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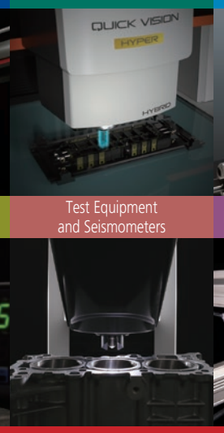
Mitutoyo

Mitutoyo Quality

Measurement Data Wireless Communication System U-WAVE

Small Tool Instruments and Data Management

Sensor Systems



Test Equipment and Seismometers

Coordinate Measuring Machines

Vision Measuring Systems

Form Measurement

Digital Scale and DRO Systems

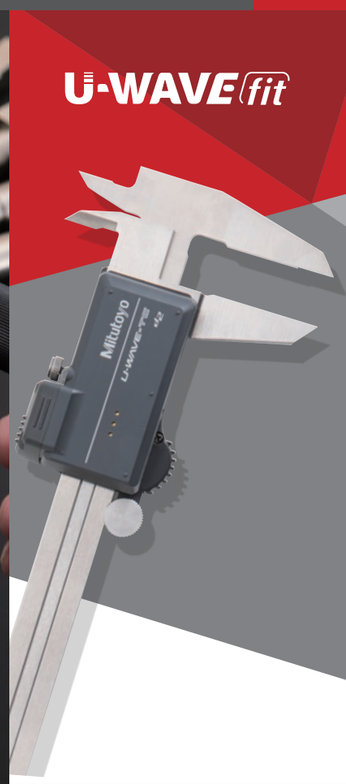
Optical Measuring

Small Tool Instruments and Data Management

Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver bespoke measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.



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https://www.mitutoyo.co.jp/global.html

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Mitutoyo

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

Catalog No. E12000(6)

What is the U-WAVE Series?

"U-WAVE", the measurement data wireless communication system, collects data in the inspection process swiftly and accurately, and increases a company's competitiveness based on detailed data analysis.
In addition, together with MeasurLink, "IoT of Quality Control envisioned by Mitutoyo" can be achieved.

Achieve Smart Measurement

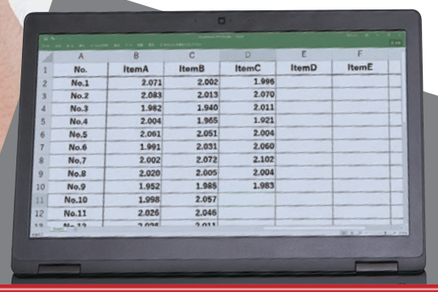
Measurement Data Wireless Communication System

U-WAVE

This is a system that transmits data from Mitutoyo Digimatic gages to software such as Excel or Notepad via wireless communication.
It saves time and eliminates misinput, helps achieve cost reductions and better efficiency while maintaining excellent operability.

From a Digimatic gage connected with U-WAVE

Data is obtained via wireless communication and sent to commercial software such as Excel



See video from here

Advantages of Introducing U-WAVE

Higher Efficiency

Data can be input by single button operation! Since there is no need for manual input misinput does not occur. Efficiency is greatly improved!

Centralized Data Management

Measurement data can be managed centrally!
"Visualization of quality" helps prevent the generation of defective products!

Cost Reduction Effect

Easily connected to the Digimatic gage* currently in use!
A system configuration reducing the initial and running cost is possible.

* Some models of U-WAVE-TM/TC are not applicable.

U-WAVE resolves measuring process issues!

Issue

Manual input of measurement data is inefficient and frequently generates misinput.

Solution

U-WAVE immediately transmits the measurement data to your PC. Misinput due to manual input can be eliminated, and therefore data reliability and operational efficiency is improved.

Issue

Loading measurement data via wireless is seen as desirable but justifying any high initial investment is difficult.

Solution

No high initial investment required because U-WAVE can be inexpensively connected to your existing Digimatic gages. No need to purchase replacements.

Issue

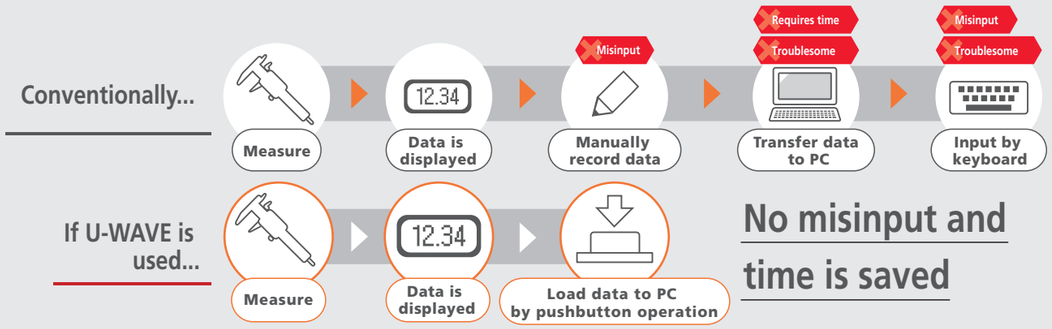
Since multiple operators use Digimatic gages, it takes a long time for data collection and Pass/fail judgment.

Solution

Up to 100 Digimatic gages can be registered to a single U-WAVE receiver on the PC side. The data is automatically entered separately in the Excel sheet. Therefore, data collection and Pass/fail judgment are easily performed.

Speedy and Reliable Data Collection and Pass/fail Judgment Improves Manufacturing Competitiveness

〈 Higher Efficiency 〉



No misinput and time is saved

LED or a buzzer notifies data reception

Patented in Japan

Confirmation that data was successfully received.

Note: The buzzer sound is only available with the buzzer equipped model.

- Normally received: green LED blinks
- Buzzer sounds twice briefly

- Reception failed: red LED blinks
- Buzzer sounds once

Dustproof and water resistant IP67 model

The water-proofed transmitter is resistant to water and dust.

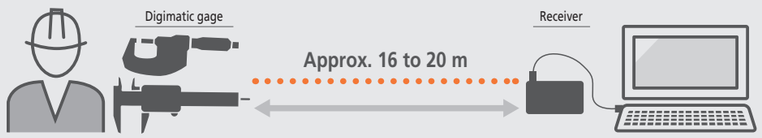
IP67

Cordless enables freedom of movement

Flexible layout of measurement site

Misinput generated by manual input is eliminated

Stable wireless communication



〈 Centralized Data Management 〉

Operation in an Excel sheet

The data can be directly written into an Excel sheet.

Digitalization enables easy data collection and analysis

The measurement data from each process can be stored and managed centrally.

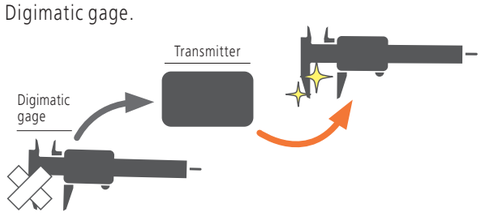
Multiple gages can be connected at the same time

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

〈 Cost Reduction Effect 〉

If a Digimatic gage is damaged, operation can be continued using a different gage

The transmitter can be reconnected to a different Digimatic gage.



Connectable to any of your existing Digimatic gages

No need to buy a replacement if your tool is equipped with the Digimatic function.

Approximately 400,000 continuous data transmissions are possible

Just one CR2032 lithium battery provides power for about 400,000 data transmissions.

* When the battery is used with U-WAVE-TM/TC/T. The battery life is approx. one year under normal use when used with U-WAVE-TMB/TMC.

Type of U-WAVE

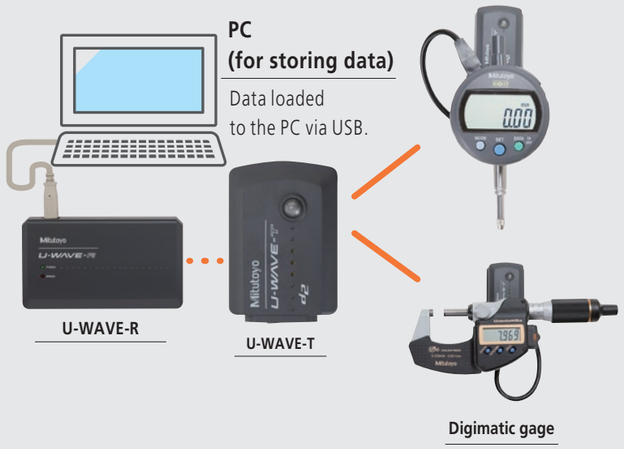
Convenient data collection tool and quality control software

- The following three types are currently available.

① U-WAVE

U-WAVE

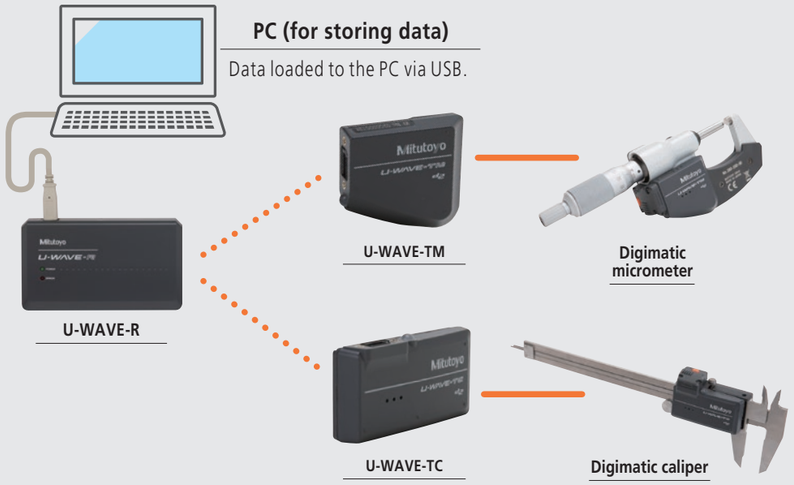
- Comprises of a receiver (U-WAVE-R) that connects to a PC and a transmitter (U-WAVE-T) that connects to a Digimatic gage.



② U-WAVE fit

U-WAVE fit

- Dedicated for Digimatic calipers and Digimatic micrometers, it inherits the functions and performance of **U-WAVE** but is more compact, thinner, and with improved operability.

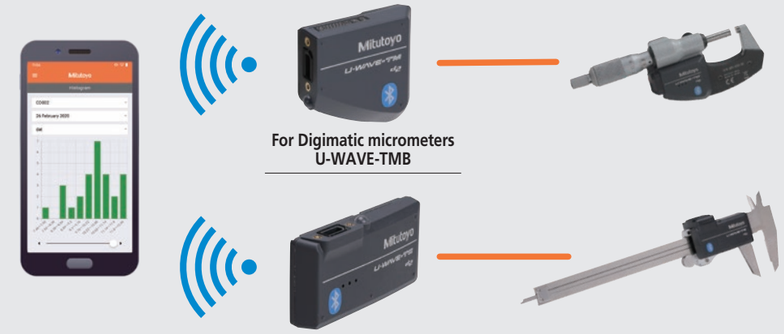


③ Mitutoyo *Bluetooth®* U-WAVE fit

U-WAVE fit

- **U-WAVE** fit with **Bluetooth®** capability. It can not only connect to a PC, but also other devices that support Bluetooth®, such as a smartphone or tablet without the need for an external receiver unit.

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



Bluetooth®

Function comparison table

	U-WAVE	U-WAVE fit*1	Bluetooth® U-WAVE fit*1
Transmission method	Original <based on IEEE802.15.4 (2.4 GHz)>		Bluetooth® 4. 2
Communication distance	Approx. 20 m (line of sight)		Approx. 16 m (line of sight)
Connectible model	Digimatic gages	Digimatic calipers and micrometers	
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 Please note that USB-ITPAK may not be recognized if your computer's OS build is old.

Typical Measuring Issues Solved

In combination with application software USB-ITPAK V2.1,
better efficiency in quality assurance can be achieved.

Case Study

Case 1

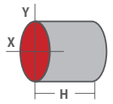
Standard sequential measurement input

Issue To record the measurement results, on a chart, from three points on a mass-produced product measured using two gages.

Solution If you set the procedure of inputting data to the Excel sheet with USB-ITPAK V2.1, the measurement data is automatically entered.

*Please refer to "Option" at the bottom of this page.

■ Measure the workpiece dimensions, X and Y, with a micrometer. Then, measure H with a caliper. Finally, visually check the appearance and judge OK or NG. Perform the above for 5 workpieces consecutively.



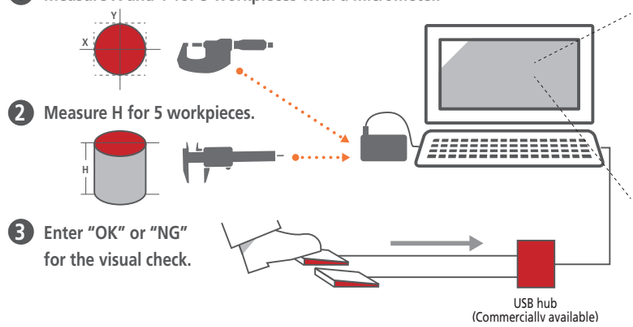
Point **Measurements in order**

The designated table will be created by measuring and transmitting data for X and Y of 5 workpieces, measuring and transmitting data of H, and then entering the result of visual check.

Point **Set the sequential measurement input order**

Designate the Excel sheet, select the data loading range, loading order, and allocate the ID for each cell.

1. Measure X and Y for 5 workpieces with a micrometer.
2. Measure H for 5 workpieces.
3. Enter "OK" or "NG" for the visual check.



Designated Excel sheet

	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	Input range of micrometer
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	Input range of caliper
5	External Appearance	OK	OK	NG			Input range of visual judgment

Data will be input one by one in the registered order to the cells of the Excel sheet designated beforehand.

Case 2

Data input by multiple operators

Issue To sort data into separate Excel sheets per Digimatic gage in the inspection process.

Solution The data collected by multiple operators can be individually set to be input to the designated cells in the Excel sheet.

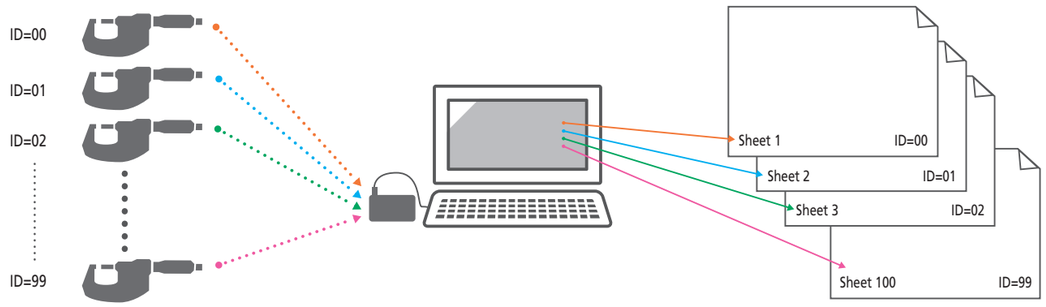
■ Input data of each Digimatic gage in order into the designated cells of the separate Excel sheet.

Point **Up to 100 Digimatic gages can be registered**

100 Digimatic gages at maximum can be registered to a receiver and the same number of Excel sheets can be designated.

Point **Designate the Excel sheet per Digimatic gage**

Using USB-ITPAK, designate the Excel sheet per Digimatic gage. Then, same as the sequential measurement, select the data loading range, loading order, and allocate the IDs.



Multiple measurement data (via U-WAVE-TM/TC/T) can be sorted into the separate Excel sheets without requiring you to program macros.

Option

USB-ITPAK V2.1

A USB dongle must be connected to the PC running the software.

USB dongle

Measurement Data Collection Software

USB-ITPAK V2.1

USB-ITPAK V2.1 is optional software to be installed in the PC connected with U-WAVE-R. It enables setting up the procedure to input the measurement data received from U-WAVE-R to the Excel sheet and to achieve greater inspection efficiency and enhanced credibility.

The combined use with U-WAVE will improve the operational efficiency of the inspection work.

Best suited for recording data in mass-production inspections where the procedure is repeated every day.

Features of USB-ITPAK V2.1

- The measuring methods can be configured, such as sequential measurement, batch measurement, individual measurement and more.
- Data can be canceled by a single operation of the foot switch or function key.
- Input range can be specified per Digimatic gage, which reduces the chance of a misinput.
- Data input or cancellation can be instructed globally in multiple-point simultaneous measurement.
- The Excel sheet can be automatically called for data input.
- The cursor movement after data input can be set to enable automatic input.

Case Study

Case 3

Batch measurement using timer

Issue To measure displacement using multiple Digimatic gages and automatically obtain data in a certain input interval.

Solution Batch timer input is available using the USB-ITPAK batch measurement function and the optional timer input function.

Specify the interval for measuring the displacement of the workpiece and collect data at once.

Point **Batch measurement with all the Digimatic gages**

Data can be obtained globally by a foot switch operation.

Point **Timer input option**

Using USB-ITPAK, the data request interval can be set by hours, minutes, and seconds (0.0 sec. to 24 hrs.).

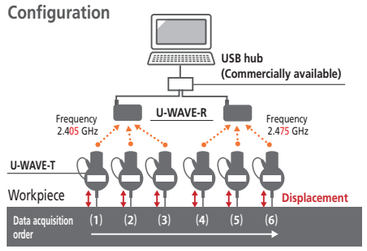
Point **Batch timer input**

Data can be obtained at the desired interval using the timer input function in batch measurement.

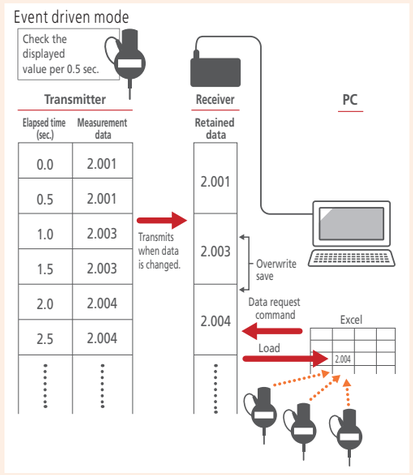
	A	B	C	D	E	F	G
1	Displacement (1)	Displacement (2)	Displacement (3)	Displacement (4)	Displacement (5)	Displacement (6)	Measurement date/ time
2	0.281	0.162	0.121	0.051	0.011	−0.001	2013/4/1 7 30 00
3	0.279	0.152	0.133	0.064	0.018	−0.003	2013/4/1 7 30 05
4	0.265	0.149	0.142	0.089	0.021	−0.007	2013/4/1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

After 5 sec. / After 5 sec. / After 5 sec.

Configuration



- To perform simultaneous measurement using U-WAVE, a special order software U-WAVEPAK (event drive) is required.
- Since the data refresh interval of the event drive is fixed at 0.5 seconds, the setting range is from 0.5 seconds to 24 hours.



Two modes for flexible measurements

"Button driven mode" and "Event driven mode"

Button driven mode

By pushing the Data button of digimatic gage/dedicated cable for U-WAVE/ connecting unit, indicated values can be transferred to the receiver.

Event driven mode

1) U-WAVE-TM/TC/T checks the displayed value of the Digimatic gage at 0.5 sec. intervals, and transfers data if the value is changed.
2) U-WAVE-R overwrites data in the storage.
3) Sends data responding to the data request command.

Enables automatic data load

Without operating the send button of the Digimatic gage, data can be obtained automatically from multiple Digimatic gages.

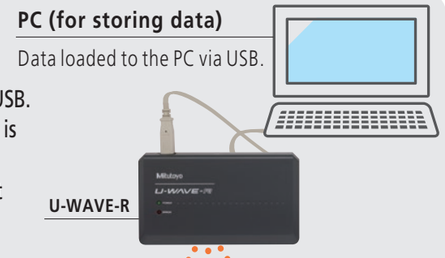
- The battery life of the U-WAVE-TM/TC/T is shortened (20 days in continuous operation).
- U-WAVE is equipped with a function to avoid radio wave interference, and enables successful simultaneous data transmission of three U-WAVE-T units per U-WAVE-R. To perform simultaneous data transmission with more than three units of U-WAVE-T, an additional U-WAVE-R and set different frequencies (15 channels) to assure reliable wireless communication.
- "Event driven mode" is not available for U-WAVE-fit Bluetooth® within USB-ITPAK.

U-WAVE
U-WAVE fit

Receiver

U-WAVE-R

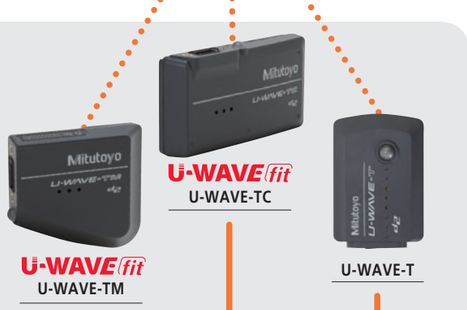
- Receives measurement data and transmits to the PC via USB.
- Since USB bus power system is used, a battery or adapter is not required.
- The identification ID and frequency to be used can be set using supplied software U-WAVEPAK.
- The data load function to Excel, etc. is supplied as a standard accessory.



Transmitters

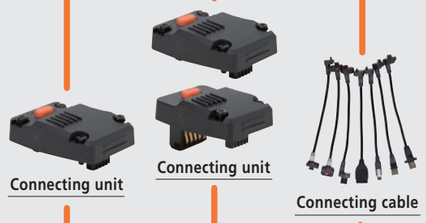
U-WAVE-TM/TC/T

- Transmits the measurement data displayed on the gage to U-WAVE-R.
- Compact, cable-less design provides a better fit with the Digimatic gage and better operability.



Connecting unit/connecting cable

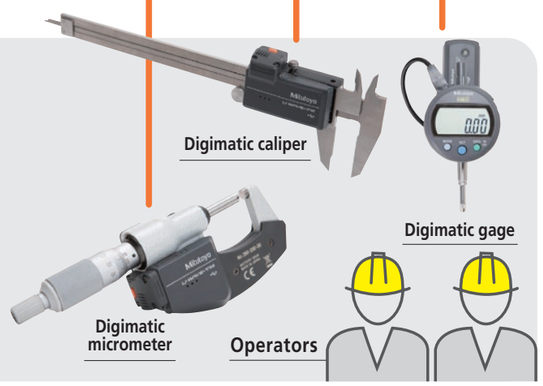
- A compact connecting unit connects the U-WAVE-TM/TC/T transmitter to the Digimatic gage.
- A dedicated cable connects the U-WAVE-T transmitter to the Digimatic gage.



Digimatic gages

Compatibility

- U-WAVE-TM/TC can be used with most of the calipers and micrometers equipped with the Digimatic output function.
- U-WAVE-T can be used with all the Digimatic gages equipped with the Digimatic output function.



U-WAVE fit

With functions and performance inherited from U-WAVE-T, a compact and thinner design provides a neater solution by eliminating cabling around the Digimatic gage and thus better operability!

U-WAVE-TM for micrometers and U-WAVE-TC for calipers are available, both the buzzer type and IP67 type. The buzzer type notifies the normal reception of data by LED and buzzer sound. The dust/water-proof IP67 type is designed for a harsh environment and as such is only equipped with LED notification of data reception.

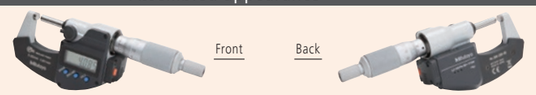
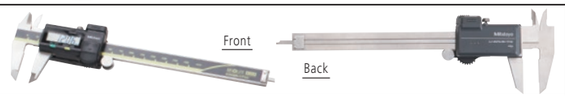
U-WAVE

This product successfully introduced U-WAVE to the market.

For digimatic micrometers, calipers, indicators and micrometer heads

The buzzer type and IP67 type are available. The buzzer type notifies the normal reception of data by LED and buzzer sound. The IP67 type is designed for a harsh environment and as such is only equipped with LED notification of data reception.

Connecting compatible micrometers, calipers and other Digimatic gages to U-WAVE

Gage		Assembled appearance	Connecting unit/connecting cable	Transmitter	Receiver
For digimatic micrometers	Standard	 Front Back	02AZF310	U-WAVE-TM With buzzer 264-623 U-WAVE fit	U-WAVE-R 02AZD810D Design registered in Japan
	Dust/ water-proof	IP65 Front Back		IP67 U-WAVE-TM Dust/water-proof 264-622 U-WAVE fit	
For calipers	Standard	 Front Back	02AZF300	U-WAVE-TC With buzzer 264-621 U-WAVE fit	
	Dust/ water-proof	IP67 Front Back	02AZF310	IP67 U-WAVE-TC Dust/water-proof 264-620 U-WAVE fit	
Digimatic gages			Connecting cable*	U-WAVE-T With buzzer 02AZD730G	
				IP67 U-WAVE-T Dust/water-proof 02AZD730G	

Note: Select according to the Digimatic gage to be connected. Refer to pages 24 and 25 for connecting cables.

Manage Measurement Data Centrally and Wirelessly on a Smartphone, Tablet or PC

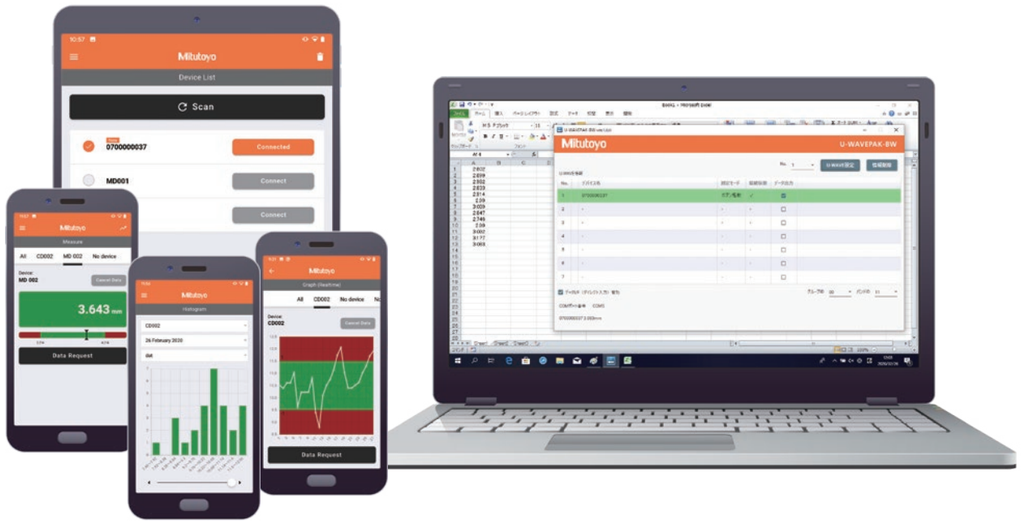
Mitutoyo *Bluetooth*® U-WAVE fit

NEW Products

U-WAVE-TMB/TCB

More compact and thinner for a better fit with Digimatic gages, and featuring improved operability and performance inherited from its predecessor, U-WAVE-TMB/ TCB is now available with Bluetooth® wireless technology. No receiver is required, and one PC can connect up to seven units of Mitutoyo *Bluetooth*® U-WAVE fit. Dust /water-proof models are also available for arduous shop floor usage.

IP67



For Digimatic micrometers
U-WAVE-TMB

For Digimatic calipers
U-WAVE-TCB

Note: Connectivity of this application software and U-WAVE-TMB/TCB to every single Bluetooth® device is not guaranteed.

Major Advantages of Introducing Mitutoyo *Bluetooth*® U-WAVE fit

Does Not Require a Receiver

Measurement data can be transmitted to PCs, tablets and smartphones without a receiver if they are equipped with Bluetooth® wireless technology.

Cost Reduction Effect

System can be configured at reduced cost, just by connecting to an existing Digimatic gage.

Higher Efficiency

Data can be input by single button operation. Since there is no need for manual input misinput does not occur. Efficiency is greatly improved.

Centralized Data Management

Measurement data can be managed centrally.
"Visualization of quality" helps prevent the generation of defective products.

Easy Data Saving

Measurement data can be saved to smartphones and tablets independently of the measurement site.

You can use with confidence since it is labeled with the wireless certification number acquired in the country of purchase.

With Bluetooth® wireless technology for Easy Pairing with Your Digimatic Micrometer or Caliper

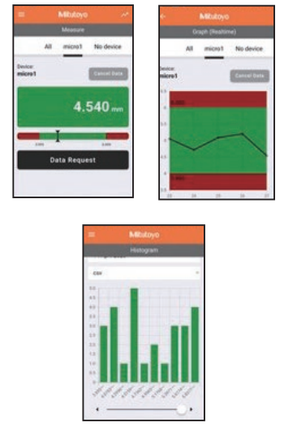
U-WAVE-TMB/ TCB is compatible with most Digimatic micrometers and calipers.
Refer to pages 28 to 42 for attachable digimatic gages

Digimatic micrometers

Digimatic calipers

Digimatic gage, connecting unit and transmitter combinations

		Assembled appearance	Connecting unit	Transmitter
For micrometers	Buzzer type		No.02AZF310	U-WAVE-TMB No.264-627
	Dust/ water-proof type			U-WAVE-TMB No.264-626 IP67
For calipers	Buzzer type		No.02AZF300	U-WAVE-TCB No.264-625
	Dust/ water-proof type		No.02AZF310	U-WAVE-TCB No.264-624 IP67

	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	• Judgment • Data logging • Graphical display of measurement result • Display the histogram of measurement results • Transfer a measurement result (log data)	U-WAVEPAK-BW enables you to identify the unit sending the data by transmitter device ID. This function is not possible in the normal use of Bluetooth®.
Display language	Japanese / English (Depends on the OS settings)	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 IT ON Google Play	Android 7.0 or later / iOS 10.0 or later **U-WAVEPAK-BM (English version only), the communication software for transferring measurement data to smartphones and tablets is available at app stores for free download.** GET IT ON Google Play Download on the 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**

Note1: We cannot guarantee the operation of this application and U-WAVE TMB/TCB with all Bluetooth equipped devices.

Note2: Google Play and the Google Play logo are trademarks of Google LLC. Apple and the Apple logo are trademarks of Apple Inc.

* By enabling the direct input feature within U-WAVEPAK-BW the results can be written directly to Excel. The results do not include the transmitter device ID. Use of our optional USB-ITPAK or MeasurLink software allows for data sorting by individual transmitter IDs.

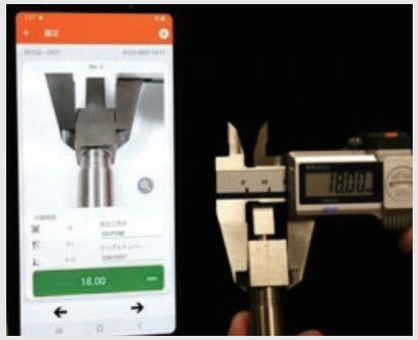
Measurement Navigation Application Mitutoyo U-WAVE Navi

NEW Products

Navigates your measurements easily and steadily

Mitutoyo *Bluetooth*® U-WAVE fit allows you to start measurements with your smartphone.

Images and text can be used to build a clear step by step measurement procedure. The app guides you how to measure and also shows you GO/NG judgment.



Easy data management

Data export to PC

Mitutoyo U-WAVE Navi is available at Google Play for free download.

Note: Google Play and the Google Play logo are trademarks of Google LLC.

GET IT ON Google Play

Mitutoyo

MeasurLink

Achieve "Visualization of Quality"

Collecting the measurement data
Measurement Data Wireless Communication System
U-WAVE

IoT of Quality Control
Measurement Data Network System
MeasurLink

Configure the measurement network system MeasurLink using U-WAVE as a base

What is MeasurLink®?

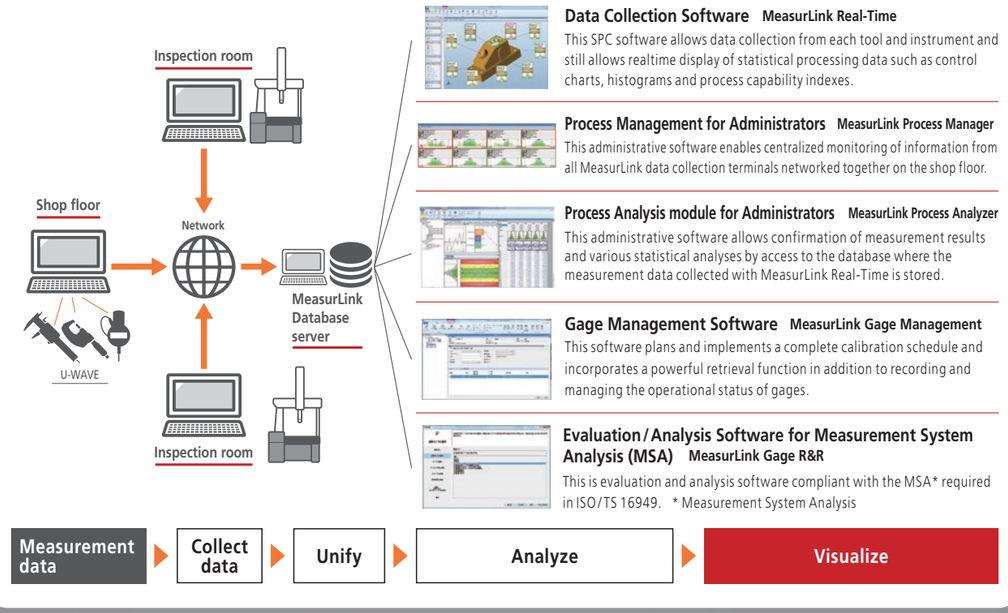
MeasurLink is an IoT platform for quality management that realizes "Visualization of Quality" by enabling real-time data collection from the networked Digimatic gages and global control and analysis. U-WAVE supports MeasurLink as an infrastructure that collects and controls data.

Preventing defectives
Collects data from the Digimatic gages on the network and performs statistical process control (SPC) to warn of possible generation of defectives.

Diagnosis by data analysis
Checking measurement results by accessing the data base and performing various analyses helps investigate and resolve process performance concerns.

Simply start achieving IoT
In addition to conventional data storage, the network can be configured in steps to simply start IoT of Quality Control.

Linkage between U-WAVE and MeasurLink



Data Collection Software MeasurLink Real-Time
This SPC software allows data collection from each tool and instrument and still allows realtime display of statistical processing data such as control charts, histograms and process capability indexes.

Process Management for Administrators MeasurLink Process Manager
This administrative software enables centralized monitoring of information from all MeasurLink data collection terminals networked together on the shop floor.

Process Analysis module for Administrators MeasurLink Process Analyzer
This administrative software allows confirmation of measurement results and various statistical analyses by access to the database where the measurement data collected with MeasurLink Real-Time is stored.

Gage Management Software MeasurLink Gage Management
This software plans and implements a complete calibration schedule and incorporates a powerful retrieval function in addition to recording and managing the operational status of gages.

Evaluation / Analysis Software for Measurement System Analysis (MSA) MeasurLink Gage R&R
This is evaluation and analysis software compliant with the MSA* required in ISO/TS 16949. * Measurement System Analysis

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

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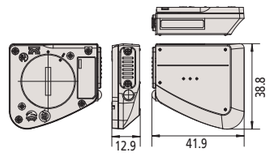
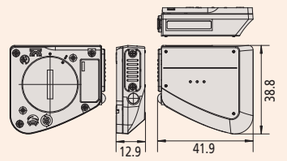
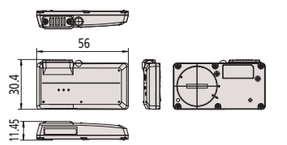
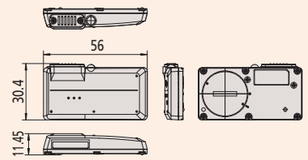
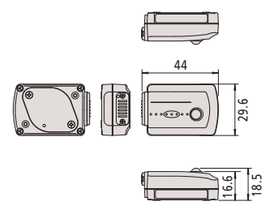
Specifications

Wireless Communication Specifications

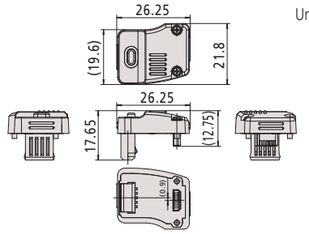
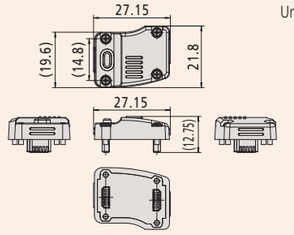
Product name	Wireless communication	Wireless communication distance	Transmission output	Modulation method	Communication frequency	Used band
U-WAVE-T/TM/TC	Original (based on IEEE802.15.4)	Approx. 20 m (line of sight)	U-WAVE-T: 1 mW (0 dBm) or less U-WAVE-TC/TM: 2.5 mW (4 dBm) or less	DS-SS (Direct Sequence - Spread Spectrum) Resistant to interfering signals and noise	2.4 GHz band	15 channels (2.405 to 2.475 GHz at intervals of 5 MHz)
U-WAVE-TMB/TMC	Bluetooth® 4.2 Low Energy	Approx.16 m (line of sight) Approx. 10 m (on shop floor)	3.2 mW (5 dBm) or less (Class2)	FH-SS (Frequency-Hopping Spread Spectrum)	2.4 GHz band	in accordance with FH-SS (2.400~2.483GHz)

Note 1: This product is a radio equipment classified in the 2.4 GHz Wide-band Low Power Data Communication System.
To use this product, conformity to the radio law of each country is required. Please contact your dealer or nearest Mitutoyo sales office.
Note 2: Not compatible with the conventional Mu-WAVE, for which communication specifications are different.

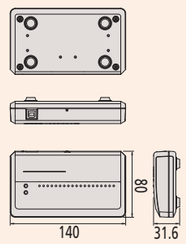
Transmitter (Refer to pages 12 and 13 for combinations.)

Product name	Model	Order No.	Protection level	Data reception indication	Power supply	Battery life	Mass	Appearance	External dimensions
U-WAVE-TM (for micrometers)	Buzzer type	264-623	N/A	LED, buzzer	Lithium battery CR2032×1	Approximately 400,000 transmissions in continuous use	18 g		Unit: mm 
	Dust/water-proof type	264-622	IP67	LED			18 g		
U-WAVE-TMB (for micrometers)	Buzzer type	264-627	N/A	LED, buzzer		Approximately 1 year under normal conditions of use, but varies according to usage.	18 g		Unit: mm 
	Dust/water-proof type	264-626	IP67	LED			18 g		
U-WAVE-TC (for calipers)	Buzzer type	264-621	N/A	LED, buzzer		Approximately 400,000 transmissions in continuous use	18 g		Unit: mm 
	Dust/water-proof type	264-620	IP67	LED			18 g		
U-WAVE-TCB (for calipers)	Buzzer type	264-625	N/A	LED, buzzer		Approximately 1 year under normal conditions of use, but varies according to usage.	18 g		Unit: mm 
	Dust/water-proof type	264-624	IP67	LED			18 g		
U-WAVE-T	Buzzer type	02AZD880G	N/A	LED, buzzer		Approximately 400,000 transmissions in continuous use	23 g		Unit: mm 
	Dust/water-proof type	02AZD730G	IP67	LED			23 g		

● Connecting unit (Refer to pages 12 and 13 for combinations.)

Product name	Model	Order No.	Protection level	Mass	Appearance	External dimensions
Connecting unit	For standard type	02AZF300	N/A	6 g		Unit: mm 
	For dust/water-proof type	02AZF310	IP67	6 g		Unit: mm 

● Receiver (Refer to pages 12 and 13 for combinations.)

Product name	Model	Order No.	Power supply	Connectable U-WAVE-R units (per PC)	Connectable U-WAVE-T units	Mass	Appearance	External dimensions	Standard accessory: U-WAVEPAK software		
									System Environment: Compatible OS	Main specifications	Data format
U-WAVE-R	U-WAVE-R	02AZD810D	USB bus power system	Up to 15	Up to 100	130 g		Unit: mm 	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* Note: Windows 10 Mobile is not supported. * 32-bit, 64-bit OS supported <Versions confirmed operational on Windows 10> • U-WAVEPAK Ver.1.020 or later <Connectability confirmed for tablet PC> • Microsoft Surface Pro 6 (the version whose operation on Windows10 Professional is confirmed) • Required environment: DVD drive (required for installation), USB port ×2 ports or more	• 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	**Example of format when the Digimatic gage displays 12.34** **DT1 01 02 +00000012.34 M** Header DT1: Measurement data ST1: **Status code** ☆ Digimatic gage display value*1 Unit M: mm U-WAVE-TC/TM/T ID: 00 to 99 U-WAVE-R ID: 00 to 99 *1 Data interface function is switchable to "Measurement value only" ☆ **Example of status code format** **ST1 01 02 0999999073 99** Header Status code U-WAVE-R ID U-WAVE-TC/TM/T ID Device ID*2 **Status code** 99: Data cancellation 01: No response from Digimatic gage 03: Measurement data missing, others *2 Unique number assigned to U-WAVE at shipment

Note:U-WAVEPAK software is packed together with the U-Wave receiver. If your computer has no DVD drive then please download and install U-WAVEPAK from our website.

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●Dedicated cable for U-WAVE-T (Refer to pages 12 and 13 for combinations.)

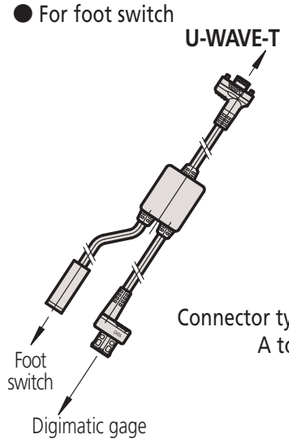
Product name	Connecting cable			Gage connectors on data cable		Digimatic ports on gage		
	Connector type	Order No.		Picture of gage connector	Data switch	Picture of Digimatic port	Applicable models	
		Standard	For foot switch					
Dedicated cable for U-WAVE-T	A Water-proof type with output button	02AZD790A	02AZE140A		✔		[**Digimatic caliper**] 500-712-20/500-713-20, etc. 550-301-20/550-331-20, etc. 551-301-20/551-331-20, 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.	[**Digimatic special application caliper**] 573-601-20/573-602-20, etc. [**Digimatic depth gage**] 571-251-20/571-252-20, etc. [**Digimatic scale unit**] 572-600, 572-601, etc.
	B Water-proof type with output button	02AZD790B	02AZE140B		✔		[**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. [**Dedicated micrometers for Digimatic**] 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.
	C Straight type with output button	02AZD790C	02AZE140C		✔		[**Digimatic caliper**] 500-150-30/500-151-30, etc. 500-500-10/500-501-10, etc. 500-443 etc. [**Digimatic special application caliper**] 573-718-20/573-719-20, etc. 573-716-20/573-717-20, 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.
	D Flat 10-pin type	02AZD790D	02AZE140D		—		[**Digimatic indicator**] ID-H ID-F (Note)	[**High-precision height gage**] QM-Height
	E Round 6-pin type	02AZD790E	02AZE140E		—		[**Hardness testing machines**] HM-100, HM-200, HV-100, HR-300/400/500, HH-411	
	F Flat straight type	02AZD790F	02AZE140F		—		[**Digimatic indicator**] ID-CX, ID-C (Peak-Value Hold Type), ID-C (Calculation type), ID-C (Bore Gage Type), ID-U (Note), ID-SS (Note), ID-SX (Note) [**Digimatic height gage**] 192-663-10/192-613-10/570-322/570-227, etc. (Flat L-shape, cable outlet is right) [**ABS boreratic**] 568-361/568-362, etc. [**Digimatic bore gage**] 511-501/511-502, etc.	[**Scale unit**] 572-460/572-560/572-480-10/572-580-10, etc. [**Hardness testing machines**] HH-300 [**Digimatic depth gage**] Digimatic type (ID-CX)
	G Flat straight water-proof type	02AZD790G	02AZE140G		—		[**Digimatic indicator**] ID-N, ID-B	

Note:If your digimatic gage doesn't have a DATA button, use the button on U-WAVE-T connection or connect it to a foot switch by using the optional foot switch connecting cable.

● Standard

Connector type
A to G

● For foot switch



Connector type
A to G

● Foot Switch (optional)

Order No.937179T

Optional Products

Application system

Product name	Model	Compatible OS: Windows*1	Compatible Excel version*2	Order No.
USB-ITPAK	06AFM386	2000 SP4 XP SP2 or later Vista 7 8 8.1 10	2002 2003 2007 2010 2013 2016 365	USB-ITPAK V2.1

*1 32-bit, 64-bit OS supported Windows 10 Mobile is not supported. *2 The operation with Excel for MAC OS is not guaranteed.

UInstallation bracket Kit for U-WAVE-T

Product	Type	Order No.	Application example	Attachable unit	Accessory
Bracket for U-WAVE-T	standard	02AZE200		U-WAVE-T	• Detachable fastener: 2pcs. (mirror imaged) • Mounting screws for U-WAVE: 2 pcs.
Bracket for QM-Height	dedicated for QM-Height	02AZE990		U-WAVE-T	• Mounting screws for back plate: 2 pcs. • Mounting screws for U-WAVE: 2 pcs.
Bracket for digimatic indicator	dedicated for ID-S and ID-C digimatic indicator	02AZF670		U-WAVE-TM/TMB	• Mounting screws for back plate: 2 pcs. • Mounting screws for U-WAVE: 2 pcs.
Bracket for ID-N	dedicated for ABS coolant proof digimatic indicator ID-N	02AZF675		U-WAVE-TM/TMB	• Mounting screws for back plate: 2 pcs. • Mounting screws for U-WAVE: 2 pcs.

Application examples of the mounting plate (02AZE200)

Digimatic indicator ID-C112XB

Front view

Rear view

Side view

QM-Height

ID-C

Front view

Attachable to ID-C in the various positions

Image of fastener attachment to main gage

In the case of an indicator

ID-C112XB

A back plate without a center lug is recommended. If a lug is present, attach fastener after cutting away material to clear the lug.

U-WAVE-TM/TMB compatible Digimatic micrometers/heads

* Current product

Order No.	Product name	Unit	Connecting unit
293-140	QuantuMike	mm	02AZF310
*293-140-30			
293-141			
*293-141-30			
293-142			
*293-142-30			
293-143			
*293-143-30			
293-180		inch/mm	
*293-180-30			
293-181			
*293-181-30			
293-182			
*293-182-30			
293-183			
*293-183-30			
293-230	Coolant proof micrometer	mm	
*293-230-30			
293-231			
*293-231-30			
293-232			
*293-232-30			
293-233			
*293-233-30			
293-234			
*293-234-30			
293-235			
*293-235-30			
293-236			
*293-236-30			
293-237			
*293-237-30			
293-238			
293-250			
293-250-10			
*293-250-30			
293-251			
293-251-10			
*293-251-30			
293-252			
293-252-10			
*293-252-30			
293-253			
293-253-10			
*293-253-30			
293-254			
293-254-10			
*293-254-30			
293-255			
293-255-10			
*293-255-30			
293-256			
293-256-10			
*293-256-30			

* Current product

Order No.	Product name	Unit	Connecting unit
293-257	Coolant proof micrometer	mm	02AZF310
293-257-10			
*293-257-30			
293-330		inch/mm	
*293-330-30			
293-331			
*293-331-30			
293-332			
*293-332-30			
293-333			
*293-333-30			
293-334			
*293-334-30			
293-335			
*293-335-30			
293-336			
*293-336-30			
293-350			
293-350-10			
*293-350-30			
293-351			
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293-356			
293-356-10			
*293-356-30			
293-357			
293-357-10			
*293-357-30			
293-960			
*293-960-30			
293-961			
*293-961-30			
293-962		mm	
*293-962-30			
293-963			
*293-963-30			
293-964			
293-965			
293-966			
*293-966-30			

* Current product

Order No.	Product name	Unit	Connecting unit
314-251	V-anvil micrometer	mm	02AZF310
314-251-10			
*314-251-30			
314-252			
314-252-10			
*314-252-30			
314-253			
314-253-10			
*314-253-30			
314-261			
314-261-10			
*314-261-30			
314-262			
314-262-10			
*314-262-30			
314-351		inch/mm	
314-351-10			
*314-351-30			
314-352			
314-352-10			
*314-352-30			
314-353			
314-353-10			
*314-353-30			
314-361			
314-361-10			
*314-361-30			
314-362			
314-362-10			
*314-362-30			
317-251	Uni-micrometer	mm	
*317-251-30			
317-252			
*317-252-30			
317-351		inch/mm	
*317-351-30			
317-352			
*317-352-30			
323-250		mm	
*323-250-30			
323-251			
*323-251-30			
323-252			
*323-252-30			
323-253			
*323-253-30			
323-350		inch/mm	
*323-350-30			
323-351			
*323-351-30			
323-352			
*323-352-30			
323-353			
*323-353-30			

* Current product

Order No.	Product name	Unit	Connecting unit
324-251	Gear tooth micrometer	mm	02AZF310
324-251-10			
*324-251-30			
324-252			
324-252-10			
*324-252-30			
324-253			
324-253-10			
*324-253-30			
324-254			
324-254-10			
*324-254-30			
324-351		inch/mm	
324-351-10			
*324-351-30			
324-352			
324-352-10			
*324-352-30			
324-353			
324-353-10			
*324-353-30			
324-354			
324-354-10			
*324-354-30			
326-251	Screw thread micrometer	mm	
326-251-10			
*326-251-30			
326-252			
326-252-10			
*326-252-30			
326-253			
326-253-10			
*326-253-30			
326-254			
326-254-10			
*326-254-30			
326-351		inch/mm	
326-351-10			
*326-351-30			
326-352			
326-352-10			
*326-352-30			
326-353			
326-353-10			
*326-353-30			
326-354			
326-354-10			
*326-354-30			
329-250	Depth micrometer	mm	
329-250-10			
*329-250-30			
329-251			
329-251-10			
*329-251-30			
329-350		inch/mm	

* Current product

Order No.	Product name	Unit	Connecting unit
329-350-10	Depth micrometer	inch/mm	02AZF310
*329-350-30			
329-351			
329-351-10			
*329-351-30			
331-251	Spline micrometer	mm	
*331-251-30			
331-252			
*331-252-30			
331-253			
*331-253-30			
331-254			
*331-254-30			
331-261			
*331-261-30			
331-262			
*331-262-30			
331-263			
*331-263-30			
331-264			
*331-264-30			
331-351		inch/mm	
*331-351-30			
331-352			
*331-352-30			
331-353			
*331-353-30			
331-354			
*331-354-30			
331-361			
*331-361-30			
331-362			
*331-362-30			
331-363			
*331-363-30			
331-364			
*331-364-30			
340-251	Outside micrometer	mm	
340-251-10			
*340-251-30			
340-252			
340-252-10			
*340-252-30			
340-351		inch/mm	
340-351-10			
*340-351-30			
340-352			
340-352-10			
*340-352-30			
342-251	Point micrometer	mm	
*342-251-30			
342-252			
*342-252-30			
342-253			

* Current product

Order No.	Product name	Unit	Connecting unit
*342-253-30	Point micrometer	mm	02AZF310
342-254			
*342-254-30			
342-261			
*342-261-30			
342-262			
*342-262-30			
342-263			
*342-263-30			
342-264			
*342-264-30			
342-271	Crimp height micrometer		
*342-271-30			
342-351	Point micrometer	inch/mm	
*342-351-30			
342-352			
*342-352-30			
342-353			
*342-353-30			
342-354			
*342-354-30			
342-361			
*342-361-30			
342-362			
*342-362-30			
342-363			
*342-363-30			
342-364			
*342-364-30			
342-371	Crimp height micrometer		
*342-371-30			
343-250	Caliper type outside micrometer	mm	
*343-250-30			
343-251			
*343-251-30			
343-252			
*343-252-30			
343-253			
*343-253-30			
343-350		inch/mm	
*343-350-30			
343-351			
*343-351-30			
343-352			
*343-352-30			
343-353			
*343-353-30			
345-250	Caliper type inside micrometer	mm	
345-250-10			
*345-250-30			
345-251			
345-251-10			
*345-251-30			
345-350		inch/mm	

* Current product

Order No.	Product name	Unit	Connecting unit
345-350-10	Caliper type inside micrometer	inch/mm	02AZF310
*345-350-30			
345-351			
345-351-10			
*345-351-30			
350-251	Digimatic micrometer head	mm	
350-251-10			
*350-251-30			
350-252			
350-252-10			
*350-252-30			
350-253			
350-253-10			
*350-253-30			
350-254			
350-254-10			
*350-254-30			
350-261			
350-261-10			
*350-261-30			
350-271			
350-271-10			
*350-271-30			
350-272			
350-272-10			
350-272-20			
*350-272-30			
350-273			
350-273-10			
*350-273-30			
350-274			
350-274-10			
350-274-20			
*350-274-30			
350-281			
350-281-10			
*350-281-30			
350-282			
350-282-10			
*350-282-30			
350-283			
350-283-10			
*350-283-30			
350-284			
350-284-10			
*350-284-30			
350-351		inch/mm	
350-351-10			
*350-351-30			
350-352			
350-352-10			
*350-352-30			
350-353			
350-353-10			

* Current product

Order No.	Product name	Unit	Connecting unit
*350-353-30	Digimatic micrometer head	inch/mm	02AZF310
350-354			
350-354-10			
*350-354-30			
350-357-10			
*350-357-30			
350-361			
350-361-10			
*350-361-30			
350-381			
350-381-10			
*350-381-30			
350-382			
350-382-10			
*350-382-30			
350-383			
350-383-10			
*350-383-30			
350-384			
350-384-10			
*350-384-30			
369-250	Disk micrometer	mm	
*369-250-30			
369-251			
*369-251-30			
369-252			
*369-252-30			
369-253			
*369-253-30			
369-350		inch/mm	
*369-350-30			
369-351			
*369-351-30			
369-352			
*369-352-30			
369-353			
*369-353-30			
389-251	Sheet metal micrometer	mm	
*389-251-30			
389-252			
*389-252-30			
389-261			
*389-261-30			
389-262			
*389-262-30			
389-271			
*389-271-30			
389-272			
*389-272-30			
389-351		inch/mm	
*389-351-30			
389-352			
*389-352-30			
389-361			

* Current product

Order No.	Product name	Unit	Connecting unit
*389-361-30	Sheet metal micrometer	inch/mm	02AZF310
389-362			
*389-362-30			
389-371			
*389-371-30			
389-372			
*389-372-30			
395-251	Tube micrometer	mm	
*395-251-30			
395-252			
*395-252-30			
395-253			
*395-253-30			
395-254			
*395-254-30			
395-261			
*395-261-30			
395-262			
*395-262-30			
395-263			
*395-263-30			
395-264			
*395-264-30			
395-271			
*395-271-30			
395-272			
*395-272-30			
395-273			
*395-273-30			
395-274			
*395-274-30			
395-351		inch/mm	
*395-351-30			
395-352			
*395-352-30			
395-353			
*395-353-30			
395-354			
*395-354-30			
395-362			
*395-362-30			
395-363			
*395-363-30			
395-364			
*395-364-30			
395-371			
*395-371-30			
395-372			
*395-372-30			
395-373			
*395-373-30			
395-374			
*395-374-30			

* Current product

Order No.	Product name	Unit	Connecting unit
406-250	Outside micrometer, non-rotating spindle	mm	02AZF310
*406-250-30			
406-251			
*406-251-30			
406-252			
*406-252-30			
406-253			
*406-253-30			
406-350		inch/mm	
*406-350-30			
406-351			
*406-351-30			
406-352			
*406-352-30			
406-353			
*406-353-30			
422-230	Blade micrometer, non-rotating spindle	mm	
*422-230-30			
422-231			
*422-231-30			
422-232			
*422-232-30			
422-233			
*422-233-30			
422-260			
*422-260-30			
422-261			
*422-261-30			
422-270			
*422-270-30			
422-271			
*422-271-30			
422-330		inch/mm	
*422-330-30			
422-331			
*422-331-30			
422-332			
*422-332-30			
422-333			
*422-333-30			
422-360			
*422-360-30			
422-361			
*422-361-30			
422-370			
*422-370-30			
422-371			
*422-371-30			

U-WAVE-TC/TCB compatible Digimatic caliper/depth gage

* Current product

Order No.	Product name	Unit	Connecting unit
500-150-20	ABS Digimatic caliper	mm	02AZF300
*500-150-30			
500-151-20			
*500-151-30			
500-152-20			
*500-152-30			
500-153			
*500-153-30			
500-154-20			
*500-154-30			
500-155-20			
*500-155-30			
500-156-20			
*500-156-30			
500-157-20			
*500-157-30			
500-158-20			
*500-158-30			
500-161-21			
*500-161-30			
500-162-21			
*500-162-30			
500-167		inch/mm	
*500-167-30			
500-168			
*500-168-30			
500-170-20			
*500-170-30			
500-171-20			
*500-171-30			
500-172-20			
*500-172-30			
500-173			
*500-173-30			
500-174-20			
*500-174-30			
500-175-20			
*500-175-30			
500-176-20			
*500-176-30			
500-177-20			
*500-177-30			
500-178-20			
*500-178-30			
500-201-21		mm	
*500-201-30			
500-202-21		inch/mm	
*500-202-30			
500-203-21		mm	
*500-203-30			
500-204-21		inch/mm	
*500-204-30			
500-205		mm	
*500-205-30			

* Current product

Order No.	Product name	Unit	Connecting unit
500-233-21	ABS Digimatic caliper	mm	02AZF300
*500-233-30			
500-234-21			
*500-234-30			
500-235-21			
*500-235-30			
500-236-21			
*500-236-30			
500-443			
500-444			
500-445			
500-463		inch/mm	
500-464			
500-465			
571-201-20	Depth gage	mm	
*571-201-30			
571-202-20			
*571-202-30			
571-203-20			
*571-203-30			
571-211-20		inch/mm	
*571-211-30			
571-212-20			
*571-212-30			
571-213-10			
*571-213-30			
573-191-20	ABS low force caliper	mm	
*573-191-30			
573-291-20		inch/mm	
*573-291-30			
500-712-10	ABS coolant proof caliper	mm	02AZF310
*500-712-20			
500-713-10			
*500-713-20			
500-714-10			
*500-714-20			
500-716-11			
*500-716-20			
500-717-11			
*500-717-20			
500-718-11			
*500-718-20			
500-719-10			
*500-719-20			
500-720-11		inch/mm	
*500-720-20			
500-721-10		mm	
*500-721-20			
500-722-10			
*500-722-20			
500-723-10			
*500-723-20			
500-724-10			
*500-724-20			

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* Current product

Order No.	Product name	Unit	Connecting unit
500-727-11	ABS coolant proof caliper	mm	02AZF310
*500-727-20			
500-728-11			
*500-728-20			
500-735-10		inch/mm	
500-735-20			
500-736-10			
*500-736-20			
500-737-10			
*500-737-20			
500-738-10			
*500-738-20			
500-762-10			
*500-762-20			
500-763-10			
*500-763-20			
500-764-10			
*500-764-20			
500-769-10			
*500-769-20			
550-301-10	ABS Digimatic caliper, nib style jaws	mm	
*550-301-20			
550-311-10		inch/mm	
*550-311-20			
550-331-10		mm	
*550-331-20			
550-341-10		inch/mm	
*550-341-20			
551-301-10	ABS Digimatic caliper, nib style and standard jaws	mm	
*551-301-20			
551-311-10		inch/mm	
*551-311-20			
551-331-10		mm	
*551-331-20			
551-341-10		inch/mm	
*551-341-20			
571-100-20	Tire tread depth gage	mm	
*571-200-20			
571-251-10	Depth gage		
*571-251-20			
571-252-10			
*571-252-20			
571-253-10			
*571-253-20			
571-254-10			
*571-254-20			
571-255-10			
*571-255-20			
571-261-10		inch/mm	
*571-261-20			
571-262-10			
*571-262-20			
571-263-10			
*571-263-20			

* Current product

Order No.	Product name	Unit	Connecting unit
571-264-10	Depth gage	inch/mm	02AZF310
*571-264-20			
571-265-10			
*571-265-20			
571-301-10		mm	
*571-301-20			
571-302-10			
*571-302-20			
571-311-10		inch/mm	
571-311-20			
571-312-10			
*571-312-20			
573-601	Dedicated caliper	mm	
*573-601-20			
573-602			
*573-602-20			
573-604			
*573-604-20			
573-605			
*573-605-20			
573-606			
*573-606-20			
573-608			
*573-608-20			
573-611			
*573-611-20			
573-612			
*573-612-20			
573-614			
*573-614-20			
573-615			
*573-615-20			
573-616			
*573-616-20			
*573-618			
*573-618-20			
573-621			
*573-621-20			
573-622			
*573-622-20			
573-625			
*573-625-20			
573-626			
*573-626-20			
573-634			
*573-634-20			
573-635			
*573-635-20			
573-645			
*573-645-20			
573-646			
*573-646-20			
573-647			
*573-647-20			

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* Current product

Order No.	Product name	Unit	Connecting unit
573-648	Dedicated caliper	mm	02AZF310
*573-648-20			
573-651			
*573-651-20			
573-652			
*573-652-20			
573-653			
*573-653-20			
573-654			
*573-654-20			
573-661			
573-661-20			
573-662			
*573-662-20			
573-676			
*573-676-20			
573-677			
*573-677-20			
573-679			
*573-679-20			
573-701		inch/mm	
*573-701-20			
573-702			
*573-702-20			
573-704			
*573-704-20			
573-705			
*573-705-20			
573-706			
*573-706-20			
573-708			
*573-708-20			
573-721			
*573-721-20			
573-725			
*573-725-20			
573-734			
*573-734-20			
573-745			
*573-745-20			
573-746			
*573-746-20			
573-751			
*573-751-20			
573-752			
*573-752-20			
573-761			
*573-761-20			

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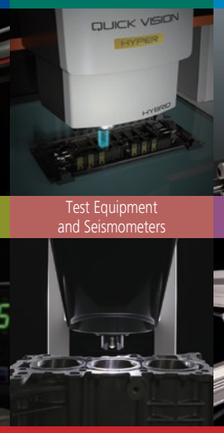
Mitutoyo Quality

Measurement Data Wireless Communication System U-WAVE

Small Tool Instruments and Data Management

Sensor Systems



Test Equipment and Seismometers

Coordinate Measuring Machines

Vision Measuring Systems

Form Measurement

Digital Scale and DRO Systems

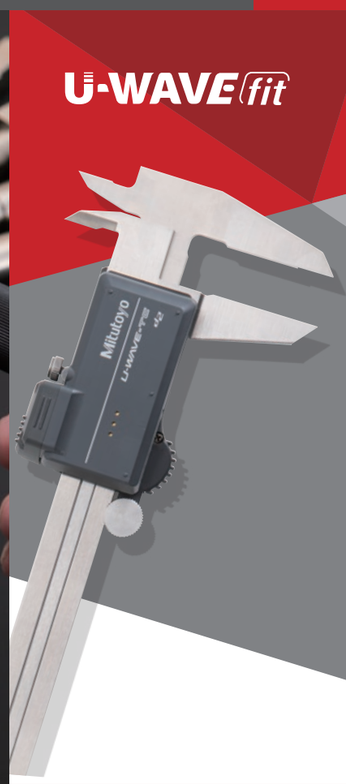
Optical Measuring

Small Tool Instruments and Data Management

Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver bespoke measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.



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Mitutoyo

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

Catalog No. E12000(6)

What is the U-WAVE Series?

"U-WAVE", the measurement data wireless communication system, collects data in the inspection process swiftly and accurately, and increases a company's competitiveness based on detailed data analysis.
In addition, together with MeasurLink, "IoT of Quality Control envisioned by Mitutoyo" can be achieved.

Achieve Smart Measurement

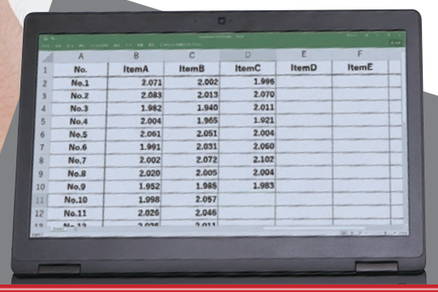
Measurement Data Wireless Communication System

U-WAVE

This is a system that transmits data from Mitutoyo Digimatic gages to software such as Excel or Notepad via wireless communication.
It saves time and eliminates misinput, helps achieve cost reductions and better efficiency while maintaining excellent operability.

From a Digimatic gage connected with U-WAVE

Data is obtained via wireless communication and sent to commercial software such as Excel



See video from here

Advantages of Introducing U-WAVE

Higher Efficiency

Data can be input by single button operation! Since there is no need for manual input misinput does not occur. Efficiency is greatly improved!

Centralized Data Management

Measurement data can be managed centrally!
"Visualization of quality" helps prevent the generation of defective products!

Cost Reduction Effect

Easily connected to the Digimatic gage* currently in use!
A system configuration reducing the initial and running cost is possible.

* Some models of U-WAVE-TM/TC are not applicable.

U-WAVE resolves measuring process issues!

Issue

Manual input of measurement data is inefficient and frequently generates misinput.

Solution

U-WAVE immediately transmits the measurement data to your PC. Misinput due to manual input can be eliminated, and therefore data reliability and operational efficiency is improved.

Issue

Loading measurement data via wireless is seen as desirable but justifying any high initial investment is difficult.

Solution

No high initial investment required because U-WAVE can be inexpensively connected to your existing Digimatic gages. No need to purchase replacements.

Issue

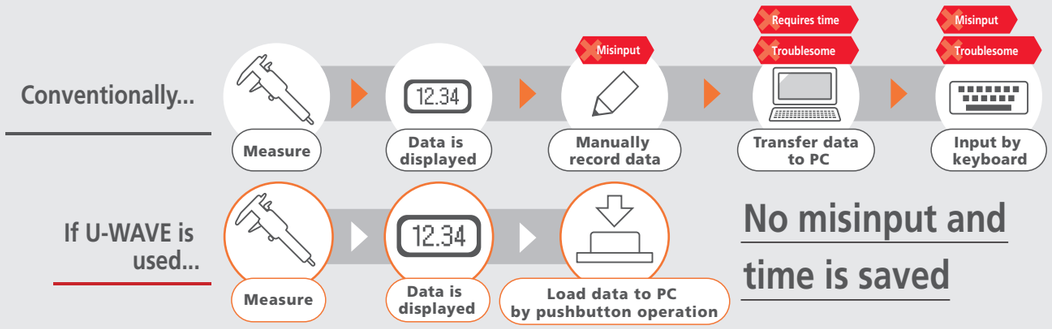
Since multiple operators use Digimatic gages, it takes a long time for data collection and Pass/fail judgment.

Solution

Up to 100 Digimatic gages can be registered to a single U-WAVE receiver on the PC side. The data is automatically entered separately in the Excel sheet. Therefore, data collection and Pass/fail judgment are easily performed.

Speedy and Reliable Data Collection and Pass/fail Judgment Improves Manufacturing Competitiveness

〈 Higher Efficiency 〉



No misinput and time is saved

LED or a buzzer notifies data reception

Patented in Japan

Confirmation that data was successfully received.

Note: The buzzer sound is only available with the buzzer equipped model.

- Normally received: green LED blinks
- Buzzer sounds twice briefly

- Reception failed: red LED blinks
- Buzzer sounds once

Dustproof and water resistant IP67 model

The water-proofed transmitter is resistant to water and dust.

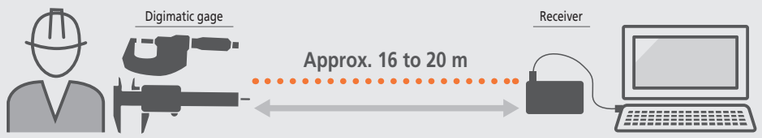
IP67

Cordless enables freedom of movement

Flexible layout of measurement site

Misinput generated by manual input is eliminated

Stable wireless communication



〈 Centralized Data Management 〉

Operation in an Excel sheet

The data can be directly written into an Excel sheet.

Digitalization enables easy data collection and analysis

The measurement data from each process can be stored and managed centrally.

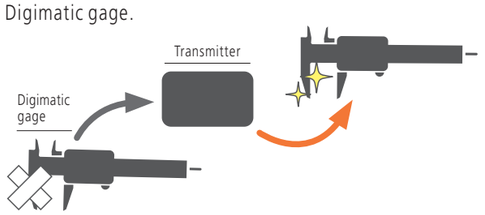
Multiple gages can be connected at the same time

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

〈 Cost Reduction Effect 〉

If a Digimatic gage is damaged, operation can be continued using a different gage

The transmitter can be reconnected to a different Digimatic gage.



Connectable to any of your existing Digimatic gages

No need to buy a replacement if your tool is equipped with the Digimatic function.

Approximately 400,000 continuous data transmissions are possible

Just one CR2032 lithium battery provides power for about 400,000 data transmissions.

* When the battery is used with U-WAVE-TM/TC/T. The battery life is approx. one year under normal use when used with U-WAVE-TMB/TMC.

Type of U-WAVE

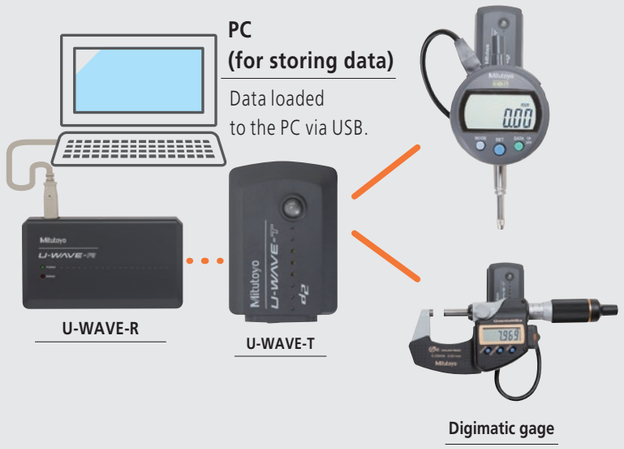
Convenient data collection tool and quality control software

- The following three types are currently available.

① U-WAVE

U-WAVE

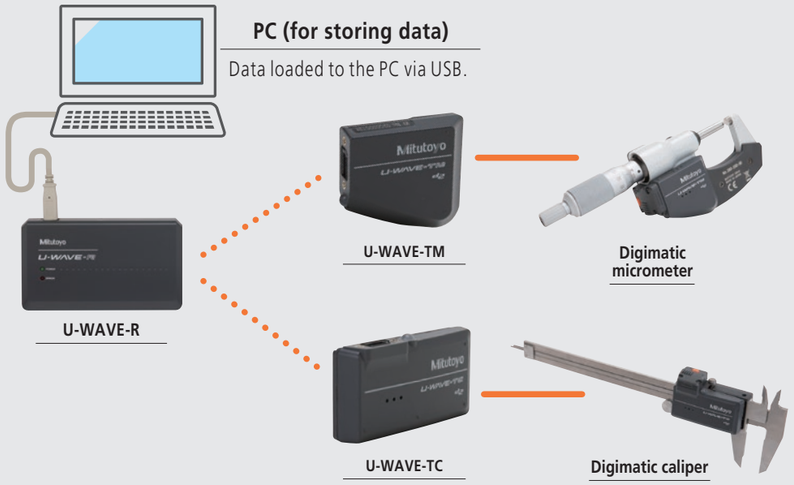
- Comprises of a receiver (U-WAVE-R) that connects to a PC and a transmitter (U-WAVE-T) that connects to a Digimatic gage.



② U-WAVE fit

U-WAVE fit

- Dedicated for Digimatic calipers and Digimatic micrometers, it inherits the functions and performance of **U-WAVE** but is more compact, thinner, and with improved operability.

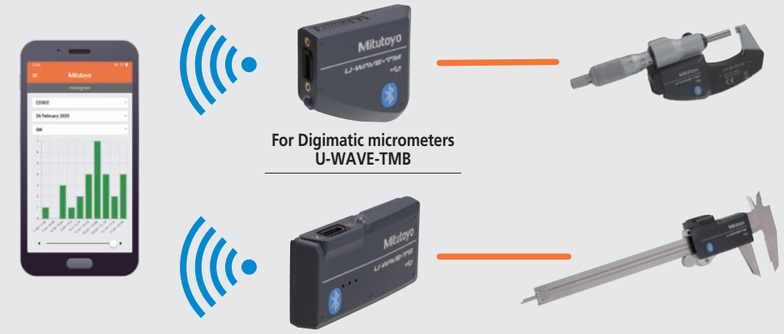


③ Mitutoyo *Bluetooth®* U-WAVE fit

U-WAVE fit

- **U-WAVE** fit with **Bluetooth®** capability. It can not only connect to a PC, but also other devices that support Bluetooth®, such as a smartphone or tablet without the need for an external receiver unit.

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



Bluetooth®

Function comparison table

	U-WAVE	U-WAVE fit*1	Bluetooth® U-WAVE fit*1
Transmission method	Original <based on IEEE802.15.4 (2.4 GHz)>		Bluetooth® 4. 2
Communication distance	Approx. 20 m (line of sight)		Approx. 16 m (line of sight)
Connectible model	Digimatic gages	Digimatic calipers and micrometers	
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 Please note that USB-ITPAK may not be recognized if your computer's OS build is old.

Typical Measuring Issues Solved

In combination with application software USB-ITPAK V2.1,
better efficiency in quality assurance can be achieved.

Case Study

Case 1

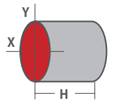
Standard sequential measurement input

Issue To record the measurement results, on a chart, from three points on a mass-produced product measured using two gages.

Solution If you set the procedure of inputting data to the Excel sheet with USB-ITPAK V2.1, the measurement data is automatically entered.

*Please refer to "Option" at the bottom of this page.

■ Measure the workpiece dimensions, X and Y, with a micrometer. Then, measure H with a caliper. Finally, visually check the appearance and judge OK or NG. Perform the above for 5 workpieces consecutively.



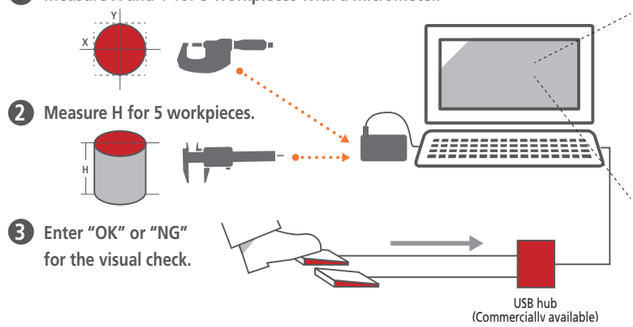
Point **Measurements in order**

The designated table will be created by measuring and transmitting data for X and Y of 5 workpieces, measuring and transmitting data of H, and then entering the result of visual check.

Point **Set the sequential measurement input order**

Designate the Excel sheet, select the data loading range, loading order, and allocate the ID for each cell.

1. Measure X and Y for 5 workpieces with a micrometer.
2. Measure H for 5 workpieces.
3. Enter "OK" or "NG" for the visual check.



Designated Excel sheet

	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	Input range of micrometer
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	Input range of caliper
5	External Appearance	OK	OK	NG			Input range of visual judgment

Data will be input one by one in the registered order to the cells of the Excel sheet designated beforehand.

Case 2

Data input by multiple operators

Issue To sort data into separate Excel sheets per Digimatic gage in the inspection process.

Solution The data collected by multiple operators can be individually set to be input to the designated cells in the Excel sheet.

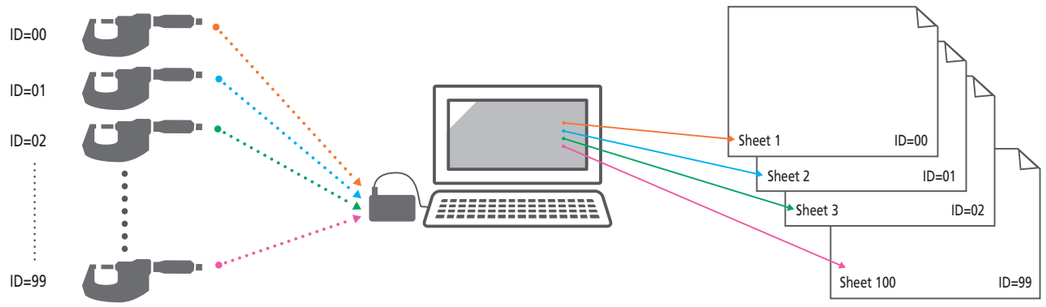
■ Input data of each Digimatic gage in order into the designated cells of the separate Excel sheet.

Point **Up to 100 Digimatic gages can be registered**

100 Digimatic gages at maximum can be registered to a receiver and the same number of Excel sheets can be designated.

Point **Designate the Excel sheet per Digimatic gage**

Using USB-ITPAK, designate the Excel sheet per Digimatic gage. Then, same as the sequential measurement, select the data loading range, loading order, and allocate the IDs.



Multiple measurement data (via U-WAVE-TM/TC/T) can be sorted into the separate Excel sheets without requiring you to program macros.

Option

USB-ITPAK V2.1

A USB dongle must be connected to the PC running the software.

USB dongle

Measurement Data Collection Software

USB-ITPAK V2.1

USB-ITPAK V2.1 is optional software to be installed in the PC connected with U-WAVE-R. It enables setting up the procedure to input the measurement data received from U-WAVE-R to the Excel sheet and to achieve greater inspection efficiency and enhanced credibility.

The combined use with U-WAVE will improve the operational efficiency of the inspection work.

Best suited for recording data in mass-production inspections where the procedure is repeated every day.

Features of USB-ITPAK V2.1

- The measuring methods can be configured, such as sequential measurement, batch measurement, individual measurement and more.
- Data can be canceled by a single operation of the foot switch or function key.
- Input range can be specified per Digimatic gage, which reduces the chance of a misinput.
- Data input or cancellation can be instructed globally in multiple-point simultaneous measurement.
- The Excel sheet can be automatically called for data input.
- The cursor movement after data input can be set to enable automatic input.

Case Study

Case 3

Batch measurement using timer

Issue To measure displacement using multiple Digimatic gages and automatically obtain data in a certain input interval.

Solution Batch timer input is available using the USB-ITPAK batch measurement function and the optional timer input function.

Specify the interval for measuring the displacement of the workpiece and collect data at once.

Point **Batch measurement with all the Digimatic gages**

Data can be obtained globally by a foot switch operation.

Point **Timer input option**

Using USB-ITPAK, the data request interval can be set by hours, minutes, and seconds (0.0 sec. to 24 hrs.).

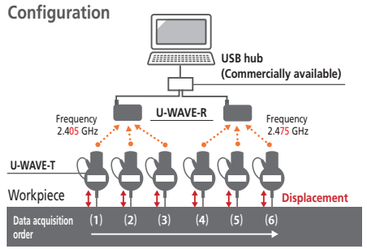
Point **Batch timer input**

Data can be obtained at the desired interval using the timer input function in batch measurement.

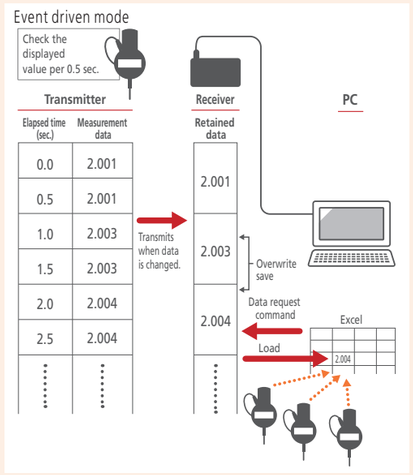
	A	B	C	D	E	F	G
1	Displacement (1)	Displacement (2)	Displacement (3)	Displacement (4)	Displacement (5)	Displacement (6)	Measurement date/ time
2	0.281	0.162	0.121	0.051	0.011	−0.001	2013/4/1 7 30 00
3	0.279	0.152	0.133	0.064	0.018	−0.003	2013/4/1 7 30 05
4	0.265	0.149	0.142	0.089	0.021	−0.007	2013/4/1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

After 5 sec. / After 5 sec. / After 5 sec.

Configuration



- To perform simultaneous measurement using U-WAVE, a special order software U-WAVEPAK (event drive) is required.
- Since the data refresh interval of the event drive is fixed at 0.5 seconds, the setting range is from 0.5 seconds to 24 hours.



Two modes for flexible measurements

"Button driven mode" and "Event driven mode"

Button driven mode

By pushing the Data button of digimatic gage/dedicated cable for U-WAVE/ connecting unit, indicated values can be transferred to the receiver.

Event driven mode

1) U-WAVE-TM/TC/T checks the displayed value of the Digimatic gage at 0.5 sec. intervals, and transfers data if the value is changed.
2) U-WAVE-R overwrites data in the storage.
3) Sends data responding to the data request command.

Enables automatic data load

Without operating the send button of the Digimatic gage, data can be obtained automatically from multiple Digimatic gages.

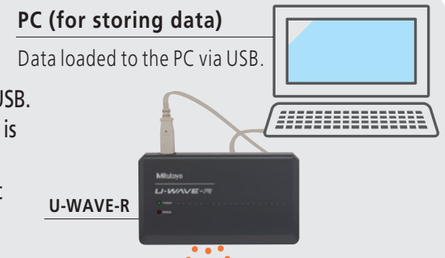
- The battery life of the U-WAVE-TM/TC/T is shortened (20 days in continuous operation).
- U-WAVE is equipped with a function to avoid radio wave interference, and enables successful simultaneous data transmission of three U-WAVE-T units per U-WAVE-R. To perform simultaneous data transmission with more than three units of U-WAVE-T, an additional U-WAVE-R and set different frequencies (15 channels) to assure reliable wireless communication.
- "Event driven mode" is not available for U-WAVE-fit Bluetooth® within USB-ITPAK.

U-WAVE
U-WAVE fit

Receiver

U-WAVE-R

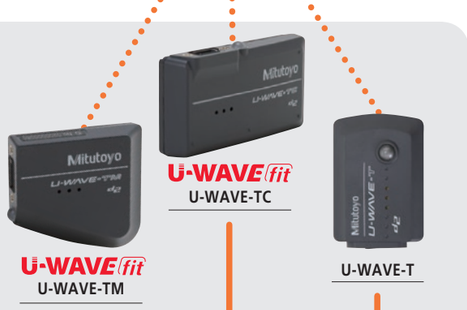
- Receives measurement data and transmits to the PC via USB.
- Since USB bus power system is used, a battery or adapter is not required.
- The identification ID and frequency to be used can be set using supplied software U-WAVEPAK.
- The data load function to Excel, etc. is supplied as a standard accessory.



Transmitters

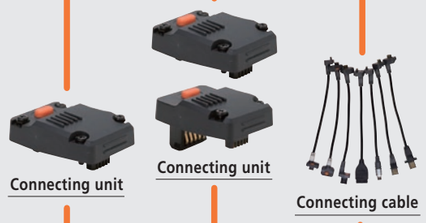
U-WAVE-TM/TC/T

- Transmits the measurement data displayed on the gage to U-WAVE-R.
- Compact, cable-less design provides a better fit with the Digimatic gage and better operability.



Connecting unit/connecting cable

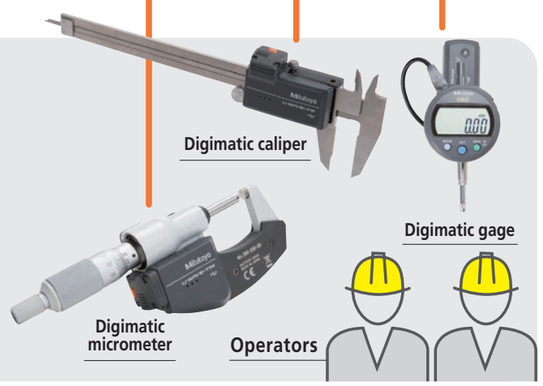
- A compact connecting unit connects the U-WAVE-TM/TC/T transmitter to the Digimatic gage.
- A dedicated cable connects the U-WAVE-T transmitter to the Digimatic gage.



Digimatic gages

Compatibility

- U-WAVE-TM/TC can be used with most of the calipers and micrometers equipped with the Digimatic output function.
- U-WAVE-T can be used with all the Digimatic gages equipped with the Digimatic output function.



U-WAVE fit

With functions and performance inherited from U-WAVE-T, a compact and thinner design provides a neater solution by eliminating cabling around the Digimatic gage and thus better operability!

U-WAVE-TM for micrometers and U-WAVE-TC for calipers are available, both the buzzer type and IP67 type. The buzzer type notifies the normal reception of data by LED and buzzer sound. The dust/water-proof IP67 type is designed for a harsh environment and as such is only equipped with LED notification of data reception.

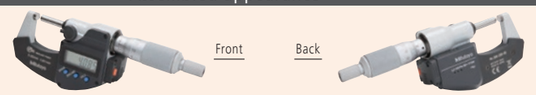
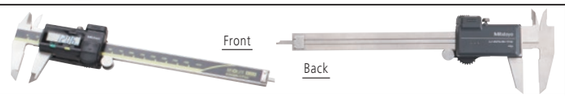
U-WAVE

This product successfully introduced U-WAVE to the market.

For digimatic micrometers, calipers, indicators and micrometer heads

The buzzer type and IP67 type are available. The buzzer type notifies the normal reception of data by LED and buzzer sound. The IP67 type is designed for a harsh environment and as such is only equipped with LED notification of data reception.

Connecting compatible micrometers, calipers and other Digimatic gages to U-WAVE

Gage		Assembled appearance	Connecting unit/connecting cable	Transmitter	Receiver
For digimatic micrometers	Standard	 Front Back	02AZF310	U-WAVE-TM With buzzer 264-623 U-WAVE fit	U-WAVE-R 02AZD810D Design registered in Japan
	Dust/ water-proof	IP65 Front Back		IP67 U-WAVE-TM Dust/water-proof 264-622 U-WAVE fit	
For calipers	Standard	 Front Back	02AZF300	U-WAVE-TC With buzzer 264-621 U-WAVE fit	
	Dust/ water-proof	IP67 Front Back	02AZF310	IP67 U-WAVE-TC Dust/water-proof 264-620 U-WAVE fit	
Digimatic gages			Connecting cable*	U-WAVE-T With buzzer 02AZD730G	
				IP67 U-WAVE-T Dust/water-proof 02AZD730G	

Note: Select according to the Digimatic gage to be connected. Refer to pages 24 and 25 for connecting cables.

Manage Measurement Data Centrally and Wirelessly on a Smartphone, Tablet or PC

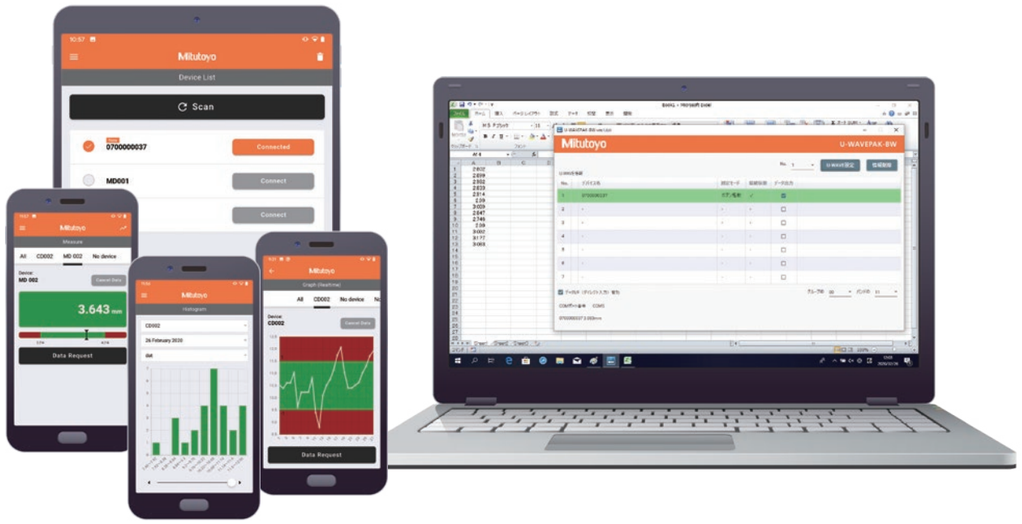
Mitutoyo *Bluetooth*® U-WAVE fit

NEW Products

U-WAVE-TMB/TCB

More compact and thinner for a better fit with Digimatic gages, and featuring improved operability and performance inherited from its predecessor, U-WAVE-TMB/ TCB is now available with Bluetooth® wireless technology. No receiver is required, and one PC can connect up to seven units of Mitutoyo *Bluetooth*® U-WAVE fit. Dust /water-proof models are also available for arduous shop floor usage.

IP67



For Digimatic micrometers
U-WAVE-TMB

For Digimatic calipers
U-WAVE-TCB

Note: Connectivity of this application software and U-WAVE-TMB/TCB to every single Bluetooth® device is not guaranteed.

Major Advantages of Introducing Mitutoyo *Bluetooth*® U-WAVE fit

Does Not Require a Receiver

Measurement data can be transmitted to PCs, tablets and smartphones without a receiver if they are equipped with Bluetooth® wireless technology.

Cost Reduction Effect

System can be configured at reduced cost, just by connecting to an existing Digimatic gage.

Higher Efficiency

Data can be input by single button operation. Since there is no need for manual input misinput does not occur. Efficiency is greatly improved.

Centralized Data Management

Measurement data can be managed centrally.
"Visualization of quality" helps prevent the generation of defective products.

Easy Data Saving

Measurement data can be saved to smartphones and tablets independently of the measurement site.

You can use with confidence since it is labeled with the wireless certification number acquired in the country of purchase.

With Bluetooth® wireless technology for Easy Pairing with Your Digimatic Micrometer or Caliper

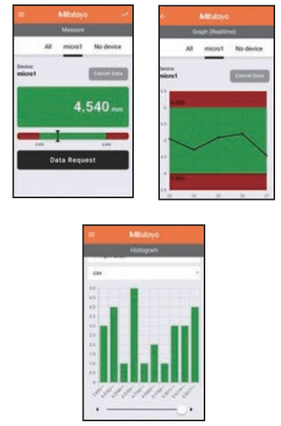
U-WAVE-TMB/ TCB is compatible with most Digimatic micrometers and calipers.
Refer to pages 28 to 42 for attachable digimatic gages

Digimatic micrometers

Digimatic calipers

Digimatic gage, connecting unit and transmitter combinations

		Assembled appearance	Connecting unit	Transmitter
For micrometers	Buzzer type		No.02AZF310	U-WAVE-TMB No.264-627
	Dust/ water-proof type			U-WAVE-TMB No.264-626 IP67
For calipers	Buzzer type		No.02AZF300	U-WAVE-TCB No.264-625
	Dust/ water-proof type		No.02AZF310	U-WAVE-TCB No.264-624 IP67

	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	• Judgment • Data logging • Graphical display of measurement result • Display the histogram of measurement results • Transfer a measurement result (log data)	U-WAVEPAK-BW enables you to identify the unit sending the data by transmitter device ID. This function is not possible in the normal use of Bluetooth®.
Display language	Japanese / English (Depends on the OS settings)	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 IT ON Google Play	Android 7.0 or later / iOS 10.0 or later **U-WAVEPAK-BM (English version only), the communication software for transferring measurement data to smartphones and tablets is available at app stores for free download.** GET IT ON Google Play Download on the 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**

Note1: We cannot guarantee the operation of this application and U-WAVE TMB/TCB with all Bluetooth equipped devices.

Note2: Google Play and the Google Play logo are trademarks of Google LLC. Apple and the Apple logo are trademarks of Apple Inc.

* By enabling the direct input feature within U-WAVEPAK-BW the results can be written directly to Excel. The results do not include the transmitter device ID. Use of our optional USB-ITPAK or MeasurLink software allows for data sorting by individual transmitter IDs.

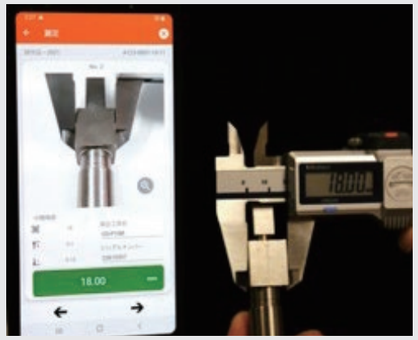
Measurement Navigation Application Mitutoyo U-WAVE Navi

NEW Products

Navigates your measurements easily and steadily

Mitutoyo *Bluetooth*® U-WAVE fit allows you to start measurements with your smartphone.

Images and text can be used to build a clear step by step measurement procedure. The app guides you how to measure and also shows you GO/NG judgment.



Easy data management

Data export to PC

Mitutoyo U-WAVE Navi is available at Google Play for free download.

Note: Google Play and the Google Play logo are trademarks of Google LLC.

GET IT ON Google Play

Mitutoyo

MeasurLink

Achieve "Visualization of Quality"

Collecting the measurement data
Measurement Data Wireless Communication System
U-WAVE

IoT of Quality Control
Measurement Data Network System
MeasurLink

Configure the measurement network system MeasurLink using U-WAVE as a base

What is MeasurLink®?

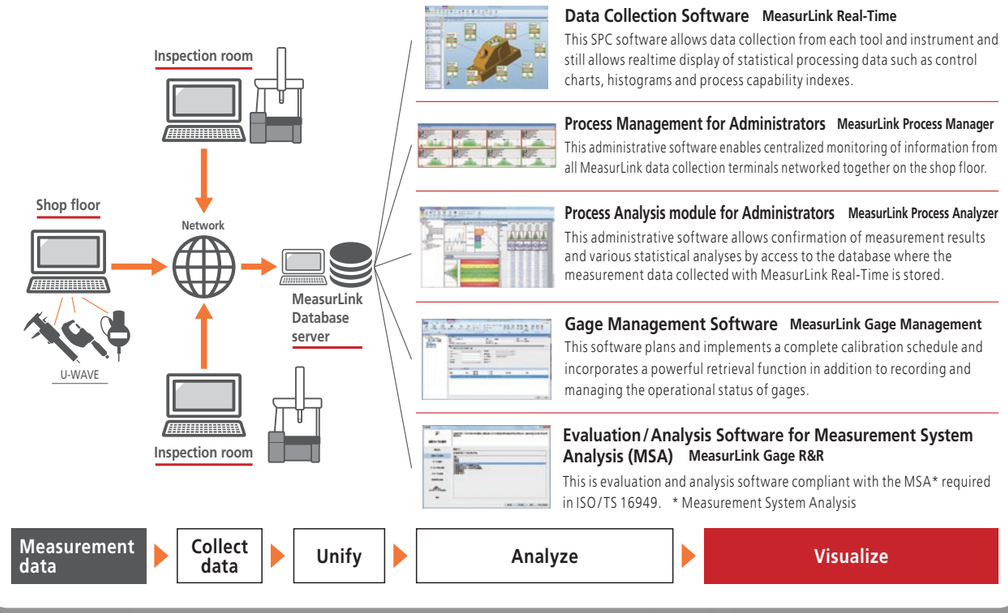
MeasurLink is an IoT platform for quality management that realizes "Visualization of Quality" by enabling real-time data collection from the networked Digimatic gages and global control and analysis. U-WAVE supports MeasurLink as an infrastructure that collects and controls data.

Preventing defectives
Collects data from the Digimatic gages on the network and performs statistical process control (SPC) to warn of possible generation of defectives.

Diagnosis by data analysis
Checking measurement results by accessing the data base and performing various analyses helps investigate and resolve process performance concerns.

Simply start achieving IoT
In addition to conventional data storage, the network can be configured in steps to simply start IoT of Quality Control.

Linkage between U-WAVE and MeasurLink



Data Collection Software MeasurLink Real-Time
This SPC software allows data collection from each tool and instrument and still allows realtime display of statistical processing data such as control charts, histograms and process capability indexes.

Process Management for Administrators MeasurLink Process Manager
This administrative software enables centralized monitoring of information from all MeasurLink data collection terminals networked together on the shop floor.

Process Analysis module for Administrators MeasurLink Process Analyzer
This administrative software allows confirmation of measurement results and various statistical analyses by access to the database where the measurement data collected with MeasurLink Real-Time is stored.

Gage Management Software MeasurLink Gage Management
This software plans and implements a complete calibration schedule and incorporates a powerful retrieval function in addition to recording and managing the operational status of gages.

Evaluation / Analysis Software for Measurement System Analysis (MSA) MeasurLink Gage R&R
This is evaluation and analysis software compliant with the MSA* required in ISO/TS 16949. * Measurement System Analysis

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

Mitutoyo

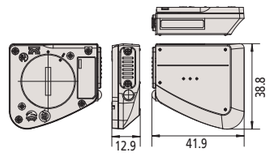
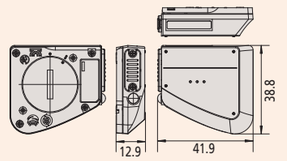
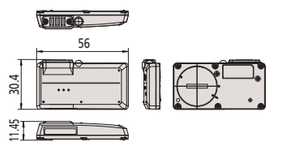
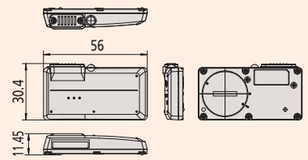
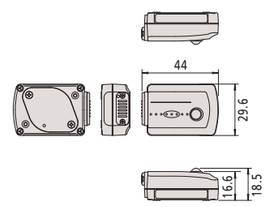
Specifications

Wireless Communication Specifications

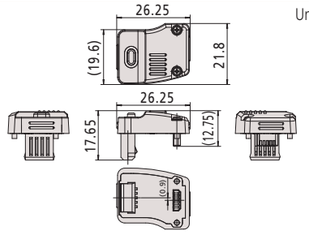
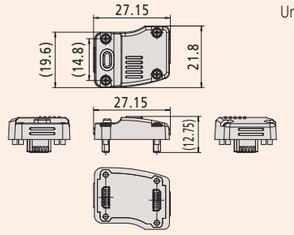
Product name	Wireless communication	Wireless communication distance	Transmission output	Modulation method	Communication frequency	Used band
U-WAVE-T/TM/TC	Original (based on IEEE802.15.4)	Approx. 20 m (line of sight)	U-WAVE-T: 1 mW (0 dBm) or less U-WAVE-TC/TM: 2.5 mW (4 dBm) or less	DS-SS (Direct Sequence - Spread Spectrum) Resistant to interfering signals and noise	2.4 GHz band	15 channels (2.405 to 2.475 GHz at intervals of 5 MHz)
U-WAVE-TMB/TMC	Bluetooth® 4.2 Low Energy	Approx.16 m (line of sight) Approx. 10 m (on shop floor)	3.2 mW (5 dBm) or less (Class2)	FH-SS (Frequency-Hopping Spread Spectrum)	2.4 GHz band	in accordance with FH-SS (2.400~2.483GHz)

Note 1: This product is a radio equipment classified in the 2.4 GHz Wide-band Low Power Data Communication System.
To use this product, conformity to the radio law of each country is required. Please contact your dealer or nearest Mitutoyo sales office.
Note 2: Not compatible with the conventional Mu-WAVE, for which communication specifications are different.

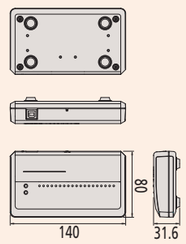
Transmitter (Refer to pages 12 and 13 for combinations.)

Product name	Model	Order No.	Protection level	Data reception indication	Power supply	Battery life	Mass	Appearance	External dimensions
U-WAVE-TM (for micrometers)	Buzzer type	264-623	N/A	LED, buzzer	Lithium battery CR2032×1	Approximately 400,000 transmissions in continuous use	18 g		Unit: mm 
	Dust/water-proof type	264-622	IP67	LED			18 g		
U-WAVE-TMB (for micrometers)	Buzzer type	264-627	N/A	LED, buzzer		Approximately 1 year under normal conditions of use, but varies according to usage.	18 g		Unit: mm 
	Dust/water-proof type	264-626	IP67	LED			18 g		
U-WAVE-TC (for calipers)	Buzzer type	264-621	N/A	LED, buzzer		Approximately 400,000 transmissions in continuous use	18 g		Unit: mm 
	Dust/water-proof type	264-620	IP67	LED			18 g		
U-WAVE-TCB (for calipers)	Buzzer type	264-625	N/A	LED, buzzer		Approximately 1 year under normal conditions of use, but varies according to usage.	18 g		Unit: mm 
	Dust/water-proof type	264-624	IP67	LED			18 g		
U-WAVE-T	Buzzer type	02AZD880G	N/A	LED, buzzer		Approximately 400,000 transmissions in continuous use	23 g		Unit: mm 
	Dust/water-proof type	02AZD730G	IP67	LED			23 g		

● Connecting unit (Refer to pages 12 and 13 for combinations.)

Product name	Model	Order No.	Protection level	Mass	Appearance	External dimensions
Connecting unit	For standard type	02AZF300	N/A	6 g		Unit: mm 
	For dust/water-proof type	02AZF310	IP67	6 g		Unit: mm 

● Receiver (Refer to pages 12 and 13 for combinations.)

Product name	Model	Order No.	Power supply	Connectable U-WAVE-R units (per PC)	Connectable U-WAVE-T units	Mass	Appearance	External dimensions	Standard accessory: U-WAVEPAK software		
									System Environment: Compatible OS	Main specifications	Data format
U-WAVE-R	U-WAVE-R	02AZD810D	USB bus power system	Up to 15	Up to 100	130 g		Unit: mm 	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* Note: Windows 10 Mobile is not supported. * 32-bit, 64-bit OS supported <Versions confirmed operational on Windows 10> • U-WAVEPAK Ver.1.020 or later <Connectability confirmed for tablet PC> • Microsoft Surface Pro 6 (the version whose operation on Windows10 Professional is confirmed) • Required environment: DVD drive (required for installation), USB port ×2 ports or more	• 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	**Example of format when the Digimatic gage displays 12.34** **DT1 01 02 +00000012.34 M** Header DT1: Measurement data ST1: **Status code** ☆ Digimatic gage display value*1 Unit M: mm U-WAVE-TC/TM/T ID: 00 to 99 U-WAVE-R ID: 00 to 99 *1 Data interface function is switchable to "Measurement value only" ☆ **Example of status code format** **ST1 01 02 0999999073 99** Header Status code U-WAVE-R ID U-WAVE-TC/TM/T ID Device ID*2 **Status code** 99: Data cancellation 01: No response from Digimatic gage 03: Measurement data missing, others *2 Unique number assigned to U-WAVE at shipment

Note:U-WAVEPAK software is packed together with the U-Wave receiver. If your computer has no DVD drive then please download and install U-WAVEPAK from our website.

Mitutoyo

●Dedicated cable for U-WAVE-T (Refer to pages 12 and 13 for combinations.)

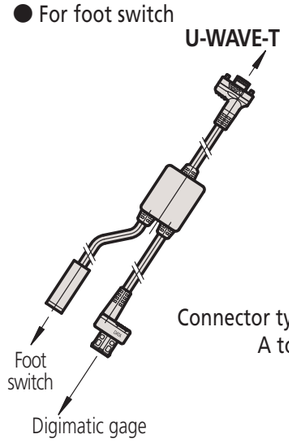
Product name	Connecting cable			Gage connectors on data cable		Digimatic ports on gage		
	Connector type	Order No.		Picture of gage connector	Data switch	Picture of Digimatic port	Applicable models	
		Standard	For foot switch					
Dedicated cable for U-WAVE-T	A Water-proof type with output button	02AZD790A	02AZE140A		✔		[**Digimatic caliper**] 500-712-20/500-713-20, etc. 550-301-20/550-331-20, etc. 551-301-20/551-331-20, 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.	[**Digimatic special application caliper**] 573-601-20/573-602-20, etc. [**Digimatic depth gage**] 571-251-20/571-252-20, etc. [**Digimatic scale unit**] 572-600, 572-601, etc.
	B Water-proof type with output button	02AZD790B	02AZE140B		✔		[**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. [**Dedicated micrometers for Digimatic**] 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.
	C Straight type with output button	02AZD790C	02AZE140C		✔		[**Digimatic caliper**] 500-150-30/500-151-30, etc. 500-500-10/500-501-10, etc. 500-443 etc. [**Digimatic special application caliper**] 573-718-20/573-719-20, etc. 573-716-20/573-717-20, 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.
	D Flat 10-pin type	02AZD790D	02AZE140D		—		[**Digimatic indicator**] ID-H ID-F (Note)	[**High-precision height gage**] QM-Height
	E Round 6-pin type	02AZD790E	02AZE140E		—		[**Hardness testing machines**] HM-100, HM-200, HV-100, HR-300/400/500, HH-411	
	F Flat straight type	02AZD790F	02AZE140F		—		[**Digimatic indicator**] ID-CX, ID-C (Peak-Value Hold Type), ID-C (Calculation type), ID-C (Bore Gage Type), ID-U (Note), ID-SS (Note), ID-SX (Note) [**Digimatic height gage**] 192-663-10/192-613-10/570-322/570-227, etc. (Flat L-shape, cable outlet is right) [**ABS boreratic**] 568-361/568-362, etc. [**Digimatic bore gage**] 511-501/511-502, etc.	[**Scale unit**] 572-460/572-560/572-480-10/572-580-10, etc. [**Hardness testing machines**] HH-300 [**Digimatic depth gage**] Digimatic type (ID-CX)
	G Flat straight water-proof type	02AZD790G	02AZE140G		—		[**Digimatic indicator**] ID-N, ID-B	

Note:If your digimatic gage doesn't have a DATA button, use the button on U-WAVE-T connection or connect it to a foot switch by using the optional foot switch connecting cable.

● Standard

Connector type
A to G

● For foot switch



Connector type
A to G

● Foot Switch (optional)

Order No.937179T

Optional Products

Application system

Product name	Model	Compatible OS: Windows*1	Compatible Excel version*2	Order No.
USB-ITPAK	06AFM386	2000 SP4 XP SP2 or later Vista 7 8 8.1 10	2002 2003 2007 2010 2013 2016 365	USB-ITPAK V2.1

*1 32-bit, 64-bit OS supported Windows 10 Mobile is not supported. *2 The operation with Excel for MAC OS is not guaranteed.

UInstallation bracket Kit for U-WAVE-T

Product	Type	Order No.	Application example	Attachable unit	Accessory
Bracket for U-WAVE-T	standard	02AZE200		U-WAVE-T	• Detachable fastener: 2pcs. (mirror imaged) • Mounting screws for U-WAVE: 2 pcs.
Bracket for QM-Height	dedicated for QM-Height	02AZE990		U-WAVE-T	• Mounting screws for back plate: 2 pcs. • Mounting screws for U-WAVE: 2 pcs.
Bracket for digimatic indicator	dedicated for ID-S and ID-C digimatic indicator	02AZF670		U-WAVE-TM/TMB	• Mounting screws for back plate: 2 pcs. • Mounting screws for U-WAVE: 2 pcs.
Bracket for ID-N	dedicated for ABS coolant proof digimatic indicator ID-N	02AZF675		U-WAVE-TM/TMB	• Mounting screws for back plate: 2 pcs. • Mounting screws for U-WAVE: 2 pcs.

Application examples of the mounting plate (02AZE200)

Digimatic indicator ID-C112XB

Front view

Rear view

Side view

QM-Height

ID-C

Front view

Attachable to ID-C in the various positions

Image of fastener attachment to main gage

In the case of an indicator

ID-C112XB

A back plate without a center lug is recommended. If a lug is present, attach fastener after cutting away material to clear the lug.

U-WAVE-TM/TMB compatible Digimatic micrometers/heads

* Current product

Order No.	Product name	Unit	Connecting unit
293-140	QuantuMike	mm	02AZF310
*293-140-30			
293-141			
*293-141-30			
293-142			
*293-142-30			
293-143			
*293-143-30			
293-180		inch/mm	
*293-180-30			
293-181			
*293-181-30			
293-182			
*293-182-30			
293-183			
*293-183-30			
293-230	Coolant proof micrometer	mm	
*293-230-30			
293-231			
*293-231-30			
293-232			
*293-232-30			
293-233			
*293-233-30			
293-234			
*293-234-30			
293-235			
*293-235-30			
293-236			
*293-236-30			
293-237			
*293-237-30			
293-238			
293-250			
293-250-10			
*293-250-30			
293-251			
293-251-10			
*293-251-30			
293-252			
293-252-10			
*293-252-30			
293-253			
293-253-10			
*293-253-30			
293-254			
293-254-10			
*293-254-30			
293-255			
293-255-10			
*293-255-30			
293-256			
293-256-10			
*293-256-30			

* Current product

Order No.	Product name	Unit	Connecting unit
293-257	Coolant proof micrometer	mm	02AZF310
293-257-10			
*293-257-30			
293-330		inch/mm	
*293-330-30			
293-331			
*293-331-30			
293-332			
*293-332-30			
293-333			
*293-333-30			
293-334			
*293-334-30			
293-335			
*293-335-30			
293-336			
*293-336-30			
293-350			
293-350-10			
*293-350-30			
293-351			
293-351-10			
*293-351-30			
293-352			
293-352-10			
*293-352-30			
293-353			
293-353-10			
*293-353-30			
293-354			
293-354-10			
*293-354-30			
293-355			
293-355-10			
*293-355-30			
293-356			
293-356-10			
*293-356-30			
293-357			
293-357-10			
*293-357-30			
293-960			
*293-960-30			
293-961			
*293-961-30			
293-962		mm	
*293-962-30			
293-963			
*293-963-30			
293-964			
293-965			
293-966			
*293-966-30			

* Current product

Order No.	Product name	Unit	Connecting unit
314-251	V-anvil micrometer	mm	02AZF310
314-251-10			
*314-251-30			
314-252			
314-252-10			
*314-252-30			
314-253			
314-253-10			
*314-253-30			
314-261			
314-261-10			
*314-261-30			
314-262			
314-262-10			
*314-262-30			
314-351		inch/mm	
314-351-10			
*314-351-30			
314-352			
314-352-10			
*314-352-30			
314-353			
314-353-10			
*314-353-30			
314-361			
314-361-10			
*314-361-30			
314-362			
314-362-10			
*314-362-30			
317-251	Uni-micrometer	mm	
*317-251-30			
317-252			
*317-252-30			
317-351		inch/mm	
*317-351-30			
317-352			
*317-352-30			
323-250		mm	
*323-250-30			
323-251			
*323-251-30			
323-252			
*323-252-30			
323-253			
*323-253-30			
323-350		inch/mm	
*323-350-30			
323-351			
*323-351-30			
323-352			
*323-352-30			
323-353			
*323-353-30			

* Current product

Order No.	Product name	Unit	Connecting unit
324-251	Gear tooth micrometer	mm	02AZF310
324-251-10			
*324-251-30			
324-252			
324-252-10			
*324-252-30			
324-253			
324-253-10			
*324-253-30			
324-254			
324-254-10			
*324-254-30			
324-351		inch/mm	
324-351-10			
*324-351-30			
324-352			
324-352-10			
*324-352-30			
324-353			
324-353-10			
*324-353-30			
324-354			
324-354-10			
*324-354-30			
326-251	Screw thread micrometer	mm	
326-251-10			
*326-251-30			
326-252			
326-252-10			
*326-252-30			
326-253			
326-253-10			
*326-253-30			
326-254			
326-254-10			
*326-254-30			
326-351		inch/mm	
326-351-10			
*326-351-30			
326-352			
326-352-10			
*326-352-30			
326-353			
326-353-10			
*326-353-30			
326-354			
326-354-10			
*326-354-30			
329-250	Depth micrometer	mm	
329-250-10			
*329-250-30			
329-251			
329-251-10			
*329-251-30			
329-350		inch/mm	

* Current product

Order No.	Product name	Unit	Connecting unit
329-350-10	Depth micrometer	inch/mm	02AZF310
*329-350-30			
329-351			
329-351-10			
*329-351-30			
331-251	Spline micrometer	mm	
*331-251-30			
331-252			
*331-252-30			
331-253			
*331-253-30			
331-254			
*331-254-30			
331-261			
*331-261-30			
331-262			
*331-262-30			
331-263			
*331-263-30			
331-264			
*331-264-30			
331-351		inch/mm	
*331-351-30			
331-352			
*331-352-30			
331-353			
*331-353-30			
331-354			
*331-354-30			
331-361			
*331-361-30			
331-362			
*331-362-30			
331-363			
*331-363-30			
331-364			
*331-364-30			
340-251	Outside micrometer	mm	
340-251-10			
*340-251-30			
340-252			
340-252-10			
*340-252-30			
340-351		inch/mm	
340-351-10			
*340-351-30			
340-352			
340-352-10			
*340-352-30			
342-251	Point micrometer	mm	
*342-251-30			
342-252			
*342-252-30			
342-253			

* Current product

Order No.	Product name	Unit	Connecting unit
*342-253-30	Point micrometer	mm	02AZF310
342-254			
*342-254-30			
342-261			
*342-261-30			
342-262			
*342-262-30			
342-263			
*342-263-30			
342-264			
*342-264-30			
342-271	Crimp height micrometer		
*342-271-30			
342-351	Point micrometer	inch/mm	
*342-351-30			
342-352			
*342-352-30			
342-353			
*342-353-30			
342-354			
*342-354-30			
342-361			
*342-361-30			
342-362			
*342-362-30			
342-363			
*342-363-30			
342-364			
*342-364-30			
342-371	Crimp height micrometer		
*342-371-30			
343-250	Caliper type outside micrometer	mm	
*343-250-30			
343-251			
*343-251-30			
343-252			
*343-252-30			
343-253			
*343-253-30			
343-350		inch/mm	
*343-350-30			
343-351			
*343-351-30			
343-352			
*343-352-30			
343-353			
*343-353-30			
345-250	Caliper type inside micrometer	mm	
345-250-10			
*345-250-30			
345-251			
345-251-10			
*345-251-30			
345-350		inch/mm	

* Current product

Order No.	Product name	Unit	Connecting unit
345-350-10	Caliper type inside micrometer	inch/mm	02AZF310
*345-350-30			
345-351			
345-351-10			
*345-351-30			
350-251	Digimatic micrometer head	mm	
350-251-10			
*350-251-30			
350-252			
350-252-10			
*350-252-30			
350-253			
350-253-10			
*350-253-30			
350-254			
350-254-10			
*350-254-30			
350-261			
350-261-10			
*350-261-30			
350-271			
350-271-10			
*350-271-30			
350-272			
350-272-10			
350-272-20			
*350-272-30			
350-273			
350-273-10			
*350-273-30			
350-274			
350-274-10			
350-274-20			
*350-274-30			
350-281			
350-281-10			
*350-281-30			
350-282			
350-282-10			
*350-282-30			
350-283			
350-283-10			
*350-283-30			
350-284			
350-284-10			
*350-284-30			
350-351		inch/mm	
350-351-10			
*350-351-30			
350-352			
350-352-10			
*350-352-30			
350-353			
350-353-10			

* Current product

Order No.	Product name	Unit	Connecting unit
*350-353-30	Digimatic micrometer head	inch/mm	02AZF310
350-354			
350-354-10			
*350-354-30			
350-357-10			
*350-357-30			
350-361			
350-361-10			
*350-361-30			
350-381			
350-381-10			
*350-381-30			
350-382			
350-382-10			
*350-382-30			
350-383			
350-383-10			
*350-383-30			
350-384			
350-384-10			
*350-384-30			
369-250	Disk micrometer	mm	
*369-250-30			
369-251			
*369-251-30			
369-252			
*369-252-30			
369-253			
*369-253-30			
369-350		inch/mm	
*369-350-30			
369-351			
*369-351-30			
369-352			
*369-352-30			
369-353			
*369-353-30			
389-251	Sheet metal micrometer	mm	
*389-251-30			
389-252			
*389-252-30			
389-261			
*389-261-30			
389-262			
*389-262-30			
389-271			
*389-271-30			
389-272			
*389-272-30			
389-351		inch/mm	
*389-351-30			
389-352			
*389-352-30			
389-361			

* Current product

Order No.	Product name	Unit	Connecting unit
*389-361-30	Sheet metal micrometer	inch/mm	02AZF310
389-362			
*389-362-30			
389-371			
*389-371-30			
389-372			
*389-372-30			
395-251	Tube micrometer	mm	
*395-251-30			
395-252			
*395-252-30			
395-253			
*395-253-30			
395-254			
*395-254-30			
395-261			
*395-261-30			
395-262			
*395-262-30			
395-263			
*395-263-30			
395-264			
*395-264-30			
395-271			
*395-271-30			
395-272			
*395-272-30			
395-273			
*395-273-30			
395-274			
*395-274-30			
395-351		inch/mm	
*395-351-30			
395-352			
*395-352-30			
395-353			
*395-353-30			
395-354			
*395-354-30			
395-362			
*395-362-30			
395-363			
*395-363-30			
395-364			
*395-364-30			
395-371			
*395-371-30			
395-372			
*395-372-30			
395-373			
*395-373-30			
395-374			
*395-374-30			

* Current product

Order No.	Product name	Unit	Connecting unit
406-250	Outside micrometer, non-rotating spindle	mm	02AZF310
*406-250-30			
406-251			
*406-251-30			
406-252			
*406-252-30			
406-253			
*406-253-30			
406-350		inch/mm	
*406-350-30			
406-351			
*406-351-30			
406-352			
*406-352-30			
406-353			
*406-353-30			
422-230	Blade micrometer, non-rotating spindle	mm	
*422-230-30			
422-231			
*422-231-30			
422-232			
*422-232-30			
422-233			
*422-233-30			
422-260			
*422-260-30			
422-261			
*422-261-30			
422-270			
*422-270-30			
422-271			
*422-271-30			
422-330		inch/mm	
*422-330-30			
422-331			
*422-331-30			
422-332			
*422-332-30			
422-333			
*422-333-30			
422-360			
*422-360-30			
422-361			
*422-361-30			
422-370			
*422-370-30			
422-371			
*422-371-30			

U-WAVE-TC/TCB compatible Digimatic caliper/depth gage

* Current product

Order No.	Product name	Unit	Connecting unit
500-150-20	ABS Digimatic caliper	mm	02AZF300
*500-150-30			
500-151-20			
*500-151-30			
500-152-20			
*500-152-30			
500-153			
*500-153-30			
500-154-20			
*500-154-30			
500-155-20			
*500-155-30			
500-156-20			
*500-156-30			
500-157-20			
*500-157-30			
500-158-20			
*500-158-30			
500-161-21			
*500-161-30			
500-162-21			
*500-162-30			
500-167		inch/mm	
*500-167-30			
500-168			
*500-168-30			
500-170-20			
*500-170-30			
500-171-20			
*500-171-30			
500-172-20			
*500-172-30			
500-173			
*500-173-30			
500-174-20			
*500-174-30			
500-175-20			
*500-175-30			
500-176-20			
*500-176-30			
500-177-20			
*500-177-30			
500-178-20			
*500-178-30			
500-201-21		mm	
*500-201-30			
500-202-21		inch/mm	
*500-202-30			
500-203-21		mm	
*500-203-30			
500-204-21		inch/mm	
*500-204-30			
500-205		mm	
*500-205-30			

* Current product

Order No.	Product name	Unit	Connecting unit
500-233-21	ABS Digimatic caliper	mm	02AZF300
*500-233-30			
500-234-21			
*500-234-30			
500-235-21			
*500-235-30			
500-236-21			
*500-236-30			
500-443			
500-444			
500-445			
500-463		inch/mm	
500-464			
500-465			
571-201-20	Depth gage	mm	
*571-201-30			
571-202-20			
*571-202-30			
571-203-20			
*571-203-30			
571-211-20		inch/mm	
*571-211-30			
571-212-20			
*571-212-30			
571-213-10			
*571-213-30			
573-191-20	ABS low force caliper	mm	
*573-191-30			
573-291-20		inch/mm	
*573-291-30			
500-712-10	ABS coolant proof caliper	mm	02AZF310
*500-712-20			
500-713-10			
*500-713-20			
500-714-10			
*500-714-20			
500-716-11			
*500-716-20			
500-717-11			
*500-717-20			
500-718-11			
*500-718-20			
500-719-10			
*500-719-20			
500-720-11		inch/mm	
*500-720-20			
500-721-10		mm	
*500-721-20			
500-722-10			
*500-722-20			
500-723-10			
*500-723-20			
500-724-10			
*500-724-20			

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* Current product

Order No.	Product name	Unit	Connecting unit
500-727-11	ABS coolant proof caliper	mm	02AZF310
*500-727-20			
500-728-11			
*500-728-20			
500-735-10		inch/mm	
500-735-20			
500-736-10			
*500-736-20			
500-737-10			
*500-737-20			
500-738-10			
*500-738-20			
500-762-10			
*500-762-20			
500-763-10			
*500-763-20			
500-764-10			
*500-764-20			
500-769-10			
*500-769-20			
550-301-10	ABS Digimatic caliper, nib style jaws	mm	
*550-301-20			
550-311-10		inch/mm	
*550-311-20			
550-331-10		mm	
*550-331-20			
550-341-10		inch/mm	
*550-341-20			
551-301-10	ABS Digimatic caliper, nib style and standard jaws	mm	
*551-301-20			
551-311-10		inch/mm	
*551-311-20			
551-331-10		mm	
*551-331-20			
551-341-10		inch/mm	
*551-341-20			
571-100-20	Tire tread depth gage	mm	
*571-200-20			
571-251-10	Depth gage		
*571-251-20			
571-252-10			
*571-252-20			
571-253-10			
*571-253-20			
571-254-10			
*571-254-20			
571-255-10			
*571-255-20			
571-261-10		inch/mm	
*571-261-20			
571-262-10			
*571-262-20			
571-263-10			
*571-263-20			

* Current product

Order No.	Product name	Unit	Connecting unit
571-264-10	Depth gage	inch/mm	02AZF310
*571-264-20			
571-265-10			
*571-265-20			
571-301-10		mm	
*571-301-20			
571-302-10			
*571-302-20			
571-311-10		inch/mm	
571-311-20			
571-312-10			
*571-312-20			
573-601	Dedicated caliper	mm	
*573-601-20			
573-602			
*573-602-20			
573-604			
*573-604-20			
573-605			
*573-605-20			
573-606			
*573-606-20			
573-608			
*573-608-20			
573-611			
*573-611-20			
573-612			
*573-612-20			
573-614			
*573-614-20			
573-615			
*573-615-20			
573-616			
*573-616-20			
*573-618			
*573-618-20			
573-621			
*573-621-20			
573-622			
*573-622-20			
573-625			
*573-625-20			
573-626			
*573-626-20			
573-634			
*573-634-20			
573-635			
*573-635-20			
573-645			
*573-645-20			
573-646			
*573-646-20			
573-647			
*573-647-20			

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* Current product

Order No.	Product name	Unit	Connecting unit
573-648	Dedicated caliper	mm	02AZF310
*573-648-20			
573-651			
*573-651-20			
573-652			
*573-652-20			
573-653			
*573-653-20			
573-654			
*573-654-20			
573-661			
573-661-20			
573-662			
*573-662-20			
573-676			
*573-676-20			
573-677			
*573-677-20			
573-679			
*573-679-20			
573-701		inch/mm	
*573-701-20			
573-702			
*573-702-20			
573-704			
*573-704-20			
573-705			
*573-705-20			
573-706			
*573-706-20			
573-708			
*573-708-20			
573-721			
*573-721-20			
573-725			
*573-725-20			
573-734			
*573-734-20			
573-745			
*573-745-20			
573-746			
*573-746-20			
573-751			
*573-751-20			
573-752			
*573-752-20			
573-761			
*573-761-20			

Mitutoyo

Mitutoyo Quality

High-Accuracy Digimatic Micrometer
MDH-25MB

Small Tool Instruments and Data Management

Catalog No. E12004(4)

Mitutoyo

HIGH ACCURACY

World's First

0.1 µm* Resolution Digital Micrometer

*0.1 µm=0.0001 mm

d2

"d2" is a generic name for Mitutoyo Digimatic output compatible with up to 8 digits of I/O data.

MDH-25MB

Easy, Rapid and High-accuracy Measurement of Workpieces That Require an Accuracy of 1 µm or Less

Delivering a Maximum Permissible Error J_{MPE} of ±0.5 µm accuracy at 0.1 µm resolution means Mitutoyo's MDH-25MB is the most accurate digital micrometer available*, and this instrument will enable you to easily and rapidly measure workpieces that require very-high-accuracy measurement. This remarkable performance has been attained thanks to Mitutoyo's proprietary ABS (absolute) rotary encoder and high-accuracy thread cutting technology.

*Mitutoyo's research as of July, 2018

Position and Merits of MDH-25MB

- Measuring accuracy equivalent to a laser micrometer
- No jig, etc. needed to be fabricated
- Simple measurement enabled even for very small parts
- Portable and compatible with standard workpiece measurement techniques, similar to conventional micrometers
- Economical - low investment in equipment compared with other choices

APPLICATION

Beyond the Usual Micrometer!
Many More Kinds of High-accuracy Parts Now Measurable.

This micrometer allows easy, rapid and high-accuracy measurement of workpieces that require a measuring accuracy of 1 µm or less, such as medical parts, precision instruments and auto-parts regarded as difficult to be accurately measured with conventional micrometers.

Manufacturing

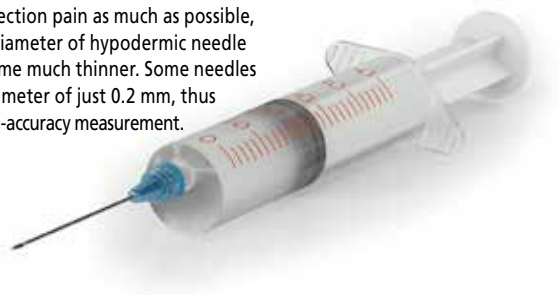
Pin gage measurement

Pin gages are widely used for measurement of the diameter or center-to-center distance of holes. The periodic calibration of a high-precision pin gage requires high-accuracy measurement.

Medical care

Hypodermic needle measurement

To reduce injection pain as much as possible, the outside diameter of hypodermic needle tips has become much thinner. Some needles have a tip diameter of just 0.2 mm, thus requiring high-accuracy measurement.



Electric/electronic devices

Fiber optics measurement

The optical-transmission cylindrical "core" made of quartz glass is 0.01 to 0.05 mm in diameter. Since its thickness is similar to a strand of hair, high accuracy is required for its measurement.

Manufacturing

Gap gage calibration

Gap gages are widely used for easy measurement of small gaps in assemblies.
Periodic gage calibration is indispensable for accuracy control to detect undue wear.

Automobile and machine tools

Gear tooth measurement

As gears decrease in size and weight, the MDH allows for convenient high accuracy evaluation. MDH simply enables accuracy evaluation with it on hand for the customer demand of high accuracy.

Medical care

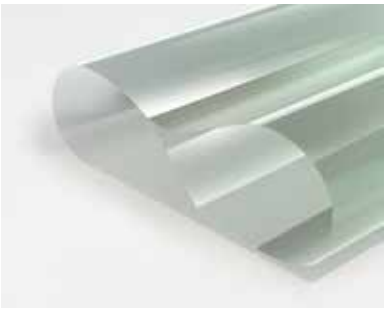
Implant measurement

An abutment is used for dental implants. Abutments have various lengths, angles, and materials. Each abutment needs to be made and measured very accurately.

Medical care

Catheter measurement

High-accuracy measurement is needed when manufacturing the fine tubing widely used in the medical field, such as a catheter that plays a crucial part in dilating a blood vessel.



Electric/electronic devices

Optical film measurement

Optical films are widely used to display still images or moving images on a car navigation device or LCD TV. The micrometer accuracy is a must for measuring film thickness.

Machine tools

Cutting tool measurement

The diameter of extremely small drills used for manufacturing precision tools and instruments requires high accuracy measurement.

Automobile/office equipment

Bearing measurement

High-accuracy measurement is required for the component parts of anti-friction ball and roller bearings that are required to support vibration-free rotation in high-quality products.

TECHNOLOGY

Ratchet thimble with an anti-friction bearing

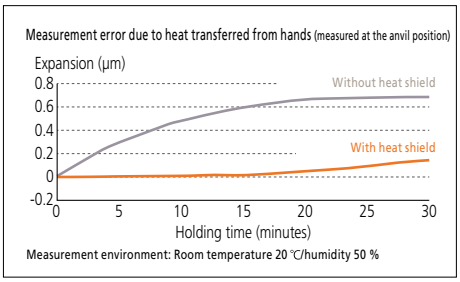
Measurement repeatability has been improved by changing from sliding to rolling friction to dramatically reduce the torque needed to operate the constant-force device. This makes measurement even more consistent, even for operators new to this micrometer.

ABS (absolute) rotary encoder with a resolution of 0.1 µm and high-accuracy thread cutting technology

The development of a 5000-division rotary encoder has achieved the unprecedented resolution of 0.1 µm in a hand-held micrometer.
The commercialization of this ABS (absolute) encoder has also improved its reliability.
Additionally, since the spindle-thread pitch accuracy directly affects measuring accuracy, Mitutoyo has developed a series of technologies from thread cutting technology to thread evaluation technology, thereby guaranteeing the achievement of high accuracy.

Heat transfer reduction with a heat shield

The influence of heat transferred to the micrometer frame through hands has been reduced during measurement with this micrometer by fitting the supplied heat shield. The graph below shows that the heat shield almost eliminates thermally induced error by minimizing thermal expansion of the frame.



■ Functions

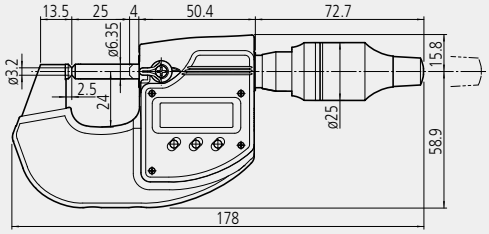
Preset (ABS measurement system):	The measurement origin can be preset to any value within the display range for convenience in measuring.
Zero-setting (INC measurement system):	The display can be zeroed at any position of the spindle, making comparison measurement easier. Returning to the absolute-measurement mode is easily accomplished.
Hold:	The displayed value is held while the spindle is withdrawn and the micrometer moved so that the display can be read at the operator's convenience.
Resolution switching:	The resolution of the display can be switched. If 0.1 µm measurement is not required, the resolution can be switched to 0.5 µm.
Function lock:	Functions such as preset or zero-set can be locked to avoid inadvertently changing the origin position.
On/off:	The power can be turned off after measurement is complete. Even after the power is turned off, the origin or last zero-set position remains in the memory.
Auto power off:	Even if the power is left on, the power turns off automatically if the micrometer is not used within a 20-minute period.
Measurement data output:	Measurement data can be output, allowing easy incorporation of this instrument into a statistical process control or measurement system.
Error alarm:	In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. Also, if the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced.

■ Specifications

	Metric	Inch/Metric
Order No.	293-100-10	293-130-10
Measuring range	0 – 25 mm	0 – 1 in
Resolution	0.0001 mm/0.0005 mm (switchable)	0.000005 in/0.00002 in 0.0001 mm/0.0005 mm (switchable)
Maximum permissible error J_{MPE}	±0.5 µm	±0.00002 in
J MPE	0.3 µm/0.6 µm	0.000012 in/0.000024 in
Measuring surface	ø3.2 mm	
Measuring force	7 to 9 N	
Measuring system	Electromagnetic induction type ABS rotary sensor	
Mass	400 g (440 g with heat shield attached)	
Power supply	Lithium battery (CR2032) x 1	
Battery life	Approx. two years when used under normal conditions	

■ Dimensions

Unit (mm)



USABILITY

Reliable operation

The sound of the ratchet provides a reliable operation and repeatable measurements.

Wear-resistant carbide tip

The ø3.2 mm carbide tip on the measuring face is highly resistant to wear, allowing accurate measurement for an extended period of time.

Versatile functionality enhances productivity and ease of use

This micrometer is equipped with many useful and time-saving functions such as resolution switching (0.0001 mm/0.0005 mm), function lock, and presetting.

Absolute encoder

The ABS (absolute) rotary encoder eliminates the need for origin point setting at every power-on, allowing immediate starting of measurement.
This encoder achieves high reliability without causing an overspeed error.

ABSOLUTE™

Zero-setting function

This function allows the displayed to be zero set at any position, thus facilitating comparative measurement. Also the absolute value from the origin can be restored.

Built-in "Hold" function

This function can hold (freeze) the displayed value. Enables the micrometer to be removed from a workpiece when the readout is not easily viewable so that the measurement value can be read at your convenience.

■ Measurement Data Recording Tools (Optional)

DP-1VA LOGGER

Mini-printer equipped with data logger function Digimatic mini processor DP-1VA LOGGER No. 264-505
(See Catalog No. E12041)

The data logger function allows data output to a PC and automatic logging of measurement data in an Excel-format inspection certificate using Mitutoyo USB-ITPAK. It provides significant potential for efficiency improvement in the QC function.

■ Standard accessories

- Heat shield (04AAB969A: 293-100-10 04AAB969B: 293-130-10) x 1
- Lithium battery (CR2032: Battery supplied is for testing purpose only) x 1
- Spanner (200877) x 1
- Screwdriver (04AAB985) x 1
- Lens paper
- Inspection certificate

■ Optional accessories

- Lens paper x 1,000 (04AZB581)

• Wired Connection to PC via USB Input Tool Series (Refer to Catalog E12007)

USB-ITN-B — USB
USB-ITN-B (2 m)**:06AFM380B**
Ⓐ IT-016U — USB
IT-016U:264-016-10
PC

Connecting cables specific to output-function equipped models
Ⓐ 1 m**: 05CZA662**
2 m**: 05CZA663**

• Wireless Connection to PC via U-WAVE (Refer to Catalog E12000)

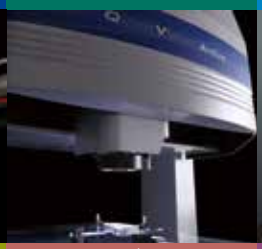
U-WAVE-T (IP67)**:02AZD730G**
U-WAVE-T (with buzzer)**:02AZD880G**
Ⓑ U-WAVE-T
U-WAVE-R — USB
U-WAVE-R: 02AZD810D
PC

Ⓑ For standard use (160 mm)**: 02AZD790B**
For foot switch use**: 02AZE140B**

130 2012(4)e(PA)HS-(JP10), Printed in Japan

Coordinate Measuring Machines

Vision Measuring Systems



Form Measurement

Optical Measuring

Sensor Systems

Test Equipment and Seismometers

Digital Scale and DRO Systems

Small Tool Instruments and Data Management

Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver bespoke measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.

Find additional product literature and our product catalogue

http://www.mitutoyo.co.jp/global.html

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Mitutoyo

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