

3 Convenient Setting Features

Initializing Settings

● **Setting Reset** Initialize all settings to the factory-set defaults.

Hold both for 3 sec. or longer

Saving/Reading Settings

● **User Save Function/User Reset Function**

User Save: The current settings are saved.
User Reload: The saved settings are loaded.

User Save Function: [SAVE] → [SAVE YES]

User Reload Function: [rSt] → [rSt USER]

Using the measuring unit reference point/Setting the point at power ON as origin

● **Reference Point Use Setting**

1. Select [Setting Mode] → [Reference Point Use Setting].

ON: The unit automatically waits for the reference point signal. When the reference point is used, turn on the power with the spindle extended as far as possible, and then move the spindle 1.5 mm or more. A measured value is displayed.

OFF: The reference point is set as the position of the measuring unit at power ON, and the measured value is displayed.

The displayed value is the preset value.

* After the setting, turning the power OFF then ON, or searching the reference point again, reflects the reference point use setting to measurement.

* When the reference point use setting is ON, a hyphen mark (-) is displayed until the measuring unit passes the reference point.

Preventing Malfunction

● **Key Lock Function** Disables all the button operations.

Enable/Cancel (The same procedure)

Hold both for 3 sec. or longer

* Press either of UP/DOWN.

● **Reference point search again** (to capture the measuring unit reference point again)

Hold both for 3 sec. or longer

1. Press and hold [MODE] and [NO/NC] buttons for 3 seconds or longer.
* Reference Point Use Setting is ON: The reference point is not acquired yet (hyphen).
Pass the measuring unit reference point. Reference Point Use Setting is OFF: Set the position at execution to the preset value.

● **Preset Function**

Set any preset value for the criteria position and perform measurement and judgment output. The preset value on factory shipment is 0, which can be used for zero-resetting.

Enable

1. Select [Setting Mode] → [Preset Input Value] and set any value.
Press and hold the [MODE] button for 3 seconds or longer to exit the Setting Mode.
2. Under the [Detection Mode], press and hold [ST] and [UP] buttons for 3 seconds or longer.

Cancel

1. Under the [Detection Mode], press and hold [ST] and [DOWN] buttons for 3 seconds or longer.

* When the reference point use setting is ON, the reference position information is saved and can be recovered after power OFF.
* A preset value can be configured within a range from -1999.9999 to 9999.9999 (in 0.0001 step with initial value of 0)
* To prevent EEPROM to reach its life for writing (100,000 times), it is recommended that writing to EEPROM should be turned OFF by selecting [Setting Mode] → [Writing to EEPROM from External Input] if prewriting is performed for each measurement by the external input.

● Status Display

Error Name / Display	Cause	Remedy
Lock ON LoC ON	The key lock function enabled	Cancel the key lock function. → Refer to "3 Convenient Setting Features"
Measured value upper limit error ouEr	The measured value is over the display upper limit (9999.9999).	Review the preset value.
Measured value lower limit error Lo	The measured value is under the display lower limit (-1999.9999).	Review the preset value.
Moving average count unreached ---	The measured values for the number of moving average count is being acquired from the measuring unit.	Please wait until the moving average result is calculated
Reference point not acquired ---	The measuring unit did not pass the reference point.	Have the measuring unit pass the reference point (the point the measuring unit is pressed in by 1.5 mm or more from where it is fully extended).

4-2 Ratings and Specifications

Model	NPN output	MF10-P1
	PNP output	MF10-P2
Control output	2	
External input*4	1	
Minimum display unit	0.1 μm	
Power supply voltage	10 to 30 VDC, including ripple (p-p) 10%	
Power consumption*1	Power supply voltage 24 V: Normal mode: 2040 mW max. (Power consumption 85 mA max.) Power saving ECO: 1920 mW max. (Power consumption 80 mA max.)	
Control output*2	Load voltage: 30 VDC max., open collector output type Load voltage: The total of the two outputs must be 100 mA max. (Residual voltage and load current less than 10 mA: 1 V max.) Load current 10 to 100 mA: 2 V max. Off state current: 0.1 mA max.	
Protection circuit	Power supply reverse polarity protection, output short-circuit protection and output incorrect connection protection	
Number of banks	4	
Ambient temperature range*3	Operating: When lining up 1 or 2 digital tolerance indicators: 0°C to 55°C Storage: -10°C to 60°C (with no icing or condensation)	
Ambient humidity range	Operating and storage: 35% to 85% RH (with no condensation)	
Mass	Approx. 75 g	
Cable lengs	2 m	

1. Power supply voltage 10 V to 30 V:
Normal mode: 2250 mW max. (Power supply voltage 30 V: Power consumption 75 mA max./Power supply voltage 10 V: Power consumption 155 mA max.)
Power saving ECO: 2100 mW max. (Power supply voltage 30 V: Power consumption 70 mA max./Power supply voltage 10 V: Power consumption 135 mA max.)
2. When lining up 4 or more digital tolerance indicators, the 2 output total is 20 mA or less.
3. When used in a row, operating ambient humidity ranges are:
3 to 10: 0°C to +50°C, 11 to 16: 0°C to +45°C, 17 to 30: 0°C to +40°C
4. Details on inputs are as follows:

	Contact input (Relay or switch)	Non-contact input (Transistor)	Input time
NPN output	ON: Short circuit to 0 V (Outflow current: 1 mA max.) OFF: Open or short circuit to Vcc	ON: 1.5 V max. (Outflow current: 1 mA max.) OFF: Vcc-1.5 V to Vcc (Leakage current: 0.1 mA max.)	ON: 2 ms min. OFF: 20 ms min.
PNP output	ON: Short circuit to Vcc (Sink current: 3 mA max.) OFF: Open or short circuit to 0 V	ON: Vcc-1.5 V to Vcc (Sink current: 3 mA max.) OFF: 1.5 V max. (Leakage current: 0.1 mA max.)	

5 Detailed Settings

Hold [MODE] button for 3 seconds or longer to enter Setting mode.

Setting mode provides the function settings described hereafter. The initial display shown after transition from one function to another represents the factory default.

1. **Function Selection** Enabling 4 to 15

Basic setting: FUNC dFLt → Detailed setting: FUNC oPt

2. **Detection Function** Changing Response Time

When the value flickers due to vibration or other factors, the value can be stabilized by averaging.

STND Standard Mode: dtLct Stnd
GIGA Giga Mode: dtLct GIGA
SHS Super High-speed Mode: dtLct SHS
HS High-speed Mode: dtLct HS

	Response time	Average Count	Measurement Cycle
SHS	3 ms	1	1 ms
HS	10 ms	8	1 ms
STND	100 ms	98	1 ms
GIGA	1000 ms	998	1 ms

3. **Output Mode Selection** Specify signal assignment to two output wires.

Normal Output Mode: out nor → out HYbd

Output line	GO Judgment	NoGO Judgment	Error Judgment/Undetermined
Control Output 1	ON	OFF	OFF
Control Output 2	OFF	OFF	ON

Hybrid Output Mode

Output line	HIGH Judgment	GO Judgment	LOW Judgment	Error Judgment/Undetermined
Control Output 1	ON	ON	OFF	OFF
Control Output 2	OFF	ON	ON	OFF

* For NO (Normal Open)
The external output is reversed when NC (Normal Close). The indicator is not reversed.

* If the judgment output mode is [Normal Detection Mode], the output is provided in the [Normal Output] pattern regardless of the setting.

4. **BANK Switching** Set values are saved for each configured bank.

The preset value configured in BANK is reflected when BANK is switched.

5. **Tolerance setting (HIGH)** Configure HIGH tolerance value for tolerance judgment.

The value is used to calculate the HIGH tolerance value for performing tolerance Judgment.

The tolerance value can be set by [MODE] buttons.
(from -199.9999 to 999.9999, in 0.0001 step, with initial value of 0.1)

6. **Tolerance setting (LOW)** Configure LOW tolerance value for tolerance judgment.

The value is used to calculate the LOW threshold value for performing tolerance judgment.

The tolerance value can be set by [MODE] buttons.
(from -199.9999 to 999.9999, in 0.0001 step, with initial value of -0.1)

7. **Reference Point Use Setting** Select whether using the measuring unit reference point or setting the point at power ON as origin.

* Pay attention that this setting is not reflected until the power is turned OFF then ON again or the origin is searched again.

Using measuring unit: rEF on → rEF off
Origin at Power On

8. **Direction** Specify a direction to increment/decrement the measured value.

Normal: drLct nor → drLct rEv
Reverse

For normal (nor) case: The pressing-in direction is +.
For reversed (rEv): The pressing-in direction is -.

9. **Judgment Output Mode** Change the judgment output mode.

Normal Detection Mode: Go Stnd
Area Detection Mode: Go RrER

Area Detection Mode: The threshold values are set as HIGH/LOW. Judgment (display/output) is done with three levels; (HIGH) if the value exceeds the HIGH threshold value, (LOW) if the value falls under the LOW threshold value, and (GO) if the value is within the tolerable range.
Normal Detection Mode: The threshold value is set and the judgment is done for non-defect (GO) or defect (NoGO).

10. **External Input** A type of external input is changed.

When judgment setting [in tUnE] is selected, short circuit time must be the same as the key input time.

in PrSt → in bRnE → in OFF → in tUnE

	1st point	2st point
2-point setting	Less than 3 seconds	Less than 3 seconds
1-point setting ± tolerance setting	3 sec min.	-

11. **Display Digits** Set the number of digits to display under the detection mode.

* Judgment is made for measured value including non-display digit s (in 0.1 μm step).

0.000 | 0.00 | 0.0 | 0.1

0.1 μm step, 1 μm step, 10 μm step, 100 μm step

12. **Preset Input Value**

→ See Preset Function in "3 Convenient Setting Features"

The preset value can be set by [MODE] button.
(from -1999.9999 to 9999.9999, in 0.0001 step, with initial value of 0)
Pressing and holding the button allows quick setting.

13. **Eco Function** Saving Power Consumption

The indicators (white digital) turn OFF.
They turn ON for approx. 10 seconds and then turn OFF by button operation.

14. **Hysteresis width**

Set the hysteresis width. Hysteresis width is provided for threshold to prevent the judgment output from becoming unstable near the boundaries.

* If chattering occurs, check the output stability while setting the hysteresis width.
* Usually, set the value to zero.

The hysteresis width can be set by [MODE] button.
(from 0.0000 to 9999.9999, in 0.0001 step, with initial value of 0.0001)

15. **Writing to EEPROM of External Input**

The settings that have been changed by an external input with "OFF" will not be overwritten to prevent EEPROM from reaching its lifespan (100,000 writings).

inSu ON → inSu OFF

Move to Detection Mode by holding the button for 3 seconds or longer.

Note) After finish the setting, if the measuring unit which measuring length differs is re-connected, the setting value will be initialized.

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4 Maintenance

4-1 Troubleshooting

● **Troubleshooting**

Phenomena	Cause	Remedy
Nothing is shown on the indication.	Is the power supply ON? Are the cables not broken?	Check the wiring and measuring unit, the power supply voltage and capacity. → Refer to "1-2 Input/Output Circuit Diagram".
The digital tolerance indicator restarts during operation.	Is the Eco Function not turned ON?	Turn OFF the Eco function. → Refer to "5 Detailed Settings".
Nothing is shown on the digital indication.	Is the Eco Function not turned ON?	Turn OFF the Eco function. → Refer to "5 Detailed Settings".
Input signal is not received.	Are the external input settings OFF?	Check the wiring and external input settings. → Refer to "1-2 Input/Output Circuit Diagram".
The measured value is not displayed in 0.0001 step	Have the display digits configuration property?	Configure it properly. → Refer to "5 Detailed Settings".
The judgment output is not properly provided	Have the tolerance setting and hysteresis properly configured?	Configure the tolerance setting and hysteresis properly. → Refer to "5 Detailed Settings".
Lost tracking of the settings made.	-	Reset the settings. → Refer to "5 Detailed Settings".

● **Error Display**

Error Name / Display	Cause	Remedy
Load short circuit detection error E-St	The judgment output line is short circuited.	Turn off the power supply, check whether the output line is short circuited or not, and then turn on the power supply again.
Overcurrent protection error E-Hd CUR	A connection error is found in the measuring unit.	Check if the measuring unit is correctly mounted, and turn ON the power supply again.
Digital tolerance indicator EEPROM error E-nE 01	An error is found in the digital tolerance indicator setting memory.	Turn ON the power again. Reset the settings if the error is not corrected.
Measuring unit communications time-out error E-Hd Co n 1	A communications error is found between the measuring unit and the digital tolerance indicator.	Turn OFF the power supply and check if the measuring unit and digital tolerance indicator are correctly connected, and then turn ON the power supply again. If the error persists, the measuring unit or digital tolerance indicator is broken. Replace the measuring unit or digital tolerance indicator.
Measuring unit memory error E-Hd nE n 2	An error is found in measuring unit setting memory.	Turn OFF the power supply and check if the measuring unit is correctly connected, and then turn ON the power supply again. If the error persists, the measuring unit is broken. Replace the measuring unit.
Measuring unit speed error E-Hd SPD	The speed of passing the reference point was too high.	Check that excessive impact is not applied to the measuring unit. Turn ON the power supply again or perform the reference point research. → Refer to "3 Convenient Setting Features"
Measuring unit signal level error E-Hd Lu	A measuring unit circuit failure	Check if the measuring unit is correctly mounted, and then turn ON the power supply again. If the error persists, the measuring unit is broken. Replace the measuring unit.