**Applications:**
- Sewage
- Wastewater
- Pulp & Paper Slurries
- DI water
- Discharge water
- Caustics
- Chemical Slurries
- Ground water
- Food and Beverage
- Petrochemical
- Any sound conducting liquid

**Features:**
- Selectable Doppler or Transit Time operating mode.
- Custom quality metric algorithms and DSP technology ensures reliable, high accuracy measurements.
- Quick and easy clamp-on transducer installation. Proprietary AGC (Automatic Gain Control) algorithm eliminates manual gain adjustment.
- Tamper Resistant - Factory configured for easy installation.
- LED lights indicate quality of measurement, set-up modes and error codes.
- Data logging to standard SD Card format. Factory configured to three minute time interval triggers. Logs time, date, flow rate and total flow values. 500,000 events with included 32MB SD Card.
- Isolated 4-20 mA output - factory configured.
- 0 - 1000Hz Pulse output - factory configured.
- Optional - Computer connection via RS-232, RS-485, USB, Ethernet. Permits remote access and control of all functions including real-time display, system configuration, data logging, remote data capture and process control functions. Software permits remote internet access through local network set-up.
Installation:

Fluid Requirements

The Sonic-Pro series Hybrid Ultrasonic Flow Meters can measure fluid flow in virtually any fluid in which sound waves can travel. The Sonic-Pro meters are considered “hybrid” because they can measure fluid flow using either the Doppler or Transit Time methods. The Sonic-Pro ultrasonic sound transducers are clamped to the outside of the pipe wall and include no moving parts. This method of flow measurement is safe, non-intrusive and very easy to service.

The Doppler measurement method requires particles be present in the flow stream to “reflect” the sound waves. The meter may be operated in the Doppler mode when the fluid contains 0.02% to 15% (200 to 150,000 ppm) of particles.

The Transit Time measuring method requires relatively “clean” fluid to enable the sound waves to complete their circuit. The meter may be operated in the Transit-Time mode when the fluid contains 0% to 10% (0 to 100,000 ppm) of particles. To allow for changes in the fluid’s particle count, the Sonic-Pro monitors the signal gain and employs an Automatic Gain Control (AGC) algorithm that periodically adjusts the gain to maintain the optimum power level.

The speed at which sound travels in the fluid must be known. The factory will configure the meter for a known fluid during the initial configuration. The Sonic-Pro model S3c includes a 5-button user interface and remote PC software that can be used to configure the meter. Many common fluids are listed in the software and can be selected directly from the menu. The speed of sound in the fluid is known, custom “unknown” fluids can be input manually by the user. A list of various fluids and their sound speeds are provided in the user manual.

Flow Stream Requirements

The Sonic-Pro’s sound wave beam is only affected by fluid that actually passes through the beam and therefore, the meter will not measure accurately if the fluid velocity is not consistent across the entire pipe diameter. Flow disturbances such as pumps, elbows, tees, and valves in the flow stream can cause swirl patterns and vortices that will affect the measurement. Install the transducers on a straight run of pipe as far as possible from any disturbances. The distance required for accuracy will depend on the type of disturbance.

Minimum Straight Pipe Length Requirements

The meter’s accuracy is affected by disturbances such as pumps, elbows, tees, valves, etc., in the flow stream. Install the meter in a straight run of pipe as far as possible from any disturbances. The distance required for accuracy will depend on the type of disturbance.

<table>
<thead>
<tr>
<th>Type of Disturbance</th>
<th>Upstream from Transducers</th>
<th>Downstream from Transducers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange</td>
<td>5 x Nominal Pipe Size</td>
<td>5 x Nominal Pipe Size</td>
</tr>
<tr>
<td>Reducer</td>
<td>7 x Nominal Pipe Size</td>
<td>5 x Nominal Pipe Size</td>
</tr>
<tr>
<td>90° Elbow</td>
<td>10 x Nominal Pipe Size</td>
<td>5 x Nominal Pipe Size</td>
</tr>
<tr>
<td>Two 90° Elbows - 1 Direction</td>
<td>15 x Nominal Pipe Size</td>
<td>5 x Nominal Pipe Size</td>
</tr>
<tr>
<td>Two 90° Elbows - 2 Directions</td>
<td>20 x Nominal Pipe Size</td>
<td>5 x Nominal Pipe Size</td>
</tr>
<tr>
<td>Gate valve or Pump</td>
<td>25 x Nominal Pipe Size</td>
<td>5 x Nominal Pipe Size</td>
</tr>
</tbody>
</table>

Transducer Mounting Location

- The meter can be mounted on horizontal or vertical runs of pipe.
- Mounting on the sides (3 o'clock and 9 o'clock) position on horizontal pipe is recommended.
- Mounting anywhere around the diameter of vertical pipe is acceptable, however, the pipe must be completely full of fluid at all times.
- Back pressure is required on downward flows to ensure a full pipe.
- See the minimum straight length of pipe requirement chart above.
- The meter can accurately measure flow from either direction.
Specifications:

General Operation

Measuring Principle
Hybrid. User-selectable Doppler or Transit Time operating modes.

Fluid Types
Virtually any acoustically conductive fluid.

Transit time mode from 0% to 15% (200 to 150,000 ppm) of 50 micron particulate.

Doppler mode from 0.02% to 15% (200 to 150,000 ppm) of 50 micron particulate.

Fluid Velocity Range
0.25 to 30 feet per second (0.07 to 9 meters per second)

Nominal Pipe Sizes
2.0 inch - 100 inch (63mm to 2500mm)

Pipe Materials
Most plastic liners

Pipe Liner Materials
2.0 inch - 100 inch (63mm to 2500mm)

Pipe Surface Temperature
-20°F to 300°F (-34°C to 150°C)

Flow Rate Averaging
Factory configured for 1.0 seconds.

Flow Rate Display Averaging:
User configurable to 0.25, 0.50, 1.0 (default), 2.5, 5.0 seconds.

Display Time Units:
User configurable for 0.50, 1.0, 2.5, 5.0 (default), 10.0 seconds.

Display Volume Units:
User configurable Rate and Total display units in:
- U.S. Gallons, ounces, barrels (US liquid), barrels (US oil), cubic feet, acre feet, Imperial (British) gallons, liter, cubic meter, or user defined “custom” units.

Clamp-On Transducers

Housing
NEMA 6P (IP67), Nickel plated aluminum, SS clamps & hardware.

Dimensions: 3.12H x 2.95W x 1.60D in. (79H x 75W x 41D mm)

Weight (excluding cable): 0.8 lb. (0.4 Kg.) each

Cable
Shielded coaxial RG/U Type:59. PVC jacket, black. RoHS Compliant
Standard length: 10 ft. (3m)
Optional lengths available: 25 ft. (7m), 50 ft. (15m), 100 ft. (30m)

Pipe Surface Temperature
-20°F to 300°F (-34°C to 150°C)

Pipe Liner Materials

Most plastic liners

Pipe Liner Materials
Pipe Size Ranges
Max Pipe Wall
---
Brass (Naval) | 2” to 100” (63mm to 2500mm) | .500” (13mm)
Copper | 2” to 100” (63mm to 2500mm) | .500” (13mm)
FRP (Fiberglass Reinforced Plastic) | 2” to 100” (63mm to 2500mm) | .500” (13mm)
Iron (cast) | 2” to 100” (63mm to 2500mm) | .500” (13mm)
Iron (ductile) | 2” to 100” (63mm to 2500mm) | .500” (13mm)
Nylon | 2” to 100” (63mm to 2500mm) | 2.00” (50mm)
Polyethylene (HDPE) | 2” to 100” (63mm to 2500mm) | 2.00” (50mm)
Polyethylene (LDPE) | 2” to 100” (63mm to 2500mm) | 1.00” (25mm)
Polypropylene | 2” to 100” (63mm to 2500mm) | .500” (13mm)
PVC / CPVC | 2” to 100” (63mm to 2500mm) | 2.00” (50mm)
304 Stainless Steel | 2” to 100” (63mm to 2500mm) | .500” (13mm)
304L Stainless Steel | 2” to 100” (63mm to 2500mm) | .500” (13mm)
316 Stainless Steel | 2” to 100” (63mm to 2500mm) | .500” (13mm)
Steel (1% carbon hard) | 2” to 100” (63mm to 2500mm) | .500” (13mm)
Steel (carbon) | 2” to 100” (63mm to 2500mm) | .500” (13mm)
Titanium | 2” to 100” (63mm to 2500mm) | .500” (13mm)

Note: Consult the factory for an updated list of pipe materials.

Accuracy

Flow Rate Averaging Time | Transit Time Accuracy at at Nominal Pipe Sizes
---|---
5.0 Seconds (default setting) | +/-1% of rate > 1 ft/sec
| +/-0.01 ft/sec < 1 ft/sec
1.0 Seconds | +/-1% of rate > 5 ft/sec
| +/-0.05 ft/sec < 5 ft/sec
0.5 Seconds | +/-2% of rate > 12 ft/sec
| +/-0.25 ft/sec < 12 ft/sec

Flow Rate Averaging Time | Doppler Accuracy at Nominal Pipe Sizes
---|---
5.0 Seconds (default setting) | +/-2% of rate > 12 ft/sec
| +/-0.25 ft/sec < 12 ft/sec
1.0 Seconds | +/-2% of rate > 12 ft/sec
| +/-0.25 ft/sec < 12 ft/sec
0.5 Seconds | +/-2% of rate > 12 ft/sec
| +/-0.25 ft/sec < 12 ft/sec

Shipping Specifications

Carton Dimensions: 21” x 17” x 9-1/2”
Carton Weight: 24 lbs. (10.9 Kg.)

SPU (Signal Processing Unit)

Enclosure
NEMA 4X (IP66), Powder coated aluminum, SS clamps and hardware.

Dimensions: 11.00H x 8.60W x 5.00D inches (279H x 218W x 127D mm)

Weight 9.5 lb. (4.3 Kg.)

Mounting
Wall, pipe (vertical or horizontal) or panel mounting. Hardware included.

Panel opening: 10.63H x 8.10W inches (270H x 206W mm)

Panel Depth. Rear: 2.78 inches (71 mm), Front: 2.18 inches (55 mm)

Power Requirements
95-264 VAC 50/60Hz or 15-30 VDC; 30 watts maximum

Operating Temperature
14°F to 140°F (-10°C to 60°C) Storage: -40°F to 158°F (-40°C to 70°C)

Display
None.

Output Update Time
Factory configured for 1.0 seconds.

Flow Rate Averaging
Factory configured for 5.0 seconds.

Data Outputs
- Isolated 4-20 mA output - factory scaled at 0 to 30 ft/s
- 0-1000 Hz Pulse output - factory scaled at 0 to 30 ft/s

Data Logging
Date/time stamped flow rate and flow total data in FAT32 file format, easily imported into Excel. Factory configured to trigger at 3 minutes time intervals. Over 500,000 log events possible with included 32MB SD Card.

Process Control - optional
(requires communications option shown below)

Three independently configurable 10 amp Form C, NO/NC relays.

- Configure to flow rate for high/low/range rate alarm. Programmable release values enable auto release or manual latching operation.

- Configure to flow total for manual trigger batch operations or automatically triggered, timed batch operations.

External Communications - optional

Computer connection via RS-232, RS485, USB, Ethernet.

- Includes user PC software for remote access to all configuration menus and real-time flow rate and total flow displays.

- Permits remote internet access through local network set-up.

- Remotely access and upload data logging files.

- Display Languages: User configurable English, Spanish, French or German.

- Display Volume Units: User configurable Rate and Total display units in:
  - U.S. Gallons, ounces, barrels (US liquid), barrels (US oil), cubic feet, acre feet, Imperial (British) gallons, liter, cubic meter, or user defined “custom” units.
  - Rate display in feet or meters per second.

- Display Time Units: User configurable to 0.25, 0.50, 1.0 (default), 2.5, 5.0 seconds.

- Display/Output Update Time: User configurable for 0.50, 1.0, 2.5, 5.0 (default), 10.0 seconds.

- Flow Rate Display Averaging: User configurable for 0.50, 1.0, 2.5, 5.0 (default), 10.0 seconds.
### Model Number Matrix:

#### Sonic-Pro Ordering Information

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Pipe Pressure Rating</th>
<th>Fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>SK</td>
<td>SK-5 (ASTM D 1785)</td>
</tr>
<tr>
<td>1&quot;</td>
<td>SA</td>
<td>SK-10 (ASTM D 1785)</td>
</tr>
<tr>
<td>1.1/2&quot;</td>
<td>SB</td>
<td>SK-20 (ASTM D 1785)</td>
</tr>
<tr>
<td>1.25&quot;</td>
<td>SC</td>
<td>SK-30 (ASTM D 1785)</td>
</tr>
<tr>
<td>1.5&quot;</td>
<td>SD</td>
<td>SK-40 (ASTM D 1785)</td>
</tr>
<tr>
<td>2&quot;</td>
<td>SE</td>
<td>SK-60 (ASTM D 1785)</td>
</tr>
<tr>
<td>2.25&quot;</td>
<td>SF</td>
<td>SK-80 (ASTM D 1785)</td>
</tr>
<tr>
<td>2.5&quot;</td>
<td>SG</td>
<td>SK-100 (ASTM D 1785)</td>
</tr>
<tr>
<td>3&quot;</td>
<td>SH</td>
<td>SK-120 (ASTM D 1785)</td>
</tr>
<tr>
<td>3.25&quot;</td>
<td>SI</td>
<td>SK-140 (ASTM D 1785)</td>
</tr>
<tr>
<td>3.5&quot;</td>
<td>SJ</td>
<td>SK-160 (ASTM D 1785)</td>
</tr>
<tr>
<td>4&quot;</td>
<td>SA</td>
<td>SK-41 (ASTM D 2241)</td>
</tr>
<tr>
<td>4.5&quot;</td>
<td>SB</td>
<td>SK-29 (ASTM D 2241)</td>
</tr>
<tr>
<td>5&quot;</td>
<td>SC</td>
<td>SK-21 (ASTM D 2241)</td>
</tr>
<tr>
<td>5.5&quot;</td>
<td>SD</td>
<td>SK-13.5 (ASTM D 2241)</td>
</tr>
<tr>
<td>6&quot;</td>
<td>SE</td>
<td>SK-4 Metric (DIN 8062)</td>
</tr>
<tr>
<td>8&quot;</td>
<td>PA</td>
<td>PN 6 Metric (DIN 8062)</td>
</tr>
<tr>
<td>10&quot;</td>
<td>PB</td>
<td>PN 10 Metric (DIN 8062)</td>
</tr>
<tr>
<td>12&quot;</td>
<td>PC</td>
<td>PN 16 Metric (DIN 8062)</td>
</tr>
<tr>
<td>14&quot;</td>
<td>PE</td>
<td>PN 20 Metric (DIN 8062)</td>
</tr>
<tr>
<td>16&quot;</td>
<td>PS</td>
<td>CLASS B British (BS 3506)</td>
</tr>
<tr>
<td>18&quot;</td>
<td>SB</td>
<td>CLASS C British (BS 3506)</td>
</tr>
<tr>
<td>20&quot;</td>
<td>SC</td>
<td>CLASS D British (BS 3506)</td>
</tr>
<tr>
<td>24&quot;</td>
<td>SD</td>
<td>CLASS E British (BS 3506)</td>
</tr>
<tr>
<td>30&quot;</td>
<td>SE</td>
<td>CLASS F British (BS 3506)</td>
</tr>
</tbody>
</table>

#### Optional replacement set of transducers

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Example model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>S30-030</td>
</tr>
<tr>
<td>1&quot;</td>
<td>S30-050</td>
</tr>
<tr>
<td>1.1/2&quot;</td>
<td>S30-070</td>
</tr>
<tr>
<td>1.5&quot;</td>
<td>S30-090</td>
</tr>
</tbody>
</table>

### Notes:

1) Unless equipped with the communications option and user software, models S1 and S2 are factory configurable only.
2) Smart Communications Option B (process control relays), requires either the S3 configurable display or the communications option for relay configuration.
3) Other display volume units, including custom units are available. Contact the factory for ordering information.
4) Not all pipe sizes, pipe pressure ratings, pipe materials and fluids are shown here. Contact the factory for more information.
5) The basic Sonic-Pro model number includes one set of transducers. Optional transducer set ordering information is shown to enable ordering replacement or secondary sets.

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