

HNF80-A

Thermal micro gas mass flow meter



PRODUCT INTRODUCTION

The HNF80-A thermal gas flowmeter is an instrument that measures flow based on the principle of heat conduction. This instrument adopts the constant temperature difference method to accurately measure gas flow, and has the advantages of small volume, high digitization, convenient installation and accurate measurement.

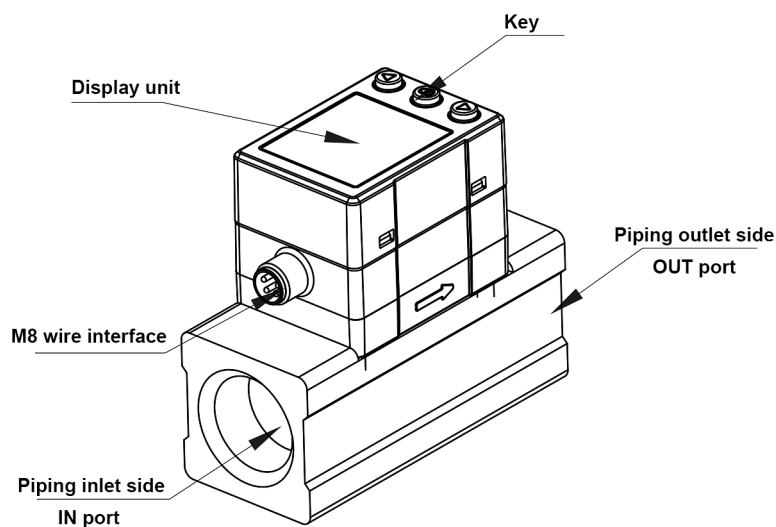
A heated NTC is installed in the fluid pipeline. Once fluid flows through, it will take away the heat of the NTC. The heat taken away by the NTC causes the resistance value to rise, and the rising rate has a certain relationship with the flow velocity of the fluid. Therefore, the flow velocity can be detected by measuring this resistance value. In addition, it has a built-in temperature sensor that compensates for the fluid temperature or ambient temperature, so stable measurement can be achieved within the operating temperature range.

1. The flow setting and detection of usable digital indicators.
2. The detection shows a unity type.
3. Switchable output, cumulative pulse output, and analog output are all available.
4. Instantaneous flow and cumulative flow can be switched.
5. The safety lock key prevents incorrect changes to the set values and can prevent accidental operations.

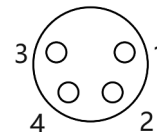
APPLICATION FIELDS

- 1 Purification gas volume management in the semiconductor industry, high-precision lead tension bonding, and electronic component mounting.
- 2 Plant-level gas volume management (air, nitrogen) and air consumption monitoring of pneumatic components.
- 3 Air management for vehicle painting in the automotive industry, rail transit, etc.
- 4 Burner fire control management in the glass industry, FPD handling in the liquid crystal industry, and negative ion purification gas management.
- 5 Filling and packaging in the food industry, leak inspection, CO₂ management and photosynthesis promotion in biochemical culture devices, as well as factory-level arc welding monitoring, machine tool matching, etc.

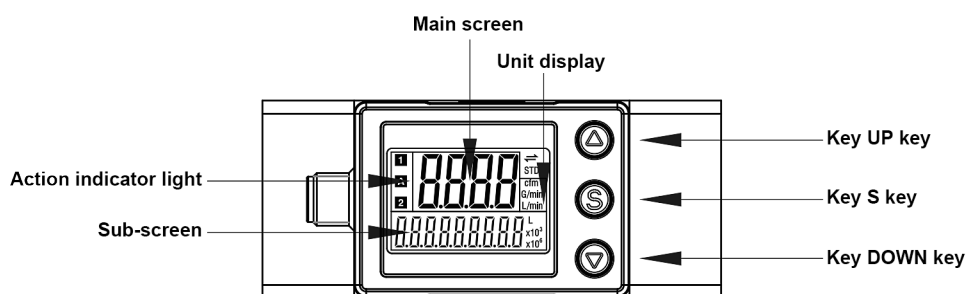
PRODUCT FUNCTION DIAGRAM



Definition of M8 Wire Interface



1	DC(+)
2	OUT2/Analog output
3	DC(-)
4	OUT1



NAME	FUNCTION
Main screen	Displays flow rate values, setting mode status, alarm codes, etc.
Sub-screen	In measurement mode, it displays cumulative values, set values, peak and valley values, and line names.
Unit display	Displays the currently selected unit.
Action indicator light	Displays the output status of OUT1 and OUT2; the orange light is on when ON.
Key UP	Function selection key for setting.
Key S	Entry and confirmation key for setting functions.
Key DOWN	Function selection key for setting.

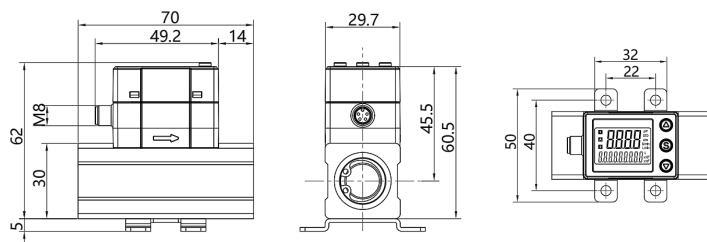
TECHNICAL PARAMETERS

NAME			HNF80-A-501	HNF80-A-102	HNF80-A-202
Measuring medium	Measuring medium		Dry air		
	Fluid temperature range		0~50℃		
Flow specifications	Detection method		Thermal type		
	Rated flow range		5-500L/Min	10-1000L/Min	20-2000L/Min
	Set flow range	Instantaneous flow	5-525L/Min	10-1050L/Min	20-2100L/Min
		Cumulative flow	0~999,999,999L		
	Minimum setting unit	Instantaneous flow	1L/min		
		Cumulative flow	1L		
	Cumulative pulse conversion value (pulse width = 50ms)		1L/pulse	10L/pulse	
	Cumulative value hold function		2-minute or 5-minute intervals can be selected		
Pressure specifications	Rated pressure range		0~0.8MPa		
	Pressure resistance		1.2MPa		
	Pressure loss		Please refer to the pressure loss diagram		
	Pressure characteristic		±5% F.S. (based on 25℃) F.S. (0~0.8MPa, with 0.6MPa as the reference)		
Electrical specifications	Power supply voltage		DC12~24V±10%		
	Current consumption		55 mA or less		
	Protection		Reverse connection protection		
Accuracy	Display accuracy		±3%F.S		
	Analog output accuracy		±3%F.S		
	Repeatability		±1% F.S. (±2% F.S. when the response time of 0.05S is selected)		
	Temperature characteristic		±5% F.S. (0~50℃, 25℃ as reference)		

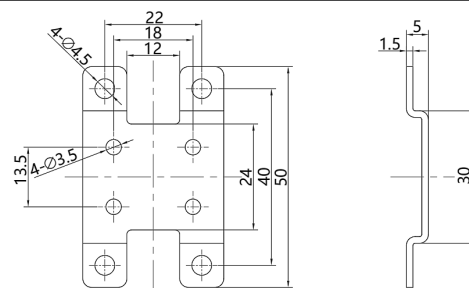
Switch output	Output form		PNP output / NPN output is available for selection		
	Output mode		Select from hysteresis mode, upper/lower limit comparison mode, cumulative output mode, cumulative pulse output mode, abnormal output, and output off		
	Switch action		NO (Normally Open) / NC (Normally Closed)		
	Maximum load current		80mA		
	Maximum applied voltage		28V (for NPN output)		
	Internal voltage drop		1.5V or less (when load current is 80mA)		
	Digital filter		Select from 0.05s / 0.1s / 0.5s / 1.0s / 2.0s / 5.0s		
	Delay time		Variable from 0 to 60s in 0.01-level increments		
	Hysteresis		Variable from 0		
	Protection		Short-circuit protection		
Analog output	Output form		Voltage output: 1~5V (0~10V optional, only when power supply voltage is DC24V) * Current output: 4~20mA		
	Impedance	Voltage output	The output impedance is approximately 1kΩ		
		Current output	Maximum load impedance: 600Ω when power supply voltage is 24V; 300Ω when power supply voltage is 12V		
	Response time		Linked with the digital filter setting value		
	Display unit reference		Standard state (STD) or reference state (NOR) can be selected		
Weight	Main body		165g		
	Wire		100g		
	Bracket		15g		
Display	Unit	Instantaneous flow	L/min, G/min, cfm		
		Cumulative flow	L		
	Displayable unit	Instantaneous flow	-25~525 L/min (Displays [0] at -4~4)	-50~1050 L/min (Displays [0] at -9~9)	-100~2100 L/min (Displays [0] at -19~19)
		Cumulative flow	0~999,999,999L		
	Display minimum unit	Instantaneous flow	1L/min		
		Cumulative flow	1L		
	Display mode		LCD		
	Display section		Display mode Number of LCD screens: 3-screen display (main screen, sub-screen) Display color Main screen: Red/Green Sub-screen: White Number of display digits Main screen: 4-digit 7-segment Sub-screen: 9-digit 7-segment		
	Operation indicator light		Lights up when the switch output is ON (OUT1/OUT2: orange)		
	Environmental resistance	Protection class		IP65	
Withstand voltage		AC 250V for 1 minute (between all external terminals and the housing)			
Insulation resistance		2MΩ or more (with DC50V megohmmeter) (between all external terminals and the housing)			
Temperature range		Operating temperature: 0~50°C; Storage temperature: -10~60°C (no condensation, no freezing)			
Operating humidity range		35~85% R.H. (no condensation, no freezing)			
Specifications			CE certification (EMC Directive, RoHS Directive)		
Piping specifications			Rc1/2, NPT1/2, G1/2		Rc3/4, NPT3/4, G3/4
Main materials of fluid contact parts			SUS304, PPS, Aluminum Alloy, EPDM, Si, Au, FR4		

OUTLINE DIMENSION DRAWING

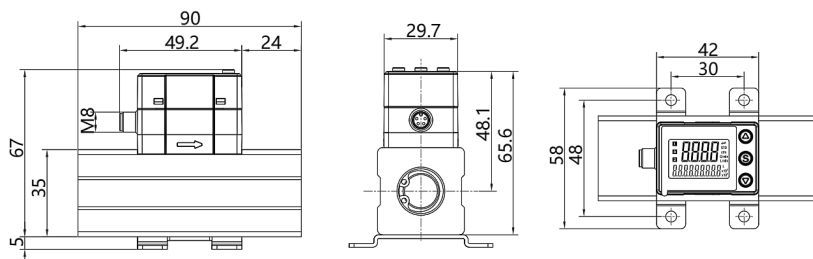
HNF80-A-501, HNF80-A-102 Overall dimensions



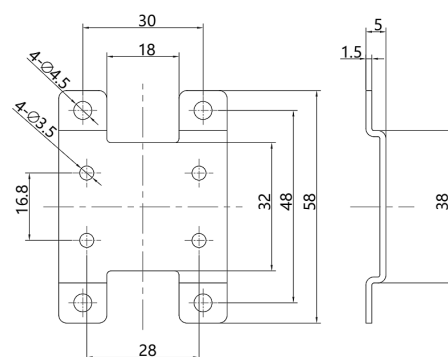
HNF80-A-501, HNF80-A-102 Bracket dimensions



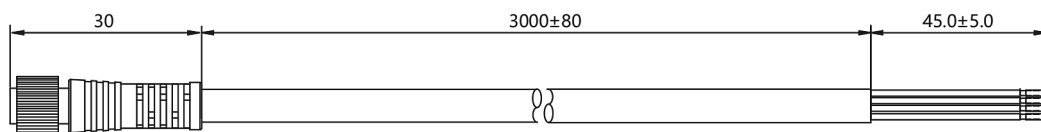
HNF80-A-202 Overall dimensions



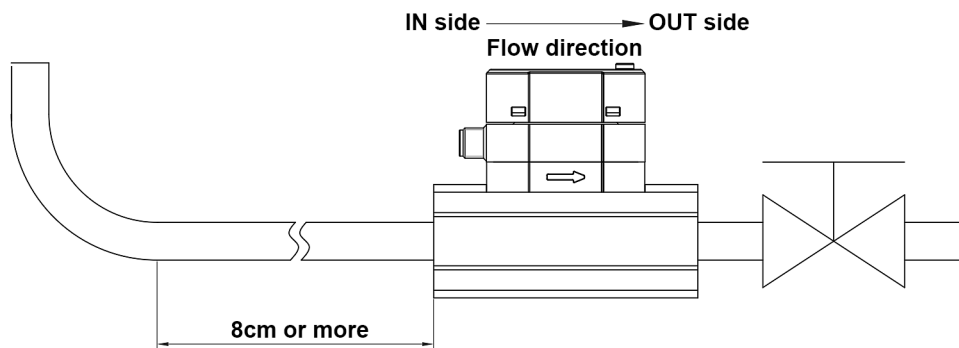
HNF80-A-202 Bracket dimensions



Conductor dimensions



TECHNICAL PARAMETERS

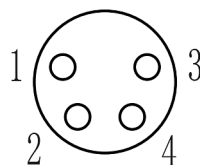
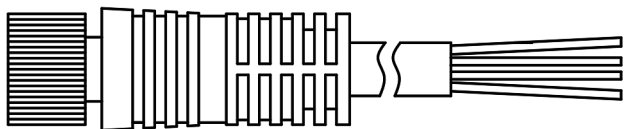


Piping method

- ① Please avoid installing the main body with the bottom facing upward.
- ② When piping to the IN side of the product, please reserve a straight pipe section of 8 cm or more.
- ③ When piping, please avoid abrupt changes in the pipe size on the IN side of the product.
- ④ Do not directly discharge to the atmosphere when the OUT-side pipe port of the product is not connected with piping, as the accuracy may change.
- ⑤ When piping, please do not allow the sealing tape to get mixed into the flow path, and after piping, please check that there is no leakage.
- ⑥ When installing the fitting, use a wrench to hold the metal body on the fitting side. Using a wrench on other parts may cause damage to the product.

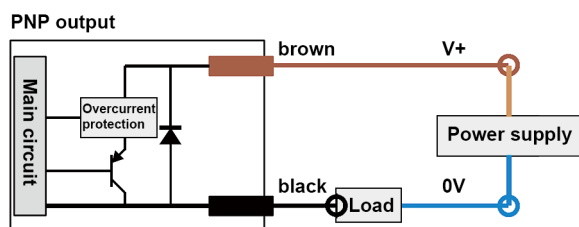
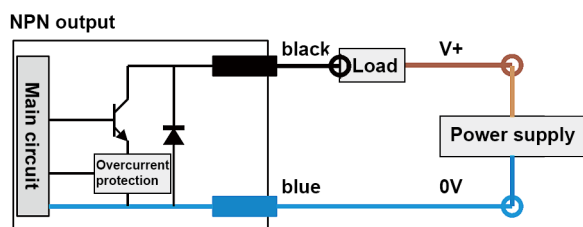
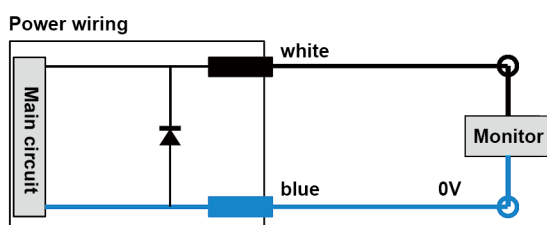
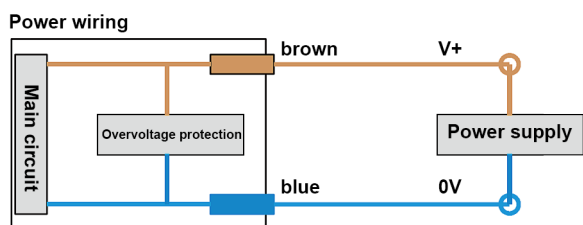
In particular, do not use a wrench on the M8 plug.

PRODUCT WIRING INSTRUCTIONS



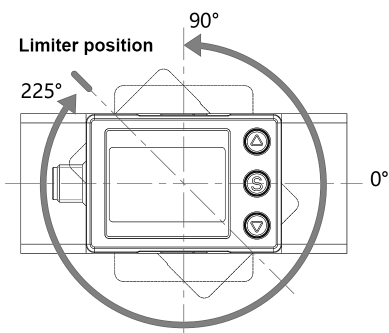
	1: Brown	DC(+)
	4: Black	OUT2/Analog Output
	2: White	OUT1
	3: Blue	DC(-)

Note: The color of the wire refers to the properties of the wire accessories configured by our company.



PRODUCT INSTALLATION

Regarding installation

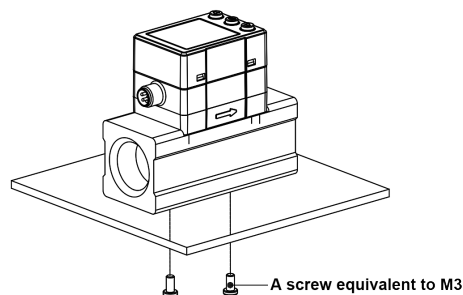


·Do not install the product in a place where it may be stepped on.

·Regarding the flow direction of the fluid, please install according to the arrow direction on the side of the main body.

·The display unit of the integrated display type can be rotated. It can rotate 90° counterclockwise, and 225° or 45° clockwise. Please note that using excessive force to rotate it may cause damage to the stopper.

Direct installation



·Please use screws equivalent to M3 (2 pieces) for installation.

·Please ask the customer to prepare the screws.

·Please refer to the outline dimension drawing for the thread tap hole diameter and depth.

·The tightening torque when installing the screws is 0.5~0.7 Nm.

Please use the 2 mounting screws included with the product to install the bracket.

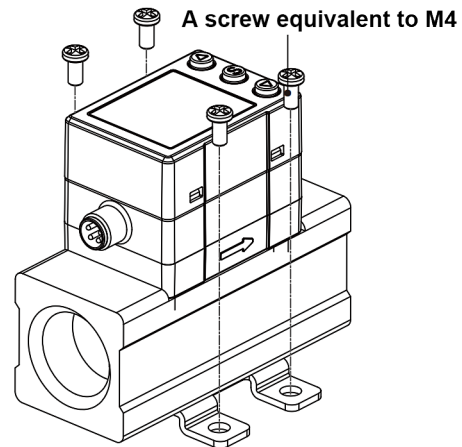
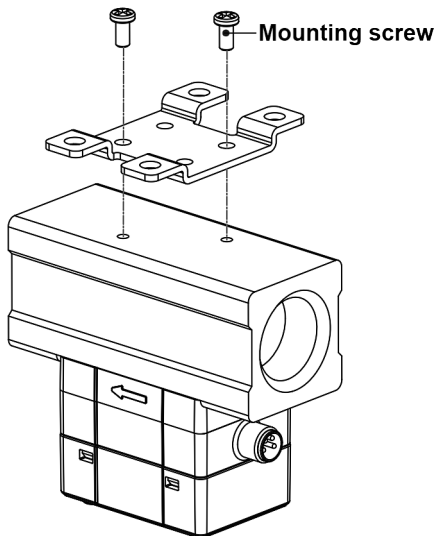
The tightening torque for the bracket mounting screws is 0.5~0.7 Nm.

Bracket installation

When installing the product bracket, please use screws equivalent to M4 (4 pieces).

Please ask the customer to prepare the screws.

For the thickness of the bracket and the processing dimensions of the mounting holes, please refer to the outline dimension drawing.



OMNIDIRECTIONAL DISPLAY



HNF80-A THERMAL MICRO GAS MASS FLOW METER SELECTION TABLE

NAME	CODE	CODE DESCRIPTION
Flow range	501	5~500L/min
	102	10~1000L/min
	202	20~2000L/min
Thread types	R	Rc
	N	NPT
	F	G
Piping size	04	1/2 (Flow range: 501, 102)
	06	3/4 (Flow range: 202)
Output type	A	2-way NPN (each way can be individually set to PNP)
	B	2-way PNP (each way can be individually set to NPN)
	C	1 channel NPN (can be set to PNP) + 1 channel 1-5V or 0-10V
	D	1 channel NPN (can be set to PNP) + 1 channel 4-20mA
	E	1 channel PNP (can be set to NPN) + 1 channel 1-5V or 0-10V
	F	1 channel PNP (can be set to NPN) + 1 channel 4-20mA
Wire selection		Wire with M8 connector (3m)
	N	None
Unit specification		With unit switching function
	M	Fixed SI units
Selection of mounting brackets		None
	R	With mounting bracket

Turn on the power



3 seconds after power on, the output is forced OFF and the product identification code is displayed.



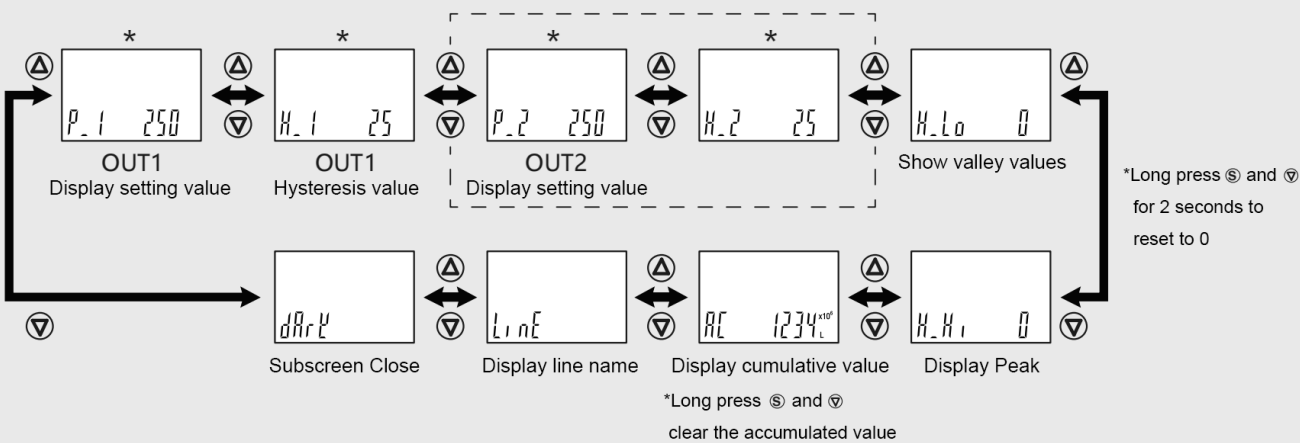
[Measurement mode]

Refers to the state of detecting and displaying flow and performing switching actions after the power is turned on.

Basic mode that can be switched to setting change mode or other function setting mode upon request.

About the Sub-Screen Display

In measurement mode, press the or button to switch to the sub-screen display.



Press once
 Button

Press Button
more than 2 seconds

Press Button
more than 5 seconds

Enter Quick Settings
(*Sub-screen only)

Change various setting values
(Function selection mode)

Lock screen settings

(Display this screen and let go)

※ : Output is also performed during the setting process.

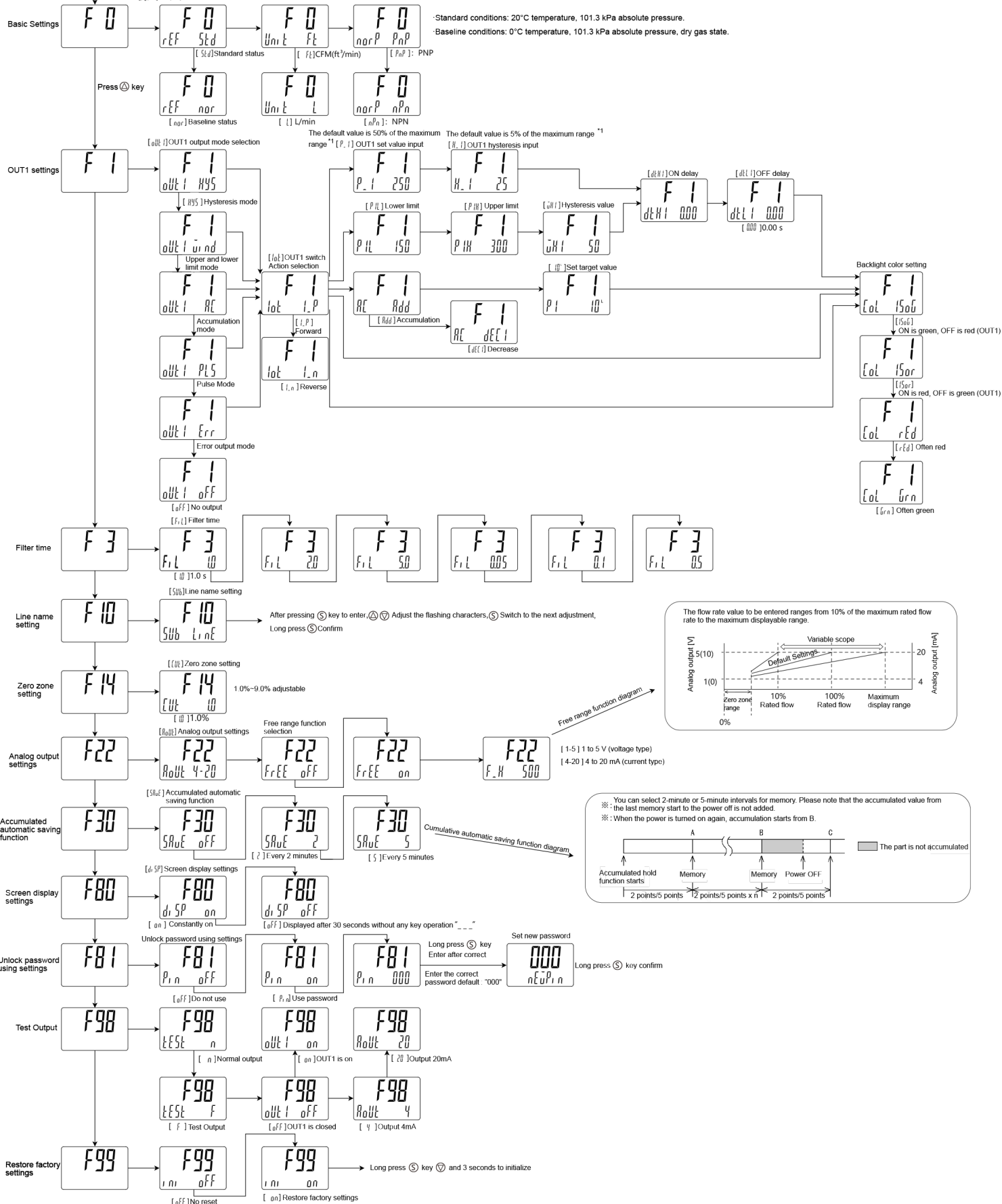
A digital display with a white background and black text. The top line shows '0.00' with 'L/min' to its right. The bottom line shows 'P-1'. To the right of the display are three circular buttons with upward, rightward, and downward arrows. A small rectangular port is on the left side.

Press and hold the button for 2 seconds

[*r*{*f*}] Display unit base selection [*u*_{*n*}{*t*}] Unit switching function [*n**o**r*{*p*}] Switch mode selection

Standard conditions: 20°C temperature, 101.3 kPa absolute pressure.

·Baseline conditions: 0°C temperature, 101.3 kPa absolute pressure, dry gas state.



■[F1] OUT1 Setting

Set the output method for OUT1.

●Switch Output Operation List

Select an operation from the table below. ()The value in the table is the value at OUT2.

	Forward output	Inverted output
Hysteresis mode		
Upper and lower limit comparison method		
Cumulative output mode (increase)		
Accumulated output mode (reduction)		
Accumulated pulse output mode		

* Using hysteresis mode or upper/lower limit comparison mode in unstable conditions such as fluid pulsation may cause unstable operation. In this case, increase hysteresis and confirm stable operation before use.

Precautions for use

When selecting and using the product, please observe the following

Regarding selection (please observe the following regarding installation and wiring).

*About product specifications, etc.

- Please use within the specified voltage.
- Using a voltage outside the specified range may cause malfunction or malfunction. If the voltage is below the specified range, the internal voltage of the product may drop, and the load may not operate. Please confirm the load's operating voltage before use.
- Do not use a voltage or current that exceeds the product's maximum load. This may damage the product and shorten its lifespan.
- Applicable fluids are dry air and N2. The fluid temperature range is 0-50°C.
- Use within the specified measured flow rate and operating pressure. Doing so may damage the pressure switch and cause it to malfunction.

About Usage

*Install

- Do not drop, hit, or apply excessive impact. This may cause internal damage or malfunction of the product.
- Do not pull the lead wires forcefully or carry the unit by pulling on them. (Tensile strength: 49N or less). To prevent damage, malfunction, or malfunction, hold the unit by the hand during use.
- When piping the product, use a wrench to hold the metal portion that is integral with the piping. Using a wrench on other parts may damage the product.
- Blow out any remaining foreign matter in the piping before piping the product. This may cause malfunction or malfunction.
- Always install and pipe according to the fluid flow direction indicated on the product nameplate. Do not install the unit with the bottom facing upward. Air entrapment may result in inaccurate measurement.
- Do not install the switch where it may be stepped on. Accidental stepping on the switch may cause excessive load and damage. Avoid
- Avoid applying excessive force to the display. The display unit of the integrated display model can be rotated 90° counterclockwise, 225°, and 45° clockwise. Be careful not to force rotation with excessive force, as this may damage the stopper.
- If there is a possibility of foreign matter in the fluid, install a filter and oil separator on the IN side (inflow side) before proceeding with installation and piping. This can cause malfunctions and incorrect operation, and may prevent accurate measurement.

*Wiring (including plugging and unplugging connectors)

- Do not pull the wires forcefully. Especially when connected to connectors and piping, do not pull the wires while transporting them. This can cause internal damage, malfunction, or detachment from the connector.
- Do not repeatedly bend, stretch, load, or apply external forces to the wires. Repeated bending or stretching of the wires during wiring can cause the wire sheath to peel or break. If the wires are movable, secure them close to the switch body. The recommended bend radius for the wires is 6 times the outer diameter of the sheath or 33 times the outer diameter of the insulation, whichever is greater. Replace the wires if they are damaged.
- Do not perform wiring errors. Incorrect wiring can cause malfunction or damage to the product.
- Do not perform wiring work while power is on. This can cause internal damage or malfunction.
- Do not use the same wiring path as power or high-voltage lines. To prevent interference signals and surges from the power and high-voltage lines from entering the signal lines, route the product wiring separately from the power and high-voltage lines.
- Please check the insulation of the wiring. If the insulation is poor (such as contact with other circuits or poor insulation between terminals), excessive voltage or current may be applied to the product.
- To prevent the ingress of noise and surges, keep the wiring as short as possible. The maximum length should be within 10 meters. Furthermore, ensure that the DC (-) wire (blue wire) is as close to the power source as possible when wiring.

FAULT LIST

If the product malfunctions, please confirm the fault status using the table below. If the cause cannot be determined, but normal operation is restored after replacing the product, it is likely that the product itself is faulty. Product failure may also be caused by the operating environment (network system configuration, etc.). In this case, the details of the countermeasures will be discussed separately.

Troubleshooting Methods List

	Fault status	Speculated causes	Countermeasures
Show	Not displayed	Defective wiring	Please wire correctly.
		Plug falls off	Please connect the plug correctly.
	Display unstable	Foreign matter is mixed in or attached to the flow path of the sensor.	If there is a possibility of foreign matter being mixed in, install a filter or oil mist separator on the IN side of the product. If there is foreign matter stuck to the filter, carefully remove it, taking care not to scratch the product.
		Reverse piping connection	The direction of fluid flow is marked on the side of the body or on the nameplate. Install in the direction indicated by the arrow.
		Flow rate pulsates	Check whether the supply pressure fluctuates and whether the compressor or pump serving as the pressure source has characteristic pulsation. Change to a pressure source with less pulsation, or install an air tank to reduce pressure fluctuations.
		Leakage occurs	Please install the piping correctly.
	Display Error	Foreign matter is mixed in or attached to the flow path of the sensor.	If there is a possibility of foreign matter being mixed in, install a filter or oil mist separator on the IN side of the product. If there is foreign matter attached to the filter, please remove it carefully, taking care not to scratch the product.
		Reverse piping connection	The flow direction of the fluid is marked on the side of the body or on the nameplate. Please install it in the direction indicated by the arrow.
		Wrong selection of unit switching function	Please select the correct unit.
		Leakage occurs	Please install the piping correctly.

※: When using a product with a unit switching function.

	Fault status	Speculated causes	Countermeasures
Output	No output	Wiring failure	Ensure correct wiring.
		Plug detached	Connect the plug correctly.
	Output is unstable	Foreign matter in or adhering to the sensor flow path	If there is a possibility of foreign matter entering the product, install a filter or oil mist separator on the IN side of the product. If foreign matter adheres to the filter, carefully remove it, taking care not to scratch the product.
		Tubing connected in reverse	The flow direction is indicated by the arrow on the side of the unit or on the nameplate. Install the product in the direction indicated by the arrow.
		Flow rate pulsation	Check for supply pressure fluctuations and for characteristic pulsation in the compressor or pump serving as the pressure source. Change to a pressure source with less pulsation or install an air tank to reduce pressure fluctuations.
		Air leak	Ensure correct piping.
		Small hysteresis	Increase hysteresis.
Button	Buttons are unresponsive	Keyboard locked	Unlock the keyboard.
External Input	Not receiving input (no response)	Wiring failure	Connect the wiring correctly.
		Input time is short	Maintain a connection to GND for at least 30ms before performing any external input.
		Input interval is short	When inputting signals continuously, leave them at least one second apart.

·Alarm display

Alarm name	Alarm display	Content	Treatment method
Instantaneous flow alarm	HHHH	The flow rate exceeds the display flow rate range.	Reduce the flow rate.
	LLLL	A flow rate equal to or greater than -5% of the maximum rated flow rate is causing reverse flow.	Allow the flow rate to flow in the correct direction.
OUT1 overcurrent alarm	Err1	The load current flowing through the switch output (OUT1) exceeds 80mA.	Turn off the power, eliminate the cause of the overcurrent, and then reconnect the power.
OUT2 overcurrent alarm	Err2	The load current flowing through the switch output (OUT2) exceeds 80mA.	
Sensor failure	Err0	The main control chip cannot obtain flow sensor data.	Try to reconnect the power.
System alarm	Er99	Displayed during an internal data alarm.	Turn off the power, then reconnect it.



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