

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

Engineering and Technical Data

SONIC-PRO S2x

Hybrid Ultrasonic Flowmeter



- Selectable Doppler or Transit Time**
- Non-Invasive clamp on transducers**
- High quality QVGA display**
- NEMA 4X (IP 66) washdown enclosure**
- Tamper resistant interface**
- 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 2-button user interface.
- Factory configured for easy installation.
- High quality 320 x 240 pixel QVGA backlit LCD.
- 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.

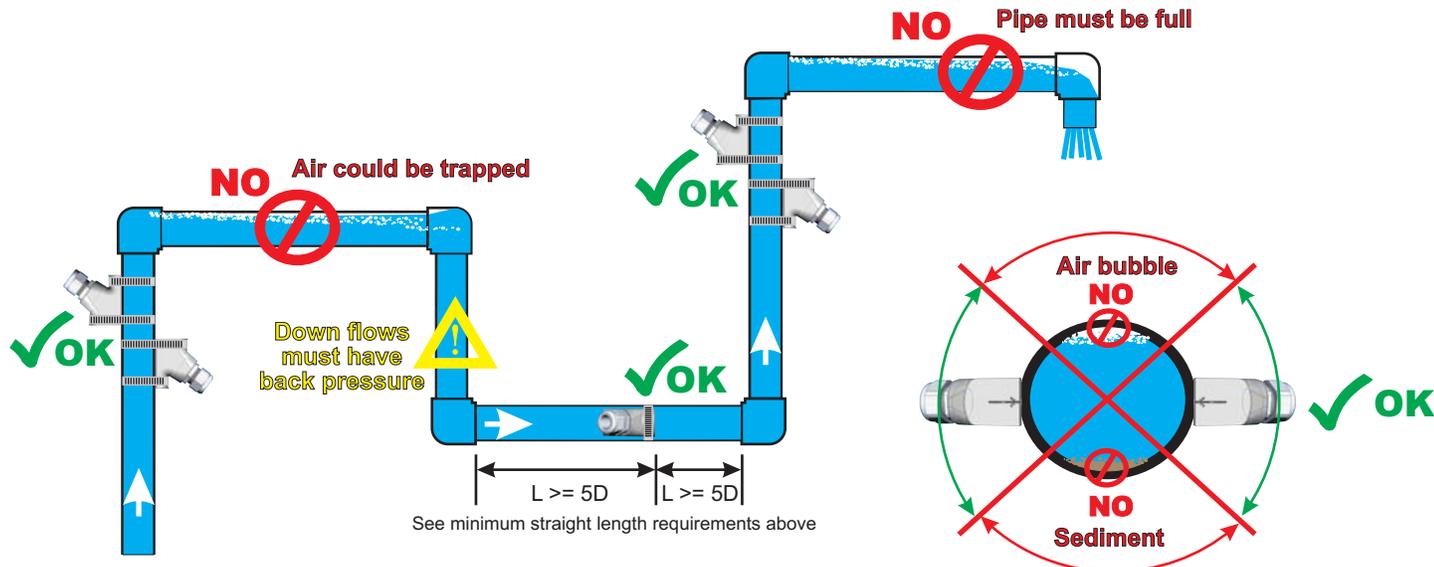
Minimum Straight Pipe Length Requirements

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

320 x 240 pixel QVGA backlit LCD, UV resistant.

Simultaneous Rate and Total: 10 digit maximum + exponent to E+32

Decimal point factory configured.

Display Languages

English, Spanish, French or German factory configured.

Keypad

Two-button positive action tactile switch keypad.

Display Volume Units

Factory configured 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

Factory configured for seconds, minutes, hours, days.

Display/Output Update Time

Factory configured for 1.0 seconds.

Flow Rate Display 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 communication and configuration software
- Permits remote internet access through local network set-up
- Remotely access and upload data logging files.

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)

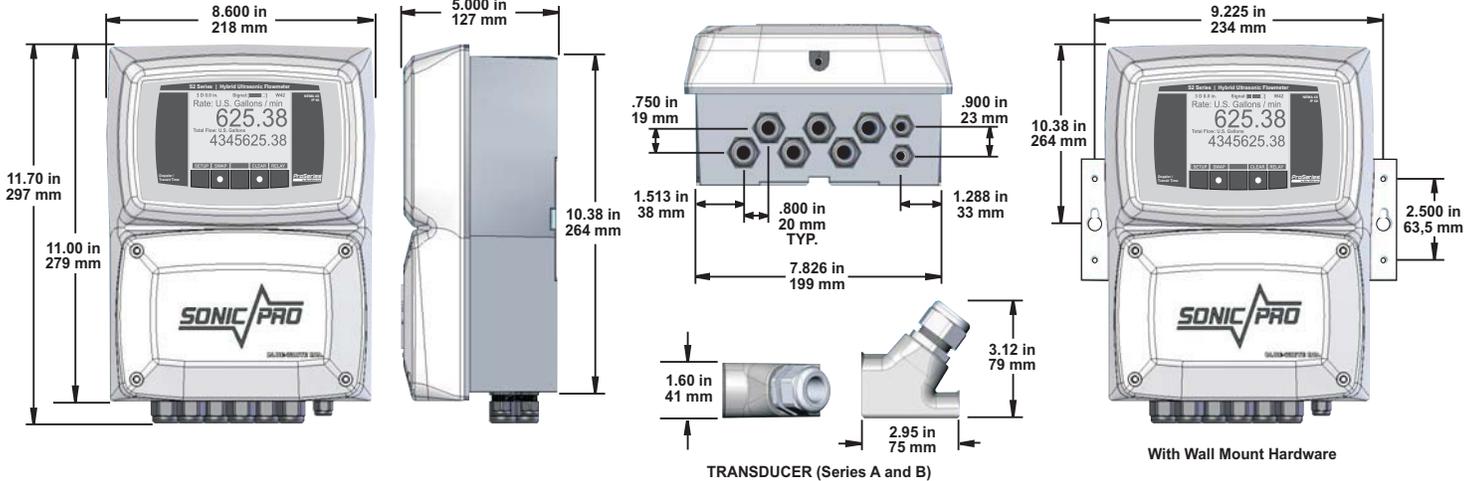
Pipe Surface Temperature

-20°F to 300°F (-34°C to 150°C)

SONIC-PRO Ultrasonic Flow Meters

Engineering and Technical Data

Dimensions:



Model Number Matrix:

Sonic-Pro Ordering Information

Sonic-Pro Part Number Matrix		Pipe Size		Pipe Pressure Rating		Fluid	
Base Electronics Package		IPS Pipe Size		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 7/11 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		B7	CLASS 7 British (BS 3506)		
Display Volume Units ³		063	63mm	XX	User configured		
G	Gallons	075	75mm	Pipe Material			
L	Liters	090	90mm	A	Brass (Naval)		
F	Cubic Feet	110	110mm	B	Copper		
A	Acre Feet	125	125mm	C	FRP (fiberglass reinforced plastic)		
M	Cubic Meters	140	140mm	D	Iron (cast)		
Display Time Units		160	160mm	E	Iron (ductile)		
M	Minutes	180	180mm	F	Nylon		
H	Hours	200	200mm	G	Polyethylene (HDPE)		
D	Days	225	225mm	H	Polyethylene(LDPE)		
Fluid ⁴		250	250mm	I	Polypropylene		
Select from options list		280	280mm	J	PVC / CPVC		
Display language		315	315mm	K	PVDF		
E	English	355	355mm	L	Stainless Steel 304		
S	Spanish	400	400mm	M	Stainless Steel 304L		
G	German	450	450mm	N	Stainless Steel 316		
F	French	500	500mm	O	Steel (1% Carbon, hardened)		
Sample model number		560	560mm	P	Steel (carbon)		
S3	C	1	A1	630	630mm	Q	Titanium
				710	710mm	X	User configured
				800	800mm		
				101	1000mm		
				XXX	User config.		

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.