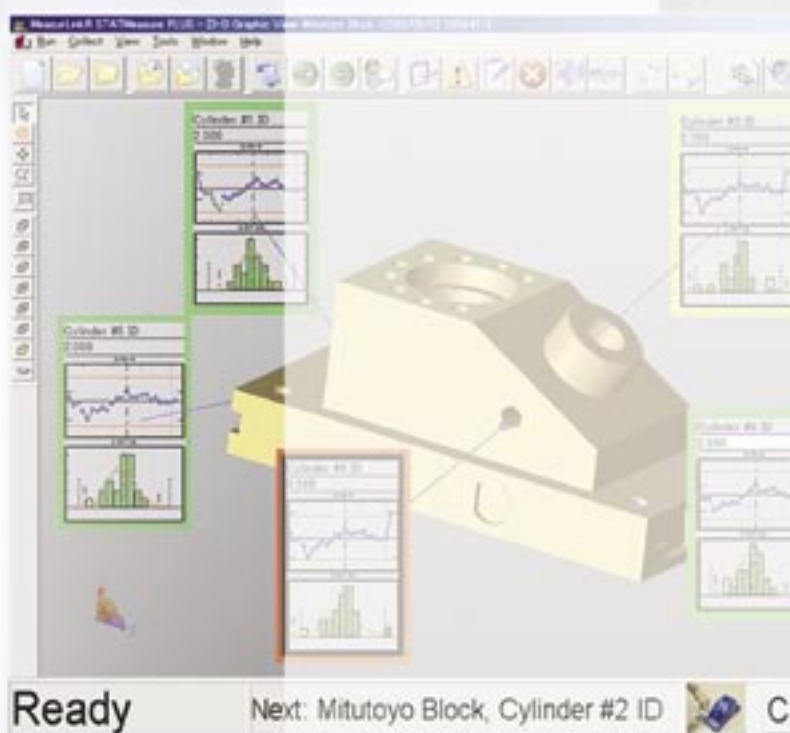


### Measurement Data Management

#### INDEX

Measurement Data Management	
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Gage Selector 3 Switching Box for Data Trans	16
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# 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

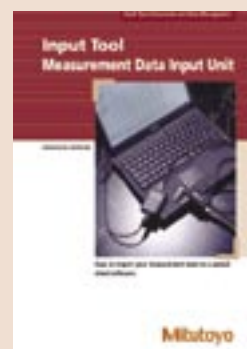
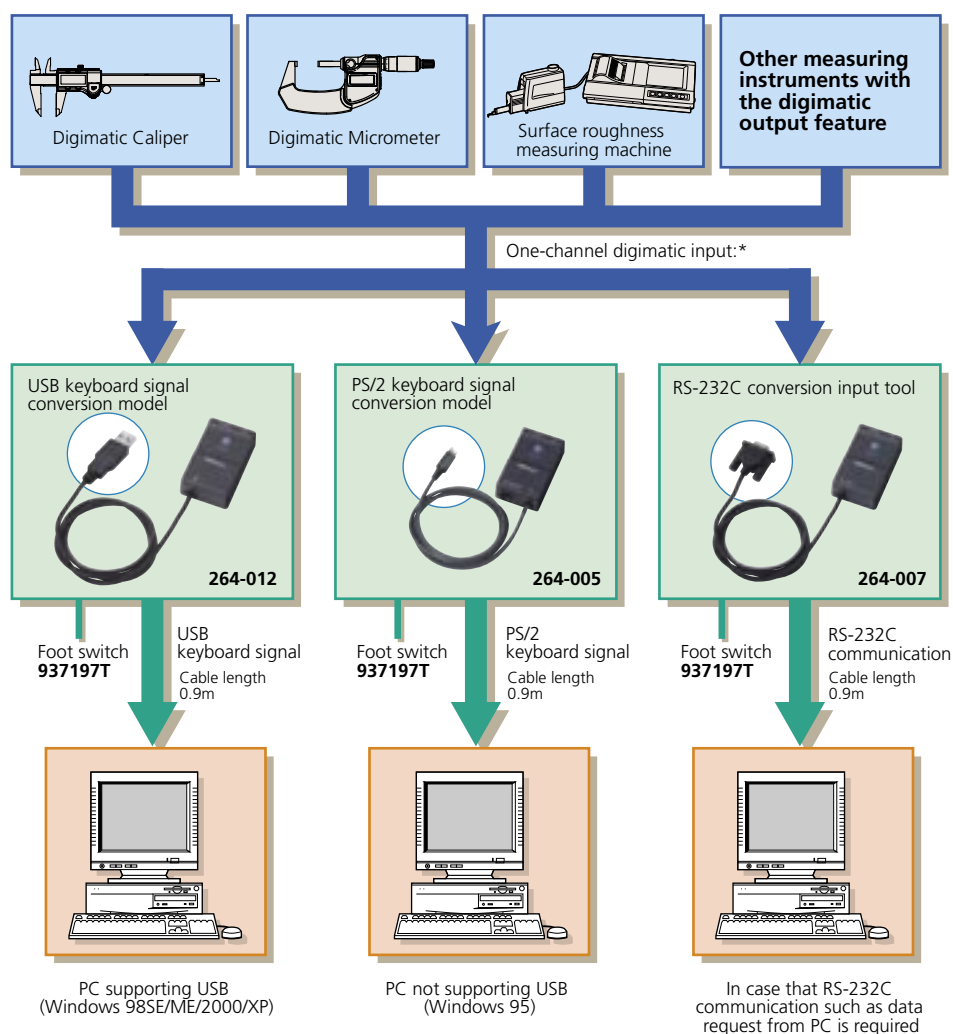
Dimensions (W x D x H): 72 x 44 x 23.5mm (main body)

#### Optional Accessory

**937197T**: Foot switch

**939039**: Gage selector

### Connection Configuration



Refer to the Input Tools leaflet (E4250) for more details.

\* When you use an optional gage selector 3 (refer to page 16), 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, refer to page 22.

# Mu-Wave System

## Measurement Data Wireless Transfer System

### Mu Wave transmitter

Order No.: **02AZB580A/C/E/G/H**  
 Communication distance: About 10 m\*1  
 Transmission frequency: VHF bandwidth,  
 Transmission speed: 2400 bps  
 Power supply: One CR2032 (lithium battery)  
 Battery life: About 6 months under normal use  
 Number of IDs: 100 (0 to 99)  
 Antenna: Built-in  
 Mass: 50g

### Mu Wave receiver

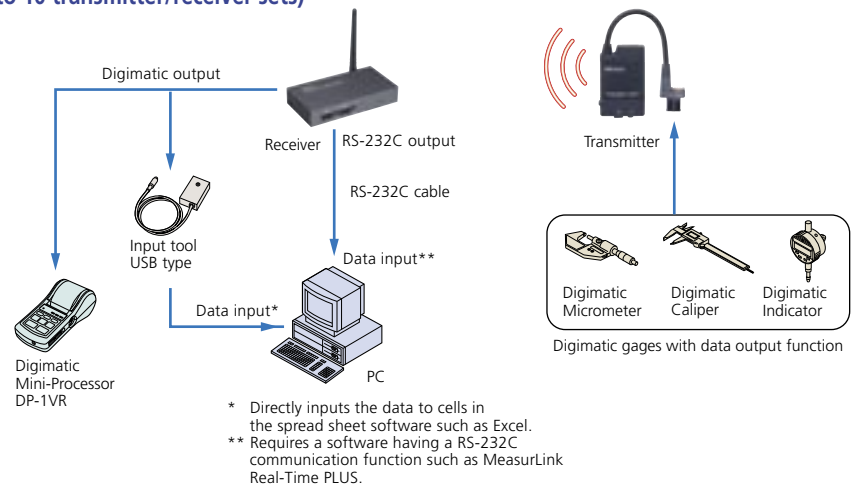
Order No.: **02AZC740**  
 Reception: Double super heterodyne  
 Output: Conforming to RS-232C  
 (connector specifications: D-sub 9 pins)  
 Digimatic output x 1 channel  
 (flat type 10 pins)  
 Display: Power LED and data transmission  
 confirmation LED  
 Buzzer: Data transmission confirmation  
 (ON/OFF switching allowed)  
 ID reception settings:  
 All ID reception mode: Receive all IDs (00 to 99).  
 Group ID reception mode: Receive IDs from a specified  
 group only.  
 Grouping: 0 to 9, 10 to 19, 20 to 29, 30 to 39, ... 90 to 99  
 Antenna: Inverted dedicated rubber antenna  
 Wired input: Digimatic signal x 2 ports

### FEATURES

- Cordless connection can be realized between a digimatic gage, digimatic mini processor, PC and other device.

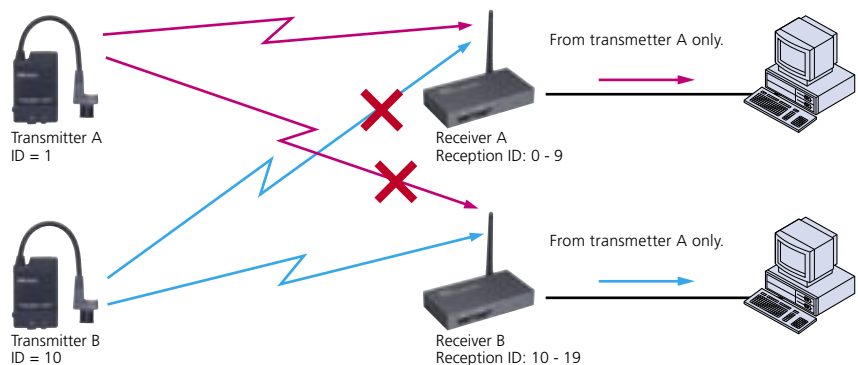


### • System Configuration Example (up to 10 transmitter/receiver sets)



### • Grouping by ID Number (up to 10 groups)

Usage example: To prevent lines from getting crossed when multiple sets are used nearby



# 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.



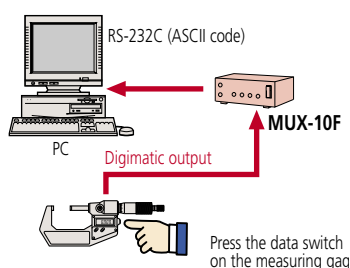
264-002



### Usage Example

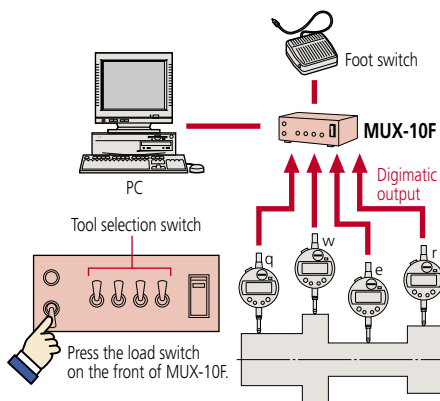
#### Data input using the data switch on the digimatic gage

- 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

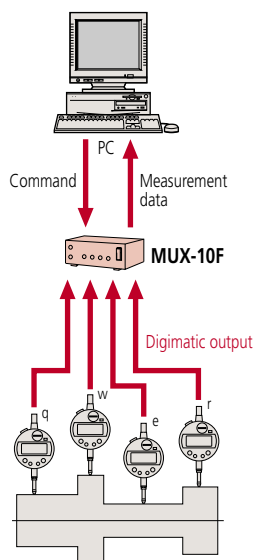
- If the digimatic gage does not have a data switch or when you perform simultaneous measurement, use the load switch to input data from the measuring gage selected by the tool selection switch, convert it according to the RS-232C specifications and output it.
- If multiple measuring gages are selected 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 code 31) CR	1
2 (ASCII code 32) CR	2
3 (ASCII code 33) CR	3
4 (ASCII code 34) CR	4
A (ASCII code 41) CR	1, 2, 3, 4
B (ASCII code 42) CR	1, 2, 4
C (ASCII code 43) CR	1, 3, 4
D (ASCII code 44) CR	2, 3, 4
E (ASCII code 45) CR	1, 2, 3
F (ASCII code 46) CR	1, 2
G (ASCII code 47) CR	1, 3
H (ASCII code 48) CR	1, 4
I (ASCII code 49) CR	2, 3
J (ASCII code 50) CR	2, 4
K (ASCII code 51) CR	3, 4



### Order No.

- 264-002: (w/100V AC adaptor)
- 264-002A: (w/120V AC adaptor)
- 264-002D: (w/220V AC adaptor)
- 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 adaptor  
 Dimensions (W x D x H): 91.4 x 92.5 x 50.4mm

### Optional Accessory

- 937179T: Foot switch



# DP-1VR

## SERIES 264 — Digimatic Mini-Processor

### Order No.

**264-504:** (w/100V AC adaptor)  
**264-504A:** (w/120V AC adaptor)  
**264-504D:** (w/220V AC adaptor)  
**264-504E:** (w/240-220V AC adaptor)

### Technical Data

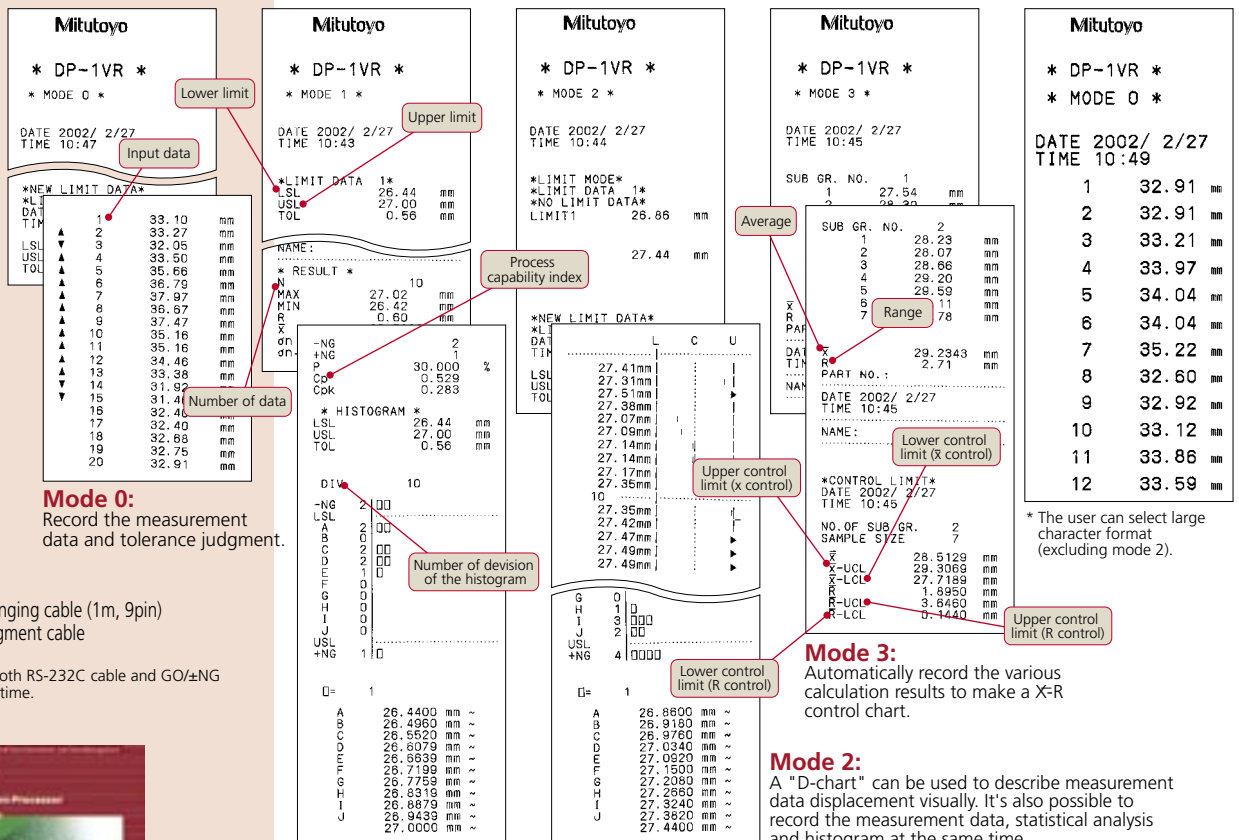
Printing method: Thermal line printer  
 Printing dot: 384dot (8dot/mm)  
 Printing speed: 6.5mm/s (using AC adapter)  
 Printing paper: 48m  
 Printing line: Approx. 6500 lines for large characters  
 Approx. 12000 lines for normal characters  
 Processing capacity: 9999 data (mode 1/2/3)  
 100000 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-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



### Optional Accessory

**09EAA084\*:** RS-232C changing cable (1m, 9pin)

**965516\*:** GO/±NG judgment cable

**937179T:** Foot switch

\*It is impossible to use the both RS-232C cable and GO/±NG judgment cable at the same time.



Refer to the DP-1VR leaflet (0) for more details.

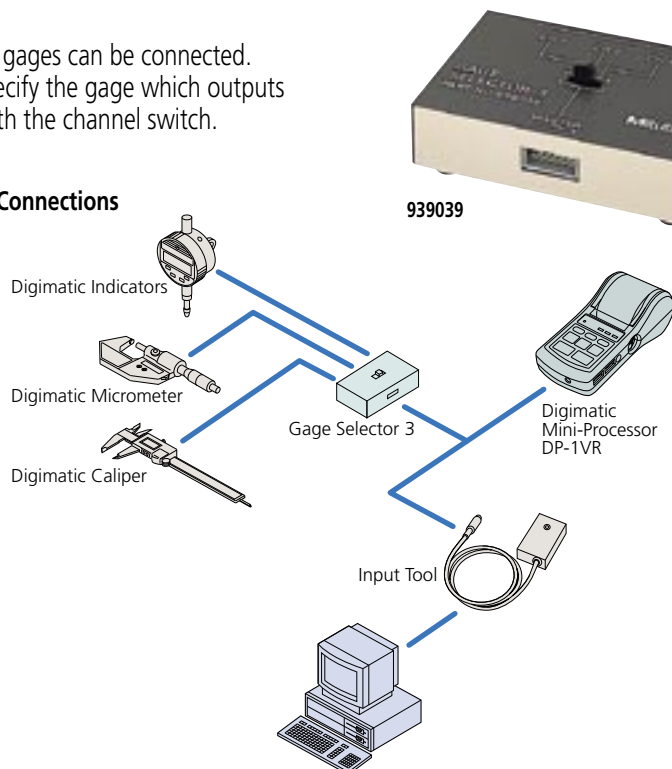
# Gage Selector 3

## 3-channel Switching Box for Data Transmission

### FEATURES

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

### Examples of Connections



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

# EC Counter

## SERIES 542 — Low-cost, Assembly Type Display Unit

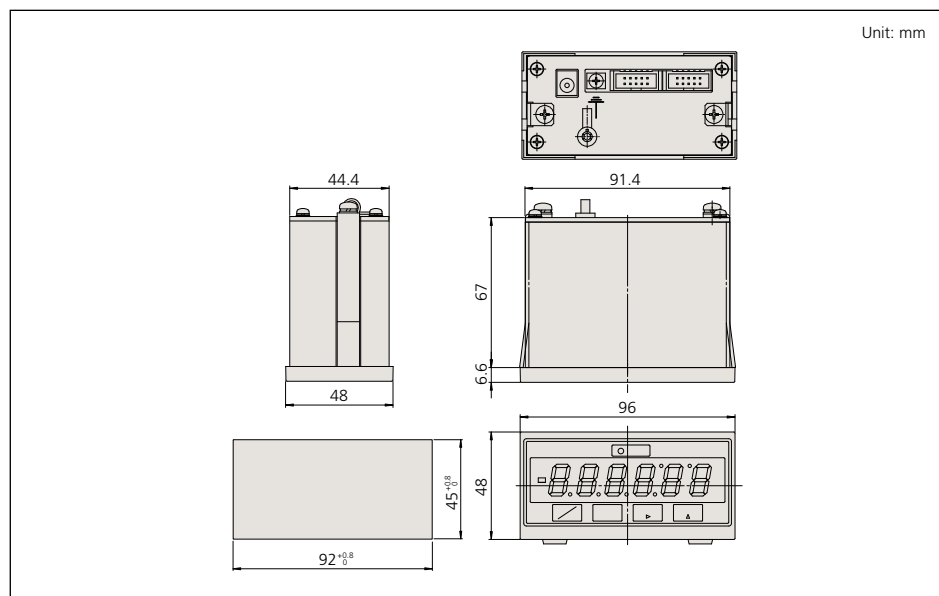
### FEATURES

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

542-007



### DIMENSION



### 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

# Digimatic Multi-Unit

## SERIES 572 — 6-channel Multi-point Measuring Unit

### Order No.

**572-052:** (w/100V AC adaptor)  
**572-052A:** (w/120V AC adaptor)  
**572-052D:** (w/220V AC adaptor)  
**572-052E:** (w/240-220V AC adaptor)

### Technical Data

Data input port: 6

Functions: MAX/MIN measurement  
 Range (MAX-MIN) measurement  
 Zero-Setting  
 Presetting  
 GO/±NG judgment (Buzzer and LED)  
 GO/±NG signal output  
 Error alarm  
 SPC data output

Power supply: 9V DC, 500mA (via AC adaptor)

Dimensions (W x D x H): 236 x 120 x 66mm

Mass: 1.3kg

### Optional Accessory

**936937:** SPC cable for data output (1m)  
**965014:** SPC cable for data output (1m)  
**907020:** GO/±NG signal output cable (2m)  
**937179T:** Foot switch

### FEATURES

- The Digimatic Multi-Unit receives measurement data from multiple (up to six) Digimatic gages.
- By connecting a Display Unit (EC Counter) measurement from each gage can be

displayed, and max, min, and range measurements can be made for the connected gages. Also possible are GO/±NG judgments on the measurement data individually or collectively.



572-052

# Digimatic Difference/Sum Unit

## SERIES 542 — For Multiple-gage Measurements

### FEATURES

- The Digimatic Difference/Sum Unit will add or subtract the measurements from two Digimatic gages and output results to a display Unit or SPC data processor.



572-041

### Order No.

**572-041:** (w/100V AC adaptor)  
**572-041A:** (w/120V AC adaptor)  
**572-041D:** (w/220V AC adaptor)  
**572-041E:** (w/240-220V AC adaptor)

### Technical Data

Data input port: 2

Calculation mode: A+B, A-B, A, B

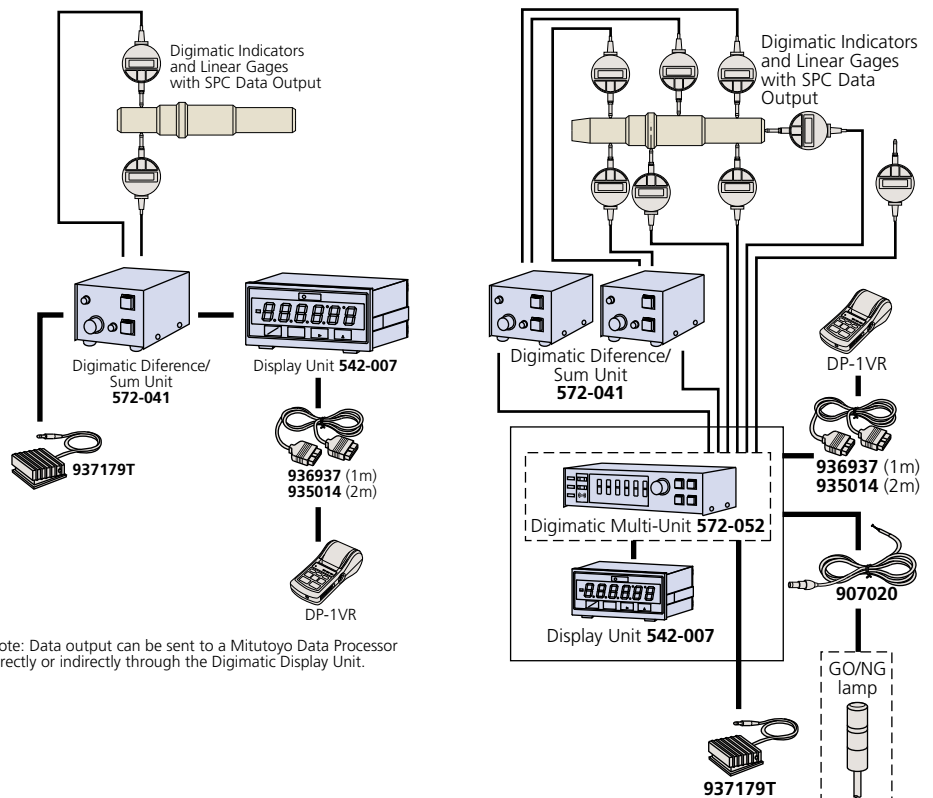
Functions: Zero-Setting  
 SPC data output

Power supply: 9V DC, 500mA (via AC adaptor)

Dimensions (W x D x H): 76 x 120 x 66mm

Mass: 0.55kg

### Examples of Connections



Note: Data output can be sent to a Mitutoyo Data Processor directly or indirectly through the Digimatic Display Unit.

# MeasurLink

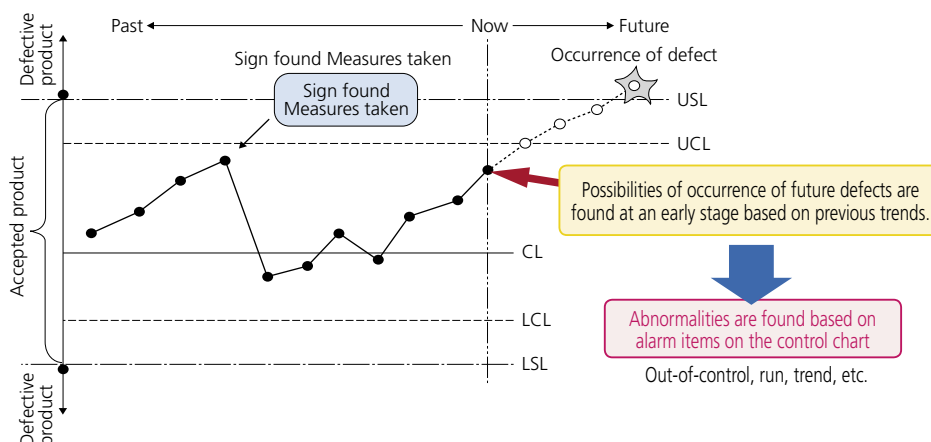
## Measurement Data Network System

The MeasurLinks® 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

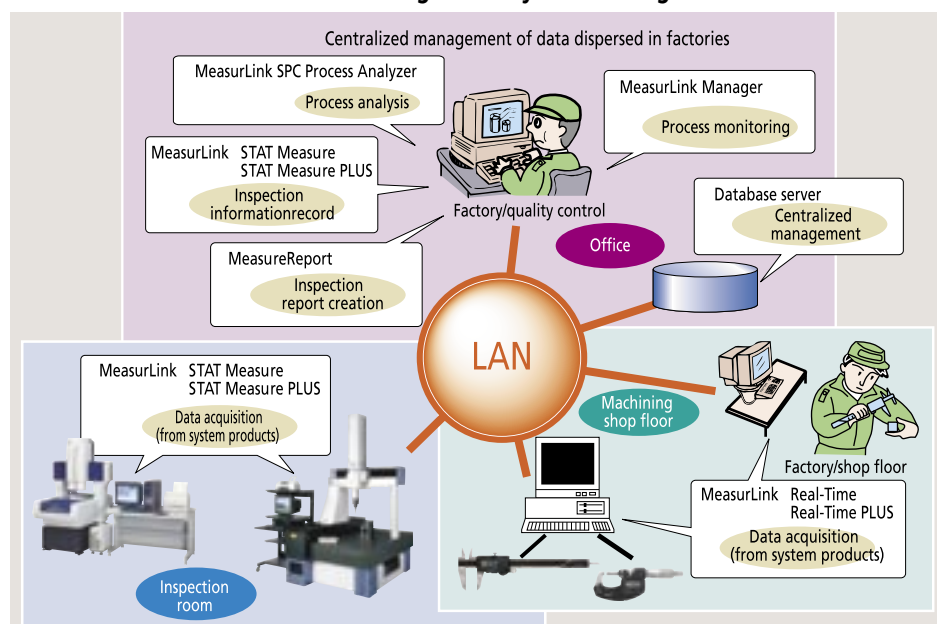
Real-time control charts are utilized to find abnormalities at an early stage in the workshop, to effectively prevent defects from occurring.



### 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



**MiCAT**

Mitutoyo Intelligent Computer Aided Technology

the standard in world  
metrology software

**MeasurLink**

### 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

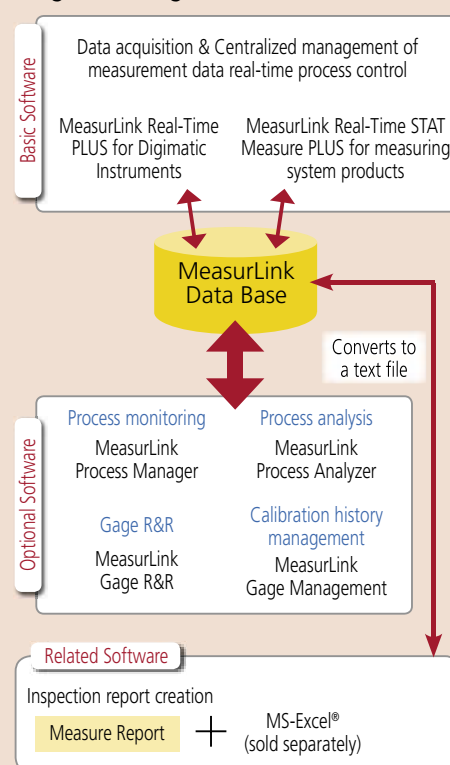
\*The specification in parentheses ( ) indicates that of servers.

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





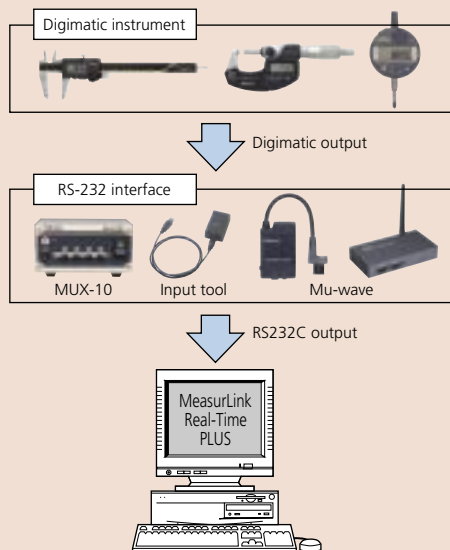
## Basic Software

### 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.



#### 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>



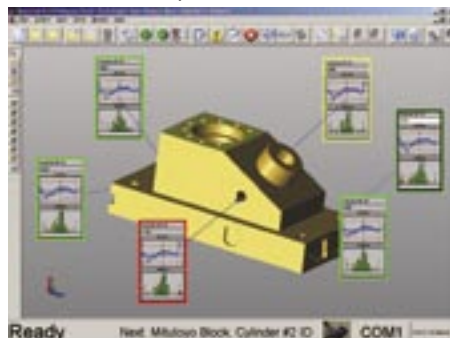
<Printout of the graphic window>



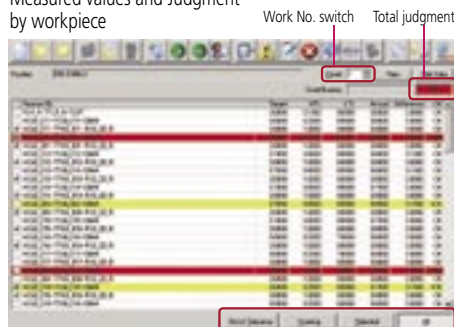
\*By using the optional MeasureReport package, you can create inspection tables in a format previously defined using Excel.

#### Real-time process control

Result of statistical analysis



Measured values and Judgment by workpiece



Narrow-down function to show results for a single workpiece at a glance.

#### 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)

##### All item chart

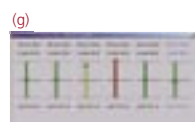
- Multivariate control chart (f)
- Column indicator (g)
- All item Cpk sheet (h)
- Multivariate defect ratio (bar graph)
- Manager display (4 columns x 3 rows) (Histogram, meter, box and whiskers plot, Cpk)

##### 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.



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.)

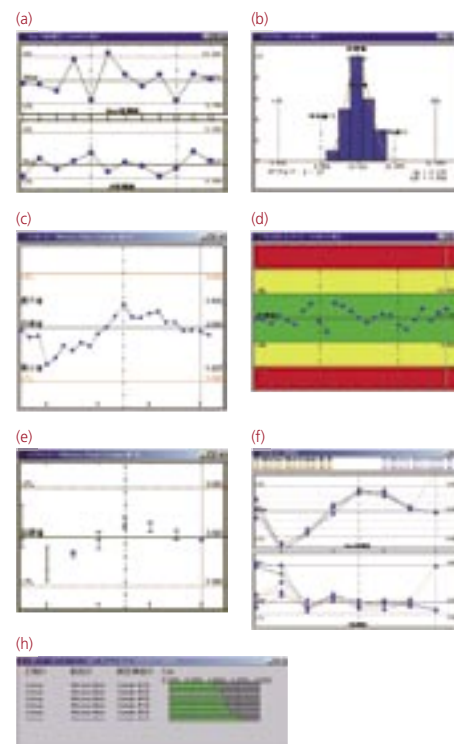
##### Chart display (control charts, etc.)

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

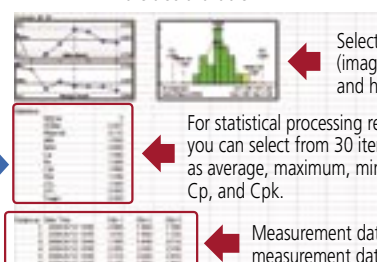
The color of the outer frame of the call-out corresponds to the GO/NG result

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



#### 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

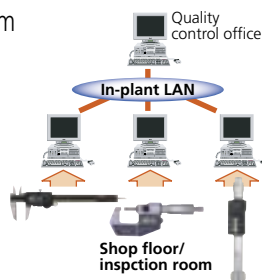
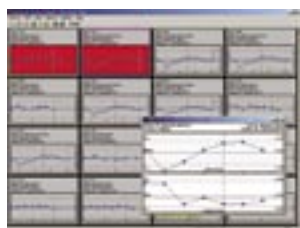
For statistical processing results, you can select from 30 items such as average, maximum, minimum, Cp, and Cpk.

Measurement data and measurement date/time

## Optional Software

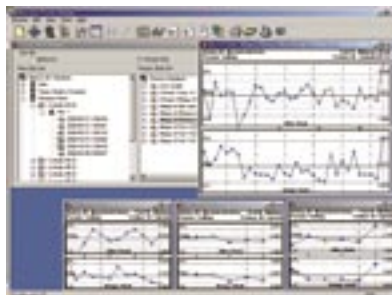
### MeasurLink Process Manager — Process Monitoring Program

- 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.



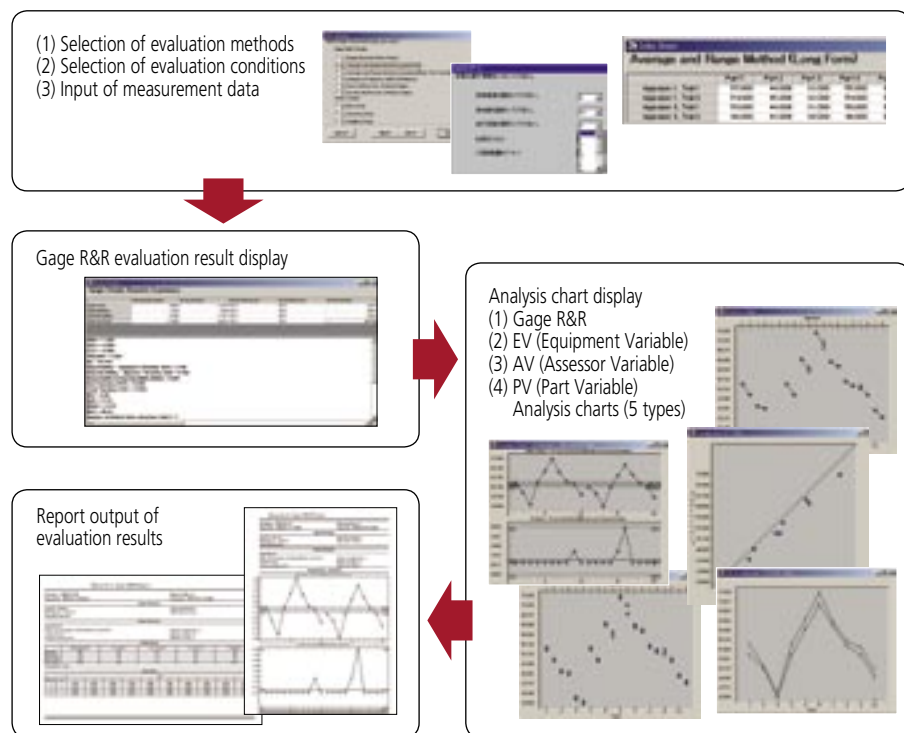
### MeasurLink Process Analyzer — Process Analysis Program

- 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.



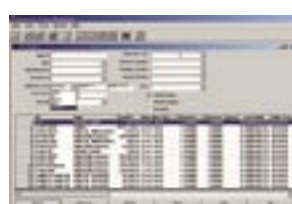
### MeasurLink Gage R&R — Gage R&R Assessment Program

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

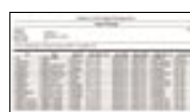


### MeasurLink Gage Management — Calibration History Management Program

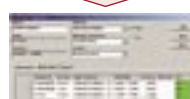
- This program allows historical record of each measuring instrument operating states to support proper management of calibrations without omission with the powerful search function.



Powerful search function using an optional item (e.g. next calibration date) as a keyword



Calibration execution



Refer to the MeasurLink leaflet (E4297) for more details.

# MeasureReport

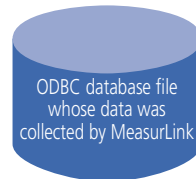
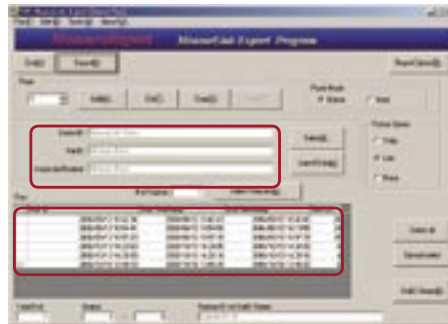
## Data Conversion Program into inspection Certificates in MS-Excel Format

### FEATURES

- You can output data from a measurement result file generated with a CMM, vision measuring machine or other machine to an inspection table generated with Excel. Data from multiple measuring machines can be combined into a single inspection table (up to 200 measurement items).
- You can also generate an inspection table by inputting data from the measuring gage with the digimatic output feature via the interface. Calculation results of optical measuring machine, QM-Data200 and the counter values for the X-axis and Y-axis output through RS-232C can be processed in the same way.
- You can generate an original Excel form using an attached sample form as template and making simple editing (such as copy and paste).
- The computation function is available for tolerance judgment, workpiece judgment, statistical calculation and other processing at generation of inspection table.

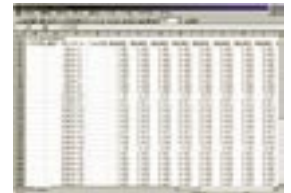
### MR-MeasurLink export program

Converts selected data from the database collected by MeasurLink and outputs it to a file, and starts up MS-Excel and executes macro processing.



After the part ID and lot number (date/time) are specified, file conversion is performed to create an Excel file.

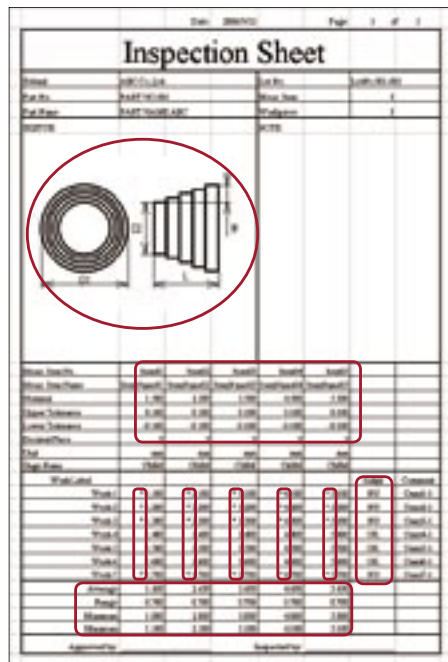
File conversion



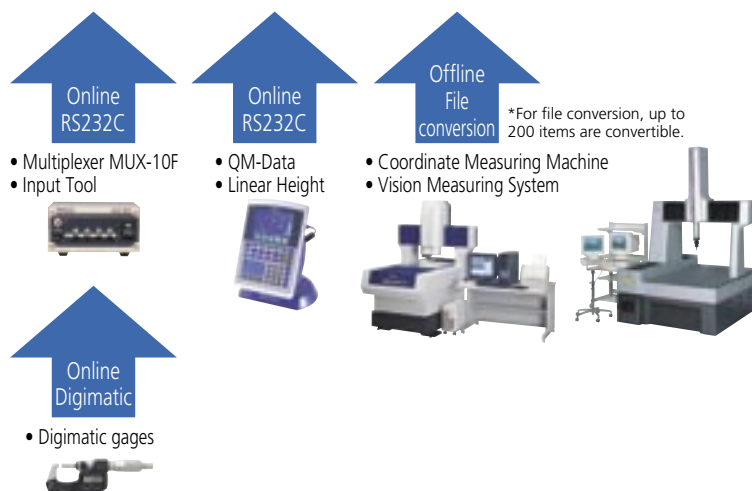
Excel starts up. Macro is executed.

### Inspection table creation macro program

Based on the data file created, the inspection table creation macro adds OK/NG judgment and statistical calculation results by macro processing, and displays them in Excel inspection table format.












- Creation of a new format file  
You can create your original format easily by editing the attached sample format file.
- Workpiece shape display  
The workpiece shape file used in the data acquisition of MeasurLink is automatically displayed.
- Design/tolerance values  
The design and tolerance values registered in MeasurLink are used as they are.
- Error value display  
Errors in the design values can be displayed.
- NG marking  
You can add any mark in front of NG data.
- Workpiece judgment  
OK/NG judgment is performed by work. (OK/NG is displayed.)
- Statistical calculation  
Desired calculation results can be displayed from 15 types of statistical items.
  - Maximum value
  - Minimum value
  - Range
  - Average
  - Standard deviation
  - Cp ((U<sub>TL</sub>-L<sub>TL</sub>)/3σ)
  - CpU ((U<sub>SL</sub>-X<sub>bar</sub>)/3σ)
  - Cpl ((X<sub>bar</sub>-L<sub>SL</sub>)/3σ)
  - CpU or Cpl, whichever is better
  - Defect count (data count outside tolerances)
  - Defect % (Defect count/Data count x 100)
  - Data count
  - Skew
  - Kurtosis
  - Coefficient of variation %



# SPC Connecting Cables

- These cables are used to output measurement data from the digimatic gage with the output feature to the digimatic mini processor, digimatic display unit, multiplexer or other device.
- Cables of one or two meters are available.
- Note that the shape of connector differs depending on the model.

Order No.	
Straight type	
905338: 1m (40")	
905409: 2m (80")	
Back type	
905689: 1m (40")	
905690: 2m (80")	
Right type	
905691: 1m (40")	
905692: 2m (80")	
Left type	
905693: 1m (40")	
905694: 2m (80")	
With data out switch type	
959149: 1m (40")	
959150: 2m (80")	
With data out switch type	
05CZA624: 1m (40")	
05CZA625: 2m (80")	
With data out switch type	
05CZA662: 1m (40")	
05CZA663: 2m (80")	
6 pins type	
937387: 1m (40")	
965013: 2m (80")	
10 pins type	
936937: 1m (40")	
965014: 2m (80")	