Flow Sensor 21 with 2-color Dual Display

2-color Dual Digital Display in 17 mm width Flow Sensor

⚠Safety instructions for this product
Safety instructions, Common safety instructions for each product category and Detailed safety instructions for each product are in the end of this catalog and our website.

Model Designation (Example)

FUS21 (1) – NVC (2) – F (3) 005 (4) – 4 (5) 1 (6) B (7) N (8)

(1) Flow Sensor 21 with 2-color dual digital display

(2) Output type

Code	Switch output		Analog output	Setting copy function
NVC	NPN	1 point	1 point (Voltage output)	Equipped
NV		2 points	1 to 5V	Not equipped
NAC		1 point	1 point (Current output)	Equipped
NA		2 points	4 to 20mA	Not equipped
PVC	PNP	1 point	1 point (Voltage output)	Equipped
PV		2 points	1 to 5V	Not equipped
PAC		1 point	1 point (Current output)	Equipped
PA		2 points	4 to 20mA	Not equipped

(3) Flow direction

Code	F	R (*)
Flow direction	Uni-direction	Bi-direction

* Selectable only for no needle valve equipped type.

(4) Flow rate range (Full scale flow rate)

Code	Flow rate (ℓ/min)
005	0.5
010	1
020	2
050	5
100	10
200	20
500	50
101	100
201	200

* Please check the right table for the combination of flow range and applicable tube size.

Table: Flow range and applicable tube size (●: Available)

(4) Flow rate code \ (5) Applicable tube size code	4	6	8	10	1/4	3/8
005	●	●			●	
010	●	●			●	
020	●	●			●	
050	●	●			●	
100	●	●			●	
200	●	●			●	
500		●	●		●	
101			●	●		●
201			●	●		●

(5) Applicable tube size (øD)

	mm size (mm)				inch size (inch)	
Code	4	6	8	10	1/4	3/8
Tube O.D.	ø4	ø6	ø8	ø10	ø1/4	ø3/8

* Please check the above table for the combination of flow range and applicable tube size.

(6) Connector cable

Code	No code	1	3
Cable length (m)	Without cable	1	3

(7) Mounting bracket option

Code	Option
No code	Not equipped
B	Bracket
P	Panel-mount bracket kit
D	DIN rail-mount bracket

(8) Needle valve

Code	No code	N
Needle valve	Not equipped	Built-in

Model Designation of Accessories (Example)

FUS21 (1) – B1 (2)

(1) Flow Sensor 21 with 2-color dual digital display

(2) Option

Code	Option
B1	Bracket
P	Panel-mount bracket kit
PN	Panel-mount bracket kit for Needle Valve type
C51	5-core cable 1m
C53	5-core cable 3m
D	DIN rail-mount bracket

Characteristics

High accuracy: Max. ± 3% F.S.

Precise flow measurement is possible.

Quick response time: Max. 50 msec.

High-speed response is realized by incorporating a platinum sensor chip processed with silicon micromachining and contributes to shorten cycle time.

Setting copy function is equipped.

Settings on master sensor can be copied to slave sensors by copy function, which can save setting time.

Built-in needle valve model.

Flow adjustable needle valve and sensor are integrated into one unit. Easy piping and space saving.

inch size is available.

Bi-directional flow measurement is possible.

Bi-directional flow model can measure the flow of preset direction as desired and gives flexibility of plumbing installation. It can be used as a reverse flow detector.

Forward direction

Bi-direction

Reverse direction

Pressure loss can be reduced up to 50% by redesigning the flow path.

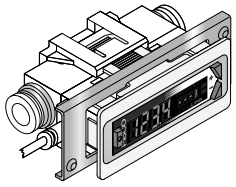
Several gases can be used as fluid medium.

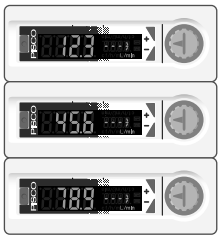
Besides air, nitrogen gas, carbon dioxide gas, argon gas and mixed gas (Argon 80% + carbon dioxide gas 20%)

Flexible mounting options

by a mounting bracket, a panel mount bracket or a DIN rail mount bracket

● Panel mount

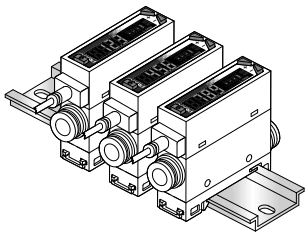




Space saving

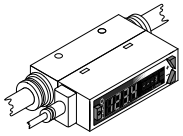
Side-by-side installation is possible.

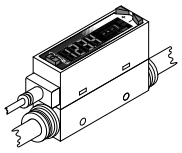
● DIN rail mount

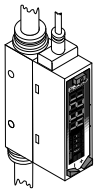


Unrestricted in mounting orientations

The sensor can be mounted in any orientation: top, bottom, left, or right.

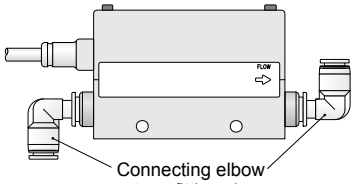






No straight piping section required.

No straight piping section is required at either upstream or downstream side as a rectifier mechanism is built-in.



Connecting elbow type fittings is possible.

Dual display/2-color indication

Indication of instantaneous flow rate or setting on main or sub display. Display color can change to Green or Red for output status for normal display and switch output.

■Dual display

Flow rate unit

Main display (instantaneous flow rate)

Sub-display (Flow direction, etc.)

■2-color indication

Green/Red (Switchable)

With rotatable display, upside down installation is OK

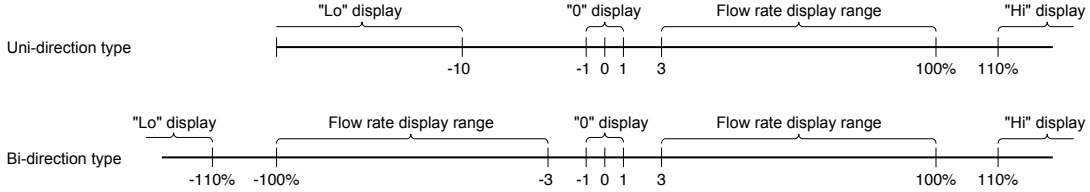
Indication can rotate.

Specifications

Flow rate range codes		005	010	020	050	100	200	500	101	201
Flow direction	F	Uni-direction								
	R	Bi-direction								
Flow rate measurement range (*1)	F	15 to 500 mℓ/min	30 to 1000 mℓ/min	0.06 to 2.00 ℓ/min	0.15 to 5.00 ℓ/min	0.30 to 10.00 ℓ/min	0.6 to 20.0 ℓ/min	1.5 to 50.0 ℓ/min	3.0 to 100.0 ℓ/min	6 to 200 ℓ/min
	R	-500 to -15, 15 to 500 mℓ/min	-1000 to -30, 30 to 1000 mℓ/min	-2.00 to -0.06, 0.06 to 2.00 ℓ/min	-5.00 to -0.15, 0.15 to 5.00 ℓ/min	-10.00 to -0.30, 0.30 to 10.00 ℓ/min	-20.0 to -0.6, 0.6 to 20.0 ℓ/min	-50.0 to -1.5, 1.5 to 50.0 ℓ/min	-100.0 to -3.0, 3.0 to 100.0 ℓ/min	-200 to -6, 6 to 200 ℓ/min
Display		4 digits + 4 digits 2-color LCD								
Flow rate display range (*2)	F	-49 to 549 mℓ/min	-99 to 1099 mℓ/min	-0.19 to 2.19 ℓ/min	-0.49 to 5.49 ℓ/min	-0.99 to 10.99 ℓ/min	-1.9 to 21.9 ℓ/min	-4.9 to 54.9 ℓ/min	-9.9 to 109.9 ℓ/min	-19 to 219 ℓ/min
	R	-549 to 549 mℓ/min	-1099 to 1099 mℓ/min	-2.19 to 2.19 ℓ/min	-5.49 to 5.49 ℓ/min	-10.99 to 10.99 ℓ/min	-21.9 to 21.9 ℓ/min	-54.9 to 54.9 ℓ/min	-109.9 to 109.9 ℓ/min	-219 to 219 ℓ/min
Integration display (*3)	Display range	0 to ±9999999mℓ		0.00 to ±99999.99ℓ			0.0 to ±999999.9ℓ			0 to ±9999999ℓ
	Pulse output rate	5mℓ	10mℓ	0.02ℓ	0.05ℓ	0.1ℓ	0.2ℓ	0.5ℓ	1ℓ	2ℓ
Operating conditions	Fluid medium (*4)	Clean air (JIS B 8392-1:2012 1.1.1 to 5.6.2), Compressed air (JIS B 8392-1:2012 1.1.1 to 1.6.2), Nitrogen gas								
		Argon gas, carbon dioxide gas and mixed gas (Argon + carbon dioxide gas)								
	Temp. range	0 to 50°C (no dew condensation)								
	Pressure range	-0.09 to 0.75MPa								
	Pressure proof	1MPa								
Operating ambient temp. and hum.		0 to 50ºC, 90%RH or less								
Storage temperature		-10 to 60ºC								
Accuracy(*5) (Fluid: Dry air)	Accuracy (*6)	± 3% F.S. or less (open to air at secondary side) (The scope of gurantee depens on the "Flow rate measurement range")								
	Repeatability (*7)	± 1% F.S. or less (open to air at secondary side)								
	Temperature characteristics	MAX ± 0.2% F.S. /°C (15 to 35°C, 25°C criteria)								
	Pressure characteristics	± 5% F.S. or less (Criteria: Open to air at secondary side)								± 5% F.S. or less (Criteria: 0.35 MPa)
Response time (*8)		50 msec or less (response time setting: OFF)								
Switch output	NV/NVC/NA/NAC	NPN open collector output (50 mA or less, voltage drop 2.4V or less)								
	PV/PVC/PA/PAC	PNP open collector output (50 mA or less, voltage drop 2.4V or less)								
Analog output (*9)	NV/NVC/PV/PVC	1 to 5 V voltage output (connected load impedance 50 kΩ and over)								
	NA/NAC/PA/PAC	4 to 20 mA current output (connected load impedance 0 to 300 Ω)								
Power supply voltage (*10)	NV/NVC/PV/PVC	12 to 24 VDC (10.8 to 26.4V) ripple rate 1% or less								
	NA/NAC/PA/PAC	24 VDC (21.6 to 26.4V) ripple rate 1% or less								
Current consumption (*11)		45 mA or less								
Lead wire		ø3.7 AWG26 equivalent × 5 cores (connector), Outside diameter of insulator is 1.0								
Functions (*12)		(1) Gas type switching, (2) Setting copy function, (3) Flow rate integration, (4) Peak hold, etc.								
Protective structure		IP40 equiv.								
Protective circuit (*13)		Power supply and switch output reverse connection protections, and switch output load short-circuit protection								
Vibration resistance		10 to 150 Hz, max. 100 m/s², 2 hours each in X, Y, Z direction								
EMC directive		EN55011, EN61000-6-2, EN61000-4-2/3/4/6/8								
Mounting	Mounting orientation (*14)	Unrestricted in vertical/horizontal direction								
	Straight piping section (*15)	Not required								

*1 The value converted from mass flow rate to volumetric flow rate at standard condition (20°C, 1 barometric pressure (101 kPa), relative humidity 65%). (For gas other than air, 20°C, 1 barometric pressure (101 kPa), relative humidity 0%RH).

*2 The displays of each flow rate are shown below.



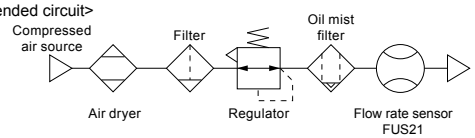
*3 The integrating flow is a calculated (reference) value. When using the integrated value save function, the number of saves should not exceed the access count limit of the storage cell (1 millions times). (Changes to the settings are counted in number of accesses.)

$$\text{Number of saves} = \frac{\text{Usage time}}{\text{5 min.}} < \text{1 million times}$$

When instantaneous flow rate is 1 % or below, it is not counted as integrated flow rate.

*4 Use dry clean gas which does not contain corrosive elements such as chlorine, sulfur or acids, and does not contain dust or oil mist. When using compressed air, use clean air that complies with JIS B 8392-1:2012 Class 1.1.1 to 1.6.2. Compressed air from the compressor contains drain (water, oil oxide, foreign substances, etc.). To maintain the function of the product, install a filter, air dryer (min. pressure dew point 10°C or less), and oil mist filter (max. oil content concentration 0.1 mg/m³) on the primary side (upstream side) of the product.

<Recommended circuit>



*5 Compressed air is used for adjustment and inspection of this product. Accuracy for gas types other than air is only a guide.

*6 The accuracy is based on the manufacturer's basic flow rate mater. It does not represent absolute accuracy.
Repeatability, temperature characteristics, and pressure characteristics are not included in accuracy ± 3% F.S.
Consider this condition according to the operating environment and operating conditions.
*7 Repeatability over a short period of time. Changes over time are not included.
*8 Actual response time may differ depending on piping conditions. Response time can be set within the range of 50 msec. to 1.5 sec.
*9 Output impedance of analog voltage output type is about 1kΩ. In the case impedance of connected load is low, the margin of output value increases. Check the margin of connected load before using the product.
*10 The power supply voltage specifications differ for the voltage output type and the current output type.
*11 Current when 24 VDC is connected and no load is applied. The current consumption will vary depending on how the load is connected.
*12 Gas can be switched to argon, carbon dioxide, argon 80% + carbon dioxide 20% with the gas switching function.
The full-scale flow rate becomes half of the flow rate range when switching to carbon dioxide gas. Also, an output type can be selected for analog output.

Gas type	Flow direction	Flow rate measurement range								
		005	010	020	050	100	200	500	101	201
· Air · Nitrogen · Argon ·Argon 80% + Carbon dioxide 20%	Uni-direction	15 to 500 mℓ/min	30 to 1000 mℓ/min	0.06 to 2.00 ℓ/min	0.15 to 5.00 ℓ/min	0.30 to 10.00 ℓ/min	0.6 to 20.0 ℓ/min	1.5 to 50.0 ℓ/min	3.0 to 100.0 ℓ/min	6 to 200 ℓ/min
	Bi-direction	-500 to -15 mℓ/min	-1000 to -30 mℓ/min	-2.00 to -0.06 ℓ/min	-5.00 to -0.15 ℓ/min	-10.00 to -0.30 ℓ/min	-20.0 to -0.6 ℓ/min	-50.0 to -1.5 ℓ/min	-100.0 to -3.0 ℓ/min	-200 to -6 ℓ/min
		15 to 500 mℓ/min	30 to 1000 mℓ/min	0.06 to 2.00 ℓ/min	0.15 to 5.00 ℓ/min	0.30 to 10.00 ℓ/min	0.6 to 20.0 ℓ/min	1.5 to 50.0 ℓ/min	3.0 to 100.0 ℓ/min	6 to 200 ℓ/min
· Carbon dioxide	Uni-direction	15 to 250 mℓ/min	30 to 500 mℓ/min	0.06 to 1.00 ℓ/min	0.15 to 2.50 ℓ/min	0.30 to 5.00 ℓ/min	0.6 to 10.0 ℓ/min	1.5 to 25.0 ℓ/min	3.0 to 50.0 ℓ/min	6 to 100 ℓ/min
	Bi-direction	-250 to -15 mℓ/min	-500 to -30 mℓ/min	-1.00 to -0.06ℓ/min	-2.50 to -0.15 ℓ/min	-5.00 to -0.30 ℓ/min	-10.0 to -0.6 ℓ/min	-25.0 to -1.5 ℓ/min	-50.0 to -3.0 ℓ/min	-100 to -6 ℓ/min
		15 to 250 mℓ/min	30 to 500 mℓ/min	0.06 to 1.00 ℓ/min	0.15 to 2.50 ℓ/min	0.30 to 5.00 ℓ/min	0.6 to 10.0 ℓ/min	1.5 to 25.0 ℓ/min	3.0 to 50.0 ℓ/min	6 to 100 ℓ/min

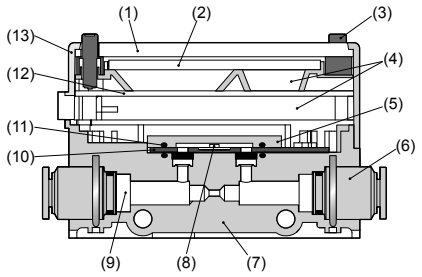
Gas type	Flow direction	Analog output			
		Output type A		Output type B	
		Voltage	Current	Voltage	Current
· Carbon dioxide	Uni-direction	1 to 3V	4 to 12mA	1 to 5V	4 to 20mA
	Bi-direction	2 to 4V	8 to 16mA		

The "Copy function" option can be selected at "Output specifications" in the model designation. Note that the "External input" function is not available on models with "Setting copy function".

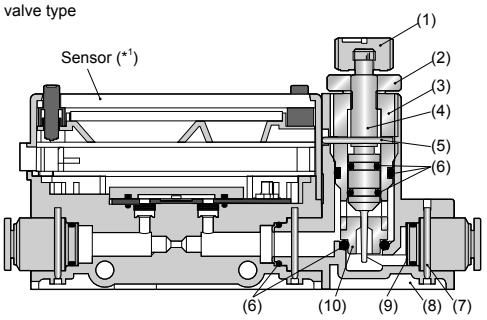
*13 The protection circuit of this product is effective only for specific error connections and load short-circuit. It is not designed to protect from any error connections.
*14 This product measures the change in heat distribution caused by the fluid flow. When this product is mounted in vertical orientation, convection flow can influence heat distribution and cause the zero point to deviate.
*15 Accuracy may be affected by the piping conditions. For more accurate measurement, provide a straight pipe section 10 times as long as the pipe inner diameter.

Sectional drawing

No needle valve type



Built-in needle valve type



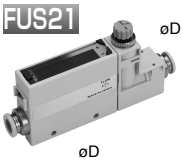
No,	Parts	Material
(1)	LCD cover	Acryl resin
(2)	LCD	−
(3)	Switch	EPDM
(4)	Circuit board spacer	PC
(5)	Sensor cover	Stainless steel
(6)	Cartridge fitting	−
(7)	Resin body	PA
(8)	Sensor chip	Semiconductive silicon
(9)	Port filter	Stainless steel
(10)	Sensor circuit board	Glass epoxy resin
(11)	Sensor gasket	FKM
(12)	Electronic substrate	Glass epoxy resin
(13)	Case	PA

No,	Parts	Material (treatment)
(1)	Knob	PBT
(2)	Lock nut	Nickel plated brass
(3)	Needle guide	Nickel plated brass
(4)	Needle	Nickel plated brass (*2)
(5)	Fixing pin	Stainless steel
(6)	O-ring	FKM
(7)	Fixing pin for fitting	Stainless steel
(8)	Needle valve body	PA
(9)	Port filter	Stainless steel
(10)	Orifice	Nickel plated brass (*3)

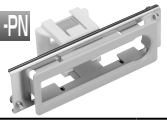
*1 Please refer to no needle valve type for the main parts of the sensor.
*2 Needle of FUS21: 005/010/020 is stainless steel.
*3 Orifice of FUS21: 005/010/020 is PTFE.

Flow Sensor 21 with 2-color Dual Display

RoHS2 (2011/65/EU+EU2015/863) compliant CE

Type	Model code FUS21-2-F4-567	Type	Model code FUS21-2-R4-567	Type	Model code FUS21-2-F4-567N
No needle valve Uni-direction FUS21 	FUS21-2-F005-567	No needle valve Bi-direction FUS21 	FUS21-2-R005-567	Built-in needle valve Uni-direction FUS21 	FUS21-2-F005-567N
	FUS21-2-F010-567		FUS21-2-R010-567		FUS21-2-F010-567N
	FUS21-2-F020-567		FUS21-2-R020-567		FUS21-2-F020-567N
	FUS21-2-F050-567		FUS21-2-R050-567		FUS21-2-F050-567N
	FUS21-2-F100-567		FUS21-2-R100-567		FUS21-2-F100-567N
	FUS21-2-F200-567		FUS21-2-R200-567		FUS21-2-F200-567N
	FUS21-2-F500-567		FUS21-2-R500-567		FUS21-2-F500-567N
	FUS21-2-F101-567		FUS21-2-R101-567		FUS21-2-F101-567N
	FUS21-2-F201-567		FUS21-2-R201-567		FUS21-2-F201-567N

Options

Type	Model code	Type	Model code	Type	Model code
Connector cable FUS21-C5 	FUS21-C51	Panel-mount bracket kit FUS21-P 	FUS21-P	Panel-mount bracket kit for Needle Valve type FUS21-PN 	FUS21-PN
	FUS21-C53				

Type	Model code	Type	Model code
Bracket FUS21-B1 	FUS21-B1	DIN rail-mount bracket FUS21-D 	FUS21-D

Notes

*1 Please select a code for output type forr 2 , a tube size code for 5, a code for cable for 6, and a code for bracket for 7 in model code, refferring to the Model Designation (Example) on plage 192.

*2 The price of accessories (cable, panel mount kit, bracket and DIN rail) are not included into the price of the sensors.

CAD data is available at PISCO website.

Packaging specifications
1 pc. /bag