

Thermal Noninvasive Ultra Low-Flow Flowmeters

Nano-and micro-flow measurements for precision laboratory applications

- Resolutions down to 500 pL/min

These liquid mass flowmeters enable extremely fast and accurate measurements of ultra-low liquid mass flows, and operate with total media isolation, very little dead volume, and no moving parts. CMOSens® sensor technology combines a high-precision thermal sensor element with digital signal processing on one single CMOS chip. In addition, the digital intelligence of the CMOSens sensor technology enables digital interfaces that permit an easy link with PCs, PLC, and other controllers.

All measurement data is fully calibrated and temperature compensated by means of an internal microcontroller. Excellent chemical resistance and bio-compatibility are ensured, and the process medium only gets in contact with the straight sensor capillary. The process medium only gets into contact with the straight sensor capillary, the PEEK fittings, and (for models 32611-06 to -10) PTFE as a sealing material.

Models 32611-00 to -08 are calibrated for water only. Superior repeatability of the measurement signal is still maintained for other media and thus allows after-measurement-correction on a computer or microcontroller. **Model 32611-10** is calibrated for IPA only but can also be used for repeatable measurements of other hydrocarbons such as ethanol, acetone, diesel, petroleum, ether, and most other media; however it does not work with aqueous solutions.

What's included: Models 32611-00 to -04: PC software, 2 µm in-line filters (model -00 only), OD360 PEEK® capillaries, RS-232 data cable, and AC adapter for 110 to 230 VDC. Models 32611-06 and -08: PC software, UNF 10-32 fitting, barb and luer connectors, RS-232 data cable, and AC adapter for 110 to 230 VDC. Model 32611-10: pigtail cable, fittings for 1/8" OD plastic tubing, and barb and luer connectors.

Specifications

Accuracy at ≥calibrated min flow

Models 32611-00 to -04: 10% of measured value
Models 32611-06 to -08: 3% of measured value
Model 32611-10: 10% of measured value

Operating temperature

Models 32611-00 to -04: 50 to 113°F (10 to 45°C)
Models 32611-06 to -08: 32 to 140°F (0 to 60°C)
Model 32611-10: 50 to 104°F (10 to 40°C)

Fittings: PEEK



Catalog number	Calibrated flow range	Resolution	Max pressure drop	Internal sensor capillary	Process connection	Power supply	Electrical connection	Output	Price
TW-32611-00	50 to 1500 nL/min	0.5 nL/min	22 psi (1.5 bar)	Fused silica	Micro fitting for 360 µm capillaries	7 to 18 VDC	4-pin M8	RS-232	
TW-32611-02	250 to 7000 nL/min	1.5 nL/min	0.7 psi (0.05 bar)						
TW-32611-04	1 to 40 µL/min	7 nL/min	0.3 psi (0.02 bar)						
TW-32611-06	40 to 1000 µL/min	1.5 µL/min at max flow	<0.01 psi (1 mbar)	Borosilicate glass	UNF 10-32	7 to 18 VDC	4-pin M8	RS-232	
TW-32611-08	200 to 4000 µL/min	5 µL/min at max flow	<0.01 psi (1 mbar)						
TW-32611-10	0 to 80 mL/min	—	0.6 psi (40 mbar)	Borosilicate glass	¼–28	16 to 26 VDC	8-pin M8	0 to 10 VDC	

FreeFlow™ Differential Pressure Flowmeters for Water

Install in any orientation—horizontal, vertical, or inverted

- Accurate and economical

Use these minimally invasive, segmented wedges flow sensors to monitor and control process water. Flowmeters have no moving parts. The segmented wedge element provides a simple and reliable restriction for sensing flow as related to pressure differential. Several ranges of calibration accommodate the requirements typical to process water applications. Units measure less than 10" (25.4 cm) long and 3½" (8.9 cm) wide, with a flanged mounting base for simple installation.

Specifications



Accuracy: ±1% full-scale
Repeatability: ±0.5% full-scale
Response time: <500 mS
Max operating temperature: 170°F (76°C)
Max pressure: 125 psi (8.6 bar)
Output: 4 to 20 mA

Wetted parts
 End port and wedge element: PVC
 Pressure sensor: polyetherimide
 Electrical enclosure: polycarbonate
Input power: 12 to 35 VDC
Electrical connection: 4-pin DIN 43-650
Electrical protection: short circuit, transient, and reverse polarity



32852-52

Catalog number	Flow rate GPM (LPM)	Process connection	Price
TW-32852-52	0.6 to 5 (2.3 to 18.9)	¾" NPT(F)	
TW-32852-54	1 to 10 (4.9 to 37.9)	½" NPT(F)	
TW-32852-56	1 to 15 (6.8 to 56.8)	¾" NPT(F)	

[TW-17080-12](#) NIST-traceable recalibration with data

Cole-Parmer® Ultralow Differential Pressure Flowmeter for Liquids

Provides readings with seven units of measure

This compact and fully contained unit provides flow measurements via differential pressure in ranges from 0 to 25 mL/min. The simple four-button control panel allows you to show flow/total, units of measure, zero, and power the unit on or off. Easy-to-read 7-digit LCD displays the current and total accumulated flow. Accuracy is ±2% full-scale for liquids with temperatures of 68 to 86°F (20 to 30°C). Below and above these temperature ranges, the accuracy is ±4% full-scale, and unit may be used with fluid temperatures from 32 to 122°F (0 to 50°C). You can adjust a viscosity compensation correction for more accurate measurement. Unit is constructed with chemical-resistant ABS plastic.

What's included: chemical-resistant nylon ¼" barb fittings, AC power adapter, 9 V battery connector for portable use, and an NIST-traceable calibration report supplied by the manufacturer.

NEW



32910-60

Specifications



Unit of measure	Range
Milliliters/minute	4 to 25
Liters/minute	0.004 to 0.025
Cubic centimeters/minute	4 to 25
Fluid ounces/minute	0.135 to 0.84
Gallons/minute	0.001050 to 0.00660
Fluid imperial ounces/minute	0.140 to 0.88
Imperial gallons/minute	0.00088 to 0.00549

Catalog number	Description	Flow range	Price
TW-32910-60	Differential pressure flow meter	4 to 25 mL/min	

[TW-17080-12](#) NIST-traceable recalibration with data



Flowmeters Differential Pressure

Cole-Parmer® Flowmeters and Controllers for Water

Achieve accurate, ultrafast volumetric measurement and control

- Technology allows for installation without typical inlet/outlet straight-run requirements
- Units provide data on multiple fluid parameters: flow, pressure and temperature
- All functions are user-programmable through an integrated keypad

These meters measure flow via pressure drop across a laminar flow element (LFE). Because the flow element makes the flow stream laminar, placement in the process does not require straight pipe runs upstream or downstream of the meter, greatly simplifying installation. The LFEs also provide an outstanding turndown ratio of 50:1 giving the meter a very broad and accurate measuring range. The design provides an ultrafast response at start-up or input change—often within 100 milliseconds. The 0 to 5 VDC output allows transmission of the flow value to a remote display, recorder, or controller regulating a valve or pump.

For the flow controllers, an integrated PID controller directs the unit's response to process changes. Set the P and D parameters to tailor the unit's response. Flow setpoint is established with the optional set point control module, a 0 to 5 V signal, or an RS-232 input signal. For portable flow metering (not controlling) applications, order the battery pack listed below. Units can be mounted via threaded taps in the meter body.

Meters and controllers feature dynamic display that simultaneously shows flow rate, line pressure, fluid temperature, and (for controllers) the set point. For the units shown, both power and input/output signals are transmitted through a single multi-pin connector.

What's included: integrated sensor, display, and transmitter; controllers add the valve assembly. All models include a 120 VAC power adapter; 220 VAC European adapters may be ordered separately below. Also included: NIST-traceable calibration report supplied by the manufacturer.



Flow controller
32907-45

Flowmeter
32908-40

TECHNICAL info!

This technology relies on fluid viscosity to determine flowrate. Using these devices with pure water is the ideal application.

For additional information about this technology, please refer to our Introduction on pages 589-592.



Specifications

Max particulate size:

Up to 50 mL/min: 20 µm
100 mL/min to 10 LPM: 50 µm

Accuracy: ±2% full-scale

Repeatability: ±2% of full-scale

Response time

Flowmeters: 20 msec
Flow controllers: 100 msec

Turndown ratio: 50:1

Operating temp: 50 to 122°F (10 to 50°C)

Max system pressure: 100 psig (6.9 bar)

Pressure drop: 0.8 psig (flowmeter element)

Wetted materials

Flowmeters: 303 SS (stainless steel), Viton®, silicone RTV, polyetherimide
Flow controllers: 302 SS, 303 SS, Viton, silicone RTV, polyetherimide, and brass

Input power

Flowmeters: 7 to 30 VDC, 30 mA
Flow controllers: 12 to 30 VDC, 250 mA

Electrical connection: 8-pin circular mini DIN

Display type: four-digit, seven-line LCD; 1/4" H flow display

Output signal: 0 to 5 VDC, 0 to 10 VDC RS-232

Input signal: 0 to 5 VDC, 0 to 10 VDC RS-232 (controllers only)

Connections

1 mL/min: 10-32 UNF
5 mL/min to 10 LPM: 1/8" NPT(F)

Flowmeters/controllers†	Dimensions
Models up to 500 mL/min	2 ⁹ / ₈ " L x 4 ⁹ / ₈ " H x 1 ¹ / ₈ " D (6.0 x 11.7 x 2.9 cm)
Models 1 LPM to 10 LPM	2 ⁹ / ₈ " L x 4 ³ / ₄ " H x 1 ¹ / ₈ " D (6.7 x 12.1 x 2.9 cm)

†Dimensions do not include control valve

Flow rate	Flowmeters		Flow controllers	
	Catalog number	Price	Catalog number	Price
0 to 1 mL/min	TW-32908-40	—	—	—
0 to 5 mL/min	TW-32908-41	—	—	—
0 to 10 mL/min	TW-32908-42	—	—	—
0 to 50 mL/min	TW-32908-43	—	TW-32907-43	—
0 to 100 mL/min	TW-32908-44	—	TW-32907-44	—
0 to 200 mL/min	TW-32908-45	—	TW-32907-45	—
0 to 500 mL/min	TW-32908-46	—	TW-32907-46	—
0 to 1 LPM	TW-32908-47	—	—	—
0 to 5 LPM	TW-32908-48	—	—	—
0 to 10 LPM	TW-32908-49	—	—	—

Accessories

TW-32916-57 Power adapter, 220 VAC, for all flowmeters or controllers 10 LPM or less, Euro plug included

TW-32916-58 Power adapter, 220 VAC, for controllers 50 LPM and greater, Euro plug included

TW-32929-50 Battery pack, for portable flow/mass measurement

TW-32929-89 Connection cable, 8-DIN to stripped ends

TW-17080-12 NIST-traceable recalibration with data

Modular Liquid Flow Rate Sensor Systems

System design is flexible to suit a wide range of applications

- Brass sensors for high pressure; PTFE sensors for high-purity systems; Ryton® PPS sensors for aggressive and non-aggressive liquids
- Interface with data acquisition systems
- Dual signal outputs to monitor and record flow rates and totals

Use these modular flow sensors and totalizers for any type of process or laboratory application. The flow sensors measure low viscosity liquids from 13 mL/min up to 10 L/min. For a complete system, order a flow sensor, power supply, and flow display/totalizer.

REQUIRED SYSTEM Components

- 1 Flow sensor
- 2 Power supply/adaptor
- 3 Flow display/totalizer for local indication



1 Brass sensor 32704-14

1 PTFE sensor 32705-00

1 Flow Sensors

These sensors use an optical beam, turbine wheel, and photodiode translator to generate a 7.5 V pulse output that is proportional to the flow rate. Sensors also provide a highly linear 0 to 5 VDC output signal for control or data logging purposes.

Note: Due to the optical pick-up, the sensors should not be used with opaque liquids.

Ryton® PPS sensors have wetted materials of polyphenylene sulfide (PPS), glass, sapphire, and Viton®. Brass sensors have wetted materials of brass, glass, and Viton. PTFE sensors have wetted materials of PTFE, sapphire, and Kalrez.

A separate power supply is required for these flow sensors—order separately below. If a Ryton® PPS or brass sensor is being used with an existing power supply, order cable assembly 32704-52 at right (PTFE models already include their own cable assembly).

Specifications for Sensors

Fluid type: low viscosity (less than 10 cSt), clear to lightly colored liquids

Max particulate size: 10 microns

Accuracy: ±3% full-scale

Linearity: ±3% full-scale

Repeatability: ±0.2% full-scale

Max operating temp: 131°F (55°C)

Max pressure: Ryton PPS models: 100 psi (6.9 bar),
Brass models: 500 psi (34.5 bar)
PTFE models: 60 psi (4.1 bar)

Output signal: 0 to 5 VDC analog and square wave pulse

Input power: Ryton PPS and brass models: 12.5 ±2 VDC, 30 mA, PTFE models: regulated 12 VDC, 15 mA

Dimensions (L x W x H): Ryton PPS and brass models: 2 3/8" x 1 5/8" x 1 1/2" (6.0 x 4.1 x 3.8 cm)
PTFE models: 2 1/4" x 2 1/4" x 1 3/4" (5.7 x 5.7 x 4.4 cm)



Flow rate	Connections (tubing OD)	Ryton® PPS sensors [†]		Brass sensors		PTFE sensors [‡]	
		Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
13 to 100 mL/min	1/8"	TW-32704-00		TW-32704-12		TW-32705-00	
50 to 500 mL/min	1/4"	TW-32704-02		TW-32704-14		TW-32705-02	
100 to 1000 mL/min	1/2"	TW-32704-04		TW-32704-16		TW-32705-04	
0.2 to 2 L/min	1/4"	TW-32704-06		TW-32704-18		TW-32705-06	
0.5 to 5 L/min	3/8"	TW-32704-08		TW-32704-20		TW-32705-08	
1 to 10 L/min	3/8"	TW-32704-10		TW-32704-22		—	—

[†]These sensors have accuracy of ±1% full-scale. [‡]The PTFE models include 30" (76 cm) L cable assembly.

TW-32704-52 Power cable assembly for Ryton® PPS and brass sensors only.

Measures 30" (76 cm) long. For use with an existing power supply

TW-17080-12 NIST-traceable calibration for liquid flowmeters

2 Power Supply/Adapter

A power supply will be required to power the sensors listed above.

Description	120 VAC, 60 Hz		240 VAC, 50 Hz	
	Catalog number	Price	Catalog number	Price
For Ryton PPS and brass sensors	TW-32704-55		TW-32704-56	
For PTFE sensors	TW-32706-50		TW-32706-55	

3 Flow Display/Totalizer

This display/totalizer is compact so that it can be mounted almost anywhere. View flow rate or flow total—front-panel button lets you easily toggle between flow rate and total flow display. The totalizer can be reset either remotely or with the local reset button. Meter displays flow rate up to four digits, flow total up to eight digits.

Input pulses are translated using a scaling factor in the range of 0.001 to 9999. Select the scaling factor so that displayed flow rate and total are in your preferred engineering units: mL/min, GPM, or any other unit combination. Program the totalizer decimal point in one of five different positions. Operates on one 3 V lithium battery (included).

TW-32704-40 Flow display/totalizer.

Use only with the flow sensors above

TW-32704-50 Replacement battery, 3 V lithium

Specifications for display/totalizer

Input signal: pulse

Accuracy: ±0.2%

Type: up counting

Input impedance: 27 kΩ at 3 VDC

Display: 8-digit LCD, 7/16"H

Update time: 0.7 seconds

Operating temp: 131°F (55°C) max

Power: internal battery, 3 V lithium (included)

Battery life: five years

Dimensions: 2 15/16"W x 1 9/16"H x 1 1/4"D (7.5 x 4.0 x 3.2 cm)

Panel cutout: 2 11/16"W x 1 5/16"H (6.8 x 3.3 cm)



32704-40



Flowmeters Pelton Wheel

Economical Modular Flow Rate Sensor Systems

Ryton® PPS materials for use in aggressive and non-aggressive gas or liquid systems

- A range of available configurations to suit most applications
- Voltage output to monitor and record flow rates and totals
- Interface with data acquisition system

1 Flow Sensors

These sensors are ideal for low-flow applications involving mildly acidic or slightly corrosive gases and liquids. Economically designed, sensors provide a single 0 to 5 VDC output signal. This single signal is ideal for simple, low-cost flow rate measurement or for integration of the sensor into an existing central control system.

Ryton® PPS sensors are ideal for liquids or air. Sensors for liquids can be used with a wide variety of transparent, low-viscosity liquids under 10 cSt. Sensors measure a wide flow range from as low as 20 mL/min to as high as 500 L/min.

The wetted materials are epoxy, glass-filled polyphenylene sulfide (Ryton® PPS), glass, stainless steel, sapphire, and Viton®.

Note: A power supply is required for these flow sensors—order separately at right. If using an existing power supply, order cable assembly 32704-52 (below table).

REQUIRED SYSTEM Components

- 1 Flow sensor
- 2 Power supply/adapter
- 3 Flow display/totalizer for local indication



Specifications

Max particulate size: 25 microns

Accuracy: ±3% full-scale including linearity

Accuracy coefficient, temperature: ±0.2% per °C

Accuracy coefficient, pressure: ±0.07% per mm Hg (for air at 1 to 3 atm)

Repeatability: ±1% full-scale

Operating temp: 131°F (55°C) max

Max system pressure

For liquids: 100 psi (6.9 bar) at 20°C

For gases: 40 psi (2.7 bar) at 20°C

Output signal: 0 to 5 VDC

Input power: 10 to 15 VDC, 30 mA

Dimensions: (L x W x H, excluding fittings) 2 3/8" x 1 5/8" x 1 1/2" (6.0 x 4.1 x 3.8 cm)



2 Power Supply/Adapters

A power supply will be required for the sensors listed at left.

TW-32700-50 Power supply; 120 VAC, 60 Hz

TW-32700-55 Power supply; 240 VAC, 50/60 Hz

3 Flow Rate Indicators

Miniature 3 1/2-Digit LCD. View the 0.4" high digits in any flow unit combination to which the sensor output signal is scaled. Panel cutout is 1.665"L x 0.915"H (x 1.00"D). The input signal is 0 to 5 VDC.



TW-32706-72 DC-powered display

Universal Rate/Totalizer/Batch Controllers. For display of flow rates and totals plus options for doing batch process control. Displays in any engineering unit through a 1/8-DIN face. See page 657 for detailed information and other available models.

Description (relays and/or outputs)	115 VAC, 50/60 Hz		230 VAC, 50/60 Hz	
	Cat. no.	Price	Cat. no.	Price
None	TW-94787-00		TW-94787-05	
Two relays	TW-94787-40		TW-94787-45	
Two relays and 4 to 20 mA output	TW-94787-50		TW-94787-55	

TW-05656-55 Benchtop stand accepts 1/8-DIN meters. Tilt-back angle allows easy reading. Features nonslip rubber feet

TW-50001-00 Line cord with US standard plug, 6-ft (1.8-m) L. For 120 VAC operation

Catalog number	Flow rates	Connections (tube OD)	Pressure drop (max flow)	Price
1 Ryton PPS sensors for liquids*				
TW-32703-50	13 to 100 mL/min	1/8"	10 psi	
TW-32703-52	50 to 500 mL/min	1/4"	10 psi	
TW-32703-54	100 to 1000 mL/min	1/4"	6 psi	
TW-32703-55	0.2 to 2 LPM	1/4"	10 psi	
TW-32703-56	0.5 to 5 LPM	3/8"	10 psi	
TW-32703-58	1 to 10 LPM	3/8"	10 psi	
1 Ryton PPS sensors for air				
TW-32700-00	20 to 100 mL/min	1/8"		
TW-32700-02	40 to 200 mL/min	1/4"	10 psi	
TW-32700-04	100 to 500 mL/min	1/4"		
TW-32700-06	0.2 to 1 LPM	1/4"		
TW-32700-08	0.4 to 2 LPM	1/4"	10 psi	
TW-32700-10	1 to 5 LPM	1/4"		
TW-32700-12	2 to 10 LPM	3/8"		
TW-32700-14	4 to 20 LPM	3/8"	10 psi	
TW-32700-16	10 to 50 LPM	3/8"		
TW-32700-18	20 to 100 LPM	3/8"		
TW-32700-20	40 to 200 LPM	1/2"	10 psi	
TW-32700-22	100 to 500 LPM	1/2"		

*Flow rates given are for water and other low-viscosity fluids less than 10 centistokes

TW-32704-52 Power cable assembly, 36" (0.9 m). Required when using an existing power supply



High-Accuracy Stainless Steel Flowmeters / Transmitters

Economical design with an outstanding $\pm 1.0\%$ full-scale accuracy

- A wide range of outputs options for integration into any system

1 Flowmeters/Transmitters

Select these flow meters and transmitters for extremely low flow-rate applications or for higher flow rate measurements and yet maintain a full-scale accuracy of $\pm 1\%$ or better. All units feature a stainless steel housing and come standard with stainless steel compression fittings.

Choose transmitters with a 0 to 5 VDC or 4 to 20 mA output for control or data logging purposes. Models 32718-20 to -32 offer a single output (0 to 5 VDC) along with a built-in 3 1/2-digit display.

The flow meters/transmitters can be used with a wide variety of transparent, low-viscosity (under 10 cSt) corrosive or neutral liquids and solvents.

Note: A power supply is required for each meter/transmitter and may be ordered at right. If using an existing power supply, order cable assembly 32704-52 below the table.

REQUIRED SYSTEM Components

- 1 Flowmeter/transmitter
- 2 Power supply adapter
- 3 Flow rate indicator (for units without built-in display)

Flowmeter with output 32718-20



Transmitter 32718-00



Transmitter 32718-40

Specifications



Max particulate size: 25 μ m

Accuracy: $\pm 1\%$ full-scale including linearity

Accuracy coefficient, temperature: $\pm 0.2\%$ per $^{\circ}$ C

Repeatability: $\pm 0.2\%$ full-scale

Operating temp: 131 $^{\circ}$ F (55 $^{\circ}$ C)

Max system pressure: 500 psi (34.5 bar) at 20 $^{\circ}$ C

Wetted parts: 316L stainless steel, glass-filled polyphenylene sulfide (Ryton® PPS), glass, sapphire, epoxy and Viton®

Output signal

Models 32718-00 to -09: 0 to 5 VDC
Models 32718-20 to -32: 0 to 5 VDC,
Models 32718-40 to -52: 4 to 20 mA

Input power
Models 32718-00 to -32:
12 VDC, 35 mA
Models 32718-40 to -52:
24 VDC, 50 mA

Dimensions (L x W x H)
Models 32718-00 to -09:
2 3/8" x 1 5/8" x 1 1/2" (6.0 x 4.1 x 3.8 cm)
Models 32718-20 to -32:
2 3/8" x 1 5/8" x 3" (6.0 x 4.1 x 7.6 cm)
Models 32718-40 to -52:
2 3/8" x 1 5/8" x 2 1/2" (6.0 x 4.1 x 5.9 cm)

Catalog number	Flow range	Connections (tube OD)	Pressure drop (max flow)	Price
1 Transmitters with 0 to 5 VDC				
TW-32718-00	13 to 100 mL/min	1/8"	10 psi	
TW-32718-02	20 to 200 mL/min	1/4"	10 psi	
TW-32718-04	50 to 500 mL/min	1/4"	10 psi	
TW-32718-06	0.1 to 1 LPM	1/4"	6 psi	
TW-32718-07	0.2 to 2 LPM	1/4"	10 psi	
TW-32718-08	0.5 to 5 LPM	3/8"	10 psi	
TW-32718-09	1 to 10 LPM	3/8"	12 psi	
1 Flowmeters with a 3 1/2-digit display and 0 to 5 VDC output				
TW-32718-20	13 to 100 mL/min	1/8"	10 psi	
TW-32718-22	20 to 200 mL/min	1/4"	10 psi	
TW-32718-24	50 to 500 mL/min	1/4"	10 psi	
TW-32718-26	0.1 to 1 LPM	1/4"	6 psi	
TW-32718-28	0.2 to 2 LPM	1/4"	10 psi	
TW-32718-30	0.5 to 5 LPM	3/8"	10 psi	
TW-32718-32	1 to 10 LPM	3/8"	12 psi	
1 Transmitters with 4 to 20 mA output				
TW-32718-40	13 to 100 mL/min	1/8"	10 psi	
TW-32718-42	20 to 200 mL/min	1/4"	10 psi	
TW-32718-44	50 to 500 mL/min	1/4"	10 psi	
TW-32718-46	0.1 to 1 LPM	1/4"	6 psi	
TW-32718-48	0.2 to 2 LPM	1/4"	10 psi	
TW-32718-50	0.5 to 5 LPM	3/8"	10 psi	
TW-32718-52	1 to 10 LPM	3/8"	12 psi	

[TW-32704-52](#) Cable assembly for sensors; 30"L (0.9 m). Required when using your own power supply

2a Power Supplies (Transmitters 32718-00 to -09 and meters 32718-20 to -32)

A power supply is required for each meter/transmitter.

[TW-32704-55](#) Power supply; 120 VAC, 60 Hz to 12 VDC.

[TW-32704-56](#) Power supply; 240 VAC, 50 Hz to 12 VDC

2b Power Supply (Transmitters 32718-40 to -52)

Power supply is required for each transmitter.

[TW-32704-90](#) Power supply; 120 VAC, 60 Hz to 24 VDC

3 Displays

Select a flow rate/total display for use with the transmitters listed at left. Note the signal-input requirements for each.

Miniature 3 1/2-Digit LCD. This low-power device operates from an existing 5 to 24 VDC source. View the 0.4" high digits in any flow unit combination to which the transmitter output signal is scaled. Panel cutout is 1.67"L x 0.92"H (x 1.00"D). The input signal is 0 to 5 VDC.



32706-72

[TW-32706-72](#) DC-powered display

Flow Display/Totalizer shows flow rate up to four digits and total flow up to eight digits; select a scaling factor to display rates and totals in any desired engineering unit. Operates on one 3 V lithium battery (included). Panel cutout is 2 1/2"L x 1 1/4"H x 1 1/4"D (6.4 x 3.2 x 3.2 cm). Input signal is pulse.



32704-40

See page 635 for more details.

[TW-32704-40](#) Flow indicator/totalizer

[TW-32704-50](#) Replacement battery, 3 V lithium

[TW-17080-12](#) NIST-traceable calibration with data

Find MORE!

Order an analog signal converter to convert the VDC output signal to an RS-232 signal on [page 627](#).



Flowmeters

Pelton Wheel

Liquid or Gas Turbine Flowmeters/Transmitters

Output signal lets you connect to a remote display, data logger, or recorder for continuous monitoring

- The 3½-digit LCD provides direct flow rate readings

These low-flow liquid and air flowmeters are ideal for industrial, commercial, laboratory, or OEM applications. They are compact and offer excellent liquid or air measurements. All models provide direct flow rate readings in mL/min or L/min and a 0 to 5 VDC linear output.

Choose from Ryton® PPS or brass flowmeters. Ryton® PPS meters are an economical alternative to brass models. Order brass meters for high-pressure applications—meters withstand up to 500 psi. Use flowmeters for liquids with a wide variety of transparent, low viscosity (below 10 cSt) liquids. Flowmeters for air cover flow rates from 10 mL/min to 20 L/min.

Wetted materials are epoxy, glass-filled polyphenylene sulphide (Ryton® PPS), glass, stainless steel, sapphire, Viton®, and acetal (for Ryton® PPS flowmeters) or brass (for brass flowmeters).

Order base plate 32709-90 below right to allow Ryton® PPS flowmeters (except 32709-16) stand on their own. Power flowmeters with an AC adapter or a rechargeable battery kit; battery kit provides up to 20 hours of portability. If your application requires a remote display, see page 657 for our universal rate/totalizer/batch controllers.



Ryton® PPS flowmeter 32709-16



Ryton® PPS flowmeter 32709-08



Brass flowmeter 32709-28

INNOCAL®
INNOVATIVE CALIBRATION SOLUTIONS

Ensure the accuracy of your flowmeter!

TW-17080-00 NIST-traceable calibration with data for air/gas flowmeters

TW-17080-12 NIST-traceable calibration with data for liquid flowmeters

Specifications

- Max particulate size:** 25 µm
- Accuracy:** ±1% full-scale including linearity for liquids; ±3% full-scale for air.
- Accuracy coefficient, temperature:** ±0.2% per °C
- Repeatability**
Meters for liquids: ±0.2%, full-scale (20 to 100%)
Meters for air: ±0.5%, full-scale (50 to 100%)
- Operating temp:** 0 to 55°C (32 to 131°F)

- Max system pressure**
Ryton® PPS: 100 psi (6.9 bar) meters for liquids, 40 psi (2.7 bar) meters for air
Brass: 500 psi (34.5 bar) meters for liquid; 40 psi (2.7 bar) meters for air
- Display:** 3½-digit LCD, 7/8"H
- Output signal:** 0 to 5 VDC
- Input power:** 12 VDC
- Dimensions (W x H x D):** 1 7/8" x 3" x 1 3/4" (4.8 x 7.6 x 4.4 cm), for models up to 5 L/min



Flow rates†	Connections (tube OD)	Pressure drop (max flow)	Ryton PPS flowmeters		Brass flowmeters	
			Catalog number	Price	Catalog number	Price
Flowmeters for transparent liquids						
13 to 100 mL/min	1/8"	10 psi	TW-32709-50		TW-32709-70	
20 to 200 mL/min	1/4"		TW-32709-52		TW-32709-72	
50 to 500 mL/min	1/4"		TW-32709-54		TW-32709-74	
0.1 to 1 L/min	1/4"	6 psi	TW-32709-56		TW-32709-76	
0.2 to 2 L/min	1/4"	10 psi	TW-32709-58		TW-32709-78	
0.5 to 5 L/min	3/8"	6 psi	TW-32709-60		TW-32709-80	
Flowmeters for air						
20 to 100 mL/min	1/8"	10 psi	TW-32709-02		TW-32709-22	
40 to 200 mL/min	1/8"		TW-32709-04		TW-32709-24	
100 to 500 mL/min	1/8"	10 psi	TW-32709-06		TW-32709-26	
0.2 to 1 L/min	1/8"		TW-32709-08		TW-32709-28	
0.4 to 2 L/min	1/4"		TW-32709-10		TW-32709-30	
1 to 5 L/min	1/4"	10 psi	TW-32709-12		TW-32709-32	
2 to 10 L/min	1/4"		TW-32709-14		TW-32709-34	
4 to 20 L/min	3/8"		TW-32709-16		TW-32709-36	

†Flow rates for air are given at 760 mm Hg and 23°C. Flow rates for liquids are given for water at 23°C.

Accessories

- TW-32709-90** Base plate for Ryton® PPS flowmeters (except 32709-16) at left. Allows meter to stand by itself. Base plate includes mounting screws
- TW-32709-92** AC adapter; 115 VAC, 50/60 Hz. Adapter includes signal output cable
- TW-32709-94** AC adapter; 230 VAC, 50/60 Hz. Adapter includes signal output cable
- TW-32709-96** Rechargeable battery kit, 115 VAC. Provides up to 20 hours of portable operation. Battery kit includes charger, cables, and carrying case
- TW-32704-52** Power cable assembly. Measures 30" (0.9 m) L. For use with an existing power supply

Analog Signal-to-RS Converters for collection and analysis of data on a PC. Includes software, a bidirectional A/D and D/A signal conditioner with switch for 0 to 5 VDC or 4 to 20 mA input, and 110 VAC power supply; uses screw terminal connections.

- TW-03277-70** Analog signal-to-RS-232 converter
- TW-03277-75** Analog signal-to-RS-485 converter



Cole-Parmer® Ultra High-Accuracy Turbine Flowmeters/Transmitters

Provides ±0.5% full scale accuracy in a compact, in-line liquid flowmeter

Select from economical Ryton® PPS construction, metal-free PPS models, or rugged brass to withstand up to 500 psi! Flowmeters simultaneously display flow rate plus provide a signal output for data logging or control. Power flowmeters with optional AC adapter sold separately.

What's included: NIST-traceable calibration report supplied by the manufacturer.

Specifications

- Max viscosity:** 10 cSt
- Max particulate size:** 10 microns
- Accuracy:** ±0.5% full-scale
- Accuracy coefficient, temperature:** ±0.2% per °C
- Repeatability:** ±0.2% full-scale
- Operating temp:** 41 to 131°F (5 to 55°C)
- Max system pressure**
Ryton® PPS: 100 psi (6.9 bar)
Brass: 500 psi (34.5 bar)

- Wetted parts**
All models: glass, Viton®, epoxy paint, sapphire
32714-00 to -16: Ryton® PPS, SS, acetal tube fittings
32715-00 to -16: Ryton® PPS, PCTFE tube fittings
32714-20 to -36: brass, SS, brass tube fittings
- Display:** 3 1/2-digit LCD, 7/8"H
- Output signal:** 0 to 5 VDC
- Input power:** 12 VDC, 35 mA max
- Dimensions (W x H x D):** 1 7/8" x 3" x 1 3/4"
(4.8 x 7.6 x 4.4 cm)



Flow rates	Connections (Tube OD)	Press. drop (max flow)	Ryton PPS/SS		Ryton PPS/PCTFE		Brass/SS	
			Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
13 to 100 mL/min	1/8"	10	TW-32714-00		TW-32715-00		TW-32714-20	
20 to 200 mL/min	1/4"	10	TW-32714-02		TW-32715-02		TW-32714-22	
50 to 500 mL/min	1/4"	10	TW-32714-04		TW-32715-04		TW-32714-24	
0.1 to 1 LPM	1/4"	6	TW-32714-06		TW-32715-06		TW-32714-26	
0.1 to 2 LPM	1/4"	10	TW-32714-08		TW-32715-08		TW-32714-28	
0.2 to 5 LPM	3/8"	10	TW-32714-10		TW-32715-10		TW-32714-30	
1 to 10 GPH	1/4"	10	TW-32714-14		TW-32715-14		TW-32714-34	
4 to 100 GPH	3/8"	10	TW-32714-16		TW-32715-16		TW-32714-36	

Brass flowmeter 32714-26



Accessories

- [TW-32709-92 AC adapter](#); 115 VAC, 50/60 Hz. Includes signal output cable
- [TW-32709-94 AC adapter](#); 230 VAC, 50/60 Hz. Includes signal output cable
- [TW-32704-52 Power cable assembly](#); for Ryton® PPS and brass sensors only. Measures 30" (76 cm) long. For use with an existing power supply

NSF-Approved Turbine Flowmeters

Designed for low-viscosity flow measurement in water and beverage applications

- NSF Standard 61 listed

Designed for low-flow OEM and pilot applications, these turbine flowmeters are highly accurate and repeatable and feature a Hall effect sensor for superior accuracy. The sensor's standard power and output specifications make it easy to retrofit existing controllers and output to a PLC, recorder, or panel meter. The 316 stainless steel shaft coupled with Delrin® acetal bearings allows for accurate measurements during quick dispensing cycles. These low-cost units meet the requirements of NSF Standard 61, making them ideal for water or beverage dispensing applications or any application with water-based liquids.

Specifications

- Process connection:** 3/8" NPT(M)
- Accuracy:** ±2% of reading
- Repeatability:** ±0.5% of reading
- Viscosity:** 32 to 81 SSU (1.8 to 16 cSt)
- Max. particulate size:** 50 microns
- Pressure:** Operating: 200 psi (13.6 bar)
Burst: 1000 psi (68 bar)
- Wetted materials:** Noryl, nylon, 316 stainless steel, Delrin acetal
- Operating temperature:** -4 to 176°F (-20 to 80°C)
- Input power:** 5 to 24 VDC @ 8 mA
- Output (Hz):** NPN sinking open collector @ 25 mA maximum leakage current 10 µA (5k to 30k pull-up resistor required)
- Electrical connection:** 3-ft (0.9-m) PVC cable, #22 AWG



Catalog number	Flow range GPM (LPM)	Frequency range	Pulses per gallon (liter)	Price
TW-98516-90	0.2 to 2 (0.8 to 7.6)	34 to 343 Hz	10,313 (2724)	
TW-98516-92	0.4 to 4 (1.5 to 15)	29 to 343 Hz	4994 (1319)	

[TW-17080-12](#) NIST-traceable recalibration with data

NEW

98516-90





Flowmeters

Turbine

PFA, PVDF, and 316L Stainless Steel Turbine Flow Sensors

Use in conjunction with batch or flow controller for precise pump control

- PFA sensors meet requirements of US Pharmacopeia Class VI standard

These liquid turbine flow sensors are corrosion resistant for long-term, trouble-free performance in demanding situations. Sensor is positioned in close proximity to the edges of the rotor blades to provide accurate flow measurements for all colored liquids. Flow in your tubing is picked up via the IR beam in the sensor connection, and converted into a 5 to 30 V square wave pulse output. One meter of PVC cable is included with an RVC jack for input into the batch or flow controllers (sold separately below). If using a recorder, panel meter, or PLC, simply remove the jack to expose the two-wire cable for installation of voltage output.

Mount these turbine flow sensors in any position; they do not require a flow straightener or other specialized installation. The PFA and PVDF sensors are replaceable for single-use applications or can be set up as permanent flow sensors. PFA and PVDF sensors come standard with a mounting clip; polypropylene tube holders are sold separately below.

PFA Turbine Sensors incorporate hose barb connections for lab or process use. Sensors are ideal for disposable single-use and sterile applications, but can also be used in permanent flow sensing applications. PFA sensors are suitable for clear and opaque, neutral, corrosive, and aggressive liquids and fuel.

PVDF Turbine Sensors are available with hose barb connections for lab or process use. PVDF sensors are generally used in applications requiring high-purity flow sensing of solvents, acids, and bases.

316L Stainless Steel (SS) Turbine Sensors are rated for high-pressure requirements in chemical, pharmaceutical, semiconductor, and environmental industries. Highly corrosion resistant.

NEW



Specifications

- Accuracy:** ±1% of reading
- Repeatability:** <0.15%
- Fluid type:** clear and opaque, neutral, corrosive, and aggressive liquids
- Viscosity:** 0.8 to 10 cSt
- Operating temperature:** -4 to 176°F (-20 to 80°C)
- Output signal:** 5 to 30 VDC square wave
- Power:** 5 to 30 VDC
- Electrical connection:** 3.3-ft (1-m) PVC RVC jack

Catalog number	Flow range (L/min)	Inner diameter (mm)	Maximum pressure psi (bar)	Wetted materials	Process connections	Price	Replacement turbine	
							Catalog number	Price
PFA turbine sensors								
TW-32516-00	0.06 to 2	4.5	290 (20)	PFA, ruby	7-mm ID hose barb		TW-32516-18	
TW-32516-02	0.5 to 20	8.5	218 (15)		12-mm ID hose barb		TW-32516-20	
PVDF turbine sensors								
TW-32516-04	0.03 to 2	4.7	363 (25)	PVDF, ruby	7-mm ID hose barb		TW-32516-22	
TW-32516-06	0.3 to 20	9.3	290 (20)		12-mm ID hose barb		TW-32516-24	
316L stainless steel turbine sensors								
TW-32516-12	0.06 to 2	4.5	363 (25)	316L SS, PFA, ruby	¼" NPT(M)		—	—
TW-32516-14	0.5 to 20	8.5	363 (25)		⅜" NPT(M)		—	—
TW-32516-16	1.5 to 40	12.5	363 (25)		½" NPT(M)		—	—

TW-32516-30 Polypropylene tube holder for PFA and PVDF turbine sensors, used with skid mounting

Batch and Flow Controllers for Pumps

These pumps controllers can be used with any pump that takes a 4 to 20 mA input signal. Sensors relay flow to controller which then transmits a signal to the pump if a change in flow is required. Controllers read flow input and display current and total flow velocity.

Batch controller is designed for batching, filling, and dosing with preset functions. Flow input controller is designed to display and control current and total flow velocity. Programming is simple with four large tactile buttons. Controllers also have a power down safe mode, 24 VDC power supply, and Ethernet communications.



Batch Controller 32516-26

Specifications

- Input**
Batch controller: two 5 to 30 volt square wave pulses
Pump controller: one 5 to 30 volt square wave pulse
- Output:** 4 to 20 mA and audible buzzer
- Operation**
Batch controller: batching, dosing, filling, mixing, and totalizing with external start and stop
Pump controller: pump speed control
- Display:** 2 x 16 character LCD

Catalog number	Description	Price
TW-32516-26	Dual-flow input batch controller	
TW-32516-28	Single-flow input controller	



PVDF Infrared Turbine Flow Sensors

Place in any orientation without flow straighteners

- Fluid bearing minimizes friction and component wear

These infrared sensors feature a unique turbine design that prevents air or gas bubbles from being trapped in the measuring chamber leading to improved accuracy and repeatability. The design also utilizes a fluid bearing and operates virtually friction free, minimizing component wear. The rotor assembly is removable for cleaning or replacement of the flow tube. For protection from particulates, all models include a 100 µm filter screen.

Note: these sensors cannot be used with opaque fluids.



Specifications

Fluid type: clear or translucent fluids capable of transmitting IR light; 1 to 15 cSt viscosity

Max particulate size: 100 µm

Accuracy: ±1% of reading

Linearity: ±1%

Repeatability: ±0.1%

Operating temp: -40 to 185°F (-40 to 85°C)

Max system pressure: 150 psi (10.3 bar) at 185°F (85°C)

Wetted materials: PVDF, PFA, Viton®

Output signal: square wave pulse, open collector

Input power: 8 to 24 VDC; 6 to 24 mA

Cable length: 3 m (9.8 ft)



Catalog number	Flow range (GPM)	Frequency range (Hz)	Connections (hose barb)	Pressure drop at 50% flow	Sensor length	Price
TW-32250-02	0.03 to 0.53	60 to 1200	1/4"		3 3/4" (9.5 cm)	
TW-32250-12	0.08 to 2.38	40 to 1200	3/8"	6.4 psi	4 9/8" (11.1 cm)	
TW-32250-22	0.13 to 3.96	26.7 to 800	7/16"		4 1/2" (11.4 cm)	
TW-32250-32	0.26 to 7.93	20 to 600	5/8"		5 5/8" (13.7 cm)	
TW-32250-42	0.66 to 19.8	18.8 to 562	3/4"	6.4 psi	5 1/4" (13.3 cm)	
TW-32250-52	1.06 to 32.0	15 to 450	7/8"		5 1/4" (13.3 cm)	

[TW-17080-12](#) NIST-traceable calibration

PVDF Turbine Flowmeters/Totalizers

Ideal for use with many strong oxidizers and acids†

- Battery-powered to eliminate the need for expensive wiring
- Two totalizers allow for process or period-specific volume monitoring
- Enclosure is FM-approved for Class I, Division I environments

These in-line flowmeters/totalizers display flow rate and accumulated flow in GPM or LPM. The NEMA 4 enclosure is suitable for indoor/outdoor use in dusty, dirty, and wet environments and the PVDF body is resistant to ultraviolet radiation and weathering.

All flowmeters measure linearly across a range and record a cumulative volume plus a resettable volume. Meters are factory-calibrated using water but can store two application-specific K-factors determined in-process. To conserve power, the six-digit display automatically turns on with flow and then turns off four minutes after flow ceases.

Wetted components are PVDF housing, rotor, and supports, and ceramic shaft and bearings. The limited internal parts are simple to replace for easy maintenance—contact our Application Specialists for details.

Meters operate on two lithium batteries. Remote installation of the flowmeter body is possible using the optional remote installation kit (order separately at right). Replacement battery kits and calibration containers can be ordered from "Accessories" at right.



Flowmeter/totalizer
05610-12

†Check chemical resistance charts on pages 2030-2038 for specific details.

Specifications

Repeatability: ±0.3% of reading

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

Max system pressure: 150 psi (10.3 bar)

Wetted materials: PVDF retainers, ceramic bearings, ceramic shafts, PVDF rotor and supports, Viton® O-rings, PVDF housing.



Display: 6-digit LCD, 1/2"H (with floating decimal)

Input power: two 3 V lithium batteries

Battery life: 9000 hours nominal

Dimensions (L x W x H): 8" x 2 3/4" x 3" (20.3 x 7.0 x 7.6 cm)

Approvals: EEx II 3 G IIC T4

Catalog number	Flow range		Connections	Accuracy	Pressure drop (linear range)	Price
	Linear	Maximum				
TW-05610-11	1.2 to 12.0 GPM (4.5 to 45.4 LPM)	15.0 GPM (56.8 LPM)	1/2" NPT(F)	±2% of reading	10 psi	
TW-05610-12	5 to 50.0 GPM (18.9 to 190.0 LPM)	75.0 GPM (284.0 LPM)	1" NPT(F)	±1.5% of reading	6 psi	

Accessories

[TW-05610-70](#) Calibration container, HDPE, 5-gallon capacity

[TW-05610-96](#) Repl. battery kit

Remote Installation Kit. Mount display up to 100 feet from the sensor—ideal for measuring flow in hot pipes (up to 250°F/121°C) or in inaccessible areas. Kit includes a sensor cover with 10-ft cable, remote display housing, and installation hardware. FM-approved.

[TW-05609-93](#) Remote installation kit

[TW-05609-91](#) Output module, pulse output. Module provides a digital open collector output for interfacing with compatible instrumentation

[TW-05609-92](#) Output module, 4 to 20 mA or 5 to 20 volts. Module provides an output for interfacing with compatible instrumentation

[TW-17080-12](#) NIST-traceable calibration



Flowmeters

Turbine

Heavy-Duty Flowmeters/Totalizers

Battery power eliminates the need for expensive wiring

- Two totalizers allow for process or period-specific volume monitoring
- FM-approved for Class I, Division I environments

These heavy-duty in-line flowmeters/totalizers display flow rate and accumulated flow in gallons or liters. The compact, yet robust design makes them ideal for use in manufacturing, pilot-plant, or quality control areas.

All flowmeters measure linearly across a range and record a cumulative volume plus a resettable volume. Meters are factory-calibrated using water but can store two application-specific K-factors determined in process. To conserve power, the six-digit display automatically turns on with flow and then turns off four minutes after flow ceases. The internal parts are simple to replace for easy maintenance—contact our Application Specialists for details.

Meters operate on two lithium batteries (included). Remote installation of the flowmeter body is possible using the optional remote installation kit 05609-93 (order separately below). Calibration containers and replacement battery kits can be ordered below.



Flowmeter 05609-17
with sanitary Tri-Clover® connection



Flowmeter 05609-23
with NPT(F) connection

Specifications

Maximum particulate size

Models with ≤50 GPM (190 LPM) max flow rate: 125 µm
Models with >50 GPM (190 LPM) max flow rate: 500 µm

Repeatability: ±0.1% of reading

Maximum pressure

Aluminum: 300 psig (21 bar); NPT SS: 1500 psig (105 bar);
Tri-Clover SS: 450 psig (31 bar); Flanged SS: 285 psig (19 bar)

Operating temp: 14 to 140°F (–10 to 60°C)

Wetted materials: 316 SS or aluminum housing, PVDF rotor and supports, tungsten carbide shaft, 316 SS retainers, and ceramic bearings



Display: 6-digit LCD, 1/2"H (with floating decimal)

Input power: two 3 V lithium batteries (included)

Battery life: 9000 hours nominal

Approvals: EEx II 3 G IIC T4

Catalog number	Flow range	Connections	Body material	Accuracy	Dimensions (W x H x D)	Price
TW-05609-01 TW-05609-03 TW-05609-05	1 to 10 GPM (3.8 to 37.9 LPM)	1/2" NPT(F) 1/2" NPT(F) 3/4" Tri-Clover†	Aluminum 316 SS 316 SS	±2% of rdg	4 1/2" x 2" x 1 7/8" (11.4 x 5.1 x 4.8 cm) 4 1/2" x 2" x 1 7/8" (11.4 x 5.1 x 4.8 cm) 5" x 2" x 1 7/8" (12.7 x 5.1 x 4.8 cm)	
TW-05609-07 TW-05609-09 TW-05609-11	2 to 20 GPM (7.6 to 75.7 LPM)	3/4" NPT(F) 3/4" NPT(F) 1" Tri-Clover†	Aluminum 316 SS 316 SS	±2.0% of rdg	4 3/8" x 2" x 2" (11.1 x 5.1 x 5.1 cm) 4 3/8" x 2" x 2" (11.1 x 5.1 x 5.1 cm) 5" x 2" x 2" (12.7 x 5.1 x 5.1 cm)	
TW-05609-13 TW-05609-15 TW-05609-17 TW-05609-19	5 to 50 GPM (18.9 to 190 LPM)	1" NPT(F) 1" NPT(F) 1 1/2" Tri-Clover† 1" ANSI‡	Aluminum 316 SS 316 SS 316 SS	±1.5% of rdg	4 1/2" x 2" x 2 1/4" (11.4 x 5.1 x 5.7 cm) 4 1/2" x 2" x 2 1/4" (11.4 x 5.1 x 5.7 cm) 5 1/2" x 2" x 2 1/4" (14.0 x 5.1 x 5.7 cm) 4 3/4" x 4 1/4" x 4 1/4" (12.1 x 10.8 x 10.8 cm)	
TW-05609-21 TW-05609-23 TW-05609-25 TW-05609-27	10 to 100 GPM (38 to 380 LPM)	1 1/2" NPT(F) 1 1/2" NPT(F) 2" Tri-Clover† 1 1/2" ANSI‡	Aluminum 316 SS 316 SS 316 SS	±1% of rdg	5 3/8" x 2 3/4" x 2 1/8" (13.7 x 7.0 x 7.3 cm) 5 3/8" x 2 3/4" x 2 1/8" (13.7 x 7.0 x 7.3 cm) 6 1/2" x 2 3/4" x 2 1/8" (16.5 x 7.0 x 7.3 cm) 8" x 5" x 5" (20.3 x 12.7 x 12.7 cm)	
TW-05609-29 TW-05609-31 TW-05609-33 TW-05609-35	20 to 200 GPM (6 to 760 LPM)	2" NPT(F) 2" NPT(F) 2 1/2" Tri-Clover† 2" ANSI‡	Aluminum 316 SS 316 SS 316 SS	±1% of rdg	6 3/8" x 3 3/8" x 3 1/4" (16.2 x 8.6 x 8.3 cm) 6 3/8" x 3 3/8" x 3 1/4" (16.2 x 8.6 x 8.3 cm) 7" x 3 3/8" x 3 1/4" (17.8 x 8.6 x 8.3 cm) 9 1/2" x 6" x 6" (24.1 x 15.2 x 15.2 cm)	

†Sanitary flange ‡150# ANSI flange

[TW-05610-70](#) Calibration container; HDPE, 5-gallon capacity

[TW-05610-96](#) Replacement battery kit

[TW-05609-93](#) Remote installation kit. Mount display up to 100 feet from the sensor—ideal for measuring flow in hot pipes (up to 250°F/121°C) or in inaccessible areas. Kit includes a sensor cover with 10-ft cable, remote display housing, and installation hardware. FM-approved

[TW-05609-91](#) Output module, pulse output. Module provides a digital open collector output for interfacing with compatible instrumentation

[TW-05609-92](#) Output module, 4 to 20 mA or 5 to 20 volts. Module provides an output for interfacing with compatible instrumentation

[TW-17080-12](#) NIST-traceable calibration with data

Low-Power Flow Sensors and Meters

Display versions designed for use in hazardous process environments

- Battery-powered displays—no wiring required and intrinsically safe
- Large display face is easily readable from a distance
- NEMA 4X enclosure is ideal for wet process environments

The sensors feature 316 stainless steel (SS) body with 416 SS rotor and abrasion-resistant tungsten carbide bearings and shaft to endure corrosive water or other aggressive fluids. All sensors include flow straighteners for stabilizing turbulent flow allowing sensors to be mounted in any position¹.

Select from flow sensor or flowmeters with display. Use sensors with an existing monitor. Sensors feature a preamplifier that must be powered and provides an output signal at distances up to 1000 feet. To interface the flow sensor, order multipin cable 32249-95 (listed below the table). For the flowmeter with remote display, the sensor may be located up to 10 feet away from the display.

¹For highest accuracy, allow at least ten pipe diameters upstream and five on downstream.

Flowmeter
32249-68



Specifications

Sensors (all models)

Fluid type: water-like; up to 30 cp
Max particulate size
 Models 32249-30, -72, and -92: 2000 µm
 All other models: 250 µm
Accuracy:
 ±1% of reading

Repeatability: ±0.1%
Operating temp: -100 to 325°F (-73 to 163°C)
Max pressure: 5000 psi (344 bar)
Input power (sensors only): 5 to 30 VDC
Output signal (sensors only): Square wave pulse, 30 mV to 3 V peak-to-peak

Display (models 32249-60 through -92)

Operating temperature:
 -22 to 158°F (-30 to 70°C)
Electrical classification
 CSA Hazardous:
 Cl. I, Div. I, Grp. B/C/D;
 Cl. II, Grp. E/F/G
 CSA Intrinsically Safe:
 Cl. I, Div. I, Grp. C/D;
 Cl. II, Div. I, Grp. E/F/G
Enclosure rating: NEMA/UL/CSA Type 4/IP67
Display type: 8-digit, 0.7" numeric (upper line); 8-character, 0.35" alphanumeric (lower line) LCD
Input power: one "D" size 1.5 V alkaline battery (included)



Sensor Data

Connections	Pulse output (pulse/gal.)	Sensor length	Pressure drop at max flow
1/2" NPT/3 GPM	20,000	3"	1.2 psi
1/2" NPT/15 GPM	3,300	3"	21 psi
1" NPT	870	4"	20 psi
2" NPT	52	6"	20 psi

Flow range (GPM)	Connections	Flow sensors		Flow sensors with mounted display		Flow sensors with remote display	
		Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
0.3 to 3 2 to 15	1/2" NPT(M)	TW-32249-00		TW-32249-60		TW-32249-80	
		TW-32249-10		TW-32249-64		TW-32249-84	
5 to 50 40 to 400	1" NPT(M)	TW-32249-20		TW-32249-68		TW-32249-88	
		TW-32249-30		TW-32249-72		TW-32249-92	

TW-32249-95 Cable, 10-ft (3 m) length with 3-pin connector. Connects flow sensors to a remote display/controller

Commercial Grade Flowmeters/Totalizers

Superb accuracy for low-flow applications

- Battery-powered to eliminate the need for expensive wiring
- Two totalizers allow for process or period-specific volume monitoring

These general purpose in-line flowmeters/totalizers display flow rate and accumulated flow in GPM or LPM. The NEMA enclosure is suitable for indoor/outdoor use in dusty, dirty, and wet environments. The compact design makes them ideal for use in light manufacturing, pilot-plant, or quality control areas. Meters are factory-calibrated using water but can store two application-specific K-factors determined in process. Wetted components are the nylon or aluminum housing, nylon rotor, tungsten carbide shaft, 316 SS rings, and ceramic bearings. Order calibration containers to easily calibrate your flow meters.



Flowmeter/totalizer
05610-04

Specifications

Accuracy: ±1.5% of reading
Operating temp: 14 to 140°F (-10 to 60°C)
Display type: 6-digit LCD, 1/2"H (with floating decimal)

Input power: two 3 V lithium batteries
Battery life: 9000 hours nominal



Dimensions (L x W x H):
 4" x 2" x 2 1/2" (10.2 x 5.1 x 6.4 cm)
Approvals: EEx II 3 G IIC T4

Catalog number	Flow range	Connections	Housing material	Maximum pressure	Repeatability	Pressure drop at max flow	Maximum particulate size	Price
TW-05610-01	0.3 to 3.0 GPM (1 to 10 LPM)	1" NPT(F)	Nylon	150 psi (10.3 bar)	±1%	8 psig	125 microns	
TW-05610-02			Aluminum	300 psi (20.7 bar)				
TW-05610-04	3 to 50 GPM (10 to 190 LPM)	1" NPT(F)	Nylon	150 psi (10.3 bar)	±0.2%	5 psig	500 microns	
TW-05610-06			Aluminum	300 psi (20.7 bar)				
TW-05610-08	30 to 300 GPM (100 to 1000 LPM)	2" NPT(F)	Aluminum	300 psi (20.7 bar)	±0.2%	4 psig	500 microns	

TW-05610-96 Replacement battery kit

TW-17080-12 NIST-traceable calibration with data

TW-05610-70 Calibration container; HDPE, 5-gal. capacity



Schedule 80 PVC Turbine Flowmeters/Totalizers

Exceptional performance in a heavy-duty schedule 80 PVC housing

- Choose from units with battery-powered 6-digit display or pulse output
- Gallon and liter measurement units

These durable meters offer accuracy at a reasonable price for measuring water and are available in flow ranges from 1 to 200 GPM and 1/2" to 2" fitting sizes. Meters with display indicate totalization and rate of flow, and offer digital indication powered by two replaceable lithium batteries. Meters read up to 999,999 gallons or liters—switch between gallon and liter and the electronics will indicate accurately in both units of measure.

Flowmeters are available with male spigot or NPT(F) fittings, and install easily into existing PVC plumbed systems. Factory calibrated to water, this economical meter can be field calibrated to other low-viscosity fluids. Connections up to 4" are available. Contact an Application Specialist or go to ColeParmer.com.

Specifications

Max particulate size: 125 µm
Media type: water
Accuracy: ±3.0% of reading
Operating temperature: 32 to 140°F (0 to 60°C)
Operating pressure: 150 psig (10.3 bar) at 73°F

Wetted materials: PVC housing, ceramic bearings, tungsten carbide shaft, PVDF rotor, and 316 SS rings
Power: Models with display: two 3 V lithium batteries (included)
 Models with pulse output: 9 to 35 VDC



05611-17



05611-52



Meter shown with 90° adapter kit 05611-90

Flow Range		Connections	Meters with display and no output		Meters with pulse output and no display	
GPM	LPM		Cat. no.	Price	Cat. no.	Price
1 to 10	3.8 to 38	1/2" male spigot 1/2" NPT(F)	TW-05611-10		TW-05611-50	
			TW-05611-15		TW-05611-51	
2 to 20	7.6 to 76	3/4" male spigot 3/4" NPT(F)	TW-05611-11		TW-05611-52	
			TW-05611-16		TW-05611-53	
5 to 50	19 to 190	1" male spigot 1" NPT(F)	TW-05611-12		TW-05611-54	
			TW-05611-17		TW-05611-55	
10 to 100	38 to 380	1 1/2" male spigot 1 1/2" NPT(F)	TW-05611-13		TW-05611-56	
			TW-05611-18		TW-05611-57	
20 to 200	76 to 760	2" male spigot 2" NPT(F)	TW-05611-14		TW-05611-58	
			TW-05611-19		TW-05611-59	

TW-05611-90 90° Adapter kit allows you to mount horizontal meters on vertical pipes. Includes O-ring, hardware, and foam spacers
 TW-17080-12 NIST-traceable calibration with data

Economical Totalizing Turbine Flowmeters

Easy-to-read LCD displays batch or cumulative totals

- Simple, small, and sturdy
- Mount on hose or in-line

Measure batch and cumulative totals in liquid transfer systems with these sturdy meters. Nylon meter is designed to measure water. Aluminum meter is designed to measure petroleum fuels. Meters can be used on any pump, pressure, or gravity feed system. The batch total can be reset to measure flow for a single use. The cumulative total will automatically reset to zero when the maximum reading of 9999 is met.

Specifications

Max particulate size: 30 µm
Accuracy: ±5% full-scale
Repeatability: ±5% full-scale
Connections: 1" NPT(F)
Operating temperature: 14 to 130°F (-10 to 55°C)

Display type: 6-digit LCD, 5/8"H
Power: two AAA batteries (included)
Battery life: 5000 hours
Dimensions (L x W x H): 4" x 2" x 2 1/2" (10.2 x 5.1 x 6.4 cm)



05611-22



Catalog number	Flow range	Body material	Media type	Max pressure	Price
TW-05611-22	3 to 30 GPM (10 to 100 LPM)	Nylon	Water	150 psi (10.3 bar)	
TW-05611-24		Aluminum	Fuel	300 psi (20.7 bar)	

TW-09376-00 Replacement batteries; AAA, 1.5 V. Pack of 12
 TW-17080-12 NIST-traceable calibration with data

Flowmeters Paddle Wheel

Flowmeter Systems

Sensors, monitors, controllers, and installation fittings—the guide at right can direct you to a full array of components that are designed to work seamlessly in any custom arrangement that you choose. The example (below right) highlights a common system application for numerous industries. This is only the beginning, there are an infinite number of component combinations to match your needs.

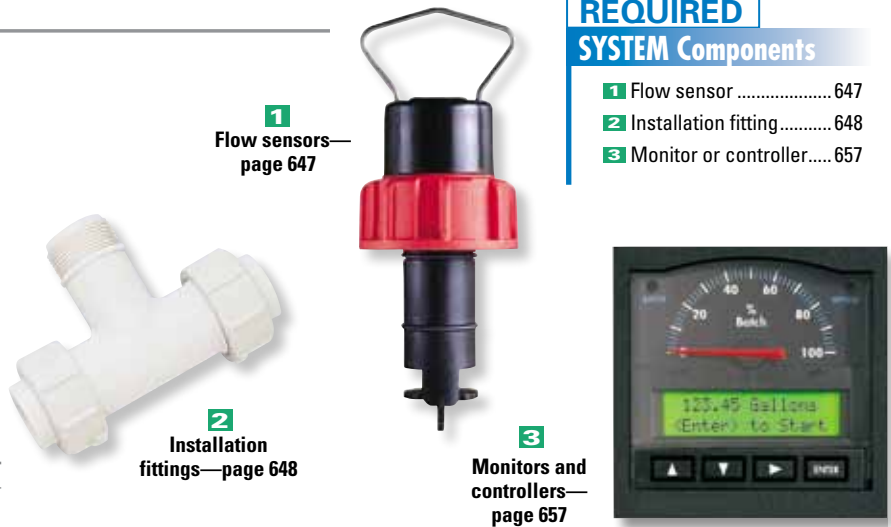
Reference the table below for suitable flow ranges of each sensor type. The guide at right lists the location of additional components to complete a system. As always, please feel free to contact an Application Specialist for additional technical support.

Flow Ranges for flow sensors on page 647.

Pipe ID	Flow range (GPM)		
	Low-flow Rotor-X™	Standard Rotor-X™	Metalex™
½"	0.3 to 19	1 to 19	1.6 to 19
¾"	0.5 to 34	1.7 to 34	2.7 to 34
1"	0.8 to 54	2.7 to 54	4.4 to 54
1¼"	1.4 to 94	4.7 to 94	7.4 to 94
1½"	1.9 to 127	6.4 to 127	10.1 to 127
2"	3.2 to 210	10.6 to 210	16.8 to 210
2½"	4.5 to 300	15 to 300	24 to 300
3"	7 to 461	24 to 461	37 to 461
4"	12 to 794	40 to 794	63 to 794
5"	19 to 1247	63 to 1247	100 to 1247
6"	27 to 1801	91 to 1801	144 to 1801
8"	47 to 3119	156 to 3119	250 to 3119
10"	74 to 4915	246 to 4915	393 to 4915
12"	105 to 6977	349 to 6977	559 to 6977

REQUIRED SYSTEM Components

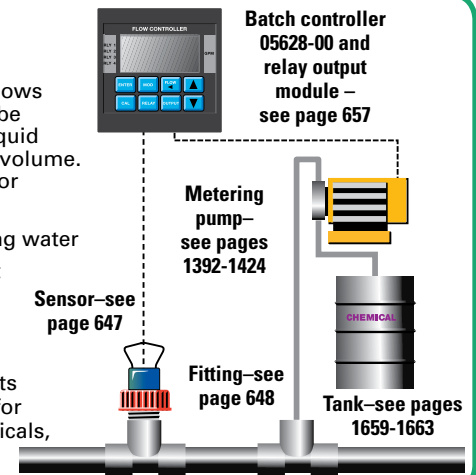
- 1 Flow sensor 647
- 2 Installation fitting 648
- 3 Monitor or controller 657



Example of a chemical proportioning system using these Flow Systems

Chemical Proportioning System allows for an accurate volumetric ratio to be maintained between the process liquid volume and the chemical injection volume. Real applications include injection or introduction of:

- Vitamins into farm animal drinking water
- Sodium hypochlorite disinfectant into water
- Fertilizer into irrigation water
- Bio-engineered organisms into liquids for manufacturing products such as man-made snow, soaps for large laundries, defoaming chemicals, and insecticides.

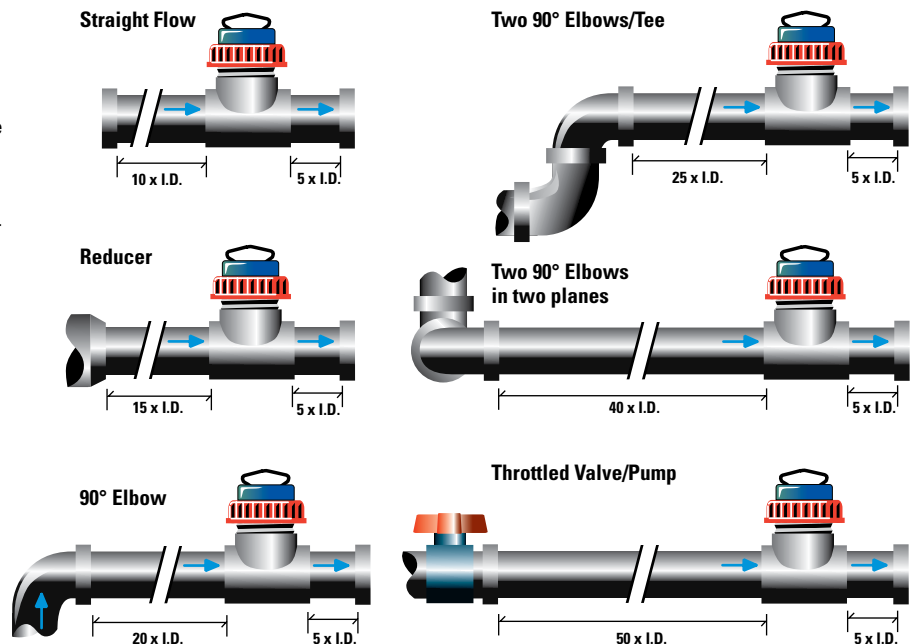
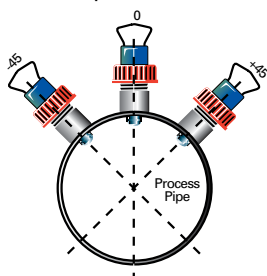


Installing Your Flow Sensor

For best results, allow a straight run of pipe before and after the sensor after any bends, valves, or flow restrictions.

Stated accuracy is not guaranteed unless the Signet installation fittings on page 648 are used. The installation fitting ensures proper paddle depth and orientation.

In horizontal pipe runs with no air pockets or sediments present, mount the sensor/fitting in the 12 o'clock or 6 o'clock position. If sediment or air pockets are present, tilt the sensor/fitting at a maximum angle of 45° to avoid these obstacles. Vertical runs require upward flow. Pipes must be full.





Low-Flow Rotor-X™ Sensors

Measure low flow rates with better resolution

Measure a wider flow range with these high-quality designs. The rotor has an open core design to eliminate cavitation, to reduce drag on the paddle and to minimize pressure drop within the system. Less refined products in the market will use solid paddlewheels that can produce a non-linear and non-repeatable signal.

The design is suitable for measuring flow from 0.3 to 20 feet/second. Unlike basic paddle designs, this sensor includes a magnet in each paddle—4 total—for much higher resolution throughout the linear measuring range. Without amplification, the output signal can be transmitted up to 1000 feet.

This sensor is offered in materials to resist most chemicals. Select from glass-filled polypropylene or natural PVDF. All sensors have a PVDF rotor and Viton® O-ring. An integrated 25-foot signal cable is included for wiring the sensor into most systems.

These sensors may be mounted in any pipe that is compatible with the installation fittings on the following page. Rotor-X low-flow sensors are compatible with all of the line-powered displays, totalizers and controllers listed on page 657.



32500-00

Rotor-X™ Sensors

Economical version of a proven design

This sensor's rotor has an open core design to eliminate cavitation, to reduce drag on the paddle, and to minimize pressure drop within the system. Less refined products in the market will use solid paddlewheels that can produce a nonlinear and nonrepeatable signal.

The design is suitable for measuring flow from 1 to 20 feet/second. This paddle design includes a magnet in two opposite paddles for good resolution throughout the measuring range. Without amplification, the output signal can be transmitted up to 200 feet. As an FM-approved device, this sensor may be installed in hazardous locations.

This sensor is offered in materials to resist most chemicals. Select from glass-filled polypropylene or natural PVDF. All sensors have a PVDF rotor and Viton® O-ring. An integrated 25-foot signal cable is included for wiring the sensor into most systems.

These sensors may be mounted in any pipe that is compatible with the installation fittings on the following page. Rotor-X sensors are compatible with all of the line-powered displays, totalizers and controllers listed on page 657.



05618-10

Specifications



Flow velocity: 0.3 to 20 ft/sec (0.1 to 6 m/sec)

Output: open collector, sinking

Linearity: ±1% full-scale

Repeatability: ±0.5% full-scale

Max temp: 185°F (85°C) at 25 psi

Max pressure (at 68°F/20°C)

PP body: 180 psi (12.4 bar)

PVDF body: 200 psi (13.8 bar)

Input power: 3.3 to 24 VDC (supplied by a flow monitor/controller)



Catalog number	Pipe ID	Sensor length	Price
Sensors with polypropylene body; titanium shaft			
TW-32500-00	½" to 4"	4½"	
TW-32500-02	5" to 8"	5¾"	
Sensors with PVDF body; Hastelloy C® shaft			
TW-32500-10	½" to 4"	4½"	

Specifications



Flow velocity: 1 to 20 ft/sec (0.3 to 6 m/sec)

Output: 1 V peak-to-peak per ft/sec; 8 kΩ source impedance, nominal frequency of 6 Hz per ft/sec

Linearity: ±1% full-scale

Repeatability: ±0.5% full-scale

Max temp

PP body: 194°F (90°C)

PVDF body: 212°F (100°C)

Max pressure (at 68°F/20°C)

PP body: 180 psi (12.4 bar)

PVDF body: 200 psi (13.8 bar)



Catalog number	Pipe ID	Sensor length	Price
Sensors with polypropylene body; titanium shaft			
TW-05618-10	½" to 4"	4½"	
TW-05618-11	5" to 8"	5¾"	
Sensors with PVDF body; Hastelloy C® shaft			
TW-05618-13	½" to 4"	4½"	

Metalex™ Sensors

Stainless steel body withstands high pressures and temperatures

This design was specifically developed to handle aggressive flow applications such as liquid ammonia and steam condensate. Like all +GF+® Signet designs, the rotor has an open core design to eliminate cavitation, to reduce drag on the paddle and to minimize pressure drop within the system.

The design is suitable for measuring flow from 1.6 to 20 feet/second. Without amplification, the output signal can be transmitted up to 200 feet. As an FM-Approved device, this sensor may be installed in hazardous locations.

The sensor body is 316 SS. Other components are a CD4MCu SS rotor, Fluoroloy B® rotor bearing and KLINGER®sil O-ring. An integrated 25-foot signal cable is included for wiring the sensor into most systems.

These sensors may be mounted in any pipe that is compatible with the Metalex-specific installation fittings on the following page. Metalex sensors are compatible with all of the line-powered displays, totalizers and controllers listed on page 657.



05618-64

Specifications



Flow velocity: 1.6 to 20 ft/sec (0.5 to 6 m/sec)

Output: sine wave, 12k Ω source impedance; nominal frequency of 12 Hz per ft/second

Linearity: ±1% full-scale

Repeatability: ±0.5% full-scale

Max temp

Mini-tap fitting: 300°F (149°C)

Saddle fitting: 150°F (66°C)

Max pressure

Mini-tap fitting: 1500 psi (103 bar)

Saddle fitting: 300 psi (20.7 bar)



Catalog number	Pipe ID	Sensor length	Price
Use with mini-tap fitting			
TW-05618-60	½" to 1"	1½"	
TW-05618-64	1¼" to 12"	2½"	
Use with saddle fitting			
TW-05618-80	2" to 12"	4½"	

MORE info!

Mounting is critical to flow measurement accuracy. The fitting places the sensor at the proper height in the flow stream to achieve the maximum accuracy. To ensure proper paddle-wheel alignment, order an installation fitting from the next page.



Flowmeters

Paddle Wheel

Installation Fittings

Fittings are precision crafted to ensure proper sensor insertion depth and accurate flow measurement. Pipe fitting sizes range from 1/2" to 12" in diameter. See our chemical resistance charts (go to www.coleparmer.com/techinfo) to select a fitting material compatible with your fluid. Order dummy plugs (key letter **J**) to use in pipelines while sensors are removed.

- A** **PVDF Tees** with true union socket connectors. For pipes up to 2" in diameter.
- B** **Polypropylene Tees** for pipes up to 2" in diameter. True union socket connectors.
- C** **PVC Tees** for PVC 80 pipes up to 4" in diameter and CPVC 80 pipes up to 1 1/2" in diameter. Slip on ends (no threads).
- D** **Metal Tees** for copper, 316 stainless steel (SS), carbon steel (CS), and galvanized iron (schedule 40) pipes up to 2" in diameter. SS, CS, and galvanized iron fittings include PVDF insert for all sizes and NPT(F) threads at each end. Copper tee fittings include PVDF insert for pipe ID over 1" and feature sweat-on ends.
- E** **316 SS Socket-Weld Mini-Tap Fittings** for Metalex™ sensors only. Includes cap kit.

- F** **316 SS Weld-On Mini-Tap Fittings** for Metalex sensors only. Include a cap kit.
- G** **PVC Saddles** for PVC 40 pipes from 2" to 4" in diameter; PVC 80 pipes from 6" to 8" in diameter. Specify schedule of pipe when ordering.
- H** **Galvanized Iron (Schedule 80) Saddles** for pipes from 2 1/2" to 4" in diameter. Specify schedule of pipe when ordering.
- I** **Weldolet Fittings** weld directly onto hole cut in pipe. For stainless steel and carbon steel pipes 2 1/2" to 12" in diameter. Specify schedule of pipe when ordering.
- J** **Dummy Plug**. Insert a plug in place of the sensor when it has been removed for inspection or service. **Note:** Not for use with Metalex sensors.

TW-05614-29 Polypropylene dummy plug

REQUIRED SYSTEM Components

- 1** Flow sensor647
- 2** Installation fitting.648
- 3** Monitor or controller.657

Fitting type	Pipe ID	Material	Catalog number	Price
A	1/2"	PVDF	TW-05619-51	
B		Polypropylene	TW-05619-61	
C		PVC 80	TW-05620-21	
C		CPVC 80	TW-05620-31	
D		316 SS	TW-05620-41	
D		Copper	TW-05620-71	
E		316 SS socketTW-weld	TW-05618-61	
A	3/4"	PVDF	TW-05619-52	
B		Polypropylene	TW-05619-62	
C		PVC 80	TW-05620-22	
C		CPVC 80	TW-05620-32	
D		316 SS	TW-05620-42	
D		Copper	TW-05620-72	
E		316 SS socketTW-weld	TW-05618-62	
C	1"	PVC 80	TW-05620-23	
C		CPVC 80	TW-05620-33	
D		Galvanized iron (40)	TW-05620-53	
D		316 SS	TW-05620-43	
D		Copper	TW-05620-73	
E		316 SS socketTW-weld	TW-05618-63	
A	1 1/4"	PVDF	TW-05619-53	
A		PVDF	TW-05619-54	
B		Polypropylene	TW-05619-64	
C		PVC 80	TW-05620-24	
C		CPVC 80	TW-05620-34	
D		Galvanized iron (40)	TW-05620-54	
D		316 SS	TW-05620-44	
D		Copper	TW-05620-74	
R		316 SS weld-on	TW-05618-65	
A	1 1/2"	PVDF	TW-05619-55	
B		Polypropylene	TW-05619-65	
C		PVC 80	TW-05620-25	
C		CPVC 80	TW-05620-35	
D		Galvanized iron (40)	TW-05620-55	
D		316 SS	TW-05620-45	
D		Copper	TW-05620-75	
F		316 SS weld-on	TW-05618-66	

*Fittings are metric size with a 32 mm (1.2598") pipe ID, not 1 1/4".



A



B



C



D

Fitting type	Pipe ID	Material	Catalog number	Price
A	2"	PVDF	TW-05619-56	
B		Polypropylene	TW-05619-66	
C		PVC 80	TW-05620-26	
D		Galvanized iron (40)	TW-05620-56	
D		316 SS	TW-05620-46	
D		Copper	TW-05620-76	
G		PVC 40	TW-05620-16	
F		316 SS weld-on	TW-05618-70	
C	2 1/2"	PVC 80	TW-05620-27	
G		PVC 40	TW-05620-17	
H	3"	Galvanized iron (80)	TW-05620-57	
C		PVC 80	TW-05620-28	
G		PVC 40	TW-05620-18	
H	4"	Galvanized iron (80)	TW-05620-58	
I		Carbon steel	TW-05615-23	
I		316 SS	TW-05620-48	
F		316 SS weld-on	TW-05618-72	
C		PVC 80	TW-05620-29	
G		PVC 40	TW-05620-19	
H	6"	Galvanized iron (80)	TW-05620-59	
I		Carbon steel	TW-05615-24	
F		316 SS weld-on	TW-05618-73	
G	8"	PVC 80	TW-05620-83	
I		Carbon steel	TW-05615-26	
F	10"	316 SS weld-on	TW-05618-75	
G		PVC 80	TW-05620-84	
I	12"	Carbon steel	TW-05615-27	
I		Carbon steel	TW-05615-28	
I		Carbon steel	TW-05615-29	



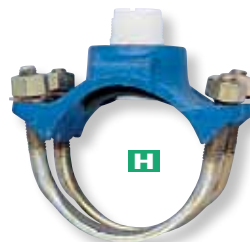
E



F



G



H



I



J



Low-Flow Impeller Sensors and Controllers

Impeller design minimizes wear for long sensor life

Each flow sensor uses a rotating turbine and a magnetic Hall-effect sensor to generate an electronic pulse proportional to flow rate. The controller converts these pulses into flow units. These low-flow sensors measure flow rates in pipe sizes from 3/8" to 1" NPT(F). Sensors generate a square wave pulse output that can be sent to flow controllers 33110-60 or -70 to display flow rate and total; batch controller 33112-52, which provides batch output control to multiple devices; or rate/total display 33112-50, which is a battery-operated two-line display.

Choose from polypropylene (PP), TFE, 316 stainless steel (SS), or brass sensors. Select PP sensors for general-purpose applications. Use TFE sensors for high-purity, high-temperature applications. The 316 SS sensors should be used in applications such as chemical batching and injection, fertilizer injection, or proportioning of spray chemicals. Brass sensor should be used in applications using clean water. For best results, install sensors within a straight run of tubing or pipe (five pipe diameters long on the inlet side). Sensors can be mounted in any orientation. All models include an 18-ft (5.5-m) L cable with stripped ends.



33125-10

Specifications

Viscosity range: 30 cp max	Max pressure	Output signal
Accuracy: ±1% full-scale	PP and TFE: 150 psi (10.3 bar)	PP, TFE, and SS: current
Linearity: ±1% full-scale	SS: 500 psi (34.5 bar)	sinking pulse,
Repeatability: ±0.5% full-scale	Brass: 175 psi (12 bar)	6 to 24 VDC
Max operating temperature	Input power	Brass: square wave pulse,
PP and TFE: 160°F (71°C)	PP, TFE, and SS:	5 to 30 VDC
SS: 200°F (93°C)	5 to 24 VDC, 2 mA min	Cable length: 18 ft
Brass: 185°F (85°C)	Brass: 5 to 30 VDC current	
	sinking pulse	

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CERTIFIED SUPPLIER



Wetted materials	PP	TFE	316 SS	Brass
Body	PP	TFE	316 SS	Nickel-plated brass
Rotor	PVDF	PVDF	PVDF	Thermoplastic
Shaft	Tungsten carbide	Ceramic	Tungsten carbide	Tungsten carbide
Bearings	Ruby	Ruby	Ruby	Sapphire, graphic
O-ring	EPDM	Viton®	Viton	Viton
Cover	Acrylic	TFE	316 SS	Thermoplastic

Flow range (GPM)	Connection NPT(F)	Pressure drop at max flow	PP sensors		TFE sensors		SS sensors		Brass sensors	
			Cat. no.	Price	Cat. no.	Price	Cat. no.	Price	Cat. no.	Price
0.07 to 5	3/8"	15 psi	TW-33110-00	—	TW-33110-05	—	—	—	—	—
0.1 to 10	1/2"	15 psi	TW-33110-10	—	TW-33110-15	—	TW-33125-10	—	—	—
0.2 to 10	1/2"	14 psi	—	—	—	—	—	—	TW-33125-00	—
0.2 to 15	3/4"	14 psi	—	—	—	—	TW-33125-15	—	—	—
0.2 to 18	3/4"	14 psi	—	—	—	—	—	—	TW-33125-05	—
0.2 to 20	3/4"	24 psi	TW-33110-20	—	TW-33110-25	—	—	—	—	—
0.5 to 25	1"	15 psi	—	—	—	—	TW-33125-20	—	—	—
0.5 to 40	1"	24 psi	TW-33110-30	—	TW-33110-35	—	—	—	—	—

Flow Rate/Totalizer Display

Battery-operated flow rate/totalizer display has a three to five year battery life. The two-line LCD provides 6-digit rate and 8-digit total display simultaneously—units are user-selectable. Flow display has simple, three-button operation: enter the R-factor, pulse output scaling, and the decimal point. Includes a wall-mountable NEMA 4X enclosure.



33112-50

Specifications

2 year warranty

Sensor input: square wave, 20 mV to 6 V peak to peak
Output: 0.1 second open collector pulse, scalable 0.1 to 200,000 units/pulse
Operating temperature: 32 to 158°F (0 to 70°C)
Power: lithium C cell battery, 3 V
Dimensions (W x H x D): 3 3/8" x 3 3/8" x 2 1/8" (9.8 x 9.8 x 7.3 cm)

Cat. no.	Description	Price
TW-33112-50	Flow rate/totalizer display	

Batch Controller

Controller provides batch output control through two relays for controlling multiple devices. Dual pulse outputs allow proportional feed with pulse-responsive metering pumps. Features backlit 5-digit flow rate and 8-digit totalizer displays—volume and time units are user-selectable. NEMA 4X enclosure can be wall or panel mounted.



2 year warranty

Specifications

Sensor input: open collector current sink; 1000 Hz max
Output power, sensor: 12 VDC, 10 mA
Relay output: two SPDT relay, 115 VAC, 5 A max, NO or NC
Pulse output: two, 100 mA at 60 VDC, max
Analog output: 4 to 20 mA, 0 to 10 VDC, or 0 to 5 VDC
Operating temperature: 32 to 130°F (0 to 55°C)
Input power: 115/220 VAC, 50/60 Hz or 12 to 24 VDC
Auxiliary input: batch start/stop/resume
Dimensions (W x H x D): 6 1/16" x 6 7/16" x 4 7/8" (16.3 x 16.3 x 11.8 cm)

Cat. no.	Description	Price
TW-33112-52	Batch controller	

Flow Controllers

Controllers display flow rate and total (resettable) simultaneously on a two-line 8-digit LCD. The 4 to 20 mA output lets you send data to a recorder or data logger. Nonvolatile memory stores flow total in the event of power failure.

Panel-mount model 33110-60 features a gasketed front panel, membrane switches, and NEMA 12 (IP52) enclosure. Wall-mount model 33110-70 has a clear cover and splashproof NEMA 4X (IP56) enclosure. Both models include a 2 1/2-ft (0.8-m) L cable with stripped ends.

Specifications

2 year warranty

Input signal: pulse frequency 5 VDC 200 Hz max
Output signal: 4 to 20 mA (loop) scaled pulse, open collector; sensor pulse pass through high/low alarm (through pulse output)
Operating temperature: 32 to 158°F (0 to 80°C)
Input power: 12 or 32 VDC, 4 mA loop powered
Display type: two-line, 8-digit LCD, 7/16"H
Panel cutout: 3 1/16"W x 3 3/16"H x 2"D
Dimensions (W x H x D)
Panel-mount model: 3 3/4" x 3 3/4" x 2" (9.5 x 9.5 x 5.1 cm)
Wall-mount model: 3 7/8" x 3 7/8" x 2 1/8" (9.8 x 9.8 x 7.3 cm)

Cat. no.	Description	Price
TW-33110-60	Panel mount	
TW-33110-70	Wall mount	



Flowmeters Paddle Wheel

Cole-Parmer® Battery-Powered In-Line Flowmeters

Battery-powered meters are perfect for remote locations

- Polypropylene (PP) in-line fittings feature NPT(F) true-union connections for simple installation on existing pipe
- Factory-calibrated for GPM or LPM
- Corrosion-resistant polyvinylidene fluoride (PVDF) sensor features a NEMA 4X enclosure acceptable for outdoor use
- Simple operation with nothing to program
- Accurate measurement with virtually zero pressure drop



Flowmeter with totalizer 32555-50

Specifications



- Fluid type:** water-like, less than 1% solids
Accuracy: ±2% full scale
Operating temperature: 200°F (93°C) max
Operating pressure: 300 psi (20.7 bar)
Wetted materials: polypropylene, PVDF, Hastelloy-C, Viton®
Power: two AAA batteries (included)
Battery life: one year minimum
Enclosure rating: NEMA 4X
Display type: 6-digit LCD, 3/8"H
Display update: 1.5 seconds
Dimensions (W x H x D): 3" x 5" x 2" (7.6 x 12.7 x 5.1 cm)

Connections NPT(F)	English scale			Metric scale		
	Flow range (GPM)	Catalog number	Price	Flow range (LPM)	Catalog number	Price
Flowmeters						
3/8"	0.4 to 4	TW-32555-00		1 to 10	TW-32555-02	
3/8"	0.8 to 8	TW-32555-04		3 to 30	TW-32555-06	
1/2"	2 to 20	TW-32555-08		7 to 70	TW-32555-10	
3/4"	4 to 40	TW-32555-12		15 to 150	TW-32555-14	
1"	6 to 60	TW-32555-16		25 to 250	TW-32555-18	
1 1/2"	10 to 100	TW-32555-20		40 to 400	TW-32555-22	
1 1/2"	15 to 150	TW-32555-24		60 to 600	TW-32555-26	
2"	30 to 300	TW-32555-28		100 to 1000	TW-32555-30	
Flowmeters with totalizers						
3/8"	0.4 to 4	TW-32555-50		1 to 10	TW-32555-52	
3/8"	0.8 to 8	TW-32555-54		3 to 30	TW-32555-56	
1/2"	2 to 20	TW-32555-58		7 to 70	TW-32555-60	
3/4"	4 to 40	TW-32555-62		15 to 150	TW-32555-64	
1"	6 to 60	TW-32555-66		25 to 250	TW-32555-68	
1 1/2"	10 to 100	TW-32555-70		40 to 400	TW-32555-72	
1 1/2"	15 to 150	TW-32555-74		60 to 600	TW-32555-76	
2"	30 to 300	TW-32555-78		100 to 1000	TW-32555-80	

[TW-09376-00](#) Replacement batteries; AAA. Pack of 12

[TW-17080-12](#) NIST-traceable calibration with data

Cole-Parmer® Economical In-Line Flowmeters

Accurate measurement with virtually zero pressure drop

- Simple operation with nothing to program
- Factory-calibrated for GPM or LPM



Flowmeter with totalizer 32556-24

These injection-molded in-line flowmeters are battery powered (two AAA batteries included) making them perfect for remote locations. Enclosure is rated NEMA 4X and can be used in outdoor locations. Sensor is constructed of corrosion-resistant PVDF; in-line NPT(M) fittings are of PP.

Specifications



- Fluid type:** water-like, less than 1% solids
Accuracy: ±1% full-scale
Operating temperature: 200°F (93°C) max
Operating pressure: 300 psi (20.7 bar)
Wetted materials: PP, PVDF, Viton®
Power: two AAA batteries (included)
Battery life: one year minimum
Enclosure rating: NEMA 4X
Display type: 6-digit LCD, 3/8"H
Display update: 1.5 seconds (10 second average)
Dimensions (W x H x D): 3" x 5" x 2" (7.6 x 12.7 x 5.1 cm)

Connections NPT(M)	English scale			Metric scale		
	Flow range (GPM)	Catalog number	Price	Flow range (LPM)	Catalog number	Price
Rate only flowmeters						
3/8"	0.4 to 4	TW-32556-00		1 to 10	TW-32556-32	
3/8"	0.8 to 8	TW-32556-02		3 to 30	TW-32556-34	
1/2"	2 to 20	TW-32556-04		7 to 70	TW-32556-36	
3/4"	3 to 30	TW-32556-06		11 to 110	TW-32556-38	
1"	6 to 60	TW-32556-08		25 to 250	TW-32556-40	
1 1/2"	10 to 100	TW-32556-10		40 to 400	TW-32556-42	
1 1/2"	15 to 150	TW-32556-12		60 to 600	TW-32556-44	
2"	30 to 300	TW-32556-14		100 to 1000	TW-32556-46	
Rate and totalizer flowmeters						
3/8"	0.4 to 4	TW-32556-16		1 to 10	TW-32556-48	
3/8"	0.8 to 8	TW-32556-18		3 to 30	TW-32556-50	
1/2"	2 to 20	TW-32556-20		7 to 70	TW-32556-52	
3/4"	3 to 30	TW-32556-22		11 to 110	TW-32556-54	
1"	6 to 60	TW-32556-24		25 to 250	TW-32556-56	
1 1/2"	10 to 100	TW-32556-26		40 to 400	TW-32556-58	
1 1/2"	15 to 150	TW-32556-28		60 to 600	TW-32556-60	
2"	30 to 300	TW-32556-30		100 to 1000	TW-32556-62	

[TW-09376-00](#) Replacement batteries; AAA. Pack of 12

[TW-17080-12](#) NIST-traceable calibration with data



Cole-Parmer® Micro-Flo Rate and Total Meters

Economical low-flow ranges

- Displays flow rate and total
- Preset factory calibrations or custom field-calibrated

These economical meters are capable of very low flow rates. The display is programmable for preselected factory settings or can be field calibrated for high accuracy in a specific application. Displays units in milliliters, ounces, liters, or gallons; displays time in minutes, hours, or days. Display can be programmed for up to four decimal places. All units are supplied with a 115 VAC/DC power supply.



32550-01

Specifications

- Accuracy:** ±6% full-scale
- Maximum fluid temperature:** 130°F (54°C)
- Maximum working pressure:** 200 psi (13.8 bar)
- Materials of construction:**
PVDF body, paddle, axle, tubing connections;
PVC NPT connections and lens; Viton® O-rings
- Power:** 115 VAC/DC plug-in transformer



Flow range (mL/min)	¼" NPT(F) pipe connection		¼" ID x ¾" OD tubing connection	
	Catalog number	Price	Catalog number	Price
30 to 300	TW-32550-01		TW-32550-13	
100 to 1000	TW-32550-03		TW-32550-15	
200 to 2000	TW-32550-05		TW-32550-17	
300 to 3000	TW-32550-07		TW-32550-19	
500 to 5000	TW-32550-09		TW-32550-21	
700 to 7000	TW-32550-11		TW-32550-23	

Turbo-Prop Open-Channel Flowmeters

Accurately measure water velocity in open channels and partially filled pipes

- Digital display in ft/sec or m/sec
- Records 30 data sets for later analysis
- Lightweight, rugged, and reliable

Water velocity flowmeter consists of a protected water turbo-prop positive displacement sensor coupled with an expandable probe handle ending in a digital readout display. Meter incorporates true velocity averaging for the most accurate flow measurements. Magnetic material in the propeller tip passes a pickup point in the water velocity meter handle producing electrical impulses that are carried to the readout display by an internal cable. The flowmeter propeller rotates freely on its bearing shaft with no mechanical interconnections for minimal friction.

The turbo-prop is easily removed for cleaning or replacement. The sensor is designed to shed debris and is protected inside a 2" diameter housing. Probe housing may be placed directly on the bottom of a pipe or streambed for measuring flow in depths as low as 2".

Large LCD displays average, minimum, and maximum water velocity readings. Up to 30 sets of time-and-date stamped data points can be stored in the computer with the push of a button. The computer has a water-resistant housing and incorporates a unique four-button operation for changing functions and resetting the display. Computer is powered by a non-replaceable battery that will last approximately five years with normal use. Low battery and end of data warnings will also display.

A 3-foot Mylar®-coated staff gauge (graduated in hundredths of a foot and centimeters) is attached to the lower section of the water velocity probe for instant water depth measurements and accurate propeller positioning. Meter is ideal for measuring flows in streams, rivers, canals, stormwater, wastewater, inflow and infiltration studies, and industrial process waters.

What's included: padded carrying case.



Specifications

- Fluid type:** water
- Accuracy:** ±0.1 ft/sec
- Flow range:** 0.3 to 19.9 ft/sec
- Operating temperature:** -4 to 158°F (-20 to 70°C)
- Display:** 3-digit LCD, 0.5"H

- Material of construction**
Probe: PVC and anodized aluminum with SS water bearing
Computer: ABS/PC housing with polyester overlay
- Power:** lithium battery (nonreplaceable)
- Battery life:** approx 5 years



Flowmeter display



Flowmeter turbine

Catalog number	Handle length	Price
TW-32922-01	3 to 6 ft (0.9 to 1.8 m)	
TW-32922-02	5 to 15 ft (1.5 to 4.5 m)	

[TW-17080-12](#) NIST-traceable calibration



Flowmeters

Gear

Aluminum/Stainless Steel Gear Flow Sensors/Transmitters

Flowmeters with ±0.5% accuracy for flow rates up to 60 GPM (227.12 LPM)

- High-strength aluminum or stainless steel body withstands pressures up to 5000 psi
- Choose models with pulse output, 4 to 20 mA signal output, or integral digital display

Precisely measured gear teeth deliver consistent ±0.5% accuracy even when measuring high-viscosity fluids—ideal for measuring the flow of oils, grease, fuels, solvents, and other nonabrasive lubricating liquids. These positive displacement flowmeters are solidly built to provide excellent dynamic response for use in high-pressure applications. Gears and bearings withstand bidirectional flow without damage. Two 6-mm mounting holes let you secure the meter on a base plate, panel, or manifold. Available with a high-strength aluminum or 303 SS body.

A Flowmeters with Pulse Output provide a NPN sourcing square wave pulse that is proportional to the flow rate. The peak-to-peak voltage of this square wave is the supply voltage provided minus two volts.

B Flowmeters with Analog Output provide a scalable 4 to 20 mA signal output proportional to the flow rate.

C Flowmeters with Meter-Mounted Display instantaneous flow rate or total readings on a large 6-digit LCD. Display is fully programmable and allows you to switch between rate and flow total as well as reset totalization by using an attached magnet sensor—no need to open up the weather-tight enclosure. Portable and battery-operated, includes a battery pack that lasts up to four years.

Note: These flowmeters are not recommended for water, for fluids with abrasives such as paint and sealants, or for strong acids and bases. Please read maximum particle size in the specifications list below.



A
Flowmeter with pulse output
32928-10



B
Meter-mounted analog flowmeter
32928-20



C
Meter-mounted digital flowmeter with integral display
32928-38



Cut away view of 32928-12

Specifications

ISO9001:2008
CERTIFIED SUPPLIER



Viscosity range: 1 to 100,000 cp
Accuracy: ±0.5% of reading
Repeatability: ±0.1% of reading
Maximum temp
 Aluminum body: 185°F (85°C)
 Stainless steel body: 400°F (205°C)
Output signals
 Pulse models: square wave, 10 to 24 VDC
 Other models: 4 to 20 mA
Maximum pressure: 5000 psi (345 bar)
Materials: 17-4 PH SS gears, 440 SS bearings, PTFE O-rings, aluminum or 303 SS body

Maximum particle size
 0.003 to 0.5 GPM models: 30 µm
 0.01 to 2 GPM models: 30 µm
 0.05 to 20 GPM models: 30 µm
 0.5 to 60 GPM models: 120 µm
Power requirements: 10 to 24 VDC at 25 mA
Flowmeter dimensions (H x dia)
 0.003 to 0.5 GPM models: 1½" x 2" (3.8 x 5.1 cm)
 0.01 to 2 GPM models: 2¼" x 2½" (5.7 x 6.4 cm)
 0.05 to 20 GPM models: 4½" x 3" (11.4 x 7.6 cm)
 0.5 to 60 GPM models: 5½" x 7⅞" (14.0 x 20.0 cm)

Flow rates (GPM)	Pressure drop (max flow)	Connections NPT(F)	Aluminum body		303 SS body	
			Catalog number	Price	Catalog number	Price
A Flowmeters with pulse output						
0.003 to 0.5	45 psi at 100 cSt	¼"	TW-32928-01	—	—	—
0.01 to 2	10 psi at 100 cSt	¼"	TW-32928-00	—	TW-32928-10	—
0.05 to 20	45 psi at 100 cSt	½"	TW-32928-02	—	TW-32928-12	—
B Meter-mounted analog flowmeters with 4 to 20 mA output						
0.01 to 2	10 psi at 100 cSt	¼"	TW-32928-20	—	TW-32928-26	—
0.05 to 20	45 psi at 100 cSt	½"	TW-32928-22	—	TW-32928-28	—
C Meter-mounted digital flowmeters with integral display						
0.01 to 2	10 psi at 100 cSt	¼"	TW-32928-30	—	TW-32928-36	—
0.05 to 20	45 psi at 100 cSt	½"	TW-32928-32	—	TW-32928-38	—
0.5 to 60	40 psi at 100 cSt	1¼"	TW-32928-34	—	TW-32928-40	—

Flow Monitors and Accessories

Monitor both flow rate and total flow from pulse output flowmeters in any engineering unit with a push of a button. Programmable, compact, and easy-to-use. Input square wave, sine, or sawtooth frequency. Back-up totalizer lock-out feature prevents accidental erasure. High-speed microprocessor ensures fast and accurate reporting—includes a 4 to 20-mA output for recording or data logging.

Flow monitor (32928-75 and -76) for pulse output flowmeters 32928-01 to -12



TW-32928-75 Flow monitor, 110 VAC; face panel measures (W x H x D) 7" x 3" x 5" (17.8 x 7.6 x 12.7 cm)
TW-32928-76 Flow monitor, 110 VAC; 4 to 20 mA output; face panel measures (W x H x D) 7" x 3" x 5" (17.8 x 7.6 x 12.7 cm)
TW-32928-60 Cable, 10-ft (3.0-m) connection for flow monitor 32928-75 and -76
TW-50001-00 Line cord; 120 VAC, 6-ft (1.8-m) L US standard plug, for use with flow monitors 32928-75 and -76



Clamp-On Transit-Time Ultrasonic Flowmeters

No need to shut down the process for installation or maintenance due to clamp-on sensor design

- Large, easy-to-read digital display
- 4 to 20 mA output
- RS-485 Modbus network connection

NEW

Transit-time ultrasonic flowmeters clamp onto the outside of pipes and do not contact the internal liquid. The technology has inherent advantages over alternate devices including low-cost installation, no pressure head loss, no moving parts to maintain or replace, no fluid compatibility issue, and a large bidirectional measuring range that ensures reliable readings even at very low and high flow rates. Flowmeters feature a rate and total function, which includes forward, reverse, and net total, and remote totalizer reset. Use meters to measure clean liquids as well as those with small amounts of suspended solids or aeration.

Flowmeters are available in a variety of configurations—select a meter with features suitable to meet your particular application requirements. Rugged, aluminum enclosure ensures a long service life in harsh environments. Flowmeters have a 0 to 1000 Hz rate pulse, dual alarm output, and USB programming port (software included).

Choose from two styles: meters with an integral flow transducer or meters with a remote flow transducer. Order flowmeters with an integral transducer for use on 1/2" to 2" ANSI or copper pipes. The flowmeters with remote transducer are ideal for pipes in hard-to-see locations or under severe vibration. Order flowmeter and transducer separately; remote transducers come with 20 ft (6 m) of cable but can be separated up to 990 ft (300 m) from the meter. Other flowmeter configurations are available—contact an Application Specialist for details.

What's included: programming software. Remote transducers also include 20-ft (6-m) cable.



32617-10



Flowmeter 32617-24 shown with transducer 32617-30.

Specifications

General

Fluid type: most clean liquids or liquids containing small amounts of suspended solids or gas bubbles

Range: bidirectional to greater than 40 ft/sec (12 m/s)

Accuracy: ±1% of reading or ±0.01 ft/sec (0.003 m/s), whichever is greater

Software: use to configure, calibrate, and troubleshoot flowmeters. Connection via USB A/B cable; compatible with Windows® 2000, Windows XP, Windows Vista® and Windows 7

Meter

Enclosure: IP65-rated construction; powder-coated aluminum, polycarbonate, stainless steel, polyurethane, nickel-plated steel mounting brackets

Display: two-line LCD, LED backlight; top row 0.7" (18 mm) H, 7 segment; bottom row 0.35" (9 mm) H Units of measure: ft, cubic ft, m, cubic m, gallons, liters, million gallons, barrels (liquid and oil), acre-feet, lb, kg

Operating temperature: -40 to 185°F (-40 to 85°C)



Power: 96 to 264 VAC, 47 to 63 Hz at 17 VA max

Dimensions (W x H x D): 6" x 4 5/16" x 2 1/16" (15.2 x 11 x 5.2 cm)

Transducer

Housing material: IP67-rated construction; CPVC, Ultem®, nylon cord grip, PVC cable jacket

Operating temperature: -40 to 250°F (-40 to 121°C)

Safety classification: Class I Div. 1, Groups C and D T5 Intrinsically Safe Ex ia; CSA C22.2 Nos. 142 and 157; UL 913 and 916

Meters with Integral Flow Transducer

Pipe size	For ANSI pipes				For copper pipes			
	Catalog number	Flow range		Price	Catalog number	Flow range		Price
		GPM	LPM			GPM	LPM	
1/2"	TW-32617-00	2 to 38	8 to 144		TW-32617-12	1.8 to 27	7 to 102	
3/4"	TW-32617-02	2.75 to 66	10 to 250		TW-32617-14	2.5 to 54	10 to 204	
1"	TW-32617-04	3.5 to 108	13 to 409		TW-32617-16	3.5 to 108	13 to 320	
1 1/4"	TW-32617-06	5 to 186	19 to 704		TW-32617-18	4.5 to 152	17 to 575	
1 1/2"	TW-32617-08	6 to 250	23 to 946		TW-32617-20	5 to 215	19 to 814	
2"	TW-32617-10	8 to 420	30 to 1590		TW-32617-22	8 to 375	30 to 1419	

Remote Flow Transducers (meter 32617-24 required; order separately below)

Pipe size	For ANSI pipes				For copper pipes			
	Catalog number	Flow range		Price	Catalog number	Flow range		Price
		GPM	LPM			GPM	LPM	
1/2"	TW-32617-26	2 to 38	8 to 144		TW-32617-38	1.8 to 27	7 to 102	
3/4"	TW-32617-28	2.75 to 66	10 to 250		TW-32617-40	2.5 to 54	10 to 204	
1"	TW-32617-30	3.5 to 108	13 to 409		TW-32617-42	3.5 to 108	13 to 320	
1 1/4"	TW-32617-32	5 to 186	19 to 704		TW-32617-44	4.5 to 152	17 to 575	
1 1/2"	TW-32617-34	6 to 250	23 to 946		TW-32617-46	5 to 215	19 to 814	
2"	TW-32617-36	8 to 420	30 to 1590		TW-32617-48	8 to 375	30 to 1419	
2" and larger	TW-32617-50	8 to 420	30 to 1590		TW-32617-50	8 to 375	30 to 1419	

[TW-32617-24 Flowmeter](#). Required for remote transducers



Flowmeters
Ultrasonic

Cole-Parmer Handheld Doppler Flowmeter

Portable and flexible for diagnosing flow profiles throughout a process

- Unit uses advanced signal processing to measure flow in pipe sized 1" to 60" (2.5 to 152.4 cm) in diameter

This noninvasive design is uniquely suited for measuring slurries and dirty fluids. The chemical industry, construction, mining, food processing, and sewage/water treatment plants use this technology extensively.

Install sensor on dense-material pipes (not typically transit/clay, concrete or fiberglass). View flow velocity in ft/sec or m/sec (switch selectable) on a large character 4-digit LCD; also displayed is signal strength and low-battery condition. The unit's power management capabilities extend battery life to 30 continuous hours.

What's included: case, sensor with 6-ft (1.8-m) cable, tube of transducer couplant, and four AA batteries.



32986-00

Specifications

Liquid type: fluids with particulates or bubbles; 100 ppm, 100 microns, or larger

Range: 0.30 to 30 ft/sec (0.1 to 9 m/sec)

Accuracy: ±2% full-scale

Repeatability: ±1% full-scale

Operating temperature: -28 to 140°F (-20 to 60°C)

Display: single-line 4-digit LCD

Power: four alkaline AA batteries (included)

Dimensions (W x H x D): 4" x 7³/₄" x 1¹/₂" (10.2 x 19.7 x 3.8 cm)



Catalog number	Description	Price
TW-32986-00	Handheld Doppler flowmeter	

[TW-09376-01](#) Replacement batteries, AA. Pack of four

TECHNICAL info!

Please refer to the intro pages of this section for details about how this technology works.

Portable Doppler Ultrasonic Flowmeter

Solid-state measurement reduces recalibration requirements

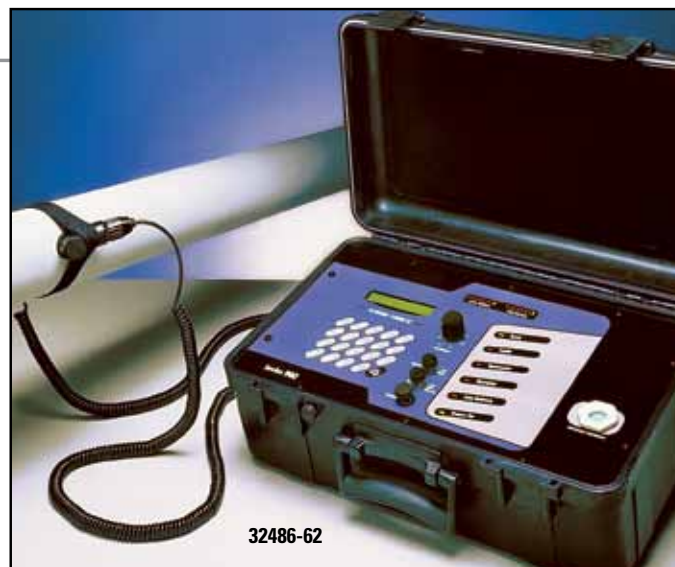
- Operates with relatively clean liquids as well as liquids with concentrations of suspended solids or aeration

This flowmeter's signal processing algorithm allows for use with fluids that are cleaner than most Doppler meters can handle. In addition, accuracy is improved with a microprocessor that automatically tracks frequency and linearizes the Doppler signal for turbulent or asymmetric flows.

The clamp-on, non-invasive transducers should be mounted to dense-material pipes (not typically transit/clay, concrete, or fiberglass) and work with pipe sizes from 1/4" to 20" (0.6 to 51 cm) in diameter. They are nonfouling to prevent permanent coating with grease, paraffin, and coupling materials.

Measure flow velocity in ft/sec or m/sec, and flow rate in GPM or MGD; a totalizer registering in gallons is also included. A 4 to 20 mA output signal is available for monitoring or recording flow data. The rechargeable battery lasts 8 hours, and nonvolatile memory saves parameters when the battery needs recharging. If planning to use this unit in a clean fluid application, place the sensors 1 to 3 pipe diameters downstream from a 90° elbow.

What's included: two transducers with 20-ft (6-m) cable for each, sensor mounting straps, transducer couplant, output cable, rechargeable battery with charger, and heavy-duty NEMA 4X carrying case.



32486-62

Specifications

Liquid type: liquids that are clean and liquids with higher concentrations of suspended solids or aeration

Range: 0.5 to 20 ft/sec (0.15 to 6 m/sec)

Accuracy: ±2% full-scale

Repeatability: ±0.4% full-scale

Output: 4 to 20 mA

Operating temp: -22 to 160°F (-30 to 70°C)

Display: 2-line x 20 character backlit LCD

Power: rechargeable cell battery (115/230 VAC charger included)

Battery life: 8 hours continuous operation

Dimensions (L x W x H): 17" x 11" x 8" (43.2 x 27.9 x 20.3 cm)



Catalog number	Description	Price
TW-32486-62	Portable Doppler flowmeter	

Technical Assistance?

Contact our expert Application Specialists to assist you. Call 1-847-549-7600 or go online to e-mail or chat live.





Cole-Parmer Doppler Ultrasonic Flowmeters

In-field linearization allows adaptation to a wide variety of applications

- Clamp-on sensor eliminates the need for in-line flanges, pipe fittings, strainers, or filters

Use these Doppler flowmeters to measure the flow of liquids in pipes from ¼" and larger. The transducers send flow data via RG59 coax cable to the monitor, and the monitor's software automatically adjusts filtering parameters and gain settings to ensure reliable readings over a wide range of liquid and reflector conditions. Easily configure the monitor using the front panel keypad. A two-line backlit LCD displays rate and accumulated flow values in user selected measuring units.

REQUIRED SYSTEM Components

- 1 Flow transducer
- 2 Flow monitor



Flow monitor
32615-60



Specifications

General

Liquid type: liquids containing 100 ppm of useful sonic suspended reflectors greater than 35 micron size, and at least 25% of the overall particle volume is larger than 100 microns

Range: 0.15 to 30 ft/sec

Accuracy: ±2% full-scale over calibrated span

Transducers

Housing material: NEMA 6P (IP68) CPVC, Ultem®, nylon, PVC (cable jacket), aluminum (small pipe only)

Operating temperature: -40 to 210°F (-40 to 99°C)

Monitor

Enclosure: IP66-rated polycarbonate and stainless steel

Display: 2-line, 8 character LCD with LED backlight; top row is 0.7"H, bottom row is 0.35"H

Power: 115 VAC 50/60 Hz

Units of measure (volumetric): user configured; feet, gallons, ft³, Millions-gallon, meters, liters, Millions ft³, m³, Millions-liters, acre-feet, oil barrels (42 gallon), liquor barrels (32.5 gallons), lb, kg

Rate interval: second, minute, hour, day

Response time: user-selectable 1 to 60 seconds

Operating temperature: -40 to 185°F (-40 to 85°C)

2 Flow Monitors

Input/output	Catalog number	Price
—	TW-32615-60	
4 to 20 mA	TW-32615-62	
Dual 4 to 20 mA	TW-32615-64	

1 Flow Transducers

Pipe size	Catalog number	Price
¼" to 1"	TW-32615-68	
1" and up	TW-32615-66	

LEVIFLOW™ Transit-Time Ultrasonic Flowmeters

Improved bubble robustness due to DSP technology

- No contamination due to noninvasive measurement
- Choice of "Z" or "U" shaped flow patterns

These meters are designed for flow measurement in high-purity processes in the pharmaceutical and semiconductor industries. Flow is sensed by two piezoelectric transducers mounted at both ends of the measuring path of the fluid stream, generating and receiving an ultrasonic wave. The wave going in direction of the flow (with-stream wave) is accelerated and the wave going against (against-stream wave) the flow direction is slowed down. The two waves are processed by a signal converter. The difference of the transmit time of both waves is proportional to the velocity of the fluid.

The standard configuration of the LEVIFLOW flowmeter consists of a flowtube with two sensors, and a converter with digital signal processor (DSP) and 4-digit display. The single-channel flow converter is DIN-rail mountable and features an alarm and totalization. Various signals (analog, digital input, and digital output) are provided and can be configured with PC software. A two-wire RS-485 bus allows arrays of multiple flowmeters.

What's included: flowtube with two sensors and flow converter. Extension cable is required; order separately below.

REQUIRED SYSTEM Components

- 1 Flow meter
- 2 Extension cable



Flow signal converter



Z-shaped PFA flowtube
32504-00



Specifications

Accuracy (flow velocity >1 m/s): ±1% of reading or better

Operating temperature: 32 to 140°F (0 to 60°C)

Fluid temperature: 50 to 320°F (10 to 160°C)

Max pressure: 72.5 psi

Wetted materials: PFA

Cable jacket material: FEP

Display: 4-digit LED

Power: 24 VDC

Output: MODBUS®, RS-485, and 4 to 20 mA

Flow range		Accuracy at stated range (LPM)		Connection	Z-shaped flow pattern	U-shaped flow pattern	Price
GPM	LPM	Low-flow	High-flow		Catalog number	Catalog number	
0 to 1	0 to 4	0 to 0.8: ±0.008 LPM	0.8 to 4: ±1% of reading	¾"	TW-32504-00	TW-32504-02	
0 to 2	0 to 8	0 to 1.7: ±0.017 LPM	1.7 to 8: ±1% of reading	¾"	TW-32504-04	TW-32504-06	
0 to 5.25	0 to 20	0 to 4.7: ±0.047 LPM	4.7 to 20: ±1% of reading	½"	TW-32504-08	TW-32504-10	
0 to 13	0 to 50	0 to 10.6: ±0.106 LPM	10.6 to 50: ±1% of reading	¾"	TW-32504-12	TW-32504-14	
0 to 21	0 to 80	0 to 18.8: ±0.188 LPM	18.8 to 80: ±1% of reading	1"	TW-32504-16	TW-32504-18	

TW-32504-80 Extension cable; flame-retardant PVC, 9½-ft (3-m) long with connector cover

TW-32504-81 Extension cable; flame-retardant FEP, 9½-ft (3-m) long with connector cover

TW-32504-82 USB to RS-485/RS-422 adapter for computer communications

TW-32504-83 D-sub connector with open-end cable for PLC communications



Flowmeters

Ultrasonic

Portable Doppler Flowmeters

Ideal for measuring flow rates of dirty or particulate ridden fluids—sensor does not contact the fluid so there is no contamination

- Programmable models 05613-60 and -65 display velocity in ft/sec, m/sec; flow rate in GPM, cu ft/sec, GPD, MGPD, and L/sec

Monitor flow rates of slurries and dirty fluids that can foul in-line sensors. These flowmeters are convenient to use both in the plant and in the field. Simply clamp or hold the sensor onto the outside of your pipe†—no specialized installation fittings needed. Dual-hinged sensor automatically aligns itself, ensuring proper placement for measurement. An LED indicator lets you know if there is a sufficient amount of reflective material in the liquid to monitor velocity. Adjustable velocity calibration control ensures accurate readings.

Standard Models measure fluid velocity or flow rate for pipe sizes from 1" to 30" ID. Models 05613-10, -15, -20, and -25 have a switch-selectable display in either ft/sec or m/sec. Select models 05613-30 or -35 to read in ft/sec or GPM. Order models with 4 to 20 mA output to connect to a recorder or data logger for keeping a permanent record.

Programmable Model provides fluid velocity and flow rate for pipe sizes from 1" to 30" ID. Units feature a 16-character display for viewing velocity in ft/sec or m/sec; flow rate in GPM, cubic ft/sec, GPD, MGPD, or L/sec; and accumulated flow to seven digits in gallons or liters. Programmable model also features a 4 to 20 mA output, a digital filter for data smoothing, and an adjustable response time of 0 to 99 seconds.

All models are battery operated—simply use the included charger/power supply to recharge battery for use up to four hours. All models except 05613-10, -15, -30, and -35 also operate on 115 or 220 VAC power for long-term monitoring using the charger/power supply.

What's included: sensor with 1-meter long cable, battery charger/power supply, couplant, and nylon carrying case with shoulder strap.

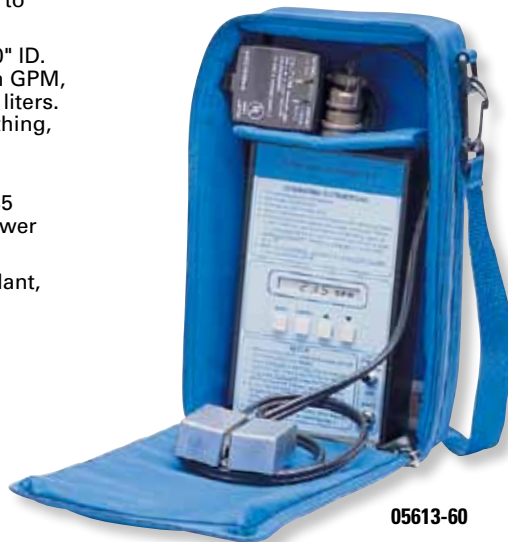
†Not recommended for use with transit (clay), cast iron, concrete, or fiberglass pipes.

TECHNICAL info!

Convert velocity into flow units:

$$\text{GPM} = 2.45 \times (\text{ID in inches})^2 \times (\text{velocity in ft/sec})$$

$$\text{L/sec} = 0.08 \times (\text{ID in cm})^2 \times (\text{velocity in m/sec})$$



Specifications

Fluid type: fluids with particulates or bubbles; 100 ppm, 100 µm or larger

Accuracy: ±2.0 LSD

Repeatability: ±0.2% full-scale

Operating temperature

Models 05613-10 through -35:

Meter: -13 to 185°F (-35 to 85°C)

Sensor: -40 to 240°F (-40 to 115°C)

Models 05613-60 and -65: 23 to 158°F (-5 to 70°C)

Display: 3½-digit LCD, ½"H (1.3 cm)

Dimensions (W x H x D): 7¼" x 4½" x 2" (18.4 x 10.4 x 5.1 cm)



Velocity rates	Resolution	Totalizer	Output	115 VAC, 60 Hz models		220 VAC, 50 Hz models	
				Catalog number	Price	Catalog number	Price
Standard models							
0.5 to 20 ft/sec; 0.3 to 6 m/sec	0.1 ft/sec; 0.1 m/sec	No	None	TW-05613-10^{††}		TW-05613-15^{††}	
0.5 to 20 ft/sec; 0.3 to 6 m/sec	0.1 ft/sec; 0.1 m/sec	No	4 to 20 mA	TW-05613-20^{††}		TW-05613-25^{††}	
0.5 to 20 ft/sec [‡]	0.1 ft/sec; 1 GPM	No	None	TW-05613-30		TW-05613-35	
Programmable model							
0.5 to 20 ft/sec; 0.3 to 6 m/sec [‡]	0.1 ft/sec; 0.1 m/sec; 1 L/sec; 1 cu ft/sec; 1GPM; 1 GPD; 1 MGPD	Yes	4 to 20 mA	TW-05613-60		TW-05613-65	

[‡]Meters also read flow rates. To figure out the maximum flow rate the meter can read, use the equation in the "Technical information" box (above).

^{††}Battery operation only. Use charger/power supply to recharge battery.

TW-03277-70 Analog signal-to-RS-232 converter for collection and analysis of data on a PC. Includes software, a bidirectional A/D and D/A signal conditioner with switch for 0 to 5 VDC or 4 to 20 mA input, and 110 V, power supply; use screw terminal connections

TW-05612-60 Replacement transducer couplant for all models; use for increased sensitivity

MORE info!

Benefits of using a nonintrusive Doppler flowmeter include reduced material costs, low maintenance costs, reduced installation time, and reduced or no downtime for your process. Since the transducers clamp on to existing piping, they can be used in any existing process. These meters are designed for applications such as water/wastewater, carbonated liquids in the beverage industry, mining slurry, paper and pulp processing, and dredging, where the accurate measurement of liquids is required.



Single-Channel Universal Flow Transmitters

Add-on modules help you create your own customized transmitter

- Large, backlit LCD with "dial-type" digital bar graph
- Customizable label and bar graph settings

NEW

Versatile transmitters feature a large LCD with digital bar graph as well as the main and secondary measurements. Preset values offer quick and easy programming. Or, customize your unit for labeling, min/max dial settings, and unit/decimal measurement options. Both panel- and field-mount models run on 12 to 32 VDC power and can be looped with compatible sensors.

Order add-on modules to create the ideal control center. The relay module 56560-15 (for panel-mount transmitter only) features two programmable dry-contact relays for hysteresis and time delay. PC COMM module 56560-19 lets you easily configure your transmitter from your computer—save settings and use for future installations. Choose the H COMM module 56560-17 to communicate with any HART®-enabled device and remotely adjust 4 to 20 mA settings. Expand your measurement capabilities using the optional parameter modules for applications including flow, pressure, and level control. Contact our Application Specialists for details.

What's included: panel-mount transmitter includes mounting bracket and panel gasket.

REQUIRED SYSTEM Components

- 1 Transmitter
- 2 Add-on modules
- 3 Accessories



56560-12

Specifications

- Accuracy:** ±0.5% of reading
Operating temperature: 14 to 158°F (–10 to 70°C)
Input signal: 0.5 to 1500 Hz
Output
 Relay: optional, two SPDT relays
 Current: one 4 to 20 mA, isolated, fully adjustable and reversible
 Open collector: optically isolated, 50 mA max
Housing: NEMA 4X (IP65) front panel
Display: 7- and 14-segmented LCD, backlit
Dimensions (W x H x D): 3¼" x 3¾" x 2½" (9.9 x 9.9 x 5.5 cm)
Power: 12 to 32 VDC, ±10%

Key	Catalog number	Description	Price
1	TW-56560-12	Transmitter, panel mount	
	TW-56560-14	Transmitter, field mount†	

†Field-mount model requires angle adjustment adapter kit 56560-26.



2 Add-On Modules

- TW-56560-15 Relay module,** two dry contact relays for panel-mount only
TW-56560-19 PC COMM communication tool allows one or many 9900 devices to be configured
TW-56560-17 H COMM module, imposes HART digital signal on top of 4 to 20 mA analog

3 Accessories

- TW-56560-26 Angle adjustment adapter kit,** required for field mount
TW-05631-50 Universal mount kit, for field mount
TW-93310-50 Integral mount kit, ¾" in for field mount
TW-56560-24 Wall mount accessory kit for both models
TW-56560-21 In-line connector kit, optional for both models
TW-19007-52 RC filter kit, for relay use. Kit of 2
TW-17101-63 NIST-traceable calibration with data

Batch Controller

- Dual relays provide external control of pumps, valves, or alarms
- Remote start/stop/resume capabilities let you control system from your computer

User-selectable menu provides easy configuration of current and relay options. Use the 4 to 20 mA output signal to send data to a recorder or data acquisition system, or to proportionally control a valve. Relays provide a simple on/off control of alarms, pumps, or valves. Pulse output lets you start, stop, or resume controller from your computer.

Front panel features a reversible analog dial (0 to 100% or 100 to 0%); a microprocessor based alphanumeric LCD; and four-button keypad. Controller even features a backlit LCD for reading display in dimly lit areas. Security code access sequence protects your programmed settings from tampering; nonvolatile memory saves data in case of power failure.

Controller operates on 12 to 24 VDC/VAC—order AC power supply 26900-10 separately. Controller is compatible with all flow sensors on page 647. Unit includes mounting brackets, panel gaskets, and a self-adhesive template for easy mounting; see below for additional mounting options.



05628-00

Specifications

- Accuracy:** ±0.5% of reading
Operating temp: 14 to 131°F (–10 to 55°C)
Input signal: 0.5 to 1000 Hz, optically isolated
Relays: two SPDT; 125 VAC or 30 VDC, 5 A max; resistive

- Output signal**
 Current: 4 to 20 mA, nonisolated
 EOB pulse: remote start, stop, resume
Power: 12 to 24 VDC/VAC, 50/60 Hz

- Display:** analog dial (0 to 100% or 100 to 0%); 2-line, 16-character alphanumeric LCD (0 to 999,999 batch size)
Dimensions (W x H x D): 3½" x 3½" x 3½" (8.9 x 8.9 x 8.9 cm)

Catalog number	Description	Price
TW-05628-00	Batch controller	

- TW-17101-63 NIST-traceable calibration** with data
TW-05629-50 NEMA 4X (IP65) rear cover kit; includes knock-out ports for cable access
TW-05629-60 Surface-mount kit for flat surface or pipe mounting; use with the NEMA 4X (IP56) rear cover kit 05629-50
TW-05629-55 Liquid-tight connector kit. Includes three watertight connectors to run sensor and/or controller wires to and from the NEMA 4X rear cover kit





Flowmeters

Magnetic

Low-Flow Magnetic Flowmeter

Unaffected by fluid density and fluid viscosity changes

- No moving parts
- Requires no straight pipe
- Chemical- and corrosion-resistant PVDF material

With no moving parts, this low-flow magmeter handles fluids containing particulate matter without clogging or jamming, keeping maintenance at a minimum. Accuracy is maintained with conductive fluids (>20 mS) of varying viscosities and densities. Flowmeter has no metallic parts and features a 100% PVDF body and PVDF carbon fiber-filled electrodes. The meter is corrosion resistant and compatible with a wide range of chemicals.

The meter is compact enough to fit most pump/injection systems. With zero straight pipe required after an elbow, it can be easily mounted in tight spaces. Mounting brackets are included and add stability for installation.

Meter comes with FlareTek™ fittings. For NPT connections, order separate fitting adapters (at right) which are required for installation. **Note:** Two fittings are required for each flowmeter.

REQUIRED SYSTEM Components

- 1 Flowmeter
- 2 Fittings



33111-51

Specifications

Minimum fluid conductivity: 20 µS/cm

Accuracy: ±1% full-scale

Max fluid temperature: 32 to 200°F (0 to 93°C)

Operating pressure: 150 psi (10.3 bar)

Wetted materials: PVDF

Power: 10 to 15 VDC

Output: 4 to 20 mA and pulse

Electrical connection: 18-ft (6-m) 8-pin M12 plug

Fitting size: 3/4" FlareTek

Dimensions (L x W x H): 3 1/2" x 2 3/4" x 4" (8.9 x 7 x 10.2 cm)



2 Fittings (required)

TW-33111-91 PVC adapter FlareTek to NPT(M) for magmeter, 3/4" x 3/4"

TW-33111-92 PVDF adapter FlareTek to NPT(M) for magmeter, 3/4" x 3/4"

TW-33111-93 PVC adapter FlareTek to NPT(M) for magmeter, 3/4" x 1/2"

TW-33111-94 PVDF adapter FlareTek to NPT(M) for magmeter, 3/4" x 1/2"

Accessories

TW-33111-89 O-ring, EPDM, for adapters

TW-33111-90 O-ring, Viton®, for adapters

TW-33111-95 Power and output cable

1 Flowmeters

Catalog number	Flow range		Price
	GPM	LPM	
TW-33111-51	0.2 to 20	0.75 to 76	

Electromagnetic Flow Sensors

Easy installation in difficult applications

- Use with 1", 1 1/2", and 2" piping

Insertion electromagnetic flow sensors are designed for use with conductive liquids in pipe. They are highly suitable for difficult applications with changing viscosities and pulsating flows such as air-driven diaphragm pumps, and can be used in "dirty" applications where debris would foul a mechanical meter. These flowmeters have no moving parts, are economical, durable, and very easy to install and maintain.

Applications include measurement and control of conductive fluids, measurement for data reporting in industrial processes, control of chemical metering pumps, and fertigation (fertilization feed). A choice of materials—PVC, brass, and 316 stainless steel (SS)—allows the meter to adapt to a wide range of temperature, pressure, and corrosive environments. These flowmeters have a current-sinking pulse output that can be combined with the appropriate transmitter or indicator for the application.

Fittings are required to ensure correct depth placement in the pipe. For fittings, go online to ColeParmer.com and type in 33112-61 in the search field. 1" fittings must be special ordered. Contact an Application Specialist.



33126-12

Specifications

Flow range: 0.2 to 20 ft/sec

Fluid type: conductive liquids

Min fluid conductivity: 20 µS/cm

Accuracy: ±1% full-scale

Operating temperature

PVC: 32 to 130°F (0 to 55°C)
Brass and SS: 32 to 200°F (0 to 93°C)

Max operating pressure

PVC: 150 psi (10.3 bar)
Brass and SS: 200 psi (13.8 bar)

Wetted materials

Body: PVC, brass, or SS
Electrodes: Hastelloy
Electrode cap: PVDF
O-ring: EPDM
Housing: aluminum

Power: 12 to 24 VDC

Output: square wave pulse, 550 Hz @ 20 ft/sec

Enclosure rating: IP65

Cable length: 18 ft (5.5 m)



Pipe size	PVC sensor body		Brass sensor body		316 SS sensor body	
	Catalog number	Price	Catalog number	Price	Catalog number	Price
1"	TW-33126-00		TW-33126-06		TW-33126-12	
1 1/2"	TW-33126-02		TW-33126-08		TW-33126-14	
2"	TW-33126-04		TW-33126-10		TW-33126-16	

TW-33112-52 Batch controller, provides batch control via two relay outputs

*For specifications on these controllers, see page 649.

TW-33110-60 Flow controller*, provides flow control via 4 to 20 mA output, panel mount

TW-33110-70 Flow controller*, provides flow control via 4 to 20 mA output, wall mount



Insertion Magmeter Flowmeters

Accurate measurement even in dirty liquids

- Bidirectional flow
- No moving parts
- No pressure drop

These magmeters are insertion-style magnetic flow sensors that feature no moving parts. The sensor design provides long-term reliability with minimal maintenance. Typical applications include flow monitoring and control in chemical processing, water and wastewater management, pool and spa monitoring, irrigation control, and water distribution. Use together with the Signet installation fittings for automatic sensor alignment and insertion depth. Choose from flow monitors and controllers on page 657 for various installation options.

These versatile, simple-to-install sensors deliver accurate flow measurement over a wide dynamic range in pipe sizes from ½" to 8", satisfying the requirements of many diverse applications. Magmeters offer a choice of outputs—frequency/digital (S3L) or 4 to 20 mA—available on sensors with or without display. The frequency or digital (S3L) sensor output can be used with an extensive line of flow displays, totalizers, and controllers (available on page 657), while the 4 to 20 mA output can be used for direct input to PLCs, chart recorders, etc. Both the digital (S3L) and 4 to 20 mA output sensor interface is available for long distance signal transmission of up to 1000 ft. An additional benefit is the empty pipe detection which features a zero flow output when the sensors are not completely wet. The frequency output is bidirectional while the 4 to 20 mA output can be set for uni- or bidirectional flow using the display or the RS-232 set-up tool which connects to PCs for programming capabilities.

Display models have two SPDT relays and one solid-state relay. They feature permanent and resettable total values which can be seen on the display. The display contains multiple languages—choose from English, Spanish, German, French, Italian, and Portuguese menu options.

REQUIRED SYSTEM Components

- 1 Flowmeter
- 2 Fittings



68874-33
with display

Specifications

Flow range: 0.05 to 10 m/sec
Fluid conductivity: minimum 20 µS/cm
Repeatability: ±0.5% of reading
Linearity: ±1% of reading plus 0.01 m/sec

Operating temperature
 Ambient: 14 to 158°F (–10 to 70°C)
 Media: 32 to 185°F (0 to 85°C)
Maximum operating pressure: 150 psi at 77°F (10.3 bar at 25°C)

Power
 Frequency out: 4.5 to 26.4 VDC, 15 mA max
 Digital out: 4.5 to 6.5 VDC, 15 mA max
 4 to 20 mA out: 21.6 to 26.4 VDC, 22.1 mA max
Display: 2-line x 16-character LCD



1 Flowmeters

Pipe size	Wetted material	Output	Flowmeters without display		Flowmeters with display	
			Catalog number	Price	Catalog number	Price
½" to 4"	PP and 316L SS	Frequency or digital	TW-32486-49		TW-68874-33	
		4 to 20 mA	TW-32486-50		TW-32486-51	
5" to 8"	PP and 316L SS	Frequency or digital	TW-32486-52		TW-68874-31	
		4 to 20 mA	TW-32486-53		TW-32486-54	

2 Fittings

Catalog number	Pipe ID	Material	Fitting type	Price
TW-05619-61	½"	Polypropylene	Tee	
TW-05620-21		PVC 80		
TW-05620-41		316 SS		
TW-05620-32	¾"	CPVC 80	Tee	
TW-05620-72		Copper		
TW-05620-42		316 SS		
TW-32512-26	1"	PVC 80	Tee	
TW-05620-33		CPVC80		
TW-05620-24	1¼"	PVC 80	Tee	
TW-05620-25	1½"	PVC 80	Tee	
TW-05620-35		CPVC 80		
TW-05620-45		316 SS		
TW-05620-26	2"	PVC 80	Tee	
TW-05620-56		Galvanized iron (40)	Tee	
TW-05620-16	3"	PVC 80	Saddle	
TW-05620-18		Galvanized iron (80)	Saddle	
TW-05620-29	4"	PVC 80	Tee	
TW-05620-19		PVC 80	Saddle	
TW-05620-83	6"	PVC 80	Saddle	



Polypropylene
tee fitting 05619-61



PVC tee fitting
05620-24



Saddle fitting
05620-16

[TW-17080-12](#) NIST-traceable calibration with data



Flowmeters

Magnetic

Magnetic Flowmeters

Advanced memory technology enables quick and reliable startup

- Accuracy of $\pm 0.4\%$ of measured value
- Intuitive navigation and configuration

Delivering accurate flow measurement in sectors as diverse as chemical, power, oil and gas, pulp and paper, and metals and mining, these magnetic flowmeters are the ultimate flow solution for any process application. These magmeters have an intelligent design, state-of-the-art technology, advanced features, and deliver reliable and accurate measuring values. Self-cleaning, double-sealed electrodes enhance reliability and performance.

Using a higher excitation frequency combined with advanced filtering, the meter improves measurement accuracy by reducing fluid and electrode noise, resulting in a better product quality and higher reliability. Flowmeters are designed for high-temperature use, and in combination with a reinforced PFA liner, provide improved vacuum stability and prevent potential liner deformation—making these magmeters a perfect fit for all hot-fluid applications. Industry-optimized linings of PFA ensure resistance to abrasion and chemicals. The flow sensor has an IP68 (NEMA 4X) rating.

Standard HART® protocol enables online modification and monitoring of parameters. The backlit, graphical display can be easily rotated 270° without the need for any tools. “Through-the-glass” control allows local operator interface to input short, quick data for all user-specific parameters. The user-friendly interface allows quick and simple data entry for all process parameters. With the soft-key functionality, the configuration is as simple as using a mobile phone.

Advanced data storage inside the sensor eliminates the need to match sensor and transmitter in the field. The on-board sensor memory eliminates the possible problems associated with pluggable data memory modules. On initial installation, the self-configuration sequence automatically replicates all data into the transmitter eliminating the opportunity for errors and leading to increased speed of startup. Redundant storage of data in both the sensor and the transmitter memory is continually updated during all operations to ensure total integrity of the measurement. Easy access to wiring also minimizes the time for problem solving in the field.

These magmeters feature diagnostic capabilities providing the right information to keep the process up and running. In accordance with NAMUR NE107, alarms and warnings are classified with the status classifications such as “maintenance required,” “function check,” “failure,” and “outside of specification”.

Specifications

- | | |
|---|---|
| Fluid type: liquids to slurries | Power: 100 to 230 VAC, 60 Hz |
| Fluid conductivity: $>5 \mu\text{S/cm}$ ($20 \mu\text{S/cm}$ for demineralized water) | Power consumption: $\leq 20 \text{ VA}$ (flowmeter sensor including transmitter) |
| Accuracy: $\pm 0.4\%$ of measured value | Output: 4 to 20 mA |
| Operating temperature: 14 to 140°F (–10 to 60°C) | Electrical connection: screw terminals; ½" NPT(F) conduits connector |
| Medium temperature: 14 to 266°F (–10 to 130°C) | Process connection: flange (ASME CL 150) |
| Operating pressure: –14.7 to 294 psi (–1 to 20.3 bar) | Enclosure rating: IP68, NEMA 4X |
| Wetted materials: PFA liner with stainless steel electrodes | Display type: high-contrast LCD; 2-line, 8-character |
| Process connection material: stainless steel | Serial communications: HART |

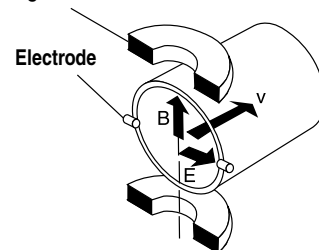


32813-10

Magnetic Flowmeters

There are two magnetic design styles: insertion and full-bore. Coils in the meter produce a magnetic field. When a conductive fluid is passed through the field, a voltage is produced through an electrode in the meter wall or insertion probe; this generated voltage is proportional to the flow. The technology offers no moving parts, and the full-bore designs offer no intrusions into the flow stream.

Magnetic coil



E = induced signal voltage
B = magnetic flux density
v = average flow velocity of fluid

Catalog number	Connection size	Flow range		Price
		GPM	LPM	
TW-32813-00	½"	0.53 to 26.4	1 to 100	
TW-32813-02	¾"	0.79 to 39.6	3 to 150	
TW-32813-04	1"	1.06 to 52.8	4 to 200	
TW-32813-06	1½"	3.17 to 159	12 to 600	
TW-32813-08	2"	5.28 to 264	20 to 999	
TW-32813-10	3"	15.9 to 739	60 to 2797	
TW-32813-12	4"	21.1 to 1057	79.9 to 4001	

Applications	Water/wastewater, pulp and paper, mining, food and beverage, chemical
Advantages	No obstruction of flow path, no pressure drop, no moving parts, can handle heavy slurries
Disadvantages	Fluid must be conductive, must ground pipe

[TW-17080-12](#) NIST-traceable calibration with data

Magnetic Flowmeters

Manufactured from FDA-approved materials and certified in accordance with EHEDG and 3A

- Accuracy to ±0.4% of measured value
- Intuitive navigation and configuration
- Designed specifically for the food and beverage, pharmaceutical, and biotechnology industries

This flowmeter is manufactured from FDA-approved materials and the sensor is fully CIP/SIP cleanable. Units feature high accuracy and advanced signal processing to ensure lowest cost of ownership. These magmeters provides a great deal of flexibility. The electrodes are embedded into the liner, ensuring a smooth surface without gaps or crevices. A reinforced PFA liner improves vacuum stability and prevents potential liner deformation.

While moisture ingress can cause drift and measurement inaccuracy or even product failure when using conventional magmeters in humid environments or areas with large temperature fluctuations, these magmeters' robust and rugged design is well-suited for these conditions. The fully encapsulated electronics reduce moisture ingress and enhance overall product reliability.

Using advanced filtering technology, these magmeters improve accuracy by separating the signal from the noise, resulting in better flow sensing reliability. The user-friendly interface allows quick and simple data entry for all process parameters. The "easy setup" guides the operator step by step through the menu to set parameters as fast as possible. Soft-key functionality makes configuration as simple as using a mobile phone.

Standard HART® protocol enables online modification and monitoring of parameters. The backlit, graphical display can be easily rotated through 270° without the need for any tools. "Through-the-glass" control allows local operator interface to input short, quick data for all user-specific parameters.

Advanced data storage inside the sensor eliminates the need to match sensor and transmitter in the field. The on-board sensor memory removes the potential problems associated with pluggable data memory modules. On initial installation, the self-configuration sequence automatically replicates all data into the transmitter, eliminating the opportunity for errors and leading to increased speed of start-up. Redundant storage of data in both the sensor and the transmitter memory is continually updated during all operations to ensure total integrity of the measurement. Easy access to wiring also minimizes the time for problem solving in the field.

The magmeter monitors its own operability and your process. In accordance with NAMUR NE107, alarms and warnings are classified with the status classifications such as "maintenance required," "function check," "failure," and "outside of specification".



32813-20

Specifications

- Fluid type:** liquids to slurries
- Fluid conductivity:** >5 µS/cm (20 µS/cm for demineralized water)
- Accuracy:** ±0.4% of measured value
- Operating temperature:** -4 to 140°F (-20 to 60°C)
- Ambient temperature:** -13 to 356°F (-25 to 180°C)
- Operating pressure:** -14.7 to 232 psi (-1 to 16 bar)
- Wetted materials:** PFA
- Nonwetted materials:** carbon steel and aluminum
- Power:** 100 to 230 VAC, 60 Hz
- Power consumption:** ≤20 VA (flowmeter sensor incl. transmitter)
- Output:** 4 to 20 mA and HART
- Electrical connection:** screw terminals; ½" NPT(F) conduit connector
- Process connection:** sanitary Tri-Clamp®
- Enclosure rating:** NEMA 4X (IP68)
- Display type:** high-contrast LCD; 2-line, 8-character
- Serial communications:** HART



Find MORE!

See our "Fittings" section on pages 509-575 for sanitary gaskets, clamps and fittings.



Unique Products



Hard-to-find products you can't get anywhere else!

Cole-Parmer®
Delivering Solutions You Trust

Catalog number	Connection size	Flow range		Price
		GPM	LPM	
TW-32813-14	½"	0.53 to 26.4	1 to 100	
TW-32813-16	¾"	0.79 to 39.6	3 to 150	
TW-32813-18	1"	1.06 to 52.8	4 to 200	
TW-32813-20	1½"	3.17 to 159	12 to 600	
TW-32813-22	2"	5.28 to 264	20 to 999	
TW-32813-24	3"	15.9 to 739	60 to 2797	
TW-32813-26	4"	21.1 to 1057	79.9 to 4001	

[TW-17080-12](#) NIST-traceable calibration with data



Flowmeters

Vortex

Heavy-Duty Process Vortex Flowmeters/ Transmitters

A rugged design for aggressive environments

- An alarm relay is standard with an additional option for temperature output

With no moving parts and a heavy-duty brass body, the device was designed to operate in aggressive environments. Meters are ideal for measuring process water, water-based machine coolant, or water/glycol coolants and can alert process operators of dangerous flow/temperature deviations.



Flowmeter 32997-32 with GPM display

Programming each unit is done through a simple array of buttons on the face of the unit. Through the 3-digit LED, you may select the display units (GPM or LPM), the relay-set point, and the relay function (normally open or normally closed). Rotate the display for easy viewing within any system arrangement.

Meters with temperature output include a second 4 to 20 mA signal scaled on the temperature range of the meter (35 to 210°F); an additional relay is also included. The unit offers the option to display temperature in addition to flow. Order multipin cables below to interface this device with a power supply and input/output controller/recorder.

Specifications

Fluid type: nonviscous water-like fluids

Accuracy: ±5% of full-scale

Repeatability: ±0.25% of full-scale

Turndown ratio: 10:1

Operating temperature: 35 to 210°F (0 to 97°C)

Operating pressure: 300 psi (20 bar)

Wetted materials: brass, Viton®, PVDF

Input power: 10 to 30 VDC @ 80 mA

Electrical connection

Flowmeter: 5-pin DC microconnector

Flowmeter w/temp transmitter: 8-pin DC microconnector

Electrical classifications: NEMA 4 (IP65)

Display type: 3-digit LED, 0.3" high

Output signal(s): 4 to 20 mA, flow or flow/temperature

Relay type: SPST solid state, NC or NO, 250 mA max†

†Relay output is 250 mA at/below 185°F for 1/4" and 1/2" units, 100 mA above 185°F. Output is 125 mA at/below 185°F for 3/4" to 2" units, 50 mA above 185°F.

Dimensions

Connections	Width	Height	Depth (face to pipe centerline)
1/4" and 1/2"	3.25"	2.74"	3.13"
3/4" and 1"	4.54"	4.19"	4.04"
1 1/2" and 2"	6.82"	4.19"	4.71"

Catalog number	Connection size NPT(F)	Flow range		Pressure drop (at max flow)	Price
		GPM	LPM		
TW-32997-30	1/4"	0.4 to 4.0	1.5 to 15.1	8 psid	
TW-32997-32	1/2"	1.2 to 12	4.7 to 45.4	4 psid	
TW-32997-34	3/4"	2.5 to 25	9.5 to 94.6	4 psid	
TW-32997-36	1"	5 to 50	18.9 to 189.2	9 psid	
TW-32997-38	1 1/2"	10 to 100	37.9 to 378.5	5 psid	
TW-32997-40	2"	20 to 200	75.7 to 757.1	5 psid	

[TW-32997-92](#) Five-pin power/signal cable for use with flowmeters, 3 m, pigtail end

[TW-32997-94](#) Eight-pin power/signal cable for use with flowmeters/temperature transmitters, 5 m, pigtail end

Vortex Flowmeters for Liquids

Built-in 1000 Ω RTD sensor provides direct temperature measurement of media

- Rugged PPA molded construction
- Excellent media compatibility



32825-72

These economical vortex flowmeters are suitable for water and water/glycol-based heat exchange systems. The transmitters work on the vortex shedding flow principle. As flow velocity increases, alternating vortices are formed on each side of the bluff body within the flowtube and travel downstream. The flowmeters utilize piezoelectric sensors embedded in a vane downstream from the bluff to detect the vortices and transfer the sensed vortices into flow velocity. A flow factor is provided to convert frequency to volumetric flow rate for each size of flowmeter.

Note: Media with viscosity greater than 2 centipose will require higher flow rates to form measurable vortices within the flowtube.

Specifications

Fluid type: low viscosity water-like fluids

Accuracy

Up to 50% flow: ≤1% of reading
Over 50% flow: ≤2% of reading

Temperature measurement

Range: -40 to 302°F (-40 to 150°C)
Accuracy: ±0.8°F at 68°F (±0.45°F at 20°C); ±1.4°F at 190°F (±0.75°C at 20°C)

Operating temperature (ambient): 5 to 185°F (-15 to 85°C)

Operating pressure: 261 psi (18 bar)

Pressure drop at max flow: 3 psid

Wetted materials

Sensor vane: ETFE
Sealing material: EPDM
Flow sensor and bluff: PPA

Input power: 5 VDC

Electrical connection: M12x1, 5-pole DC microconnector

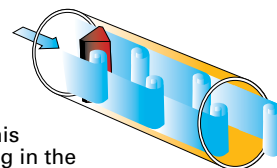
Output: 4 to 20 mA

Catalog number	Connection size NPT(F)	Flow range		Price
		GPM	LPM	
TW-32825-68	1/4"	0.24 to 3.96	0.9 to 15	
TW-32825-70	3/8"	0.48 to 8.45	1.8 to 32	
TW-32825-72	1/2"	0.93 to 13.2	3.5 to 50	
TW-32825-74	3/4"	1.32 to 22.5	5 to 85	
TW-32825-76	1"	2.38 to 39.6	9 to 150	

TECHNICAL info!

Vortex Flowmeterics

Using a pressure sensor, this meter measures the pressure pulses from vortices that come from the fluid passing a bluff body bar across the flow stream. A simple analogy of this phenomenon is that of a flag waving in the wind. The pulses are proportional to the rate of flow. Many users find the technology appealing because it has no moving parts. Because the meter body and vortex bar can be molded as one, this design is ideal for making meters for use in aggressive or high-purity applications.



Applications	Utilities, water and wastewater
Advantages	Low to medium initial setup costs, very low maintenance when used in clean flow conditions
Disadvantages	Low to medium pressure drop due to obstruction in flow path



Cole-Parmer Flow Switches

A Compact Low-Flow Switches



These normally open switches are specifically designed for reliable operation in clean air and water applications. Select from gas or liquid flow switches. Use a 50 µm filter to protect your switch. Switches include 18" (45.7 cm) L leads.

Specifications



Switch: SPST, NO, 20 VA
Max temperature: 212°F (100°C)
Max pressure: 150 psi at 70°F (10.3 bar at 21°C)
Wetted materials: Noryl®, 316 SS, and epoxy
Connections: 1/4" NPT(M)



Flow setting [†]	Catalog number	Price
Gas switches		
25 cfm/60 cfm	TW-32778-30	
1 cfm/2.6 cfm	TW-32778-32	
2.5 cfm/5.6 cfm	TW-32778-34	
5 cfm/12 cfm	TW-32778-36	
Liquid switches		
0.05 GPM	TW-32778-31	
0.25 GPM	TW-32778-33	
0.50 GPM	TW-32778-35	
1.00 GPM	TW-32778-37	

[†]Switch actuation set points are listed for 5 psi and 100 psi.

D Liquid Flow Switches for Threaded Plastic Piping



These normally open switches have 3/4" NPT(F) ports for a quick connection to threaded plastic piping. Polypropylene and stainless steel wetted parts offer excellent chemical resistance. The materials are also NSF and FDA approved for potable water treatment applications such as chlorinators, purifiers, and heaters. Switches include 24" (61.0 cm) L leads.

Specifications



Switch: SPST, NO, 20 VA
Max temperature: 212°F (100°C)
Max pressure: 100 psi at 70°F (6.9 bar at 21°C)
Wetted materials: polypropylene, Viton®, 316 SS, and PH 15-7 Mo stainless steel
Connections: 3/4" NPT(F)



Flow setting	Catalog number	Price
0.25 GPM	TW-32774-60	
0.50 GPM	TW-32774-62	
1.00 GPM	TW-32774-64	
2.00 GPM	TW-32774-66	
2.50 GPM	TW-32774-68	
5.00 GPM	TW-32774-70	

B Low Pressure-Drop Liquid Flow Switches



These SPST switches feature a unique, dual-diameter, internal bore and piston configuration to minimize flow constriction and provide low pressure drop. Use a 150 µm filter to protect your switch. Switches include 1/4" male quick connect terminals.

Specifications



Switch: SPST, 20 VA
Max temperature: 212°F (100°C)
Max pressure: 200 psi at 70°F (13.8 bar at 21°C)
Wetted materials: PP, Ryton® PPS, Viton®, and 316 SS
Connections: 1/2" NPT(M)



Flow setting	Catalog number	Price
Normally open switches		
0.5 GPM	TW-32776-00	
1.0 GPM	TW-32776-01	
2.0 GPM	TW-32776-02	
3.0 GPM	TW-32776-03	
4.0 GPM	TW-32776-04	
5.0 GPM	TW-32776-05	
Normally closed switches		
0.5 GPM	TW-32776-20	
1.0 GPM	TW-32776-21	
2.0 GPM	TW-32776-22	
3.0 GPM	TW-32776-40	
4.0 GPM	TW-32776-42	
5.0 GPM	TW-32776-44	

E Liquid Flow Switches with 90° Ports



No need to cut a straight pipe to install your flow switch. These switches with 90° ports easily fit where a pipe elbow would be installed. Available in SPST or SPDT models. Use a 50 µm filter to protect your switch. Switches include 24" (61.0 cm) L leads.

Specifications



Switch: SPST or SPDT, 20 VA
Max temperature: 225°F (107°C)
Max pressure: 250 psi at 70°F (17.2 bar at 21°C)
Wetted materials: Ryton® PPS, Viton®, 316 SS, and epoxy
Connections: 9/16-18 UNF



C Liquid Flow Switches for Plastic Piping



Use these normally open switches with plastic pipes without threads. Switches are available in gray or clear PVC housing. Use clear switches where visual flow confirmation is needed. Use a 150 µm filter to protect your switch. Switches include 24" (61.0 cm) L leads.

Specifications



Switch: SPST, NO, 20 VA
Max temperature:
 Clear switches: 120°F (50°C)
 Gray switches: 140°F (60°C)
Max pressure:
 Clear switches: 120 psi at 70°F (8.3 bar at 21°C)
 Gray switches: 150 psi at 70°F (10.3 bar at 21°C)
Wetted materials: PVC, Buna N, and epoxy



Connections	Flow setting	Catalog number	Price
Clear switches			
1/2" NPT [‡]	0.5 GPM	TW-32777-00	
3/4" IPS	0.5 GPM	TW-32777-02	
1" IPS	2.0 GPM	TW-32777-03	
Gray switches			
1/2" NPT [‡]	0.5 GPM	TW-32777-20	
3/4" IPS	0.5 GPM	TW-32777-22	
1" IPS	2.0 GPM	TW-32777-24	

[‡]The 3/4" IPS model with 1/2" NPT port adapter installed.

Ordering Information for **E**

Flow setting	Catalog number	Price
Normally open SPST switches		
0.1 GPM	TW-32774-00	
0.25 GPM	TW-32774-02	
0.5 GPM	TW-32774-04	
0.75 GPM	TW-32774-06	
1.0 GPM	TW-32774-08	
1.5 GPM	TW-32774-10	
SPDT switches		
0.1 GPM	TW-32775-00	
0.25 GPM	TW-32775-01	

Adapters

TW-32775-50 Adapter,
 9/16-18 UNF x 1/8" NPT(F)
TW-32775-51 Adapter,
 9/16-18 UNF x 1/4" NPT(F)
TW-32775-52 Adapter,
 9/16-18 UNF x 1/2" hose barb

See next page for more...



Flowmeters Switches

Adjustable Flow Switches for Liquids and Gases

■ Liquid Flow Switches for High In-line Pressures



The one-piece magnetic PPS composite piston makes these normally open switches ideal for high pressure applications. Switches withstand up to 1500 psi at 70°F (21°C)! Use a 100 µm filter to protect your switch. Switches include 24 to 26"L leads.

Specifications

- Switch: SPST, NO, 20 VA
- Max temperature: 275°F (135°C)
- Max pressure: 1500 psi at 70°F (10.3 bar at 21°C)
- Wetted materials: brass or SS, PPS composite, 316 SS, and fluorocarbon
- Connections: 3/8" NPT(M)



Flow setting	Catalog number	Price
Brass switches		
0.25 GPM	TW-32774-30	
0.50 GPM	TW-32774-32	
1.00 GPM	TW-32774-34	
1.50 GPM	TW-32774-36	
2.00 GPM	TW-32774-38	

Flow setting	Catalog number	Price
Stainless steel switches		
0.25 GPM	TW-32774-40	
0.50 GPM	TW-32774-42	
1.00 GPM	TW-32774-44	
1.50 GPM	TW-32774-46	
2.00 GPM	TW-32774-48	

■ UL-Approved Liquid Flow Switches for High In-Line Pressures



These high-pressure SPDT switches withstand pressures up to 1000 psi at 225°F (107°C)! They provide reliable and consistent performance; ±1% repeatability. Switches are UL-listed for use in Class I, Division 2, Groups A, B, C, D hazardous environments. Use a 50 µm filter to protect your switch. Switches include 24"L leads.

Specifications

- Switch: SPDT, 20 VA
- Operating temp: 225°F (107°C)
- Operating pressure: 1000 psi at 225°F (68.9 bar at 107°C)
- Wetted materials: brass, polysulfone, 316 SS, Viton®, and epoxy
- Connections: 1/4" NPT(F)



Flow setting	Catalog number	Price
0.10 GPM	TW-32778-06	
0.25 GPM	TW-32778-08	
0.50 GPM	TW-32778-10	
0.75 GPM	TW-32778-12	
1.00 GPM	TW-32778-14	
1.50 GPM	TW-32778-16	

Adjustable set points trigger SPST contacts rated for 70 VA

- Brass models handle pressures up to 1500 psi

As liquid or gas flows past the switch, it displaces a magnetic piston—this actuates a hermetically sealed reed switch. All flow switches have actuation points for air at 68°F and 14.7 psi with increasing flow. Withstand temperatures from -40 to 220°F. UL-recognized.

■ **Mini Low-Flow Switches** are configured to open the SPST contact when flow goes beyond the set point or stops. Typical applications include gas/liquid sampling, chemical injection, pollution control monitoring, atmospheric furnaces, and process systems.

Specifications

- Repeatability: ±2%
- Wetted materials: Model 32929-00: brass, epoxy, and Viton®; Model 32929-02: TFE



Connections	Flow range		Max pressure psi (bar)	Material	Catalog number	Price
	Air (scc/min)	Water (cc/min)				
1/8" NPT(F)	30.0 to 16,000	1.0 to 500	1500 (103)	Brass	TW-32929-00	
			80 (5.5)	TFE	TW-32929-02	



A 32929-00

■ **Standard Low-Flow Switches** are normally closed (NC) but can be wired for normally open (NO). Typical applications include chemical process and vapor deposition systems, industrial gas lines, pollution control monitoring, and atmospheric furnaces.

Specifications

- Repeatability: ±2%
- Wetted materials: Models 32929-10 and -14: brass, epoxy, and Viton®; Models 32929-12 and -16: TFE



Connections	Flow range		Max pressure psi (bar)	Material	Catalog number	Price
	Air (scc/min)	Water (cc/min)				
1/8" NPT(F)	100 to 20,000	3.0 to 500	1500 (103.4)	Brass	TW-32929-10	
			100 (6.9)	TFE	TW-32929-12	
1/8" NPT(F)	200 to 60,000	5.0 to 950	1500 (103.4)	Brass	TW-32929-14	
			100 (6.9)	TFE	TW-32929-16	



B 32929-10

■ **Industrial Flow Switches** are normally closed (NC) but can be wired for normally open (NO). Typical applications include lubrication, process and fire control, cooling systems, heat pumps, hydraulic lifts, and water treatment.

Specifications

- Repeatability: ±2%
- Wetted materials: brass, epoxy, and Viton®
- Back pressure: 5 psi required for gas applications



Connections	Flow range		Max pressure psi (bar)	Material	Catalog number	Price
	Air (scfm)	Water (GPM)				
1/4" NPT(F)	0.5 to 50.0	0.1 to 4.0	1500 (103.4)	Brass	TW-32929-20	
3/8" NPT(F)					TW-32929-22	
1/2" NPT(F)	1.0 to 75.0	0.5 to 10.0			TW-32929-24	
3/4" NPT(F)	5.0 to 120	1.0 to 20.0			TW-32929-26	



C 32929-22