



# AquaTrans™ AT600

## Panametrics ultrasonic flow meter for liquids

### Applications

The AquaTrans AT600 flowmeter is a complete ultrasonic system for the measurement of:

- Potable Water
- Wastewater
- Sewage
- Discharge water
- Treated water
- Cooling and heating water
- Irrigation water

### Features & Benefits

- Economical non-intrusive flow measurement
- Extremely simple setup and installation
- Suitable for a wide range of pipe sizes and materials
- Suitable for lined pipes
- Velocity, volumetric, and totalized flow outputs
- Clamp-on installations
- Permanent solid couplant for clamp-on applications

## Liquid flow ultrasonic transmitter

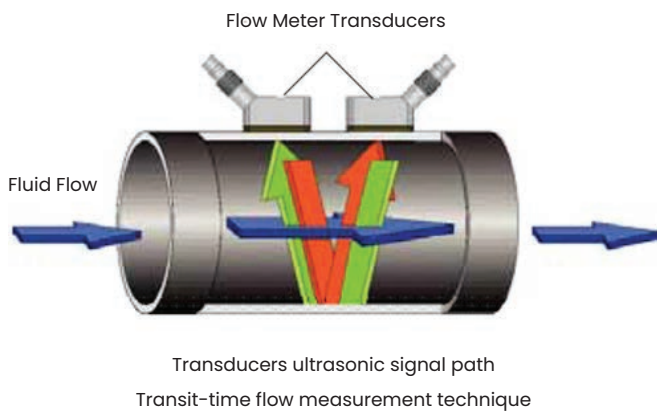
The AquaTrans AT600 liquid flow ultrasonic transmitter combines state-of-the-art flow measurement capability with a low-cost transmitter package that can be installed right at the process measurement point. It's designed specifically for water and wastewater applications in full pipes. The all-digital AquaTrans AT600 has no moving parts and requires minimal maintenance. An onboard microprocessor uses patented correlation transit-time™ technology for long-term, drift-free operation. Automatic adjustment to changing fluid properties and dynamically configured operating software simplify programming.

## Transit-time flow measurement

In this method, two transducers serve as both ultrasonic signal generators and receivers. They are in acoustic communication with each other, meaning the second transducer can receive ultrasonic signals transmitted by the first transducer and vice versa.

In operation, each transducer functions as a transmitter, generating a specified number of acoustic pulses, and then as a receiver for an identical number of pulses. The time interval between transmission and reception of the ultrasonic signals is measured in both directions. When the liquid in the pipe is not flowing, the transit-time downstream equals the transit-time upstream. When the liquid is flowing, the transit-time downstream is less than the transit-time upstream.

The difference between the downstream and upstream transit times is proportional to the velocity of the flowing liquid, and its sign indicates the direction of flow.

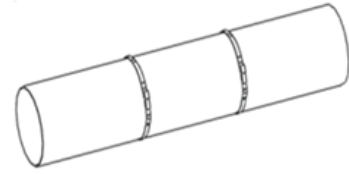


## Clamp-on transducers

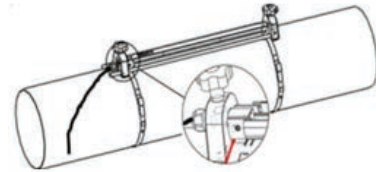
Clamp-on transducers offer maximum convenience, flexibility and a low installation cost compared to traditional flow metering technologies. With proper installation, clamp-on transducers provide better than 1% of reading accuracy in most applications.

## Easy four step installation

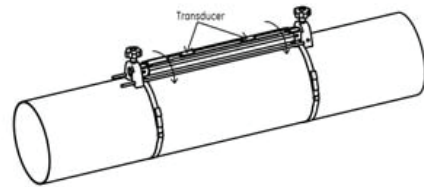
Step #1: Install straps onto pipe.



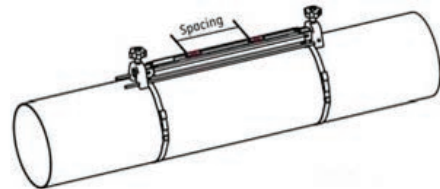
Step #2: Put clamp-on fixture on pipe and move straps onto sides of fixture.



Step #3: Open fixture to set spacing.

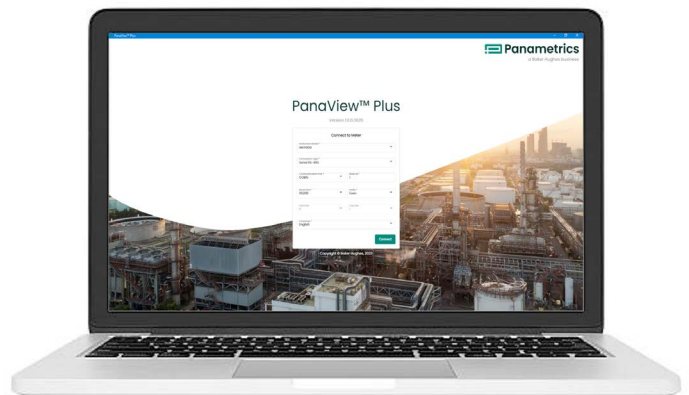


Step 4: Set spacing and lock fixture with transducers onto pipe.



## PanaViewPlus™ software (optional)

The AquaTrans AT600 can communicate with a PC via our PanaViewPlus interface program. Consult the manual for details on sites, logs, and other operations with a PC.



# Specifications

## Overall operation and performance

### Fluid types

Liquids: acoustically conductive fluids, including most clean liquids, and many liquids with small amounts of entrained solids or gas bubbles.

### Flow measurement

Patented Correlation Transit-Time™ mode

### Pipe sizes

0.5 to 300 in. (15 to 7600 mm)

### Pipe materials

All metals and most plastics. Consult Baker Hughes for concrete, composite materials, and highly corroded or lined pipes.

### Accuracy

- $\pm 1\%$  of reading in application,  $\geq 2$  in. (50 mm) pipe and  $> 1$  ft/s (0.3 m/s) velocity
- $\pm 2\%$  of reading in application,  $< 2$  in. (50 mm) pipe and  $> 1$  ft/s (0.3 m/s) velocity
- $\pm 0.5\%$  in field calibration

Installation assumes a fully developed, symmetrical flow profile (typically 10 diameters upstream and 5 diameters downstream of straight pipe run). Final installation accuracy is a function of multiple factors including fluid, temperature range, pipe centricity and others.

### Calibration

All meters are water calibrated and delivered with a traceable calibration certificate.

### Repeatability

$\pm 0.2\%$  of reading

### Range (bidirectional)

-40 to 40 ft/s (-12.19 to 12.19 m/s)

### Rangability (overall)

400:1

### Measurement parameters

Velocity, Volumetric, and totalized flow

## Electronics

### Enclosure

Epoxy-coated aluminum weatherproof Type 4X/IP67

### Dimensions

6.6 x 5.0 x 2.4 in. (168 x 128 x 61 mm) Weight: 3.5 lb/1.5 kg

### Channels

One channel

### Display

Graphic LCD (128 x 64 pixels)

### Keypad

Six-button keypad for full functionality operation

### Error display indicator

Green or red light

### Power supplies

- Standard: 85 to 265 VAC, 50/60 Hz
- Optional: 12 to 28 VDC,  $\pm 5\%$

Note: For DC-powered meters, Class 2 rated supplies must be used for the line power

### Power consumption

10 Watts in-rush

5 Watts normal operation

### Operating temperature

-4°F to 131°F (-20°C to 55°C)

### Storage temperature

-40°F to 158°F (-40°C to 70°C)

### Outputs (based on configuration)

- 4-20 mA (24VDC powered, 600 $\Omega$  maximum load, 1500 VDC isolation)
- Frequency, pulse, alarm (Passive output, 100 VDC, 1 A/1 W maximum, 1500 VDC isolation)
- HART (FSK modulation, category flow, protocol version 7.5, device revision 2, MFG ID 157, device type code 127, number of device variables 34)
- Modbus/RS485 (Half-duplex, 1500 VDC isolation)

Note: Analog outputs are Namur NE43 compliant.

### Certification

CE, UL, CSA, (MCert approval pending)

## Clamp-on ultrasonic flow transducers

### Temperature ranges

- Standard: -40 to 302°F (-40 to 150°C)
- Optional: -328 to 752°F (-200 to 400°C)

See specific transducer for exact temperature range.

### Mounting fixture

Anodized aluminum with stainless steel strapping

### Couplant

- Standard: Solid couplant
- Optional: Liquid couplant

### Rating

Standard: General purpose (IP66 or IP68)

Note: See specific transducer model for exact rating.

| A   | B  | C    | D        | E  | F                     | G      | H                                | I  | J                                                  | K      | L      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----|----|------|----------|----|-----------------------|--------|----------------------------------|----|----------------------------------------------------|--------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AT6 |    |      |          |    |                       |        |                                  |    |                                                    |        |        | <b>Model</b><br>Clamp-on liquid ultrasonic flow meter consisting of an AT600, transducers, clamping fixture, transducer cable and coupling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|     | Cl |      |          |    |                       |        |                                  |    |                                                    |        |        | <b>Clamp-on system</b><br>Single-channel clamp-on system                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|     |    | AT05 |          |    |                       |        |                                  |    |                                                    |        |        | <b>Transducer system</b><br><b>AT05:</b> C-AT transducers, 0.5 MHz, IP68, 12 in./300 mm or greater typ., Tprocess: -40 to 150°C<br><b>AT10:</b> C-AT transducers, 1 MHz, IP68, 4 to 24 in./100 to 600 mm typ., Tprocess: -40 to 150°C<br><b>AT20:</b> C-AT transducers, 2 MHz, IP68, 2 to 6 in./50 to 150 mm typ., Tprocess: -40 to 150°C<br><b>CFLP:</b> CF-LP transducers, 4 MHz, IP66, 0.5 to 2 in./15 to 50 mm, Tprocess: -40 to 230°C<br><b>CR05:</b> C-RS transducers, 0.5 MHz, IP66, 12 in./300 mm or greater typ., Tprocess: -40 to 150°C<br><b>CR10:</b> C-RS transducers, 1 MHz, IP66, 4 to 24 in./100 to 600 mm typ., Tprocess: -40 to 150°C<br><b>CR05SUB:</b> C-RS submersible transducers, 0.5 MHz, IP68, 12 in./300 mm or greater typical, Tprocess: -40 to 150°C<br><b>CR10SUB:</b> C-RS submersible transducers, 1 MHz, IP68, 4 to 24 in./100 to 600 mm typ., Tprocess: -40 to 150°C<br><b>CR05JB:</b> C-RS with junction box transducers, 0.5 MHz, IP66, 12 in./300 mm or greater typ., Tprocess: -40 to 150°C<br><b>CR10JB:</b> C-RS with junction box transducers, 1 MHz, IP66, 4 to 24 in./100 to 600 mm typ., Tprocess: -40 to 150°C<br><b>CP10JB:</b> C-PT with junction box transducers, 1 MHz, IP66, 4 to 24 in./100 to 600 mm typ., Tprocess: -20 to 210°C<br><b>CP20JB:</b> C-PT with junction box transducers, 2 MHz, IP66, 2 to 6 in./50 to 150 mm typ., Tprocess: -20 to 210°C<br><b>CFJR:</b> CF-JR transducers, 4 MHz, IP66, 0.5 to 2 in./15 to 50 mm, Tprocess: -40 to 150°C |
|     |    |      | < >      |    |                       |        |                                  |    |                                                    |        |        | <b>Pipe size</b><br>Nominal outside diameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|     |    |      | IN<br>MM |    |                       |        |                                  |    |                                                    |        |        | <b>Pipe units</b><br>Inches<br>Millimeters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|     |    |      |          |    | 1<br>2<br>3<br>4<br>7 |        |                                  |    |                                                    |        |        | <b>Cable length:</b><br>10 ft (3 m) of transducer cable<br>25 ft (7.5 m) of transducer cable<br>50 ft (15 m) of transducer cable<br>100 ft (30 m) of transducer cable<br>300 ft (90 m) of transducer cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|     |    |      |          |    |                       | 1<br>2 |                                  |    |                                                    |        |        | <b>AT power:</b><br>85 to 265 VAC<br>12 to 28 VDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|     |    |      |          |    |                       |        | A<br>H<br>M                      |    |                                                    |        |        | <b>Analog and digital output:</b><br>4-20 mA analog output only<br>4-20 mA output with HART<br>4-20 mA output and Modbus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|     |    |      |          |    |                       |        | AA<br>AF<br>AT<br>FF<br>FT<br>TT |    |                                                    |        |        | <b>Discrete output:</b><br>Two alarm contacts<br>One alarm contact and one frequency output<br>One alarm contact and one totalizer (pulse) output<br>Two frequency outputs<br>One frequency output and one totalizer (pulse) output<br>Two totalizer (pulse) outputs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|     |    |      |          |    |                       |        |                                  |    | 01<br>02<br>03<br>04<br>05<br>06<br>07<br>08<br>09 |        |        | <b>Language:</b><br>English<br>German<br>French<br>Italian<br>Spanish<br>Portuguese<br>Russian<br>Japanese<br>Chinese                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|     |    |      |          |    |                       |        |                                  |    |                                                    | M<br>E |        | <b>Default units:</b><br>Metric<br>English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|     |    |      |          |    |                       |        |                                  |    |                                                    |        | O<br>S | <b>Special:</b><br>No specials<br>Special                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| AT6 | Cl | AT05 | 5        | IN | 1                     | 2      | A                                | AA | 01                                                 | M      | 0      | (Example part number)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

Ordering information (AT6I Model)

| A B C D E F G H I J K L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |          |  |    |    |   |   |   |    |    |   |
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| AT6I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |          |  |    |    |   |   |   |    |    |   |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |          |  |    |    |   |   | M |    |    |   |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |          |  |    |    |   |   |   | AT |    |   |
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| AT6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | C1 | AT05     |  | 5  | IN | 1 | 2 | A | AA | 01 | M |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |          |  |    |    |   |   |   |    |    | 0 |
| (Example part number)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |    |          |  |    |    |   |   |   |    |    |   |
| <b>Model</b><br>Clamp-on liquid ultrasonic flow meter consisting of an AT600, transducers, clamping fixture, transducer cable and coupling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |          |  |    |    |   |   |   |    |    |   |
| <b>Clamp-on system</b><br>Single-channel clamp-on system                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |          |  |    |    |   |   |   |    |    |   |
| <b>Transducer system</b><br><b>None:</b> Spare transmitter only<br><b>CRS05SUB:</b> C-RS submersible transducers, 0.5 MHz, IP68, 12 in./300 mm or greater typical, Tprocess: -40 to 150°C<br><b>CRS10SUB:</b> C-RS submersible transducers, 1 MHz, IP68, 4 to 24 in./100 to 600mm typ., Tprocess: -40 to 150°C<br><b>CRS20SUB:</b> C-RS submersible transducers, 2 MHz, IP68, 2 to 6 in./50 to 150mm typ., Tprocess: -40 to 150°C<br><b>CFLP:</b> CF-LP transducers, 4 MHz, IP66, 0.5 to 2 in./15 to 50 mm, Tprocess: -40 to 230°C<br><b>CFJR:</b> CF-JR transducers, 4 MHz, IP66, 0.5 to 2 in./15 to 50 mm, Tprocess: -40 to 150°C |    |          |  |    |    |   |   |   |    |    |   |
| <b>Pipe size</b><br>Nominal outside diameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |          |  |    |    |   |   |   |    |    |   |
| <b>Pipe units</b><br>Inches<br>Millimeters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |          |  |    |    |   |   |   |    |    |   |
| <b>Cable length:</b><br>No cable<br>10 ft (3 m) of transducer cable<br>25 ft (7.5 m) of transducer cable<br>50 ft (15 m) of transducer cable<br>100 ft (30 m) of transducer cable<br>300 ft (90 m) of transducer cable                                                                                                                                                                                                                                                                                                                                                                                                              |    |          |  |    |    |   |   |   |    |    |   |
| <b>AT600 Input Power:</b><br>85 to 265 VAC<br>12 to 28 VDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |          |  |    |    |   |   |   |    |    |   |
| <b>Analog and digital output:</b><br>4-20 mA analog output only<br>4-20 mA output with HART<br>4-20 mA output and Modbus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |          |  |    |    |   |   |   |    |    |   |
| <b>Discrete output:</b><br>Two alarm contacts<br>One alarm contact and one frequency output<br>One alarm contact and one totalizer (pulse) output<br>Two frequency outputs<br>One frequency output and one totalizer (pulse) output<br>Two totalizer (pulse) outputs                                                                                                                                                                                                                                                                                                                                                                |    |          |  |    |    |   |   |   |    |    |   |
| <b>Display Language:</b><br>English<br>German<br>French<br>Italian<br>Spanish<br>Portuguese<br>Russian<br>Japanese<br>Chinese<br>Swedish<br>Turkish                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |          |  |    |    |   |   |   |    |    |   |
| <b>Default units:</b><br>Metric<br>English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |          |  |    |    |   |   |   |    |    |   |
| <b>Special:</b><br>No specials<br>Special                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |          |  |    |    |   |   |   |    |    |   |