PRECISION FLOW

Introducing the PRECISION 190PD portable hand held Dual Mode clamp-on ultrasonic flowmeter

Features

- Cost effective.
- Ideal for both dirty and clean fluid applications.
- Analog and digital outputs.
- Data logger with graphical display of data.
- AZW Adaptive Zoom Windowing technology as standard.
- Built in help.
- Automatic speed of sound measurement and flow profile correction algorithm.*
- Measure flow rate within a pipe without cutting the pipe.
- Easy to attach clamp-on sensors.
- Suitable for all commonly used sonically conductive pipe materials and liquids.
- Advanced matrix array Doppler sensor.

- Clearly laid out high tactile response keypad.
- Very large flow measureing range with no complicated upper velocity limits.
- Wide range of special application sensors.
- Latest transit time correlation signal detection system and Doppler measurement system.

Description

The Precision Flow 190PD is a lightweight, high quality, transit time, and Doppler flowmeter designed to meet the flow measurement needs of the service, maintenance and commissioning engineer. The flowmeter has dedicated Doppler and transit time sensors for superior performance. Precision Flow's experience in ultrasonic technology ensures that the 190PD is a high precision instrument, which can be configured and operational within minutes.

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

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Transit time principle of operation

When in transit time mode ultrasonic waves are transmitted in the direction of flow. These are accelerated slightly by the velocity of the liquid in the pipe. When ultrasound is transmitted in the opposite direction, the flow of the liquid causes the transmitted sound to decelerate. The subsequent time difference is directly proportional to the flow velocity in the pipe. Having measured the flow velocity and knowing the cross-sectional area, the volumetric flow can be easily calculated. Time differences are resolved to a resolution of 20 Pico seconds , thus giving extremely good performance in small pipes or in large pipes with low velocity flows.

Doppler principle of operation

When in Doppler mode the 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 190PD Doppler transducer 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 190PD is easily configured by selecting the options displayed in the main menu and following simple on screen instructions. Flow readings can be achieved at most sites within a few seconds. The use of rechargeable batteries allows the unit to be operated for a period in excess of 10 hours depending on the facilities used. Continuous operation via the PSU is possible while also recharging the battery pack. The graphic display provides flow data in large highly visible characters, which can be enhanced by the use of the back light facility, making it possible to read the flow rate from a distance under extremely poor lighting conditions. Error messages, battery status, signal quality, time and date are all continuously displayed, as well as flow information in either numerical or graph format, keeping the user fully aware of the measurement process.

Data Logger

The built in data logger has the capacity to store 60,000 flow readings. Data can be stored in 5-second to 1 hour intervals. Data from each logging session can be saved with unique name and is stored in the memory until it has been cleared. The stored data can be displayed on the instrument in text or graphical format. The instrument is also capable of downloading the stored data via the RS232/USB output port to a printer or PC onto a standard spreadsheet.

Specification

Hand Held Electronics

Protection Class **:** IP54
Material **:** ABS
Weight **:** < 1.5 Kg
Dimensions **:** 275 x 150 x 55mm
Display **:** 240 x 64 graphics LCD with backlight
Keypad **:** 17 key tactile membrane
Temperature range **:** 0ºC to +50ºC (operating) -10ºC to +50ºC (storage)
Power supply/charger Input **:** 12VDC
Volumetric flow units **:** m^3, gallons (Imperial and US), Litres
Velocity units **:** metres/sec, feet/sec
Flow velocity range transit time mode **:** 0.01 m/sec to 25 m/sec to 4 significant figures
Flow velocity range Doppler mode**:** 0.05 m/sec to 10 m/sec to 4 significant figures
(option higher if required)
Total volume **:** 12 digits forward and reverse*
Continuous battery level indication
Continuous signal quality indication
ERROR messages
Analogue 4-20mA into 750 Ohms **:** User definable scaling
Resolution **:** 0.1% of full scale
Pulse 5 Volts User definable scaling
Serial RS232, USB
Data Logging memory capacity 60,000 data points
Data Logging output Via RS232 or displayed graphically/numerically
Repeatability transit time mode**:** ±0.5% with unchanged transducer positions
Accuracy Transit time mode**:** ± 1% to± 2% or ± 0.02 m/sec whichever is the greater, depending on application.
Repeatability Doppler mode**:** ±0.2% of F.S.
Accuracy Doppler mode**:** Typically better than ± 1% to ± 3% of F.S or ± 0.03 m/sec . Which ever is the greater, depending on application.
The specification assumes turbulent flow profile with Reynolds numbers above 4000

PRECISION FLOW

Standard Transducer options**:

Transducer standard temperature WPG type Pipe size : 15mm-300mm	**Order code WPG**
General service temp short term :-30 to 130 °C	
General service temp long term :-30 to 105 °C	
Transducer standard temperature XPG type Pipe size : 50mm-1200mm	**Order Code XPG**
General service temp short term :-30 to 130 °C	
General service temp long term :-30 to 105 °C	
Transducer XPGD type Pipe size : 1200mm-6500mm	**Order Code XPGD**
General service temp short term :-6 to 75 °C	
General service Storage :-10 to 75 °C	
Transducer V Type (Doppler) type Pipe size : 20 mm-1200mm	**Order Code VT190**
General operating service temp :-6 to 50 °C	
General service storage :-10 to 75 °C	

Mounting Hardware options:

Mounting Rail for WPG transducers up to 300mm pipe	**Order Code WPGR**
Diagonal Mounting strap for WPG (2 needed)	**Order Code WD STRAP**
Diagonal extension strap	**Order Code EXD STRAP**
Mounting Rail for XPG transducers up to 400mm pipe (also suitable for V type sensor)	**Order Code XPGR**
Diagonal or large pipe mounting strap for XPG (2 needed) or V Type (1 needed)	**Order Code XD STRAP**
Mounting rail for small pipes V type	**Order Code VTYPER**

Standard Kits and variants:

All kits include: Main electronics pack , hard carry case, Data down load cable, power adapter , ultrasonic coupling compound, sensors detailed and suitable sensor mounting hard ware.

Precision flow 190P LT — **Order code 190P LT WPG**
Transit time only instrument WPG sensors 15mm to 300mm pipe sizes please see separate data sheet.

Precision Flow 190P — **Order code 190P WPG XPG**
Transit time only instrument WPG and XPG sensors 15mm to 1200mm pipe sizes see separate data sheet

Precision Flow 190PD — **Order code 190PD WPG VT190**
Transit time and Doppler instrument with V type and WPG sensors

Precision Flow 190PD — **Order code 190PD XPG VT190**
Transit time and Doppler instrument with V type and XPG sensors

Precision Flow 190PD — **Order code 190PD WPG XPG VT190**
Transit time and Doppler instrument with V type, WPG and XPG sensors

The 190PD is available with any combination of transducers and mounting hardware please contact us to discuss your requirements.

Fixed meters are also available please see separate data sheet.

Special application transducer design service is available please contact Precision Flow for details.
* *Reverse Flow and speed of sound correction only in transit time mode.

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