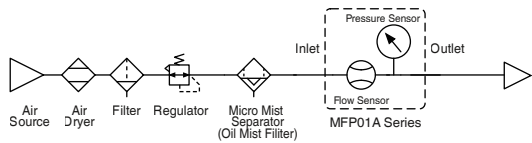


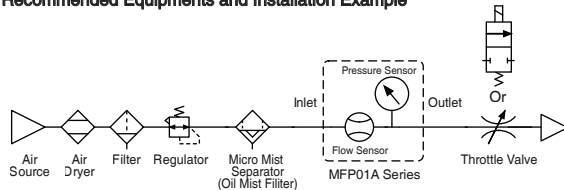
For your safety, please read the following before using.

- Check the regulator and flow adjustment valve before introducing the fluid.
- On the inlet side, be sure to install an air filter below the filtration level of 10um.
The sensing element cannot measure properly if foreign matter adheres to it.
- Recommended Equipments and Installation

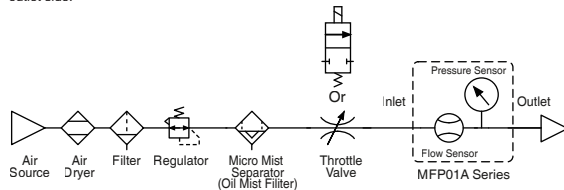


※ NOTE :
When measuring the pressure of the inlet side, install a throttle valve or solenoid valve on the outlet side.
When measuring the pressure of the outlet side, install a throttle valve or solenoid valve on the inlet side.

4 Recommended Equipments and Installation Example



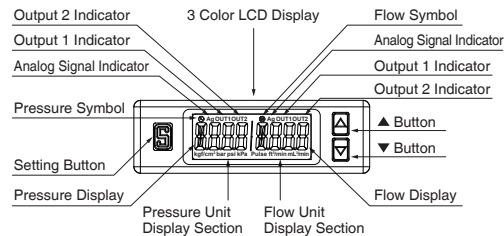
※ NOTE :
When measuring the pressure of the inlet side, install a throttle valve or solenoid valve on the outlet side.



※ NOTE :
When measuring the pressure of the outlet side, install a throttle valve or solenoid valve on the inlet side.

- Sensors at end-of-life must be disposed of in accordance with E-Waste regulations of the country/region, NOT disposed of with regular garbage.

A. PANEL DESCRIPTION



B. ORDERING INFORMATION

MFP01A - 005 - 010 - R6

Flow Rate Range

005:500 mL/min
010:1000 mL/min
050:5 L/min
100:10 L/min
500:50 L/min
101:100 L/min
201:200 L/min

Output Specifications

010 : 2 NPN output + Analog output 1~5V
011 : 2 NPN output + Analog output 4~20mA
02 : 2 NPN output + RS485
030 : 2 PNP output + Analog output 1~5V
031 : 2 PNP output + Analog output 4~20mA
04 : 2 PNP output + RS485

Port Size

R6 : Ø6 mm, for Flow Rate Range 005, 010, 050, 100, 500.
R8 : Ø8 mm, for Flow Rate Range 101, 201.
F1C : Rc½", with internal threads,
for Flow Rate Range 005, 010, 050, 100, 500.
F4C : Rc½", with internal threads, for Flow Rate Range 101, 201.

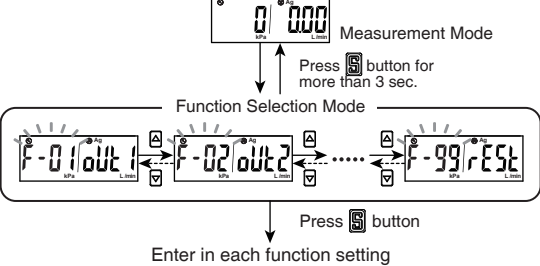
Optional Parts

MP-A26 : Mounting bracket
MP-B4 : Panel adapter
MP-C4 : Panel adapter + Front protective lid

C. OPERATION INSTRUCTIONS

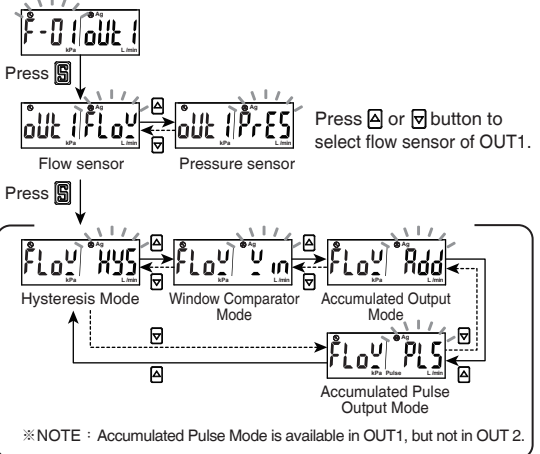
1 Function Selection Mode

At Measurement Mode, press  button for more than 3 sec. to display [F-01]. Press  or  button to select other setting functions. Press  for 3 sec. at Function Setting Mode to return to Measurement Mode.

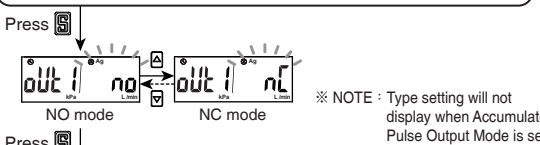


2 [F-01] OUT1 Setting

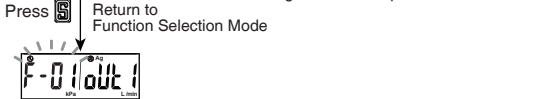
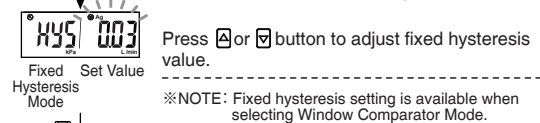
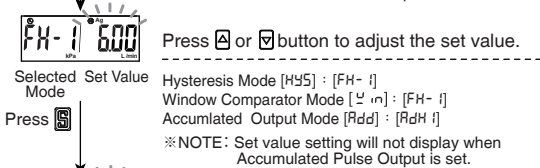
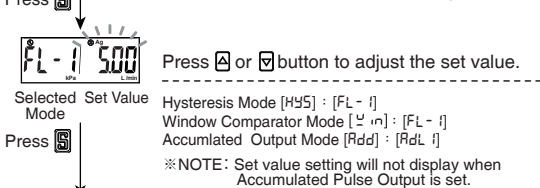
1. Flow sensor setting



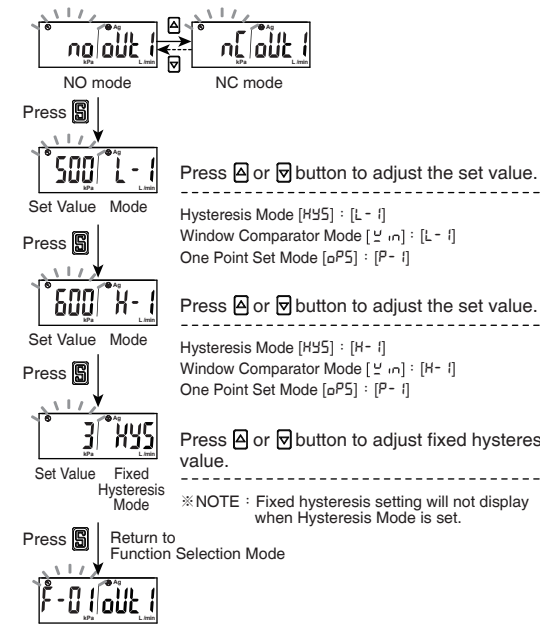
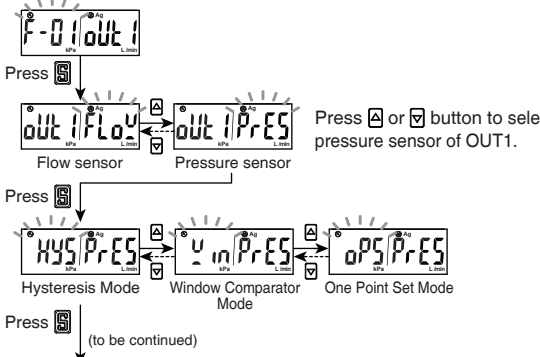
※ NOTE : Accumulated Pulse Mode is available in OUT1, but not in OUT2.



※ NOTE : Type setting will not display when Accumulated Pulse Output Mode is set.

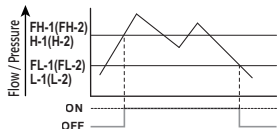


2. Pressure sensor setting

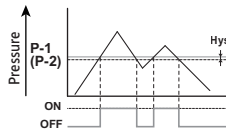


Normal Open Mode

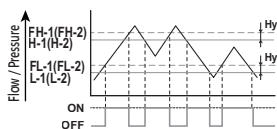
Hysteresis Mode



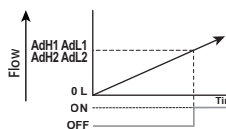
One Point Set Mode



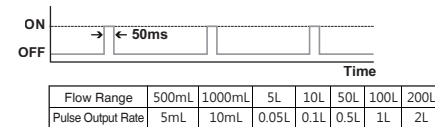
Window Comparator Mode



Accumulated Output Mode



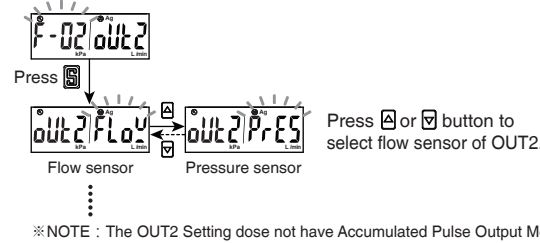
Accumulated Pulse Output Mode



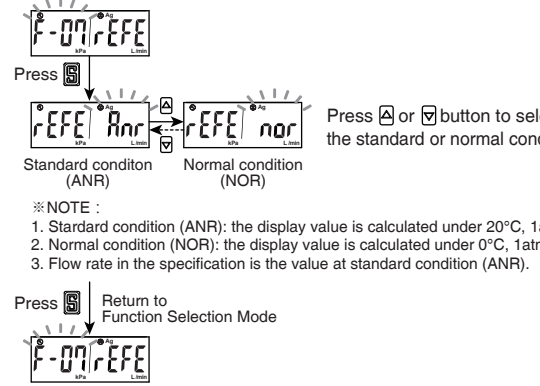
※ NOTE:
1. In case hysteresis is set at less than or equal to 2 digits, switch output may chatter if input pressure fluctuates near the set point.
2. When using window comparator mode, the difference between two set points must be greater than the fixed hysteresis, otherwise will cause the switch output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

3 [F-02] OUT2 Setting

※ Check the [F-01] for the same follow setting.



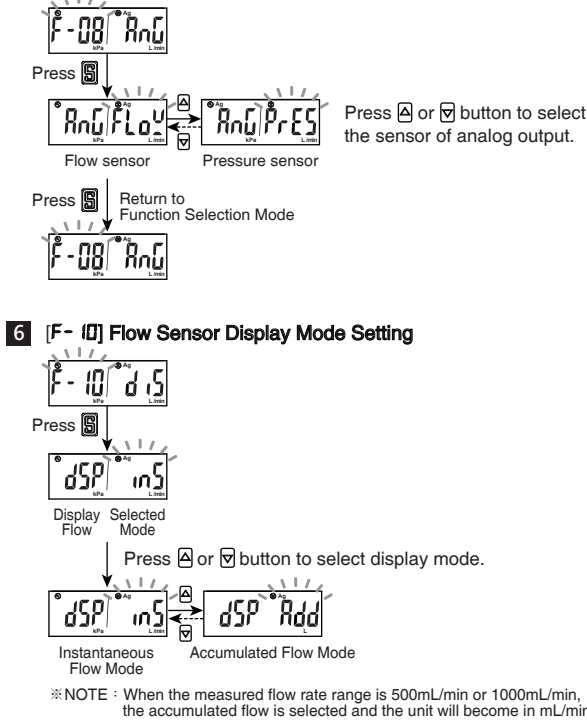
4 [F-07] Flow Reference Standard Setting



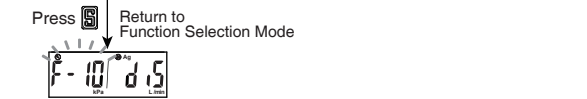
※ NOTE :
1. Standard condition (ANR): the display value is calculated under 20°C, 1atm.
2. Normal condition (NOR): the display value is calculated under 0°C, 1atm.
3. Flow rate in the specification is the value at standard condition (ANR).

5 [F-08] Analog Output Setting

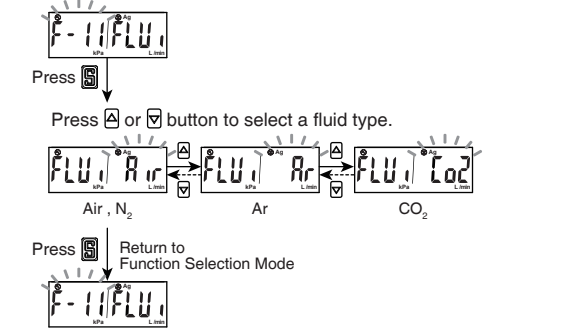
※ This function is not available with RS485 (Output Specification -02 and -04).



※ NOTE : When the measured flow rate range is 500mL/min or 1000mL/min, the accumulated flow is selected and the unit will become in mL/min.

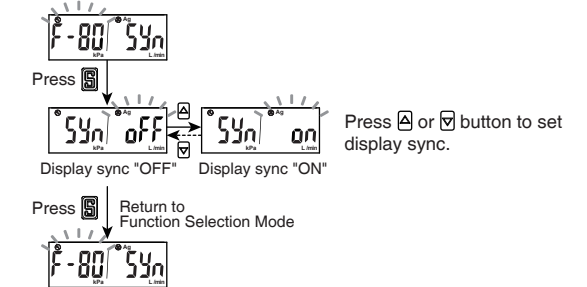


7 [F-11] Fluid Setting



8 [F-80] Sync the value of flow analog output and display

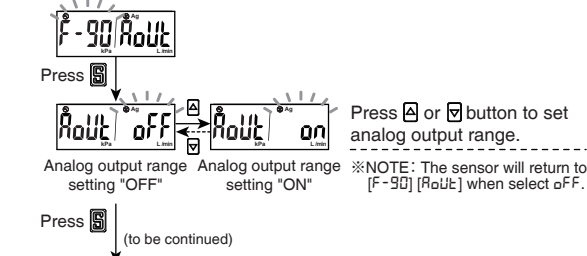
※ 1. This function is not available with RS485 (Output Specification -02 and -04).
2. This function is available for output of flow rate only.



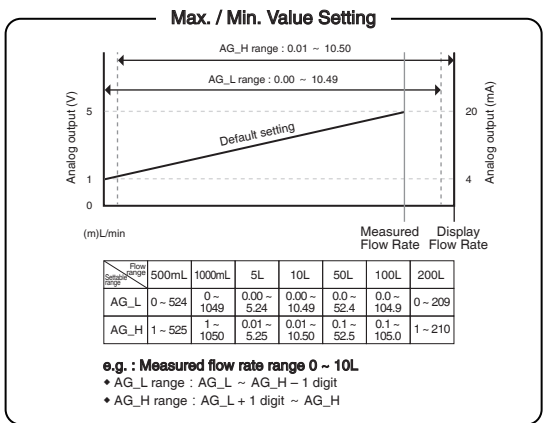
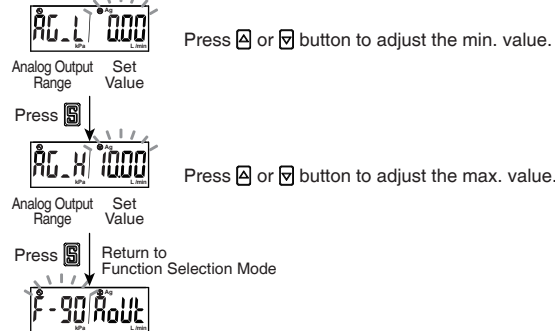
9 [F-90] Analog Output Range Setting

※ This function is not available with RS485 (Output Specification -02 and -04).

1. Flow sensor setting



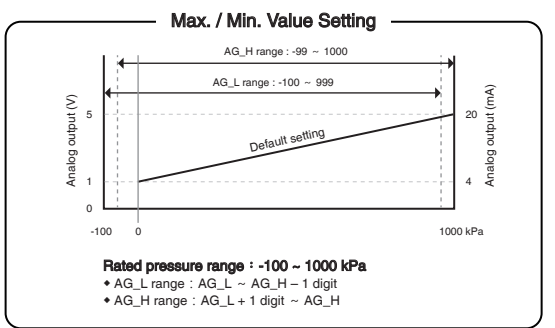
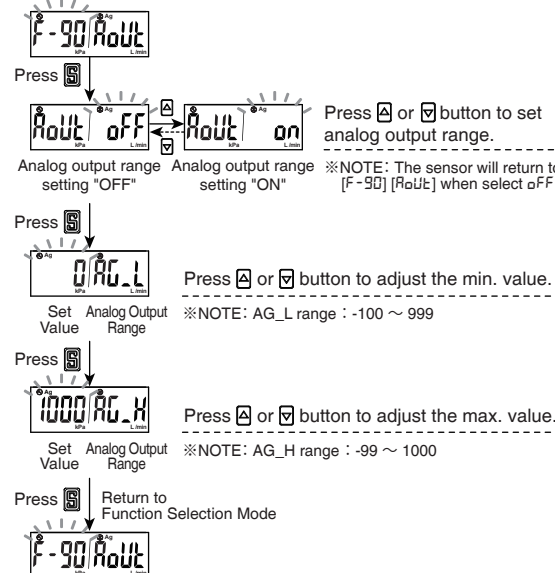
※ NOTE : The sensor will return to [F-90] [RAO] when select oFF.



e.g. : Measured flow rate range 0 ~ 10L

• AG_L range : AG_L ~ AG_H - 1 digit
• AG_H range : AG_L + 1 digit ~ AG_H

2. Pressure sensor setting



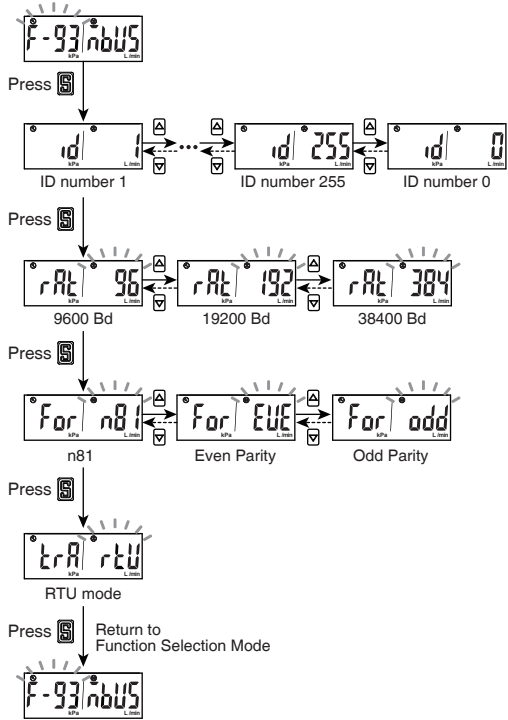
Rated pressure range : -100 ~ 1000 kPa

• AG_L range : AG_L ~ AG_H - 1 digit
• AG_H range : AG_L + 1 digit ~ AG_H

C. OPERATION INSTRUCTIONS

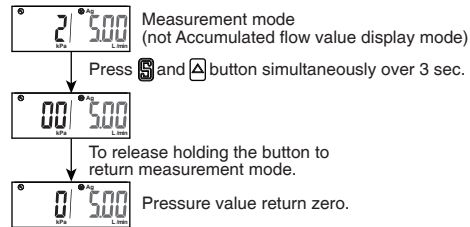
10 [F-93] Modbus RTU Setting

※ This function only available for RS485 (Output Specification -02 and -04).



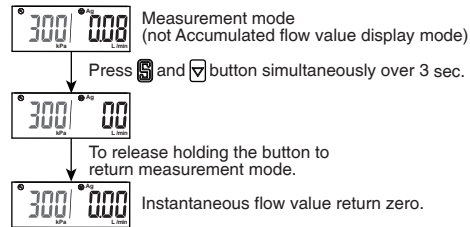
11 Pressure Zero Adjustment Function

The displayed value can be adjusted to "0" when the pressure is within $\pm 3\%$ F.S. of the zero point at the time of shipment from the factory.

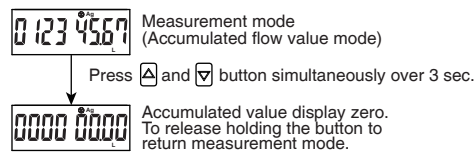


12 Instantaneous Flow Zero Adjustment Function

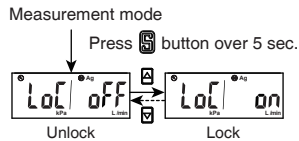
The displayed value can be adjusted to "0" when the measured flow is within $\pm 5\%$ F.S. of the zero point at the time of shipment from the factory.



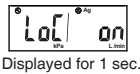
13 Reset Accumulated Flow Function



14 Key Lock Mode



※ NOTE : If a button operation is performed while the key lock setting is ON, [LoC][on] will be displayed.



D. Modbus RTU INSTRUCTIONS

Function Code	Explanation	Operation
0000H	ID Number (0 ~ 255) Range : 0 ~ 255	Read Write
0001H	Baud rate setting 0 : 9600 bps 1 : 19200 bps 2 : 38400 bps	Read Write
0002H	Transmission format setting 0 : N.8.1 1 : E.8.1 2 : O.8.1	Read Write
0003H	Communications protocol setting 0 : RTU	Read Write
0004H	Measured flow rate range 0 : 500 mL/min 1 : 1000 mL/min 2 : 5 L/min 3 : 10 L/min 4 : 50 L/min 5 : 100 L/min 6 : 200 L/min	Read
0005H	Instantaneous flow value	Read
0006H	Flow unit 0 : LPM (L/min or mL/min) 1 : CFM (ft³/min)	Read Write
0007H	Decimal place for flow value 0 : None 1 : One decimal place 0.1 2 : Two decimal places 0.01 3 : Three decimal places 0.001	Read
0008H	Accumulated flow value (ADL) XXXX 9999	Read
0009H	Accumulated flow value (ADH) 9999 XXXX	Read
000AH	Flow reference standard 0 : ANR (Standard condition) 1 : NOR (Normal condition)	Read Write
000BH	Flow sensor display mode 0 : Instantaneous flow 1 : Accumulated flow	Read Write
000CH	Accumulated value hold 0 : None 1 : 2min /times 2 : 5min/times	Read Write
000DH	Flow display refresh time 0 : 200ms 1 : 500ms 2 : 1000ms	Read Write
000EH	Rated pressure range 3 : -0.100 ~ 1.000 MPa	Read
000FH	Display pressure value	Read
0010H	Pressure unit 0 : kPa 1 : kgf/cm² 2 : bar 3 : psi	Read Write
0011H	Decimal place for pressure value 1 : One decimal place 0.1 2 : Two decimal places 0.01 3 : Three decimal places 0.001	Read
0012H	Pressure display refresh time 0 : 200ms 1 : 500ms 2 : 1000ms	Read Write
0013H	Fine adjustment setting 0 : OFF 1 : FLOW SENSOR 2 : PRESSURE SENSOR	Read Write

Function Code	Explanation	Operation
0014H	Fine adjustment of display value -25 ~ 25 (-2.5% ~ +2.5%)	Read Write
0015H	Response time of flow sensor 0 : 50ms 4 : 400ms 1 : 80ms 5 : 800ms 2 : 120ms 6 : 1500ms 3 : 200ms	Read Write
0016H	Response time of pressure sensor 0 : 2.5ms 4 : 500ms 1 : 25ms 5 : 1000ms 2 : 100ms 6 : 1500ms 3 : 250ms	Read Write
0017H	OUT1 corresponding sensor 0 : FLOW SENSOR 1 : PRESSURE SENSOR	Read Write
0018H	OUT1 output mode FLOW 0 : Hysteresis 1 : Window Comparator 2 : Accumulated Output 3 : Accumulated Pulse Output PRESSURE 0 : One Point Set 1 : Hysteresis 2 : Window Comparator	Read Write
0019H	OUT1 output type 0 : N.O. mode 1 : N.C. mode	Read Write
001AH	Flow setting value FL-1	Read Write
001BH	Flow setting value FH-1	Read Write
001CH	Flow setting value ADL1	Read Write
001DH	Flow setting value ADH1	Read Write
001EH	OUT1 fixed hysteresis setting for flow value HYS 1 ~ 8	Read Write
001FH	Pressure setting value P-1 or L-1	Read Write
0020H	Pressure setting value H-1	Read Write
0021H	OUT1 fixed hysteresis setting for pressure value HYS 1 ~ 8	Read Write
0022H	OUT1 switch 0 : OFF 1 : ON	Read
0023H	OUT2 corresponding sensor 0 : FLOW SENSOR 1 : PRESSURE SENSOR	Read Write
0024H	OUT2 output mode FLOW 0 : Hysteresis 1 : Window Comparator 2 : Accumulated Output PRESSURE 0 : One Point Set 1 : Hysteresis 2 : Window Comparator	Read Write
0025H	OUT2 output type 0 : N.O. mode 1 : N.C. mode	Read Write
0026H	Flow setting value FL-2	Read Write
0027H	Flow setting value FH-2	Read Write
0028H	Flow setting value ADL2	Read Write
0029H	Flow setting value ADH2	Read Write

Function Code	Explanation	Operation
002AH	OUT2 fixed hysteresis setting for flow value HYS 1 ~ 8	Read Write
002BH	Pressure setting value P-2 or L-2	Read Write
002CH	Pressure setting value H-2	Read Write
002DH	OUT2 fixed hysteresis setting for pressure value HYS 1 ~ 8	Read Write
002EH	OUT2 switch 0 : OFF 1 : ON	Read
002FH	Color display for OUT1 or OUT2 selection 0 : OUT1 1 : OUT2	Read Write
0030H	Display color setting 0 : SOG (Switch on Green) 1 : SOR (Switch on Red) 2 : GRN (Always is Green) 3 : RED (Always is Red)	Read Write
0031H	Power-save mode 0 : NO 1 : YES	Read Write
0032H	Reset to the default setting 0 : RECALL	Write
0033H	Instantaneous flow zero adjustment 0 : When over $\pm 5\%$ F.S., error code 03H will show.	Write
0034H	Pressure zero adjustment 0 : When over $\pm 3\%$ F.S., error code 03H will show.	Write
0035H	Reset accumulated flow 0 : Accumulated flow value return to zero	Write
0036H	Key lock/unlock setting 0 : OFF 1 : ON	Read Write
0037H	Switch output 0 : NPN 1 : PNP	Read
0038H	Fluid setting 0 : Dry Air or N ₂ 1 : Ar 2 : CO ₂	Read Write

● Read / Write Code

Read/Write Code	Explanation
03H	Read pressure sensor data Range 1 ~ 4 data Number, 2 ~ 8 Bytes
06H	Write pressure sensor data

● Error Code Description

Error Code	Explanation
01H	Read / Write error
02H	Function Code error
03H	Illegal data or over setting value

E. FUNCTION INSTRUCTION

Function Code	Item	Explanation
[F - 0 1]	[oUt 1] OUT 1 setting	Select Output 1 corresponding to flow sensor or pressure sensor. Set the flow rate or pressure value to switch ON/OFF.
[F - 02]	[oUt 2] OUT 2 setting	Select Output 2 corresponding to flow sensor or pressure sensor. Set the flow rate or pressure value to switch ON/OFF.
[F - 03]	[CLor] LCD Display color setting	Select back light color and display mode.
[F - 04]	[rESP] Response time setting	Select the response time for analog output. Pressure sensor: 2.5ms ~ 1500ms. Flow sensor: 50ms ~ 1500ms.
[F - 05]	[UPdR] Display refresh time setting	Display refresh cycle can be set in 200ms, 500ms or 1000ms.
[F - 06]	[Un t] Unit setting	Select the UNIT of pressure / flow sensor.
[F - 07]	[rEFE] Flow reference standard setting	Select the flow value is shown under standard (ANR) or normal condition (NOR).
[F - 08]	[RnG] Analog output setting	Select the analog corresponding to pressure or flow sensor. (※1)
[F - 09]	[EEP r] Accumulated value hold setting	To save the last accumulated flow value every 2 or 5 minutes.
[F - 10]	[d rS] Flow sensor display mode setting	Select to display Instantaneous Flow or Accumulated Flow Mode.
[F - 11]	[FLU i] Fluid setting	Select desired fluid.
[F - 80]	[Sdr] Sync the value of flow analog output and display	Turn ON to synchronize the value of flow analog output and display. (※1) (※3) (Default setting : OFF)
[F - 90]	[RoUt] Analog output range setting	Adjust the desired flow or pressure range corresponding to analog output. (※1)
[F - 91]	[ECo] Power-Save mode setting	Select if turn on power-save mode to reduce power consumption
[F - 92]	[nP] External input setting	Select for Accumulated flow rate zero clear, Auto-Shift or Auto-Shift zero. (※1)
[F - 93]	[nBtS] Modbus RTU setting	Set ID number, baud rate and transmission format. (※2)
[F - 94]	[F mE] Fine adjustment setting	The displayed value can be adjusted slightly.
[F - 95]	[FoUt] Forced output function	To force output ON/OFF to test the switch function.
[F - 99]	[rESt] Reset to the default setting	Return to the factory default setting.

※ Note :

- This function is not available with RS485 (Output Specification -02 and -04).
- This function only available for RS485 (Output Specification -02 and -04).
- This function is available for output of flow rate only.

F. ERROR CODE INSTRUCTION

Error Type	Error Code	Error Condition	Troubleshooting
OUT1 Excess Load Current Error	800 Er 1	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.
	Er 1 200		
OUT2 Excess Load Current Error	800 Er 2	Output 2 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.
	Er 2 200		
Zero Adjustment Error	800 Er 3	The instantaneous flow is over $\pm 5\%$ F.S. of the zero point.	Perform the zero clear function again under no flow conditions.
	Er 3 200	The pressure value is over $\pm 3\%$ F.S. of the zero point.	Perform the zero clear function again under no pressure conditions.
System Error	Er 4 Er 4	Memory error	Turn power off, and then restart. If error condition remains, please return to factory for inspection.
	Er 5 Er 5	Internal data error	
	Er 6 Er 6	Internal data error	
	Er 7 Er 7	System parameter error	
Applied Flow/Pressure Error	800 HHH	The instantaneous flow has exceeded the upper limit of the flow display range.	Reduce the flow to the display range.
	HHH 200	The pressure has exceeded the upper limit of the pressure display range.	Reduce the pressure to the display range.
	800 LLL	The instantaneous flow has exceeded the lower limit of the flow display range.	Ensure the flow is in the correct direction.
	LLL 200	The pressure has exceeded the lower limit of the pressure display range.	Increase the pressure to the display range.