Flow Sensor - Dual Range

RS Stock No. 256-225

General

This flow transducer has been designed for use with a range of different liquids including water and most fuels. The unit is capable of operating over two flow ranges. High flow (0.2 - 9.0 L/Min) is achieved by NOT inserting the supplied jet into the inlet pipe as shown in the outline diagram. The unit will accept both 8mm and 12mm diameter hose fittings on inlet and outlet pipes.

Note: 1. Flow direction is indicated by the arrow moulded into the unit and is in **ONE DIRECTION ONLY.**
2. For low flow range the jet must be **FULLY** inserted in the inlet port, pushing it to the inner end with a flat ended rod and tapping it gently to ensure it is fully seated.

Installation

Before installation check the free running of the sensor by blowing through it. **DO NOT USE AN AIR LINE.**

The detector uses a Hall Effect system (magnetic) and should therefore not be mounted near strong magnetic fields. For example: motors, solenoids, relays etc. For the best overall performance the sensor should be with the spindle vertical i.e. on either the face with the label or the face with the moulded arrow head. If a lot of gas bubbles are likely to be present in the fluid accurate results would be obtained with the flow vertically upwards through the meter. It may however be positioned in any attitude.

Pockets of vapour or bubbles of air will effect some of the volumetric flow and so alter the number of pulses recorded from the sensor. On the lower flow model these bubbles may take some time to clear because of the low fluid velocities inside the chamber. A large back pressure will reduce any tendency the liquid has to form vapour pockets.

Pumps

All pumps cause pulsations in the fluid, centrifugal pumps have probably the lowest disturbance, and reciprocating pumps the largest. With a centrifugal pump the pulsations reduce after a fairly short pipe run so if the flow sensor is positioned as far from the pump as possible, the effects will be minimised. With reciprocating pumps more positive isolation is desirable and a pulse damper or accumulator is probably required. If pulsations cannot be removed the unit must be recalibrated in circuit over the desired flow range.

Considerations

All flow sensors should only be installed with the following in mind: bends, valves, flow regulators, tee junctions and other fittings which cause the flow to travel faster at one side of the pipe relative to the other. This asymmetry in the flow can seriously affect the calibration and the disturbance should be as far removed from the sensor as possible and if at all practical, put after the flow sensor. Recalibration on site will, of course, remove any doubt about the installation. In all cases an 80 mesh filter should be fitted upstream of the flow sensor.

Viscosity

Viscosity effects: all turbine transducers are affected by viscosity and where possible the viscosity (temperature) of the liquid should be kept fairly constant. Viscous drag causes the turbine to be slowed down quicker at the lower flows, as viscosity increases so does the threshold to operation. If the fluid is lubricating and a higher pressure drop is acceptable, the turbine can be run at up to 50% over range with no detrimental effects.

Electronic

Inside the housing is a Hall Effect switch which is activated by three small magnets in the turbine. Each Hall Effect circuit includes a voltage regulator, quadratic Hall voltage generator, temperature stability circuit, signal amplifier, Schmitt trigger, and open-collector output with pull-up resistor. The on-board regulator permits operation with supply voltage of 4.5 to 24V. The switches' output can sink up to 20mA which includes the internal 10KΩ pull-up resistor. They can be used directly with bipolar or MOS logic circuits. The detector has an operating range of - 40°C to + 125°C.

Standard materials of construction

Body	-	PVDF
Cover	-	PVDF
Rotor	-	PVDF
Spindle	-	Sapphire
Bearings	-	Sapphire
'O' ring	-	Viton
Cable	-	Oil Res. PVC

Figure 1.

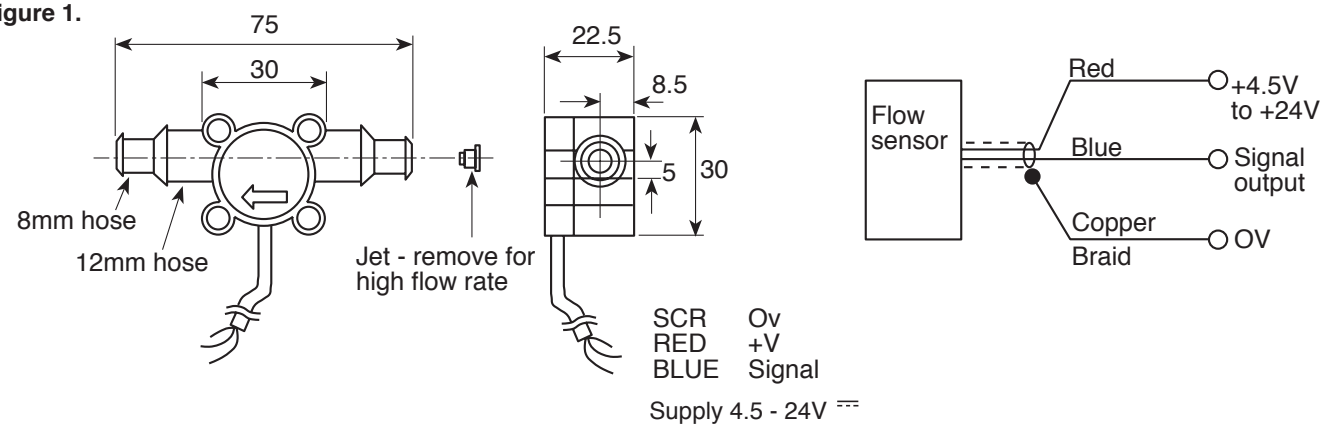


Figure 2.

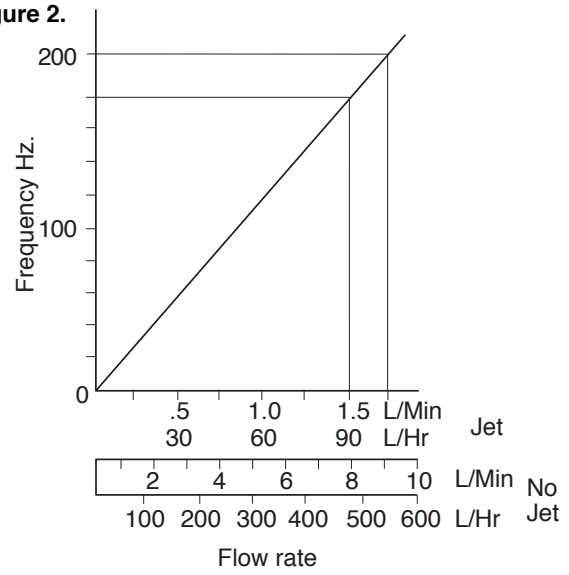
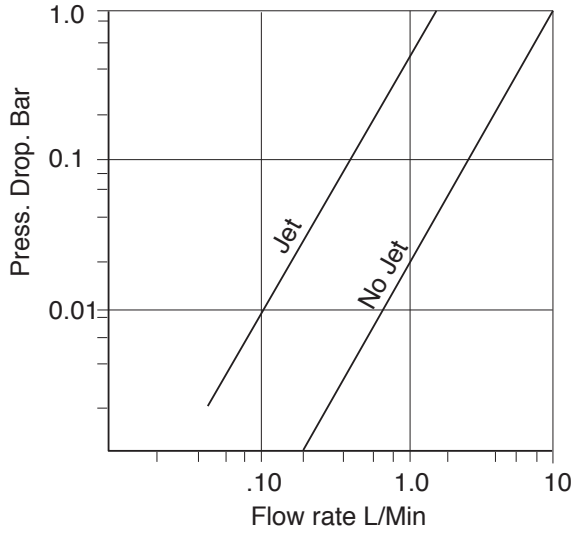


Figure 3.



	Flow range L/Hr	Linearity at FSD	Approx. FS Frequency	Approx. Pulses/L at FS
Jet	3 - 90	±1.0%	175 Hz	7000
No Jet	12 - 540	±1.0%	200 Hz	1330

Electrical characteristics at TA = +25°C, Vcc = 4.5V to 24V
(unless otherwise noted)

Characteristics	Symbol	Min	Typ.	Max.	Units
Supply voltage	Vcc	4.5	-	24	V
O/P saturation V.	$Vcc_{(SAT)}$	-	150	400	mV
O/P leakage current	I_{OFF}	-	0.05	10	µA
Supply current	I_{CC}	-	4.7	8	mA
O/P rise time	T_r	-	0.04	2	µS
O/P fall time	T_f	-	0.18	2	µS

Technical specification

	Standard	High flow
Flow rate	3-90 L/Hr	12-540 L/Hr
F.S. frequency	175 Hz	200 Hz
Frequency @ 12L/Hr	23Hz	4Hz
Viscosity range	0.8-20 + cSt	0.8-50 + cSt
F.S. pressure drop	1 Bar at 1 cSt	
Operating pressure (max.)	10 Bar	
Temperature range	-25 to 125°C	
Repeatability	±0.25%	
Linearity	1% FSD	
Sensor to sensor variation	±3%	
Supply voltage	4.5 to 24V ⎓	
Current consumption	10 mA typical	
Output	Open collector (10KΩ internal pull up)	
Output low	100 mV max.	
Rise and fall times	2µS max.	
Wetted materials	PVDF, sapphire and viton	