

TransPort[®] PT878 Panametrics Portable Liquid Ultrasonic Flowmeter



Applications

The TransPort PT878 portable liquid flowmeter is a complete portable ultrasonic flow metering system for measurement of:

- Potable water
- Wastewater
- Cooling and heating water
- Ultrapure water and liquids
- Water/glycol solutions
- Crude oil
- Refined hydrocarbons
- Diesel and fuel oils
- Lubricating oils
- Chemicals
- Beverages
- Other liquids

Features

- Small, lightweight and easy-to-use
- Non-intrusive flow measurement
- Velocity, volumetric and energy flow rates
- Totalized flow and trend data
- Large, backlit LCD display
- Alphanumeric and graphic formats
- Multiple-language user interface
- Rechargeable battery pack
- Logs over 100,000 flow data points
- Submersible package
- 32 site locations
- Optional thickness gauge
- Optional energy measurement
- Suitable for most pipe sizes and materials, including lined pipe



Portable Flow Metering at Its Best

The TransPort PT878 flowmeter is a highly versatile, self-contained, portable transit-time system with options and accessories to meet all your liquid flow measurement needs. Its compact size; lightweight, rechargeable internal battery pack; and universal power supply charger make it the ideal go-anywhere flowmeter.

Accurate with Two-Phase and Perfectly Clean Liquids

The TransPort PT878's patented Correlation Transit-Time™ digital signal processing (DSP) technique greatly increases its signal-to-noise ratio for accurate, drift-free flow measurement in liquids that contain a second phase of entrained solids or gas bubbles. The TransPort flowmeter operates in these and other difficult applications where conventional transit-time flowmeters fail.

The TransPort PT878 flowmeter also accurately measures flow rate in perfectly clean liquids containing no "scatterers," where Doppler-type flowmeters cannot work. The TransPort flowmeter is suited for all standard transit-time applications, plus many that would prevent other transit-time flowmeters from working.

Quick and Easy to Use

It's possible to make your first flow measurement within minutes of opening the box—the TransPort flowmeter is that easy to use. Simply input the site parameters, clamp the transducers onto the pipe, adjust the spacing, and you're under way. No ancillary equipment is needed, and there's no need to break into the pipeline. An experienced user can make scores of different measurements in a single day. The TransPort PT878 flowmeter is ideal for all kinds of flow survey work.

Flow Transducers and Clamping Fixtures

Using clamp-on transducers, the TransPort PT878 flowmeter measures flow rate through metal, plastic or even concrete-lined pipes, without penetrating the pipewall. From ultra-pure water to corrosive and toxic liquids, the TransPort PT878 flowmeter ensures non-contaminating, leak-free measurement with drift-free accuracy. The TransPort PT878 flowmeter has no moving parts to wear or orifices to clog. It can't be fouled, and it requires no routine maintenance.

A wide variety of transducers are available with different operating frequencies, materials of construction, operating temperatures and sizes to meet the requirements of rugged industrial environments.



To hold clamp-on transducers in contact with the pipe, a variety of clamping fixtures are available to accommodate different pipe and transducer sizes. These fixtures use a variety of attachment methods including chain, metal strap, Velcro® strap and magnetic clamps.

Alphanumeric and Graphic Liquid Crystal Display Completes the Picture

A large, multifunction LCD presents measured data in both alphanumeric and graphic forms. In addition, it helps make programming easy by presenting a software menu that walks you through data entry and function selection.

Standard alphanumeric functions include flow velocity, volumetric or energy flow rates, and totalized flow in either English (U.S.) or metric units.

In graphic mode, the LCD shows both real time and logged data. The result is a chart recording right on the display, which is very useful for reviewing data and observing trends while on the site.

Submersible, Rugged Electronics Housing

Your investment in this flowmeter is protected from the day-to-day rigors of industrial usage. The TransPort PT878 is equipped with a rubber boot that provides protection against vibration and shock. The completely sealed housing and ports meet IP67 requirements, so the unit will withstand submersion in up to 3 ft (1 m) of water for limited periods of time. It will continue to function safely even if it is dropped in water. The complete TransPort PT878 flowmeter system fits in a compact carrying case.

Optional Energy Measurement

The TransPort PT878 flowmeter combines proven ultrasonic flow measurement with precise RTD temperature measurement to determine the energy flow rate in liquid heating and cooling systems. With this option, the TransPort flowmeter comes equipped with a built-in power supply for loop-powered RTD temperature sensors, as well as all necessary circuitry and software to make energy flow rate measurements. The energy kit option includes two matched Pt1000 surface mount RTDs with 30 feet of cable to plug into the PT878,

Optional Pipe Wall Thickness Gauge Transducer

Pipe wall thickness is a critical parameter used by the TransPort flowmeter for clamp-on flow measurements. The thickness-gauge option allows accurate wall thickness measurement from outside the pipe.

Infrared Port

The TransPort PT878 contains an infrared port for communication with your PC. If your laptop or desktop PC does not have infrared capability, an adapter is available that can be plugged into your PC's serial port.

Optional Infrared Thermal Printer and Accessories

When you need a permanent record of your work, live measurements, logged data and site parameters can be sent to a variety of printers by beaming data directly from the TransPort PT878's infrared port. A compact, lightweight, hand-held, infrared thermal printer is available. This printer is powered by a lithium ion battery.

Built to Be Economical and Stay Economical

To be of real value, a portable flowmeter must be as economical to own and operate as it is capable in the field. The TransPort PT878 flowmeter is built to stay in service for many years. Completely solid state, the device rarely wears out or needs servicing, resulting in little downtime and low maintenance costs.

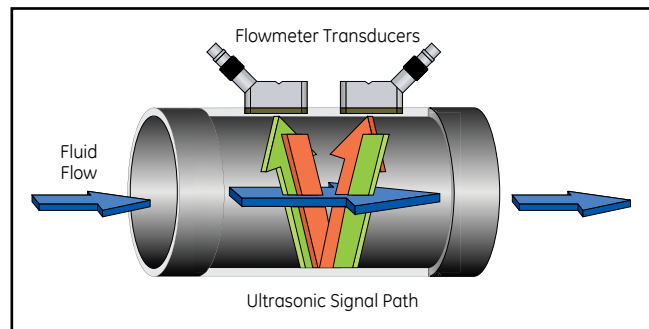
The TransPort PT878 Flowmeter Uses the Transit-Time Flow Measurement Technique

In this method, two transducers serve as both ultrasonic-signal generators and receivers. When mounted on a pipe, they are in acoustic communication with each other, meaning that 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 certain 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.



Transit-time flow measurement technique



The core of the kit includes the PT878 electronics, along with a power charger with North American, European, or United Kingdom power cable.



A variety of transducer kits are available to handle a wide range of applications. Selection is based on pipe size and temperature range. More transducers can be added to the kit by ordering separately if the desired combination is not available as part of a standard kit.



The PT878 comes standard with a soft sided carrying case. Made from lightweight, durable nylon, this case is excellent for everyday use.



The PT878 offers an optional hard case when durability is more important. This is ideal for traveling and shipping purposes, or in environments where nylon bags are not suitable.



Knowing the wall thickness of your pipe is critical to ensuring your meter provides the best possible accuracy. Wall thickness on standard pipe can vary up to 13%. The PT878 comes standard with the ability to measure pipe wall thickness. This requires the use of a thickness gage that plugs directly into the transducer ports. There is no need for a separate device.

Select option code — TG.



Measuring energy usage in buildings is increasing in importance. The PT878 can measure energy by using the optional 4-wire, 1000 Ohm RTDs with integrated transmitters to spot check applications and test existing meters monitoring the line.

Select option code — E



A variety of clamping fixtures are available to simplify attaching the transducers to the pipe. Transducers are integrated into the small pipe transducers up to 2" lines. For larger pipes, the transducers ship with clamps that range up to 24" pipes. For pipes up to 48", a larger pipe clamp is available with chains. If all the pipes are made from carbon steel, magnetic clamping fixtures may be the best option for fast setup.

Select option code — C48 for large clamping fixtures.

Order MC style clamping fixtures for magnetic fixtures.



The PT878 uses an IR port to transfer data between the unit and a PC. If your PC or laptop does not have an IR port, you need an IR adapter. We offer one that will plug into a USB port.

Select option code — IR

The PT878 can output data to a data acquisition system to act as a temporary replacement for a failed permanent meter or to provide a temporary monitoring point. An input/output cable will be necessary to provide 4-20 mA or pulse outputs from the PT878.

Select option code — IO

PT878 Specifications

Operation and Performance

Fluid Types

Acoustically conductive fluids, including most clean liquids, and many liquids with entrained solids or gas bubbles. Maximum void fraction depends on transducer, interrogation carrier frequency, path length and pipe configuration.

Pipe Sizes

0.5 in to 300 in (12.7 mm to 7.6 m) and larger

Pipe Wall Thickness

Up to 3 in (76.2 mm)

Pipe Materials

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

Clamp-On Flow Accuracy (Velocity)

- Pipe ID > 6 in (150 mm): ±1% to 2% of reading typical
- Pipe ID < 6 in (150 mm): ±2% to 5% of reading typical

Accuracy depends on pipe size and whether measurement is one-path or two-path. Accuracy to ±0.5% of reading may be achievable with process calibration.

Repeatability

±0.1% to 0.3% of reading

Range (Bidirectional)

-40 to 40 ft/s (-12.2 to 12.2 m/s)

Rangeability (Overall)

400:1

Specifications assume a fully developed flow profile (typically 10 diameters upstream and 5 diameters downstream of straight pipe run) and flow velocity greater than 1 ft/s (0.3 m/s).

Measurement Parameters

Volumetric flow, totalized flow and flow velocity

Electronics

Flow Measurement

Patented Correlation Transit-Time mode

Enclosure

Submersible IP67

Dimensions

Weight 3 lb (1.36 kg),

Size (h x w x d) 9.4 in x 5.5 in x 1.5 in
(238 mm x 138 mm x 38 mm)

Display

240 x 200 pixel backlit LCD graphic display

Keypad

25-key rubberized tactile membrane keypad

Internal Battery

Rechargeable battery: 9 to 11 hr of continuous operation

Battery Charger Input

100 to 250 VAC, 50/60 Hz, 0.38 A

Memory

FLASH memory, field-upgradable

Operating Temperature

-4°F to 131°F (-20°C to 55°C)

Storage Temperature

-40°F to 158°F (-40°C to 70°C)

To ensure maximum battery life, storage temperature exceeding 35°C (95°F) is not recommended for more than one month.

Standard Inputs/Outputs

- One 0/4 to 20 mA current output, 550 Ω maximum load
- One user-selectable pulse (solid state, 5 V maximum) or frequency (5 V square wave, 100 to 10,000 Hz)
- Two 4 to 20 mA analog inputs with switchable power supply for loop-powered temperature transmitters

Digital Interface

Infrared communication port for printer or PC interface

Site-Parameter Programming

- Menu-driven operator interface using keypad and “soft” function keys
- Online help functions including pipe tables
- Storage for saving site parameters

Data Logging

- Memory capacity to log over 100,000 flow data points
- Keypad programmable for log units, update times, and start and stop time

Display Functions

- Graphic display shows flow in numerical or graphic format
- Displays logged data
- Extensive diagnostic parameters
- Supports multiple languages: Dutch, English, French, German, Italian, Japanese, Portuguese, Russian, Spanish, Swedish and others

European Compliance

Battery-powered system complies with EMC Directive 89/336/EEC and transducers comply with PED 97/23/EC for DN<25

Clamp-On Ultrasonic Flow Transducers

Temperature Ranges

- Standard: -40°F to 300°F (-40°C to 150°C)
- Optional (overall range): -310°F to 572°F (-190°C to 300°C)

Mountings

Stainless steel chain or strap, welded or magnetic clamping fixtures

Area Classifications

- Standard: General purpose
- Optional: Weatherproof Type 4/IP65
- Optional: Submersible IP67/68

PT878 electronics are designed for general purpose areas.

Transducer Cables

- Standard: One pair of LEMO® coaxial transducer connectors with 25-ft (8-m) cables
- Optional: 1,000-ft (305-m) extension cables available for most transducers

Thickness-Gauge Option

Transducer

Dual-element transducer

Pipe-Thickness Range

0.05 in to 3 in (1.3 mm to 76.2 mm)

Pipe Materials

Most standard metal and plastic pipe materials

Accuracy

±1% typical or ±0.002 in (±0.05 mm)

Thermal Exposure

Continuous operation to 100°F (37°C); intermittent operation to 500°F (260°C) for 10 sec followed by 2 min air cooling



Energy Measurement

Energy Measurement

Calculates energy flow rate and totalized energy.
Requires optional energy kit.

Temperature Transducers

Loop-powered, 4-wire Pt1000 surface-mount RTDs

Accuracy

$\pm 0.12^\circ\text{C}$ of temperature)

Range

32°F to 300°F (0°C to 150°C) standard

The accuracy of the energy measurement is a combination of the accuracy of the associated flow and temperature measurements. 1% to 2% of reading is typical for calibrated systems. Not all extremes of parameters can be achieved simultaneously.

Additional Options

PC-Interface Software

The TransPort PT878 communicates with a PC through the infrared interface and Windows® operating systems. Consult the manual for details on sites, logs and other operations with a PC.

Printer

- Infrared, portable, thermal printer with rechargeable battery and 120 to 240 VAC power supply/recharger
- Weight 13 oz (370 g), size 6.3 in x 6.5 in x 2.3 in (160 mm x 164.2 mm x 59 mm), print width 4 in (104 mm)

RS232-to-Infrared

Infrared adapter plugs into any available serial port to give desktop PCs infrared capability.



Ordering Information

PT-SYS	X	X	X	X	X	PT878 System
Language	1					English language only
	2					German and English languages
	3					French and English languages
	4					Italian and English languages
	5					Spanish (South American) and English languages
	6					Spanish (Castilian) and English languages
	7					Portuguese and English languages
	8					Russian and English languages
	9					Swedish and English languages
	10					Dutch and English languages
	11					Japanese and English languages
Power Cord	1					North American
	2					European
	3					United Kingdom
Carry Case		SC				Standard softshell case; Ideal for everyday users
		H				Optional hard shell case; Ideal for shipping and travel purposes.
Transducer Kit			0			No Transducers
			A			-40 to 150 °C applications, 2" to 24" pipes (C-RS-402)
			B			High temperature -40 to 230 °C applications, 1/2" to 2" pipes (CF-LP-2EM-40HM-6)
			C			-40 to 150 °C applications, 6" and larger pipes (C-RS-401). Requires extensions for up to 48" lines or magnetic clamping fixtures for pipes larger than 24".
			D			Combination kit of options A and B
			E			Combination kit of options A, B and C
			F			High temperature -20 to 210°C applications, 2" to 24" pipes (C-PT-10-HT)
			G			Combination kit of options B and F
Accessories			TG			Thickness Gage
			E			Energy kit with matched pair Pt 1000, surface mount RTDs with transmitters and I/O cable
			C48			Clamping fixture for up to 48 inch lines
			IO			I/O cable
			IR			USB to IR Converter
			FV			6 Point Flow Verification Test on traceable loop
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