KOGANEI

Y142948
Ver.2.0

Multi-channel Flow Rate Sensor Controller
FSU
Owner's Manual Ver. 2.0

Thank you very much for purchasing Koganei Multi-channel Flow Rate Sensor Controller. Please read this Owner's Manual carefully and thoroughly for the correct and optimum use of the pressure switch. Kindly keep this manual in a convenient place for quick reference.

⚠ **This product is intended for detection of targeted objects, and does not have control functions for the purposes of accident prevention or other safety measures.**

1 Specifications

●Multi-channel flow rate sensor controller

Item		Model: FSU
Power supply	Voltage	DC24V±10%
	Sensor head supply voltage	DC24V±10%Note 1
	Consumption current	100mA MAX. (Not including current supplied to sensor)
Sensor input	Compatible sensor heads	Rated flow rate ・−500～500 mℓ/min (ANR) type ・−3～3 ℓ/min (ANR) type ・0～10 ℓ/min (ANR) type
	Number of connectable sensors	1～4
	Input voltage range	DC1.0～5.0V
	Maximum input voltage	5.3V MAX.
SW output	Number of outputs	4
	Output method	NPN open collector
	Response time	3ms
	Load voltage	DC30V MAX.
	Load current	50mA MAX.
	Internal voltage drop	0.3V MAX./at load current 5mA
	Output mode	Window comparator mode 1　Window comparator mode 3 Window comparator mode 2　Window comparator mode 4
	Switch output reversal	Compatible with window comparator mode 4 only
	Hysteresis	Variable (Can be freely set at 2 digits or more)
Display	Flow rate display	7-segment LED, 3-digit display
	Switch output display (SW.OUT)	Red LED lights up when ON
	Flow rate display channel indication (A.S.OUT)	Flow rate display channel green LED lights up
Setting method	Body key setting	△: UP, ▽: DOWN, ◹: MODE
	External setting (option)Note 2	Conforms with RS232C
General	Operating temperature range	−10～50°C (storage: −20～80°C, no condensation and freezing)
	Noise resistance	IEC61000-4-4 Power supply line: 1KV (level 2) Sensor input signal line: 1KV (level 3)
	Dielectric strength	AC500V 1 minute
	Insulation resistance	100MΩ min. (at DC500V megger)
	Vibration resistance	88.3m/s² (total amplitude 1.5mm, 10～55Hz)
	Shock resistance	294.2m/s² (Non-repeated shock)
	Material	Case: PBT
	Mass	45g (excluding cable)

Notes: 1. The supply voltage to the sensor head is lower by 0.5V MAX than the controller power supply voltage.
2. **FSU-S-D-□-□** only.

2 General precautions

Wiring

1. If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
2. In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of sensor mounting portion, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
3. When wiring is completed, check that there is no error in the wiring connections.

Others

1. Sensor head is designed for use with non-corrosive gas. It cannot be used for liquid or corrosive gas.
2. Use within the rated pressure range.
3. Do not use during the initial transient time (0.5 sec.) after the power supply is switched on.
4. Do not operate the keys with pointed or sharp objects.
5. When using window comparator mode 2 in operations that involve repeated utilization of the reference flow rate, the guaranteed number of times may be exceeded in a short period of time. In such cases, use window comparator mode 3.
6. If using with window comparator mode 3, use FSU-S-D.

1 Specifications

●Flow rate sensor heads

Item	Model: FS-R3	FS-R05	FS-10
Gases targeted for measurement	Air/nitrogen. However, the detection media cannot contain chlorine, sulfur, acid, or other corrosive substances. Gas must also be dry. Gas must be clean gas devoid of dust or mist (oil mist).		
Measurement flow rate range	−3～+3 ℓ/min	−500～+500 mℓ/min	0～+10 ℓ/min
	Converted volume flow rate at 20°C, 1atm		
Response	5ms or less (95% response to stepped changes in flow rate)		
Output signal	DC1～5V (nonlinear characteristics), Allowable load resistance 10kΩ or more		
Operating temperature range	0～50°C (For both ambient temperature and measured media temperature)		
Storage temperature range	−10～60°C		
Operating and storage humidity range	10～80%RH (no condensation)		
Operating pressure range	−100～+200kPa (Pressure characteristic warranty range is −70～+200kPa)		
Proof pressure	300kPa		
Output voltage accuracy	±5%FS MAX.	±5%FS MAX.	±5%FS MAX.
Standard flow rate characteristics	0.0 ℓ/min: 3.00±0.15V	0.0 ℓ/min: 3.00±0.20V	0.0 ℓ/min: 1.00±0.20V
	0.5 ℓ/min: 3.88±0.15V	0.1 ℓ/min: 3.77±0.20V	3.0 ℓ/min: 3.89±0.15V
	1.5 ℓ/min: 4.49±0.15V	0.3 ℓ/min: 4.53±0.20V	5.0 ℓ/min: 4.46±0.15V
	3.0 ℓ/min: 5.00±0.20V	0.5 ℓ/min: 5.00±0.20V	10.0 ℓ/min: 5.00±0.20V
Repeatability	±3.5%FS MAX.	±2%FS MAX.	±6%FS MAX.
	Assuming the same temperature and pressure conditions at time of measurement		
Pressure characteristics	±0.01%FS/kPa	±0.01%FS/kPa	±0.01%FS/kPa (0～+200kPa)
	In −70～+200kPa pressure range		±0.03%FS/kPa (−70～0kPa)
Temperature characteristics	0.0 ℓ/min: ±0.1%FS/°C	0.0 ℓ/min: ±0.1%FS/°C	0.0 ℓ/min: ±0.1%FS/°C
	1.5 ℓ/min: ±0.15%FS/°C	0.3 ℓ/min: ±0.15%FS/°C	5.0 ℓ/min: ±0.2%FS/°C
Power supply voltage	DC24V (Supplied from sensor controller)		
Allowable voltage fluctuation range	In the DC21.6～26.4V range, ±2%FS or less in relation to output value at DC24VNote 2		
Output stabilization time	Time required to come within ±5%FS of final attained voltage (flow rate): Instantaneous Time required to come within ±1%FS of final attained voltage (flow rate): Within 10 sec.		
Consumption current	12mA MAX.		
Dielectric strength	Between all external connector terminals and body: AC500V for 1 min., or AC600V for 1 sec.		
Insulation resistance	Between all external connector terminals and body: 50MΩ (at DC500V megger)		
Connection method	M5 female thread (brass insertion), tightening torque at 2.5N·m or less		
Material	Gas contact part: PPS plastic (flow path body), ceramic (substrate), brass (connections) Cover part: PC plastic (polycarbonate)		
Mounting direction	Any direction except where cover part faces downward		
Mounting conditions	When using the mounting holes on this device, use M3 screws and a tightening torque of 0.6N·m or less. In addition, install a filter upstream from the device that is capable of collecting dust and mist particles of 10μm or larger.		
Straight piping length	Unnecessary either upstream or downstream from the device		
Vibration resistance	10～55Hz, total amplitude 1.5mm, XYZ directions each 2 hours		
Mass	9g		
Electrical connection (special connectors)	Cable with dedicated connector		
	Flow rate sensor heads side: SM03B-SRSS-G-TB made by JST Mfg. Co., Ltd. Mating side: SHR-03V-S-B (housing), SSH-003GA-P0.2 (contact) made by JST Mfg Co., Ltd.		

Notes 1: The %FS in the table assumes full-scale output voltage of 4V (1-5V).
2: Near the upper limit of the measurement flow rate range, output fluctuation after flow rate stabilization can be generated up to a maximum of ±1%FS (amount of drift 500 seconds after flow rate stabilization).

Wiring specifications

Connector type	Item		Specification
B11B-XASK-1 made by JST	Power supply		1 pin : 24V (red)
			2 pin : 0V (black)
	Data input and output	Switch output	3 pin : SW1 (white)
			4 pin : SW2 (green)
			5 pin : SW3 (yellow)
			6 pin : SW4 (brown)
		RS232CNote	7 pin : 0V (blue)
			8 pin : RXD (brown)
			9 pin : TXD (black)
			10 pin : N.C
			11 pin : N.C
37104-3101 made by SUMITOMO 3M	Data input		1 pin : +V (brown)
			2 pin : Sensor output (black)
			3 pin : 0V (blue)
			4 pin : PIN

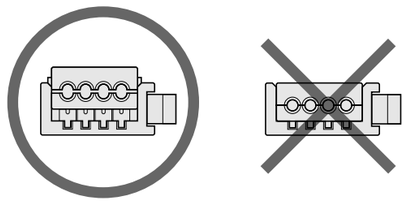
Note: **FSU-S-D-□-□** only.

3 Mounting

Sensor head and connector connection procedure

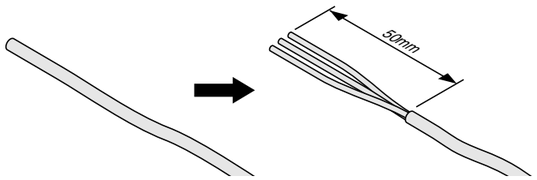
When the sensor head **FSU-□-□** is supplied, the sensor head body and mini clamp connector (male) are not yet connected. Follow the procedure below to perform the connection.

1. Check that the connector cover (the part where lead wires are to be inserted) is protruding from the connector body.



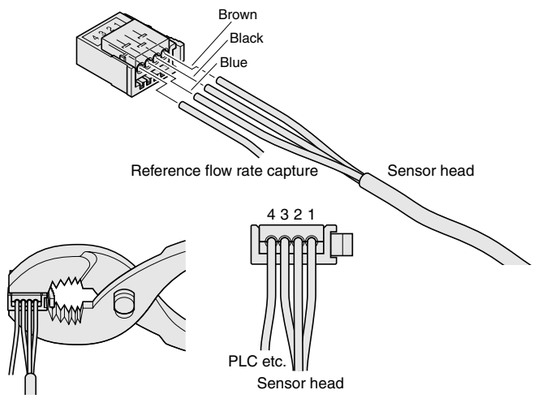
It cannot be used if it's flat and placed at the same level against the body.

2. Cut the cable at the length required for the sensor head. Strip off the cable sheath for 50mm from the cable end, and expose the lead wires. At this time, do not take off the lead wire insulation.



3. Follow the instructions in the table to insert the lead wires into the hole in the connector cover. Look through the top of the semi-transparent cover to check that the lead wires have been firmly inserted all the way to the back. (Insertion length is about 9mm.)
Use caution in making the connections, since switching on the power with wrong connections will damage the sensor head and controller.

No. on the connector	Signal name	Color of lead wire
1	Sensor head power supply (+)	Sensor head brown wire
2	Sensor head voltage output	Sensor head black wire
3	Sensor head power supply (0V)	Sensor head blue wire
4	Reference flow rate capture	Prepared by customer AWG 24-26 (0.14-0.3sq) Insulation diameter: ϕ 0.8-1.0mm

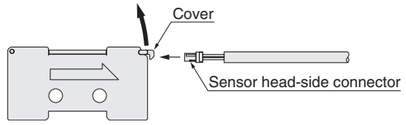


4. Taking care to avoid letting the lead wires slip out from the connector, use pliers or some other hand tool to crimp the cover and connector body, and push the cover into the connector body.
Limit the crimping force to 980.7N.
When the cover is flat and placed at the same level against the connector body, the connection is complete.

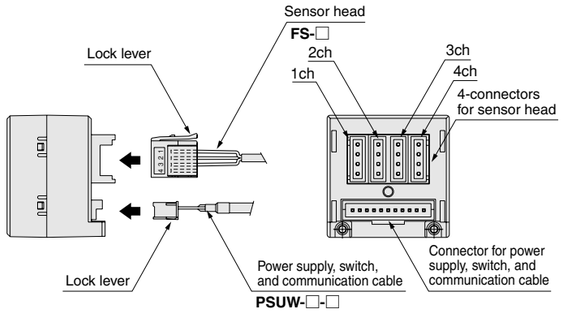
5. In the same way, handle the sensor head relay cable **PSUK-□** mini-clamp connectors (male, female).

6. Check one more time that the wiring is correct.

7. On the sensor head body, connect the sensor head-side connector. Open the sensor head cover, connect the connector and then close the cover.

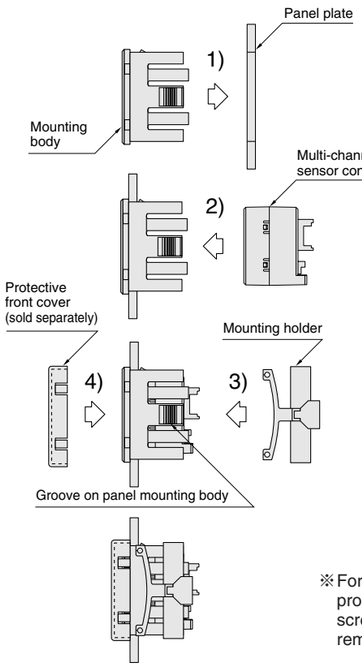


Attaching and removing of the sensor head, and the power supply, switch, and communication cable



To mount the sensor head and the power supply, switch, and communication cable, align the lock lever position as shown in the figure, and push until the lock hooks on the controller-side connector.
To remove, push down hard on the lock lever, take the connector and pull it out. At this time, be careful to avoid applying excessive force on the lead wires.

Attaching the panel mounting parts and protective front cover



1) Insert the mounting body from the front of the panel hole.

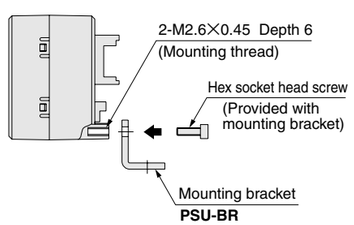
2) Insert the sensor controller from the back of the mounting body.

3) From the back of the position in 2), place the mounting holder on the mounting body groove, and insert it.

4) Set the separately sold protective front cover in place.

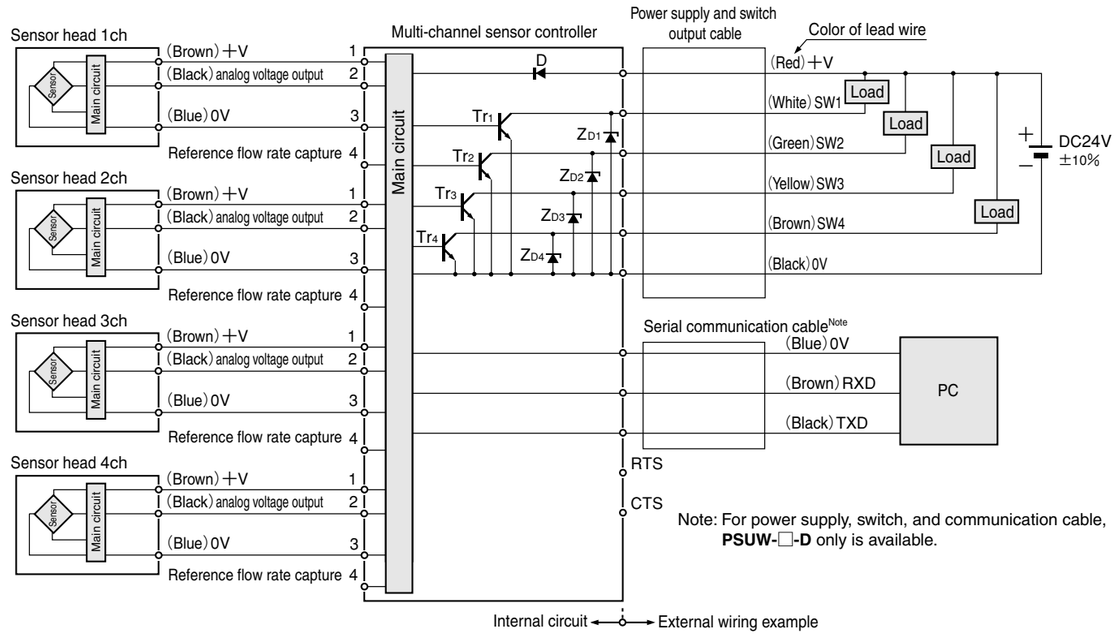
※For removal, follow the above procedure in reverse, using a screwdriver or other tool to remove the mounting holder.

Attaching the mounting bracket



Use the hex socket head screws (M2.6×0.45, length 5mm) to mount the mounting bracket into the mounting holes on the back of the sensor controller. The tightening torque should be 0.32N·m.

4 Internal Circuit Diagrams and Wiring Specifications (External Wiring Example)



Note: For power supply, switch, and communication cable, **PSUW-□-D** only is available.

Note: Be aware that voltage drops as cable resistance increases when extending the cable.

Code	D	: Diode for reverse connecting protection of power supply
	ZD1～ZD4	: Zener diode for surge voltage absorption
	Tr1～Tr4	: NPN output transistor

5 Major parts and functions

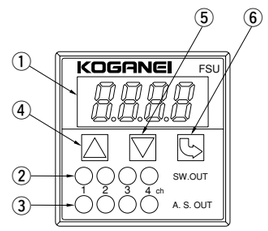


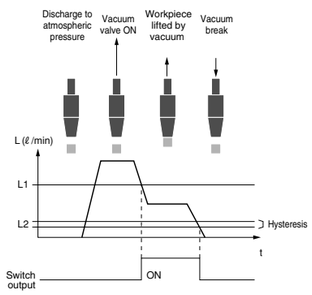
Figure 1

	Name	Description
①	LED display (red)	Displays the detected electric potential value, setting contents, and error content
②	Switch output indicator (red)	Lights up when switch output is ON
③	Autoscan indicator (green)	The channel whose current flow rate is displayed on the LED lights up
④	UP key (△)	Used when adjusting setting value upward
⑤	DOWN key (▽)	Used when adjusting setting value downward
⑥	Mode key ( )	Used for all types of settings

6 Output Mode

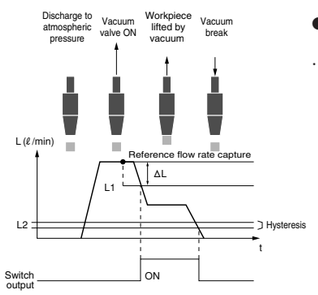
● Window comparator mode 1

· Mode for freely setting L1 and L2. Note, however, that switch output does not go ON while flow rate is increasing.



● Window comparator modes 2 and 3

· Modes for automatically setting L1, using ΔL setting and reference flow rate capture. (L1= Reference flow rate − ΔL)



● Window comparator mode 2

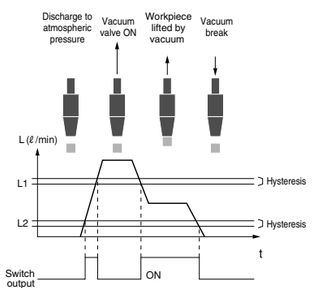
· When L1 has been set, this mode maintains it unchanged until reference flow rate capture is performed again.

● Window comparator mode 3

· Each time the L1 setting is deleted when switch output goes OFF, this mode performs reference flow rate capture and sets L1.
Effective for situations where flow rate fluctuation is severe.
When using window comparator mode 3, use RS232C to perform reference flow rate capture from outside.

● Window comparator mode 4

· Mode for freely setting L1 and L2.



7 Setting

⚠ Caution

1. Since miswiring in the sensor head, or in the power supply, switch, and communication cable, can damage both the controller and sensor head, always check the wiring before switching on the power.
2. The setting conditions are written to EEPROM and saved. Be aware that EEPROM has a finite lifetime, with guaranteed number of times up to 100,000 times.
3. When using window comparator mode 2 in operations that involve repeated reference flow rate capture, the EEPROM guaranteed number of times may be exceeded in a short period of time. In such cases, use window comparator mode 3.
4. In this manual, window comparator mode 1 is called by code: CO1, window comparator mode 2 by code: CO2, window comparator mode 3 by code: CO3, and window comparator mode 4 by code: CO4.

■ Setting procedure

Sensor head selection
Sets the sensor heads to be used in each channel.

↓

Output mode setting
Sets each channel to CO1, CO2, CO3, or CO4.

→ **Hysteresis setting**
Performs the hysteresis settings for each channel.

→ **Window comparator mode 1 (CO1)**
Window comparator mode 4 (CO4)
L1, L2 settings
Performs the L1 and L2 settings for each channel.

Window comparator mode 2 (CO2)
Window comparator mode 3 (CO3)
ΔL, L2 settings
Performs the ΔL and L2 settings for each channel.

↓

Reference flow rate capture
Performs reference flow rate capture for each channel. L1 is automatically created inside the controller.
L1=Reference flow rate — ΔL

→ **Various function settings**
Performs function settings for each channel. (See Functions List.)

→ **Detection**
Completes the settings, and commences detection.

Settings at time of shipment (1ch to 4ch)
Sensor head type: ±3 [ℓ/min] type
Output mode: Window comparator mode 1
Hysteresis: 0.02 [ℓ/min]
L1 level: 2.00 [ℓ/min]
L2 level: 1.00 [ℓ/min]

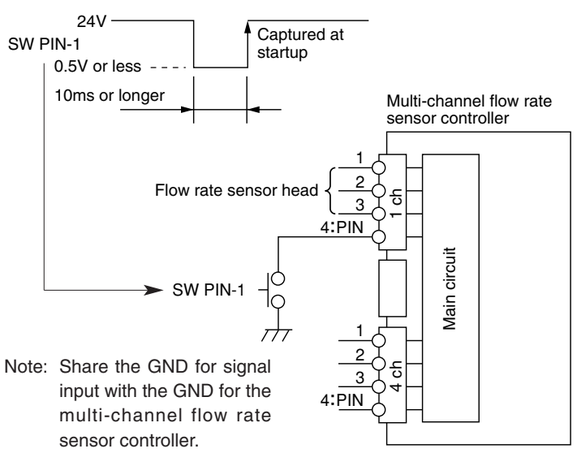
■ Setting

● Reference flow rate capture method in window comparator modes 2 and 3

Device key operation method	For the operations method, see p.⓮
RS232C method	For RS232C commands, see p.⓯
General-purpose I/O input method	See diagram below

● Reference flow rate capture method using general-purpose I/O input

Set PIN (sensor head connector 4-pin) for corresponding channel to "L level" (0.5V or less, 10ms or longer).



Note: Share the GND for signal input with the GND for the multi-channel flow rate sensor controller.

If not using general-purpose I/O input to perform reference flow rate capture, do not connect anything to the PIN. (Note: PIN is pulled up at 24V.)

● Functions List (For details about operations, see the each operation method)

Function	Device button command	Serial communication command (-D only)
Flow rate display	○	@A
L1 (ΔL)/L2 point settings	○	@PRE
Hysteresis setting	○	@HYS
Reference flow rate capture	○	@P
Mode selection	○	@MODE
Sensor head type setting	○	@TYPE
Zero reset	○	@B
Flow rate display autoscan	○	@AS
Switch output reversal (Enabled in mode 4 only)	○	@INV
Peak hold	○	@PHL
Bottom hold	○	@BHL
Flow rate display deleted	○	@DIS
Output mode check	×	@MD
Sensor head type check	×	@TP
ON (ΔL)/OFF point check	×	@C
Reference flow rate, ΔL/OFF point check	×	@E (Enabled for modes 2 and 3 only)
Switch output condition display	×	@SW
Version display	×	@VER

Detection mode

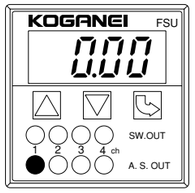


Figure 2

- Switching on the power supply (DC24V voltage) automatically provides detection mode.
- The flow rate of the selected channel is indicated in the LED display. (The selected channel's A.S.OUT LED (green) lights up. See Figure 2.)
- The SW.OUT LED (red) lights up when the switch output is turned ON.
- Pressing the △ key or ▽ key changes the selected channel.
- If the oFF display appears, it means that the selected channel's sensor head was not connected or has a wire break.
- In the case of a wire break, shut off the power and replace the sensor head.

Sensor head selection

Use the following procedure to perform settings for the sensor head used in each channel.

Procedure	Device operation	7-seg display	Remarks
1		SEr 1	
2		SEr	
3	△ ▽ (Push both at the same time)	CH 1	Use △or ▽to select channel
4		SE 1	Use △or ▽to select sensor head
5			Sensor head determined

Note: SE2 and SE4 cannot be used.

[Sensor head selection]
SE1: −3.00 to 3.00: ±3ℓ type
SE2: Cannot be used
SE3: −500 to 500: ±500 mℓ type
SE4: Cannot be used
SE5: 0.00 to 10.00: 10ℓ type

Output mode selection

Use the following procedure to perform output mode settings for each channel.

Procedure	Device operation	7-seg display	Remarks
1		SEr 1	
2		SEr	
3	▽ (Push both at the same time)	CH 1	Use △or ▽to select channel
4		CO1	Use △or ▽to select output mode
5			Output mode determined

[Output mode selection]
CO1: Window comparator mode 1
CO2: Window comparator mode 2
CO3: Window comparator mode 3
CO4: Window comparator mode 4

Hysteresis setting

Use the following procedure to change the hysteresis for each channel.

Procedure	Device operation	7-seg display	Remarks
1		SEr 1	
2	△	SEr2	
3		SEr	
4	△ ▽ (Push both at the same time)	HY51	Use △or ▽to select channel
		0002	Use △or ▽to perform hysteresis setting
5			Hysteresis determined

[Hysteresis selection]
HYS1: 1ch
HYS2: 2ch
HYS3: 3ch
HYS4: 4ch
- To prevent chattering, set hysteresis to 2 digits or more.

Threshold setting (L1 (ΔL)/L2 setting)

Use the following procedure to perform threshold settings for each channel.

Procedure	Device operation	7-seg display	Remarks
1		SEr 1	
2		SEr	
3		11	Use △or ▽to select channel
4		***	Use △or ▽to set threshold
5			Threshold determined

[Threshold setting]
11: 1ch_L1/ΔL
12: 1ch_L2
21: 2ch_L1/ΔL
22: 2ch_L2
31: 3ch_L1/ΔL
32: 3ch_L2
41: 4ch_L1/ΔL
42: 4ch_L2

Reference flow rate capture (for window comparator modes 2 and 3)

When using window comparator mode 2 or 3, use the following procedure to perform reference flow rate capture.

Procedure	Device operation	7-seg display	Remarks
1		SEr 1	
2		SEr	
3	△ ▽ (Push both at same time)	REF1	Use △or ▽to select channel
4			Reference flow rate captured

[Reference flow rate capture]
REF1: 1ch
REF2: 2ch
REF3: 3ch
REF4: 4ch

Flow rate display switch-off

Use the following procedure to switch off the flow rate display.

Procedure	Device operation	7-seg display	Remarks
1		SEr 1	
2	△	SEr2	
3		SEr	
4	▽ (Push both at the same time)		7-seg LED off
5	▽ (Push both at the same time)	***	7-seg LED re-lighted

Flow rate display autoscan

Use the following procedure to switch the flow rate display to autoscan mode.
Since autoscan mode is combined with the key lock function, no key operation other than cancellation of autoscan can be performed.

Procedure	Device operation	7-seg display	Remarks
1		SEr 1	
2	△	SEr2	
3		SEr	
4	△ ▽ (Push both at the same time)		Autoscan start
5	△ ▽ (Push both at the same time)		Autoscan stop

Note: Autoscan mode is cancelled when the power supply is switched OFF.

Switch output reversal (enabled for window comparator mode 4 only)

Use the following procedure to reverse the switch output for each channel.

Procedure	Device operation	7-seg display	Remarks
1		SEr 1	
2	△	SEr2	
3	△	SEr3	
		SEr	
4	△ ▽ (Push both at the same time)	CH 1	Use △or ▽to select channel
		5-0	Use △or ▽to set
5			Output mode determined

Note: Cannot be used with any mode other than window comparator mode 4.

[Switch output reversal]
S-0: Not reversed (A-contact)
S-1: Reversed (B-contact)

Zero point correction (Zero reset)

Use the following procedure to perform zero point correction for each channel.

Procedure	Device operation	7-seg display	Remarks
1		SEr 1	
2	△	SEr2	
3	△	SEr3	
4		SEr	
5	△ ▽ (Push both at the same time)	b-1	Use △or ▽to select channel
6			Zero point correction

Note: Zero point is cancelled when the power supply is switched OFF.

[Zero point correction]
b-1: 1ch
b-2: 2ch
b-3: 3ch
b-4: 4ch

Peak hold and bottom hold

Use the following procedure to put the flow rate display on peak hold or bottom hold. The display channel can be switched back and forth while in hold position.

Procedure	Peak hold	7-seg display	Bottom hold	7-seg display	Remarks
1		SEt 1		SEt 1	
2		SEt2		SEt2	
3		SEt3		SEt3	
4		SEt4		SEt4	
5		SEt		SEt	
6	(Push both at the same time)	PHL	(Push both at the same time)	bHL	Hold start
7	(Push both at the same time)		(Push both at the same time)		Hold cancel

Note: Peak hold and bottom hold are cancelled when the power supply is switched OFF. Peak hold and bottom hold cannot be implemented at the same time.

8 Error Display

	Error description	Error cancel
oFF	Sensor head on selected channel either not connected or has a wire break.	In the case of a wire break, shut off the power and replace the sensor head.
E-1	In window comparator modes 2 and 3, threshold is set outside the measured range.	Correct the error, and then press the mode key for at least 1 second.
E-2 n (n is the targeted channel)	Overvoltage (5V or more) applied to sensor input (AN0 to AN3).	
E-3 n (n is the targeted channel)	Overcurrent flowing to switch output.	

9 Communication with personal computer

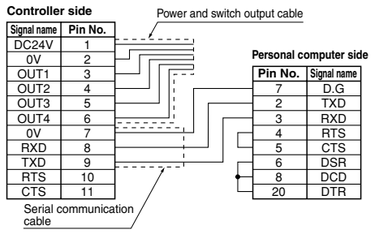
● **Hardware and operations environment**
PC: PC-98 series (excluding PC-98LT) or equivalent DOS/V machine
OS: Windows95 or later

● **Software and operations environment**
Hyperterminal with WIndows95 or later as the standard.
※Windows is a registered trademark of Microsoft Corp.

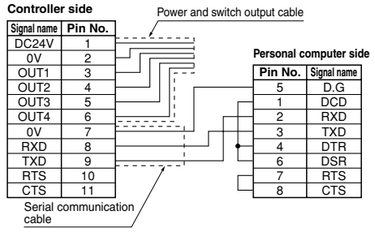
● **Communication parameter**

Baud rate	9600 (baud)
Stop bit length	1[bit]
Parity	Odd
Parity check	Yes
Data bit length	8[bit]
Communication method	Full duplex
Return key send procedure	CR code, LF code

● **Communication cable specification and connection**



D-sub 25 pin configuration



D-sub 9 pin configuration

● **Communication command detail**

Command List Note: "␣" denotes a space.

@A
Function: Reads out the current flow rate value (1ch-4ch).
Send example: @A c/rl/f
Response example: 1 =−3.00 c/rl/f
2 =−3.00 c/rl/f
c/rl/f ← When sensor head is not connected
4 =0.00 c/rl/f
c/rl/f
Response example: NG c/rl/f
21: illegal type

@PRE
Function: Sets the ON and OFF points for each channel.
Send example: @PRE11␣−3.00 c/rl/f
Response example: OK c/rl/f
Response example: NG c/rl/f
21: illegal type

@PRE11: Sets L1/ΔL for Channel 1
@PRE12: Sets L2 for Channel 1
@PRE21: Sets L1/ΔL for Channel 2
@PRE22: Sets L2 for Channel 2
@PRE31: Sets L1/ΔL for Channel 3
@PRE32: Sets L2 for Channel 3
@PRE41: Sets L1/ΔL for Channel 4
@PRE42: Sets L2 for Channel 4

@PRE 1␣ ＊＊＊＊
1: 1CH
2: 2CH
3: 3CH
4: 4CH
1: L1/ΔL
2: L2

@HYS
Function: Sets the hysteresis width for each channel.
Send example: @HYS11␣0.02 c/rl/f
Response example: OK c/rl/f
Response example: NG c/rl/f
21: illegal type

@HYS11: Hysteresis width setting for Channel 1
@HYS21: Hysteresis width setting for Channel 2
@HYS31: Hysteresis width setting for Channel 3
@HYS41: Hysteresis width setting for Channel 4

@HYS1 1␣ ＊＊＊
1: 1CH
2: 2CH
3: 3CH
4: 4CH
Always input 1

@P
Function: In output mode, the reference flow rate capture when comparator modes 2 and 3 are selected.
Send example: @P c/rl/f
Response example: OK c/rl/f
Response example: NG c/rl/f
21: illegal type

@P1: Channel 1 reference value setting
@P2: Channel 2 reference value setting
@P3: Channel 3 reference value setting
@P4: Channel 4 reference value setting

@P1
1: 1CH
2: 2CH
3: 3CH
4: 4CH

@MODE
Function: Sets the output mode for each channel.
Send example: @MODE1␣1c/rl/f
Response example: OK c/rl/f
Response example: NG c/rl/f
21: illegal type

@MODE1␣1
1: 1CH
2: 2CH
3: 3CH
4: 4CH
1: Window comparator mode 1
2: Window comparator mode 2
3: Window comparator mode 3
4: Window comparator mode 4

@TYPE
Function: Sets the sensor head type for each channel.
Send example: @TYPE1␣1c/rl/f
Response example: OK c/rl/f
Response example: NG c/rl/f
21: illegal type

@TYPE1␣1
1: 1CH
2: 2CH
3: 3CH
4: 4CH
1: −3.00～3.00
2: Cannot be used
3: −500～500
4: Cannot be used
5: 0.00～10.00

@INV (Enabled for window comparator mode 4 only)
Function: Sets switch output reversed/not reversed.
Send example: @INV1␣0c/rl/f
Response example: OK c/rl/f
Response example: NG c/rl/f
21: illegal type

@INV1␣0
1: 1CH
2: 2CH
3: 3CH
4: 4CH
0: Not reversed
1: Reversed

@B
Function: Performs zero correction for each channel.
Send example: @B1 c/rl/f @B1
Response example: OK c/rl/f
Response example: NG c/rl/f
21: illegal type
1: 1CH
2: 2CH
3: 3CH
4: 4CH

@SW
Function: Displays the switch output for each channel.
Send example: @SW c/rl/f
Response example: 1010 c/rl/f
Response example: NG c/rl/f
21: illegal type

1 0 1 0
1 2 3 4
ch ch ch ch
1: Switch output ON
0: Switch output OFF

@MD
Function: Displays the output mode for each channel.
Send example: @MD c/rl/f
Response example: 1231 c/rl/f
Response example: NG c/rl/f
21: illegal type

1 2 3 1
1 2 3 4
ch ch ch ch
1: Window comparator mode 1
2: Window comparator mode 2
3: Window comparator mode 3
4: Window comparator mode 4

@TP
Function: Displays the sensor head type for each channel.
Send example: @TP c/rl/f
Response example: 1135 c/rl/f
Response example: NG c/rl/f
21: illegal type

1 1 3 5
1 2 3 4
ch ch ch ch
1: −3.00～3.00
2: Cannot be used
3: −500～500
4: Cannot be used
5: 0.00～10.00

@C
Function: Displays the L1 (ΔL) and L2 points for each channel.
Send example: @C1 c/rl/f
Response example: 1.00 c/rl/f ←L1(ΔL)
0.50 c/rl/f ←L2
c/rl/f
Response example: NG c/rl/f @C1
21: illegal type
1: 1CH
2: 2CH
3: 3CH
4: 4CH

@E
Function: Displays L1= Reference flow rate− ΔL, and L2 for each channel.
Send example: @E1 c/rl/f
Response example: 1.00 c/rl/f ←L1= Reference flow rate− ΔL
0.50 c/rl/f ←L2
c/rl/f
Response example: NG c/rl/f @E1
21: illegal type
1: 1CH
2: 2CH
3: 3CH
4: 4CH

@DIS
Function: Switches off (Locks) the main body LED.
Send example: @DIS␣1 c/rl/f
Response example: OK c/rl/f
Response example: NG c/rl/f
21: illegal type

@DIS␣1
1: Not lighted
0: Lighted

@AS
Function: Sets ON/OFF for autoscan function.
Send example: @AS␣1 c/rl/f
Response example: OK c/rl/f
Response example: NG c/rl/f
21: illegal type

@AS␣1
1: ON
0: OFF

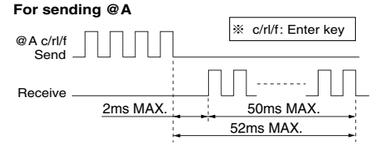
@PHL
Function: Sets ON/OFF for peak hold function.
Send example: @PHL␣1 c/rl/f
Response example: OK c/rl/f
Response example: NG c/rl/f
21: illegal type

@PHL␣1
1: ON
0: OFF

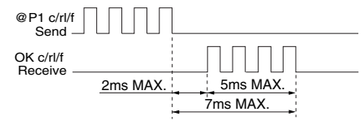
@BHL
Function: Sets ON/OFF for bottom hold function.
Send example: @BHL␣1 c/rl/f
Response example: OK c/rl/f @BHL␣1
Response example: NG c/rl/f
21: illegal type
1: ON
0: OFF

● **Communication time chart**

For sending @A



For sending @P, @PRE, @MODE



● **Hyperterminal setting method**

Figure 1

Click File, and then click Property to open the window at left, and set Connect using.

Click on Configure...

Figure 2

As shown in Figure 2, set the baud rate, etc.

Bits per second	:	9600
Data bits	:	8
Parity	:	Odd
Stop bits	:	1
Flow control	:	Xon/Xoff

When the settings are complete, click OK.

Figure 3

Clicking on the Setting tag in Figure 1 displays Figure 3. Click the ASCII Setup... button.

Figure 4

Set as shown in Figure 4, and click OK.

Return to Figure 3.
Click OK again.

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