

LIQUI VIEW

The smart and lightweight vortex meter for monitoring low viscosity, water-like liquids

> Introduction

Mass Flow ONLINE B.V. sells flow measuring and controlling products through the internet. From the website www.massflow-online.com flow meters or controllers can be ordered 24 hours a day 7 days a week. Most products are in stock and will be shipped world-wide within two working days.

> Description

The new LIQUI-VIEW series offer a compact, light weight and cost-effective solution for monitoring the flow or consumption of cleansing, cooling or spa water. The unique sensor body and transmitter design makes LIQUI-VIEW one of the most compact, lightweight vortex meters in the industry. The LIQUI-VIEW offers an easy-to-read digital display and has integrated totaliser and alarm functions.

> LIQUI-VIEW series

The LIQUI-VIEW series operate on the vortex principle. The obstruction (bluff body) placed in the flow of the liquid sheds vortices downstream at a frequency proportional to the velocity of the liquid. This pattern of vortices is named the Von Kármán vortex street. A piezo-electric sensor detects the vortices and creates electrical pulses which are proportional to the liquid flow rate. The instruments may be mounted in any position; the local read-out unit can be rotated. LIQUI-VIEW flow meters can be supplied in full scale ranges from 4 l/min up to 133 l/min at max. 10 bar pressure rating. An LCD display allows reading of actual flow and two total flow indicators with one reset switch. Furthermore the instruments can be supplied with an analog output or with two alarm outputs, thereby operating as a flow switch. The LIQUI-VIEW series can also be supplied as a "lite" version. This "lite" version has no local readout and only a pulse output.

> Fields of application

- ◆ cooling water monitor
- ◆ deionized water (RO/DI skids)
- ◆ ultra pure water distribution (medicare, biotech, semiconductor, pharmaceutical)
- ◆ Chemical feed
- ◆ PPS material is compatible with nearly all liquids



> LIQUI-VIEW features

- ◆ Indication in:
 - Actual flow (volume per minute or per hour)
 - totalised flow (consumption)
 - Alarm Hi + Low
- ◆ Unique coupling design allows free positioning of the transmitter for ease of reading regardless of meter body orientation
- ◆ No moving parts makes it:
 - impervious to deposits of hard water
 - maintenance free
- ◆ Low pressure drop
- ◆ Mounting in any position
- ◆ Wide flow ranges
- ◆ Fast response
- ◆ Alarm and counter functions (2 counters, one with reset switch)
- ◆ Optional analog 4-20 mA or pulse output with external power
- ◆ Suitable for dirty water (circulating, well or waste water)
- ◆ Detachable display
- ◆ Sustainable product design
 - Battery powered model available with replaceable battery pack and low battery indication
 - Low power consumption
 - Maintenance free
 - Lightweight and compact
 - EEPROM retains parameters and total flow



Mass Flow
ONLINE

> Technical specifications

Performance

Acceptable liquids	: low viscosity liquids like cooling, well, waste and pure water. <i>This product is NOT compatible with flammable, corrosive or toxic liquids.</i>
Operating pressure	: 1..10 bar(a)
Operating temperature	: -10 .. 80°C (free from freezing)
Accuracy	: ± 3% FS
Rangeability	: up to 1:16
Repeatability	: < 0.5% FS typical
Display	: 8 digit totaliser with two separate 4 digit indicators showing flow rate per hour and minute + 7 digit resettable totaliser

Mechanical parts

Materials (wetted parts)	: PPS-Resin (Polyphenylene sulphide), viton
Ingress protection (housing)	: IP65

Electrical specifications

Output	: analog: 4 .. 20 mA or pulse (scaled or unscaled)
Power	: Battery (3.6 V lithium) powered if no output (other than local readout) is required (4 years of life at room temperature)
External power supply	: 12 .. 45 Vdc

> Available models with local read-out

Model	Nom. size	Capacity	Output
FLM2S-10	4 mm	0.4 .. 4 l/min	No, battery powered
FLM20-10	8 mm	1.1 .. 15 l/min	No, battery powered
FLM21-10	15 mm	2.8 .. 45 l/min	No, battery powered
FLM22-10	25 mm	8.3 .. 133 l/min	No, battery powered
FLM2S-1*	4 mm	0.4 .. 4 l/min	4-20mA or pulse + alarms
FLM20-1*	8 mm	1.1 .. 15 l/min	4-20mA or pulse + alarms
FLM21-1*	15 mm	2.8 .. 45 l/min	4-20mA or pulse + alarms
FLM22-1*	25 mm	8.3 .. 133 l/min	4-20mA or pulse + alarms

Flow range may vary under different process conditions

> Indicated pulse unit

Nominal size (mm)	Scaled pulse [l/pulse]	Unscaled pulse (nominal) [ml/pulse]	Frequency @ max. flow rate [Hz]
4	0.01	0.4450	130
8	0.1	2.204	140
15	1	11.82	80
25	1	63.30	45

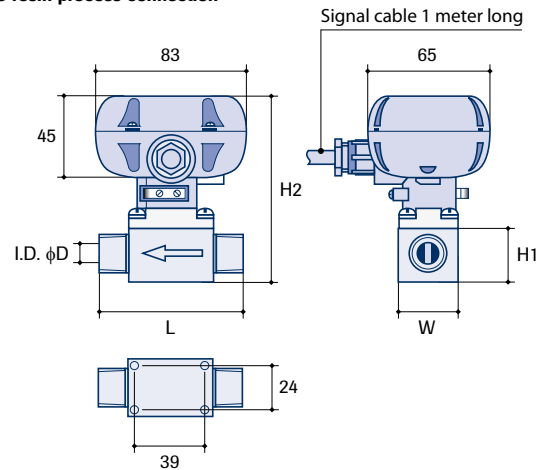
> Process connections (in/out)

Each model has an PPS-Resin R male thread type. NPT or Rc female thread is also available as an option. The connectors will be supplied in stainless steel thereby eliminating the risk of damaging threads when using metallic tubing.



> Dimensions and weights

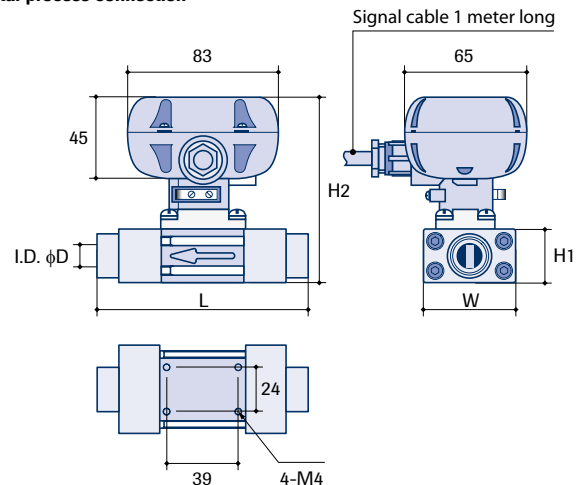
PPS resin process connection



Model	Nom. size	φD	R	L	W	H1	H2	Approx. weight
FLM2S-1*	4	8.5	3/8"	80	32	29	102	285
FLM20-1*	8	13	1/2"	80	32	29	102	285
FLM21-1*	15	14	3/4"	85	32	29	102	290
FLM22-1*	25	24.5	1 1/4"	120	46	46	119	420

Dimensions in mm, weight in g

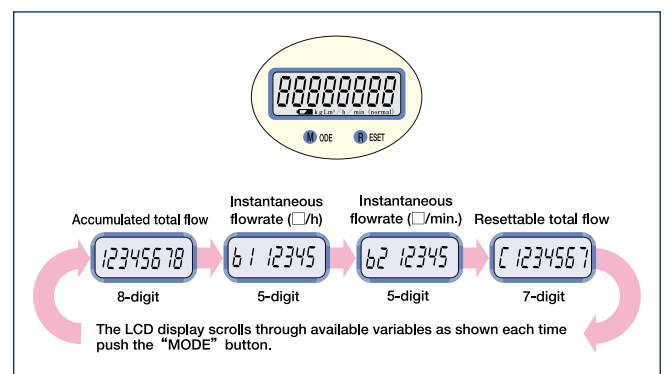
Metal process connection



Model	Nom. size	φD	Rc	NPT	L	W	H1	H2	Approx. weight
FLM2S-1*	4	8.5	1/4"	1/4"	91	50	29	102	660
FLM20-1*	8	13	3/8"	3/8"	91	50	29	102	660
FLM21-1*	15	14	1/2"	1/2"	91	50	29	102	660
FLM22-1*	25	24.5	1"	1"	126	46	46	119	960

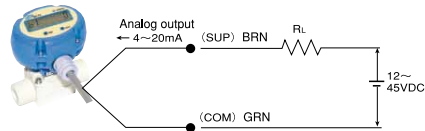
Dimensions in mm, weight in g

> Display

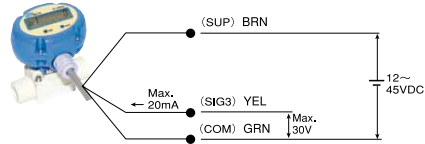


> Electrical connection

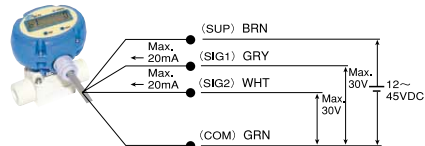
Analog output (2-wire)



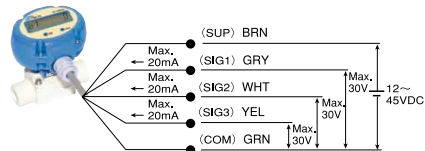
Scaled or unscaled pulse output (3-wire)



High/low alarm output (2 outputs) (4-wire)

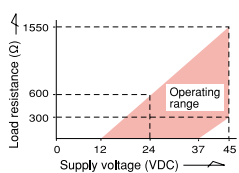


High/low alarm output (2 outputs) + scaled or unscaled pulse output (5-wire)



※ : Transmission distance; longest 1km with the conductive area 2.0mm².

Load resistance range

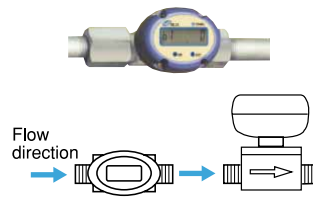


Polarities

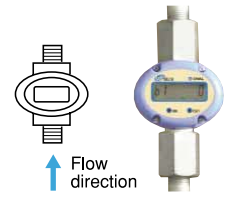
BRN : SUP, (and analog output)
 GRY : SIG, 1... Alarm 1 output (upper and lower)
 WHT : SIG, 2... Alarm 2 output (upper and lower)
 YEL : SIG, 3... Scaled or unscaled pulse output

> Tubing guidelines

Horizontal line



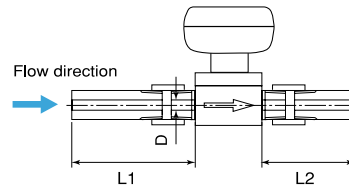
Vertical line



With PPS external threads, exercise care to avoid applying excessive stress or impact, observing the tightening torques shown in the table.

Nominal size (mm)	Tightening torque tolerances (N · cm)
4	1960
8	1960
15	1960
25	9800

D: Flowmeter I.D.



- Secure a straight tube length 7D min. upstream of, and 3D min. downstream of the meter.
- Any equipment having a "sharp increase in the tube diameter" such as a throttle valve or a tapered tube, if present upstream of the meter, should be located at least 50D.
- Flow regulating valve should be located downstream of the meter for controlling the flow.
- Use tubing having an inside diameter larger than the meter inside diameter.

Required straight tube lengths

Nominal size (mm)	I.D. (D) (mm)	Upstream tube		Downstream tube	
		(L1) (mm)	(mm)	(L2) (mm)	(mm)
4	8.5	59 min.		25 min.	
8	13	91 min.		39 min.	
15	14	98 min.		42 min.	
25	24.5	171 min.		73 min.	

> Technical specifications *Lite* version

Performance

Acceptable liquids : low viscosity liquids like cooling, well, waste and pure water.

This product is NOT compatible with flammable, corrosive or toxic liquids.

Operating pressure : 1..10 bar(a)

Operating temperature : -10 .. 80°C (free from freezing)

Accuracy : ±3% FS

Rangeability : up to 1:16

Repeatability : <0.5% FS typical

Mechanical parts

Materials (wetted parts) : PPS-Resin (Polyphenylene sulphide), viton

Ingress protection (housing) : IP53

Electrical specifications

Output : pulse (unscaled)

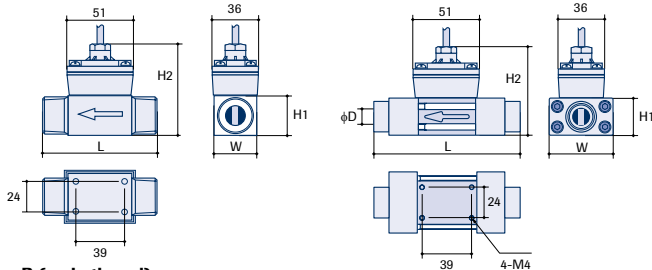
External power supply : 12 .. 24 Vdc

Power consumption : max. 10 mA



Model	Capacity	Max. Pulse Output
FLP04-L1PA	0.4 .. 4 l/min	750 Hz
FLP08-L1PA	1.1 .. 15 l/min	570 Hz
FLP15-L1PA	2.8 .. 45 l/min	320 Hz
FLP25-L1PA	8.3 .. 133 l/min	180 Hz

> Dimensions and weights *Lite* version



R (male thread)

Nom. size	φD (meter I.D.)	R (conn.)	L	W	H1	H2	Approx. weight*
4	8.5	3/8"	80	32	29	68	270
8	13	1/2"	80	32	29	68	270
15	14	3/4"	85	32	29	68	280
25	24.5	1 1/4"	120	46	46	85	410

Dimensions in mm, weight in g

Rc and NPT (female thread)

Nom. size	φD (meter I.D.)	Rc	NPT	L	W	H1	H2	Approx. weight*
4	8.5	1/4"	1/4"	91	50	29	68	650
8	13	3/8"	3/8"	91	50	29	68	650
15	14	1/2"	1/2"	91	50	29	68	650
25	24.5	1"	1"	126	46	46	85	950

Dimensions in mm, weight (incl. cable) in g

> Indicated pulse unit *Lite* version

Nominal size (mm)	Scaled pulse [l/pulse]	Unscaled pulse (nominal) [ml/pulse]	Frequency @ max. flow rate [Hz]
4	n.a.	0.0890	750
8	n.a.	0.4408	570
15	n.a.	2.363	320
25	n.a.	12.66	180

> Tubing guidelines *Lite* version

Horizontal run

Vertical run

With PPS male thread, avoid forcibly tightening or excessive impact loads. Torque to the specification given below.

Nom. size (mm)	Permissible tightening torque (N·cm)
4	1960
8	1960
15	1960
25	9800

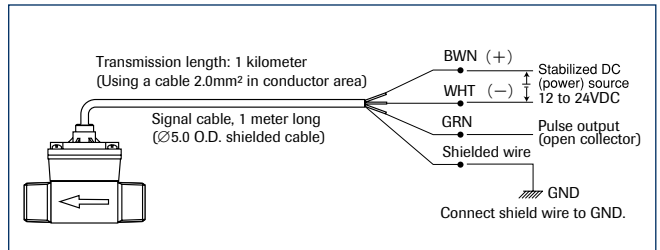
- Secure a straight tube length 7D min. upstream of, and 3D min. downstream of, the flow monitor.
- If a throttle valve or expansion tube exists, where the flow path cross section abruptly changes, upstream of the flow monitor, locate it at least 50D away from the flow monitor.
- Provide a throttle valve downstream of the flow monitor for regulating the flow.
- For process connection, use tubes having an inside diameter larger than that of the flow monitor.

D: Flow monitor I.D.

Required straight tube lengths *Lite* version

Nominal size (mm)	I.D. (D) (mm)	Upstream tube (L1) (mm)		Downstream tube (L2) (mm)	
		min.	max.	min.	max.
4	8.5	59	100	25	60
8	13	91	130	39	100
15	14	98	130	42	100
25	24.5	171	200	73	100

> Electrical connection *Lite* version



> Process connections (in/out)

Each model has an PPS-Resin R male thread type. NPT or Rc female thread is also available as an option. The connectors will be supplied in stainless steel thereby eliminating the risk of damaging threads when using metallic tubing.

> Pressure drop (all models)

Pressure loss calculation formula

$$\Delta P = \Delta P_o \times \frac{\rho}{\rho_o} \times \left(\frac{Q}{Q_o} \right)^2$$

ΔP : Pressure drop [kPa]

ΔP_o : Pressure drop max. of flowrate is 31 kPa for 4 mm model and 34.3 kPa for other models

ρ : Density of fluid at measurement [kg/m³]

ρ_o : Standard density: 1000 [kg/m³]

Q : Flowrate at measurement [L/min.]

Q_o : Max. flowrate (Page 2 or 4 stated value) [L/min.]

> Installation conditions (all models)

Select an **installation location** that meets the following requirements:

- CAUTION:** Installation in an explosionproof area (hazardous location) is NOT permitted.
- ① A location free from rainwater and moisture (for use indoors).
- CAUTION:** Avoid exposure to the sun.
- ② A location with least temperature variation (preferably within a range 0 to +60 °C).
- ③ A location free from excessive vibration and shock (preferably pipe oscillation 0.2G max.).
- ④ A location for ease of display readability and servicing.
- ⑤ A location free of bubble entrapment and filled with the fluid (in liquid measurement).
- ⑥ A location where fluid pressure is held below permissible pressure of 0.98MP.
- ⑦ A location free for the fluid from freezing..

All information is subject to change without notice.

Bronkhorst distributor



MASS-FLOW ONLINE BV
www.massflow-online.com