

Thermo Scientific Model 5100 Model 5400

Insertion Turbine Flowmeters
for Liquid and Gas

Thermo Scientific insertion turbine flowmeters are a dependable, economical flow metering solution for large pipeline applications. Backed by 35 years of manufacturing expertise, the devices ensure accuracy superior to that of differential pressure devices and install easily using the "hot tap" method to optimize your process and minimize downtime.



Industries

- Potable water distribution
- Oil and gas pipeline
- Water treatment
- General process
- Petrochemical

Features

- Highly accurate and repeatable
- "One-size-fits-all" for 4-in to 10-ft diameter pipes
- Individually calibrated turbine heads
- Negligible pressure drop
- Extractable for "pigging"
- Field repairable
- Cost-effective, proven technology

Accurate & Durable

Thermo Scientific insertion turbine flowmeters are widely used for monitoring oil, gas and potable water distribution. Providing outstanding performance at a competitive price, these devices consist of a rotating impeller assembly mounted on the end of a stainless steel insertion stem. The instrument is designed to offer repeatable measurements down to extremely low velocities, and can be installed into a pipe through an isolating valve which facilitates removal without interrupting the process. The impeller acts much like a windmill in that the rotational speed is directly proportional to the velocity (i.e. $\text{Velocity} \times \text{Pipe Area} = \text{Flow Rate}$). This proven design operates efficiently under demanding conditions yet requires little maintenance.

Powered for Remote Locations

The lack of power in remote locations can complicate the metering process. Thermo Scientific insertion turbine flowmeters can be supplied with a lithium battery pack that lasts up to five years. Manufactured from magnetic stainless steel, the flowmeter's impeller generates a pulsed output as the blades rotate through the flux field of a magnet contained in the pickup assembly. When used in conjunction with a battery powered totalizer and SCADA system, the flow measurement data can be read in the field via the local display or transmitted to a DCS. For industrial applications, a 4-20 mA output can be fed directly into a process control system. These flexible output options increase operational efficiency while lowering your cost of operation.

Easy-to-Install

Our insertion turbine flowmeter can be installed easily by a qualified pipeline service technician using the "hot tap" method. This process involves installing a full-port ball valve on the line without shutting off the flow or interrupting the process. The device can be mounted on the top of the valve and installed or retracted for periodic service without interrupting the flow to minimize downtime.

A Range of Flowmeters

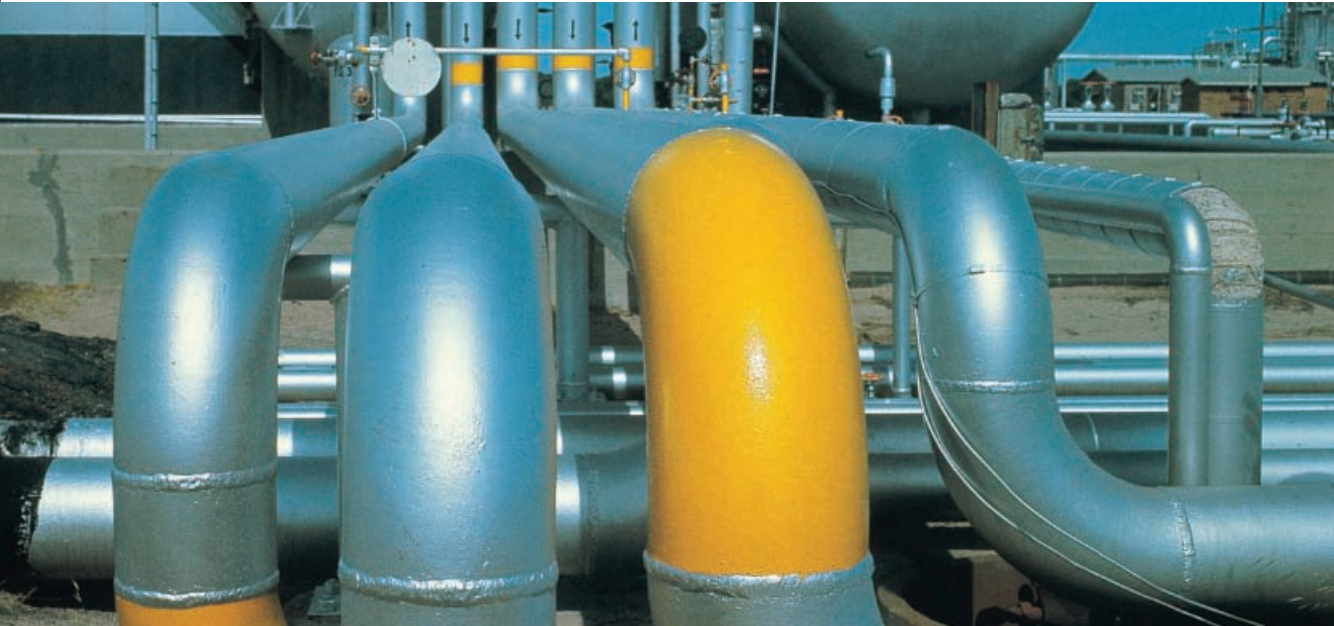
As the global demand for water, oil and gas increases, a complex network of pipelines transports liquids and gases 24/7 over thousands of miles to waiting consumers. Most pipeline operators have a fiscal and environmental obligation to monitor the flow of product during this transportation process. We offer a range of Thermo Scientific ultrasonic and turbine flowmeters that accurately measure the flow of liquid or gas in large pipes. Serving a range of applications, these flowmeters feature highly accurate and repeatable measurements that result in process improvement and a significant return on investment.

Model 5100 Insertion Turbine Flowmeter for Gas and Liquid

The Model 5100 turbine flowmeter is an extremely robust instrument that accurately measures liquids and gases in pipes that range from 100 mm to 3 m (4 in to 10 ft) in diameter. It is generally installed on a full-port ball-valve using a 3-inch 150 lb ANSI flange. The instrument gives continuous, reliable flow measurement with achievable accuracy of better than 1% for liquid and 3% for gas, and has a wide operating range with a (typical) 10 to 1 turndown. The operator can select from a variety of different turbine heads in order to optimize the performance on any given application. Each instrument is factory calibrated and replacement insertion head assemblies can be installed easily without loss of accuracy. The Model 5100 flowmeter is recommended for application pressures up to 270 psi (18 bar).

Model 5400 Insertion Turbine Flowmeter for Low Flow Liquids

The Model 5400 insertion turbine flowmeter is specifically designed for low flow applications in irrigation or potable water distribution lines. It installs conveniently through a 1.5 inch female threaded full-port ball-valve, and the "hot tap" method can be used to install it in an active pipeline. The instrument is very lightweight and easy to handle, and features a compact impeller assembly which is designed to offer repeatable measurements down to extremely low velocities. A variety of signal amplifiers are available that ensure compatibility with your system requirements. The Model 5400 is suitable for use on pressures up to 225 psi (15 bar).





Model 5400 Insertion Turbine Flowmeter Ordering Information

MODEL NUMBER

54: Model 5400 Insertion Liquid Turbine Flowmeter — 735-mm (29-in) stem length

A. FLUID TYPE

L: Liquid (Standard Liquid Applications)

B. FLOW RANGE

	FLOW RANGE		DESCRIPTION
	m/s	ft/s	
1:	0.2-5	0.66-16	Unidirectional

C. BODY MATERIAL

1: Stainless steel

D. TEMPERATURE RANGE

T1: -20°C to +150°C (0°F to +300°F) — I.S. & safe area
T3: -200°C to +230°C (-300°F to +450°F) — safe area only

E. PROCESS CONNECTION

S1: Male NPT (thread 1.5-in)
S2: Male BSPT (thread 1.5-in)

F. TERMINATION

01: 1-in NPT for ex-proof enclosure or local indicator
02: M25 thread for safe area or I.S.
03: M25 thread suitable for flameproof enclosure

G. HAZARDOUS AREA REQUIREMENT

S: Non-hazardous/safe area operation
I: ATEX Intrinsically safe EEx ia IIB T5 (EEx ia IIC T6 when no accessory kit fitted)*
D: ATEX Flameproof EEx d IIB T5
7: US explosion proof enclosure Class 1, Groups B,C,D

H. INTERFACE ELECTRONICS

Refer to Interface Electronics

MODEL NUMBER

54

FLUID TYPE

A

FLOW RANGE

B

BODY MATERIAL

C

TEMPERATURE RANGE

D

PROCESS CONNECTION

E

TERMINATION

F

HAZARDOUS AREA REQUIREMENT

G

INTERFACE ELECTRONICS

H

*Select hazardous area requirement (I) when specifying local display

NOTE: Consult Thermo Fisher Scientific for details of maintenance contracts and additional services including installation, commissioning, re-calibration, service, or repair.

Model 5100 Insertion Turbine Flowmeter Ordering Information

MODEL NUMBER

51: Model 5100 Insertion Turbine Flowmeter for Liquid or Gas

A. FLUID TYPE

- G:** Gas
- L:** Liquid (Standard Liquid Applications)

B. FLOW RANGE

	FLOW RANGE		DESCRIPTION
	m/s	ft/s	
1:	1-12	3-40	General liquid use, no filtration required
2:	0.6-12	2-40	Clean liquids with lubricating properties
3:	2-30	6-100	High pressure gas, >10 bar (145 psi)
4:	4-45	13-150	High velocity, high pressure gas >10 bar (145 psi)
5:	0.3-5	1-16	General liquid use, low velocity ranges
6:	0.6-6	2-20	Low pressure gas, low velocity ranges
7:	1.2-12	4-40	Low pressure gas, medium velocity ranges
8:	3-30	10-100	Low pressure gas, high velocity ranges
9:	5-50	16-170	Low pressure gas, very high velocity ranges

C. BODY MATERIAL AND FLANGE

- 1:** 3-inch ANSI 150 stainless steel flange and seal housing assembly
- 2:** 3-inch ANSI 150 carbon steel flange and seal housing assembly with oven cured epoxy powder coat finish
- X:** Special-- consult Thermo Fisher Scientific applications department

D. TEMPERATURE RANGE

- T1:** -20°C to +150°C (0°F to +300°F) — I.S. & safe area
- T3:** -200°C to +230°C (-300°F to +450°F) — safe area use only

E. STEM LENGTH

- A:** 22-inch (559 mm) stem length
- B:** 27-inch (686 mm) stem length
- X:** Special — consult Thermo Fisher Scientific applications department

F. TERMINATION

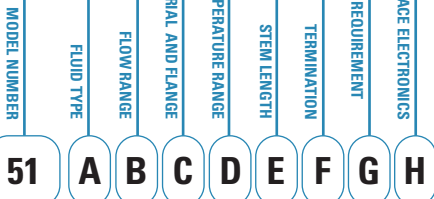
- 01:** 1-in NPT for explosion-proof enclosure or local indicator
- 02:** M25, suitable for standard enclosure connection
- 03:** M25, suitable for flameproof enclosure connection

G. HAZARDOUS AREA REQUIREMENT

- S:** Non-hazardous/safe area operation
- I:** ATEX Intrinsically safe EEx ia IIB T5 (EEx ia IIC T6 when no accessory kit fitted)*
- D:** Flameproof EEx d IIB T5
- 7:** US explosion-proof enclosure Class 1 Groups B,C,D

H. INTERFACE ELECTRONICS

Refer to Interface Electronics table



*Select hazardous area requirement (I) when specifying local display

NOTE: Consult Thermo Fisher Scientific for details of maintenance contracts and additional services including installation, commissioning, re-calibration, service, or repair.



Interface Electronics for Turbine Flowmeters

INTERFACE ELECTRONICS

- A:** ATEX Flameproof enclosure with terminal block
- B:** ATEX Flameproof enclosure with 4-20 mA analog amplifier
- C:** ATEX Flameproof enclosure with 4-20 mA current modulated pulse
- D:** ATEX Enclosure with terminal block for I.S. service (must be used with I.S. pick-up)
- E:** ATEX Enclosure with 4-20 mA current modulated pulse amplifier for I.S. service (must be used with I.S. pick-up)
- F:** Explosion-proof enclosure with terminal block
- G:** Explosion-proof enclosure with 4-20 mA analog amplifier
- H:** Explosion-proof enclosure with 5 volt square wave amplifier
- I:** Local display with Rate/Total indicator (battery powered)
- J:** Local display with Rate/Total indicator with 4-20 mA output (loop powered)
- K:** Local display with Rate/Total indicator with relay mA output + alarm (DC powered)

NOTES:

1. Items I, J & K are certified intrinsically safe to European & U.S. standards;
Europe: ATEX EEX ia IIB T3 (Group II 2G);
U.S.A.: CSA I.S. for Class 1 Groups C & D;
2. All amplifiers require 24 VDC power source
3. Items F, G & H comply with U.S. (NEMA 7) requirements

Replacement Turbine Heads

MODEL 5100

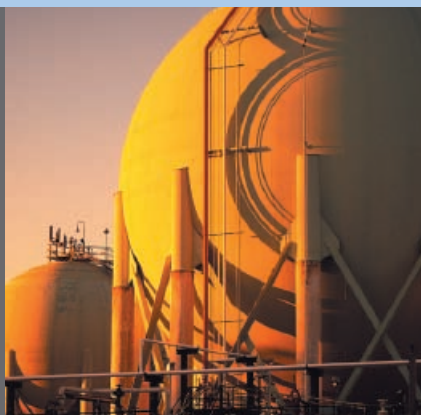
	FLOW RANGE		DESCRIPTION	PART NUMBER
	m/s	ft/s		
1	1-12	3-40	General liquid use	51L-1
2	0.6-12	2-40	Clean liquids	51L-2
3	2-30	6-100	High pressure gas	51G-3
4	4-45	13-150	High pressure gas	51G-4
5	0.3-5	1-16	General liquid use	51L-5
6	0.6-6	2-20	Low pressure gas	51G-6
7	1.2-12	4-40	Low pressure gas	51G-7
8	3-30	10-100	Low pressure gas	51G-8
9	5-50	16-170	Low pressure gas	51G-9

MODEL 5400

	FLOW RANGE		DESCRIPTION	PART NUMBER
	m/s	ft/s		
1	0.2-5	0.66-16	Low velocity liquid	54L-1

We can repair or replace turbine products manufactured by the following companies

- Electronic Flow Meters (EFM)
- Automatic Oil Tools (AOT)
- Flow Automation
- Hydril PTD
- Onix Measurement
- Tokheim Automation
- GH Flow Automation



Model 5100 — Insertion Turbine Flowmeter for Liquid and Gas

Functional Specifications

Accuracy	Liquids: $\pm 2.0\%$ of reading achievable (10 to 1 turndown) Gases: $\pm 2.0\%$ of reading achievable (5 to 1 turndown)
Repeatability	0.2%
Pressure Drop	Liquids: Typically 300 mbar (1 psi) at normal maximum flow rate in water Gases: Negligible at 100% flow rate dependent on gas density
Maximum Pressure	270 psig (18 bar)
Maximum Process Temperature	150°C (300°F)

Physical Specifications

Materials	Seal housing: Carbon steel (standard) or stainless steel Flanges: Forged carbon steel or stainless steel Shaft and sleeve bearings: Tungsten carbide and durable alloy Ball bearings: Stainless steel ANSI 440C
Installation	Install in pipeline with at least 10 pipe diameters of straight length upstream and 5 diameters downstream of flowmeter.

Outputs

Standard Pickup	100 m V pulse peak-to-peak at 1 m/s (3 ft/s)
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Model 5400 — Insertion Turbine Flowmeter for Low Flow Liquids

Functional Specifications

Accuracy	Liquids: $\pm 2.0\%$ of reading achievable (5 to 1 turndown)
Repeatability	0.2%
Pressure Drop	Liquids: Typically 300 mbar (1 psi) at normal maximum flow rate in water Gases: Not available
Maximum Pressure	225 psig (15 bar)
Maximum Process Temperature	150°C (300°F)

Physical Specifications

Materials	Seal housing: 316 stainless steel Shaft and sleeve bearings: Tungsten carbide and durable alloy
Installation	Install in pipeline with at least 10 pipe diameters of straight length upstream and 5 diameters downstream of flowmeter.

Outputs

Standard Pickup	100 mV pulse peak-to-peak at 1 m/s (3 ft/s)
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