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 ETL

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. 30,000 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 1% (0 to 10,000 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 **S1** offers optional 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.

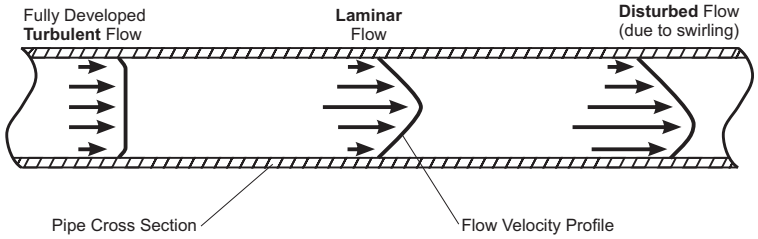
Flow Stream Requirements

To ensure measurement accuracy requires a fully developed ***turbulent*** flow profile. Pulsating, swirling and other disruptions in the flow stream will affect accuracy. Flow conditions with a ***Reynolds Number*** greater than 4000 will demonstrate fully developed ***turbulent*** flow. A Reynolds Number less than 2000 indicates ***laminar*** flow and may result in inaccurate readings.

REYNOLDS NUMBER EQUATION:

$$\text{REYNOLDS NUMBER} = \frac{3160 \times Q \times G}{D \times V}$$

Where:
Flow rate of the fluid in GPM = Q
Specific gravity of the fluid = G
Pipe inside diameter in inches = D
Fluid viscosity in centepoise = V



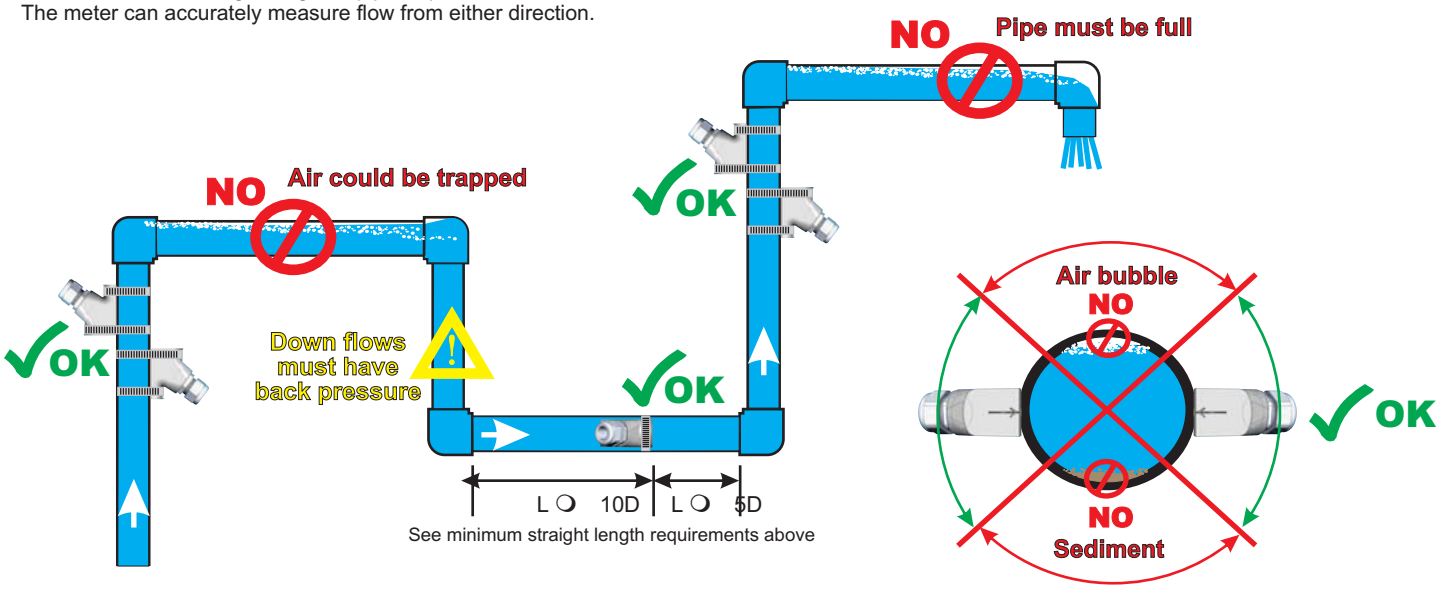
Minimum Straight Pipe Length Requirements

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	Minimum Inlet Pipe Length	Minimum Outlet Pipe Length
Flange - Reducer - 90° Elbow	10 X Pipe Inside Diameter	5 X Pipe Inside Diameter
Two 90° Elbows -1 plane	15 X Pipe Inside Diameter	5 X Pipe Inside Diameter
Two 90° Elbows -2 planes	20 X Pipe Inside Diameter	5 X Pipe Inside Diameter
Pump Or Gate Valves	25 X Pipe Inside Diameter	5 X Pipe Inside Diameter

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 operation from 0% to 1% (0 to 10,000 ppm) particulate.
Doppler mode operation from 0.02% to 15% (200 to 150,000 ppm) of 100 micron particulate.

Nominal Pipe Sizes
0.5 inch - 12.0 inch (20mm to 315mm)

Pipe Materials
Most metal and plastic pipes

Pipe Liner Materials
Most plastic liners

Fluid Velocity Range
0 to 30 f/s (0 to 9 m/s)

Accuracy

Flow Rate Averaging Time	Accuracy at Pipe Inside Diameter	
	Doppler all pipe sizes Transit Time ½" to 1"	Transit Time 1-1/4" to 12"
5.0 Seconds (default setting)	+/-1% of rate > 8 ft/sec +/-0.06 ft/sec < 8 ft/sec	+/-1% of rate > 1 ft/sec +/-0.01 ft/sec < 1 ft/sec
1.0 Seconds	+/-1% of rate > 12 ft/sec +/-0.12 ft/sec < 12 ft/sec	+/-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	+/-2% of rate > 12 ft/sec +/-0.25 ft/sec < 12 ft/sec

Electronics

Enclosure
NEMA 4X (IP66), Powder coated aluminum, stainless steel mounting plates, clamps and hardware.
Dimensions: 11.00H x 8.60W x 5.00D inches (279H x 218W x 127D mm)
Weight 6.8 lb. (3.1 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
90-264 VAC 50/60Hz or 15-30 VDC

Power Consumption
40 watts maximum

Operating Temperature
14°F to 140°F (-10°C to 60°C)

Storage Temperature
-40°F to 158°F (-40°C to 70°C)

Display
None.

Data Outputs
- Isolated 4-20 mA output - factory scaled at 0-30 fps
- 0-1000 Hz Pulse output - factory scaled at 0-30 fps

Data Logging
Date/time stamped flow rate and total data in FAT32 file format, easily imported into Excel. Factory configured to trigger at 3 minute time intervals. Over 30,000 events with included 32MB SD Card.

External Communications - optional
Computer connection via RS-232, RS485, USB, Ethernet.
- Includes user communication and complete configuration software
- Permits remote internet access through local network set-up
- Remotely access and upload data logging files.

Clamp-On Transducers

Housing
NEMA 4X (IP66), Powder coated aluminum, stainless steel mounting clamps and hardware.
Dimensions: 3.12H x 2.95W x 1.60D inches (79H x 75W x 41D mm)
Weight: 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)

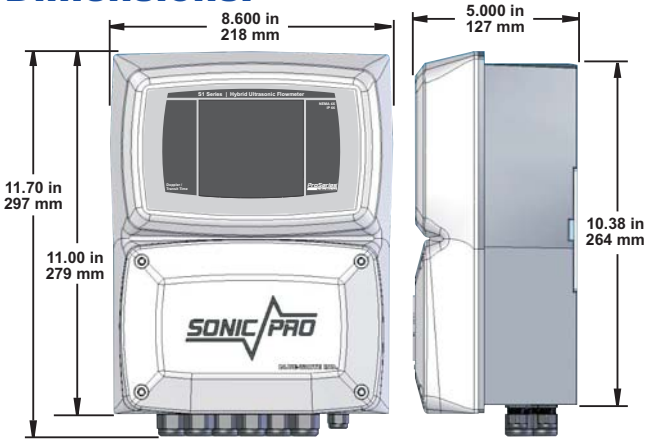
Nominal Pipe Sizes
A series transducer: 0.5 inch - 2.0 inch (20mm to 63mm)
B series transducer: 2.0 inch - 12.0 inch (63mm to 300mm)

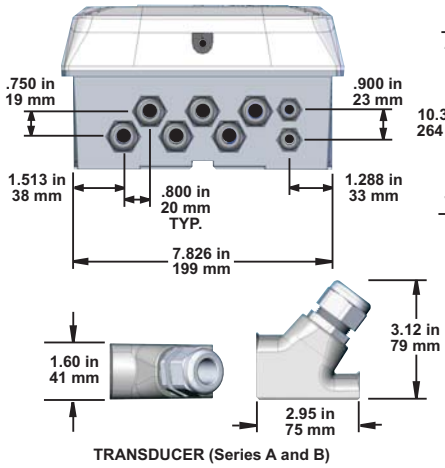
Pipe Surface Temperature
14°F to 212°F (-10°C to 100°C)

SONIC-PRO Ultrasonic Flow Meters

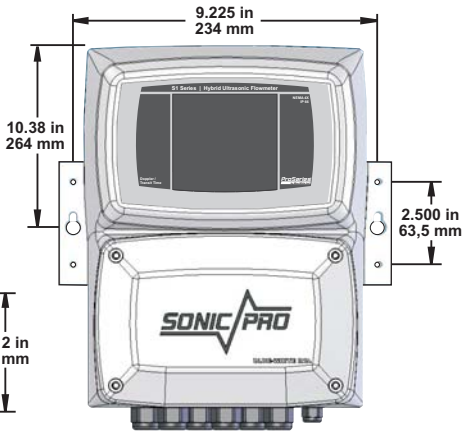
Engineering and Technical Data

Dimensions:





TRANSDUCER (Series A and B)



With Wall Mount Hardware

Model Number Matrix:

Sonic-Pro Part Number Matrix	
Base Electronics Package	
S1	Factory configured without display
S2	Factory configured with display
S3	Factory configured with user configurable display
Smart Communications	
C	Ethernet, USB, RS-232, RS-485 with PC software
X	None
Power Supply Cord	
1	U.S. 115V with NEMA 5/15 plug
2	European 220V with CEE 7/VII plug
3	U.S. 230V with NEMA 6/15 plug
Transducer	
A1	Small pipe <= 2" diameter with 10 ft cable
A3	Small pipe <= 2" diameter with 50 ft cable
B1	Large pipe >= 2" diameter with 10 ft cable
B3	Large pipe >= 2" diameter with 50 ft cable
Nominal Pipe Size	
	Select from options list
Pipe Pressure Rating	
	Select from options list
Pipe Material	
	Select from options list
Display Volume Units	
G	Gallons
L	Liters
F	Cubic Feet
A	Acre Feet
M	Cubic Meters
Display Time Units	
M	Minutes
H	Hours
D	Days
Fluid	
	Select from options list
Display language	
E	English
S	Spanish
G	German
F	French

S3	C	1	A1	015	SD	J	G	M	AL	E	Sample model number

Pipe Size	
005	1/2"
007	3/4"
010	1"
012	1-1/4"
015	1-1/2"
020	2"
025	2-1/2"
030	3"
040	4"
050	5"
060	6"
080	8"
100	10"
120	12"
020	20mm
025	25mm
032	32mm
040	40mm
050	50mm
063	63mm
075	75mm
090	90mm
110	110mm
125	125mm
140	140mm
160	160mm
180	180mm
200	200mm
225	225mm
250	250mm
280	280mm
312	312mm
XXX	USER

Pipe Pressure Rating	
SA	Sch 10 (ASTM D 1785)
SB	Sch 20 (ASTM D 1785)
SC	Sch 30 (ASTM D 1785)
SD	Sch 40 (ASTM D 1785)
SE	Sch 60 (ASTM D 1785)
SF	Sch 80 (ASTM D 1785)
SG	Sch 100 (ASTM D 1785)
SH	Sch 120 (ASTM D 1785)
SI	Sch 140 (ASTM D 1785)
SJ	Sch 160 (ASTM D 1785)
DA	SDR 41 (ASTM D 2241)
DB	SDR 26 (ASTM D 2241)
DC	SDR 21 (ASTM D 2241)
DD	SDR 13.5 (ASTM D 2241)
PA	PN 4 Metric (DIN 8062)
PB	PN 6 Metric (DIN 8062)
PC	PN 10 Metric (DIN 8062)
PD	PN 16 Metric (DIN 8062)
PE	PN 20 Metric (DIN 8062)
BB	CLASS B British (BS 3506)
BC	CLASS C British (BS 3506)
BD	CLASS D British (BS 3506)
BE	CLASS E British (BS 3506)
B7	CLASS 7 British (BS 3506)
XX	User configured

Pipe Material	
A	Brass (Naval)
B	Copper
C	FRP (fiberglass reinforced plastic)
D	Iron (cast)
E	Iron (ductile)
F	Nylon
G	Polyethylene (HDPE)
H	Polyethylene(LDPE)
I	Polypropylene
J	PVC / CPVC
K	PVDF
L	Stainless Steel 304
M	Stainless Steel 304L
N	Stainless Steel 316
O	Steel (1% Carbon, hardened)
P	Steel (carbon)
Q	Titanium
X	User configured

Fluid	
AA	Alcohol (Ethyl alcohol; Ethanol)
AB	Benzene
AC	Ethylene glycol
AD	Ethylene glycol / water (50%)
AE	Gasoline
AF	Isopropyl alcohol
AG	Methyl alcohol (Methanol)
AH	Methyl ethyl Ketone
AI	Milk, homogenized
AJ	Oil, diesel
AK	Toluene
AL	Water (distilled; waste)
AM	Water, heavy
AN	Water, sea
XX	User configured

Note: Other options available.

Blue-White Industries, Ltd.
5300 Business Drive, Huntington Beach, CA 92649
Tel: 714-893-8529 **Fax:** 714-894-9492
www.blue-white.com **Email:** sales@blue-white.com