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 ETL LISTED

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.

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.

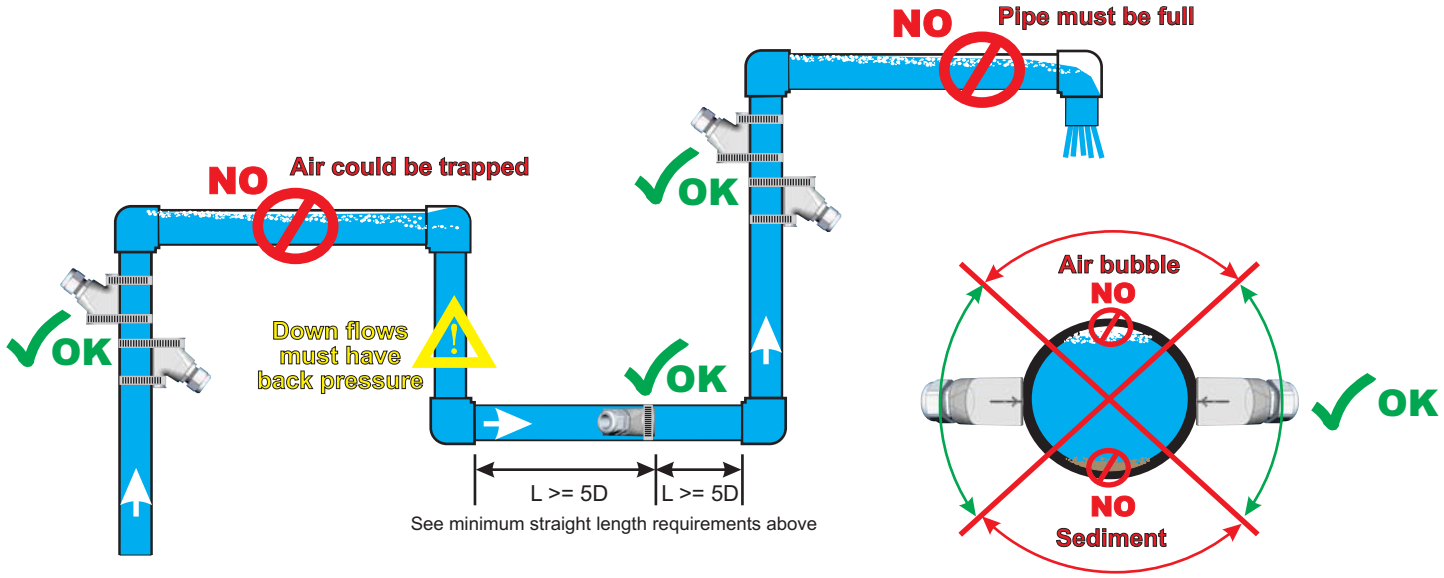
Minimum Straight Pipe Length Requirements

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

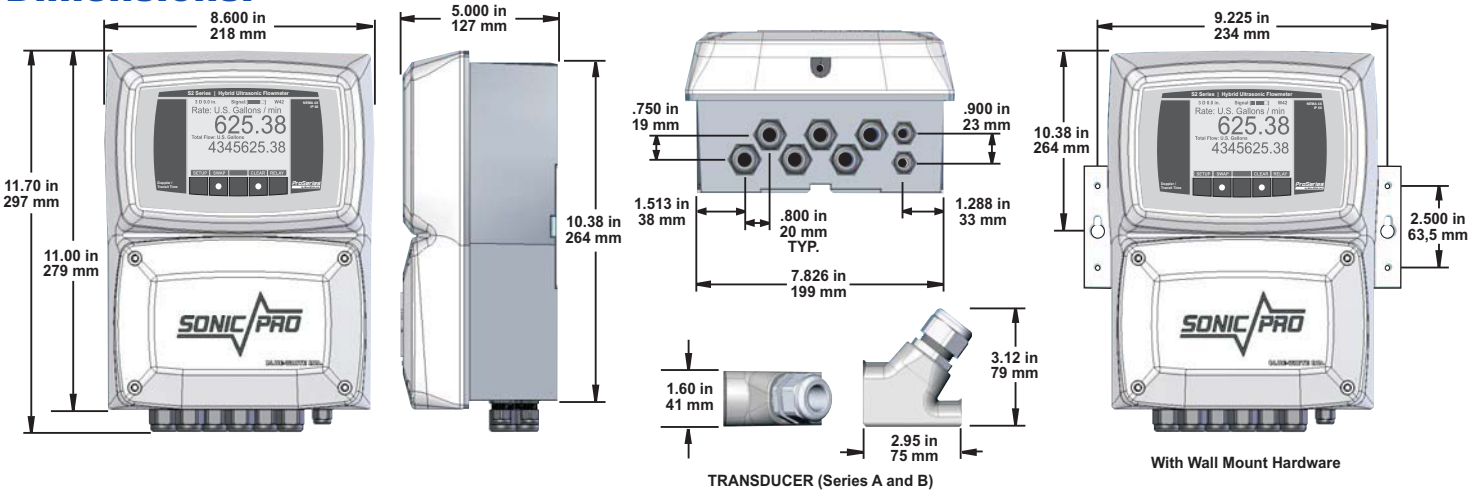
Cable
Shielded coaxial RG/U Type:59. PVC jacket, black. RoHS Compliant
Standard length: 10 ft. (3m)
Optional lengths available: 25 ft. (7m), 50 ft. (15m), 100 ft. (30m)

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

SONIC-PRO Ultrasonic Flow Meters

Engineering and Technical Data

Dimensions:



TRANSDUCER (Series A and B)

With Wall Mount Hardware

Model Number Matrix:

Sonic-Pro Ordering Information

Sonic-Pro Part Number Matrix

Base Electronics Package

S1	Factory configured without display [1]
S2	Factory configured with display [1]
S3	Factory configured with user configurable display

Smart Communications and Control [2]

A	**Communications** Includes Ethernet, USB, RS-232, RS-485 connections, and user configuration and monitoring PC software.
B	**Process control** Includes three 10 amp, form C relays. Note: Requires S3 configurable display or the communications option
C	Both Communication and Process Control options
X	None

Power Supply Cord Rating and Plug Type [5]

1	U.S. 125V with NEMA 5/15 plug
2	European 250V with CEE 7/VII plug
3	U.S. 250V with NEMA 6/15 plug
X	Power cord without attachement plug

Transducer Model and Cable Length

A1	Model A with 10 ft cable
A2	Model A with 25 ft cable
A3	Model A with 50 ft cable
A4	Model A with 100 ft cable

Nominal Pipe Size [4]

Select from options list

Pipe Pressure Rating [4]

Select from options list

Pipe Material [4]

Select from options list

Display Volume Units [3]

G	Gallons
L	Liters
F	Cubic Feet
A	Acre Feet
M	Cubic Meters

Display Time Units

M	Minutes
H	Hours
D	Days

Fluid [4]

Select from options list

Display language

E	English
S	Spanish
G	German
F	French

S3	C	1	A1	060	SD	J	G	M	AL	E	Sample model number

Pipe Size

IPS Pipe Size

020	2"
025	2-1/2"
030	3"
040	4"
050	5"
060	6"
080	8"
100	10"
120	12"
141	14"
161	16"
181	18"
201	20"
220	22"
240	24"
260	26"
281	28"
300	30"
320	32"
340	34"
360	36"
420	42"
480	48"

Metric Pipe Size

063	63mm
075	75mm
090	90mm
110	110mm
125	125mm
140	140mm
160	160mm
180	180mm
200	200mm
225	225mm
250	250mm
280	280mm
315	315mm
355	355mm
400	400mm
450	450mm
500	500mm
560	560mm
630	630mm
710	710mm
800	800mm
101	1000mm
XXX	User config.

Pipe Pressure Rating

SK	Sch 5 (ASTM D 1785)
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)
AN	Water, sea
XX	User configured

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.

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