

Measurement Data Wireless Communication System U-WAVE

Small Tool Instruments
and Data Management



U-WAVE fit

U-WAVE fit

U-WAVE fit

We call U-WAVE-TM/TC "U-WAVE fit" based on its compact and thinner design that provides a better fit to the Digimatic gage and better operability.

Promotes Smart Factory by Collecting and Managing Measurement Data

“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.

U-WAVE *fit*

Compared to U-WAVE-T, compact and thin design provides a better fit to the Digimatic gage and better operability.

From a Digimatic gage connected with U-WAVE



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

	A	B	C	D	E	F
1	No.	ItemA	ItemB	ItemC	ItemD	ItemE
2	No.1	2.071	2.002	1.996		
3	No.2	2.083	2.013	2.070		
4	No.3	1.982	1.940	2.011		
5	No.4	2.004	1.965	1.921		
6	No.5	2.061	2.051	2.004		
7	No.6	1.991	2.031	2.060		
8	No.7	2.002	2.072	2.102		
9	No.8	2.020	2.005	2.004		
10	No.9	1.952	1.985	1.983		
11	No.10	1.998	2.057			
12	No.11	2.026	2.046			
13						

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/TTC 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.

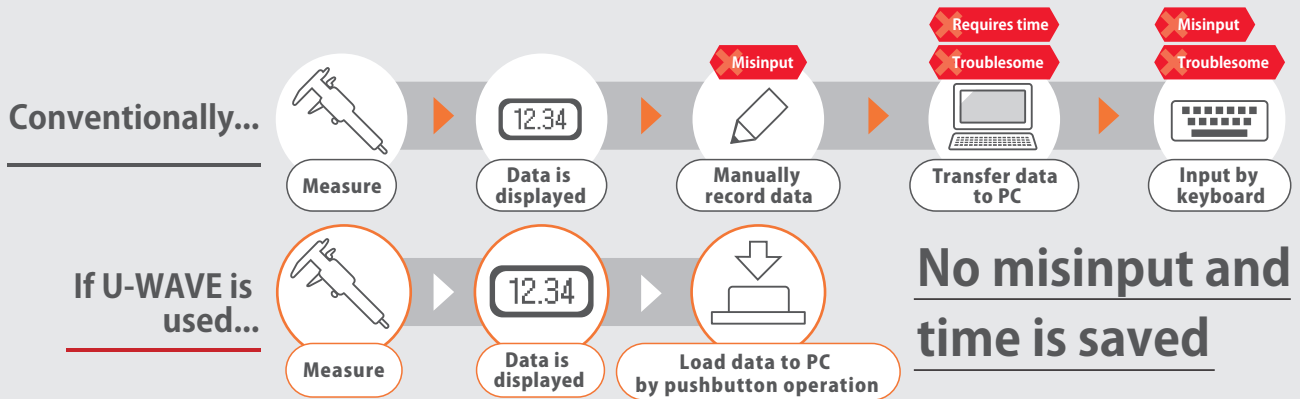
Solution

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



LED or a buzzer notifies data reception

Confirmation that data was successfully received.

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

Patented in Japan



- 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

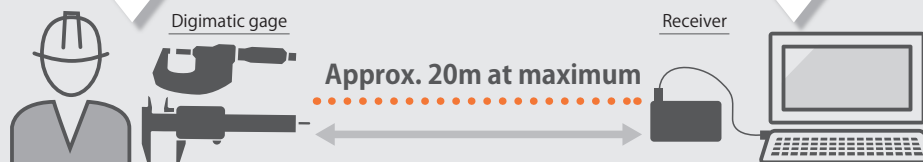
No cord allows easy operation.

Wireless communication range up to 20 m*1 (line of sight)

The measurement site can be layout freely.

*1: May be less according to the operating environment.

*1: May be less, if the Digimatic gage is used while covered by hand.



Misinput generated by manual input is eliminated

The measurement data can be directly input by a single button operation.



Stable wireless communication

Mitutoyo's original wireless communication based on IEEE802.15.4 (2.4 GHz) has been adopted.

Advantage

Centralized Data Management

Operation in an Excel sheet

The data can be directly read into an Excel sheet.



Digitalization enables easy data collection and analysis

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



Up to 100 Digimatic gages can be registered

Using USB-ITPAK V2.1, data can be laid out for each Digimatic gage based on the data identification ID.

Up to 15 units can be connected to a PC

Data can be collected from any measuring instrument equipped with the Digimatic output function.

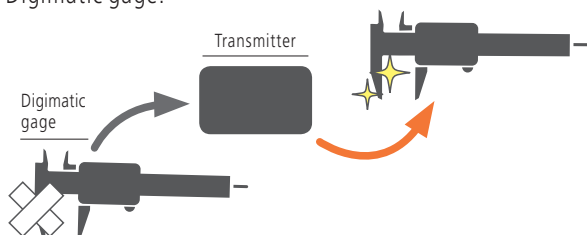


Cost Reduction Effect

Point

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

The transmitter can be reconnected to a different Digimatic gage.



Point

Connectable to any of your existing Digimatic gages

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

Point

Approximately 400,000 continuous data transmissions are possible

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

Product Configuration

(Refer to pages 7 and 8 for details.)

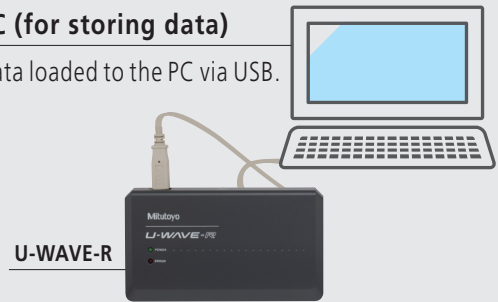
Receiver

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.

PC (for storing data)

Data loaded to the PC via USB.



Transmitters



U-WAVE-TM/TC/T

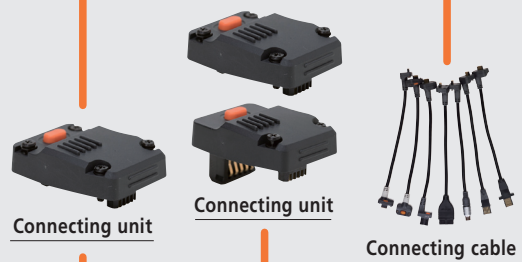
- Transmits the measurement data displayed on the gage to U-WAVE-R.
- Compact, cable-less design provides a better fit with the Digimatic gage and better operability.

U-WAVE fit



Connecting unit/connecting cable

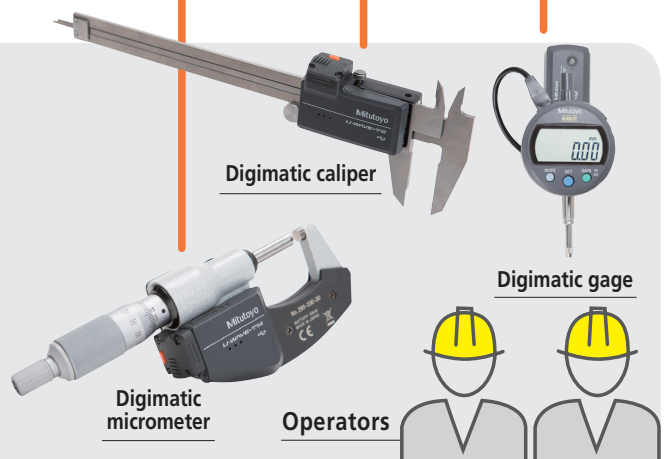
- A compact connecting unit connects the U-WAVE-TM/TC/T transmitter to the Digimatic gage.
- A dedicated cable connects the U-WAVE-T transmitter to the Digimatic gage.



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.



Product Outline

U-WAVE^{fit} U-WAVE-TM/TC compatible Digimatic gages(reference)

For details, refer to a separate sheet "U-WAVE-TM/TC Compatible Devices" or our web site.

Digimatic micrometer



Digimatic caliper



Transmitters



U-WAVE-TM/TC

Patent applied for in Japan, U.S., China, and Germany

Design registered in Japan, U.S., EU, and China

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 as the buzzer type and water/dust-proof IP67 type. The buzzer type notifies the normal reception of data by LED and buzzer sound. The water/dust-proof 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
For micrometers	Standard		 02AZF310
	Water/dust-proof		
For calipers	Standard		 02AZF300
	Water/dust-proof		
Digimatic gages			 Connecting cable*

* Select according to the Digimatic gage to be connected. Refer to page 13 for connecting cables.

Type of Transmission Unit

U-WAVE-T

Design registered in Japan

This product successfully introduced U-WAVE to the market.



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

Transmitter			Receiver
	U-WAVE-TM With buzzer 264-623		 U-WAVE-R 02AZD810D Design registered in Japan
	U-WAVE-TM Water/dust-proof 264-622		
	U-WAVE-TC With buzzer 264-621		
	U-WAVE-TC Water/dust-proof 264-620		
	U-WAVE-T With buzzer 02AZD880G		
	U-WAVE-T Water/dust-proof 02AZD730G		

Typical Measuring Issues Solved

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

Case 1

Standard sequential measurement input

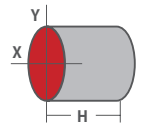
Issue

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.

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.

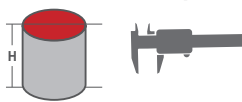
Point Set the sequential measurement input order

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

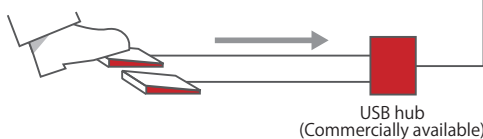
1 Measure X and Y for 5 workpieces with a micrometer.



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	Input range of caliper
4 Dimension H	29.97	30.02	30.07	29.96	30.04	Input range of visual judgment
5 External Appearance	OK	OK	NG			

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

Option

USB-ITPAK V2.1



USB dongle



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

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.

Case Study

Case
2Data 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.

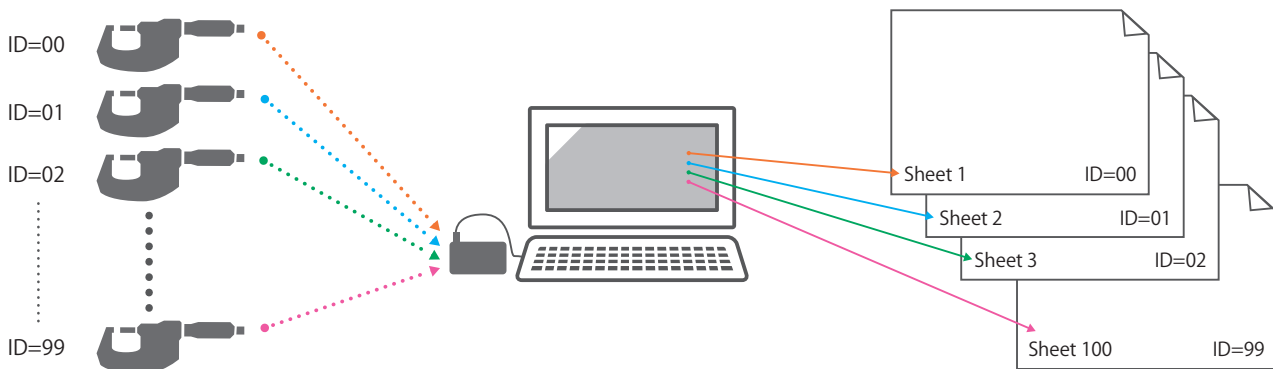
Input data of each Digimatic gage in order into the designated cells of the separate Excel sheet.

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.

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

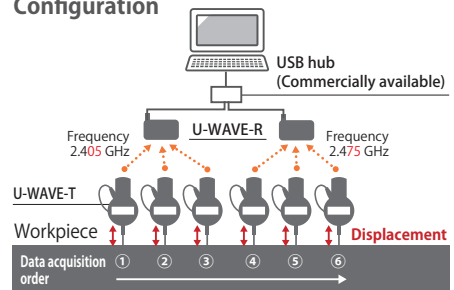
Data can be obtained at the desired interval using the timer input function in batch measurement.

	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							

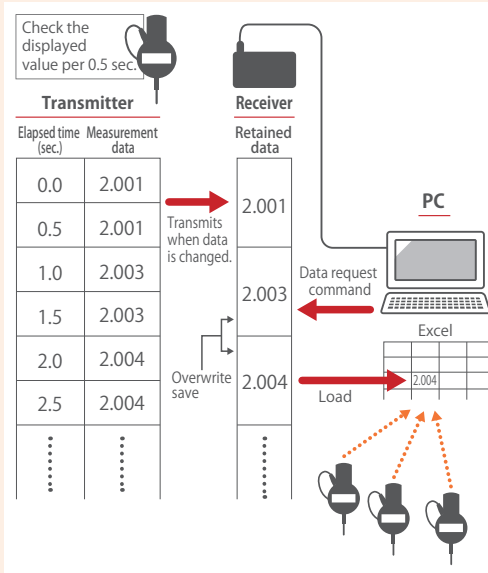
After 5 sec.
After 5 sec.
After 5 sec.

- 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.

Configuration



Option



Responds to data request from PC

Special order U-WAVEPAK (Event drive)

Using event drive mode

- For configuration, special order software U-WAVEPAK (Event drive) is used.
- The data request command can be sent to U-WAVE-R at an arbitrary timing.

Responds to data request command

- U-WAVE-TM/TC/T checks the displayed value of the Digimatic gage in the 0.5 sec. interval, and transfers data if the value is changed.
- U-WAVE-R overwrites data in the storage.
- 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.

- Special order software U-WAVEPAK (Event drive) is used.
- 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, add U-WAVE-R and set different frequencies (15 ch) to assure reliable wireless communication.

Achieve "Visualization of Quality"

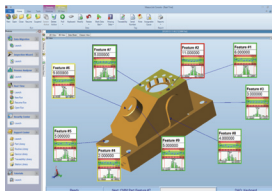
Collecting the measurement data

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.

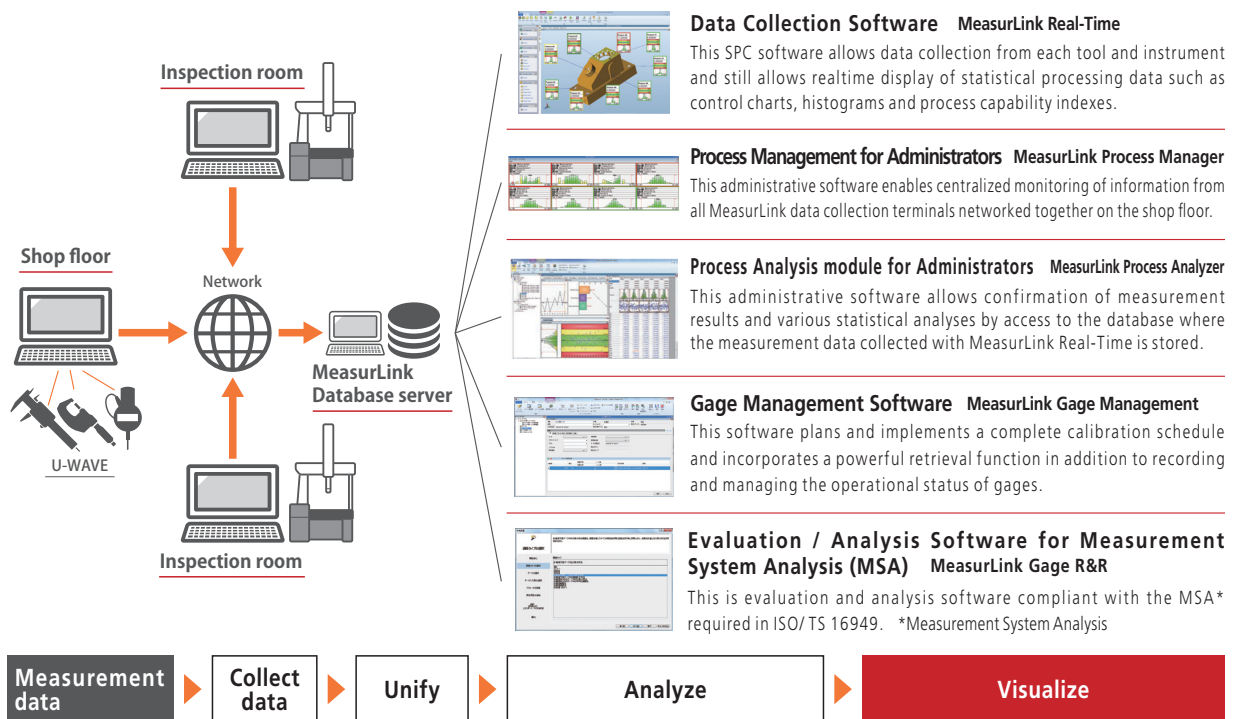
Diagnosis by data analysis

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



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

Specifications

Transmitter (Refer to page 7 for combinations.)

Product name	U-WAVE-TM (for micrometers)		U-WAVE-TC (for calipers)		U-WAVE-T	
Model	U-WAVE-TM (IP67 type dust/water-proof)	U-WAVE-TM (buzzer type)	U-WAVE-TC (IP67 type dust/water-proof)	U-WAVE-TC (buzzer type)	U-WAVE-T (IP67 type dust/water-proof)	U-WAVE-T (buzzer type)
Order No.	264-622	264-623	264-620	264-621	02AZD730G	02AZD880G
Protection level	IP67	N/A	IP67	N/A	IP67	N/A
Data reception indication	LED	LED, buzzer	LED	LED, buzzer	LED	LED, buzzer
Power supply	Lithium battery CR2032x1					
Battery life	Approximately 400,000 transmissions					
Mass	18g				23g	
Appearance						
External dimensions						

Receiver

U-WAVE-R	
Model	U-WAVE-R
Order No.	02AZD810D
Power supply	USB bus power system
Connectable U-WAVE-R units (per PC)	Up to 15
Connectable U-WAVE-T units	Up to 100
Mass	130g
Appearance	
External dimensions	

Compatible OS: Windows 2000 Professional (SP2 or later) / Windows XP / Home Edition (SP2 or later) / Windows XP Professional (SP2 or later)* / Windows Vista* / Windows 7* / Windows 8* / Windows 8.1* / Windows 10* (*compatible with 32/64-bit OS)

Connecting unit/connecting cable (Refer to page 7 for combinations.)

Product name	Order No.	Protection level	Mass	Appearance	External dimensions
Connecting unit (for water/dust-proof type)	02AZF310	IP67	6g		
Connecting unit (for standard type)	02AZF300	N/A	6g		
Product name	Appearance		Cable connector type		Part No.
Dedicated cable for U-WAVE-T			A	Water-proof type with output button	02AZD790A
			B	Water-proof type with output button	02AZD790B
			C	With data-out button	02AZD790C
			D	Flat 10-pin type	02AZD790D
			E	Round 6-pin type	02AZD790E
			F	Flat straight type	02AZD790F
			G	Flat straight waterproof type	02AZD790G

Wireless Communication Specifications

Wireless communication	Original (based on IEEE802.15.4 (2.4 GHz))	Modulation method	DS-SS (Direct Sequence - Spread Spectrum) Resistant to interfering signals and noise
Wireless communication distance	Approx. 20 m (line of sight)	Communication frequency	2.4 GHz band (ISM band: Universal frequency)
Wireless communication speed	250kbps	Used band	15 channels (2.405 to 2.475 GHz at intervals of 5 MHz) The noise search function avoids interference with other communication devices.
Transmission output	U-WAVE-T: 1 mW (0 dBm) or less U-WAVE-TC/TM: 2.5 mW (4 dBm) or less		

Note: 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.

Optional Products

Application system

Product name	Model No.	Compatible OS: Windows*1	Compatible Excel version*2	Part No.
USB-ITPAK	USB-ITPAK V2.1	2000 SP4	2000	06AFM386
		XP SP2 or later	2002	
		Vista	2003	
		7	2007	
		8	2010	
		8.1	2013	
10	2016			
U-WAVEPAK (for event drive)	<p>This is a special order product. For the latest pricing, please contact your dealer or the nearest Mitutoyo Service Center. Product configuration: Only the program CD</p> <ul style="list-style-type: none"> ● For U-WAVE-R and U-WAVE-TM/TC/T, please purchase the standard model. ● Install this special order U-WAVEPAK (Event drive) and perform setups without using the standard accessory U-WAVEPAK. ● A program to send a data request command is separately required to load data to the PC. <p><Event drive supporting software> USB-ITPAK V2.1 (manual input by the function key or foot switch and automatic timer input enabled)</p>			

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

Accessories for U-WAVE-T

Product name	Product configuration	Order No.			
Foot switch and connecting cable		Foot switch	937179T		
		Connector type	A	Water-proof with switch	02AZE140A
			B	Water-proof with switch	02AZE140B
			C	With switch	02AZE140C
			D	10-pin plain	02AZE140D
			E	6-pin round	02AZE140E
			F	Straight type	02AZE140F
			G	Water-proof straight type	02AZE140G
Product name	Appearance	Dimensions and fixing example	Order No.		
U-WAVE-T Installation Bracket Kit		<p>Unit: mm</p>		02AZE200	
			<p>Accessories</p> <ul style="list-style-type: none"> • Detachable fastener, 2 pcs. (mirror-imaged) • Mounting screws, 2 pcs. 	02AZE990	

Coordinate Measuring Machines



Vision Measuring Systems



Form Measurement



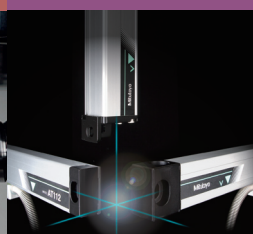
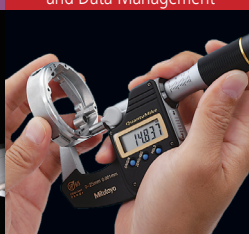
Optical Measuring



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>