Doppler ultrasonic velocity sensors

True average velocity measurement with MASP Technology

MACE velocity sensors use continuous wave Doppler ultrasound to measure the speed of dirt, bubbles and other particles in the stream flow.

MACE Doppler ultrasonic velocity sensors utilizing MACE Advanced Signal Processing (MASP) technology “see” across the entire stream profile to give a true average velocity.

Doppler ultrasonic insert velocity sensor

For use in full pipes or partially full pipes when used in conjunction with an EchoFlo ultrasonic depth sensor.

Insertion sensors measure velocity only and require access to the outside wall of the pipe in which the sensor is to be mounted.

Installation

These sensors can be installed into existing pipework through a 2” ball valve (recommended) or just through a 2” female thread fitting.

Compatibility

The Doppler ultrasonic insert velocity sensor is compatible with the following MACE meters:

- MACE AgriFlo XCi (Requires a Doppler card)
- MACE FloPro XCi (Requires a Doppler card)
- HVFlo Logging Flow Meter

TECHNICAL SPECIFICATIONS:

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Pipe size:</td>
<td>0.1 to 2.54m (4” to 100”) diameter</td>
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<tr>
<td>Process fitting:</td>
<td>2” BSP or 2” NPT</td>
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<tr>
<td>Max. process fitting pressure:</td>
<td>1034 kPa (150psi)</td>
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<tr>
<td>Max. operating pressure: ²</td>
<td>253 kPa (37psi)</td>
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<tr>
<td>Shaft dimensions:</td>
<td>33cm (L) x 2cm (D)</td>
<td></td>
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<tr>
<td>Head dimensions:</td>
<td>4.5cm (D) x 2.5cm (H)</td>
<td></td>
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<tr>
<td>Wetted materials:</td>
<td>Nickel plated brass and epoxy</td>
<td></td>
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<tr>
<td>Pipe intrusion area:</td>
<td>11.25cm² (1.75 sq.”)</td>
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</tbody>
</table>

1 The pipe must be de-pressurized prior to insertion or removal
2 The stream flow may be suitable for Doppler ultrasonic flow measurement in pressures >253 kPa (37psi) if it contains at least 100 parts per million of suspended solids that are >75 microns in size.

VELOCITY MEASUREMENT:

- Method: Submerged Ultrasonic Doppler
- Range: ±0.025 to ± 8.0 m/s (±0.08 to ± 26ft/s)
- Resolution: 1mm at 1.0 m/s (0.04” at 3.3ft/s)
- Accuracy: ±1% up to 3.0 m/s (±1% up to 10ft/s)
- Urethane sensor cable: 9mm (D) up to 50m (L)
- Min. operating depth: 40mm (1.57”)
- Max. operating temp.: 60°C (140°F)

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MACE Doppler ultrasonic sensors “see” particles in water like turning on a flashlight in fog.
Doppler ultrasonic velocity sensor

This sensor is used to measure velocity only in full pipes when access to the pipe is available and the pipe can be emptied when installation or maintenance is required. It can also be used in partially full pipes or open channels in situations where the user is measuring depth by a third party or ultrasonic depth sensor.

Installation
Use a MACE ZX SnapStrap to install this sensor inside a pipe in minutes. The polycarbonate ZX SnapStrap is tough, secure, does not foul and can be easily removed to take the sensor to another site.

Compatibility
The Doppler ultrasonic area/velocity sensor is compatible with the following MACE meters:
- MACE AgriFlo XCi (Requires a Doppler card)
- MACE FloPro XCi (Requires a Doppler card)
- HVFlo Logging Flow Meter

TECHNICAL SPECIFICATIONS:
- Pipe size: 0.15 to 2.54m (6” to 100”) diameter
- Max. channel width: * 3m (10ft.)
- Dimensions: 12.5cm (L) x 5cm (W) x 1.6cm (H)  
  5” (L) x 2” (W) x 0.63” (H)
- Wetted materials: PVC, Alumina ceramic and epoxy
- Pipe intrusion area: 8cm² (1.25 sq.”)

* MACE Doppler ultrasonic sensors will operate in wider channels, but a reliable stream gauging must be performed for best system accuracy.

VELOCITY MEASUREMENT:
- Method: Submerged Ultrasonic Doppler
- Range: ±0.025 to ± 8.0 m/s (±0.08 to ± 26ft/s)
- Resolution: 1mm at 1.0 m/s (0.04” at 3.3ft/s)
- Accuracy: ±1% up to 3.0 m/s (±1% up to 10ft/s)
- Urethane sensor cable: 9mm (D) up to 50m (L)  
  0.35” (D) up to 164ft (L)
- Min. operating depth: 40mm (1.57”)
- Max. operating temp.: 60° C (140° F)

DEPTH MEASUREMENT:
- Method: Ceramic pressure transducer with large flat sensing diaphragm which allows straight, undeflected flow over the sensing area to reduce drawdown effects at high stream velocities and provides for self cleaning with an impervious Alumina ceramic surface.
- Full scale range: 4m (13ft) above the transducer face
- Accuracy: 0.2% of full scale at constant temperature in a static stream, 1% of full scale over a stream 5 to 55° C (41 to 131° F)
- Resolution: 1mm (0.04”)
- Overrange: 60m (200ft) without damage
- Min. operating depth: 17mm (0.67”)

VELOCITY MEASUREMENT:
- Method: Submerged Ultrasonic Doppler
- Range: ±0.025 to ± 8.0 m/s (±0.08 to ± 26ft/s)
- Resolution: 1mm at 1.0 m/s (0.04” at 3.3ft/s)
- Accuracy: ±1% up to 3.0 m/s (±1% up to 10ft/s)
- Urethane sensor cable: 9mm (D) up to 50m (L)  
  0.35” (D) up to 164ft (L)
- Min. operating depth: 40mm (1.57”)
- Max. operating temp.: 60° C (140° F)

Doppler ultrasonic area/velocity sensor

This sensor is used in open channels or pipes that run partially full. This sensor is used to measure depth (using a capacitive pressure diaphragm) and velocity. Access to the monitoring point is required for installation and maintenance.

Installation
Use a MACE ZX SnapStrap to install this sensor inside a pipe in minutes. The polycarbonate ZX SnapStrap is tough, secure, does not foul and can be easily removed to take the sensor to another site.

Compatibility
The Doppler ultrasonic area/velocity sensor is compatible with the following MACE meters:
- MACE AgriFlo XCi (Requires a Doppler card)
- MACE FloPro XCi (Requires a Doppler card)
- HVFlo Logging Flow Meter

TECHNICAL SPECIFICATIONS:
- Pipe size: 0.15 to 2.54m (6” to 100”) diameter
- Max. channel width: * 3m (10ft.)
- Dimensions: 12.5cm (L) x 5cm (W) x 1.6cm (H)  
  5” (L) x 2” (W) x 0.63” (H)
- Wetted materials: PVC, Alumina ceramic and epoxy
- Pipe intrusion area: 8cm² (1.25 sq.”)

* MACE Doppler ultrasonic sensors will operate in wider channels, but a reliable stream gauging must be performed for best system accuracy.