

## 190D Doppler clamp-on ultrasonic flow sensor

### Features

- A cost effective clamp-on non-invasive Doppler flowmeter.
- Voltage and frequency outputs.
- 15 or 24 Volt operation.
- Signal strength output option.
- Easily connected to most display systems.
- Measure flow rate within a pipe without cutting the pipe.
- Latest signal detection system
- Easy to attach, matrix array, single clamp-on sensor.
- Zero head loss results in improved pumping efficiency.



- Large flow measuring range, with no complicated upper velocity limits on sensor.
- Suitable for all commonly used sonically conductive pipe materials and liquids with suspended particles or bubbles.

### Description

The Precision Flow 190D sensor probe is a self contained clamp on Doppler flowmeter designed for liquid flow measurement applications, in particular where dirty or aerated waste water flow conditions prevail and any invasion of the piping system could cause inline meters problems. It is also a very economical solution to flow measurement in larger pipe applications. Precision Flow's experience in ultrasonic technology ensures that the 190D is a high precision instrument, which can be configured and operational within minutes.

Various clamping options are available for non standard applications. Please contact us for more information.

## Principle of operation

The Doppler flowmeter utilises the well known Doppler effect, this is named after Christian Doppler, who documented the effect in 1842. In general terms it is the change in frequency and wavelength of a wave as perceived by an observer moving relative to the source of the waves. The Precision Flow 190D flow meter has an array of piezoelectric crystals, part of the array transmits a beam of high frequency ultrasonic pressure waves so as to form a fixed cross angle with the pipe axis. As the beam travels into the non-homogeneous fluid, some energy is scattered back by solid particles or gas bubbles entrained in the flow. The relative motion of these discontinuities produces a frequency shift of the scattered wave, which is received and analysed by the ultrasonic flow meter. The different frequency is known as the Doppler shift. This is linearly proportional to the fluid velocity. As the internal cross sectional area of the pipe is easily measured so the volumetric flow rate is easily calculated.

## Electronics

The Precision flow 190D is an encapsulated completely self contained flow sensor and electronics. It requires no complicated configuration and provides a simple 0-6 volt output and (or) a TTL rate output. A calibrated K factor is supplied with each meter for the value of the pulse rate output. Also available is a signal strength output.

## Display

For simplicity and cost saving a simple volt meter can be used. The meter can be connected to our transit time machine display heads or various standard process meter displays. This allows us to offer a display solution to exactly fit your display and output needs. Please do not hesitate to contact us to discuss your requirements. For best accuracy we recommend using our signal processing heads.

## Specification

**Protection Class :** IP66

**Material :** Stainless Steel and plastic

**Weight :** 200 g

**Dimensions :** 112 mm x 35 mm X 32 mm (without cable and cable connector)

**Display :** none (separate unit)

**Temperature range :** -6°C to +75°C (operating) -10°C to +50°C (storage)

**Power supply :** 24V DC (40mA)  $V_{min}$  18V  $V_{max}$  34V  
15V DC (40mA)  $V_{min}$  14.5V  $V_{max}$  15.5V

Code 24

Code 15

**Outputs:** Any 2 of the following

Voltage output 0 – 6 Volts indicating 0 to 6 m/s (standard) or 0 to 10m/s

TTL Pulse rate output up to 5000 Hz calibrated value supplied with flowmeter\*

Signal indicator output

Code V6 (standard) or Code V10

Code F

Code S

**Cable length:** ( terminated with bare ends)

2m

5m

Code 2M

Code 5m

**Flow velocity range :** 0.05 m/sec to 10 m/sec

**Pipe size range:** 20 mm to 700 mm

**Linearity :**  $\pm 0.2\%$  of F.S.

**Repeatability**  $\pm 0.2\%$  of F.S.

**Accuracy:** Typically better than  $\pm 1\%$  to  $\pm 3\%$  of F.S or  $\pm 0.03$  m/sec . Which ever is the greater, depending on application.

Order code example **190D 24 V6 F 2M** is a 190D 24 volt version with voltage (0 to 6m/s) and rate outputs with 2 meters of cable.