

ProSeries™**SONIC-PRO™ Ultrasonic Flow Meters****by Blue-White Ind.**

Engineering and Technical Data

SONIC-PRO S1x

Hybrid Ultrasonic Flowmeter



- Selectable Doppler or Transit Time**
- Non-Invasive clamp on transducers**
- NEMA 4X (IP 66) washdown enclosure**
- Tamper resistant**
- Factory Configured**
- Optional "Smart" external communications**
- 2 Year warranty**

💧 Liquid applications

NEMA 4X **CE** 

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.

SONIC-PRO Ultrasonic Flow Meters*Engineering and Technical Data***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 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. Provided 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.

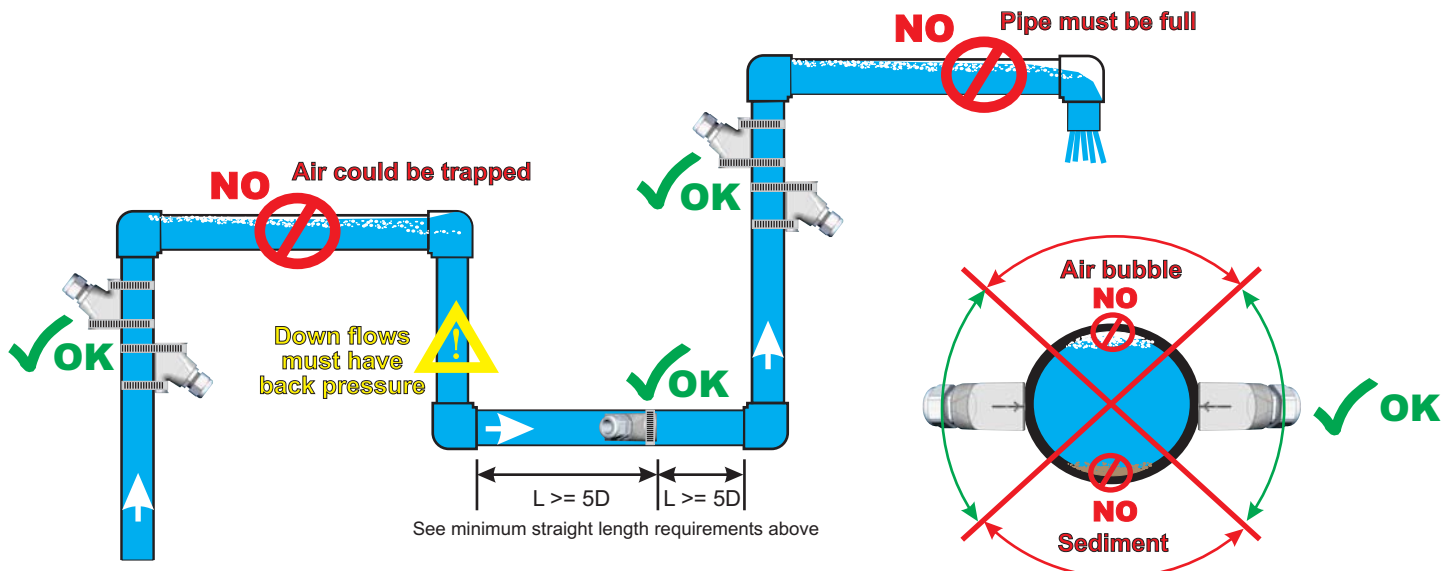
Minimum Straight Pipe Length Requirements

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.

| Type of Disturbance | Straight Lengths of Pipe Required | |
|-------------------------------|-----------------------------------|-----------------------------|
| | Upstream from Transducers | Downstream from Transducers |
| Flange | 5 x Nominal Pipe Size | 5 x Nominal Pipe Size |
| Reducer | 7 x Nominal Pipe Size | 5 x Nominal Pipe Size |
| 90° Elbow | 10 x Nominal Pipe Size | 5 x Nominal Pipe Size |
| Two 90° Elbows - 1 Direction | 15 x Nominal Pipe Size | 5 x Nominal Pipe Size |
| Two 90° Elbows - 2 Directions | 20 x Nominal Pipe Size | 5 x Nominal Pipe Size |
| Gate valve or Pump | 25 x Nominal Pipe Size | 5 x Nominal Pipe Size |

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 10% (0 to 100,000 ppm) 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 Liner Materials

Most plastic liners

Pipe Materials

Most metal and plastic pipes

| Pipe Material | 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.

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)

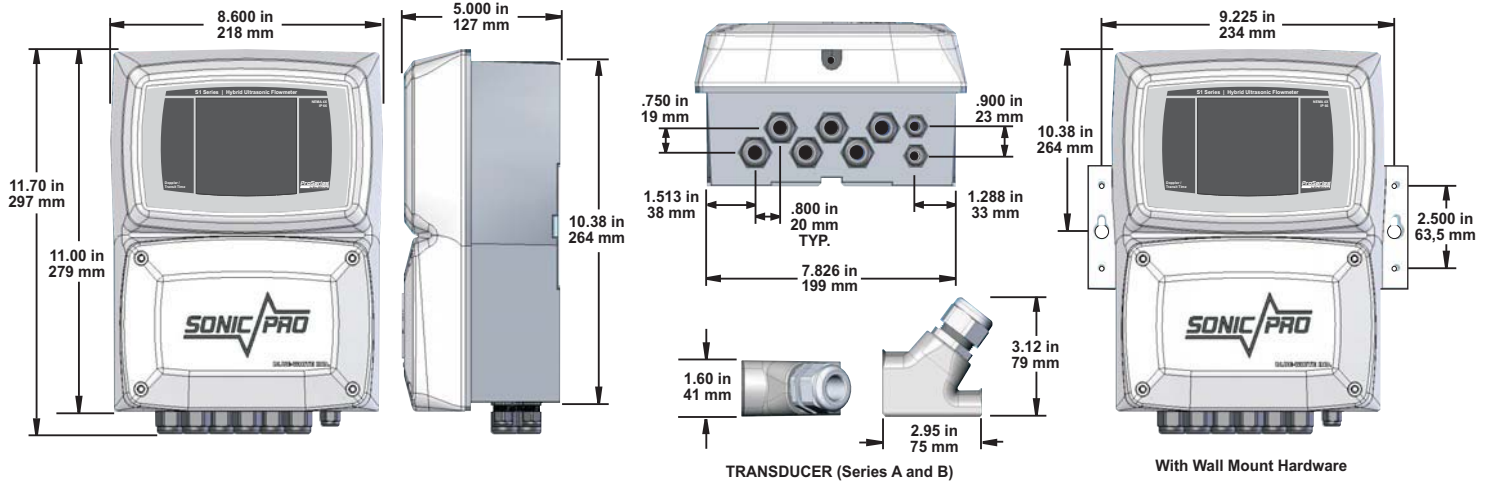
Pipe Surface Temperature

-20°F to 300°F (-34°C to 150°C)

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Dimensions:



Sonic-Pro Ordering Information

| Sonic-Pro Part Number Matrix | | Pipe Size | Pipe Pressure Rating | Fluid |
|--|--|------------------|------------------------------|-------------------------------------|
| Base Electronics Package | | IPS Pipe Size | SK Sch 5 (ASTM D 1785) | AA Alcohol (Ethyl alcohol; Ethanol) |
| S1 | Factory configured without display ¹ | 020 2" | SA Sch 10 (ASTM D 1785) | AB Benzene |
| S2 | Factory configured with display ¹ | 025 2-1/2" | SB Sch 20 (ASTM D 1785) | AC Ethylene glycol |
| S3 | Factory configured with user configurable display | 030 3" | SC Sch 30 (ASTM D 1785) | AD Ethylene glycol / water (50%) |
| Smart Communications and Control ² | | 040 4" | SD Sch 40 (ASTM D 1785) | AE Gasoline |
| A | Communications Includes Ethernet, USB, RS-232, RS-485 connections, and user configuration and monitoring PC software. | 050 5" | SE Sch 60 (ASTM D 1785) | AF Isopropyl alcohol |
| B | Process control Includes three 10 amp, form C relays. Note: Requires S3 configurable display or the communications option | 060 6" | SF Sch 80 (ASTM D 1785) | AG Methyl alcohol (Methanol) |
| C | Both Communication and Process Control options | 080 8" | SG Sch 100 (ASTM D 1785) | AH Methyl ethyl Ketone |
| X | None | 100 10" | SH Sch 120 (ASTM D 1785) | AI Milk, homogenized |
| Power Supply Cord Rating and Plug Type ⁵ | | 120 12" | SI Sch 140 (ASTM D 1785) | AJ Oil, diesel |
| 1 | U.S. 125V with NEMA 5/15 plug | 141 14" | SJ Sch 160 (ASTM D 1785) | AK Toluene |
| 2 | European 250V with CEE 7/III plug | 161 16" | DA SDR 41 (ASTM D 2241) | AL Water (distilled; waste) |
| 3 | U.S. 250V with NEMA 6/15 plug | 181 18" | DB SDR 26 (ASTM D 2241) | AN Water, sea |
| X | Power cord without attachment plug | 201 20" | DC SDR 21 (ASTM D 2241) | XX User configured |
| Transducer Model and Cable Length | | 220 22" | DD SDR 13.5 (ASTM D 2241) | |
| A1 | Model A with 10 ft cable | 240 24" | PA PN 4 Metric (DIN 8062) | |
| A2 | Model A with 25 ft cable | 260 26" | PB PN 6 Metric (DIN 8062) | |
| A3 | Model A with 50 ft cable | 281 28" | PC PN 10 Metric (DIN 8062) | |
| A4 | Model A with 100 ft cable | 300 30" | PD PN 16 Metric (DIN 8062) | |
| Nominal Pipe Size ⁴ | | 320 32" | PE PN 20 Metric (DIN 8062) | |
| Select from options list | | 340 34" | BB CLASS B British (BS 3506) | |
| Pipe Pressure Rating ⁴ | | 360 36" | BC CLASS C British (BS 3506) | |
| Select from options list | | 420 42" | BD CLASS D British (BS 3506) | |
| Pipe Material ⁴ | | 480 48" | BE CLASS E British (BS 3506) | |
| Select from options list | | Metric Pipe Size | | |
| Display Volume Units ³ | | 063 63mm | Pipe Material | |
| G | Gallons | 075 75mm | A | Brass (Naval) |
| L | Liters | 090 90mm | B | Copper |
| F | Cubic Feet | 110 110mm | C | FRP (fiberglass reinforced plastic) |
| A | Acre Feet | 125 125mm | D | Iron (cast) |
| M | Cubic Meters | 140 140mm | E | Iron (ductile) |
| Display Time Units | | 160 160mm | F | Nylon |
| M | Minutes | 180 180mm | G | Polyethylene (HDPE) |
| H | Hours | 200 200mm | H | Polyethylene(LDPE) |
| D | Days | 225 225mm | I | Polypropylene |
| Fluid ⁴ | | 250 250mm | J | PVC / CPVC |
| Select from options list | | 280 280mm | K | PVDF |
| Display language | | 315 315mm | L | Stainless Steel 304 |
| E | English | 355 355mm | M | Stainless Steel 304L |
| S | Spanish | 400 400mm | N | Stainless Steel 316 |
| G | German | 450 450mm | O | Steel (1% Carbon, hardened) |
| F | French | 500 500mm | P | Steel (carbon) |
| Sample model number | | 560 560mm | Q | Titanium |
| S3 | C | 630 630mm | X | User configured |
| 1 | A1 | 710 710mm | | |
| A | 060 | 800 800mm | | |
| SD | J | 101 1000mm | | |
| G | M | XXX User config. | | |
| AL | E | | | |

| Optional replacement set of transducers | |
|---|----------------------------------|
| ST | SonicPro Transducer |
| Pipe Size | |
| A | Pipe 2" to 100" (63mm to 2500mm) |
| Cable Length | |
| 010 | 10 feet |
| 025 | 25 feet |
| 050 | 50 feet |
| 100 | 100 feet |
| ST - A - 010 | Sample model |

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.