MULTI CHANNEL Elec" MicroMeter

User's manual (STANDARD Version)

Index

※The manual depends on its version.

! Safety cautions !

1) The apparatus should not be exposed to water(dripping or splashing) and no objects filled with liquids, such as vases, should be placed on the apparatus.
2) The mains plug is used as the disconnect device. The disconnect device shall remain readily operable.
3) This equipment shall be connected to mains socket outlet with a protective earthing connection.

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

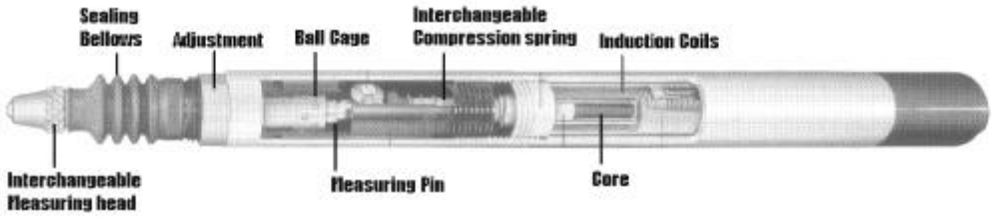
- The sensor is hypersensitive itself and precise.
- It has high resistance to the influence of environment(temperature changes, humidity, etc...)
- Heavy duty, small size and light weight

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 be used by



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

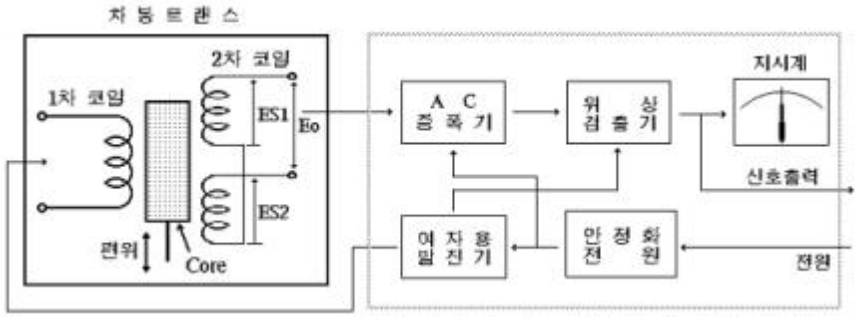
high saturation magnetic flux density or resistivity.

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

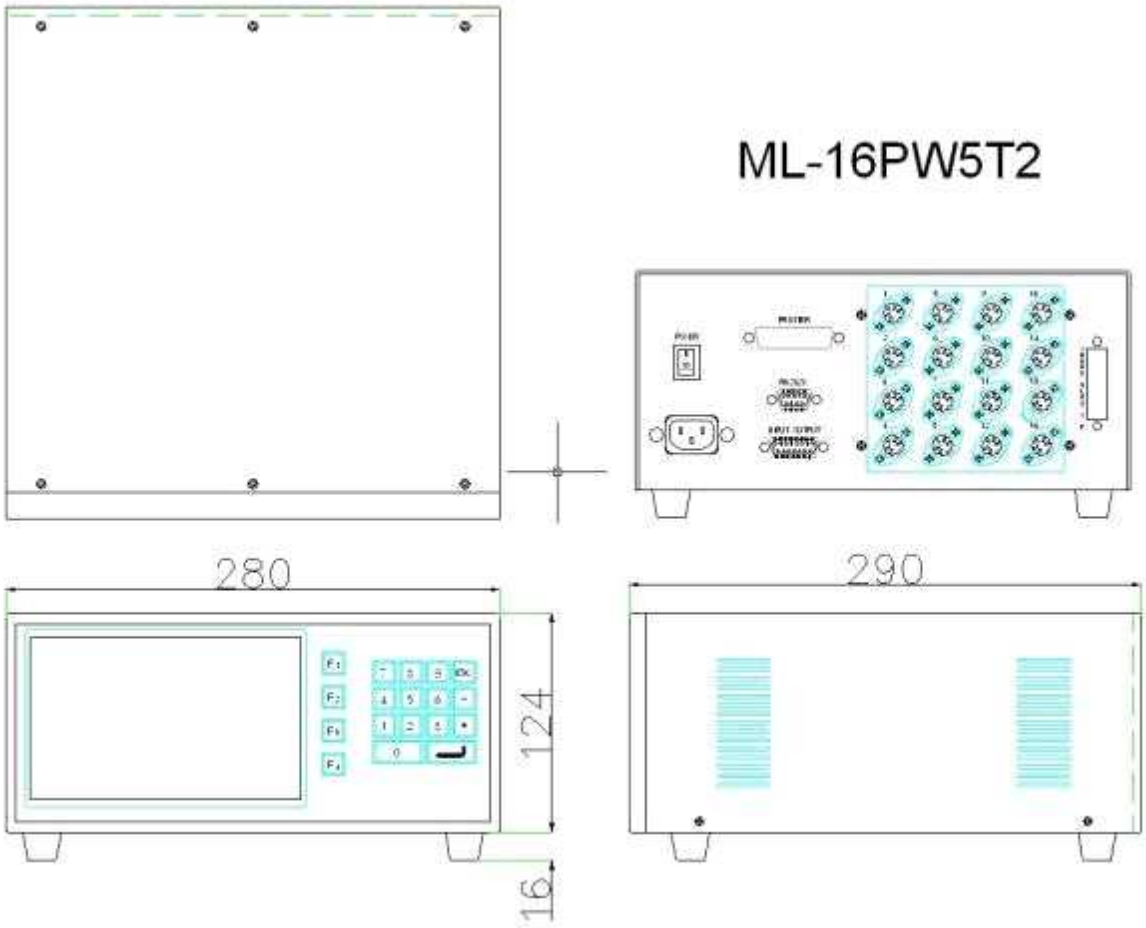
1) General

DIVISION	G E N E R A L
M A I N SUPPLY	AC100-220V~ 50/60Hz
MAX.POWER CONSUMTION	30W
INNER FUSE	Fuse T2AL 250V
OPERATING TEMPERATURE	5 ~ 40℃
R E L A T I V E HUMIDITY	Up To 70%
OPERATING CONDITION	NO CORROSIVE GAS AND DUST
SUPPORTING O U T A G E	DATA BACK UP BY INNER FLASH MEMORY

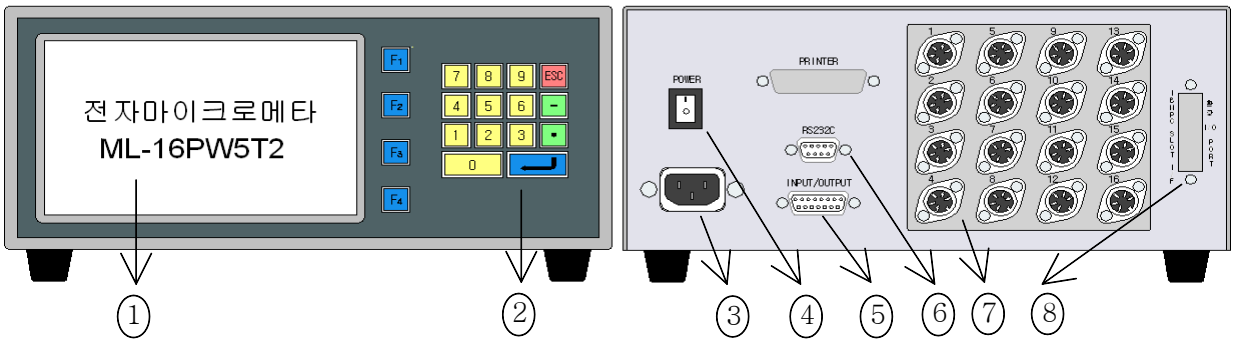
2) Specifications

D I V I S I O N		SPECIFICATIONS
L V D T / H B T (A M P .)	INNER POWER	±12V, +5V, +24V
	PROBE INPUT	MAX 16CH.
	MEASUREMET R A N G E	ON MODELS
D I S P L A Y	L C D	TFT COLOR GRAPHIC LCD
	B A C K L I G H T	CCFL
	S I Z E	800×480(pixel)
D I M E N S I O N		W280×D290×H124(㎜)
W E I G H T		6㎏
O U T E R I N T E R F A C E		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

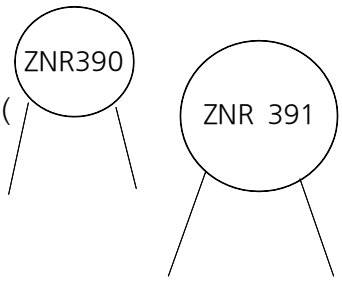
When you install the product must be careful of your micrometer and sensor. It is very sensitive and accuracy. Follow the instructions below to install easily not only our product but also inspection and measurement equipment.

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°)
(or, CUTTING OVER 39V SURGE VOLTAGE)

e.g. 2) USING 220V MAGNETIC CONTACTOR : USE ZNR 391(39x10¹)
(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)

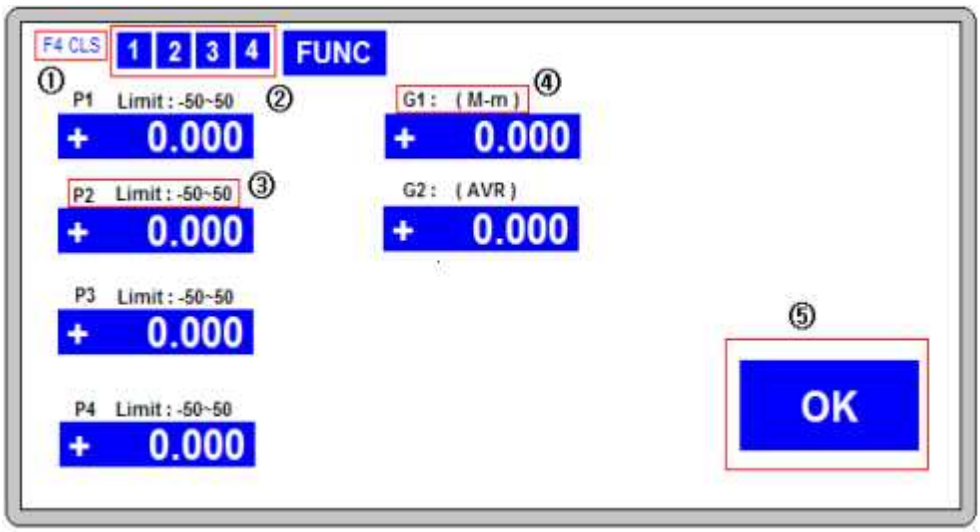
2. Measurement Display

1) Introduction

Elec" MicroMeter can process several displacement sensor's value in real-time and analyze data with printing text or graph.

2) Measurement Display

After press ON button a screen will appear like the one below, which is showed text or graph.



[Figure 1]

① Screen Clear function : Press F4 to road default value.

※ Only make screen clear. It does not make sensor's value zero.

② Probe Limit function : Become red when each sensor is moving out of the measurement limits and than treat its results as NG. You can set the limits and delete with probe limit from the setup menu.

※ When it is purchased it does not set default value.

③ Narrow tolerance for error : Shows narrow tolerance for error you set under channel.

④ Group items : Among other sensor's channel there is a group with random channel.

⑤ Result of decision : OK with Blue light, NG with red light will be showed.

⑥ Model Number : Shows the current model.

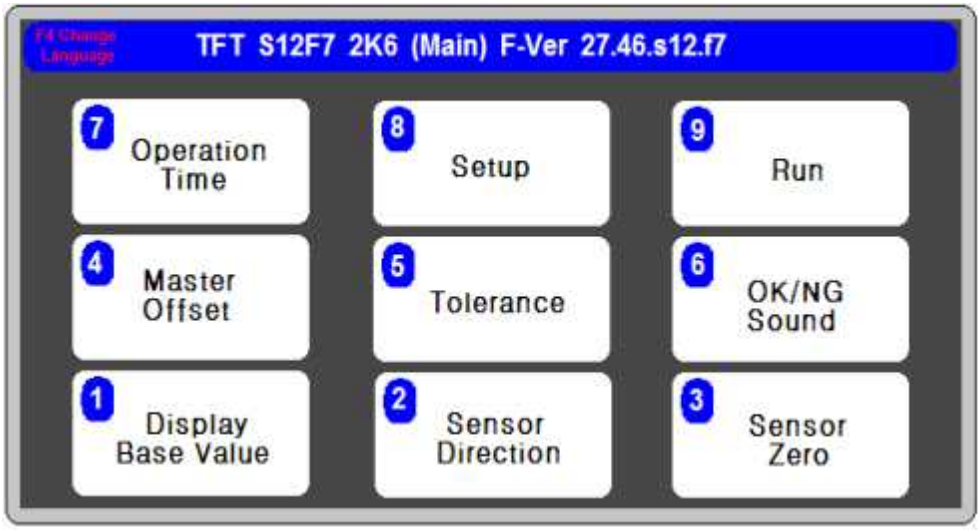
3) Operation keys

There are function keys(F1~F4) and numeral keys in front of meter. (F1~F4): Function keys carry out the function of each menu screen displayed or select menu. Numeral keys arrangement is organized by (0~9)and(-, ·, ESC, ↵). (0~9): These are for numeric input or choosing menu. (- , ·) : Negative number and decimal point.

Fucntion key	F1 F2 F3 F4	Function keys carry out the function of each menu screen displayed or select menu.
Keys arrang-ement	0 1 2 3 4 5 6 7 8 9	These are for numeric input or choosing menu.
	- ·	Negative number and decimal point.
	↵	On meas. screen : Start measuring On main menu : Move next item
	ESC	On meas. screen : Move to Main Menu On main menu : Move to previous menu

Table 1. Basic of operation keys

3. MAIN MENU

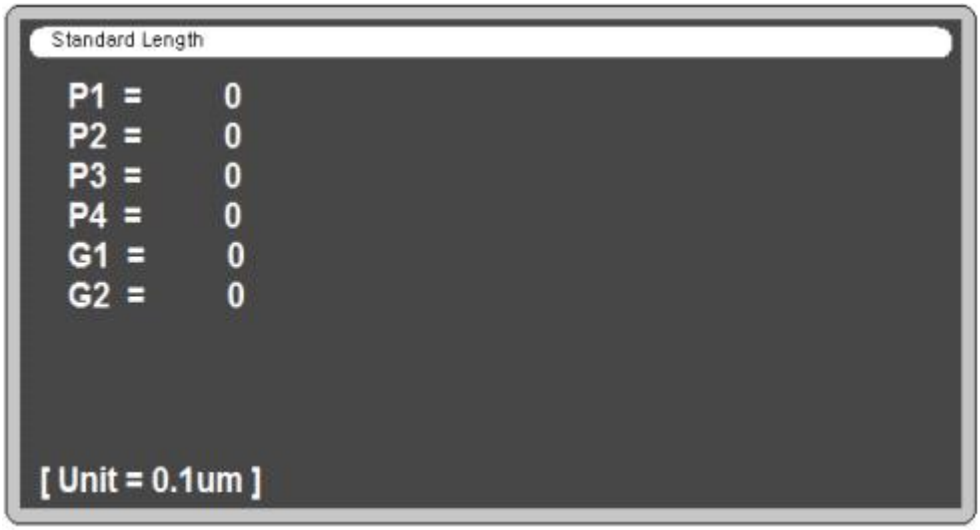


[figure 2]

When the press ESC key. It will show the initial screen.

Any screens can be showed it by pressing ESC key several times.

4. Display Base Value



[Figure. 3]

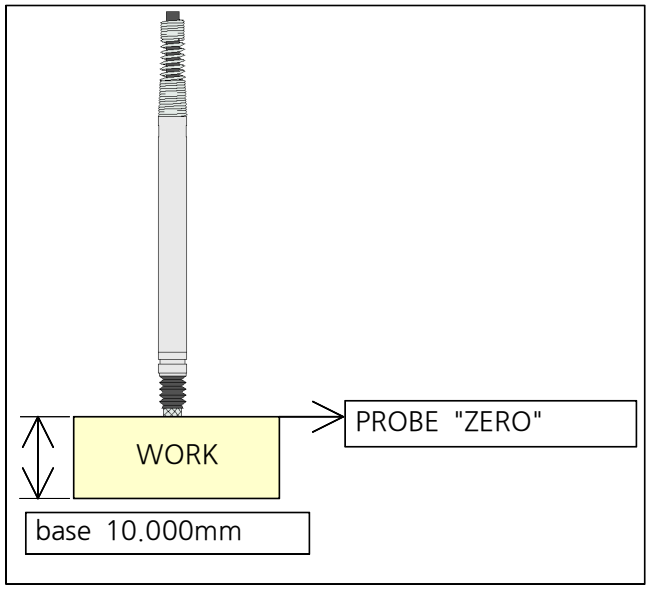
Input product's real value. The screen will appear that measured sensor value adds each input data.

Such as [Figure. 4-3] set the base in that "ZERO" position. Meter will recognize the position "0" and if measures over again it would print out "0.000"

The screen will show the value that the thickness of product is set by setting base value.

예) Display = Base value+
Measurement value
10.500 = 10.000 + 0.500

Notice) Base value does not have influence on result of measurement(OK/NG)



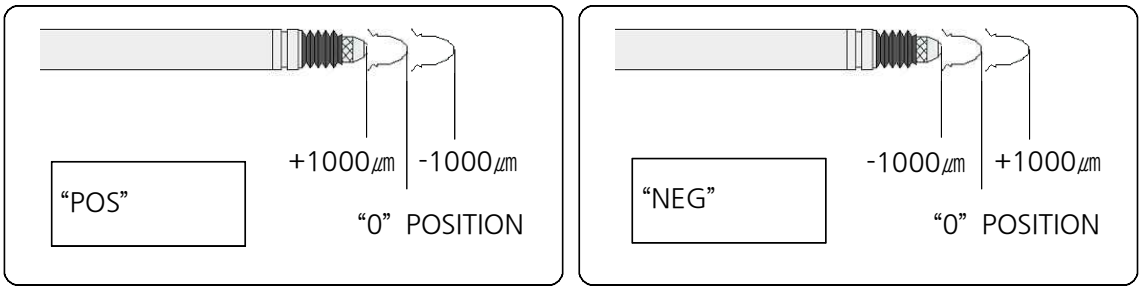
[Figure. 4]

5. Sensor Direction

[Figure. 5]

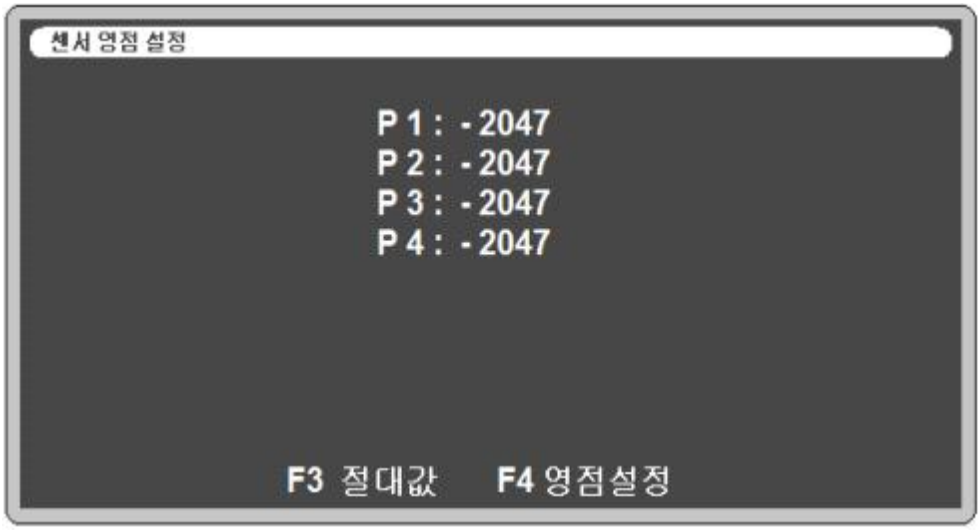
-This menu [Figure. 5] can change sensor's direction to software.
while measuring generally it will set to "-" without setting of sensor's measurement value. if setting starts it will change to "+". In other way please set to "NEG"

Ex) Set the "POS" to make "+" like on the right[Figure. 5-3] and the "NEG" to make "-" like on the left[Figure. 5-3].



[Figure. 5-3]

6. Sensor Zero



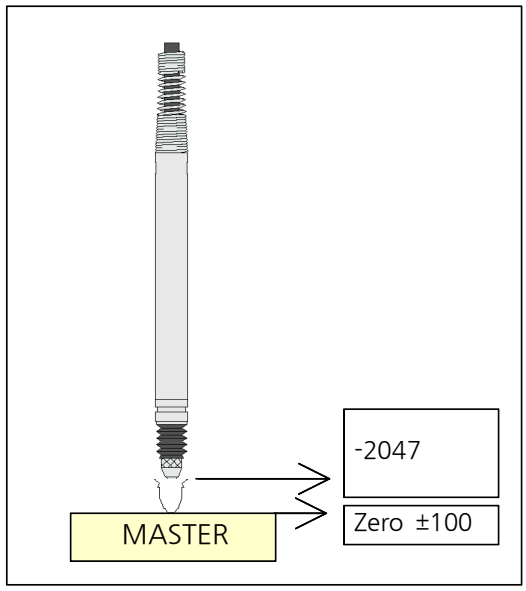
- Press "F1"(SET) to skip from [Figure. 4] to [Figure. 4-1] Master menu.
- Method

Move to the position of measurement after taking MASTER and the meter.

Press " F3 " (SCAN) : Displays sensor's real-time value.

Press " F4 " (ZERO) : Set the zero current position.

※After zeroing if you load the zeroing mode again the screen will appear previous probe's absolute 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

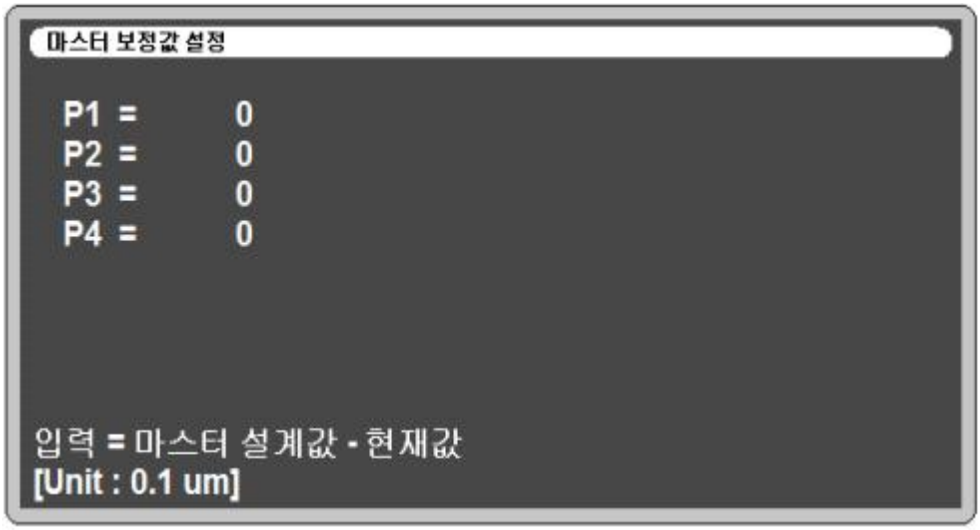
(You will see the message “-2047” and while moving sensor tip you can check changes.

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. MASTER OFFSET



[figure. 6]

- After making Master product if there is the difference between target and measured result, in the case of this it will compensate the difference.

- Method

Ex)

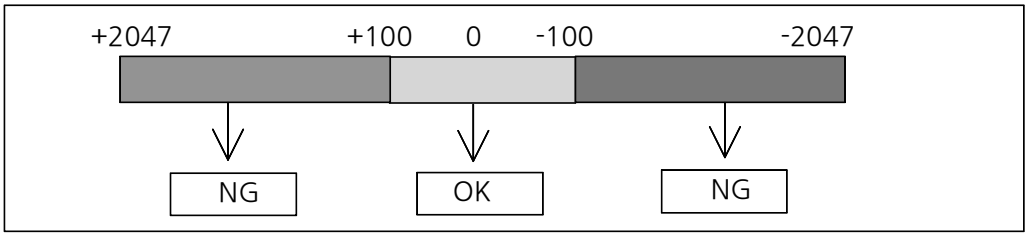
Measured result - Target(Drawing) = Input data
9.900 - 10.000 = -0.100

8. Tolerance

[figure. 7]

- Set Limit : Max. and Min. base value on Master's Zero position.
  and it will be able to print "OK"(within Max. & Min.) and "NG"(Out of range)

- If you set the Limit range ±100㎛ that looks like one[Figure. 7-1] below it will print "OK"(within Max. and Min.) and "NG"(Out of range).



[Figure. 7-1]

9. OK/NG SOUND

[figure. 8]

- It sets sound of OK/NG

1) OK SOUND : when the result of product is ok.

2) NG SOUND : when the result of product is not ok(defective).

10. Operation Time

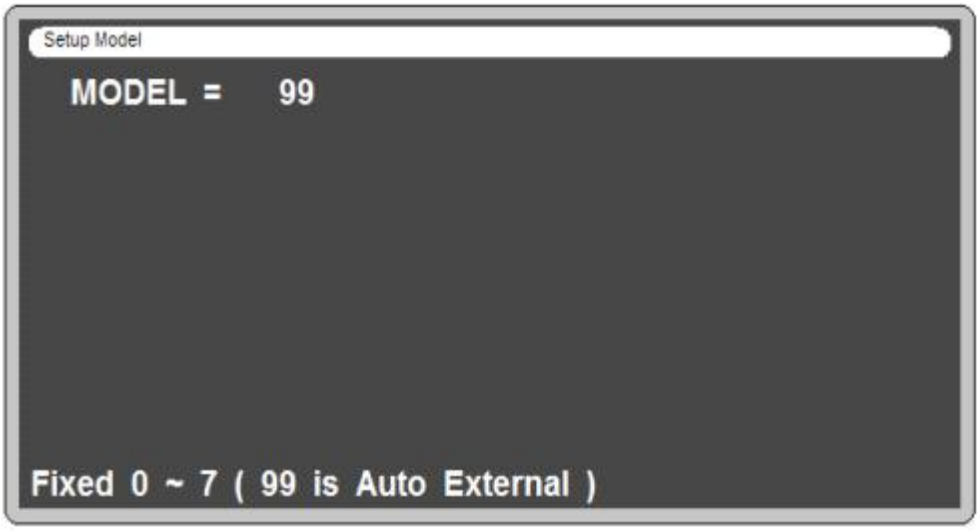
[figure. 9]

-Probe stable time : After receiving sign of start measurement it delays for a moment as you set and it will start to measure.

-Output hold time : After measured by sign of start measurement. it will set the output range of OK/NG.

Set “0” : Continue to print until set the next sign of start.

11. MODEL



[figure. 11]

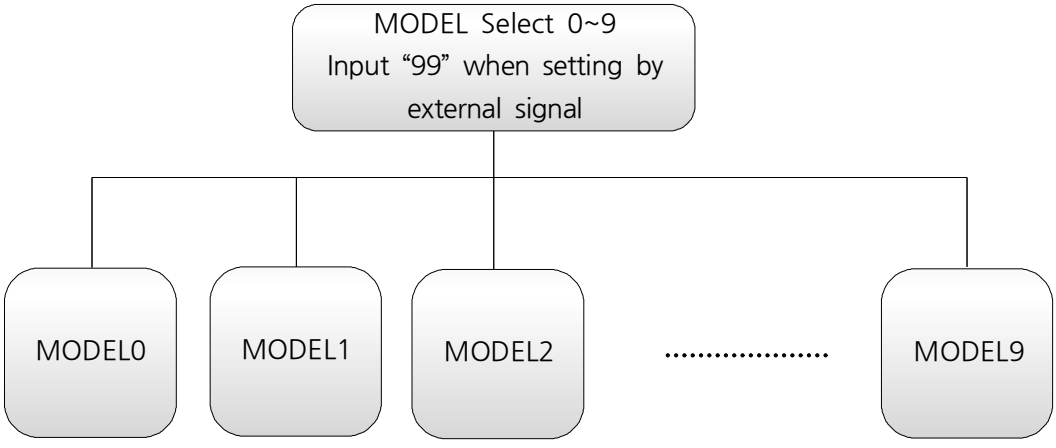
If there are various product which have to inspect, it is possible to manage tolerance, measuring time according to product.

Thare are two method to setting model.

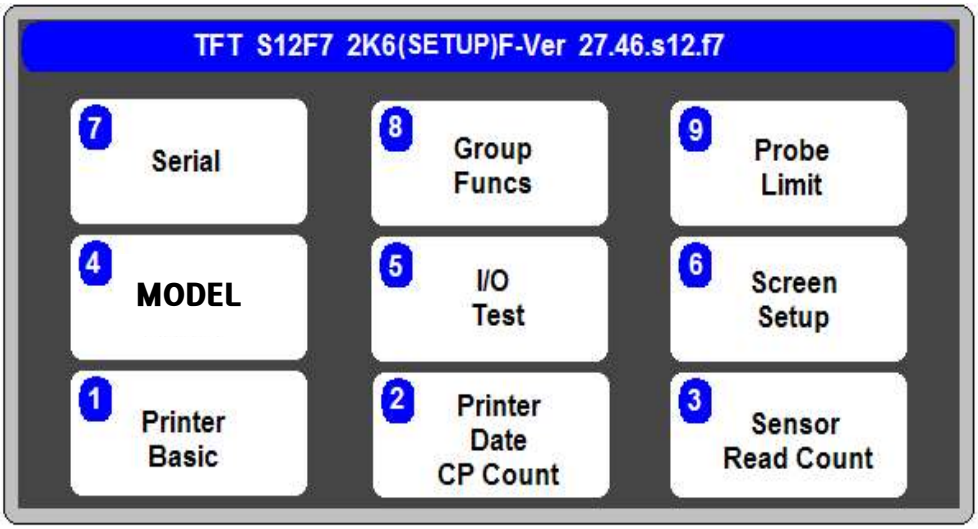
1) Input by number keypad : Input no. of model you want and then set sensor zero, tolerance of model(product). This setting values not change(saved) although the other model be selected.

2) Setting by external input signal : Setting by external input signal after input "99".

※ Refer to I/O configuration in appendix to get more information.



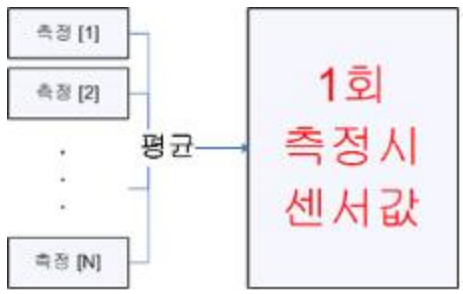
12. SETUP



In setup menu, you can setting additional items.

13. Sensor Read Count

The value is average of sensor value on measuring screen. It can be selected No. of reading in this menu.



14. CONTROL IN/OUT

1) Wait Start off : In case of be selected "YES" Elec' micrometer wait start signal off after measurement. To measure start, the start signal should ON after OFF. This item valid when Auto Measure is not use.

2) Auto Measure : When selected "YES" Elec's micrometer do measuring operarion continuously although there's no start signal by external.

※ Caution! When using Auto Measure, measuring result and data output continuously by serial port & output port(D-Sub 15Pin).

15. I/O TEST

[figure. 12]

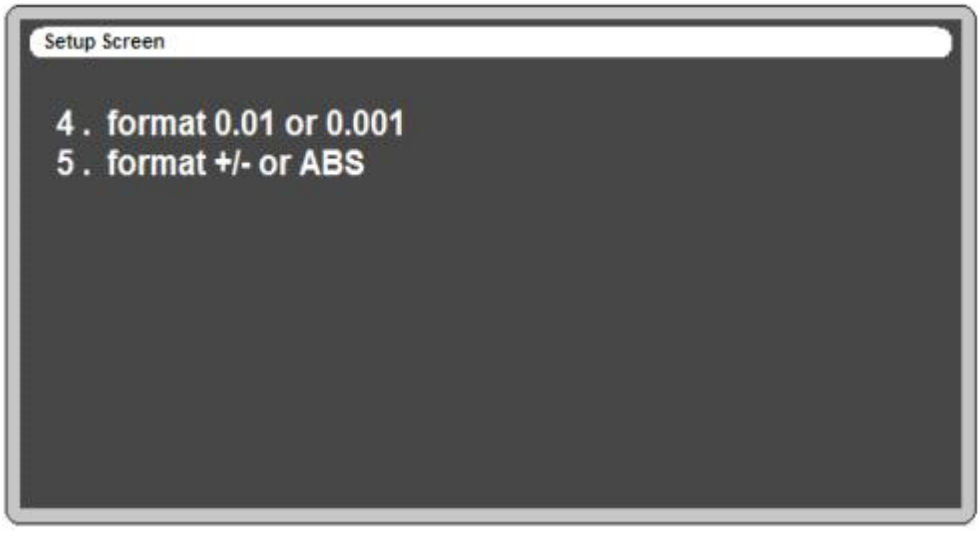
On Setup more, press No. 1 key, appear I/O Test Screen. You can test connection condition of in/output port. You can confirm input condition y output signal on outer PLC.

Input signal is on, "off" change "on".

You can test press F1~F4 key or No.1~6 key.

※ In/Output test is not operating automatically.

16. Display Resolution



[figure. 13]

Display resolution can be selected to 0.01mm or 0.001mm.

17. Serial communication

[figure. 14]

1) Meaning

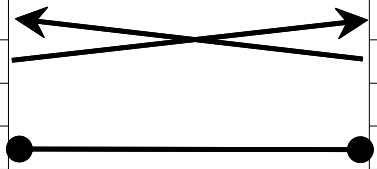
- Send : Turns communication ON or OFF.
- ASCII : Sets Control units.(Off : HEX format.)
- 19200 : Sets communication speed. Use(19200bps)/No use(9600bps)
- POINT : Sets Output format. In case of "USE" output data value include decimal point and bas Base value.

2) 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

3) Cable setting

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

4) 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 / POINT = NO

Byte	1	2	1	2	1	5*n+(n-1)	1	1	2	1	1
Char	ENQ	Start Point	,	End Point	,	Data	,	ETX	@@	CR	LF

ex) In case of No. of Data is 2.

1	2	1	2	1	5	1	5	1	1	2	1	1
ENQ	01	,	02	,	+0043	,	-0025	,	ETX	@@	CR	LF

- ASCII Format / POINT = Yes

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

ex) In case of No. of Data is 2.

1	2	1	2	1	8	1	8	1	1	2	1	1
ENQ	01	,	02	,	+023.932	,	-015.725	,	ETX	@@	CR	LF

18. Group funcs

Each sensing point be grouped for calculation by Group funcs

- Setting method

1) Select group by using function key F1/F2.

2) Press keypad 1 and then the operation type be indicated.

1. Point One	Each sensing point
2. Group Max-min	Maximum value - minimum value of grouped point
3. Value - Value	Point value - Point value
4. Group Sum	Sum value of grouped point
5. Group Average	Average value of grouped point
6. Group Sum /2	Sum value of grouped point / 2
7. Group Max	Maximum value of grouped point
8. Group Min	Minimum value of grouped point

2) Select point which you want to group by using Enter key(moving to cursor : F1/F2). Press Enter key to cancel select.

3) Press ESC to move main menu. Set Tolerance of group.

※ When you setting group function the first time, there's no tolerance of group. So, it is valid when the tolerance has some value.

Ex) G1 : Max-min value of P1, P2, P3, P4

Main Menu -> 8 KEY(SETUP) -> 8 KEY(Group Func) -> 1 KEY(Operation type of G1) -> 2 KEY(Select Group Max-min) -> ENTER(P1~P4 Use) -> Set the tolerance of group -> Move to measuring screen and confirm " G1 (M-m) ".

19. Probe Limit

[figure. 16]

It can be seted range of sensing by using probe limit. The measuring result is "NG" when the value of sensor exceed probe limit.

※ It operated by using absolute value of sensor(Before calculate the zero point).

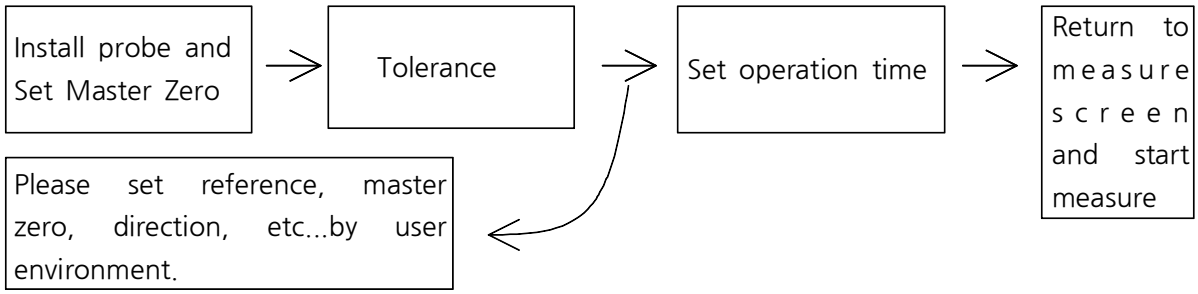
Set lower/upper value to "0" when do not use.

Probe limit set limit of sensing range. In case of DP-S4 series(4 mm) recommanded value of range is -1000 to +1000. If measuring range exceed 2mm ~ 3mm, should use DP-10 series(10mm).

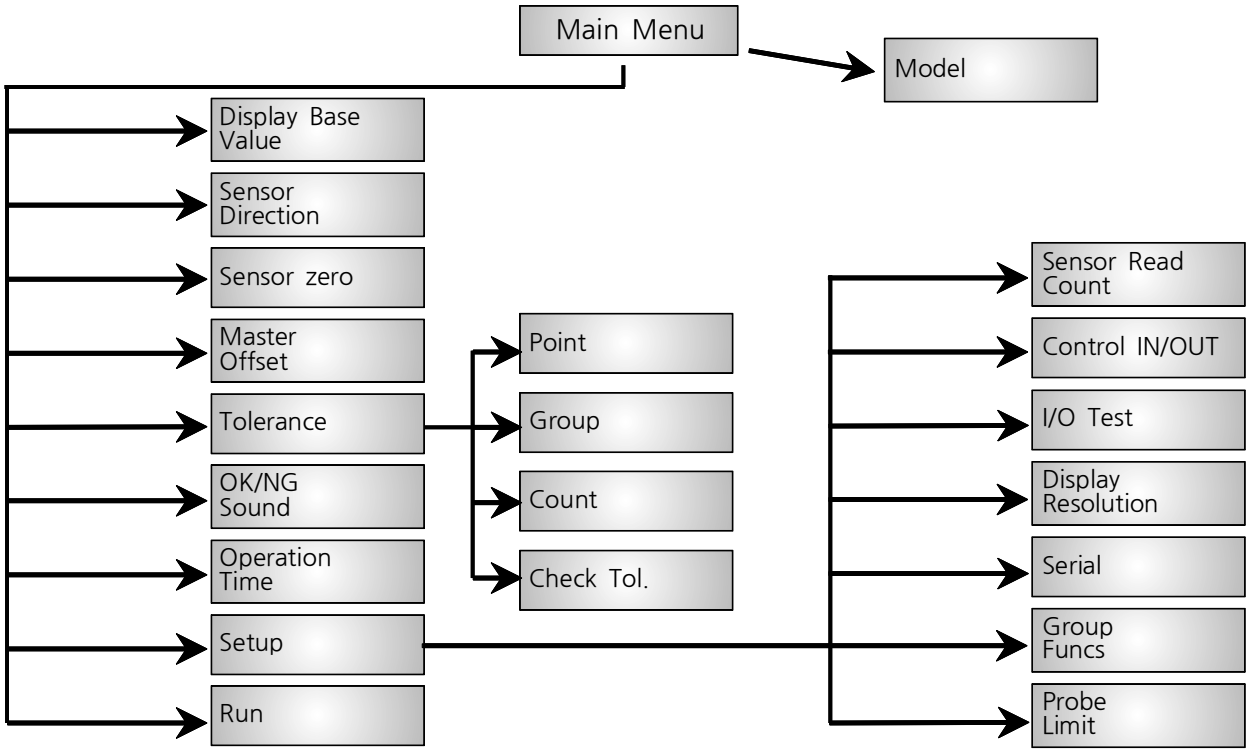
20. Setup and appendices

1. Operation setting

- Oder from installation to measurement.



1) Menu display.



2. Appendices

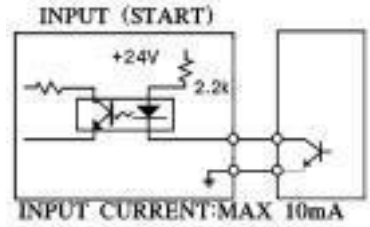
- Reset : Turn off the meter first. Press "F4" and "Power on" at the same time.
  Enter to reset after massage.

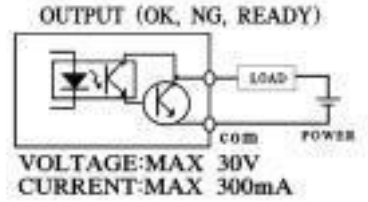
※ Please note your settings before reset. (set as default status.)

21. I/O pin configuration

▶ I/O pin description

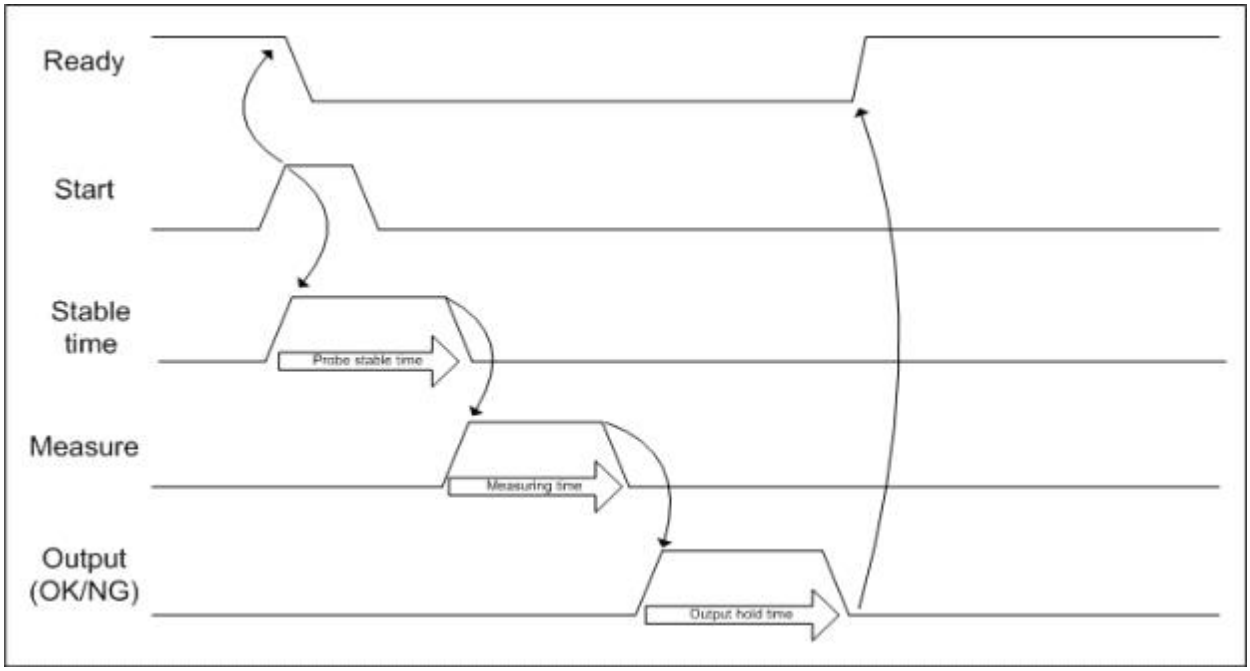
Pin	Name	In/Out		Description	Circuit
1	NCOMMON		0 V	GROUND	
3	RECALL	in	H/L	RECALL serial output	
4	MODEL BIT2	in	H/L	Model control bit 2	
5	MODEL BIT1	in	H/L	Model control bit 1	
6	MODEL BIT0	in	H/L	Model control bit 0	
7	ZERO	in	H/L	Zero signal	
8	START	in	H/L	Meas. Start signal	
9	ERROR	out	H/L	Error signal	
10	READY	out	H/L	READY signal	
11	N.C				
12	N.C				
13	NG	out	H/L	NG signal	
14	OK	out	H/L	OK signal	





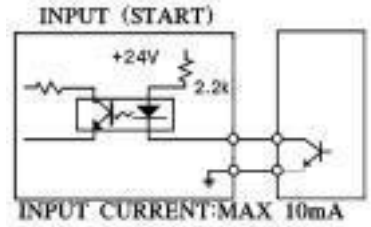
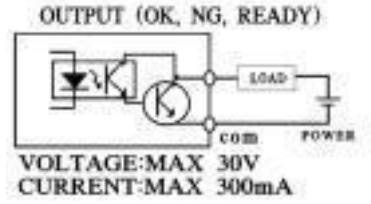
MODEL		4	5	6
MODEL0		OFF	OFF	OFF
MODEL1		OFF	OFF	ON
	...			
MODEL7		ON	ON	ON

▶ Timing diagram



21. I/O pin configuration

▶ I/O pin description

Pin	Name	In/Out		Description	Circuit
1	NCOMMON		0 V	GROUND	
3	MODEL BIT3	in	H/L	Model control bit 3	
4	MODEL BIT2	in	H/L	Model control bit 2	
5	MODEL BIT1	in	H/L	Model control bit 1	
6	MODEL BIT0	in	H/L	Model control bit 0	
7	ZERO	in	H/L	Zero signal	
8	START	in	H/L	Meas. Start signal	
9	ERROR	out	H/L	Error signal	
10	READY	out	H/L	READY signal	
11	N.C				
12	N.C				
13	NG	out	H/L	NG signal	
14	OK	out	H/L	OK signal	

Model	3	4	5	6
MODEL0	OFF	OFF	OFF	OFF
MODEL1	OFF	OFF	OFF	ON
...				
MODEL9	ON	OFF	OFF	ON

▶ Timing diagram