

The Thermo Scientific M-PULSe is a fast, accurate ultrasonic flowmeter for the custody transfer of petroleum products. It's compact, easy to install, intrinsically safe and simple to maintain—saving you time and money.

Thermo Scientific M-PULSe™ Multi-Path Ultrasonic Liquid Flow Measurement System



System Features

- Meter spool size from 4 to 16 inches with no moving parts
- ATEX Zone 0 (Class I Div 1) hazardous area certification
- Transducers that can be changed under line pressure without interrupting the process
- Recessed transducer design which is suitable for pigging
- Compensation for temperature and pressure inputs in accordance with API standards
- User interfaces include keypad and laptop configuration software through RS232
- Multiple levels of security ensure controlled user access
- Various batching options
- Self proving function
- Logs flow data, alarms, and audit trail

Accurate and Fast

Backed by years of ultrasonic manufacturing experience, the Thermo Scientific M-PULSe is the world's first intrinsically-safe, multi-path liquid flow measurement system. Ideal for use as a custody transfer meter for crude oil and refined products, it utilizes four-path transit time technology as well as compensation for temperature and pressure to provide the highest accuracy and repeatability attainable in a flow measurement device. A sleek, stainless steel spool, available in sizes ranging from 4 to 16 inches, and a lightning-fast flow computer operate in tandem to minimize product waste and increase your profit potential.

Intrinsically Safe and Compact

The revolutionary design features patented, intrinsically safe transducers that eliminate the possibility of sparks. Rated to Zone 0, the M-PULSe is certified for use in the world's most hazardous environments. When compared to other explosion-proof ultrasonic flowmeters, the spool is more compact and lighter weight. In addition, the spool has no moving parts and transducers can be replaced while the device is in use, eliminating costly downtime.

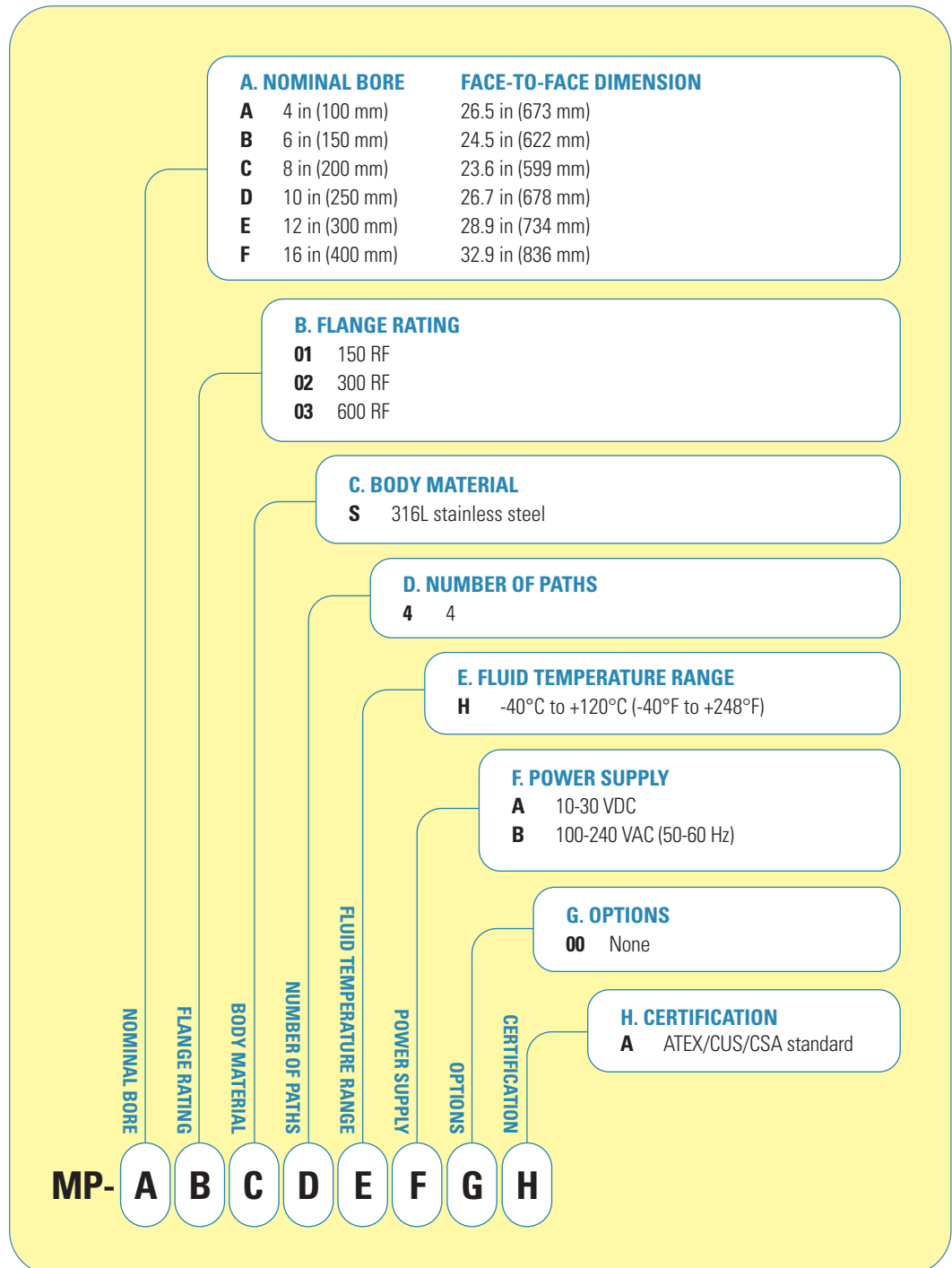
Easy-to-Install

The meter-mounted termination box enables a plant technician to easily connect the M-PULSe to any existing IS or explosion-proof installation. Set-up is facilitated by a user-friendly interface. Simple point-and-click functionality ensures rapid installation and start-up.



The M-PULSe pool is controlled by a feature-rich, lightning fast flow computer. Powered by a 32-bit industrial processor that is supported by quad digital signal processors, this flow computer incorporates all of the required API approved algorithms and software to ensure accuracy and repeatability. The unit can be mounted up to 500 feet away from the spool piece in a Zone 2 (Div 2) or safe area. The flow computer cabinet has sufficient room to accommodate barrier boards for a variety of complementary inputs such as RTD, analog temperature, pressure sensor and density meter. The unit is available with AC and DC power supply options.

Model Configuration Guide



M-PULSe Turndown Ratios and Flow Ranges of Various Meter Sizes

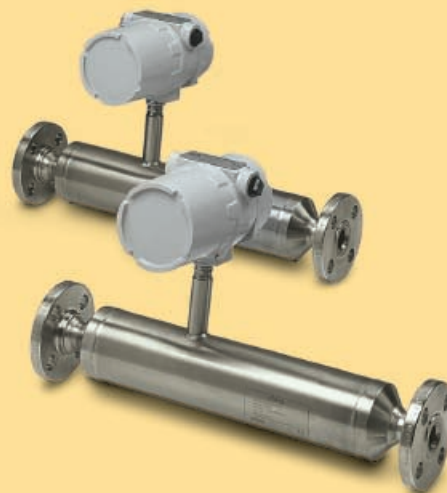
4-inch meter spool (ID 4.026 inch)				
Unit	Min 20:1	Max 20:1	Min 10:1	Max 10:1
GPM	78.3	1567.5	156.7	1567.5
m ³ /hr	17.8	356.0	35.6	356.0
BPH	112.0	2239.3	223.9	2239.3
6-inch meter spool (ID 5.761 inch)				
Unit	Min 20:1	Max 20:1	Min 10:1	Max 10:1
GPM	162.4	3249.9	324.9	3249.9
m ³ /hr	36.9	738.1	73.8	738.1
BPH	232.1	4642.8	464.3	4642.8
8-inch meter spool (ID 7.625 inch)				
Unit	Min 20:1	Max 20:1	Min 10:1	Max 10:1
GPM	284.6	5693.1	569.3	5693.1
m ³ /hr	64.6	1293.0	129.3	1293.0
BPH	406.7	8133.0	813.3	8133.0
10-inch meter spool (ID 9.562 inch)				
Unit	Min 20:1	Max 20:1	Min 10:1	Max 10:1
GPM	447.6	8952.9	895.2	8952.9
m ³ /hr	101.6	2033.4	203.3	2033.4
BPH	639.5	12790.0	1279.0	12790.0
12-inch meter spool (ID 11.374 inch)				
Unit	Min 20:1	Max 20:1	Min 10:1	Max 10:1
GPM	633.3	12667.6	1266.7	12667.6
m ³ /hr	143.8	2877.1	287.7	2877.1
BPH	904.8	18096.7	1809.7	18096.7
16-inch meter spool (ID 14.312 inch)				
Unit	Min 20:1	Max 20:1	Min 10:1	Max 10:1
GPM	1002.8	20057.2	2005.7	20057.2
m ³ /hr	227.7	4555.4	455.5	4555.4
BPH	1432.7	28653.2	2865.3	28653.2

Spool Weight in Kilograms (Pounds)

Flange Class Size	150 lb RF kg (lb)	300 lb RF kg (lb)	600 lb RF kg (lb)
4 in (100 mm)	83 (183)	93 (204)	101 (223)
6 in (150 mm)	112 (248)	130 (286)	170 (374)
8 in (200 mm)	152 (336)	178 (392)	215 (474)
10 in (250 mm)	213 (469)	246 (542)	337 (743)
12 in (300 mm)	287 (633)	334 (737)	427 (941)
16 in (400 mm)	440 (969)	534 (1177)	675 (1489)

Reliable Density Input to M-PULSe

Achieving accurate density input is critical during the custody transfer of petroleum products. Thermo Scientific Sarasota density meters work in conjunction with the M-PULSe to provide rapid, repeatable measurement of liquid density. From inline and insertion to pocket density models, these compact devices provide real-time control to enhance productivity, ensure minimal product waste and reduce costs. Contact our applications staff today to learn how our meters will improve your petroleum and clean gas applications.



Thermo Scientific M-PULSe — Multi-Path Ultrasonic Liquid Flow Measurement System

General Specifications

Accuracy	±0.15% over 10:1 flow range of measured value; ±0.25% over 20:1 flow range of measured value
Repeatability	±0.05% of measured value
Flow Range	-12.2 m/second to +12.2 m/second (-40 ft/second to +40 ft/second) automatic bi-directional detection
Viscosity Range	Up to 150 cSt
Operating Temperature	-40°C to +85°C (-40°F to +185°F) – Electronics
Fluid Temperature	-40°C to +120°C (-40°F to +248°F) – Transducers
Number of Ultrasonic Paths	4
History	Data log interval 1 minute to 60 minutes, Audit trail, Alarms
Units	Imperial or metric

Flow Computer

Volumetric Correction	Implements API Ch11.1 2004. Density range 0.61120 to 1.16464
Low Density Fluids Calculation	Implements API TP25. Low density range extended to 0.3500
Batch Options	Manual; Daily; Timed; Fixed Quantity
Self Proving	Works with uni-directional or bi-directional prover, small volume prover
Line Density Input Options	4-20 mA input or interfaces with Solartron, Sarasota, UGC

User Interfaces

Keyboard	4x4, metal
LCD	16x4, -20°C to +70°C (-4°F to +158°F)
Software	Thermo Scientific AutoCONFIG™, through RS232 or RS485 port
User Programming Interface	Modbus, RTU protocol

Input/Output

Serial Ports	1 RS232: local; 2 RS232/RS485 (2-wire/4-wire)
Ethernet Port	1 port, 10/100 MHz
A/D Converter	-0.5-5.5 V span, 14 bit A/D
Analog Input	3 x 4-20 mA inputs; one 1-5 V input
RTD Input	2 inputs for process and spool piece temperatures (non-custody transfer input) Temperature: 1000-ohm, 0.00375 RTDs; -40°C to +200°C (-40°F to +392°F); 3-wire/4-wire
Density Input	2 density meter period current pulse inputs
Analog Output	1 electrically isolated 4-20 mA port with separate 24 VDC 20 mA source
Digital Output	3 solid-state relays for 250 VAC/DC, 0.1A; 1 FET, open drain
Pulse Output	1 frequency output: 0-10 KHz, with 2 outputs 90 degrees out of phase
Prover Input	2 sphere detect lines
Prover Output	4 valve control lines
Totalizer Output	2 software configurable pulse outputs

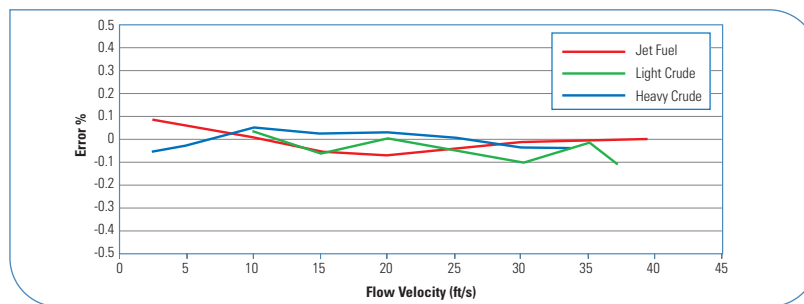
Power Supply

Power Input	10-30 VDC or 100-240 VAC
Current Draw	10-30 VDC: less than 2A; 100-240 VAC: less than 0.5 A

Safety Specifications

NEMA/IP Rating	NEMA 4X/IP65
North American Hazardous Area Certification	Transducer: Class I Div 1 Group C & D
Area Certification	Electronic Enclosure: Class I Div 2 Group C & D
ATEX Hazardous Area Certification	Transducer: II 1 G EEx ia IIB T4 (Zone 0); Electronics Enclosure: II 3 (1) G EEx nL (ia) IIB T4 (Zone 2)
European Compliance	CE
Pressure Vessel	Meter body designed and manufactured in accordance with ASME B31.3 Process Piping Code and the Pressure Equipment Directive (PED) 97/23/EC

Typical Accuracy/Linearity (8-inch Example)



Custody Transfer Approval (pending)
OIML R 117 class 0.3 (1995)

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