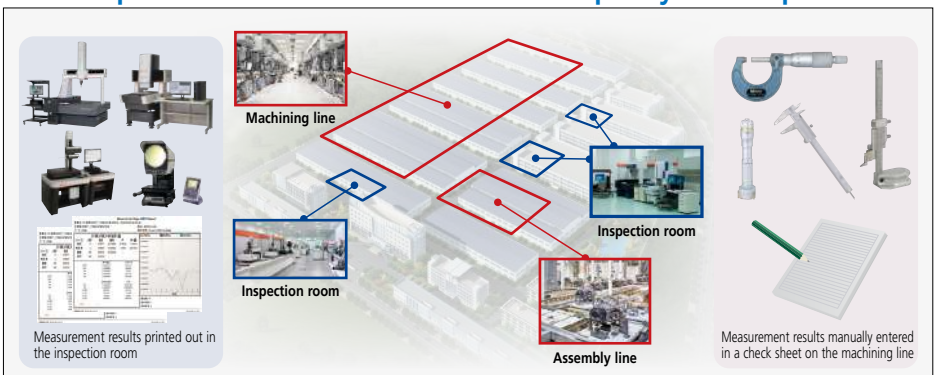
MeasurLink® ENABLED
Data Management Software by Mitutoyo

Measurement Data Network System MeasurLink®

- **MeasurLink®** is a data management modular software system that enables collecting data from a wide range of Mitutoyo measuring tools and systems including Coordinate Measuring Machines.
  It supports the "visualization of quality" by showing quality information important for judging the status of processes, such as control charts and process capability indexes, in an easy-to-understand way.

Note: MeasurLink® is a registered trademark of Mitutoyo Corporation in Japan and Mitutoyo America Corporation in the United States.

Is the inspection record data utilized to solve quality-related problems?

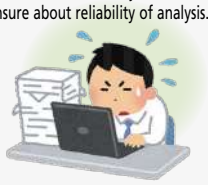


Hard to identify problems with only numerical data

Current problem

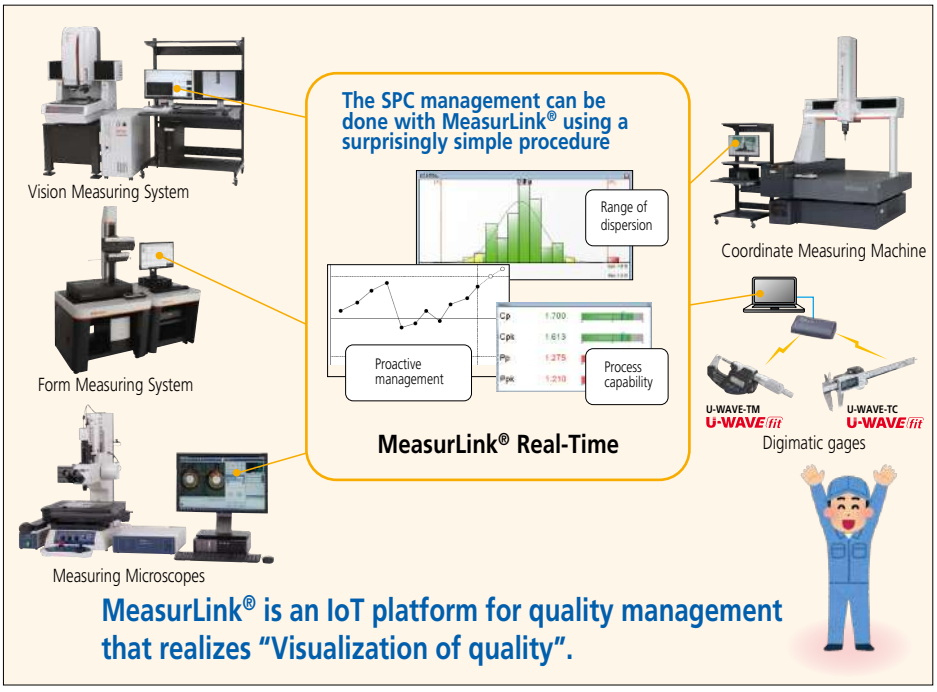
- Data is not leveraged effectively
- Data is at discrete locations
- Management using spreadsheet software
- Every problem needs to be checked with a field operator
- Statistical processing is difficult to learn

Hard to respond quickly since it takes time to enter and analyze data. Unsure about reliability of analysis.



Isn't there any quicker, simpler and more reliable management method?

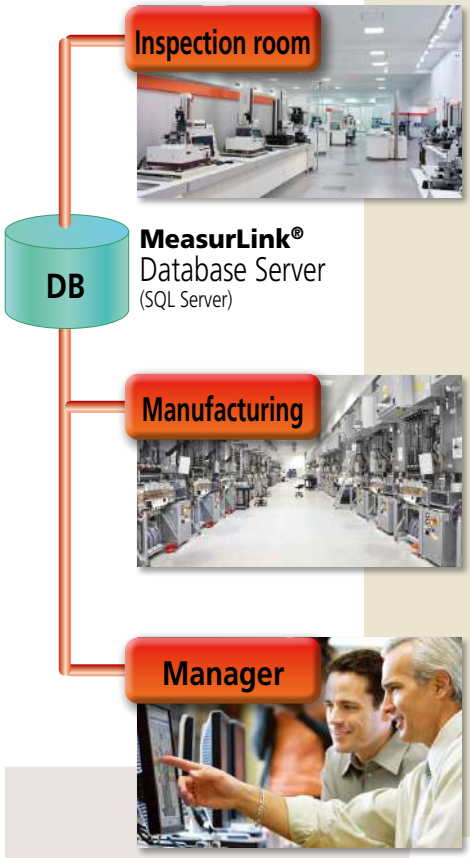
SPC management can be easily done by combining Mitutoyo measuring instruments and MeasurLink®.



MeasurLink® is an IoT platform for quality management that realizes "Visualization of quality".

Video

- **Centralized monitoring from all MeasurLink® data collection terminals networked together on the shop floor**
  Enables easy networking through the Database Server (SQL Server). It comprises the six software packages shown in the figure below, and allows for choosing/combining functions necessary for the purpose, such as "data collection" in the inspection room or on the shop floor, or "process monitoring/analysis" by the manager.



Data collection/Analysis module
MeasurLink® Real-Time
(Refer to page 09-27 for details.)

This SPC software allows data collection from each tool and instrument and still allows real-time display of statistical processing data such as control charts, histograms and process capability indexes.

Automatic reporting program
MeasurLink® Report Scheduler
(Refer to page 09-28 for details.)

This program automatically outputs reports created by **Real-Time** or **ProcessAnalyzer** in the preset schedule.

Process Management for Managers
MeasurLink® Process Manager
(Refer to page 09-29 for details.)

This software enables managers to centrally monitor the collected data in **Real-Time**.

Process Analysis module for Managers
MeasurLink® Process Analyzer Proffesional
(Refer to page 09-29 for details.)

This software enables managers to check the collected data in **Real-Time** and analyze in detail.

Evaluation/Analysis Software for Measurement System Analysis (MSA)
MeasurLink® Gage R&R
(Refer to page 09-30 for details.)

This software aids measurement system analysis (MSA) required by IATF 16949.

Gage Management Software
MeasurLink® Gage Management
(Refer to page 09-30 for details.)

This software helps with recording the usage status of gages and planning and implementing a feasible calibration schedule.

Mitutoyo

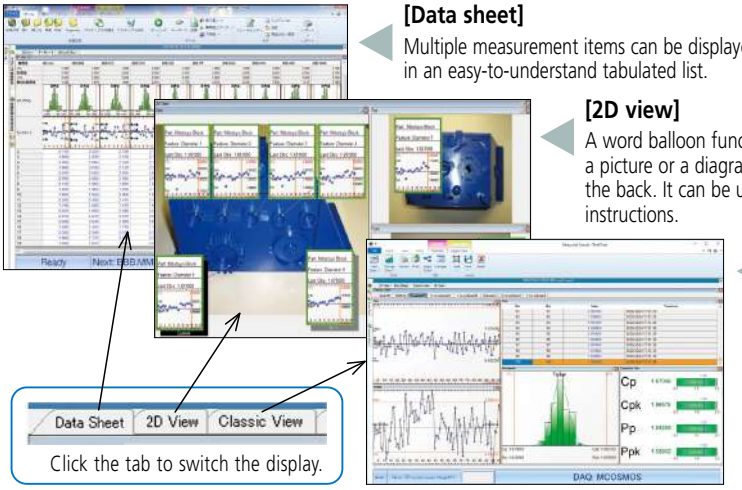
MeasurLink® Data Collection/Analysis Software

Real-Time Standard (RT Std)
Real-Time Professional (RT Pro)
Real-Time Professional 3D (RT Pro 3D)

• **Real-Time** is the Statistical Process Control (SPC) MeasurLink® module that collects data from Mitutoyo and third-party measuring devices and systems to provide analysis functionality in real-time by displaying control charts or process capability indexes.

Various data views

Collected data can be displayed in various views, such as data lists, work instruction images, statistical analysis results, etc. The views can be switched easily according to the needs of the operator.



[Data sheet]
Multiple measurement items can be displayed in an easy-to-understand tabulated list.

[2D view]
A word balloon function is available having a picture or a diagram of the workpiece on the back. It can be used as work process instructions.

[Classic view]
Graphs and lists can be freely selected to display data for a single measurement item. It is useful for checking detailed information such as date and time of the acquired data.

Adding traceability information

Traceability information for each workpiece can be added, for example, serial no., lot no., inspector name, machine no., or cause of problems and remedies. Traceability will also support Barcode scanners for easy error free entry.
This information can be used as search criteria when extracting data using the filtering function (**RT Pro**/**RT Pro 3D**) when a problem occurs.

Alarm function

The operator and management are notified when an "Out of Tolerance" or other events occur.
The method of notification can be selected from a pop-up window, E-mail (Fig. 1), audible alarm or log file.

Subject: Out of tolerance

MeasurLink
Status : Out of tolerance
Station : MeasurLink Demo
Routine : AAA
Run : 2014/01/28 TEST-LOT-03
Characteristic : A
TimeStamp : 2014/12/01 10:19:44
Subgroup Number : 18
Observation Number : 1
Observation : 3
Upper Tolerance Limit : 2.5
Target : 2
Lower Tolerance Limit : 1.5

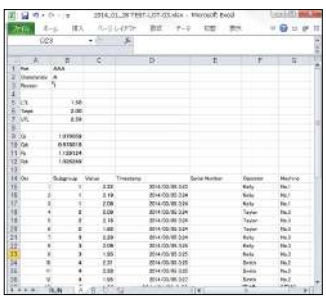
(Fig. 1) Alarm notification by E-mail

Events possible to be logged

- Measurement data
- Retake/modify data
- Failed data tests
- Assignable Cause and Corrective Action

Exporting data to an Excel file

Measurement data can output to an Excel file. This function is useful if the data needs to be used in a department that does not have **MeasurLink®**. (Fig. 2)



(Fig. 2) Export to Excel

MeasurLink® System Requirements

• Operating environments
[Operating System]
Microsoft Windows 7 (32-bit/64-bit)
Microsoft Windows 7 SP1
Microsoft Windows 8.1 (32-bit/64-bit)
(Microsoft Windows 8.1 RT is not supported)
Windows 10 (32-bit/64-bit)
(Windows 10 Mobile and IoT editions are not supported)
Windows 11 (64 bit)
[Database]
Microsoft SQL Server 2017 Standard/Enterprise Edition
Microsoft SQL Server 2016 Standard/Enterprise Edition
Microsoft SQL Server 2014 Standard/Business Intelligense/Enterprise Edition
SQL 2019 Standard/Enterprise

RT Std/RT Pro/RT Pro 3D Common Functions

• Connectable measuring instruments
· Measuring tool with Digimatic output (equipped with PC data processing unit)
[Supported interfaces]
• Wireless (USB) **U-WAVE**/**U-WAVE fit** (VCP)
• Wired (USB) **IT-020U**/**USB-ITN** (VCP or HID)
• Wireless (D-sub 9 pin) **IT-007R, MUX-10F, DP-1VA LOGGER**, and others
• Various RS-232C devices (partially restricted)
• Screen display mode when collecting data
· Classic view
· Data sheet
· 2D view
· Part data sheet, etc.
• Statistical Analysis result
[Chart]
Xbar-R, Xbar-S, X-Rs control charts, Histogram, Run chart, Pre-control chart, Tier chart, Box plot chart, Meter chart, Indicator bar, Multivariate data control chart, etc.
[Statistics]
Maximum value, Minimum value, Standard deviation, Average ±3σ/4σ/6σ, Process capability indexes (Cp, Cpk, Pp, Ppk), Defect ratio, etc.
• Alarm function
[Target items]
· Out of tolerance
· 1 point exceeds control limit line (following are related to management chart)
· Consecutive 9 points on one side of center line
· 6 points successively increasing or decreasing
Others including 8 judgment criteria for Shewhart control chart
• Adding traceability information
· Measurement date (automatically added)
· Serial No. (Keyboard entry)
· Special causes and remedies
· Selection from comment list registered as an option
· Enter from keyboard when measuring classified title registered as an option (e.g. Lot No. LOT 001)
• Report print out function
Measurement values, analysis calculation results and various charts can be arranged to output according to requirements.
• Export function of measurement results
· Excel
· Text
· QIF
· AQDEF
• Security function
Once the access authorization is set, it requires "User name" and "Password" input before the program will start. Data editing actions such as reference, entry and changes require authorization according to the user's role in order to preserve data integrity.
• Operation languages (19 languages)
English, Japanese, French, German, Dutch, Spanish, Swedish, Polish, Italian, Turkish, Korean, Chinese (simplified/traditional), Thai, Hungarian, Czech, Finnish, Portuguese, Russian

RT Pro/RT Pro 3D Common Functions

• Connectable measuring instrument
· Mitutoyo Measurement Data Management System (equipped with PC data processing unit)
[Supported data processing software]
· CMM: **MCOSMOS V3.2** or later
· Vision System: **QVPAK V10.0** or later/**QSPAK V10.2** or later/**QSPAK MSE V3.1** or later/**QIPAK V4.1** or later
· Vision unit: **QSPAK VUE V4.1** or later
· Surface Roughness/contour instruments: **FORMTRACEPAK V5.311** or later
· Roundness instruments: **ROUNDPAK V7.0** or later
· Hardness testing machines: **AVPAK V2.0** or later
• Filter function
Keyword items for data extraction
· Measurement data (year, month, day, time, week, etc.)
· Serial No.
· Traceability information (e.g. Inspectors, Machine No., etc.)
· Alarm item
• Import function for text data
A custom import template can be built to collect data in **Real-Time Pro/Pro 3D**. MeasurLink® supports ASCII file types such as CSV and TXT with minimum required information (e.g. part name, characteristic name and measurement values, etc.) In addition, MeasurLink® supports QIF, AQDEF, and QMD file types.

RT Pro 3D functions

• Screen display mode when collecting data
· 3D view

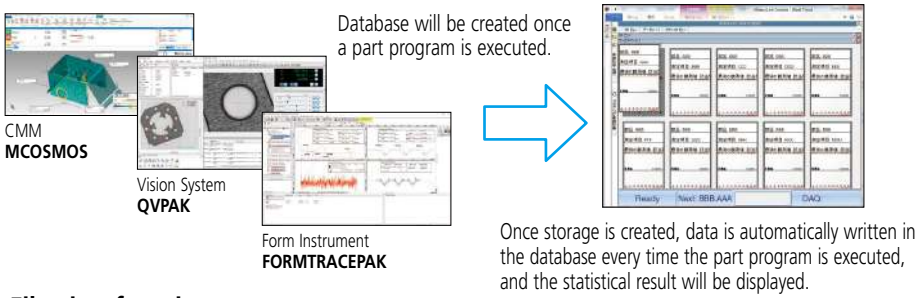
Data collection/analysis software Real-Time functional comparison

Functions		Data collection software		
		Real-Time Standard	Real-Time Professional	Real-Time Professional 3D
Collected data display	Classic view	✓	✓	✓
	Data sheet	✓	✓	✓
	2D view	✓	✓	✓
	3D view (Hoops)			✓
Data extract	Filter		✓	✓
Input from tools and devices	Measuring tools (RS-232C, USB)	✓	✓	✓
	Measuring instruments (DDE)		✓	✓
Text input	Import		✓	✓

• **RT Pro/RT Pro 3D** enables customers to connect and acquire data from Mitutoyo coordinate measuring machines, vision and form measuring systems via native integration (DDE).

• Automatic linking with part programs

To automate the process of linking the CMM, Vision or Form system with MeasurLink®, some easy setup is needed on the device and in MeasurLink®. Then, when the part program is executed, the measurement system will send the part and measurement information to MeasurLink®, along with any tagged data related to the measurement. A new run can be created in **Real-Time Pro/Pro 3D**, or the data can be added to an existing run. The charts and statistics will continuously update and be displayed in the view.



Once storage is created, data is automatically written in the database every time the part program is executed, and the statistical result will be displayed.

• Filtering function

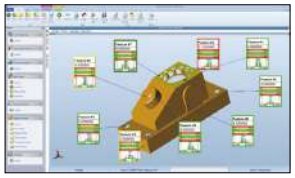
Required data can be easily extracted based on the date and time of the measurement, added comments, or alarms.

• Import function

Measurement data saved in ASCII files can be loaded. Also, a feature to customize a template for loading according to the format is provided.

• RT Pro 3D is a full-spec package

The feature to be measured can be displayed in detail using 3D CAD data.



[3D view]

3D graphics library HOOPS displays real view of the workpiece using an hsf file created from 3D CAD data. The displayed workpiece image can be freely turned, translated, or scaled so that you can get a clear view of the feature to be measured.
The word balloons and lead lines that display the measurement result and measured feature will move following the CAD data translation.

MeasurLink® Automatic Report Generation Program MeasurLink® Report Scheduler

Automatically generates a report created by the **Real-Time (RT Std/RT Pro/RT Pro 3D)** or **Process Analyzer Professional** modules, each of which is connected to the network according to a specified schedule.

The Use of MeasurLink® Report Scheduler

• Typical applications

• Automatic generation of a weekly report specified from among last week's data.
• Automatic report generation by extracting only data with tag information about "tool replacement" (due to wear, breakage, etc.)
• Automatic generation of a daily report for each shift by filtering inspection record data on the basis of a shift

MeasurLink® Report Scheduler common functions

• Report output destinations

• Printer, file, E-mail (as an attached document)

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Measurement Data Management

MeasurLink® Optional Process Analysis Software for Managers Process Analyzer Professional

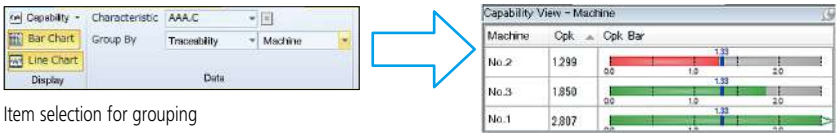
• **Process Analyzer** is optional software for a manager who accesses the database created by the **Real-Time** data collection software to review measurement results and perform statistic analyses.

The same data displayable by data collection software can be displayed, including measurement results, charts, and statistical calculation results with the look and feel of Windows Explorer.

Filtering function that allows data extraction and grouping

Data can be extracted or grouped by selecting the date and time and other traceability information as keywords.

Example) Grouping by Machine No. ..... Cp, Cpk comparison



Item selection for grouping

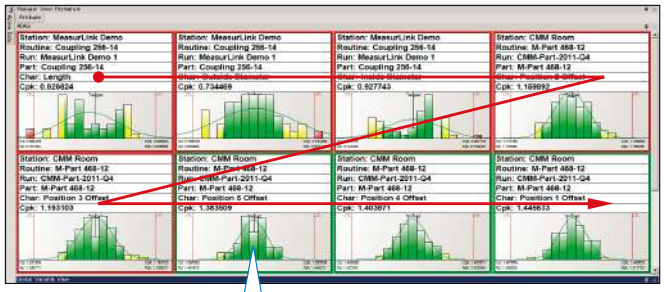
Cpk value and bar graph per machine

MeasurLink® Process Management for Managers Process Manager

• Monitor data as it is collected in Real-Time. **Process Manager** provides managers with the perfect tool to organize and maintain a shop-wide quality program at a glance. Display snapshot windows of characteristics that are currently being collected in MeasurLink® Real-Time. The data can be sorted by inspection station, capability or timestamp. Easily see process information without walking from one inspection area to another by viewing current production across all machines. Show clients your quality operation for the entire facility.

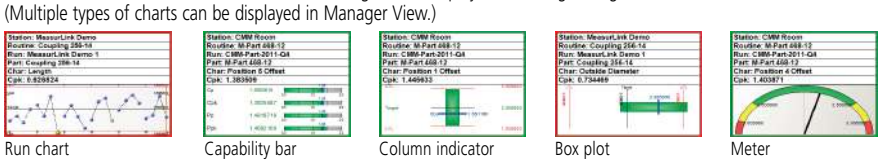
Manager View

Displays various types of charts as an at-a-glance guide. The manager can narrow down all items of data currently being measured into a specific monitoring range of those of critical importance or sort those data (in ascending or descending order) on the basis of process capability index.



Possible to sort charts in the view and narrow down the monitoring range.

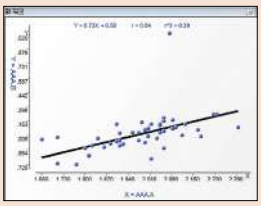
Selects various charts such as run charts and histograms to display as an at-a-glance guide.
(Multiple types of charts can be displayed in Manager View.)



Run chart | Capability bar | Column indicator | Box plot | Meter

PA Pro Functions

• Result display
· Classic view
· Data sheet
· 2D view
· Part data sheet, etc.
• Statistical Analysis result
[Chart]
Xbar-R, Xbar-S, X-Rs control charts, Histogram, Run chart, Pre-control chart, Tear chart, Box plot chart, Meter chart, Indicator bar, multivariate data control chart, etc.
[Statistics]
Maximum value, Minimum value, Standard deviation, Average ±3σ/4σ/6σ, Process capability indexes (Cp, Cpk, Pp, Ppk), Defect ratio, etc.
• Report print out function
Measurement values, analysis calculation results and various charts can be arranged to output according to requirements.
• Exporting function of measurement result
· Excel



Scatter plots: The relationship between two items can be plotted.

• Filter function
Keyword items for data extraction
· Measurement data (year, month, day, time, week, etc.)
· Serial No.
· Traceability information
(e.g. Inspectors, Machine No., etc.)
· Alarm item
• Data processing
· Data file merging, Copying
· Editing
• Data processing capability
Old runs can be archived so they are not available for collection in Real-Time.
• Electronic signature function
· Provides support for medical and pharmaceutical manufacturers electronic records, including audit trails, e-signatures and advanced security.
· Conforms to FDA 21CFR Part 11

MeasurLink® Evaluation/Analysis Software for Measurement System Analysis (MSA) Gage R&R

The evaluation and analysis software supports measurement system analysis (MSA) required by IATF 16949. It uses a statistical method to analyze variations attributable to differences in accuracy among measuring instruments or operators in order to build an optimum measurement system.

• Automatic calculation of MSA evaluation results

This allows the operator to simply input an evaluation method/evaluation condition and measurement data with the Wizard function. The operator can implement MSA evaluation simply by selecting an "investigation type option", "Measuring instrument option", "data input source option", "parameter option", etc.

Investigation type options　Parameter options　Overview

• Evaluation method compliant with MSA (fourth edition)

The software can implement evaluation using the following methods.

1) Measurement value tolerance Gage R&R variance analysis method
2) Measurement value tolerance Gage R&R range & average method
3) Measurement value branching Gage R&R variance analysis method
4) Measurement value branching Gage R&R average & range method
5) Measurement value range method
6) Measurement value simplified method
7) Measurement value MSA4
8) Deviation
9) Linearity
10) Stability

• Analysis chart view

Various charts such as the control chart are effective for analysis/judgment on variations due to operator, the adequacy of gage accuracy, etc., and remedies for problems.

• Registration of gage-specific information

1. Registration of information on gages within the system

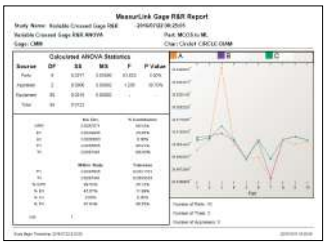
This allows registration of gage information on the following items and association with evaluated results.
Registration items: Gage name, maker, model, resolution, unit, measuring range, etc.

2. Information link between MeasurLink® Gage Management and this software

This software can use measuring instruments information that has been registered in **Gage Management** directly as options.
Additionally, **Gage R&R** evaluation results are reflected in the measuring instruments information, which means the expiry dates determined by **Gage R&R** can be managed by **Gage Management** as well.

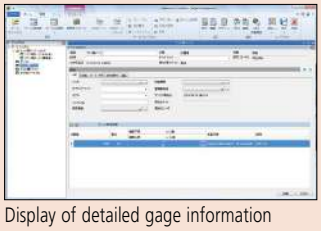
• Output of results as a report

Evaluated results and charts can be printed as a report.



• Confirmation of detailed gage information

Allows confirmation of detailed information on individual gages. The software allows you to display a list of gages depending on "Calibration Overdue", "Next Month Due", etc., by setting a calibration date and confirm detailed information on the calibration history of gages.



Display of detailed gage information

Display of gages listed depending on calibration date

Display of calibration history

MeasurLink® Gage Management Software Gage Management

This software can help you plan and implement a reliable calibration schedule with a powerful retrieval function in addition to recording and controlling the status of measuring instruments. Measuring instrument information can be viewed from any networked terminal on which **Gage Management** is installed since the information is centrally managed in a database. Measuring instruments information can be shared between software packages linked to **Gage R&R**.

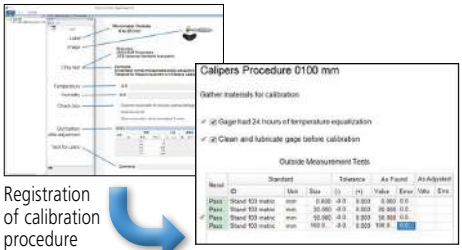
• Creation of a list of calibration-targeted gages from the gage management table

The target gages are retrieved from a variety of search items such as gage ID, gage type, model, maker, distributor, calibration date, current usage state and location to create the list.

Gage management table

• Registration and running a calibration procedure

Allows simple registration of the calibration procedure for each measuring instruments and implementation of the calibration.



Registration of calibration procedure

Calibration run

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