

MEASUREMENT DATA MANAGEMENT

Mitutoyo



MEASUREMENT DATA MANAGEMENT



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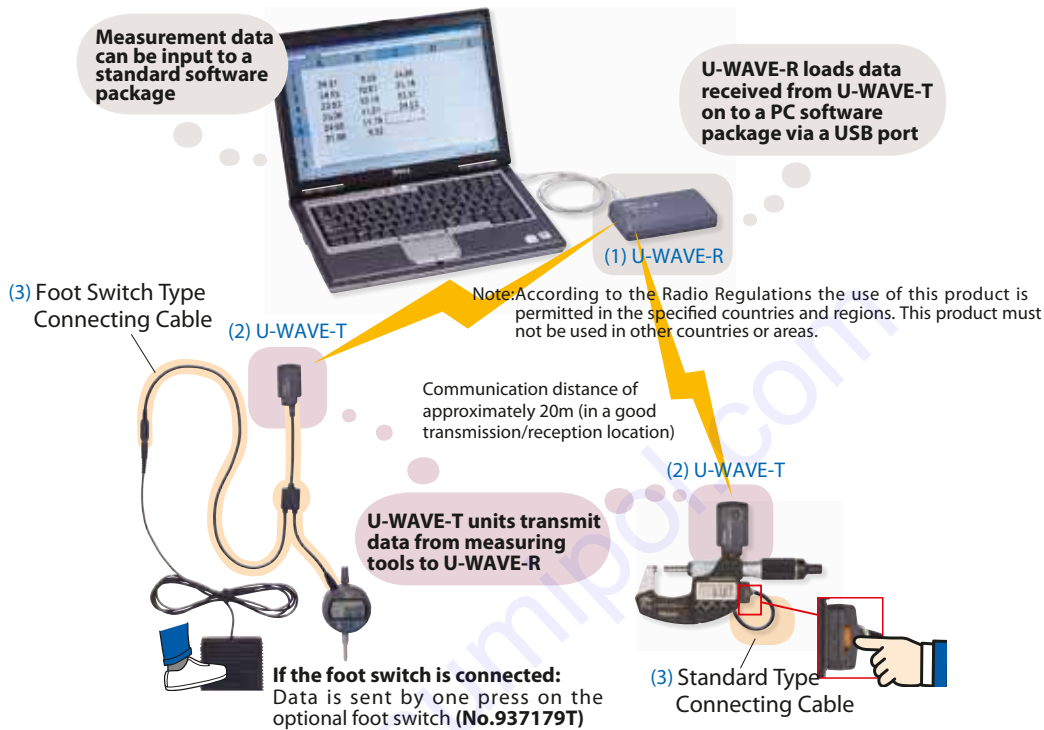
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Mitutoyo U-WAVE Measurement Data Wireless Communication System



FEATURES

- Wireless transfer system used to transfer data from a digimatic measuring instrument to a PC
- Easy data export to Excel or other applications using the bundled data I/F (interface) software
- Water-proof and oil-proof (IP67), longer battery life, transmitted data reception confirmation (LED, buzzer) on the transmitter
- Enhanced system (works with MeasurLink, MeasureReport, and PDA Navi)



(1) U-WAVE-R · Registered Design (Japan)

Major Specifications of U-WAVE-R

Model	U-WAVE-R
Order No.	02AZD810*
Power supply	USB bus power system
Number of U-WAVE-R units that can be connected to one PC	Up to 16
Number of U-WAVE-T units that can be connected	Up to 100
External dimensions	140×80×31.6mm
Mass	130g

*Detailed information on order No. and conformity standards of wireless communication specification.

U-WAVE-R main unit



Standard U-WAVEPAK setup software



Receives data from U-WAVE-T and loads it onto a PC via a USB connection

[Specifications of U-WAVEPAK (setup software)]

Before using U-WAVEPAK for the first time after purchase, IDs, frequencies, and other settings must be made. The data interface function allows measurement data to be loaded into a PC in Excel, Notepad or other software file that accepts keyboard input.

Data can also be input to a program that supports RS-232C serial communication using the virtual COM driver.

1) Operating environment

Supported OS:

- Windows 2000 Professional (SP4 or higher)
- Windows XP Home Edition (SP2 or higher)
- Windows XP Professional (SP2 or higher)
- Windows Vista
- Windows 7

64-bit operating systems are not supported.

Other information: USB port needed

- (2) Connect the U-WAVE-R main unit to the PC with a USB 2.0 cable.
- (3) Install the dedicated USB driver and virtual COM driver.
- (4) Set IDs and frequencies for U-WAVE-R and U-WAVE-T with U-WAVEPAK.
- (5) Press the DATA button of U-WAVE-T once to write settings into U-WAVE-T. Once this procedure has been performed when using U-WAVE-T for the first time, settings are then stored in the main unit memory.

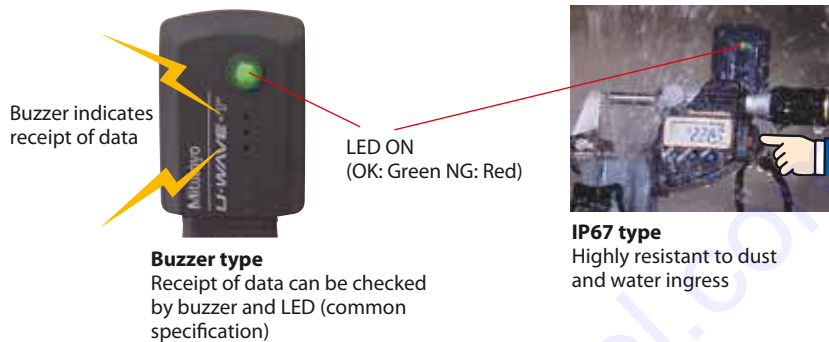
2) Initial setup procedure

- (1) Install the U-WAVEPAK (setup software).

(2) U-WAVE-T

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

Model No.	U-WAVE-T (IP67 model)	U-WAVE-T (buzzer model)
Order No.	02ADZ730D	02AZD880
Protection Rating	IP67	-
Data reception indication	LEDs	Buzzer and LEDs
Power supply	Lithium battery CR2032×1	
Battery life	Approx. 400,000 transmissions	
External dimensions	44 x 29.6 x 18.5mm	
Mass	23g	



(3) U-WAVE-T

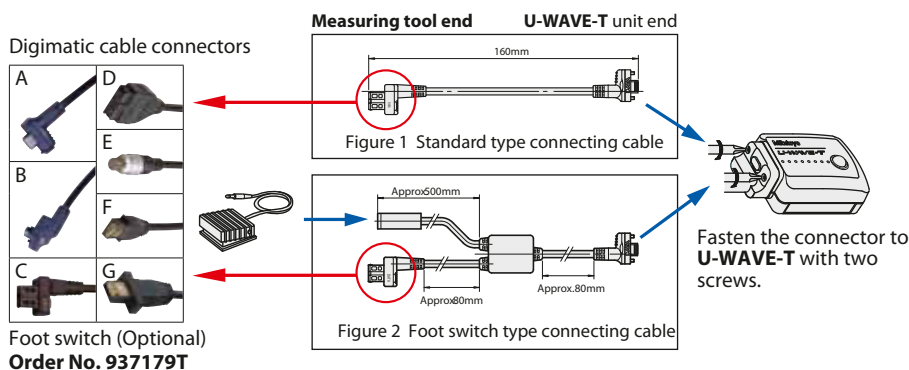
Two Types of Connecting Cable

A much-needed foot switch type connecting cable (lower drawing at right) has been provided in addition to the conventional type (upper drawing at right) of connecting cable between the U-WAVE-T unit and a measuring tool. Identify the connector type compatible with your measuring tool in the following table listing 7 types (A to G), and select either the standard type or foot switch type cable according to the purpose. The table also lists wired-type connecting cables with the same connector as those 7 types on each measuring tool. Specify those cables as required.

Type	Standard type	Foot switch type
	Order No.	Order No.
A Coolant proof caliper	02AZD790A	02AZE140A
B Coolant proof micrometer	02AZD790B	02AZE140B
C ABSOLUTE Digimatic caliper	02AZD790C	02AZE140C
D Flat type (10 pins)	02AZD790D	02AZE140D
E Round type (6 pins)	02AZD790E	02AZE140E
F Flat straight type	02AZD790F	02AZE140F
G ABSOLUTE Digimatic indicator ID-N/B	02AZD790G	02AZE140G



- Cable length: 160 mm
- Accessories: Cable clamp



Mitutoyo Input Tools SERIES 264 — Digimatic Gage/PC Data Input Device



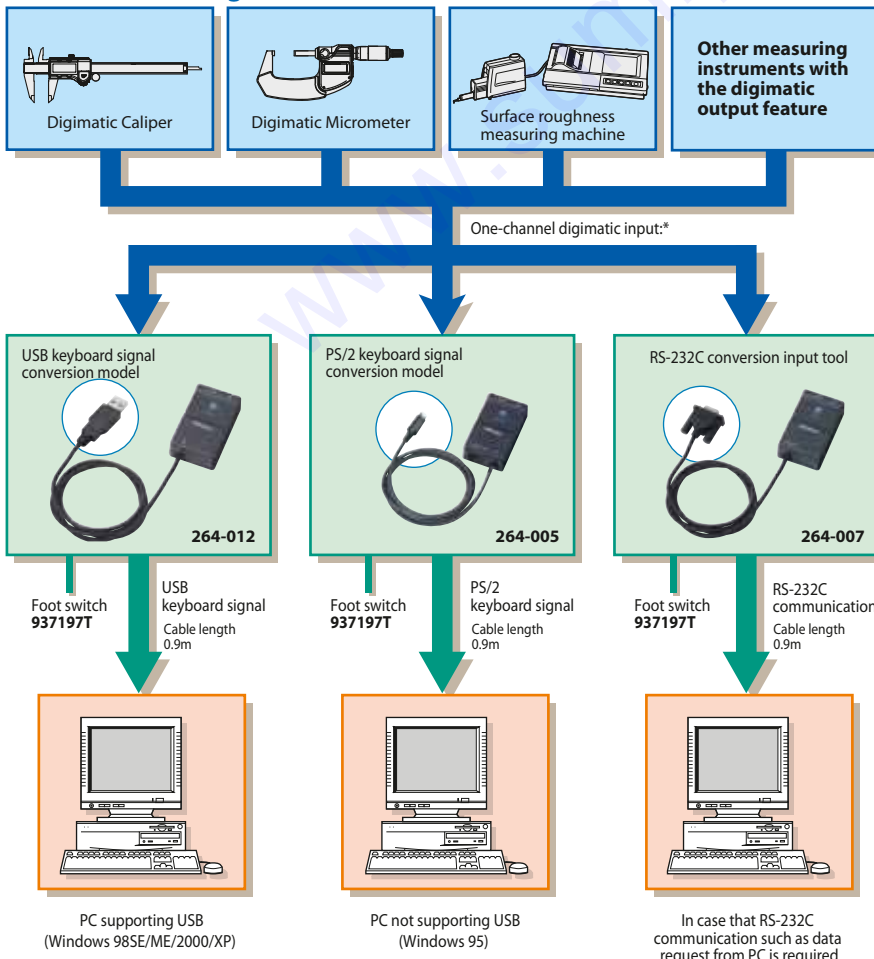
FEATURES

- The input tool is an interface enabling you to easily input measurement data from a Mitutoyo measuring instrument with the digimatic output feature to your PC.
- An USB keyboard signal conversion input tool, IT-012U converts measurement data to keyboard signals and directly inputs them to cells in off-the-shelf spreadsheet software such as Excel. An RS-232C communication input tool, IT-007R is also available to input data through RS-232C communication.
- More accurate measurement is possible using an optional foot switch.



USB keyboard signal conversion model	
Order No.: 264-012-10	
Input:	Digimatic signal x 1 channel
Output:	USB keyboard signal x 1 channel (USB 2.0)
Power supply:	5V from the PC bus power
Weight:	61g (including cable)
PS/2 keyboard signal conversion model	
Order No.: 264-005	
Input:	Digimatic signal x 1 channel
Output:	PS/2 keyboard signal x 1 channel
Power supply:	5V from the PC bus power
Weight:	70g (including cable)
RS-232C conversion model	
Order No.: 264-007	
Input:	Digimatic signal x 1 channel
Output:	RS-232C x 1 channel
Power supply:	12V from the PC bus power (power storage)
Weight:	91g (including cable)
Common to all models	
DATA switch: Switch life of one million times	
Dimensions (W x D x H): 72 x 44 x 23.5mm (main body)	

Connection Configuration



Optional Accessory

- 937197T: Foot switch
- 939039: Gage selector



* When you use an optional gage selector 3, you can connect up to three measuring gages and select an input by switching them. When using 264-012, you can connect multiple input tools at the same time with an off-the-shelf USB hub. Simultaneous input, however, is not supported. For cables used to connect each measuring gage and input tool.



USB Input Tool Direct: USB-ITN

SERIES 264 — Digimatic Gage / PC Data Input Device

FEATURES

- Our USB Input Tool Direct has been streamlined into a range of dedicated models for each type of measuring instrument.
- In the same way as the existing model, IT-012U, measurement data can be input to Excel, Notepad, and other programs just by connecting the input tool to a computer.

Data collection can start immediately after connecting the measuring instrument to a computer

Because the input tool is automatically recognized as an *HID keyboard device (a standard Windows driver) just by connecting it to a USB port, no special software is required.
Patent pending (Japan)
*HID (Human Interface Device)

The input tool directly connects the measuring instrument to a USB port on a computer

USB Input Tool Direct for micrometers: USB-ITN-B

The values displayed on the measuring instrument can be sent to the computer just by pressing the data switch.

The input tool has been streamlined by incorporating the USB function into the cable

Existing model: USB input tool

Cable length: 0.9 m IT-012U No.264-012-10 Cable length: 1 m No.05CZA662

This is the same result as that of typing numbers using the keyboard and then pressing Enter.

Note on using a foot switch with USB-ITN
The USB-ITPAK and USB-FSW options are required (see page opposite).
If not using optional software the IT-012U input tool can be used with a foot switch.

Measuring instrument with digimatic output

The digimatic plug is connected to the measuring instrument.

USB-ITN types

Each type of USB-ITN has a unique plug to fit the instrument it is designed for (figures A to G on the left). Just select the type that fits your measuring instrument (USB-ITN-A, USB-ITN-B,...). Detailed specifications, such as part numbers, are shown on page A-20.

Cable length: 2 m

The USB plug is connected to a computer.

Computer

Supported operating systems: Windows 2000 SP4 Windows XP SP2 or later Windows Vista Windows 7

SPECIFICATIONS

Model	USB-ITN-A	USB-ITN-B	USB-ITN-C	USB-ITN-D	USB-ITN-E	USB-ITN-F	USB-ITN-G
Order No.	06ADV380A	06ADV380B	06ADV380C	06ADV380D	06ADV380E	06ADV380F	06ADV380G

Mitutoyo DP-1VR SERIES 264 — Digimatic Mini-Processor

Order No.

264-504E: (w/240-220V AC adaptor)

Technical Data

Printing method: Thermal line printer
 Printing dot: 384dot (8dot/mm)
 Printing speed: 6.5mm/s (using AC adapter)
 Printing paper: 48m
 Printing line: Approx. 6500 lines for large characters
 Approx. 12000 lines for normal characters
 Processing capacity: 9999 data (mode 1/2/3)
 100000 data (mode 0)
 Printing data: Measurement data, GO/±NG judgment,
 No. of data, Max/min value, Range, Average,
 Standard deviation, No. of defective,
 Fraction defective, Process capability index,
 Histogram, D-chart, Control chart generation
 for Xd-bar and control limit data, date and time
 Output function: Output the measuring data (RS232C) or
 GO/±NG judgment
 Input timer: 0.25s, 1s, 5s, 30s, 1min, 30min, 60min
 Power: AC adapter 6V
 Electric battery: LR6 (alkaline), Ni-Mh (AA size)
 Battery life: 10 years (clock battery), 10000 lines (1600mA
 1time/5 sec. using the nickel hydrofluoric battery)
 Dimensions (W x D x H): 94 x 201 x 75.2mm
 Mass: 390g

FEATURES

- This is a palm-sized printer used to print measurement data from the digimatic gage or to perform statistical analysis.
- This printer offers excellent functionality. You can use it not only to print measurement data, perform a variety of statistical analyses, and draw a histogram or D chart but also to perform complicated operations for X bar R control chart.
- Equipped with RS-232C output and GO/NG judgment output as standard functions, this processor ensures high reliability as an advanced quality inspection machine.
- The line thermal printer enables fast and quiet printing.



264-504



Mode 0:
Record the measurement data and tolerance judgment.

Mode 1:
Record the measurement data, statistical analysis and histogram.

Mode 2:
A "D-chart" can be used to describe measurement data displacement visually. It's also possible to record the measurement data, statistical analysis and histogram at the same time.

Mode 3:
Automatically record the various calculation results to make a X-R control chart.

Measurement Data Management
 U-WAVE Input Tools DP-1VR Multiplexer -10F Gage Selector 3 EC Counter MeasurLink

Mitutoyo Multiplexer-10F SERIES 264 — Digimatic/RS-232C Interface Unit

FEATURES

- A measurement data transfer device, multiplexer MUX-10F converts digimatic output measurement data to RS-232C and outputs it to an external device such as PC.
- Up to four measuring instruments with the digimatic output feature can be connected.



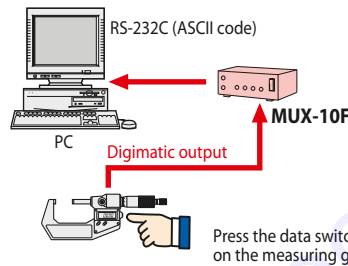
264-002



Usage Example

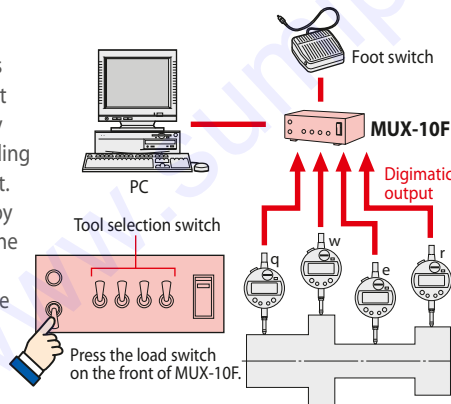
Data input using the data switch on the digimatic gage

- If the digimatic gage has a data switch, press it to input data, convert it according to the RS-232C specifications and output it.



Data input using the load switch

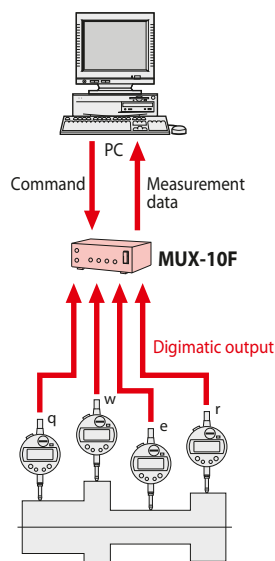
- If the digimatic gage does not have a data switch or when you perform simultaneous measurement, use the load switch to input data from the measuring gage selected by the tool selection switch, convert it according to the RS-232C specifications and output it.
- If multiple measuring gages are selected by the tool selection switch, data is input in the order of channels 1 through 4.
- Optional foot switch (937179T) is available for quick data entry.



Data input using the external commands

- You can input data from the specified measuring gage connected with MUX-10F (ch 1 - 4) by inputting a command on your PC.

Commands (ASCII)	Transfer channels
1 (ASCII corde31) CR	1
2 (ASCII corde32) CR	2
3 (ASCII corde33) CR	3
4 (ASCII corde34) CR	4
A (ASCII corde41) CR	1, 2, 3, 4
B (ASCII corde42) CR	1, 2, 4
C (ASCII corde43) CR	1, 3, 4
D (ASCII corde44) CR	2, 3, 4
E (ASCII corde45) CR	1, 2, 3
F (ASCII corde46) CR	1, 2
G (ASCII corde47) CR	1, 3
H (ASCII corde48) CR	1, 4
I (ASCII corde49) CR	2, 3
J (ASCII corde50) CR	2, 4
K (ASCII corde51) CR	3, 4



Order No.

264-002E: (w/240-220V AC adaptor)

Technical Data

Data input port: 4 channels for Digimatic gages
 Data output: Via RS-232C interface
 Data output format: RS-232C (D-SUB 9P in connector)
 Data transmission method: Half-duplex transmission
 Data transmission code: ASCII/JIS
 Data length: 8 bits
 Start bit: 1 bit
 Stop bit: 1 bit
 Parity check: Non
 Synchronizing method: Start-stop system
 Data transmission speed: 300bps, 600bps, 1200bps, 2400bps, 9600bps, 19200bps
 Power supply: AC adapter
 Dimensions (W x D x H): 91.4 x 92.5 x 50.4mm

Optional Accessory

937179T: Foot switch

Gage Selector 3 / EC Counter

Mitutoyo Gage Selector 3 3-channel Switching Box for Data Transmission



939039

Order No.
939039:

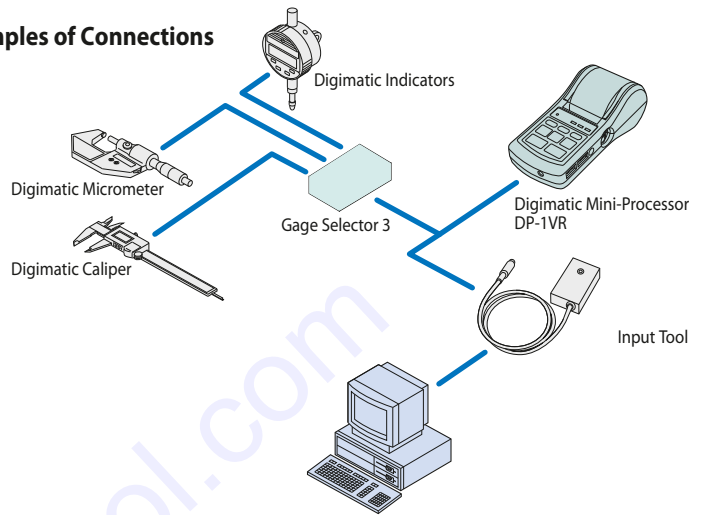
Technical Data

Connection: Up to three gages
Signal: Digimatic code format
Connection: Bidirectional
External dimensions (W x D x H): 100 x 70 x 33mm

FEATURES

- 3 Digimatic gages can be connected.
- You can specify the gage which outputs the data with the channel switch.

Examples of Connections



Mitutoyo EC Counter SERIES 542 — Low-cost, Assembly Type Display Unit



542-007

Order No.
542-007

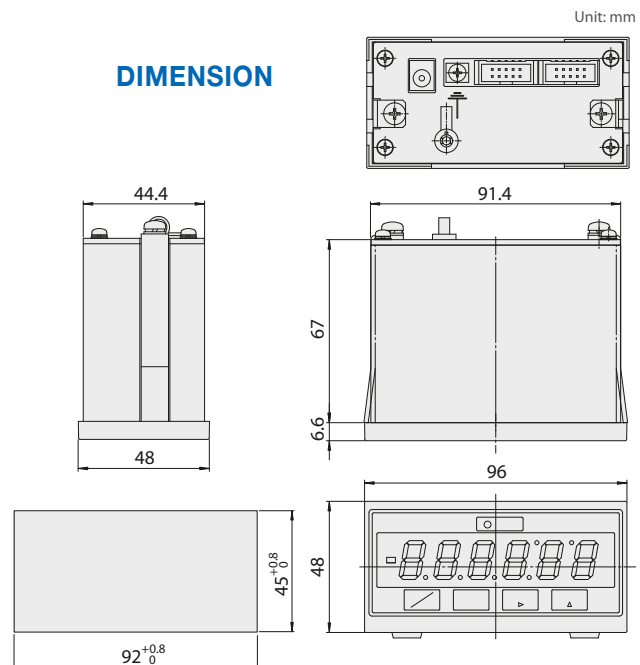
Technical Data

Applicable gage: LGD, LGS
Resolution: 0.001mm, 0.01mm
No. of gage input: 1
Display: 6-digit LED and a negative [-] sign
Function: Preset
GO/±NG judgment
Output (open-collector): 3-step limit signal, Normal signal
External control: Preset, Data hold
Power supply: Via AC adaptor
Dimensions (W x D x H): 96 x 48 x 84.6mm
Mass: 50g

FEATURES

- Compact panel mounting type and DIN size.
It can be easily incorporated into each system.

DIMENSION



Mitutoyo MeasurLink Measurement Data Network System

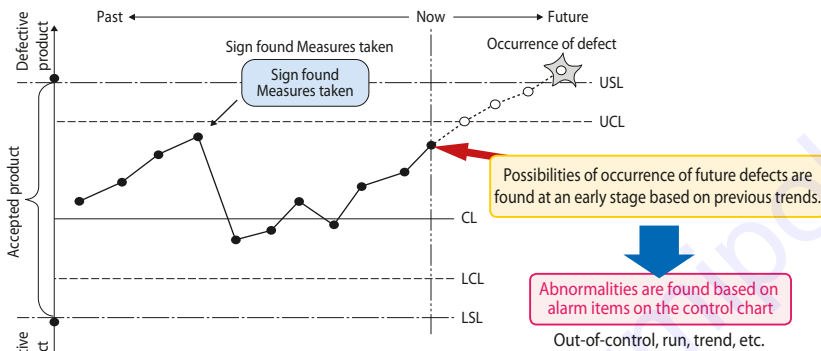
The MeasurLink® program that has been developed by U.S. Mitutoyo and incorporates over a decade of expertise in the U.S., the birthplace of SPC. Industries have become increasingly borderless worldwide, and there will be more business with overseas companies, including Japanese manufacturers, in the future. In this scenario it is likely the acquisition of certified ISO9000-based quality control

standards, such as QS-9000 of the automobile industry in the U.S., will be increasingly mandated, and this trend is expected to spread to other industries. In Japan today, most systems utilize inspection certificates, but process control will be required in more cases in the acquisition of international standard certificates.



Preventive control via real-time control chart

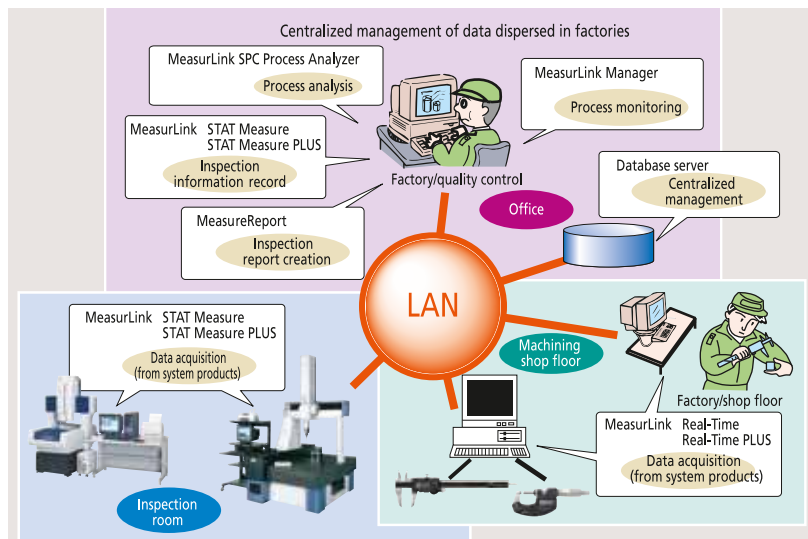
Real-time control charts are utilized to find abnormalities at an early stage in the workshop, to effectively prevent defects from occurring.



Expansion to the measurement network system

MeasurLink® supports anything from stand-alone, small-scale systems to large-scale systems utilizing a PC network environment. You can choose from the 7 types of package software as shown in the right hand figure, according to your budget and application. Expansion from a stand-alone to a network system is easy, so you can gradually upgrade test operation in one section into full-scale operation.

Centralized measurement data management by networking



MeasurLink programs

Basic software	MeasurLink SPC Real-Time (PLUS) (for Digimatic instruments) MeasurLink STATMeasure (PLUS) (for measuring system products)
Optional software	MeasurLink SPC Process Manager (for process monitoring) MeasurLink SPC Process Analyzer (for process analysis) MeasurLink Gage R&R (for gage R&R calculation) MeasurLink Gage Management (for calibration history management)
Related software	MeasureReport (for inspection report creation)

Note: Database software is separately required for network construction.

Recommended operating environments

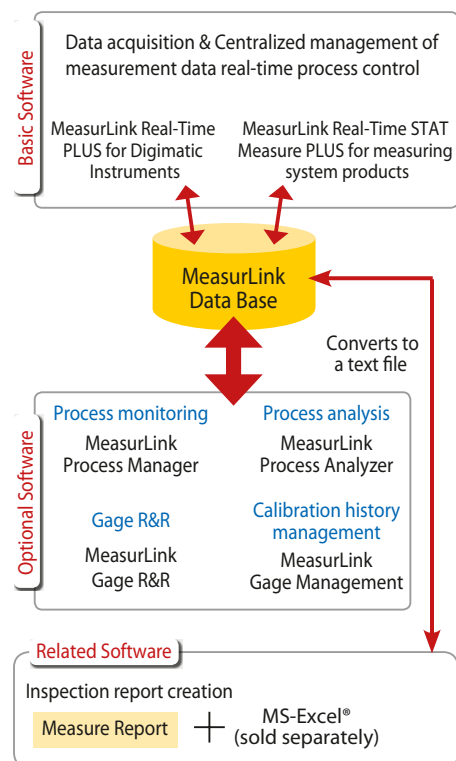
*The specification in parentheses () indicates that of servers.

OS	Windows95/98/NT4.0/2000
Database	Sybase SQL Anywhere*
CPU	Pentium II 266MHz (333MHz)
Memory	128MB or more
Hard disk	500MB or more (1GB or more)
Display	SVGA
Others	CD-ROM drive, keyboard, mouse**

* If used in a network, it is necessary to purchase the database license according to the number of servers and clients.

** If used in a network, the parts comprising the network environments such as LAN card, LAN cables and hub are required.

Program configuration of MeasurLink



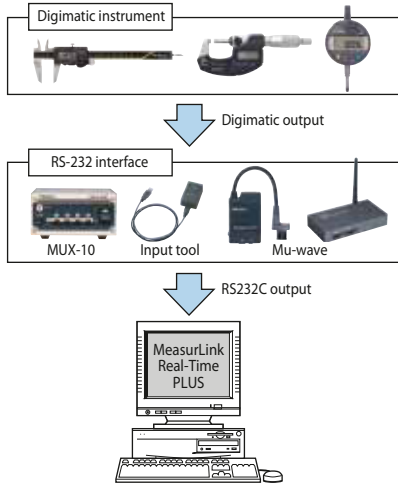
Basic Software



MeasurLink Real-Time PLUS (for Digimatic instruments)
MeasurLink STATMeasure PLUS (for measuring instrument products)

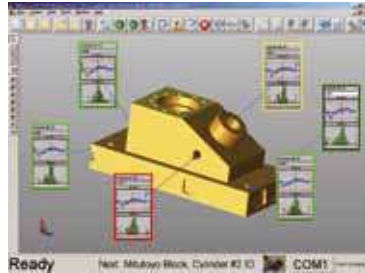
MeasurLink Real-Time PLUS (for Digimatic instruments)

MeasurLink Real-Time PLUS transmits measurement data in real time from measuring tools with Digimatic output with RS-232C communication via the interface.



Real-time process control

Result of statistical analysis



Measured values and Judgment by workpiece

The content of the measurement item balloon display can be configured as desired



Character information (item information calculation result)

Item name, measured value, error value, upper/lower limits, Cp, Cpk, Pp, Ppk, standard deviation, average, maximum value, minimum value, defect rate, etc. (All selectable.)

Chart display (control charts, etc.)
Xbar-R control chart, Xbar-S control chart, X-Rs control chart, histogram, tear chart, run chart, pre-control chart, statistic, etc. (All selectable.)

Color-coding of judgment of GO/NG results

The color of the outer frame of the call-out corresponds to the GO/NG result

Green	Yellow	Red
OK	Close to out-of-tolerance	Out-of-tolerance

MeasurLink STATMeasure PLUS (for measuring instrument products)

MeasurLink STATMeasure PLUS, which resides on the data processing PC, transmits measurement data in real time when the measurement program is executed with inter-program communication (DDE communication).

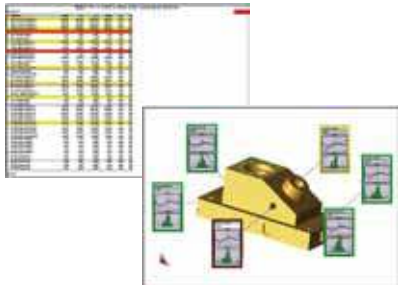
Report output

Results of statistical processing can be output in various types of report.

<Report by measurement item>



<Printout of the graphic window>



*By using the optional MeasureReport package, you can create inspection tables in a format previously defined using Excel.

Statistical analysis result display

Wide range of statistical analysis/display functions provides results according to characteristics and purposes.

Individual item chart

- Xbar-R control chart (a)
- Xbar-S control chart
- X-Rs control chart
- EWMA control chart
- Histogram (b)
- Run chart (c)
- Pre-control chart (d)
- Tear chart (e)

Measured value

- Measured value data sheet
- (Individual item n count x sub Gr)
- Part data sheet

Statistics

- Maximum value
- Minimum value
- Average
- Standard deviation $S, Rbar/d2$
- Process capability Cp, Cpk, Pp, Ppk
- Defect ratio
- Average $\pm 3\sigma / 4\sigma / 6\sigma$ etc.

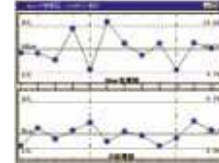
All item chart

- Multivariate control chart (f)
- Column indicator (g)
- All item Cpk sheet (h)
- Multivariate defect ratio (bar graph)
- Manager display (4 columns x 3 rows) (Histogram, meter, box and whiskers plot, Cpk)

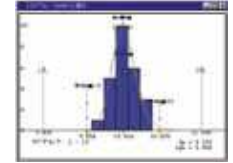
(g)



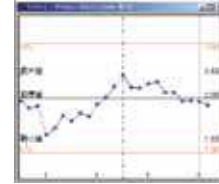
(a)



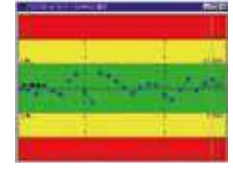
(b)



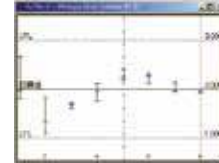
(c)



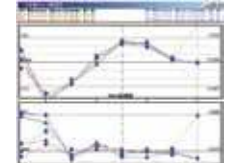
(d)



(e)



(f)



(h)



File output

Results for the specified inspection lot (data, graph, calculation result, etc.) can be output to files in Excel format. (1 sheet is created for each item.)



You can easily extract the necessary results and provide them to any department not using MeasurLink. Other file output formats, such as text file and MeasurLink's dedicated format, are also available.

Select from 10 types of charts (image capture), control charts, and histograms

For statistical processing results, you can select from 30 items such as average, maximum, minimum, Cp, and Cpk.

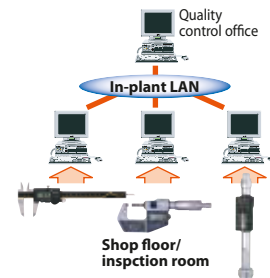
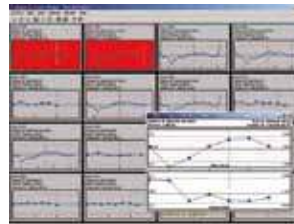
Measurement data and measurement date/time

Measurement Data Management
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Mitutoyo Optional Software

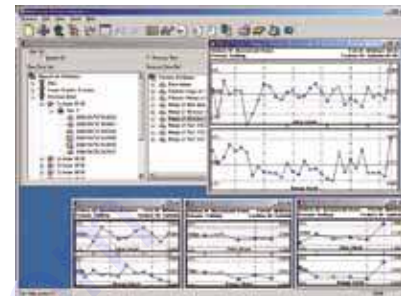
MeasurLink Process Manager — Process Monitoring Program

- This program can monitor each inspection process state on the network even in the QC office.
- This program quickly notifies the administrator of a problem that occurs in a process with the alarm function.



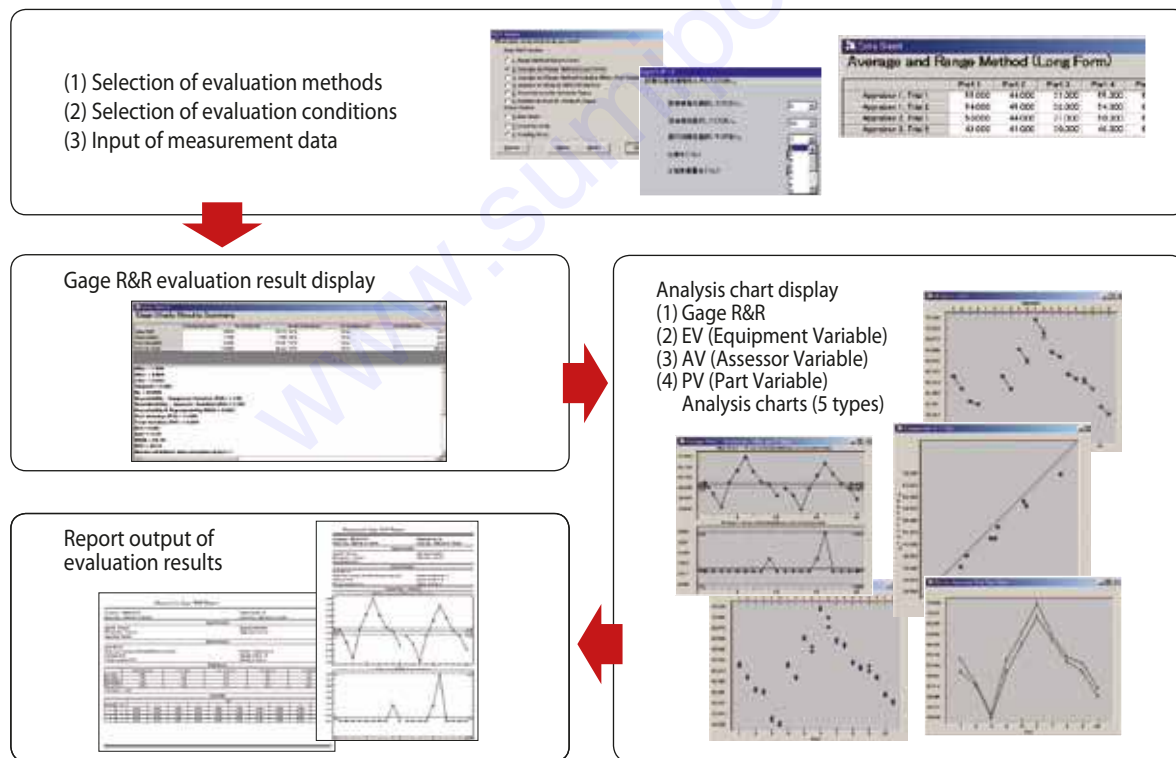
MeasurLink Process Analyzer — Process Analysis Program

- This program supports verification of problems through various analyses according to historical information (such as environment, time, machine tool, and operator) about parts and processes using the database in which data has been acquired and accumulated by MeasurLink SPC.
- This program allows differential analysis under a specific condition with the filter function and grasp of long-term trend with the combination function.



MeasurLink Gage R&R — Gage R&R Assessment Program

- This program can perform gage R&R assessment required by QS-9000 in simple operation.



MeasurLink Gage Management — Calibration History Management Program

- This program allows historical record of each measuring instrument operating states to support proper management of calibrations without omission with the powerful search function.

