Mainstream MainProbe-V^{u} RS485 MODBUS

MAINPROBE-V^{u} RS485 MODBUS is a low-power, streamlined ultrasonic flow velocity sensor with a 10 mm/s to 5 m/s bi-directional measurement range and 1 mm/s resolution. The minimum operating depth is 30 mm. The flow velocity measurement is temperature corrected for variations in the speed of sound.

Measurements are accessed via an RS485 Modbus RTU interface.

Features include measurement on demand and timed measurement refresh, while the Mainstream Adaptive Measurement System adjusts the sensor operation to match the flow conditions.

Signal quality indication provides measurement integrity monitoring with velocity histograms and velocity signal capture for diagnostics.

measurement principle

MAINPROBE-V^{u} RS485 MODBUS operates immersed in the flow and transmits ultrasound into the liquid to create a zone of inspection. Bubbles and solid particles carried through this zone by the flow, even when present in only minute quantities, reflect ultrasound back to the probe.

The received ultrasound is processed to extract bursts of signal containing verifiable velocity information. Only these signals bursts are used to determine the flow velocity, the remainder of the signal is ignored, thereby ensuring measurement integrity. The fraction of the total signal processed is the signal quality, an important metric for monitoring measurement performance.

Each signal burst is processed to extract the burst velocity. A measure of the flow temperature is used to correct this velocity for changes in the speed of sound. The burst velocities are used to construct a velocity histogram. Analysing this histogram gives the mean flow velocity.

To guarantee consistent measurement performance under all operating conditions, the Mainstream Adaptive Measurement System automatically adjusts the ultrasonic signal acquisition time so that each velocity measurement is based on the same quantity of information.

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MAINPROBE-V^{U} RS485 MODBUS

measurands and units

Power Supply Voltage :	10mV resolution
Fluid Temperature :	°C, °F: 1° resolution
Signal Quality :	0.1% resolution
Velocity :	mm/s, cm/s, m/s, in/s, ft/s, ft/min: 1 mm/s resolution

velocity measurement

Transducer Type :	Submerged sensor containing complete ultrasonic transmitter, receiver and signal processing chain.
Method :	Phase Coherence time delay measurement which determines the time for tracers carried by the flow to travel a fixed distance (~ 0.75 mm).
Minimum Operating Depth:	30 mm
Velocity Range :	-5 m/s to -10 mm/s and 10 mm/s to 5 m/s
Resolution :	Better than 1 mm/s
Measurement Integrity :	Ultrasound signal quality monitor gives the percentage of the measurement time that the received ultrasound signal contains verifiable velocity information.
Mainstream Adaptive Measurement System :	Automatically adjusts the ultrasonic signal acquisition time so that each velocity measurement is based on the same quantity of information

power supply

DC Supply :	6*-28Vdc at 27mA maximum current whilst measuring and less than 1.8mA idle (listening for incoming commands); *maximum 1 unit load

communications

Modbus :	Modbus RTU protocol over half-duplex RS485 connection. Address range 1-247. 1/8 unit load. Drive capability 10 unit loads. Baud rates 2400, 4800, 9600, 19200 (default), 38400, 57600 and 115200.

product hardware

Materials :	Streamlined PVC-U moulding and polyurethane cable
Dimensions :	105 mm long x 50 mm wide x 20 mm high
Cable :	Six core with 2 x power; 2 x twisted pair comms; screened 8 mm diameter polyurethane cable. Minimum static bend radius 60 mm
Weight :	850 gm including standard 10 m cable length
Maximum Cable Length :	500 m
Environmental Protection :	Totally encapsulated to IP68
Operating Temperature :	-10°C to 80°C