CKD

MD Series CE UKCA

INSTRUCTION MANUAL

Flow/pressure monitor
MD Series

Read this instruction manual carefully before using this product.
If the using method is mistaken, it may damage the function of the product.
Retain this instruction manual with the product for further consultation whenever necessary.

⚠ CAUTION:

- Do not drop, hit or allow excessives shock. Even if switch body appears undamaged,internal components may be broken and can cause malfunction.
- Turn power off before connecting wiring. Wrong wiring or short circuit will damage and/ or cause malfunction.
- Do not use in environment containing steam or oil vapor.
- Wiring for this product should avoid power source line and high voltage line.
- If use in the same circuit, noise may cause malfunction.
- Please use with an instruction manual of the sensor side about a connected sensor.
- Before using this product ,make sure to set the range and unit according to the instruction.

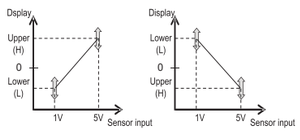
A. SPECIFICATIONS

Display	Flow/ pressure range (※)	Upper(H)	-100.0 ~ 0	1.000 ~ 0	1.50 ~ 0	2.00 ~ 0	4.00 ~ 0	5.00 ~ 0	10.00 ~ 0	12.0 ~ 0	20.0 ~ 0	25.0 ~ 0
		Lower(L)										
		Resolution	0.1	0.001	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1
		Upper(H)	32.0 ~ 0	50.0 ~ 0	60.0 ~ 0	100.0 ~ 0	200 ~ 0	300 ~ 0	500 ~ 0	1000 ~ 0	1.000 ~ -1.000	2.00 ~ -2.00
		Lower(L)										
		Resolution	0.1	0.1	0.1	0.1	1	1	1	1	0.001	0.01
		Upper(H)	5.00 ~ -5.00	10.00 ~ -10.00	20.0 ~ -20.0	50.0 ~ -50.0	100.0 ~ -100.0	200 ~ -200	500 ~ -500	1000 ~ -1000	300 ~ -100	980 ~ -100
		Lower(L)										
		Resolution	0.01	0.01	0.1	0.1	0.1	1	1	1	1	1
	Unit (※)	Provided with scaling function										
		MPa	kPa			mL/min		L/min			m^3/min	
Power supply voltage		12 to 24V DC ± 10%, Ripple (P-P) ≤ 10%										
Current consumption		≤ 40mA (with no load)										
Sensor input		1 to 5V or 4 to 20mA										
Supply current to sensor		MAX100mA										
Switch output		NPN : Transistor, open collector 2 outputs Max. load current : 125mA Max. supply voltage : 30V DC Residual voltage : ≤ 1.5V					PNP : Transistor, open collector 2 outputs Max. load current : 125mA Max. supply voltage : 24V DC Residual voltage : ≤ 1.5V					
Repeatability (Switch output)		±0.1%F.S. ±1 digit										
Hysteresis	One point set mode Hysteresis mode Window comparator mode	Adjustable (※)										
Response time		≤ 2.5 ms (Chattering-proof function : 25ms, 100ms, 250ms, 500ms, 1000ms,1500ms selectable)										
Output short circuit protection		Provided										
Display		3 ½ digital, 7 segment LCD display (Red / Green / Orange) (Sampling rate : 5 times / sec.)										
Indicator accuracy		±1%F.S.±1digit (ambient temperature:25±3℃)										
Switch on indicator		Orange Indicator 1 : OUT1 & Orange Indicator 2 : OUT2										
Analog output(voltage Output)		Output voltage : 1 to 5V ± 2% F.S. (within rated pressure range) Linearity : ± 1% F.S. Output impedance : about 1 kΩ										
Analog output(Current Output)		Output current : 4 to 20mA ± 2% F.S. (within rated pressure range) Linearity : ± 1% F.S. Max. load impedance : 300Ω at power supply of 12V, 600Ω at power supply of 24V Min. load impedance : 50Ω										
Environment	Enclosure	IP40										
	Ambient temp. Range	Operation:0 to 50℃, Storage:-10 to 60℃(No condensation or freezing)										
	Ambient humidity range	Operation/Storage:35 to 85%RH(No condensation)										
	Withstand voltage	1000V AC in 1-min (between case and lead wire)										
	Insulation resistance	≥ 50MΩ (at 500V DC, between case and lead wire)										
	Vibration	Total amplitude 1.5mm or 10G, 10Hz-55Hz-10Hz scan for 1 minute, 2 hours each direction of X,Y and Z										
	Shock	100m/s²(10G), 3 times each in direction of X,Y and Z										
Temperature characteristic		± 0.5% F.S. of detected pressure (25℃) at temp. (Range of 0 to 50℃)										
Lead wire		Ø4 Oil-resistance cable (PVC) - 26 AWG (0.15 mm²) - 5 cores										
Weight		Approx. 67g(with 2meter lead wire)										

※ Flow/pressure range can be selected from 30 patterns. Ranges other these 30 can also be specified using the scaling function.
※ Hysteresis value is adjustable within 1~8 digits for one point set mode and window comparator mode.
※ There are 5 types of units to choose from: MPa, kPa, mL/min, L/min, m³/min.

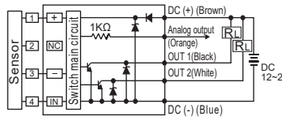
Provided with scaling function

Flow/pressure range of your choice
can be specified using the scaling function.
Number of decimal places can also be changed.
Note: Upper(H) and Lower(L) can be set between ±1999.
However, they cannot be of the same polarity(+ or -).
That is, they cannot be +(or both be -).

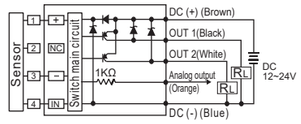


B. OUTPUT CIRCUIT WIRING DIAGRAMS

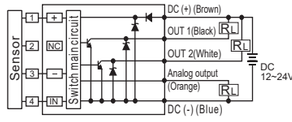
MD-NV
2NPN+Analog(Voltage) output



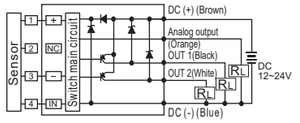
MD-PV
2PNP+Analog(Voltage) output



MD-NA
2NPN+Analog(Current) output



MD-PA
2PNP+Analog(Current) output



C. ORDERING INFORMATION

M D - ① N ② V ③ A

① Output specification

N	2 Switch output (NPN)
P	2 Switch output (PNP)

② Analog output

V	Voltage output (1~5V)
A	Current output (4~20mA)

③ Sensortype

A	FSM-V,PPE,PPD3-A
B	WFK3000
C	WFK5·6·7000,WFC

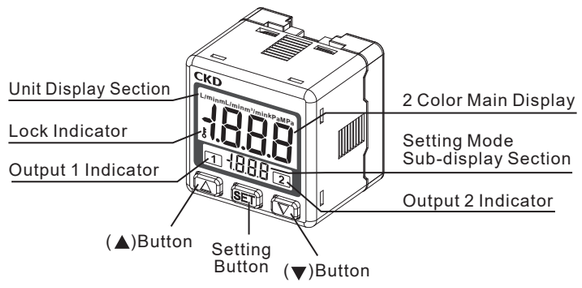
Caution: The voltage output(1-5V) type sensor is supported.

③	AWG	outside diameter	Cover	SUMITOMO 3M model code
A	24-26	Ø1.0-1.2	Yellow	37104-3122-000 FL
B	24-26	Ø1.2-1.6	Orange	37104-3163-000 FL
C	20-22	Ø1.6-2.0	Gray	37104-2206-000 FL

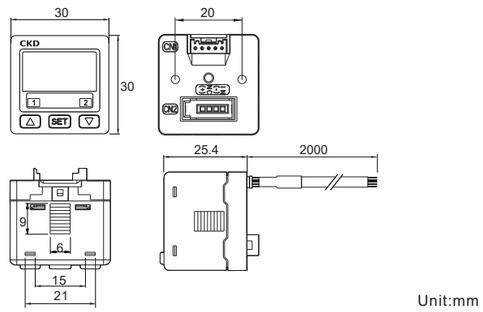
(Accessory)
· 5-core connector cable2m· · · 1
· e-con· · · 1

Optional parts	
MD-KD	axial installation bracket(set screw attached)
MD-KL	radial installation bracket(set screw attached)
MD-KHS	Panel adapter
MD-KHSCB	Panel adaptor+Front protective lid
MD-C2	5 conductor connector cable2m

D. PANEL DESCRIPTION



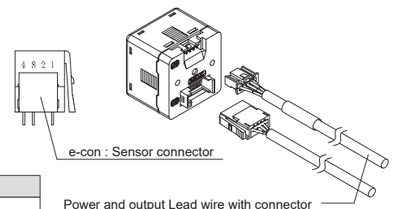
E. DIMENSIONS



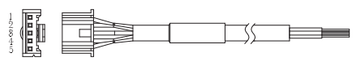
Unit:mm

F. CONNECTOR

PIN No.	Sensor wiring
1	DC+
2	NC
3	DC-
4	IN(1-5V)

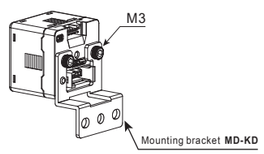


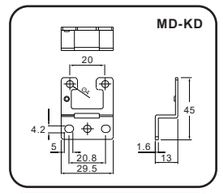
PIN No.	Wire Color
1	Brown (DC+)
2	Orange (Analog)
3	White (OUT2)
4	Black (OUT1)
5	Blue (DC-)

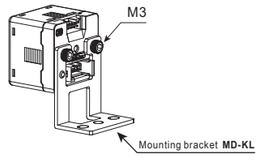


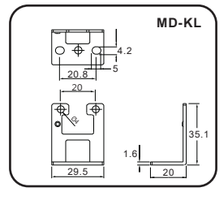
G. OPTIONAL PARTS DIMENSIONS

① Mounting bracket

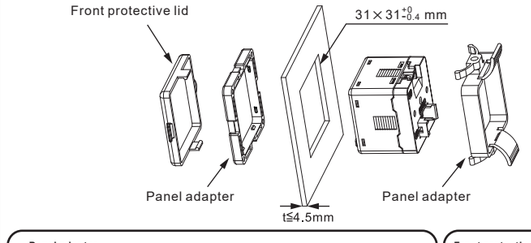


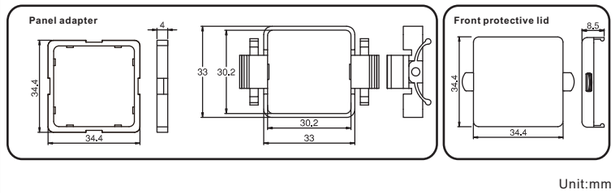






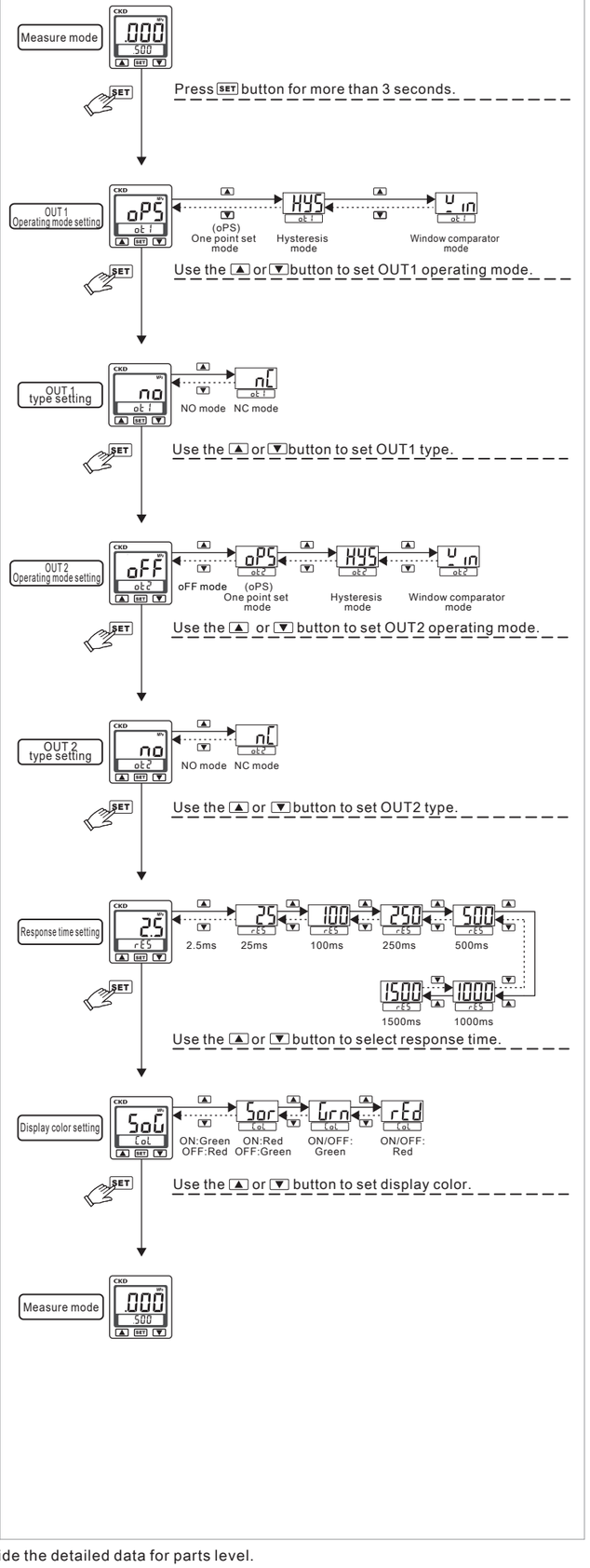
② Panel Mounting



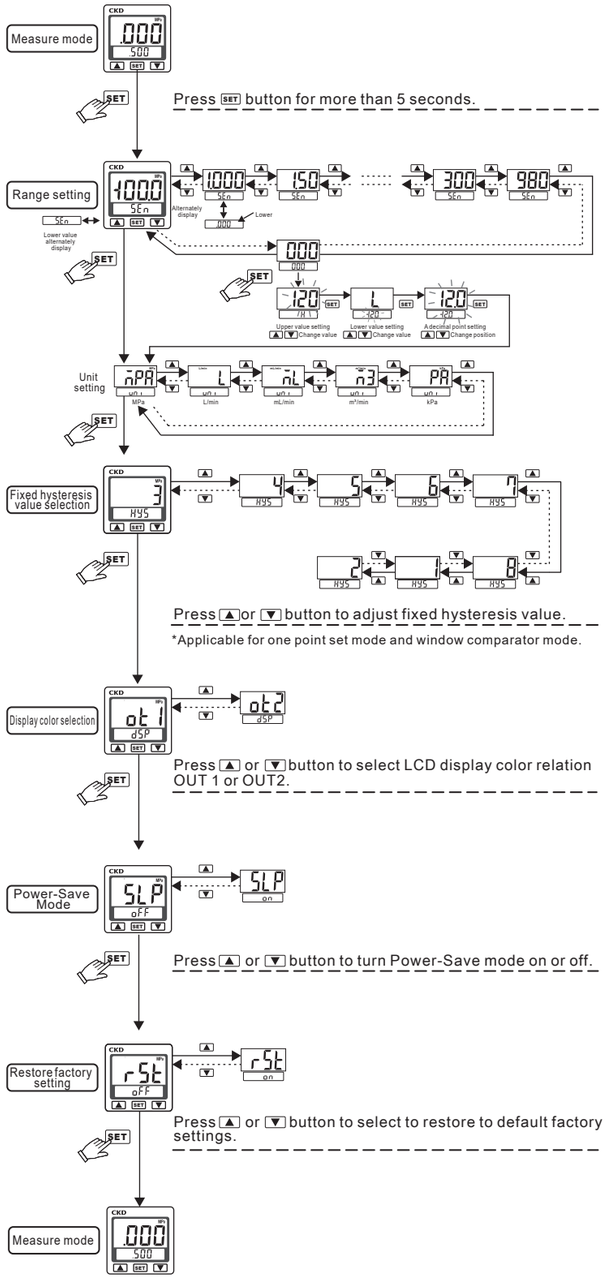


Unit:mm

H. INITIAL SETTING MODE

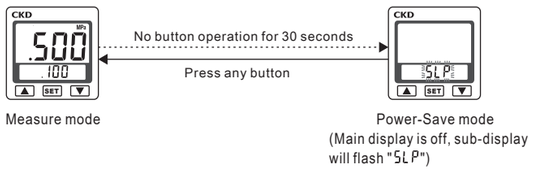


I. ADVANCE SETTING MODE

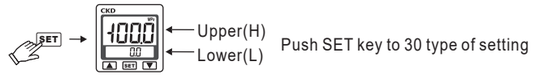


J. POWER-SAVE MODE

◎ During Power-Save mode, the main display will turned off if no buttons is pressed after 30 seconds.
◎ During Power-Save mode, the output LCD's may not be synchronize with the output. It is normal and will not affect output operation.
◎ Press any button to turn-on main display temporarily.



K. RANGE SETTING MODE



Select flow/pressure range setting (30type) by ▲ ▼ key

	1	2	3	4	5
Upper(H)	-100.0 ~	1.000 ~	1.50 ~	2.00 ~	4.00 ~
Lower(L)	0	0	0	0	0
Resolution	0.1	0.001	0.01	0.01	0.01

	6	7	8	9	10
Upper(H)	5.00 ~	10.00 ~	12.0 ~	20.0 ~	25.0 ~
Lower(L)	0	0	0	0	0
Resolution	0.1	0.1	0.1	0.1	1

	11	12	13	14	15
Upper(H)	32.00 ~	50.00 ~	60.0 ~	100.0 ~	200.0 ~
Lower(L)	0	0	0	0	0
Resolution	0.01	0.01	0.1	0.1	0.1

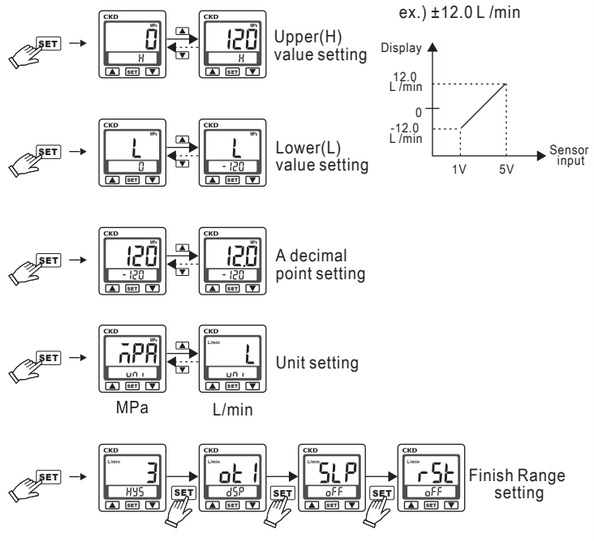
	16	17	18	19	20
Upper(H)	300 ~	500 ~	1000 ~	1.000 ~	2.00 ~
Lower(L)	0	0	0	-1.000	-2.00
Resolution	1	1	1	0.001	0.01

	21	22	23	24	25
Upper(H)	5.00 ~	10.00 ~	20.0 ~	50.0 ~	100.0 ~
Lower(L)	-5.00	-10.00	-20.0	-50.0	-100.0
Resolution	0.01	0.01	0.1	0.1	0.1

	26	27	28	29	30
Upper(H)	200 ~	500 ~	1000 ~	300 ~	980 ~
Lower(L)	-200	-500	-1000	-100	-100
Resolution	1	1	1	1	1

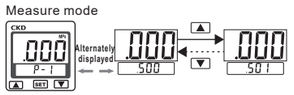
Scaling function setting

	31
Upper(H)	000 ~
Lower(L)	000

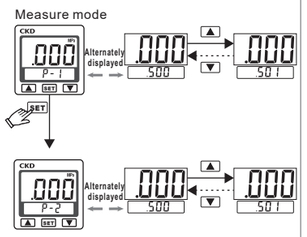


L. FLOW / PRESSURE SETTING MODE

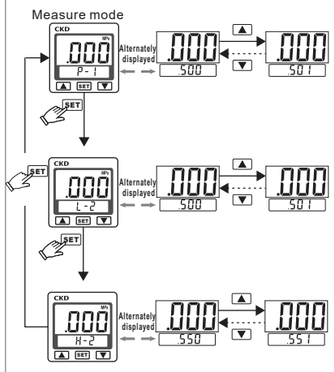
◎ Setting Condition 1 :
OUT 1 mode setting :
" oP5 " (One point set mode)
OUT 2 mode setting :
" oFF " (Not used)



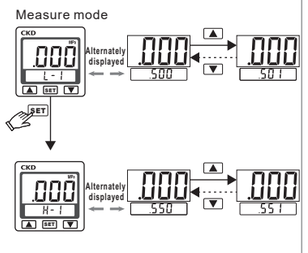
◎ Setting Condition 2 :
OUT 1 mode setting :
" oP5 " (One point set mode)
OUT 2 mode setting :
" oP5 " (One point set mode)



◎ Setting Condition 3 :
OUT 1 mode setting :
" oP5 " (One point set mode)
OUT 2 mode setting :
" HY5 " (Hysteresis mode)
" U in " (Window comparator mode)

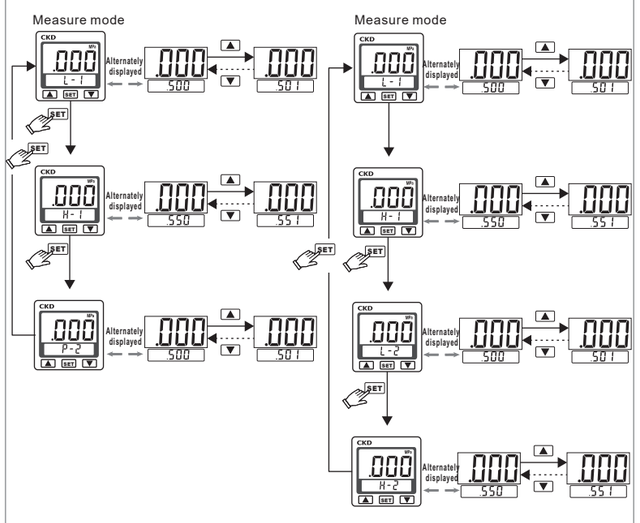


◎ Setting Condition 4 :
OUT 1 mode setting :
" HY5 " (Hysteresis mode)
" U in " (Window comparator mode)
OUT 2 mode setting :
" oFF " (Not used)



◎ Setting Condition 5 :
OUT 1 mode setting :
" HY5 " (Hysteresis mode)
" U in " (Window comparator mode)
OUT 2 mode setting :
" oP5 " (One point set mode)

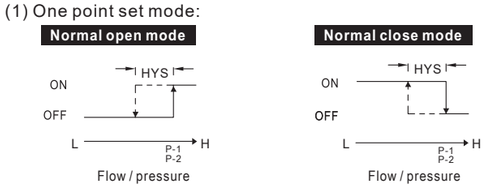
◎ Setting Condition 6 :
OUT 1 mode setting :
" HY5 " (Hysteresis mode)
" U in " (Window comparator mode)
OUT 2 mode setting :
" HY5 " (Hysteresis mode)
" U in " (Window comparator mode)



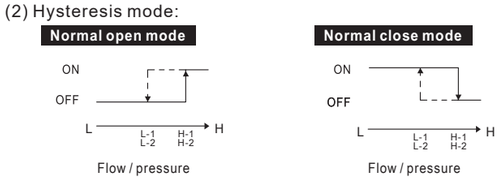
【NOTE :】
Do not disconnect power when the sub-display and setting value is flashing alternately; otherwise the system cannot store the values.

M. OUTPUT TYPE

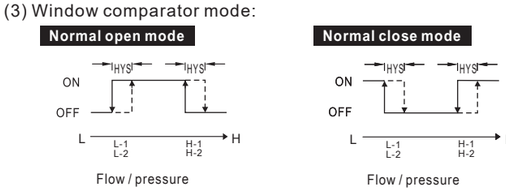
(1) One point set mode:



(2) Hysteresis mode:



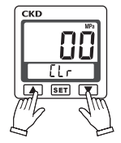
(3) Window comparator mode:



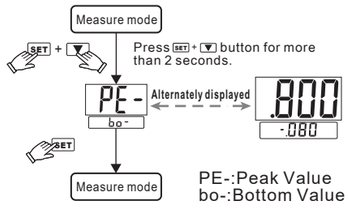
【NOTE :】
*1. In case hysteresis is set at less than or equal to 3 digits, switch output may chatter if input pressure/flow fluctuates near the set point.
*2. When using window comparator mode, the difference between two set points must be greater than the fixed hysteresis, otherwise will cause the switch output to malfunction.

N. ZERO POINT SETTING

Press the ▲ + ▼ button at the same time until the "00" is shown.
Release the button to end zero setting.

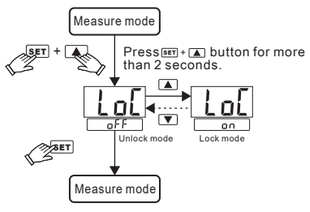


O. PEAK/BOTTOM HOLD FUNCTION



PE-:Peak Value
bo-:Bottom Value

P. KEY LOCK/UNLOCK MODE



◎ Use key lock mode to prevent unauthorized or accidental tampering with the switch setting.
◎ When lock mode is selected, panel will display " ⚷ ".

Q. ERROR CODE INSTRUCTION

Error Type		Error code	Error Condition	Troubleshooting
Excess load current error	out1	Er1	Output 1 load current is more than 125 mA.	Turn power off and check the cause of overload current or lower the current load under 125 mA, then restart.
	out2	Er2	Output 2 load current is more than 125 mA.	
Residual pressure/flow error		Er3	During zero reset, flow/pressure is outside ±3% F.S.	Change to no flow/pressure condition and perform zero reset again.
Applied pressure/flow error		HHH	Flow/pressure is outside the upper limit.	Adjust the flow/pressure within its available range.
		LLL	Flow/pressure is outside the lower limit.	
System error		Er4	Internal system error.	Turn power off, and then restart. If error condition remains, please return to factory for inspection.
		Er5	Internal system error.	
		Er6	Internal data error.	
		Er7	Internal data error.	