



Instruction Leaflet

316 St Body Flow Sensor 

 **RS Stock No.**
511-3959, 511-3965, 511-3971, 511-3987

General

The principle of operation is very simple. A jet of low viscosity liquid (less than 15cP) is directed at the free running Pelton wheel turbine in a specially shaped chamber. The rotation of the rotor is detected with a Hall effect sensor. The output frequency of these pulses is directly proportional to flow rate and the total number of pulses the total volume passed. The standard bearing material is sapphire as this gives a long trouble free life of the meter. Non-metallic options mean that these meters may be used with aggressive chemicals and ultra-pure water.

Installation

The pipe work must be designed in such a way as to eliminate reverse flow and the flow passed through the meter in the direction of the arrow. The meter should be installed in a position that prevents it from draining down as on a start-up as serious damage could result by 'impacting' an empty flowmeter with high velocity fluid stream. The fluid should be clean and homogenous. In all cases an upstream filter of at least 80 microns **must** be fitted. **It is recommended that before the flowmeter is installed in the line a 'dummy' section of the pipe is inserted and the system flushed.** This is to eliminate any debris in that section of the line. The pipe must not stress the body of the meter and should be fully supported either side with appropriate isolation valves and in some cases a by-pass valve. When screwing fittings into a threaded body always place the second spanner next to the fitting being inserted, never tighten one fitting against the other across the meter body. On initial start-up increase the flow slowly to ensure no over speeding of the meter occurs as the air is forced from the line. This is best achieved by monitoring the flow rate and ensuring that 50% over-range is not exceeded. **Never blow a flowmeter with an airline.** Care should be taken to ensure that no air enters the system (e.g. leaky pump gland) or that no cavitations takes place. With a volatile liquid we recommend at least twice the vapour pressure plus 1 Bar as the operating pressure. The user must ensure that the materials of construction are compatible with the fluid. We accept no responsibility for material compatibility, it is the users responsibility.

All turbines flowmeters require a fully formed up-stream flow profile. This is usually attained by positioning the flow meter in a straight length of pipe some distance from any component that is likely to introduce an asymmetric or swirling velocity profile. The chart below gives some indication of the straight lengths a pipe expressed in pipe diameters required by various site conditions.

Flow range L/Min	Filter, pump or 1 bend	Regulator or 2 bends	2 bends @ 90°
10 – 160	15	50	100
1 – 10	10	15	50
0 - 1	5	10	15

Electrical

It is recommended that all 'signal' cables are screened and run separately to power lines and switch inductive loads and are located well away from inverters and other 'noisy' apparatus. Always use sound wiring practice. Hall Effect detectors (NPN) require an external pull-up resistor connected between the output and a suitable power supply to attain a pulse. Typically the flowmeter PSU may be used but sometimes a dc pulse, which is of a different voltage, may be required e.g. using PLC with a 24V PSU and an internal 5V rail for the pull-up resistor/pulse input.

Electrical characteristics

- Supply voltage: 4.5 – 24Vdc
- Temp. range: -40 to 150°C
- Rise & fall times: 1.5µs max
- Supply current: 7.5mA typ.
- Switch current: 10mA max
- Electrical connection: Via IP67 M12 instrument connector (wireable mating part provided)
- Pin 1: +4.5 – 24V
- Pin 2: Not used
- Pin 3: 0 Volt
- Pin 4: Output

Standard materials of construction

- Body: 316 Stainless steel
- Sides: PVDF
- Turbine: PVDF
- 'O' ring seal: Viton
- Bearings: Sapphire
- Magnets: Ceramic

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Technical specification

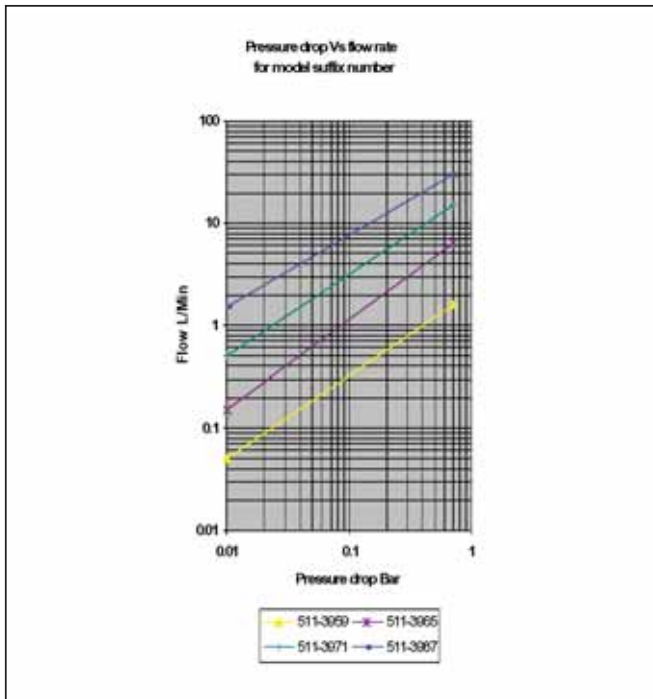
Model:	915	965	1010	1000
Flow (l/min):	0.12 – 15	0.25 to 6.5	0.5 - 15	2.0 – 30
Thread:	¼ BSP	¼ BSP	½ BSP	½ BSP
Frequency output:	175 Hz	230 Hz	245 Hz	250 Hz
Approx. Pulse/litre:	7000	2100	980	500
Linearity:	±2% FSD	±1.5% FSD	±1% FSD	±1% FSD
Pressure drop:	0.7 bar at full flow			
Working pressure:	10 bar max			
Temperature range:	-25 to +125°C			
Repeatability:	±0.25%			
Viscosity range:	1 to 20 cSt			
Detection system:	Hall Effect, which is suitable for opaque fluids.			

Commissioning

If problems occur during commissioning always check the fundamentals first:

- Is the flowmeter/instrument the correct one for the installation.
- Is the power connected to the meter and the instrument, and is it turned on.
- Is the instrument set/wired correctly? I/P port, pulse type, frequency span, units etc.
- Where possible check the O/P from the flowmeter with an oscilloscope before proceeding.
- Was the line flushed prior to installing the meter?
- Is the meter blocked?

Problem	Reading			Action required
	Low	High	Erratic	
Air in system		Y	Y	Check plumbing raise back pressure
Pulsations		Y	Y	Distance pump – provide damping
Flow disturbance	Y	Y	Y	Re-site flowmeter of disturber
Poor connections	Y	Y	Y	Check all terminations and wire
Debris in meter	Y	Y	Y	Clean meter – install filter
Opaque fluid	Y		Y	Use Hall Effect flowmeter
Incorrect inst. cal.	Y	Y		Re-set instrument and recalibrate
Blocked filter	Y			Replace filter element



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