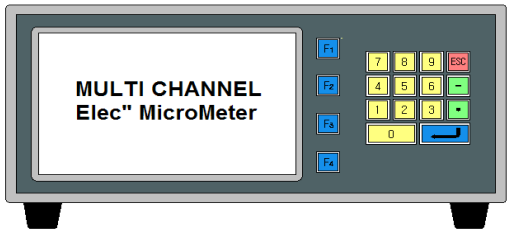
Runout Electronic MicroMeter

User's manual



(STANDARD Version)

Rev. 20080129

Dong Do Electronic Industries Co.,Ltd.

- Contents -

1. Beginning

Thanks so much for purchasing one of our products.

1.1 Description

There are some merits when you use the type of touching displacement sensor(LVDT/HBT) for a high accuracy

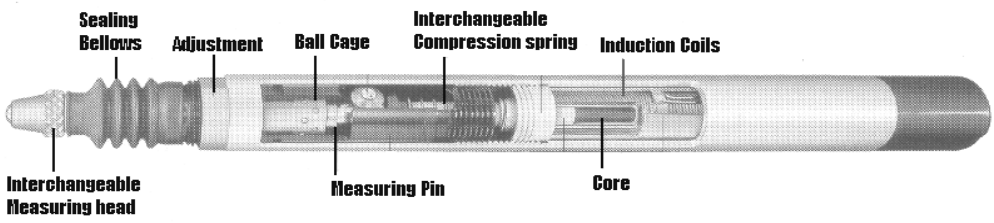
- The sensor is hypersensitive itself and precise.
- It has high resistance to the influence of environment(temperature changes, humidity, etc...)
- Heavy duty, small size and light weight

For that reason this sensor can be used for several measuring field.
To operate the type of touching displacement sensor(LVDT/HBT) needs Amplifier or Indicator. we developed this product("Electrical micrometer") user centered who has Amplifier or Indicator. A feature of this product is we sell and develop it based on user's purpose. One thing we have model could measure manufacture's thickness, difference of height, flatness, perpendicularity rate, etc...

These are our advantages for the new product.
- It has many functions that can be provide you easy directions for your needs.
- It will print formatted data and results for the quality control directly using the built in serial port(RS232C/PLC Interface)

1.2 Structure and Fundamental

1) Structure of the type of touching displacement sensor(LVDT/HBT PROBE)
Displacement sensor include differential transformer that can convert with the change of Core & Coil's position into electrical signals. The Bobbin twisted with coil is insulated material, so that might be used by lower temperature modulus and core might



[Figure.1] Structure of sensor.(LVDT/HBT)

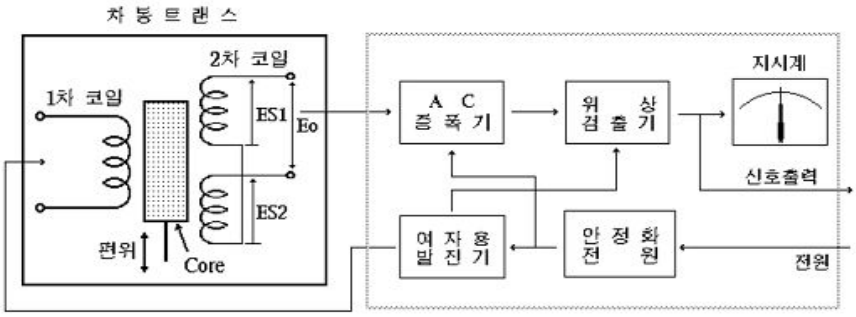
be used by high saturation magnetic flux density or resistivity.

2) Fundamental of measurement

[Figure.2]is differential transformer electric circuit. Magnetize primary coil into an A.C on the differential transformer. According to core's displacement it will show D.C signal after check the secondary sign of proportional change.

When the Core is on the center of Coil[Figure.2] out voltage is 0(Zero) and it will change directly according to the Core's displacement.

After Being taken out voltage passes through the Amplifier and Filter circuit, the user will get the final rectified voltage which is based on Core's position.



[Figure.2] Signal processor circuit

1.3 System specifications

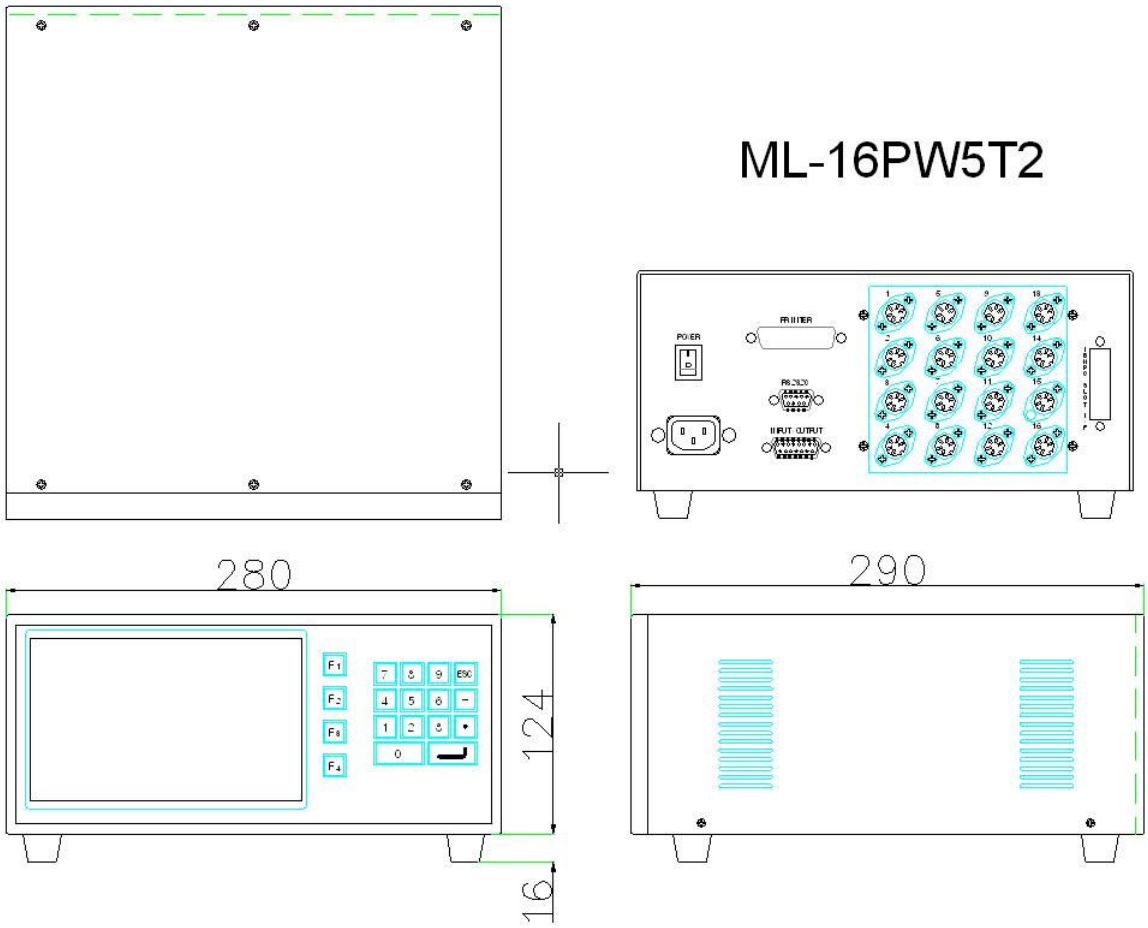
1) General

DIVISION	GENERAL
MAIN SUPPLY	AC100-220V~ 50/60Hz
MAX.POWER CONSUMTION	30W
INNER FUSE	Fuse T2AL 250V
OPERATING TEMPERATURE	5 ~ 40℃
RELATIVE HUMIDITY	Up To 70%
OPERATING CONDITION	NO CORROSIVE GAS AND DUST
SUPPORTING OUTAGE	DATA BACK UP BY INNER FLASH MEMORY

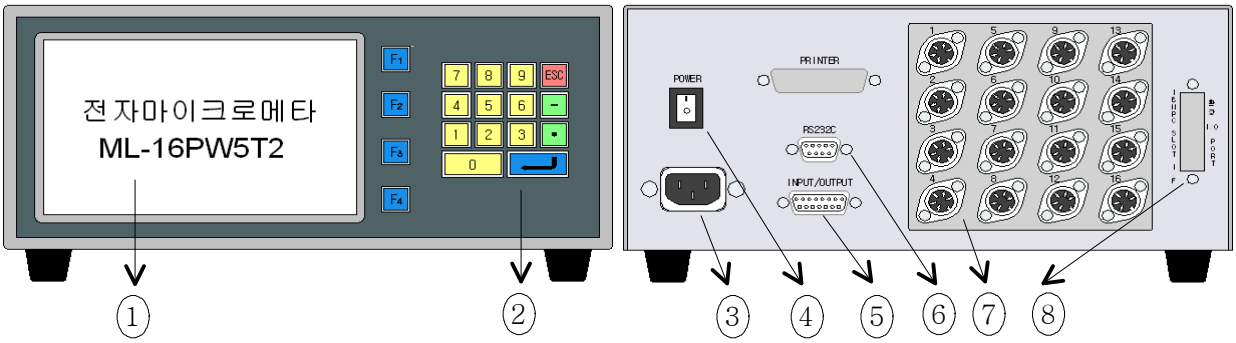
2) Specifications

DIVISION		SPECIFICATIONS
LVDT/HBT (AMP.)	INNER POWER	±12V, +5V, +24V
	PROBE INPUT	MAX 16CH.
	MEASUREMET RANGE	ON MODELS
DISPLAY	LCD	TFT COLOR GRAPHIC LCD
	BACKLIGHT	CCFL
	SIZE	800×480(pixel)
DIMENSION		W280×D290×H124(㎜)
WEIGHT		6㎏
OUTER INTERFACE		RS232C, 9600N81
		PLC I/F(IN:6, OUT:6)

3) Dimension drawing



1.4 Physical Description and functions



1) General features

(1) Liquid Crystal Dispaly(LCD) : displays power readings, menus, and information necessary for operation of the micrometer.

(2) Function and Numeric keys : calibrate master value and set the limit.

(3) Power Plug : connects power cord(include Noise Filter supply for AC220V)

(4) On/Off key : turns the micrometer ON or OFF

(5) Outer interface : connects outer PLC or controller

(6) RS232C connector : serial port for communicating computer or PLC

(7) Displacement sensor(LVDT/HBT PROBE) connector : connect with displacement sensor (Maximum amount:16)

(8) Optional input/output port : expands additional input/outpot contacts

※ Six input and output contacts basically

1.5 Directions for use

- Master setting require Probe's value up to ±100um.
- Before use meter please set the master value for avoiding error.
- Before use meter please inspect the sensor for its useful life.
- If you keep the old meter model without use, inner battery might be discharge also the initial value can be change. It is not a faulty product. Please follow instructions and reset the meter.

1.6 Directions for installation

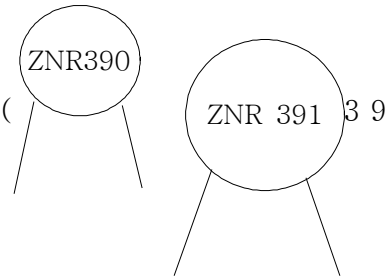
When you install the product must be careful of your micrometer and sensor. It is very sensitive and accuracy. Follow the instructions below to install easily not only our product but also inspection and measurement equipment.

1) The cable of signal of the displacement sensor is treated by shield but it might be influenced by organic voltage, therefore please keep the distance(more than 30mm) all the PLC input/output, motor related, power cabels.

2)Please connect spark killer or varistor(ZNR/TNR) with the induction load power(or signal cable and RELAY, MAGNETIC CONTACTOR, MOTOR, PARTS FEEDER, etc)
when the induction load power on have no problem but off make strong counter electromotive force(20times of power voltage) and it will have affect on results.
Please reduce counter electromotive force for the reliable results.

e.g. 1) USING 24V RELAY : USE ZNR 390($39x10^{0}$)
(or, CUTTING OVER 39V SURGE VOLTAGE)

e.g. 2) USING 220V MAGNETIC CONTACTOR : USE ZNR 391($39x10^{1}$)
(or, CUTTING OVER 390V SURGE VOLTAGE)



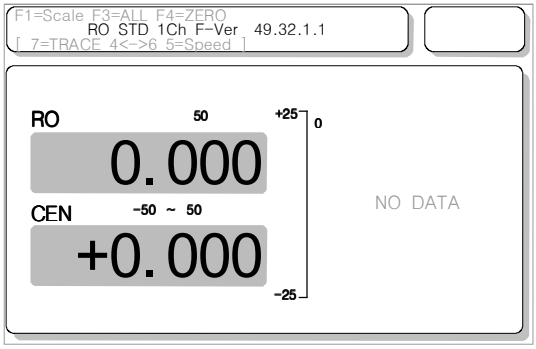
3) In case of using the motor for equipment's operation. This electric force might affect the results. In this case please make mounting bracket to be insulated materials(MC NYLON, BAKELITE)

1.7 Symple discription of measurement screen

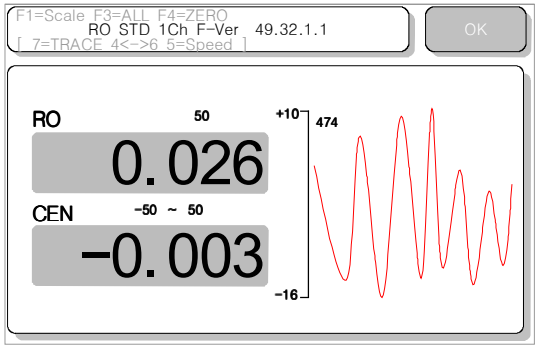
An electric micrometa is a measurement equipment that reads measurements of many displacement sensors real time, analyzes the data, and shows the results in text or graphic form.

If you turn on the power switch on the back of the machine, a measurement screen appears on the front LCD, as shown below. It starts measurement if a START signal is given. If you press the ESC key on the measurement screen, a main menu screen appears as shown below.

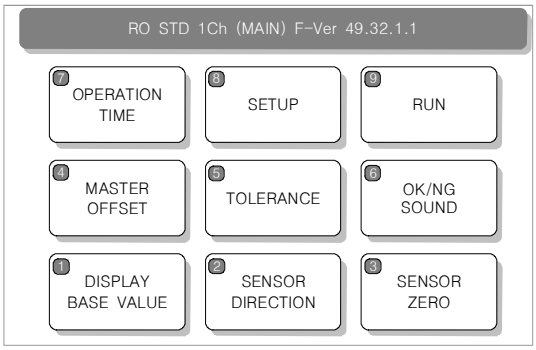
※ *The picture below shows 1 channel. There are slight differences according to products.*



First measurement screen



Measurement screen



Main menu screen

2. Basic Key Functions

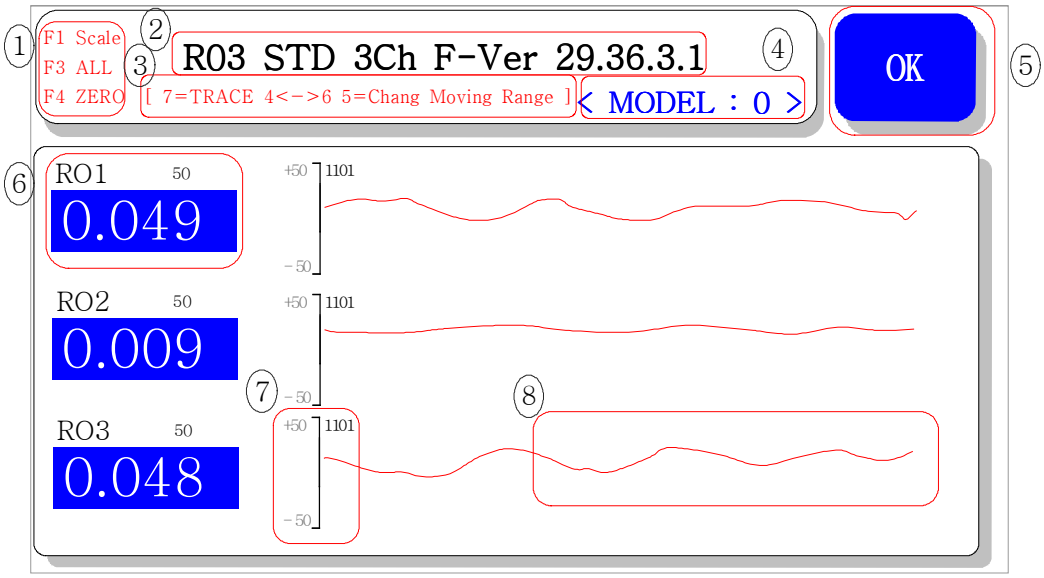
On the front of the machine is a layout of functions keys([F1]~[F4]) and number keys. The functions keys are used to carry out functions shown on each menu screen, or to select a menu. The number keys consist of numbers [0]~[9] and the keys [-], [•], [ESC], [↵]. The number keys are used to input numbers, and the [-] and [•] keys are used to input those signs, and the [↵] key is used to move to the next item when you have finished entering the necessary points in a menu item. The [ESC] key is used when moving to the main menu screen or when you move to the previous menu after finishing setting each menu screen.

Function keys	[F1] [F2] [F3] [F4]	When carrying out each function on a menu screen or selecting a menu
Number keys layout	[0] [1] [2] [3] [4] [5] [6] [7] [8] [9]	When entering numbers into a menu screen
	[-] [•]	When entering minus or a decimal point
	[↵]	In the menu screen : When moving to another item after finishing input for one item
	[ESC]	In the measurement screen : When moving to the main menu In the menu screen :When finishing settings and going back to the previous menu

Table 1. Basic Key Functions

3. About Measurement screen (Run)

The measurement screen is a screen that appears when the power is switched on, and it appears in text or graphic mode, according to the program version.



- ① F1(SCALE) : The measured graph is shown automtically in optimized magnification.
  F3(ALL) : Even cut data is shown when setting F1(SCALE) function and cut functions.
  F4(ZERO) : Zero point is set.
- ② This shows the machine program version currently used.
- ③ This is a function that confirms the position of measured data according to time.
- ④ This shows the model(type) currently used.
- ⑤ This is the result value. OK is shown in blue, NG (Not Good) is shown in red.
- ⑥ This is the item that shows data, measured channel and margin as a result of measurement.
- ⑦ This shows the marked zone and number of data measured.
- ⑧ This shows the amount of displacement according to time of measured data.

The measurement screen consists of measured value, Ro graph, measurement results, etc. You start measurement with an outside start signal, and measure for the set amount of time, and then the results appear on the screen.

The measurement value part shows the Ro(Run-out) value based on the master setting value.

- Ro value: Max-Min of the measured data (Always more than 0).

The Ro graph shows the number of data measured during the time of measurement and graphs according to their values. The graphs are shown within a set marginal value range, but if you press the [F1] button, you can control the scale of the Ro graph.

The measurement results are shown in blue for OK if the measured value is within the marginal range, and red for NG if it is not in the range.

※ *Please see the margin setting part for more information on measurement results.*

Note.

Measured value, Ro graph, measured results etc. appear when measurement ends. The measurement results do not appear on the screen during measurement.

4. About the Measurement Sequence

The measurement process is a repetition of the following.

Measurement standby → measurement start signal recognition (outside start signal) → delayed until the sensor is stabilized → **read sensor → save measured value** → calculate value needed using saved measured value → decide measurement results by comparing measured value with margin → measurement results ouput through outside signal(I/O) and RS232C → measurement results (measured value and graph) shown on screen

The part underlined above continuously repeats itself during the time of measurement, and the evaluation results appear on the screen when the measurement stops, and then the output is made.

※ *Each setting value can be corrected, noting the following.*

5. Display Base Value Setting Method

Display Base Value

P1 MAX	=	0
P1 MIN	=	0
P1 AVG	=	0
P1 CENTER	=	0
P2 MAX	=	0
P2 MIN	=	0
P2 AVG	=	0
P2 CENTER	=	0
P3 MAX	=	0
P3 MIN	=	0
P3 AVG	=	0
P3 CENTER	=	0

UNIT = 1/1000(mm) <MODEL 0>

If you press [1] key on the main menu screen, the screen above appears.

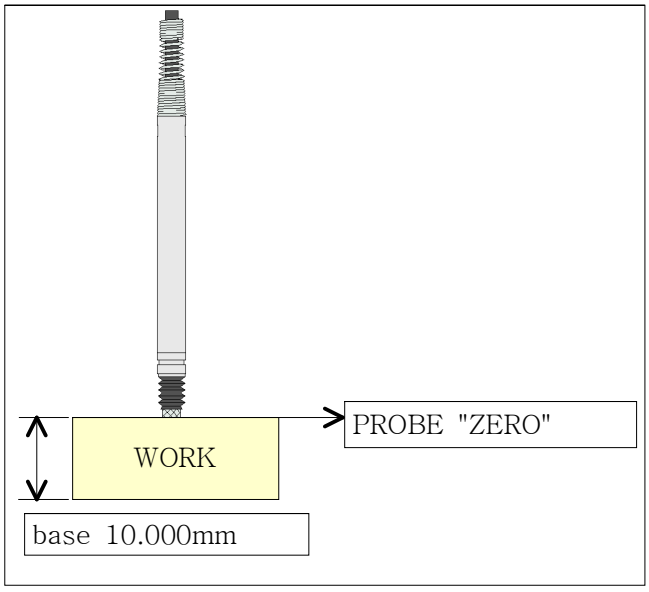
The base value does not have an effect on the measured result(evaluation of OK/NG) and is a value that is entered as a standard for the user's convenience. If you enter a base value, the measured value is added to the base value and shown(refer to below picture).

Value shown on the screen = Base value + Measured value
(master/modified values etc. calculated)

The value that appears on the first screen is the value set before. You can use the number keys [0]~[9] to input a new value. Use the [-] key to input a minus number.

Press the [↵] key to move the cursor to the next item.

If you press the [ESC] key after input, a message appears that it is saving and the screen goes back to the previous menu. The base value setting ends and the sensor value shown is based on the new base value.

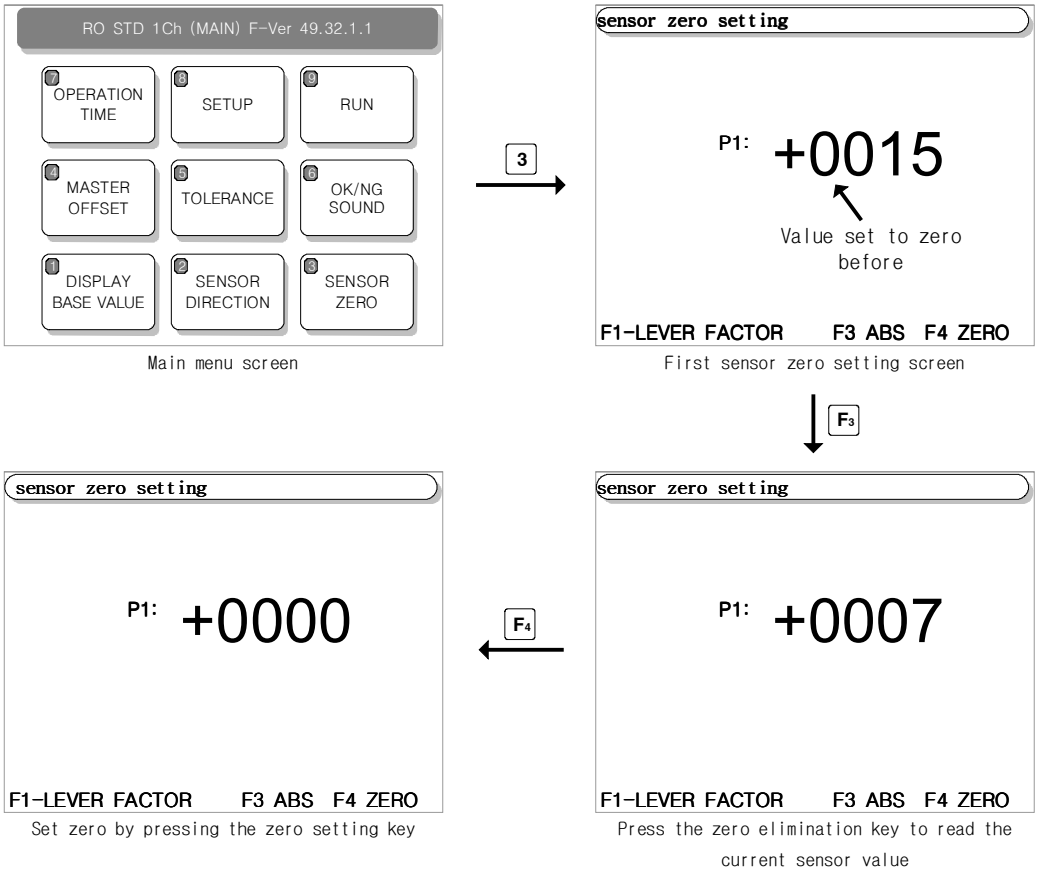


6. Sensor Zero Setting / Master Setting Method

This is the item that sets the sensor's random position to zero. Zero setting is not normally done for run-out measurement, but it is necessary when measuring height ot installing first probe.

If you press the [ESC] key on the measurement screen, you move to the main menu. Press the [3] sensor zero key at the main menu to move to the sensor zero setting screen, and you can set zero.

Before setting to zero, secure the master or product and move the equipment to measurement position.



Main menu screen

First sensor zero setting screen

Press the zero elimination key to read the current sensor value

Set zero by pressing the zero setting key

The sensor value shown on the first sensor zero setting screen is the existing set value. Place the master on the measurement jig or secure the sensor on the zero point setting position and press the [F3] ABS zero elimination key to read the sensor value. You will see the current absolute sensor value. If the sensor value is not within ±100um, adjust the position of the sensor by moving the equipment and make it come within ±100um. The reason for this is to use a good linear zone of the sensor for measurement. After adjusting the position of the sensor, press the [F4] ZERO zero setting key to make the current sensor value 0. If you press the [ESC] key, a message appears, as shown below, that it is saving, and then it returns to the previous menu. The zero setting is complete and the new measured value uses the new setting value.

<Initial installation of PROBE>

Please set the initial position correctly for standing long use and avoiding damage.

Ex) Installation of DP-S4

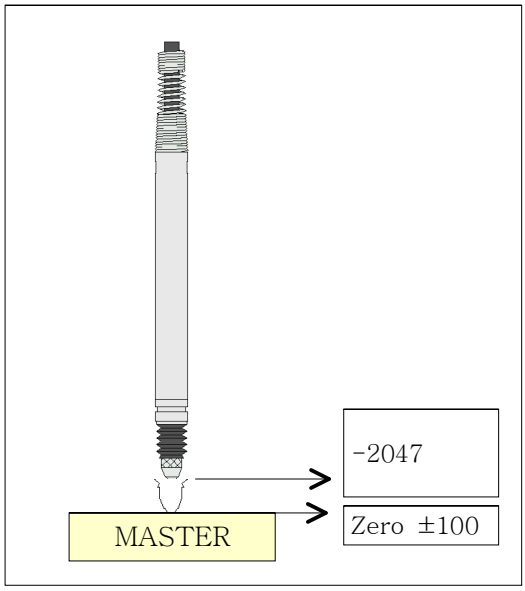
1) Press F3(SCAN) in Master Menu.

You will see the message "-2047" and while moving sensor tip you can check changes.

2) Put the standard(MASTER) and move to sensor Zero position.

3) Adjust measurement value shown LCD within ±100 ㎛ after the sensor install to BUSH.

4) Press F4(ZERO) and ESC to return and store at once.



7. Offset Setting Method

There are two types of offset values.

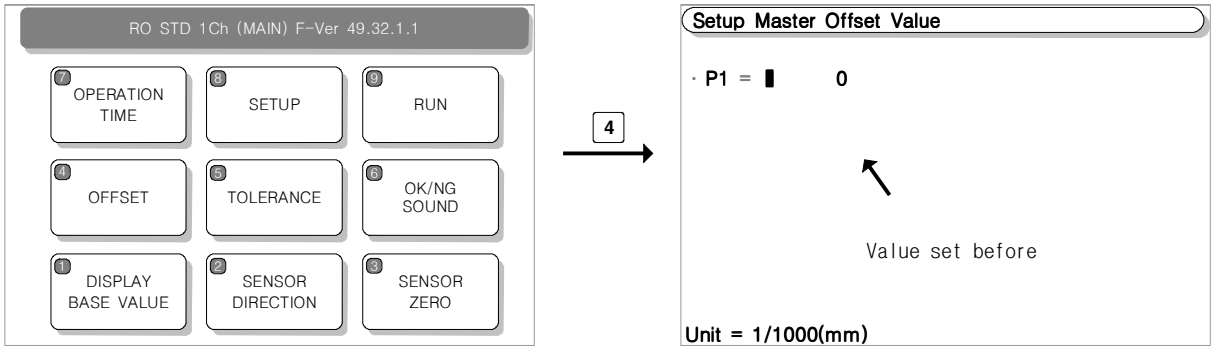
1. Master Offset
2. Runout Offset

The master offset plays the role of modifying the zero setting value by being added to the sensor zero setting value (taken away according to calculation). For example, if the measurement desired is 100um less than the actual measurement, input -100 as the modifying value.

◇ Modifying value to input = Measurement value - Actual value(designed value)

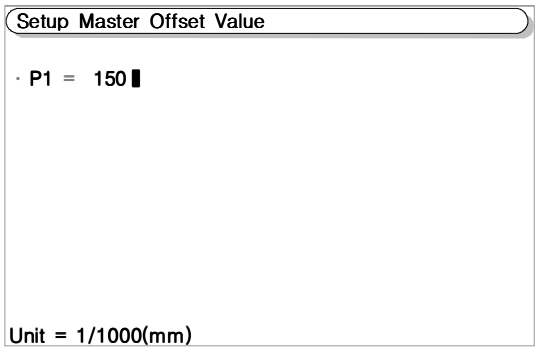
Runout is the difference between the maximum value and the minimum value during measurement, so the master offset does not have any effect on the runout offset, and values such as MAX , MIN , AVR , CENTER etc. are modified. Runout offset is used to modify the runout offset.

Press the [ESC] key on the measurement screen to move to the main menu. Press the [4] Offset key after moving to the main menu to set the offset value.



Main menu screen　　First offset setting screen

If you move to the offset value setting screen, you will see the offset values and the cursor will be blinking.



Input new value with number keys

The value that appears on the screen is the existing setting value. Use the number keys [0]~[9] to input the desired new value. Use the [-] key to input a minus number.

Press the [↵] key to move the cursor to the next item.

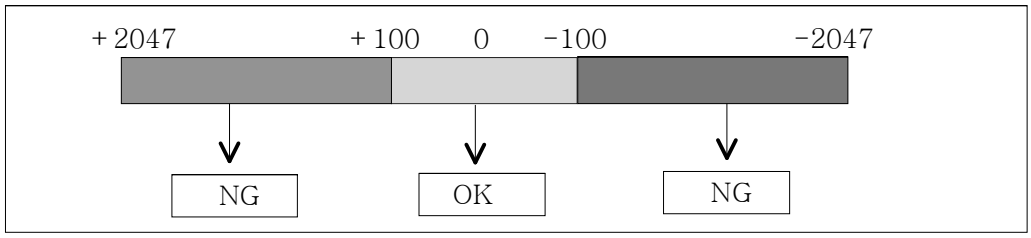
If you press the [ESC] key after input, a message appears that it is saving and the screen goes back to the previous menu. The offset value setting ends and the sensor value shown is based on the new offset value.

※ If the screen does not return to the previous menu from the offset value setting screen, and the power is turned off, the offset value will not be saved.

8. Tolerance Setting Method

Whether the measured result passes or fails depends on the tolerance setting.

If you set the Limit range ±100㎛ that looks like one below it will print "OK"(within Max. and Min.) and "NG"(Out of range).

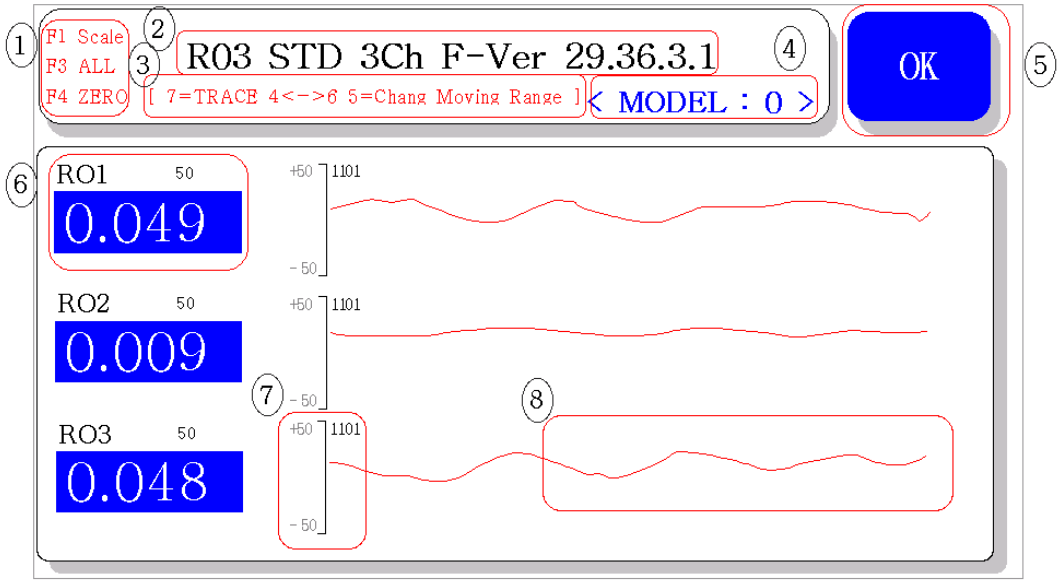


The tolerance item consists of 12 types as shown on the tolerance menu screen below.

Tolerance

1. RunOut(Max-Min) tolerance
2. Average value of measured data tolerance
3. Middle value of measured data tolerance
4. Maximum value of measured data tolerance
5. Minimum value of measured data tolerance
6. Absolute value of sensor tolerance
7. Sensor zero change tolerance
8. RunOut Zero Line
9. Auto Zero after Start

F1. RunOut graph range
F2. Use Auto Scale = No
F3. Runout Low Value Limit



1) RunOut(Max-Min) tolerance : This is the difference between the maximum value and minimum value of the measured data.

2) Average value of measured data tolerance : The average of all measured data is shown.

3) Middle value of measured data tolerance : The middle value of measured data is shown.

4) Maximum value of measured data tolerance : The largest value of measured data is shown.

5) Minimum value of measured data tolerance : The smallest value of measured data is shown.

Only one out of the 4 tolerances, data average/middle/maximum/minimum can appear on the screen at once. If many tolerances are entered, the tolerance with the highest priority is shown on the screen, the order of priority is average/middle/maximum/minimum. However, even tolerances not shown on the screen are used when evaluating results, to take caution. Input all values as 0 if you do not wish to use them.

6) Absolute value of sensor tolerance : It evaluates the highest and lowest numbers based on the absolute value of the probe sensor, so is unrelated to the master zero position. The function is the same as the probe limit of the setup menu.

7) Sensor zero change tolerance :

8) RunOut Zero Line : This item shows a line based on the zero point.

9) Auto Zero after Start : This automatically sets zero and starts measurement when an outside measurement signal is entered.

10) RunOut graph range : This sets the graph range shown.

11) Use Auto Scale : This automatically sets marked area, and if not set, "Runout marked range" must be set.

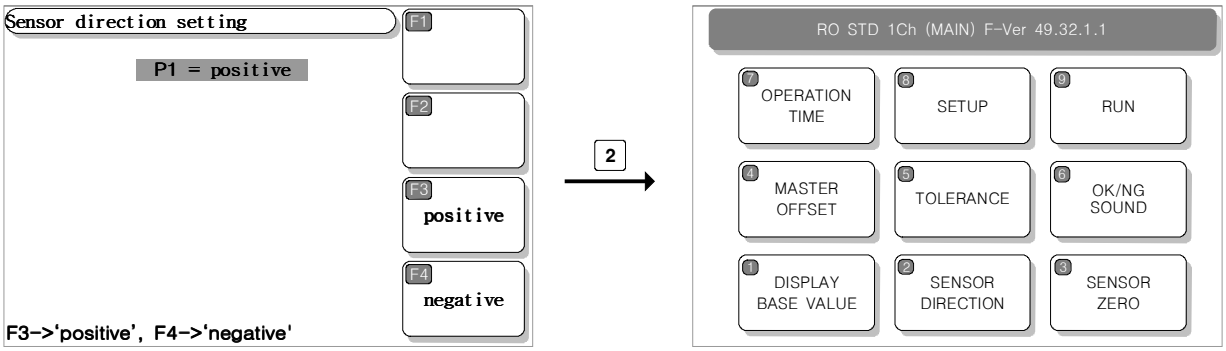
12) Runout Low Value Limit : A lower tolerance is set for the measured data. If the measurement result shows tolerance is lower than the runout value, it fails.

9. Electric Direction of Probe Setting Method

The electric direction of the sensor can be changed to change the measured value shown on the measurement screen.

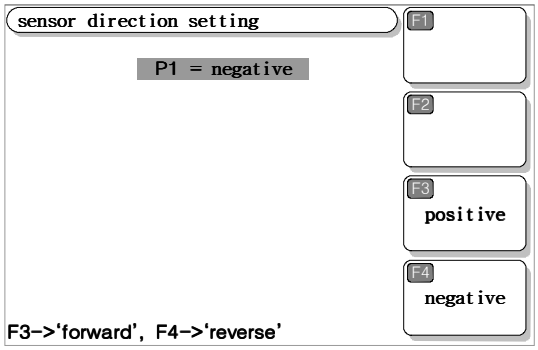
The minus value appears for normal measurement without pressing the sensor's measurement value, and if it is pressed, the value changes to a plus. If the case is the opposite, the opposite direction should be set.

If you press the [ESC] key on the measurement screen, you move to the main menu. If you press the [2] Sensor Direction key and move to the sensor direction setting screen, you can set the electric direction of the probe.



First sensor direction setting screen　　Main menu screen

If you move to the sensor direction setting screen, you will see possible values to set using the function keys.



New direction setting using function keys

The sensor value shown on the first sensor zero setting screen is the existing set value. Use the function keys to change to the desired new setting.

If you press the [ESC] key after input, a message appears that it is saving and the screen goes back to the previous menu. The probe direction setting ends and the sensor value shown is based on the new probe direction.

If the sensor direction setting is changed, the sensor zero setting must be set again.

※ If the screen does not return to the previous menu and the power is turned off, the value will not be saved.

Note!!

> If the sensor direction setting has been changed, the zero setting must be set again. Confirm the offset and tolerance values of the sensor, too, if necessary.

10. Operation Time Setting Method

Probe stable time, output signal hold time and **measuring time** etc. can be set from the operation time item.

1) Probe stable time : After the start signal is entered, the machine delays for the set time and starts measuring.

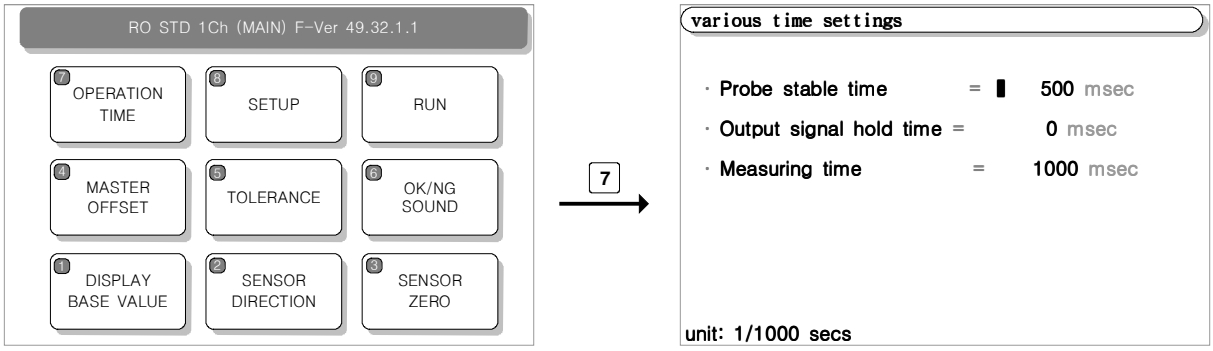
2) Output signal hold time : This is where you can set the time range of measured results (OK/NG) output. If it is set as "0" it outputs continuously until the next measurement starting signal is entered.

3) Measuring time : Measured for the amount of time entered.

4) Start hold time : This is a function used when there is outside noise, so measurement signal is sustained for the amount of time entered.

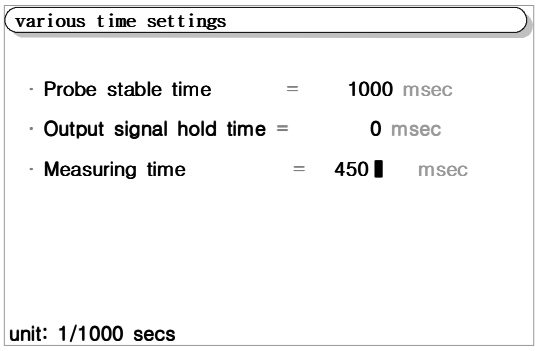
※ *The probe stable time is related to the measurement sequence.*

If you press the [ESC] key on the measurement screen, you move to the main menu. Press the [7] Operation Time key to move to various time setting, and you will see various setting values and a blinking cursor.



Main menu screen

First operation time setting screen



Input new value with number keys

The sensor value shown on the first sensor zero setting screen is the existing set value. Use the number keys [0]~[9] to input a new value. The unit is msec(1/1000second).

Input 0 if a sensor stability time is not necessary, and input 0 as the output signal sustenance time to maintain output signal until the next measurement.

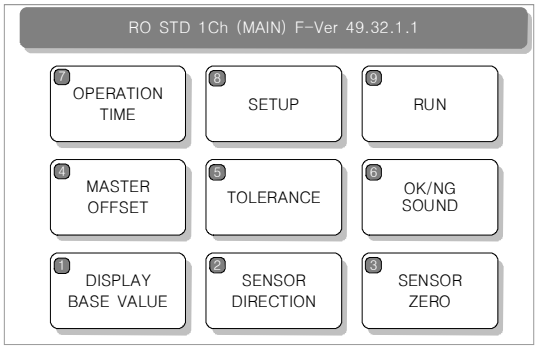
If you press the [ESC] key after input, a message appears that it is saving and the screen goes back to the previous menu. The operation time setting ends and the sensor value shown is based on the new operation time.

※ *If the screen does not return to the previous menu and the power is turned off, the value will not be saved.*

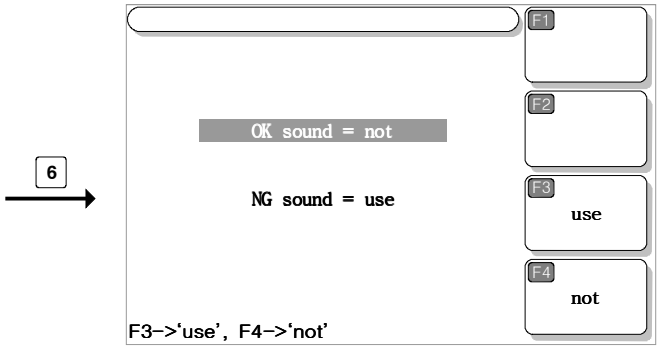
11. OK/NG Sound of Measurement Results Setting Method

The on/off setting of the sound for OK/NG measurement results can be changed.

If you press the [ESC] key on the measurement screen, you move to the main menu. If you press the [6] OK/NG Sound key and move to the sound of measurement results setting screen, you can set the sound.

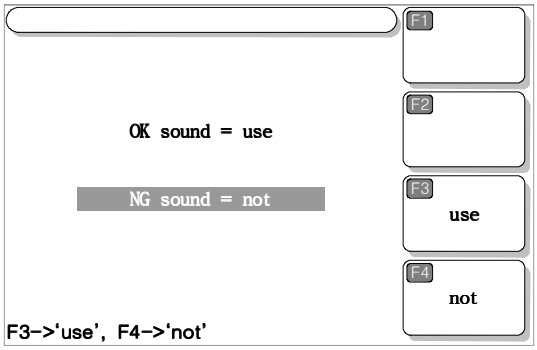


Main menu screen



First sound of measurement results setting screen

If you move to the sound of measurement results setting page, you can see that the possible setting values appear in the function keys.



Change setting using function keys

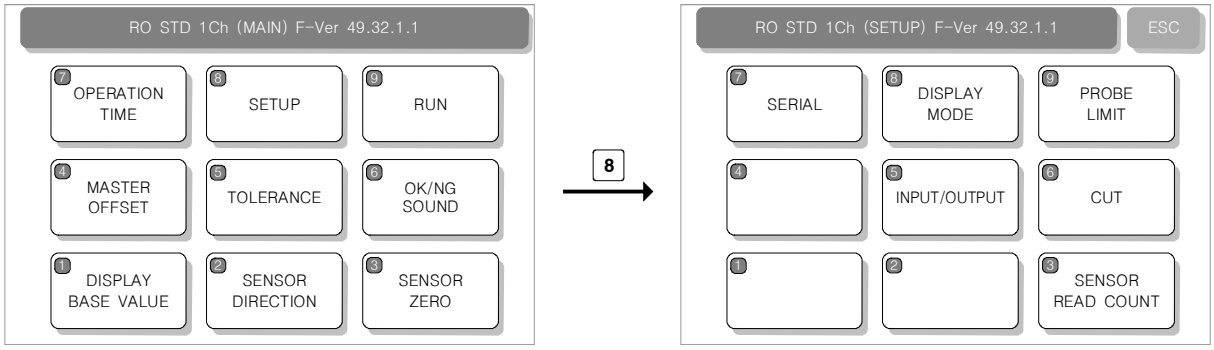
The sensor value shown on the first sensor zero setting screen is the existing set value. Change to a new setting using the function keys where the red cursor is positioned. If you change the setting, the cursor automatically points at the next item.

If you press the [ESC] key after input, a message appears that it is saving and the screen goes back to the previous menu. The measurement result sound setting ends and the new measurement result sound is adopted.

※ *If the screen does not return to the previous menu and the power is turned off, the value will not be saved.*

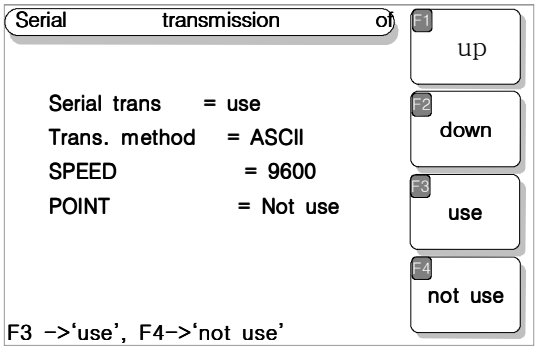
12. Serial Transmission Setting Method

If you press the [ESC] key you move to the main menu. At the main menu, press the [8] Setup key and move to the setup menu to set serial transmission.



Main menu screen　　Setup menu screen

If you press the [7] Serial key from the setup menu, you can confirm possible setting values with the function keys.



Serial transmission of measurement results setting screen

There is no serial transmission data output if the serial transmission item is set as "none."

If the transmission method is "ASCII" it is Ascii method, if "BINARY" it refers to the Binary method.

Transmission speed is set at the speed item. 9600/19200 BPS.

The transmission format of serial transmission is set at the point item. If set as "use" decimal points and base values are included in the transmission data output.

The sensor value shown on the first sensor zero setting screen is the existing set value. If you change the settings, the next item is pointed at automatically.

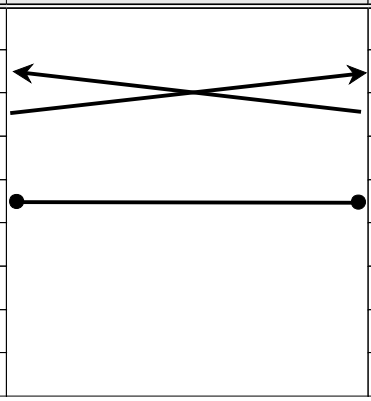
If you press the [ESC] key after input, a message appears that it is saving and the screen goes back to the previous menu. The serial transmission setting ends and the new serial transmission is adopted.

※ *If the screen does not return to the previous menu and the power is turned off, the value will not be saved.*

- Transmit setting

Division	Specification
· Interface · Port	- RS232C - RS232C PORT ⇨ 1 Channel - Asynchronous
· Character organization · Control units · Communication spped · Connection	- DATA BIT ⇨ 8 Bit - PARITY BIT ⇨ None - STOP BIT ⇨ 1 Bit - ASCII Code - 9600 Baud (Fixed) - One

- Cable discription

Elec' micrometer		Direction of signal	Computer	
Signal	Pin No.		Pin No.	Signal
N.C	1		1	DC
RD	2		2	RD
TD	3		3	TD
N.C	4		4	DTR
SG	5		5	SG
N.C	6		6	DSR
N.C	7		7	RTS
N.C	8		8	CTS
N.C	9		9	RI

- Cable of computer serial working terminal - Connect 4P, 6P
Connect 7P, 8P

< Output types for communication >

- HEX Format

STX (1 Byte)	STATUS (1 Byte)	MEASURING DATA (n Byte)	ETX (1 Byte)

(n = Transmit Data Q'ty x 2)

- ASCII Format

If the POINT item is set as "not use" the serial output data format is as follows.

Byte	1	2	1	2	1	5*n+(n-1)	1	1	2	1	1
Char	ENQ	Result	,	Data Num.	,	Data	,	ETX	@@	CR	LF

e.g.) If the measurement result is OK and there are 2 data

1	2	1	2	1	5	1	5	1	1	2	1	1
ENQ	OK	,	02	,	+0043	,	-0025	,	ETX	@@	CR	LF

If the POINT item is set as “use” the serial output data format is as follows.

Byte	1	2	1	2	1	8*n+(n-1)	1	1	2	1	1
Char	ENQ	Result	,	End Point	,	Data	,	ETX	@@	CR	LF

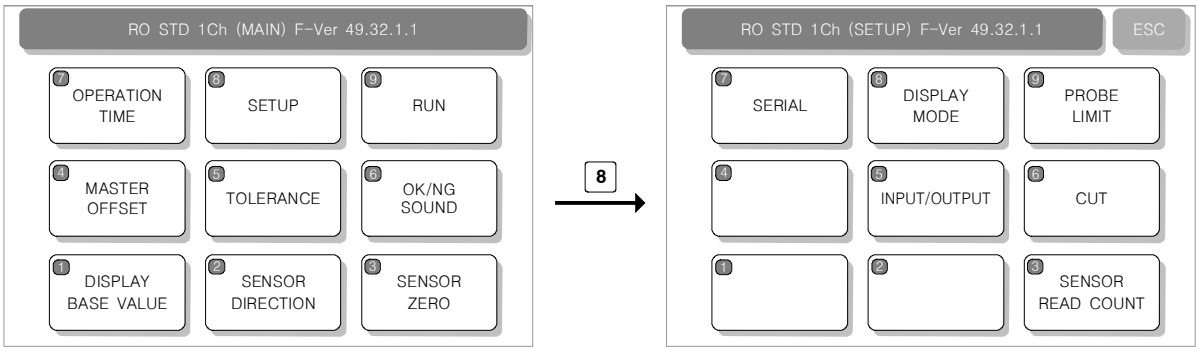
e.g.) If the measurement result is NG and there are 2 data

1	2	1	2	1	8	1	8	1	1	2	1	1
ENQ	NG	,	02	,	+0.932	,	-0.725	,	ETX	@@	CR	LF

13. Sensor Read Count Setting Method

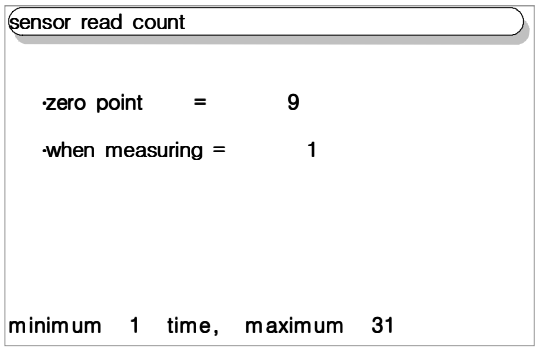
When measuring or setting the sensor zero setting, the sensor value can be red many times to use an average. For example. if the sensor reading is set as 10 times, it is read 10 times and 1 average is calculated.

If you press the [ESC] key from the measurement screen, you move to the main menu. At the main menu, press the [8] Setup key to move to the setup menu and set the sensor read count.



Main menu screen　　Setup menu screen

If you press the [3] Sensor Read Count at the sensor menu, the read count setting screen appears, and a cursor blinks.



Sensor read count setting screen

The sensor value shown on the first sensor zero setting screen is the existing set value. Use the number keys [0]~[9] to input the desired new value.

Input is possible from a minimum of 1 time to a maximum of 31 times.

If you press the [ESC] key after input, a message appears that it is saving and the screen goes back to the previous menu. The sensor read count setting ends and the new sensor read count is adopted.

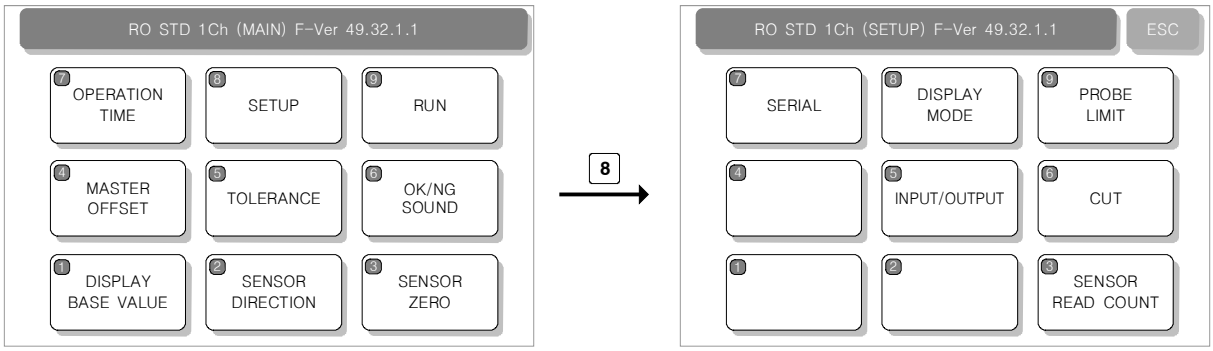
※ *If the screen does not return to the previous menu and the power is turned off, the value will not be saved.*

14. Sensor Probe Limit Setting Method

When measuring with a set sensor absolute value range, the measured result can be made "NG" if it is not in the set range. If setting is not desired, highest and lowest values should be set as 0.

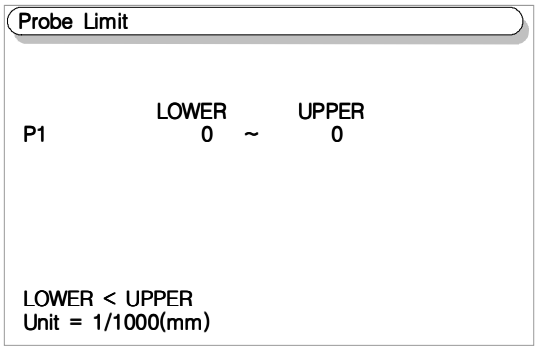
※ *If the sensor value is not within the range, WG and OVER signals output.*

Press the [ESC] key and move to the main menu. Press the [8] Setup key and move to the setup menu, and you can set the limit values of the absolute sensor value.



Main menu screen　　Setup menu screen

If you press the [9] PROBE LIMIT key from the setup screen the PROBE LIMIT setting screen appears with a blinking cursor.



PROBE LIMIT screen

The sensor value shown on the first sensor zero setting screen is the existing set value. Use the number keys [0]~[9] to input the desired new value. The unit is um(1/1000mm). Use the [-] key to input minus numbers, and press the key again to input a plus number.

After entering the lower number, press the [↵] key to move to the upper item.

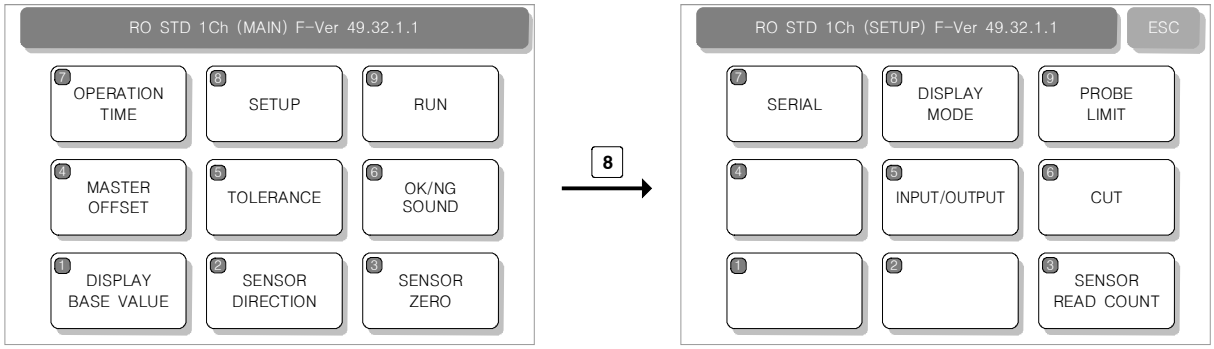
If you press the [ESC] key after input, a message appears that it is saving and the screen goes back to the previous menu. The probe limit setting ends and the new probe limit is adopted.

※ *If the screen does not return to the previous menu and the power is turned off, the value will not be saved.*

The recommended probe limit value that sets the actual measurement limit of the sensor is between -1000 and +1000 for 4mm. It can be expanded to between -1500 and +1500 and used at times. If the measurement range is over 2mm or3mm, a 10mm sensor is recommended to be used instead of a 4mm sensor.

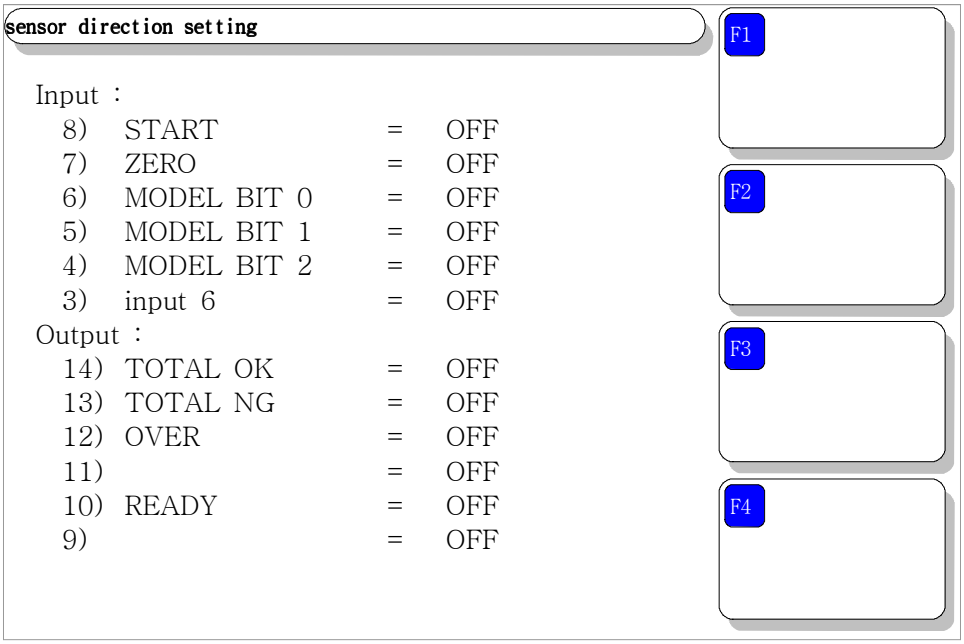
15. Other Settings

Press the [ESC] key from the measurement screen to move to the main menu. Press the [8] Setup key at the main menu to make the following settings.



Main menu screen　　Setup menu screen

5) I/O Test - Function where input and output related tests can be executed.



The condition of the 15 pin D-SUB connector connection, which is the I/O interface, can be tested. If the machine input is output through an outside PLC signal, the condition of the pin can be confirmed. Also, the condition of the output pin can be reversed by pressing the [F1] [F2] [F3] [F4] buttons or the number keys [1] ~ [6].

※All input and output tests are manual and not automatic.

6) CUT - This eliminates undesired measurement values when measuring.

At times, the measured value can appear to be too large due to a temporary big change or dist or other obstruction. In order to prevent this, "noise cut" or "over cut" sets an acceptable range and if a measurement appears that is not within the range, it is ignored.

- NOISE : This can eliminate a lot of noise that can bring temporary changes. If the amount of change is set as a ㎛ unit, the front and back data of change that is more than the set amount is deleted. The deleted data can be confirmed if you press the [F3]

(ALL) button after measurement.

- OVER : This can eliminate huge data which is made by dust. By appointing the particular sector, it can ignore data which is out of the sector. If you input 0 to each 'OVER',it does not work at the level of Channel.

Note!!

Caution for using the dust elimination function! If the remaining data after using the function is 0, the overall evaluation is NG.

8) DISPLAY MODE - This selects whether the measurement result value will be shown as 1/1000 or 1/100.

< Additional functions >

1) Functions that can be used in the measurement screen.

- Measurement function : [↵] key(Same function as the outside measurement start signal)
- Virtual data forming function for demonstration : Button [1] (virtual measurement data appears)
- Move to menu : [ESC]

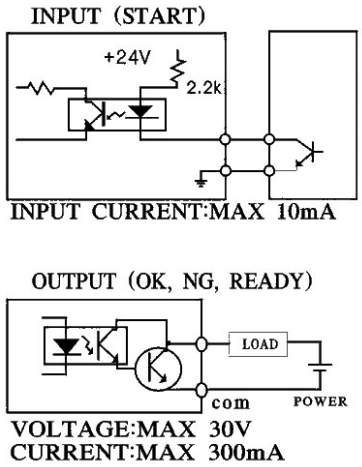
2) Other functions

- Reset function : Turn off the power and turn on the power while pressing the [F4]. A message appears that it is resetting, and if you press the enter key, the machine resets.

※ All contents go back to the state it was in when shipped out of the factory, so take a not of internal setting contents first before resetting.

Appendix - Input and output(Input and output timing)

▶ Input and output pin layout when selecting total OK/NG

Pin	Name	Direction		Explanation	Circuit board
1	NCOMMON		0 V	GND terminal	
3	N.C.				
4	N.C.				
5	N.C.				
6	RECALL	Input	H/L	Serial re-transmission request	
7	ZERO	Input	H/L	Outside zero signal	
8	START	Output	H/L	Measurement start signal	
9	N.C.	Output	H/L		
10	READY	Output	H/L	READY signal	
11	N.C				
12	OVER	Output	H/L	Probe Limit exceed signal	
13	Total NG	Output	H/L	NG signal	
14	Total OK	Output	H/L	OK signal	

▶ Input and output timing