

INSTRUCTION MANUAL FOR 600 / 601 SERIES FLOW SENSOR



IMPORTANT

Even if you are already familiar or aware of the preparation steps involved in setting up the product, it is still highly recommended to read the following requirements before actual installation.

1. Specifications

	600 Series	601 Series
Output frequency	15Hz / M / Sec	20Hz / M / Sec
Output signal	Approx. 2.2V PP / M / Sec	Open collector, Sinking
Measuring range	0.3 to 6m/Sec~0.1 to 6m/Sec	0.3 to 6m/Sec~0.1 to 6m/Sec
Exciting power	Not required	3.5 to 24V DC
Supply current		1~6mA (3.5~24V)
Output current		25mA max.
Repeatability	±0.5% FS (0.3 to 6m/Sec)	±0.5% FS (0.3 to 6m/Sec)
Linearity	±0.5% (0.3 to 6m/Sec)	±0.5% (0.3 to 6m/Sec)
Fluid temperature	105°C max.	105°C max.
Ambient temperature	0~60°C, 90%RH max.	0~60°C, 90%RH max.
Enclosure	IP67 Encapsulation	IP67 Encapsulation
Electric protection	Ex ia IIC T6	Ex ia IIC T6
Standard materials	Sensor Body / PVDF Rotor / PVDF Shaft / Ceramic Bearing / Ceramic O-Ring / EPDM	Sensor Body / PVDF Rotor / PVDF Shaft / Ceramic Bearing / Ceramic O-Ring / EPDM

2. Flow Sensor / Flow Meter Straight Pipe of Inlet and Outlet

To reassure the accuracy of the flow sensor or meter, both inlet and outlet pipe must be made available in order to allow constant flow, as indicated in the table below, as well as in item 5.

Barrier of Inlet	Upstream	Downstream
Tee / Reducer	15 times ID of pipe	5 times ID of pipe
Butterfly valve / Ball valve	15 times ID of pipe	5 times ID of pipe
Elbow / Gate valve	20 times ID of pipe	5 times ID of pipe

3. Fitting Location of Sensor/Flow Meter (Horizontal Piping)

In case the sensor/flow meter must be mounted onto a horizontal pipe, the Sensor / flow meter should be pointing at 0° (see Fig.1). When air bubbles are present, DO NOT place the sensor / flow meter straight up or down. The correct angle should be ±45° (see Fig. 2), in order to prevent disturbance from sediments which affects accuracy.

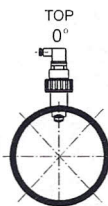


Fig.1

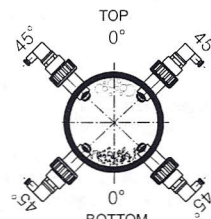


Fig.2

4. Vertical Pipeline

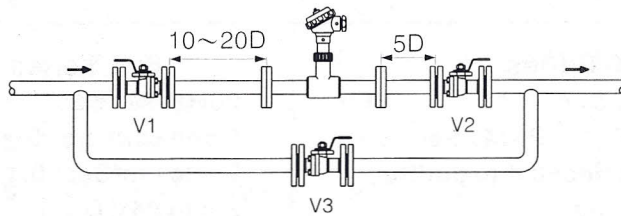
The flow sensor is suggested to be mounted in upward lines.

While the outlet of the flow sensor or meter is facing down or venting, add an extra elbow or valve.

5. By-pass Pipe

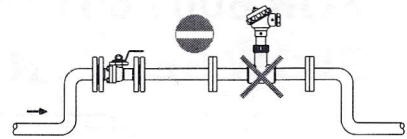
Unless power-off maintenance or inspection is allowed, it is recommended to create a by-pass pipe in order to enable steady flow or maintenance.

V1 : Regulating valve V2 : Ball valve V3 : By-pass valve

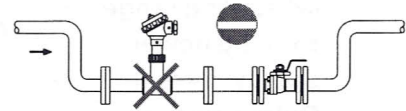


*Avoid the following fitting

■ Highest location
(unable to fill up)



■ Lowest location
(sediments may occur)



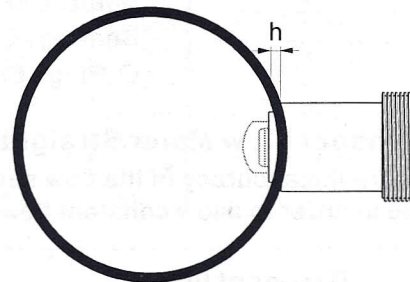
6. Others

Aside from the above, the following must also be implemented:

- A). DO NOT install nearby water hammer. Keep the installation location away from where water hammer reacts.
- B). DO NOT install where vibration might occur.
- C). Keep surrounding temperature between 0-50°C and humidity under 95% RH.
- D). Keep the distance between flow sensor/ meter and receiver(transmitter / indicator / integrator) as short as possible (18m max.)

7. Inserted dimensions for weldolet

Be sure the dimension of "h" should be 1/10 of measuring tube's inside diameter before welding weldolet fitting to pipeline.

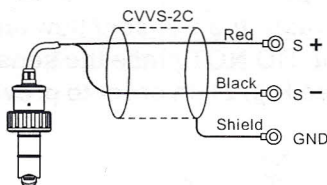


8. Wiring Connections

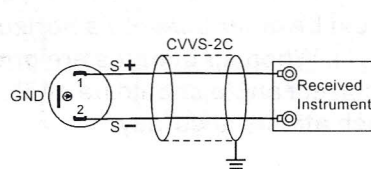
- The sensor output is able to pass through a distance up to 60m when shielded cable is used.
- The shielded cable should be aligned with 3rd earthed set.
- Refer to appropriate instruction manual for the wiring connection of the receiver.

8.1 600 Sensor

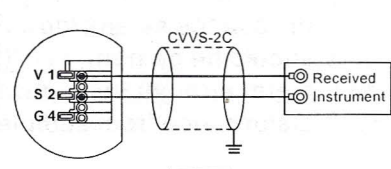
■ 600A



■ 600B



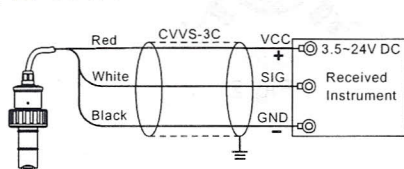
■ 600C / D / E / F



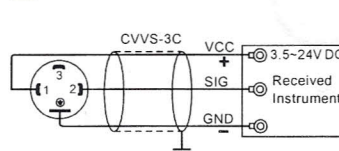
P/N:CG1-1-1809 of 600 series

8.2 601 Sensor

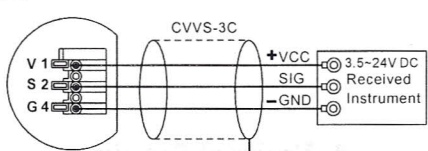
■ 601A



■ 601B



■ 601C / D / E / F



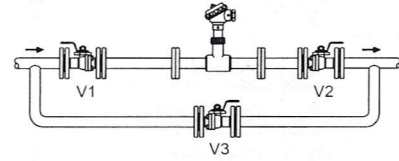
P/N:CG1-1-1809 of 601 series

9. Operation Instruction

Before activating the product, reassure the installation procedures are carried out correctly.

9.1 With By-pass pipe

- A). Open by-pass pipe V3, close V1 and V2.
- B). Turn on the pump, wait till the flow stabilized, open V2 and slowly adjust V1 until the display stops between 30-50%.
- C). Slowly close V3.
- D). Adjust V1 for desired flow.



9.2 Without By-pass Pipe

- A). Enable the flow adjustment valve stays at 30-50%.
- B). Turn on the pump or front valve, enable the flow passes the flow meter steadily.
- C). Slowly adjust the valve until reaches desired flow value.

10. Maintenance and Rectification Procedure

10.1 Cleaning of Flow Sensor / Meter

Maintenance is not required under normal usage, however, the sensor should be cleaned on a regular basis if used for the following circumstances:

- A). Waste water
- B). Liquid that attaches easily
- C). Liquid that contains iron

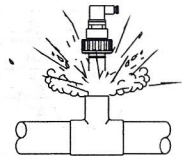
Take out the sensor in a vertical direction. Care must be exercised not to break the sensor. Lubricate the surface of the sensor with small amount of grease that prevents damages to the O-rings. Finally, align notch and key of the flow sensor vertically, hand tighten the sensor cap or flange.

10.2 Pull Out The Flow Sensor

When the flow sensor is pulled out for cleaning or replacement the line pressure and service conditions must be carefully checked beforehand. In order to protect the operator and to ensure industrial safety, it is strongly recommended to stop the machines operation while doing cleaning and replacement.

10.3 To Insert The Flow Sensor

The flow sensor has a convexity which connects the concave side of fitting. The convexity has to be inserted or pulled out straight without swaying. Also the convexity must meet the fitting closely to join the sensor coupling tightly.

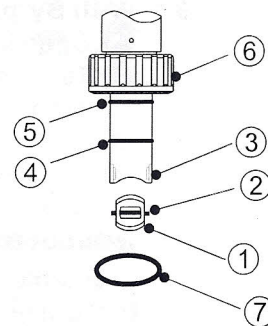


11. Troubleshooting

Unusual Phenomenon	Reasons	Troubleshootings
Leaked out from flow sensor connector	Ageing or damage of O-ring	O-ring replacement
Flow indicating value is lower than the actual flow	1. Flow sensor is dirty. 2. Other device of piping is unusual. 3. Circuit signal of converter is unusual. 4. The depth of weldolet fitting or sensor is not enough inserted.	1. Wash the flow sensor. 2. Overhaul other devices. 3. Change the converter or K-factor. 4. Adjust K-factor of receiver.
Indicating value appears instable movement or unstable signal output	1. The straight pipe is too short of up / down stream. 2. Too close with pump. 3. Influenced by pipe fitting and valves. 4. The flow velocity is too fast. Reynold's number valve is too high. 5. Signal disrupted by other noise around.	1~4 Change installing position or to install rectifier or straightening vane at the upstream. 5. Add an isolator or capacitor on the input terminal of receiver.
Indicator appears normal or indicating zero or unusual exertion	1. Flow sensor is dirty. 2. The connection of flow sensor is broken. 3. The circuit board function of the transmitter emerges error.	1. Wash the flow sensor. 2. Change the flow sensor. 3. Change the converter.
No signal output	1. Damaged or missing the rotor. 2. Sensor element breakdown.	1. Replace a new rotor. 2. Replace a new sensor unit.

12. Spare parts list

Item	Part name	Material (St'd)	Part No.	Material (Option)	Part No.
1	Rotor	PVDF	CT1-2L	PP	CT1-1L
2	Shaft	Ceramic	CT1-3MB	—	—
3	Bearing	Ceramic	CT1-3MA	—	—
4	O-Ring(B)	NBR	CS3-2	Viton	CS3-8
5	O-Ring(T)	NBR	CS3-1	Viton	CS3-9
6	Coupler of sensor	PP	AA3-2L-1F	PVC	AA3-2L-1B
7	O-Ring of fitting	NBR	CS3-5	Viton	CS3-6



13. K-Factors

■ stainless steel

PIPE SIZE	O.D.	SCH-20S	K	PIPE SIZE	O.D.	SCH-40	K	PIPE SIZE	O.D.	SCH-80	K
INCH	m/m	Thickness(m/m)	For Liter	INCH	m/m	Thickness(m/m)	For Liter	INCH	m/m	Thickness(m/m)	For Liter
1/2"	21.7	2.5	91.30744	1/2"	21.7	2.8	9.823977	1/2"	21.7	3.7	124.528
3/4"	27.7	2.5	49.41825	3/4"	27.7	2.9	53.09466	3/4"	27.7	3.9	64.30325
1"	34	3	32.48052	1"	34	3.4	34.41924	1"	34	4.5	40.74357
1-1/4"	42.7	3	18.90632	1-1/4"	42.7	3.6	20.2061	1-1/4"	42.7	4.9	23.52596
1-1/2"	48.6	3	14.03201	1-1/2"	48.6	3.7	15.00184	1-1/2"	48.6	5.1	17.26938
2"	60.5	3.5	8.896753	2"	60.5	3.9	9.168913	2"	60.5	5.5	10.39271
2-1/2"	76.3	3.5	5.302402	2-1/2"	76.3	5.2	5.863653	2-1/2"	76.3	7	6.560894
3"	89.1	4	3.871662	3"	89.1	5.5	4.174813	3"	89.1	7.6	4.662837
4"	114.3	4	2.253578	4"	114.3	6	2.433256	4"	114.3	8.6	2.700851
5"	139.8	5	1.511436	5"	139.8	6.6	1.588809	5"	139.8	9.5	1.745039
6"	165.2	5	1.057196	6"	165.2	7.1	1.116825	6"	165.2	11	1.241804
8"	216.3	6.5	0.616119	8"	216.3	8.2	0.637255	8"	216.3	12.7	0.698759

■ non metal

PIPE SIZE	O.D.	PVDF-HP	K	PIPE SIZE	O.D.	PVC(SCH-40)	K	PIPE SIZE	O.D.	PVC(SCH-80)	K
INCH	m/m	Thickness(m/m)	For Liter	INCH	m/m	Thickness(m/m)	For Liter	INCH	m/m	Thickness(m/m)	For Liter
1/2"	20	1.9	97.03068	1/2"	21.3	2.77	102.5243	1/2"	21.3	3.73	132.9434
3/4"	25	1.9	56.6588	3/4"	26.7	2.87	57.96376	3/4"	26.7	3.91	71.43896
1"	32	2.4	34.41924	1"	33.4	3.38	35.88151	1"	33.4	4.55	43.12475
1-1/4"	40	2.4	20.55198	1-1/4"	42.2	3.56	20.69283	1-1/4"	42.2	4.85	24.10862
1-1/2"	50	3	13.15327	1-1/2"	48.3	3.68	15.193	1-1/2"	48.3	5.08	17.50563
2"	63	3	7.837714	2"	60.3	3.91	9.245948	2"	60.3	5.54	10.51129
2-1/2"	75	3.6	5.539617	2-1/2"	73	5.16	6.481584	2-1/2"	73	7.01	7.320312
3"	90	4.3	3.843176	3"	88.9	5.49	4.194126	3"	88.9	7.62	4.693271
4"	110	5.3	2.577308	4"	114.3	6.02	2.43516	4"	114.3	8.56	2.696406
				6"	168.3	7.11	1.072622	6"	168.3	10.97	1.18876
				8"	219.1	8.18	0.619527	8"	219.1	12.7	0.678703