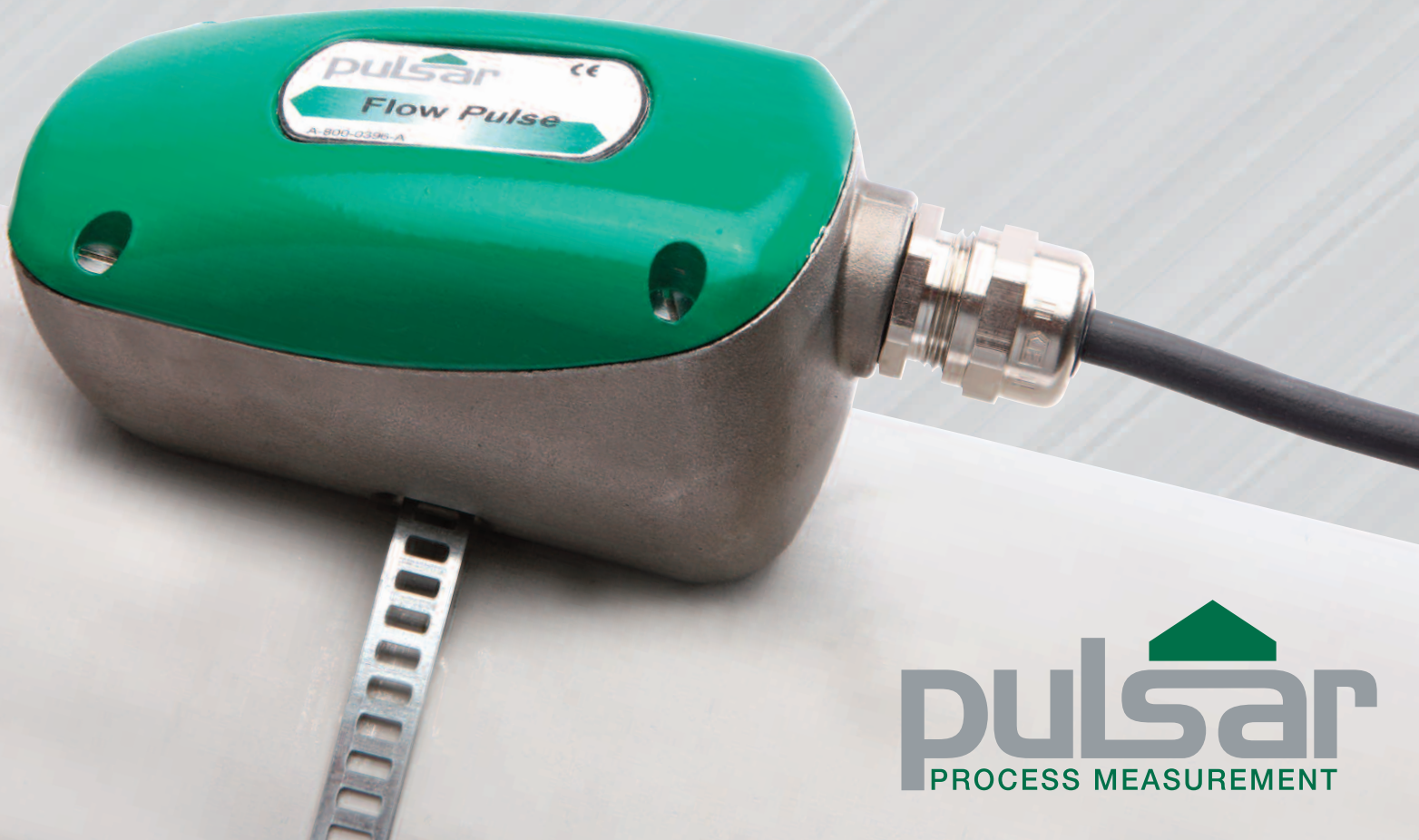


Flow Pulse

Unique, non-invasive clamp-on flow monitor

Easily installed and simple to set up, Flow Pulse uses an acoustic technique never before seen in flow measurement to deliver reliable results across an amazing range of pipe materials and sizes. At a fraction of the installation cost of an equivalent magflow meter, Flow Pulse delivers repeatable flow measurement.



Flow Pulse:

Amazing new flow monitoring technology

Features

- **Non-invasive, clamp-on**
- **Simple installation, no service interruption**
- **Use on all common pipe types, measures through corrugated or corroded pipes**
- **4-20mA output**
- **Modbus RTU**
- **Self-contained, no external controller required to operate**
- **ATEX approval pending**
- **2 versions depending on pipe diameter**

Flow Pulse is a major leap forward in flow measurement - no need to break into a pipe, or to get any civils involved, just clamp a small sensor to the outside of a pipe and get reliable, repeatable flow monitoring straight away.

Virtually no installation costs, no interruption to service, clean and simple. Flow Pulse is simply fixed in place by a band (tools required = one screwdriver). A silicone coupling pad makes sure that the Flow Pulse makes a good acoustic contact to the pipe.

Flow Pulse uses a novel spread spectrum analysis technique never before used in flow monitoring. It incorporates a radical new Digital Signal Processing (DSP) approach that gives exceptional repeatability.

Flow Pulse produces a wide ultrasonic beam that is refracted by the pipe wall, as well as reflected by suspended particles in the flowing media.

Ultrasound is fired through the pipe wall at 90 degrees to the flow via a tangentially mounted high-output ceramic, then refracted at angles across the axis of the flow and subsequently reflected from bubbles, particles and vortices in all directions and at a wide range of frequencies. The wide, refracted, ultrasonic beam maximises the ultrasound energy captured from flowing particles. These multiple

reflections are received back into the unit via a second high performance ceramic.

The returned signal is analysed using Flow Pulse's Refracted Spread Spectrum Analysis (RSSA) digital signal processing platform to derive flow information. RSSA analyses and integrates the received signals over a wide frequency range, then slices them for real-time analysis and flow rate calculation.

The digital platform also offers robust performance in the repeatability of measurement, as well as the flexibility to adapt to application requirement. For example, features such as damping and response time can be easily customised to suit.

Flow Pulse operates in a flow range from as little as 0.3m/s through to 4m/s (1 - 13 ft/sec), with a minimum particle size of 100µ and concentration of 200ppm or above (the equivalent of hard water).

Pipe material can be rigid plastic, stainless steel, mild steel or cast iron. Corrugated pipe is not an issue, and, as long as the silicone pad can fill in the irregularities, light corrosion will also give a good result.

Flow Pulse provides repeatability and accuracy of around ±5% (up to 350mm/14 inch pipe dia).

RSSA - Developed:

Pulsar have introduced two major innovations with the launch of Flow Pulse - firstly, of course, that the system is non-invasive, and secondly the new way that the mass of flow data is analysed. Pulsar call it Refracted Spread Spectrum Analysis (RSSA).

RSSA builds on Pulsar's track record of excellence in acoustic digital signal processing. Pulsar's non-contacting ultrasonic level and open channel flow measurement equipment has revolutionised the way that process and utility engineers view that technology, in large part down to the DATEM echo processing software on board. Similarly, Sludge Finder brought Pulsar's technical expertise to bear on the challenge of accurately and reliably measuring sludge blanket interface levels



**SIMPLE INSTALLATION,
MONITORING PUMP
PERFORMANCE IN TWO-
PUMP SEWAGE PUMPING
STATION**

Options and Outputs:

Flow Pulse operates as a stand-alone device, requiring 18-28VDC. It includes 1 volt-free programmable relay, provides scalable 4-20mA proportional to flow and connects to a PC via RS232 (see software below).

Optionally, Flow Pulse can interface directly with a dedicated wall mounted device, Flow Monitor, which can be either AC or DC supplied, providing the power and interface for the Flow Pulse via a 4-core cable.

Flow Monitor expands the capability of Flow Pulse, providing two relays that can be programmed as

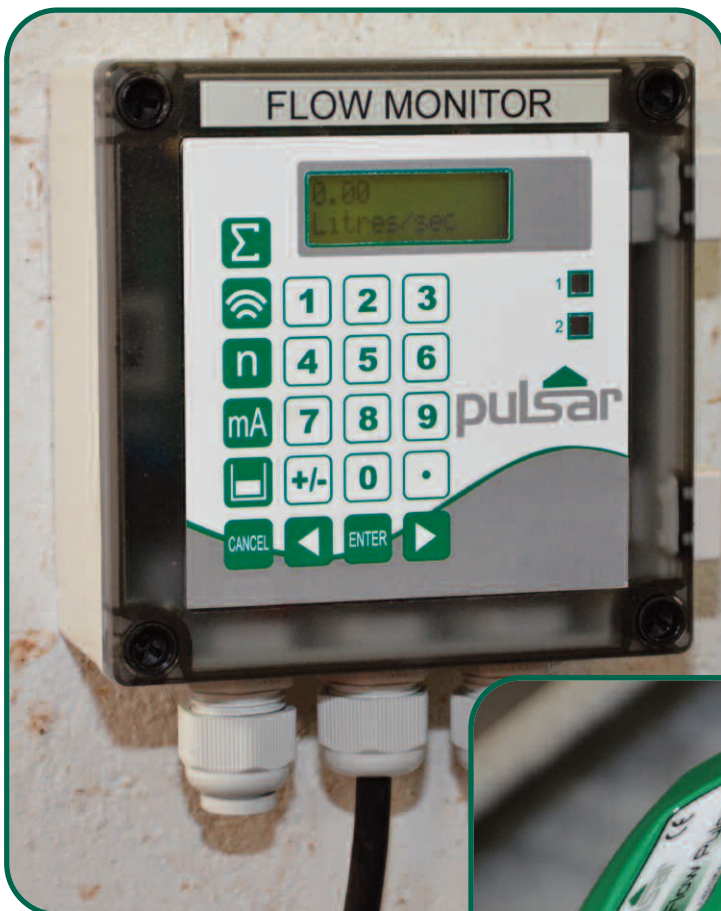
alarm (relay 1) or control (relay 2) for flow or velocity. Either relay can alternatively be programmed as a totaliser.

Flow Monitor also provides a mA output and on-board logging, including a daily total. Typical capacity is 36 days flow logging at 1 minute intervals.

Flow Monitor has an LCD display of flow rate and flow velocity (selectable), and is menu-programmable via a set of function keys.

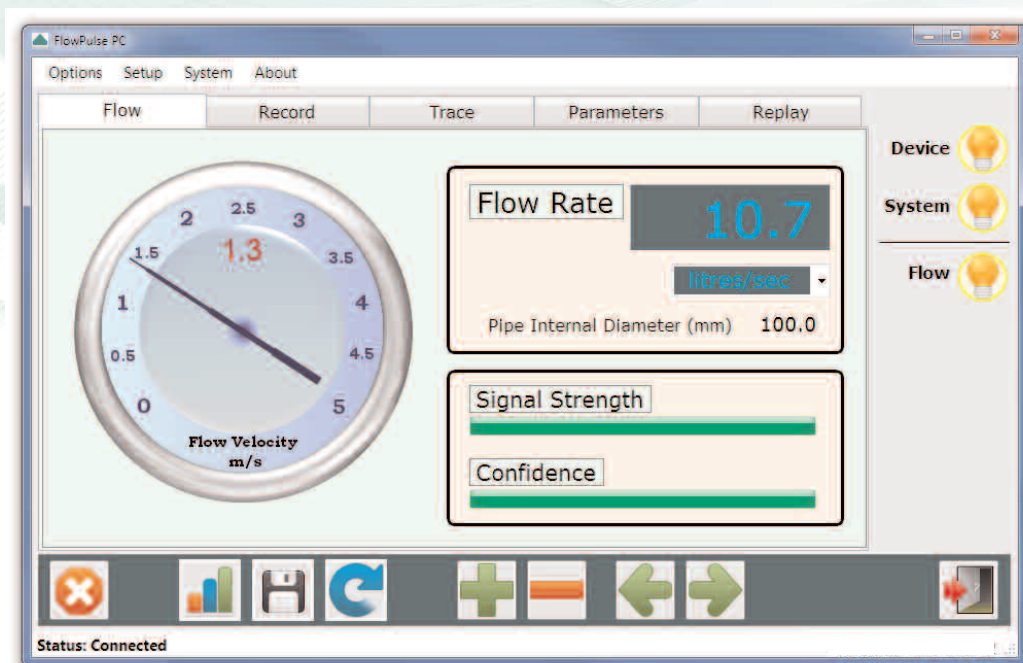


OPTIONAL FLOW
MONITOR POWERS
FLOW PULSE AND
PROVIDES
PROGRAMMING,
ALARM AND FLOW
LOGGING EXPANSION



TOOLS NEEDED TO FIX
FLOW PULSE IN PLACE:
1 SCREWDRIVER

Software:



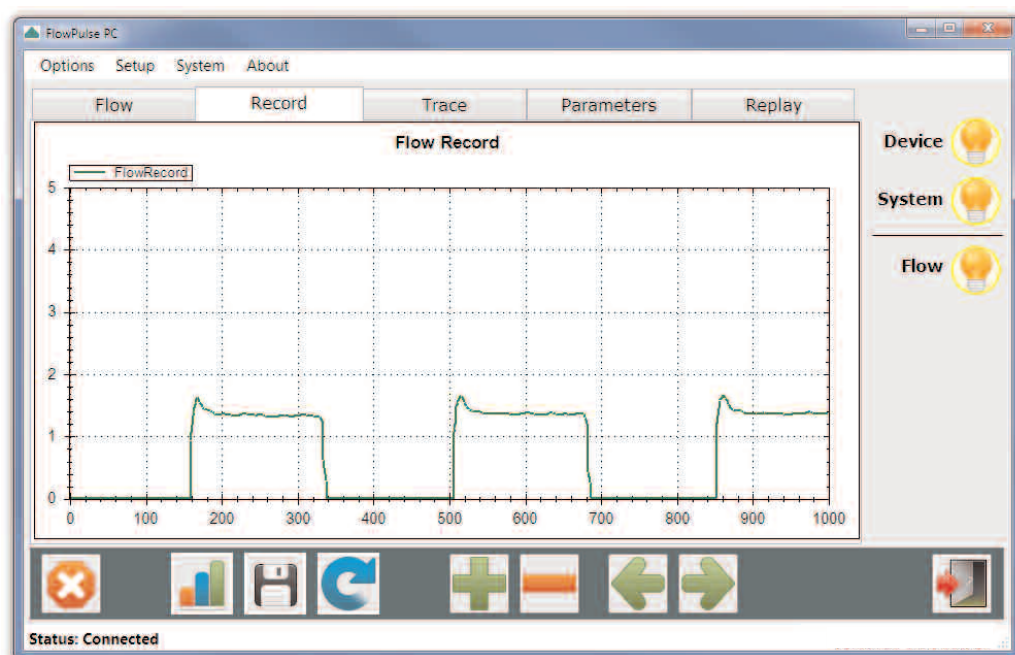
THE MAIN FLOW SCREEN GIVES 'AT A GLANCE' DISPLAY OF THE CURRENT FLOW RATE, WITH UNITS SELECTABLE.

To accompany Flow Pulse, Pulsar have introduced Flow Pulse PC, software to control, set up and monitor Flow Pulse. From here, users can see at a glance the flow rate in units of their choice, the application can be monitored in terms of signal strength and confidence, and the raw signal can be seen. The RS232 Modbus connection allows the Flow Pulse to be set up through an intuitive and straightforward set of parameters, while real-time flow information can be read and recorded.

Flow Pulse is simplicity itself to set up. All that is required once Flow Pulse is in position and powered is to provide the internal diameter. The rest of the set-up process is all about options and the way that the information is presented and recorded, especially if multi-drop Modbus RTU is in use.

'Signal Strength' (see screen shot above) is a measurement of the total strength of the returning echoes from the interior of the pipe. 'Confidence' is, as the term suggests, a measurement of how sure Flow Pulse is of the measurement and is an indication of the consistency of the flow rate. Confidence will increase the longer flow continues.

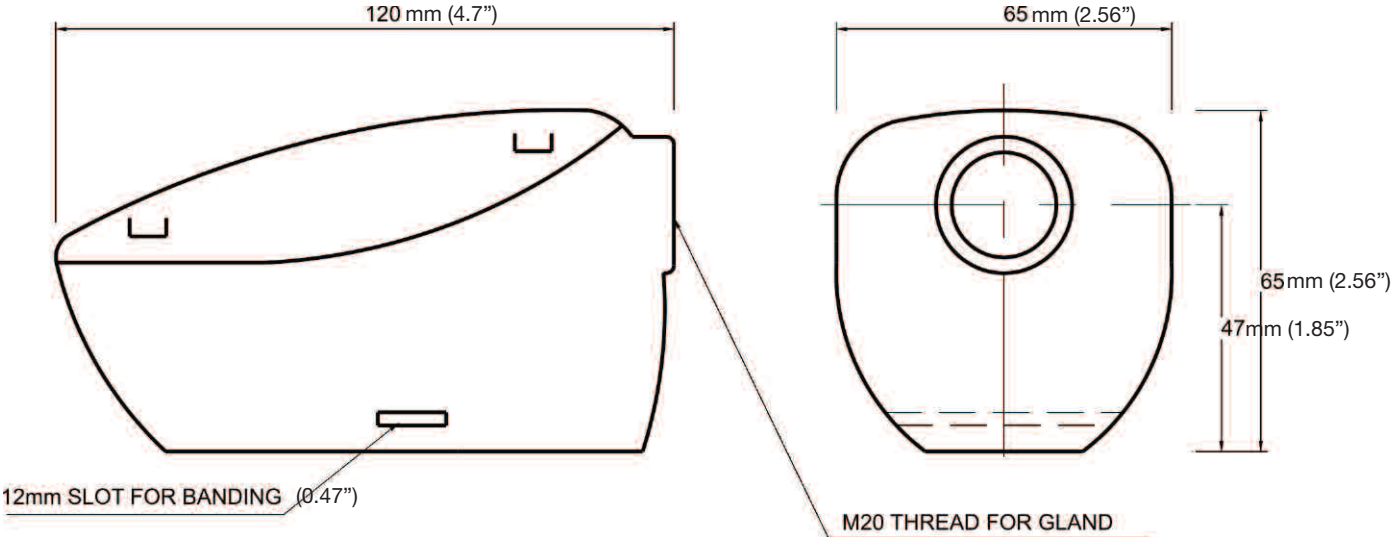
Flow Pulse PC is free-issued with Flow Pulse and requires no further licensing or equipment to run, other than an RS232 cable (available from Pulsar if required).



THIS SCREEN SHOT SHOWS A TYPICAL FLOW PULSE RECORD, WITH THE CHARACTERISTIC FLAT-TOP FLOW PATTERN.

Technical Specification: Flow Pulse (Patent Pending)

PHYSICAL:	
Weight:	Nominal 1.5kg (3.3lbs)
Case material:	Type 316 Stainless steel investment casting
Cable requirements:	multicore screened (2 for power, 2 for mA output and/or 3 for RS485)
Maximum cable length:	500m (547 yards) (minimum of 22VDC supply @ 500m)
Cable entry:	M20 x 1.5 gland
ENVIRONMENTAL:	
IP rating:	IP68
Max. and min. temperature:	-20°C to +70°C (-4°F to 158°F)
CE/EMC Approval:	Complies with BS EN 61326-1:2006 for emissions and immunity
Power Supply:	18-28 VDC, 125mA
APPLICATION:	
Accuracy/Repeatability:	±5% typical on pipes <350mm (14 inch) diameter
Pipe Diameter:	30mm to 350mm (1.2 to 14 inch) (version 1) 30mm to 1000mm (1.2 to 39 inch) (version 2)
Velocity Range:	0.3m/s to 4m/s (1-13 feet/sec)
Minimum particle size:	>100µ
Minimum particle concentration:	>200ppm
Pipe wall thickness	Metal or rigid pipe up to 20mm (0.8 inch) thick
Installation:	By means of a banding strap, using a silicone coupling pad applied to the base of the sensor and on the pipe.
ECHO PROCESSING:	
Echo Processing:	RSSA Digital Signal Processing
INPUT/OUTPUT:	
Volt free contact:	1 volt free programmable relay
Analogue Output:	4-20mA scalable
Digital Communications:	RS 232 and RS485 Modbus RTU
PC software:	Flow Pulse PC included



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Pulsar Process Measurement Limited operates a policy of constant development and improvement and reserves the right to amend technical details as necessary

Literature number: FPulse/MHA/02/9-12