

Measurement Data Management

Convenient data collection tool and quality control software

Measurement Data Wireless Communication System

U-WAVE-TCB/TMB (Mitutoyo Bluetooth® U-WAVE)

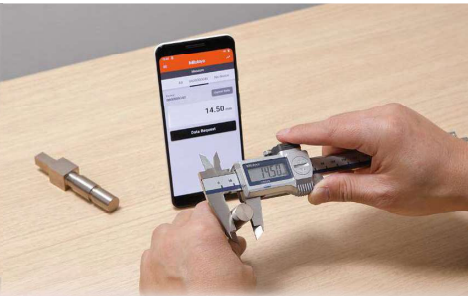
- Bluetooth® communication allows for wireless transmission of measurement data from digimatic micrometers and calipers to PCs, smartphones, tablets and other such terminals.
- More compact and thinner for a better fit with Digimatic gages, and featuring improved operability and performance inherited from its predecessor, U-WAVE-TCB/TMB 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. Dust/water-proof models are also available for arduous shop floor usage.
- Bluetooth® communication not only allows cost reduction, as it does not require the conventional dedicated receiver unit, but it also improves operability.
- The application software for transferring measurement data to smartphones and tablets, or the application **U-WAVEPAK-BM** (English version only) is available at app stores (Google Play, Apple Store) for download.

U- WAVEPAK-BM



- **U-WAVEPAK-BW**, the computer communication software for transferring measurement data to computer software, is available for download from our company's website.

<https://www.mitutoyo.co.jp/contact/products/u-wave/>



Bluetooth® communication not only allows cost reduction, as it does not require the conventional dedicated receiver unit, but it also improves operability.

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

• Wireless Communication Specifications

Wireless communication	Bluetooth® 4.2 Low Energy
Wireless communication distance	Approx. 16 m (line of sight) Approx. 10 m (in a factory environment)
Transmission output	3.2 mW (5 dBm) or less (Class2)
Modulation method	FH-SS (Frequency-hopping spread spectrum)
Communication frequency	2.4 GHz band

Note1 To use **U-WAVE-TCB/TMB**, conformity to the radio law of each country is required. Please contact your dealer or nearest Mitutoyo sales office.

Note2 **U-WAVE-TCB/TMB** is not compatible with **U-WAVE fit**, for which communication specifications are different.

Optional Accessories

Model No.	USB-ITPAK V2.1
Order No.	06AFM386
Compatible OS (Windows)	10 (64 bit)
Compatible Excel version	2016 (The operation with Excel for MAC OS is not guaranteed.)

Note: Refer to pages A-22 to A-24 for details of **USB-ITPAK V2.1**.

USB-ITPAK V2.1



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



Refer to the Measurement Data Wireless Communication System **Mitutoyo Bluetooth® U-WAVE Brochure (E12048)** for more details.

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

Transmitter / Receiver



SPECIFICATIONS

Order No.	For Digimatic micrometers		For Digimatic calipers	
	264-626	264-627	264-624	264-625
Model	U-WAVE-TMB (IP67 type dust/water-proof)	U-WAVE-TMB (buzzer type)	U-WAVE-TCB (IP67 type dust/water-proof)	U-WAVE-TCB (buzzer type)
Protection level	IP67	N/A	IP67	N/A
Data reception indication	LED	LED, buzzer	LED	LED, buzzer
Power supply	Lithium battery CR2032×1			
Battery life	Approx. 1 year under normal conditions of use, but varies according to usage.			
Mass (g)	18			

For model compatibility information, refer to "U-WAVE fit Compatible Devices", a separate sheet provided with **Catalog No. 12000**: Measurement Data Wireless Communication System U-WAVE.

https://www.mitutoyo.co.jp/support/service/catalog/09_system/1200_appendix.pdf



02AZF310



02AZF300

Choose a connecting unit compatible with your gage.

Order No.	02AZF310	02AZF300
Protection level	IP67	N/A
Mass (g)	6	
Connecting unit	U-WAVE-TCB/TMB (for dust/water-proof type)	U-WAVE-TCB (for standard type)

Compatibility of measuring tool and unit

	Assembled appearance	Connecting unit	Transmitter
For micrometers	Standard	02AZF310	264-627 U-WAVE-TMB (buzzer type)
	Water-proof type	02AZF310	264-626 U-WAVE-TMB (IP67 type dust/water-proof)
For calipers	Standard	02AZF300	264-625 U-WAVE-TCB (buzzer type)
	Coolant-proof type	02AZF310	264-624 U-WAVE-TCB (IP67 type dust/water-proof)

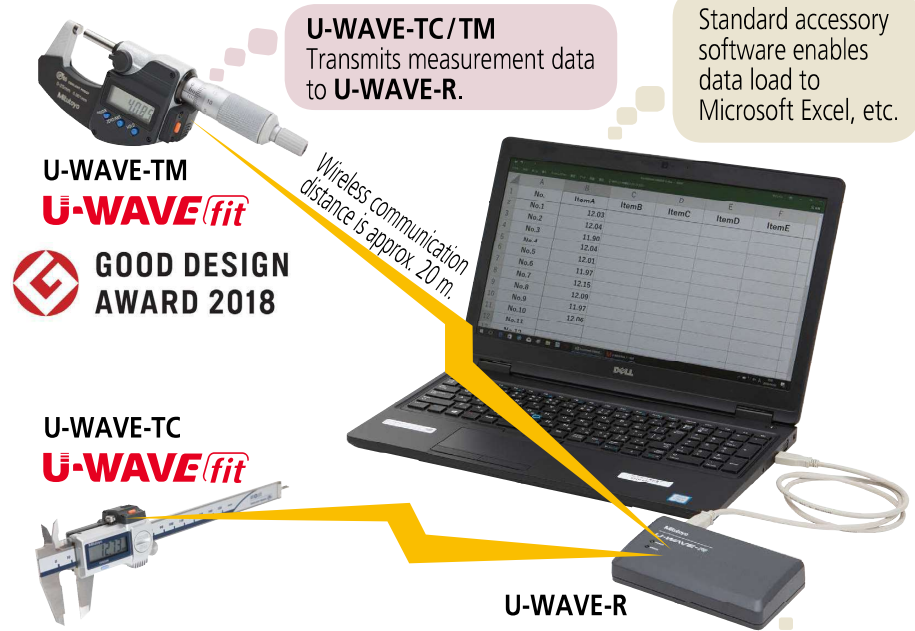
Measurement Data Management

Convenient data collection tool and quality control software

Measurement data wireless communication system U-WAVE-TC/TM (U-WAVE fit)

- Data from tools with Digimatic output function can be sent to a PC via wireless communication.
- With functions and performance inherited from **U-WAVE-T**, the compact and thinner design provides better fitting to an instrument and improved operability, which enables further improvement of efficiency.
- The data interface function of the **U-WAVE-R** standard accessory software enables data input to commonly available software (Microsoft Excel, Notepad, etc.) by keyboard input.
- Wireless communication eliminates cabling, improving measuring operability.
- By combining with **USB-ITPAK V2.1**, recording of inspections using Excel becomes more efficient. Loading multiple measurement data into separate Excel sheets, or simultaneous measurement using the event driven is now available without the need for macro programming yourself. (Automatic loading in a certain interval is available with a timer function.)

U-WAVE fit system configuration



A maximum of 100 Digimatic gages can be connected.
Loads the data received from **U-WAVE-TC/TM** to a PC via USB.

U-WAVE-R

Receives data from **U-WAVE-TC/TM**, **U-WAVE-T** and loads to a PC via USB.

Model	U-WAVE-R
Order No.*	02AZD810D/02AZD810E/02AZD810F
Power supply	USB bus power system
Number of U-WAVE-R units that can be connected to one PC	Up to 15
Number of U-WAVE-T units that can be connected	Up to 100
External dimensions	140x80x31.6 mm
Mass (g)	130

* Order No. differs depending on the destination country.

U-WAVEPAK software (standard accessory)

System Environment: Compatible OS
Windows 2000 Professional (SP4 or later)
Windows XP Home Edition (SP2 or later)
Windows XP Professional (SP2 or later)*
Windows Vista*, Windows 7*, Windows 8/8.1*
Windows 10*

* 32-bit, 64-bit OS supported
<Versions confirmed operational on Windows 10>
• **U-WAVEPAK Version 1.020** or later

- Connectability confirmed for tablet PC
- Microsoft Surface Pro 6 (the version whose operation on Windows 10 Professional is confirmed)
 - Required environment: DVD drive (required for installation), USB port x2 ports or more

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

U-WAVE-R main unit



USB2.0 cable (1 m) attached

U-WAVEPAK



U-WAVE-TC/TM (U-WAVE fit)

System Communication Specifications

- Wireless communication

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

Note: To use **U-WAVE-TC/TM**, the conformity to the radio law of each country is required. If you use this product outside the country of purchase, please contact your dealer or nearest Mitutoyo sales office.



Refer to the **U-WAVE Brochure (E12000)** for more details.

Item No.	Product name	Model	Unit No.	Serial No.
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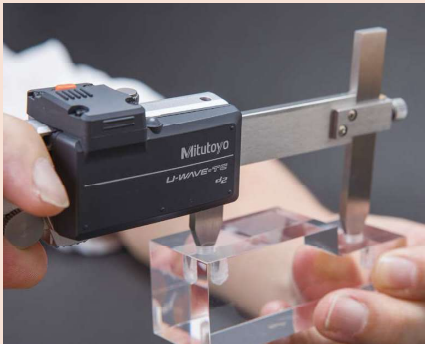
For model compatibility information, refer to "U-WAVE fit Compatible Devices", a separate sheet provided with **Catalog No. 12000: Measurement Data Wireless Communication System U-WAVE**.

Main specifications of U-WAVEPAK

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

Measurement data wireless communication system U-WAVE-TM/TC (U-WAVE fit)

Type of transmission unit



264-622



264-621

SPECIFICATIONS

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

Connectable measuring instruments	Micrometer		Caliper	
	Order No.	Model	Order No.	Model
	264-622*	U-WAVE-TM (IP67 type)	264-620*	U-WAVE-TC (IP67 type)
	264-623*	U-WAVE-TM (Buzzer type)	264-621*	U-WAVE-TC (Buzzer type)
Protection Rating	IP67	N/A	IP67	N/A
Data reception indication	LEDs	Buzzer and LEDs	LEDs	Buzzer and LEDs
Power supply	Lithium battery CR2032x1			
Battery life	Approx. 400,000 times continuous data transmission			
External dimensions (mm)	41.9x12.9x38.8		56x11.45x30.4	
Mass (g)	18			

* Order No. differs depending on the destination country. Add the following suffix to the order No.: K for Korea, B for Brazil and Argentina.

Note: IP67 type is water/dust-proofed suitable for the factory floor. Buzzer type is not water/dust-proofed.



02AZF310



02AZF300

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

Order No.	02AZF310	02AZF300
Protection level	IP67	N/A
Mass (g)	6	
Connectable transmission unit	U-WAVE-TC/TM (IP67 type)	U-WAVE-TC (buzzer type)

Note: **02AZF310** ensures water-proof performance only when attached to measuring instruments of IP67 type. For information on supported connecting units, please contact your local Mitutoyo sales office.

Compatibility of measuring tool and unit

Digimatic gage		Assembled appearance (Front/Back)	Connecting unit	Transmission unit
Micrometer	Standard			264-623* U-WAVE-TM (buzzer type)
	Water-proof type			264-622* U-WAVE-TM (IP67 type)
Caliper	Standard			264-621* U-WAVE-TC (buzzer type)
	Coolant-proof type			264-620* U-WAVE-TC (IP67 type)

* Order No. differs depending on the destination country. Add the following suffix to the order No.: K for Korea, B for Brazil and Argentina.

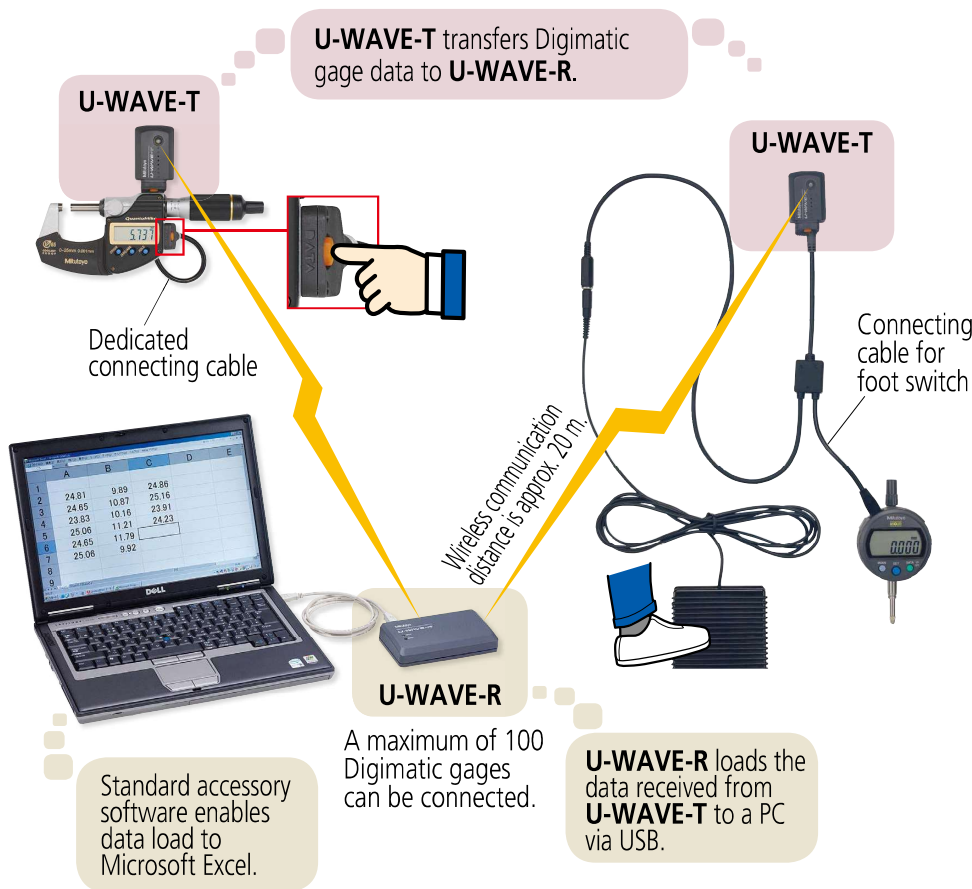
Measurement Data Management

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Measurement Data Wireless Communication System U-WAVE

- Data from Digimatic gages can be loaded to a PC easily.
- Wireless communication eliminates cabling, improving measuring operability.
- The Data Interface Function of the **U-WAVE-R** standard accessory software enables data input to commonly available software by keyboard input (Microsoft Excel, Notepad, etc.).
- **USB-ITPAK V2.1** supports **U-WAVE!**
Loading multiple measurement data into separate Excel sheets, or simultaneous measurement using the event driven is now available without the need for macro programming yourself. (Automatic loading in a certain interval is available with the timer function.)

U-WAVE system configuration



- Refer to page A-17 for details of **U-WAVE-R**.

U-WAVE-T

System Communication Specifications

- Wireless communication

Order No. *	02AZD730G/02AZD730H/ 02AZD880G/02AZD880H	02AZD730J/02AZD880J
Transmission output	1 mW (0 dBm) or less	5 mW (7 dBm) or less
Wireless specifications	IEEE802.15.4 base	
Wireless communication distance	Approx. 20 m (within visible range)	
Wireless communication speed	250 kbps	
Modulation method	DS-SS (Direct Sequence - Spread Spectrum) Resistant to interfering signals and noise	
Communication frequency	2.4 GHz band (ISM band: Universal frequency)	
Used band	15 channels (2.405 to 2.475 GHz at intervals of 5 MHz) The noise search function avoids interference with other communication devices.	

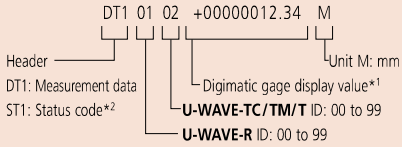
* Order No. differs depending on the destination country.
Note: To use **U-WAVE-T**, the conformity to the radio law of each country is required. If you use this product outside the country of purchase, please contact your dealer or nearest Mitutoyo sales office.



Refer to the **U-WAVE Brochure (E12000)** for more details.

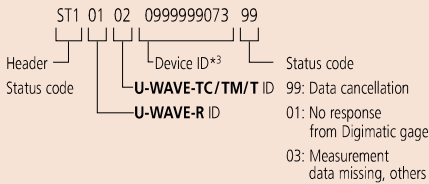
• Data format

Example of format when the Digimatic gage displays 12.34



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

*2 Example of status code format



*3 Unique number assigned to U-WAVE at shipment

Notes on Identification of Measurement Data and Multiple Systems Operation

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

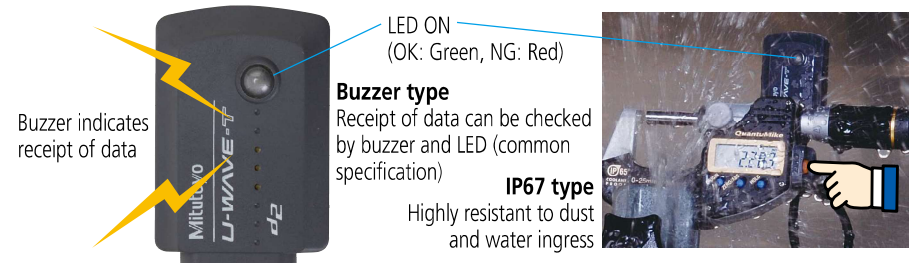
Measurement Data Wireless Communication System U-WAVE

U-WAVE-T

Transmits measurement data to U-WAVE-R. Select IP67 or buzzer type, according to your application. U-WAVE-R can be connected to Digimatic gages by dedicated cable for U-WAVE-T (optional).

Model	U-WAVE-T (IP67 type)	U-WAVE-T (Buzzer type)
Order No.*	02AZD730G/02AZD730H/02AZD730J	02AZD880G/02AZD880H/02AZD880J
Protection Rating	IP67	None
Data reception indication	LEDs	Buzzer and LEDs
Power supply	Lithium battery CR2032x1	
Battery life	Approx. 400,000 transmissions	
Dimensions (mm)	44x29.6x18.5	
Mass (g)	23	

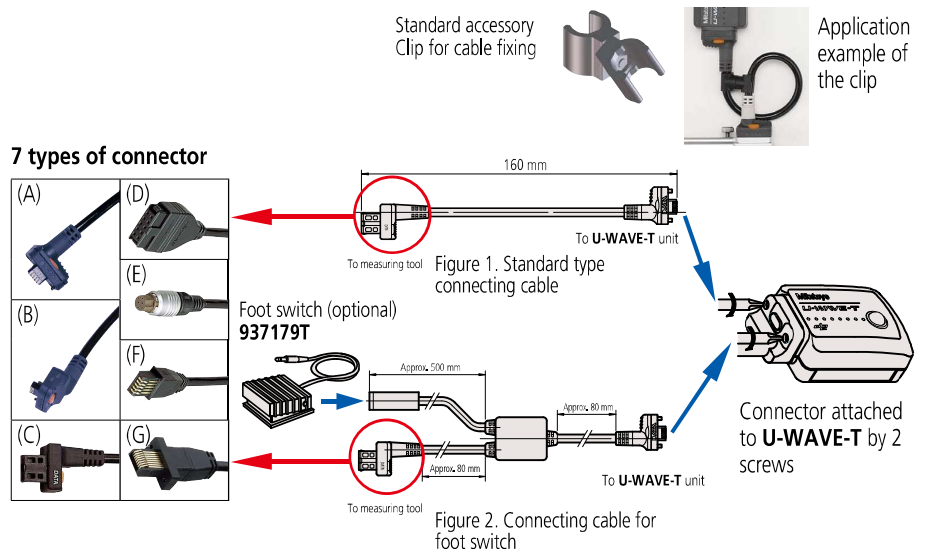
* Order No. differs depending on the destination country.



U-WAVE-T dedicated connection cable

A dedicated cable connects a Digimatic gage to U-WAVE-T. Check the connector (A to G; refer to pages A-27 and A-28 for details) compatible with the Digimatic gage to be used and select either standard type (figure 1) or foot switch type (figure 2) according to your application.

Type	Standard connecting cable	Connecting cable for foot switch
	Order No.	Order No.
(A) Water-proof model with output button	02AZD790A	02AZE140A
(B) Water-proof model with output button	02AZD790B	02AZE140B
(C) With data-out button	02AZD790C	02AZE140C
(D) 10-pin plain type	02AZD790D	02AZE140D
(E) 6-pin round type	02AZD790E	02AZE140E
(F) Plain type straight	02AZD790F	02AZE140F
(G) Plain type straight water-proof model	02AZD790G	02AZE140G



Measurement Data Management

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Measurement Data Wireless Communication System U-WAVE

Optional Accessories for U-WAVE-T

U-WAVE-T mounting plate

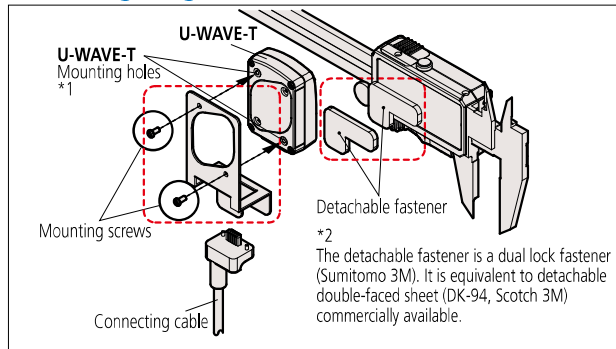
Since the standard cable clip is not sufficient to support the **U-WAVE-T** on a Digimatic gage, a mounting plate is provided. The mounting plate can be fixed to the gage by the easily detachable hook-and-eye type fasteners provided. Batteries can be replaced without needing to detach the **U-WAVE-T** from the gage.



**U-WAVE-T mounting plate
02AZE200**

- Standard accessories
- Detachable fasteners: 1 set
 - Mounting screw: 2 pcs.

Mounting diagram (02AZE200)



- *1 To avoid damaging the threaded holes in the plastic body of the **U-WAVE-T** unit, the mounting screws should be tightened only just sufficiently to grip. Repeated removal of these screws should also be avoided for the same reason.
- *2 In order to avoid loss of adhesion, do not allow oil or coolant to come into contact with the bonding surfaces of the detachable fasteners.

Typical applications of the mounting plate

Super Caliper CD67-S15PM



Front view Rear view

QuantuMike MDE-25MX



Front view Rear view

Digimatic Indicator ID-C112XB

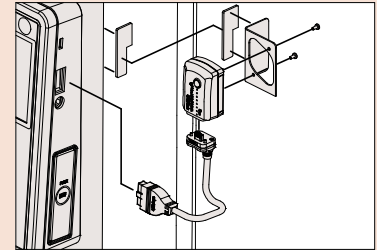


Front view Rear view

U-WAVE-T mounting plate for QM-Height 02AZE990

- Standard accessories
- Detachable fastener, 2 pcs. (mirror-imaged)
 - Mounting screw: 2 pcs.

Mounting Diagram for QM-Height (02AZE990)



Refer to the **U-WAVE Brochure (E12000)** for more details.

Applications of the 'Event driven' mode

Data request support from PC

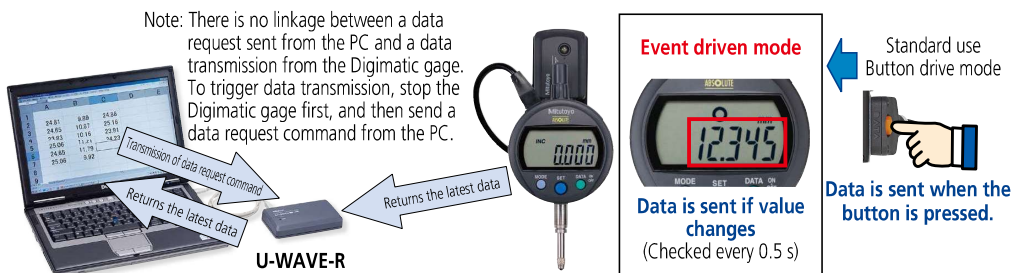
The currently displayed data can be sent by pressing the data switch. This is called "**button drive mode**".

In the "**event driven mode**", the measurement value is checked every 0.5 seconds and measurement data is automatically sent if there is a change. At this time, the data switch is disabled. The sent data is written in the **U-WAVE-R** memory, and only the latest data is kept, it is not output to the PC. The data is loaded to the PC from the **U-WAVE-R** memory when the data request command is sent. The mode switching between "button drive" and "event driven" is enabled by **U-WAVEPAK**.

In the event driven mode, pressing the data switch on the Digimatic gage is not necessary. PC operation enables loading data from multiple gages at once.

To perform simultaneous measurement using USB-ITPAK V2.1, U-WAVEPAK must be in the event driven mode.

Note: There is no linkage between a data request sent from the PC and a data transmission from the Digimatic gage. To trigger data transmission, stop the Digimatic gage first, and then send a data request command from the PC.



When using the event driven please note:

- The battery life is shorter than in normal mode. The battery lasts approximately 20 days with continuous use. Switching to the button mode when the battery is not in use extends the battery life.
- When using several Digimatic gages (**U-WAVE-T**), communication errors may occur because of radio interference in simultaneous measuring. Therefore, it is required to add **U-WAVE-R** and set different frequencies (15 ch) to avoid radio wave interference.