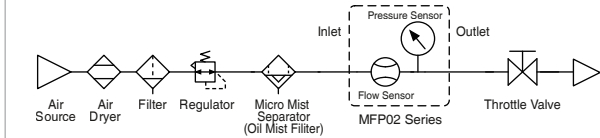


For your safety, please read the following before using.

- 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.

3 Recommended Equipments and Installation



NOTE: Please install a throttle valve on the outlet side of the sensor to prevent errors caused by unstable flow.

- Use straight piping 8cm or longer to connect the Piping Port (Inlet side). If straight piping is not installed, the accuracy may vary by ±2% F.S..

Avoid sudden changes in the piping size on the inlet side of the product. Do not release the outlet side piping port of the product directly to the atmosphere without the piping connected.

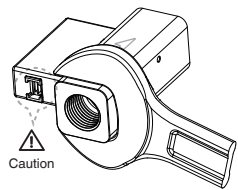
(NOTE: Straight Piping: The pipe is without bending and the cross sectional areas of the pipe keeps the same.)

- When piping, please apply I.D. 9 mm or more air tube.

- Please use a wrench on the metallic area and torque properly.

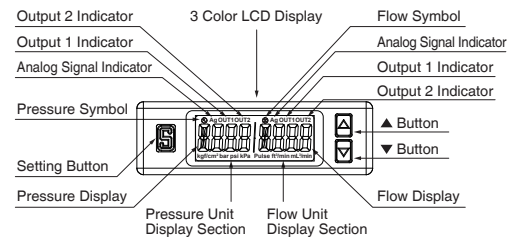
When piping with metallic area, please refer to the applicable torque below. Over torquing may be damaged the product. When insufficient torque, the connection may loosen to cause air leakage.

After installation completed, please make gas and power on and operate properly and test leakage to verify the installation correct.



Piping Specification	Required Torque
Rc1/2", G1/2"	28-30 Nm
Rc3/4", G3/4"	

A. PANEL DESCRIPTION



B. ORDERING INFORMATION

MFP02 - 501 - 010 - F7C

Flow Rate Range

- 501 : 500 L/min
- 102 : 1000 L/min
- 202 : 2000 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

- F7C : Rc1/2", for Flow Rate Range 501, 102.
- F9C : G1/2", for Flow Rate Range 501, 102.
- F10C : Rc3/4", for Flow Rate Range 202.
- F12C : G3/4", for Flow Rate Range 202.

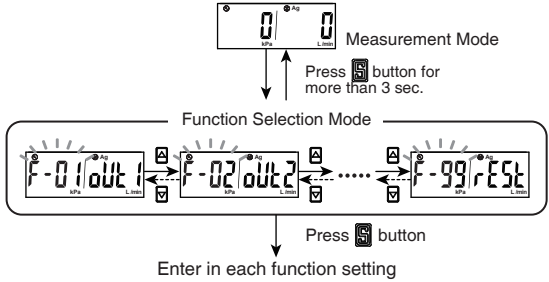
Optional Parts

- MP-A27 : Mounting bracket, for Flow Rate Range 501, 102.
- MP-A28 : Mounting bracket, for Flow Rate Range 202.

C. OPERATION INSTRUCTIONS

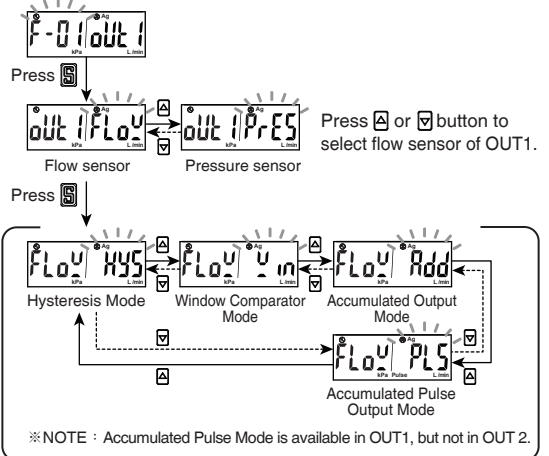
1 Function Selection Mode

At Measurement Mode, press [M] button for more than 3 sec. to display [F-0] [OUT 1]. Press [L] or [R] button to select other setting functions. Press [M] for 3 sec. at Function Setting Mode to return to Measurement Mode.

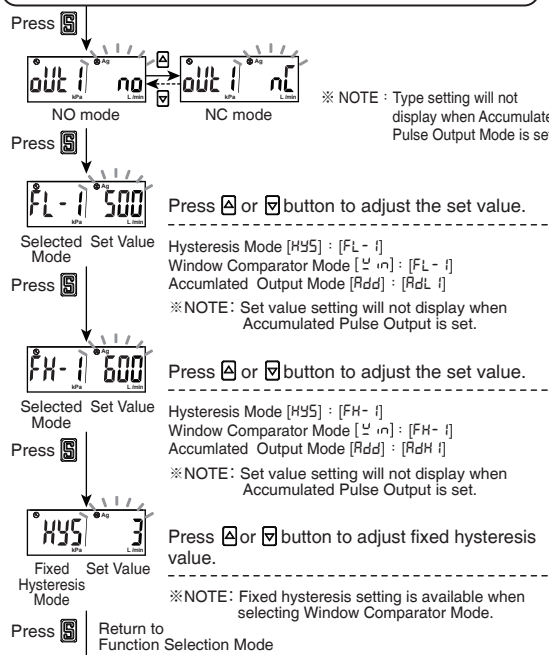


2 [F-0] OUT1 Setting

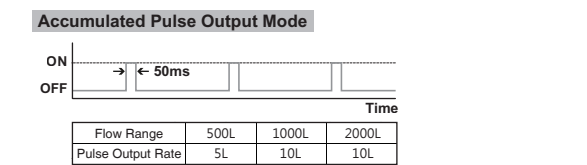
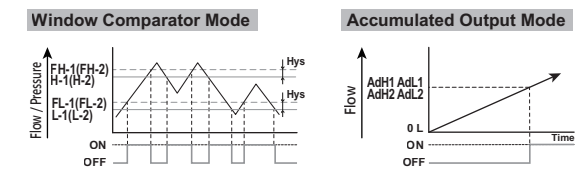
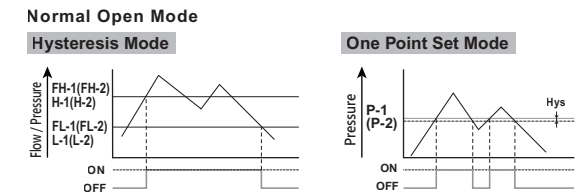
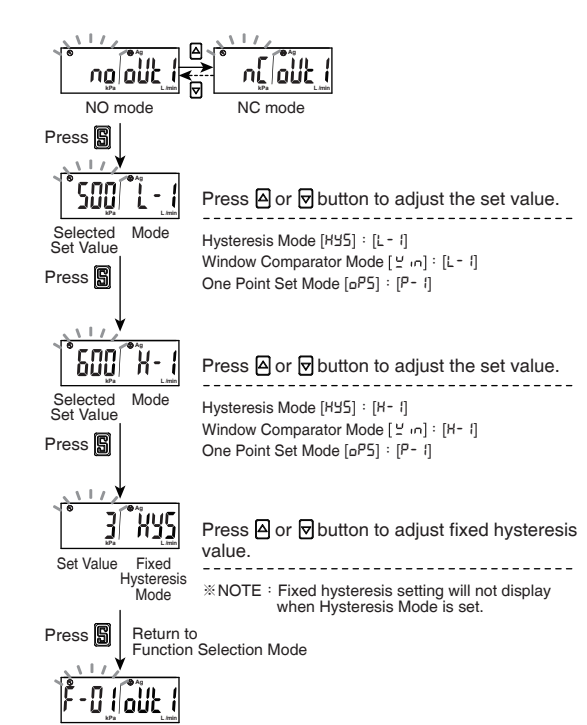
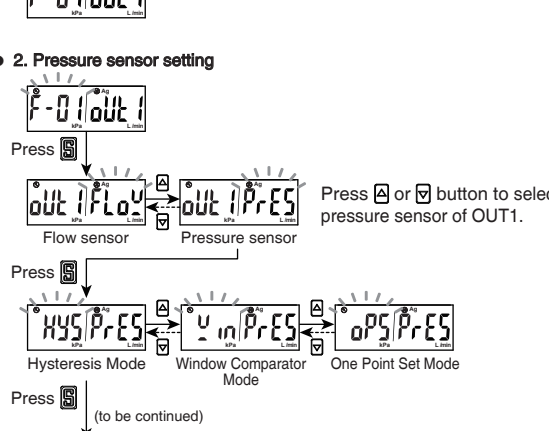
1. Flow sensor setting



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



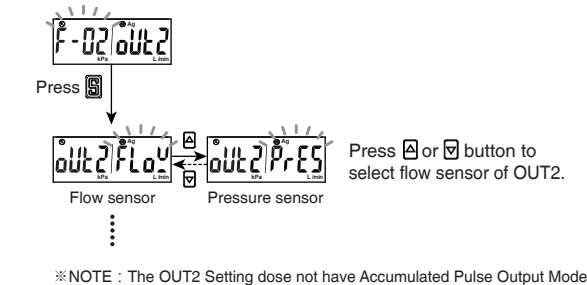
2. Pressure sensor setting



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.

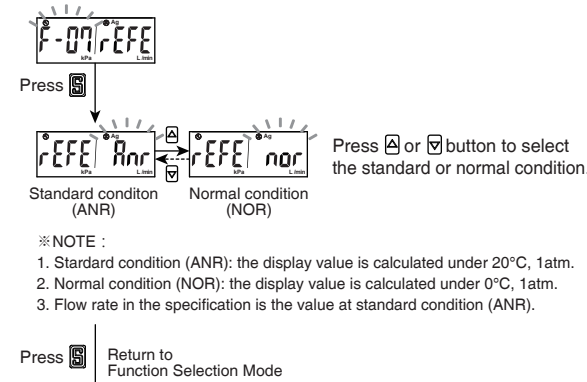
3 [F-02] OUT2 Setting

Check the [F-0] for the same follow setting.



NOTE: The OUT2 Setting dose not have Accumulated Pulse Output Mode.

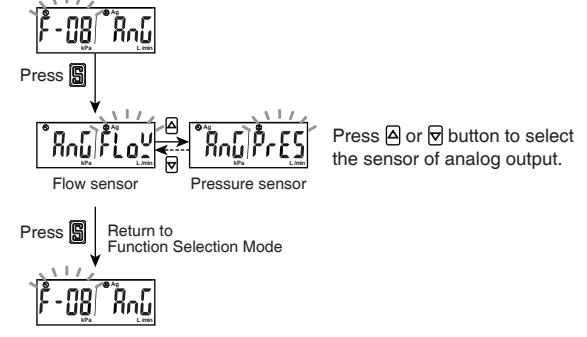
4 [F-07] Flow Reference Standard Setting



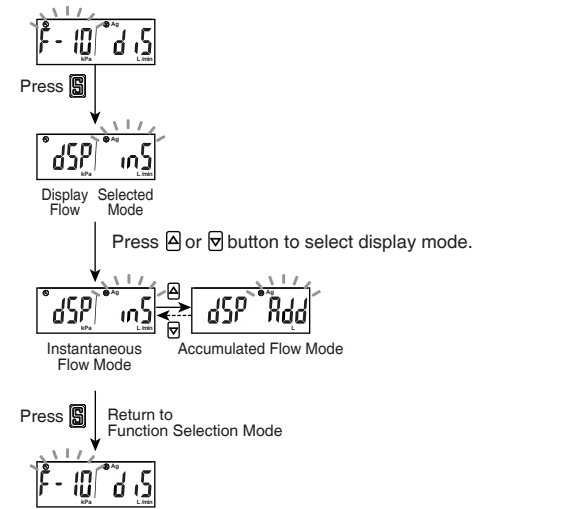
NOTE: 1. Standard condition (ANR): the display value is calculated under 20°C, 1atm. 2. Normal condition (NOR): the display value is calculated under 0°C, 1atm. 3. Flow rate in the specification is the value at standard condition (ANR).

5 [F-08] Analog Output Setting

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

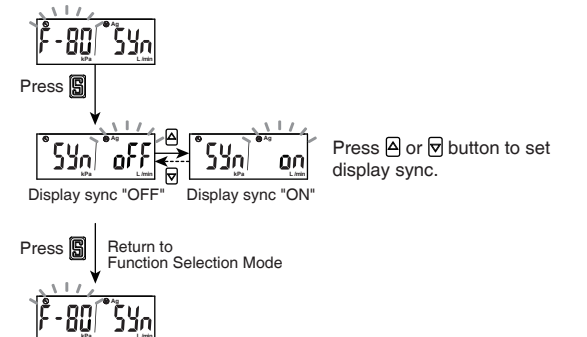


6 [F-10] Flow Sensor Display Mode Setting



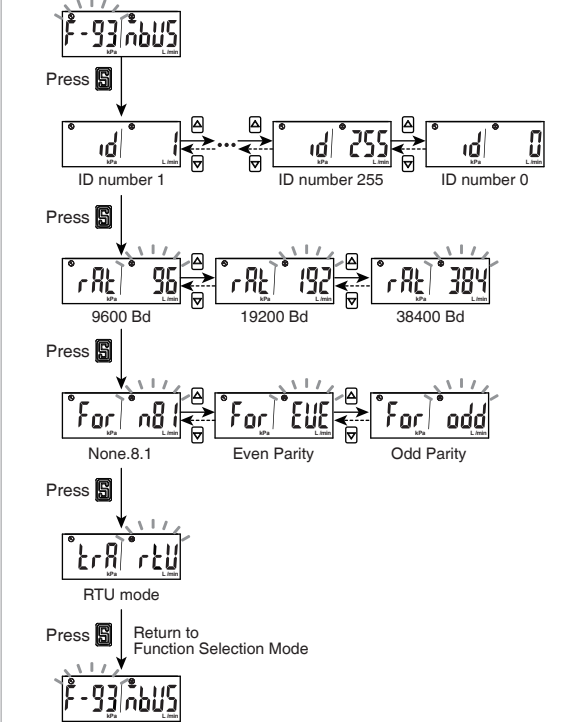
7 [F-80] Sync the value of flow analog output and display

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



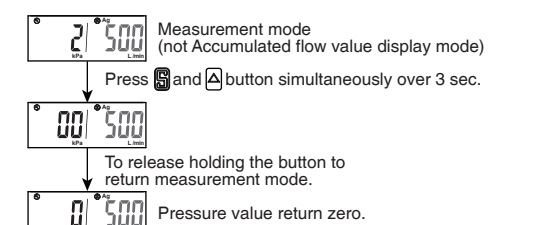
8 [F-93] Modbus RTU Setting

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



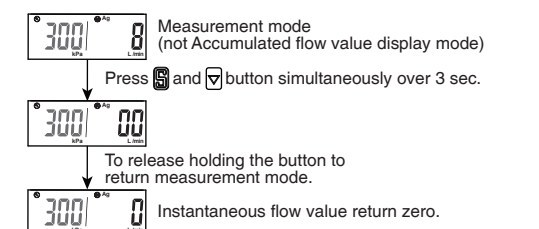
9 Pressure Zero Adjustment Function

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

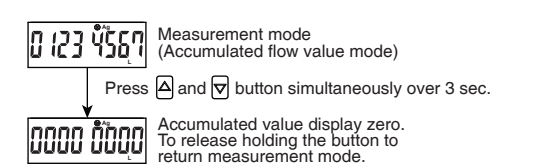


10 Instantaneous Flow Zero Adjustment Function

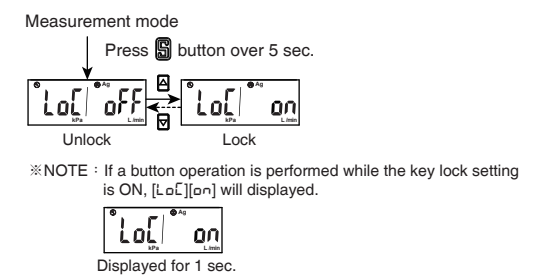
The displayed value can be adjusted to "0" when the measured flow is within ±5% F.S. of the zero point at the time of shipment from the factory.



11 Reset Accumulated Flow Function



12 Key Lock / Unlock Mode



## 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 7 : 500 L/min 8 : 1000 L/min 9 : 2000 L/min	Read
0005H	Instantaneous flow value	Read
0006H	Flow unit 0 : LPM (L/min or mL/min) 1 : CFM (ft <sup>3</sup> /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/cm <sup>2</sup> 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	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	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

### • 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 - 01]	[OUT1] 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]	[OUT2] 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]	[LCD] 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]	[UNIT] 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]	[ANOG] Analog output setting	Select the analog corresponding to pressure or flow sensor. (*1)
[F - 09]	[EPR] Accumulated value hold setting	To save the last accumulated flow value every 2 or 5 minutes.
[F - 10]	[d5] Flow sensor display mode setting	Select to display Instantaneous Flow or Accumulated Flow Mode.
[F - 80]	[5n] 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 - 91]	[ECo] Power-Save mode setting	Select if turn on power-save mode to reduce power consumption
[F - 92]	[rnp] External input setting	Select for Accumulated flow rate zero clear, Auto-Shift or Auto-Shift zero. (*1)
[F - 93]	[nbU5] Modbus RTU setting	Set ID number, baud rate and transmission format. (*2)
[F - 94]	[F rE] 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 :

1. This function is not available with RS485 (Output Specification -02 and -04).
2. This function only available for RS485 (Output Specification -02 and -04).
3. 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	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.
	Er2	Output 2 load current is more than 125 mA.	
Zero Adjustment Error	Er3	The instant flow is over ±5% F.S. of the zero point.	Perform the zero clear function again under no flow conditions.
	Er3	The pressure value is over ±3% F.S. of the zero point.	Perform the zero clear function again under no pressure conditions.
System Error	Er4	Memory error	Turn power off, and then restart. If error condition remains, please return to factory for inspection.
	Er5	Internal data error	
	Er6	Internal data error	
	Er7	System parameter error	
Applied Flow/Pressure Error	HHH	The instant flow has exceeded the upper limit of the flow display range.	Reduce the flow to the display range.
	HHH	The pressure has exceeded the upper limit of the pressure display range.	Reduce the pressure to the display range.
	LLL	The instant flow has exceeded the lower limit of the flow display range.	Ensure the flow is in the correct direction.
	LLL	The pressure has exceeded the lower limit of the pressure display range.	Increase the pressure to the display range.