

Eldridge Products, Inc.

EPI produces a wide variety of thermal instrumentation for gas mass flow measurement and control. Built with over twenty years experience in thermal mass flow metering design and production, our thermal flowmeters and flow switches are known for superior quality, dependability, ease of use, and durability in real world applications.

Our Master-Touch™ Family of thermal mass flowmeters greatly expanded this legacy by adding a powerful microprocessor to our proven thermal technology for an unparalleled degree of flexibility, accuracy, and control. Upon its introduction, the Master-Touch raised the standard for “smart” technology and it remains at the forefront of thermal gas mass flow instrumentation.

Sensor Theory and Operation

Master-Touch products include a rugged, cleanable, thermal mass flow sensor. These units consist of a sensor assembly which utilizes two RTD (Resistance Temperature Detector) sensing elements. The sensors are constructed of reference grade platinum, ceramic, glass, and stainless steel. Two platinum resistance sensors are built up upon the ceramic substrate and then given a thin glass coating. The assembly is then slipped into a

stainless steel sheath for ruggedness, corrosion and abrasion resistance. The sensor assembly is large, rugged, insensitive to dirt buildup, and easily cleaned.



During operation, the temperature sensor constantly measures the ambient temperature of the gas and maintains a reference resistance on one side of a Wheatstone bridge. The second sensor is forced through self-heating to a constant temperature above that of the gas stream and is controlled by the temperature sensor and our forced null Wheatstone bridge amplifier. Our bridge circuit is set up with precise resistance values to maintain the overheat temperature and to counterbalance the process gas temperature effects. Optional wide temperature ranges are supported by EPI's patented μ -controlled sensor bridge.

Since the sensor compensates for temperature changes and pressure effects are negligible, the heated sensor becomes a mass flow sensor. Gas mass flow across the heated sensor is measured by the thermal heat transfer (loss) of the sensor. Gas molecules absorb heat while passing the heated sensor surface. As the velocity of the gas is increased, more heat is transferred from the sensor to the gas stream and more power is required of the sensor's drive circuit to maintain a constant sensor overheat temperature. This heat

transfer is directly proportional to the mass velocity of the gas (density x velocity). The power demand of the flow transmitter is what we use as our non-linear mass flow or mass velocity transmitter signal. This signal is then linearized for a direct reading of the process flow output.

Inline & Insertion Styles

The inline style flowmeter assembly includes the flow sensing element, temperature sensing element, bridge amplifier/signal output board, microprocessor, linearizer circuit board, transmitter enclosure, and flow section. The flow section is specified to match the user's flow conduit and plumbed directly in the flow line. This design has the sensing elements mounted in the flow section for exposure to the process gas.

Our inline style flowmeters are available in sizes from 1/4" pipe through 4" pipe and are provided with threaded male NPT ends as the standard mounting style for sizes as large as 2 1/2". For sizes 3" and larger, ANSI 150# flanges are standard. Optional end mounting styles may be specified, such as tube ends, tube end fittings, butt weld ends, flanged ends, etc. as required for any size. Pipe sizes in excess of 4" require insertion style thermal mass flow meters.



The insertion style flowmeter assembly includes the flow sensing element, temperature sensing element, bridge amplifier/signal output board, microprocessor, linearizer circuit board, transmitter enclosure, and probe assembly which supports the sensing elements. This design requires the

probe assembly to be inserted into the process gas flow conduit to allow the process gas to flow across the sensor assembly. The insertion style thermal mass flow meter probe assemblies may be inserted into any suitable flow section, pipe, duct, etc.

Our Insertion style thermal mass flowmeters are available with 1/2", 3/4", or 1" OD probes and may be installed with pipe fitting connections or user supplied bored through tube fittings. Tube fittings, with or without mounting flange, are also available from the factory as an option. The tube length must be specified upon ordering.



Standard probe lengths are available in 6" increments for lengths of 6" to 24", and in 12" for lengths of 24" to 60".

Integral & Remote Styles

Integral style flowmeters are assembled with all electrical components, digital display and power supply located within one enclosure. This enclosure is mounted directly to the flowbody (inline thermal mass flowmeters) or probe assembly (insertion thermal mass flowmeters).



Remote style flowmeters are assembled with the flow transmitter located in an enclosure that is mounted directly to the flowbody (inline flowmeters) or probe assembly (insertion flowmeters). The linearizing electronics, digital display and power supply are remotely mounted for convenient access. A two-wire, twisted pair cable is typically used to connect the electronics enclosures.



Flow Straightening Assembly

All inline style flowmeters for line sizes of 3/4" and larger include a pair of inlet flow conditioners. These conditioners help to improve problematic, uneven flow profiles by disrupting the gas flow and allowing it to assume a more uniform profile, without adding any significant pressure drop in most applications.

LightWIRE™



Our Master-Touch flowmeters offer optional infrared communications via our LightWIRE technology.

LightWIRE-enabled flowmeters are used with PCs and laptops running EPICommunicator™ software via Communicator I RS232 or USB adapters, or with Communicator II modules. The Communicator modules do not include a rating for hazardous-area locations.



Master-Touch™ Technology



Our Master-Touch technology adds a powerful micro-controller to our proven sensor and bridge circuitry for improved performance and user control. The micro-computer performs digital signal processing (DSP) functions utilizing a high speed, high resolution 16-bit analog to digital converter (ADC), a central processing unit (CPU) and a high resolution 14-bit digital to analog converter (DAC). Operations are performed in real time while supporting simultaneous full duplex RS232 and RS485 (Modbus RTU) communications.

Digital Subsystems

Five digital subsystems control the Master-Touch functions:

1. **Analog-to-Digital Converter** (ADC) to acquire the data generated by the sensors.
2. **Curve Linearizer** to transform nonlinear to linear voltages.
3. **Digital-to-Analog Converter** (DAC) to generate output voltage from sensor data.
4. **Voltage Tracking** to perform real-time processing of input and output signals.
5. **EEPROM** to store and maintain user configurable variables.

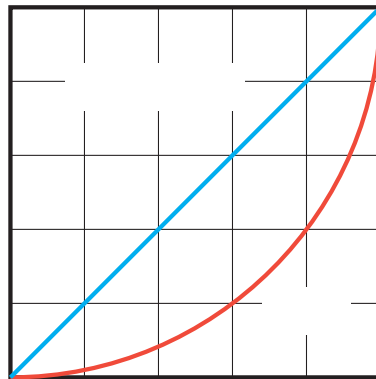
Major Features

Every Master-Touch flowmeter supports up to **Four Separate Meter Ranges** that can include independent calibration data for different gases, flow ranges, pressures, etc. The meter ranges can be selected through the keypad, a PC, your DCS, or by external switching.

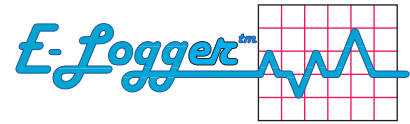
The Master-Touch provides **Continuous Curve Fitting** as the microprocessor uses a polynomial curve fit to linearize data into a continuous linear output with 14-bit precision. The flowmeter variables may be viewed without any interruption to the flow signal or elapsed flow totalization.

The Master-Touch also supports **Continuous Tracking** and **Timestamping** of high and low flow rates. These values can be easily reset as needed.

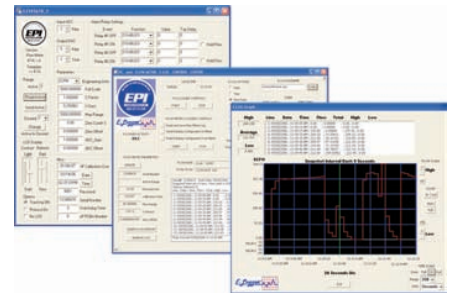
The user can choose from a variety of **Engineering Units** while the flowmeter is in operation. All flow rate, accumulated total, alarm, and timestamp information is automatically converted into the new units.



User input and control of the field-adjustable, smart transmitter is supported by the four-button touch keypad or via RS232 I/O communications using **EPICommunicator™** software.



E-Logger includes a fully functional, PC-based data logger that works in conjunction with Master-Touch™ flowmeters which have v4.1A and higher software. The user can select from a set of categories for the data collection, the time interval for each data "snapshot" and, if necessary, programmed start and stop times. The data is stored on either the flowmeter or a PC. E-Logger will also graph the data, and it provides tools for analysis of the data. Data files stored on a PC can be accessed by most common spreadsheet applications.



Applications & Solutions



EPI's flowmeters have been installed in a wide variety of process control applications, from steel and paper mills to auto manufacturers to pharmaceutical houses, from natural gas submetering and compressed air consumption to water & wastewater treatment plants.

Gas Submetering

For many companies, the use of natural gas is the obvious choice for submetering. The gas is typically delivered through large lines at very high pressure and the gas company supplies the figures for your overall consumption. But beyond this general custody transfer, how much do you know about specific consumption and how are opportunities for cost savings determined? Submetering at selected points will show where the gas is used, how much gas is used at each location or work area, and when each location or work area is using the gas. This is

the information needed to analyze ongoing expenses and to refine overall usage.

Compressed Air Monitoring

In many facilities, compressed air is one of the primary components of overall energy use. As energy costs continue to rise, accurately tracking the use of compressed air can produce direct and immediate benefits by providing the information you need to establish a program that:

- 1) monitors general usage to encourage cost conservation;
- 2) tracks peak usage to determine the optimum compressor capacity; and
- 3) simplifies the overall instrumentation needs through the use of thermal gas mass flow technology.

EPI flowmeters are the instrument of choice for compressor distributors and air audit professionals throughout the country.

Water & Wastewater Treatment

The treatment of water and wastewater is a critical element of municipal responsibility. Increased public and private awareness of water quality, availability, and cost is a driving force behind the demands for better efficiency and economy in these processes.

The use of compressed air is necessary to promote optimal bacteria growth in aeration basins. Closely controlling the aeration process can reduce energy consumption by as much as 25%, and accurate measurement is critical to achieving this goal.

Monitoring Digester or Bio Gas is equally important. The primary objective is to achieve an overall system balance. A secondary objective is to monitor the excess gas (waste gas) that is used as a fuel to power onsite generators and pumps, or to create energy for a more widespread power grid. In addition, monitoring is often a requirement of local, state, and Federal environmental guidelines.

Typical Industrial Applications

AUTOMOTIVE INDUSTRY

Compressed air monitoring *
Natural gas consumption * Powder paint air flow * Paint booth/paint oven ventilation

UTILITY SERVICES

Stack or flue gas * Waste water aeration * Ventilation systems * Digester gas * Gas flows * Nitrogen purge * Combustion air * Boiler inlet air

FOOD PROCESSING

Drying air * Ventilation systems * Boiler inlet air * Exhaust gas * Process control * Compressor lines

HVAC

Air balancing * Duct flows * Energy conservation * Fume hoods * Clean rooms * Laminar flow benches

LABORATORY AND R & D

Flow research * Biomedical studies * University studies * Toxicology studies * Energy studies * Industrial

Hygiene * Occupational Safety * Experimentation

PETROLEUM & GAS INDUSTRIES

Custody transfer * Landfill gas recovery * Flare gas measurement * Gas mixing * Gas quality studies * Leak testing

RAW MATERIALS INDUSTRIES

Pulp & paper mills * Mining * Semiconductor manufacturing * Chemical processing * Primary metals * Plastics & synthetics

Master-Touch™ MP Series

Manufacturing applications typically require accurate, dependable measurement in an approved industrial-strength package. Our Master-Touch MP Series is the answer to this demand. Available in a variety of configurations to meet virtually any situation, the MP Series is the instrument of choice through the world. All of the MP Series flow transmitters include an explosion-proof enclosure for use in hazardous areas. The remote signal processor enclosures are for use in non-hazardous area locations.

Series 8000MP-8100MP

Master-Touch™ Series 8000MP-8100MP flowmeters are inline style instruments with the flow transmitter mounted on the flow section and the signal processor electronics remotely mounted in a separate enclosure. Input power is supplied to the remote electronics. This configuration uses only a two-wire connection between the flow



transmitter and the signal processor. Flow sections for pipes ¾" and larger have flow straightening screens as standard. Flow sections for pipes up to 2½" have MNPT ends as standard; flow sections for pipes 3" and up have ANSI 150lb. Class flanges as standard. Depending on the line size, a variety of alternatives are available, including ANSI 300lb. and DIN flanges, butt ends, sanitary fittings, etc.

Series 8200MP

Master-Touch™ Series 8200MP flowmeters are insertion style instruments with the flow transmitter mounted on the sensor probe assembly and the signal processor electronics remotely mounted in a separate enclosure. This configuration uses only a two-wire connection between the flow transmitter



and the signal processor. A variety of installation options are available, including ball valve retractor assemblies, tube to pipe compression fittings, and probe mounted flanges. Input power is supplied to the remote electronics.

Series 8600MP-8700MP

Master-Touch™ Series 8600MP-8700MP flowmeters are inline style instruments with all electronics mounted integrally on the flow section. All input power and signal

output connections are accessible through the double-sided enclosure. Flow sections for pipes ¾" and larger have flow straightening screens as standard. Flow sections for pipes up to 2½" have MNPT



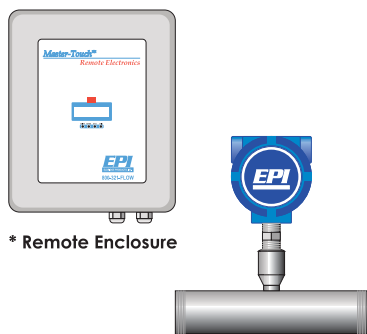
ends as standard; flow sections for pipes 3" and up have ANSI 150lb. Class flanges as standard. Depending on the line size, a variety of alternatives are available, including ANSI 300lb. and DIN flanges, butt ends, sanitary fittings, etc.

Series 8800MP

Master-Touch™ Series 8800MP flowmeters are insertion style instruments with all electronics mounted integrally on the sensor probe assembly. All input power and signal output connections are accessible through the double-sided enclosure. A variety of installation options are available, including ball valve retractor assemblies, tube to pipe compression fittings, and probe mounted flanges.

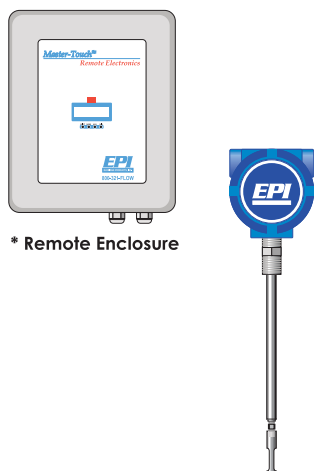


Series 8000MP – 8100MP



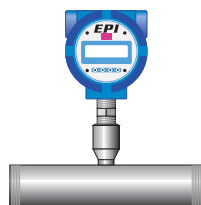
* Remote Enclosure

Series 8200MP



* Remote Enclosure

Series 8600MP – 8700MP



Series 8800MP



Specifications

Linear signal output	0-5 VDC & 4-20 mA
Relay Output	Two 1-amp, user-selectable alarm functions
Computer Signal Interface	RS232 & RS485, Modbus RTU (optional HART-compatible)
Accuracy, including linearity (Ref.: 21°C) with ideal flow profile	±[1% of Rdg + (0.5% + .02%/°C of Full Scale)]
Repeatability	±0.2% of Full Scale
Sensor flow response time	1 second to 63% of final flow value
Turn down ratio	100:1 (15 SCFM/FT ² minimum Reading)
Electronics temperature range	-40°-85°C (-40°-185°F)
Gas temperature range	-40°-66°C (-40°-150°F); extended range available, consult factory
Gas pressure effect	Negligible over ± 20% of absolute calibration pressure
Conduit/probe pressure rating range	Vacuum to 500 PSIG standard; higher pressures, consult factory
Input power requirement	24VDC @ 250mA 115 VAC 50/60 Hz optional 230 VAC 50/60 Hz optional
Flow Transmitter power requirements	5 watts or less
Wetted materials	316 Stainless Steel (Hastelloy optional)
Standard temperature & pressure (STP)	70°F & 29.92" Hg (Air .075 lb./cubic foot)
NIST traceable calibration	Standard

For use in hazardous area locations:
Class I Division 1 Groups B, C and D; Class II E, F and G; Class III; Type 4X, 7; Ex d IIB+H2; AEx d IIB+H2, IP66; EEx d IIB+H2, IP66; T2 standard.

Certified to US requirements; Certified to Canadian requirements

Certified to European ATEX requirements 0344 KEMA 04 ATEX 2276

* Remote Enclosure (Series 8000MP– 8200MP) for use in Ordinary (Non-Hazardous) area locations: Type 4X, IP66

Series 8000MP-8100MP			Series 8600MP-8700MP		
Model	Pipe OD" x L"	Design SCFM	Model	Pipe OD" x L"	Design SCFM
8036MP-SSS-133	1/4 x 6	3.50	8636MP-SSS-133	1/4 x 6	3.50
8049MP-SSS-133	3/8 x 6	6.00	8649MP-SSS-133	3/8 x 6	6.00
8059MP-SSS-133	1/2 x 7	13.0	8659MP-SSS-133	1/2 x 7	13.0
8069MP-SSS-133	3/4 x 7	60.0	8669MP-SSS-133	3/4 x 7	60.0
8089MP-SSS-133	1 x 8	90.0	8689MP-SSS-133	1 x 8	90.0
8110MP-SSS-133	1 1/4 x 10	150	8710MP-SSS-133	1 1/4 x 10	150
8112MP-SSS-133	1 1/2 x 14	200	8712MP-SSS-133	1 1/2 x 14	200
8116MP-SSS-133	2 x 14	350	8716MP-SSS-133	2 x 14	350
8120MP-SSS-133	2 1/2 x 14	500	8720MP-SSS-133	2 1/2 x 14	500
8124MP-SSS-133	3 x 14	750	8724MP-SSS-133	3 x 14	750
8132MP-SSS-133	4 x 14	1350	8732MP-SSS-133	4 x 14	1350

Series 8200MP			Series 8800MP		
Model	Probe OD"	Max L"	Model	Probe OD"	Max L"
8240MP-SSS-133	1/2	36	8840MP-SSS-133	1/2	36
8260MP-SSS-133	3/4	60	8860MP-SSS-133	3/4	60
8280MP-SSS-133	1	84	8880MP-SSS-133	1	84

Higher flow ranges are available, dependent upon process gas and flow specifications. Please consult the factory for details.

Master-Touch™ MPNH Series

In many industries the need for monitoring gas flow does not involve hazardous gases or potentially dangerous operating conditions. These applications can include many water and wastewater treatment applications, the HVAC industry, the general use of compressed air, and many other applications using air, nitrogen, argon, etc. In these cases, an explosion-proof electronics enclosure is not required, and may be considered a needless expense. To meet this challenge, Eldridge Products, Inc. now offers the Master-Touch™ Family of microprocessor-based thermal mass flowmeters in an economical configuration intended for use in non-hazardous area locations.

Series 8000MPNH-8100MPNH

Master-Touch™ Series 8000MPNH-8100MPNH flowmeters are inline style flowmeters with the flow transmitter mounted on the flow section and the signal processor electronics remotely mounted in a separate enclosure. Input power is supplied to the remote electronics. This configuration uses only a two-wire connection between the flow transmitter and the signal processor. Flow sections for pipes 3/4" and larger have flow straightening screens as standard. Flow sections have MNPT ends as standard. Depending on the line size, a vari-

ety of alternatives are available, including ANSI and DIN flanges, butt ends, sanitary fittings, etc.



Series 8200MPNH

Master-Touch™ Series 8200MPNH flowmeters are insertion style flowmeters with the flow transmitter mounted on the sensor probe assembly and the signal processor electronics remotely mounted in a separate enclosure. A variety of installation options are available, including ball valve retractor assemblies, tube to pipe compression fittings, and probe mounted flanges. Input power is supplied to the remote electronics. This configuration uses only a two-wire connection between the flow transmitter and the signal processor.



Series 8600MPNH-8700MPNH

Master-Touch™ Series 8600MPNH-8700MPNH flowmeters are inline style flowmeters with all electronics mounted integrally on the flow

section. Flow sections for pipes 3/4" and larger have flow straightening screens as standard. Flow sections have MNPT ends as standard. Depending on the line size, a variety of alternatives are available, including ANSI 300lb. and DN flanges, butt ends, sanitary fittings, etc.

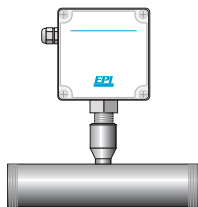
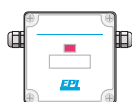


Series 8800MPNH

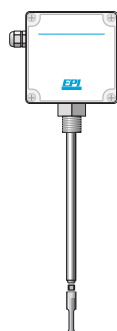
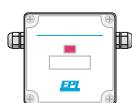
Master-Touch™ Series 8800MPNH flowmeters are insertion style flowmeters with all electronics mounted integrally on the sensor probe assembly. A variety of installation options are available, including ball valve retractor assemblies, tube to pipe compression fittings, and probe mounted flanges.



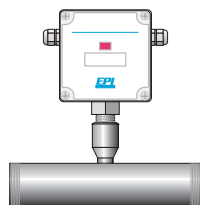
Series 8000MPNH – 8100MPNH



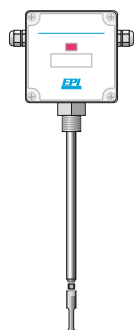
Series 8200MPNH



Series 8600MPNH – 8700MPNH



Series 8800MPNH



Specifications

Linear signal output	0-5 VDC & 4-20 mA
Relay Output	Two 1-amp, user-selectable alarm functions
Computer Signal Interface	RS232 & RS485, Modbus RTU (optional HART-compatible)
Accuracy, including linearity (Ref.: 21°C) with ideal flow profile	±[1% of Reading + (0.5% + .02%/°C of Full Scale)]
Repeatability	±0.2% of Full Scale
Sensor flow response time	1 second to 63% of final flow value
Turn down ratio	100:1 (15 SCFM/FT ² minimum Reading)
Electronics temperature range	-40°-85°C (-40°-185°F)
Gas temperature range	-40°-66°C (-40°-150°F); extended range available, consult factory
Gas pressure effect	Negligible over ± 20% of absolute calibration pressure
Conduit/probe pressure rating range	Vacuum to 500 PSIG standard; higher pressures, consult factory
Input power requirement	24VDC @ 250mA 115 VAC 50/60 Hz optional 230 VAC 50/60 Hz optional
Flow Transmitter power requirements	5 watts or less
Wetted materials	316 Stainless Steel (Hastelloy optional)
Standard temperature & pressure (STP)	70°F & 29.92" Hg (Air .075 lb./cubic foot)
NIST traceable calibration	Standard

For use in Ordinary (Non-Hazardous) area locations: Type 4X, IP66

Certified to US requirements; Certified to Canadian requirements

Series 8000MPNH-8100MPNH			Series 8600MPNH-8700MPNH		
Model	Pipe OD" x L"	Design SCFM	Model	Pipe OD" x L"	Design SCFM
8036MPNH-SSS-133	1/4 x 6	3.50	8636MPNH-SSS-133	1/4 x 6	3.50
8049MPNH-SSS-133	3/8 x 6	6.00	8649MPNH-SSS-133	3/8 x 6	6.00
8059MPNH-SSS-133	1/2 x 7	13.0	8659MPNH-SSS-133	1/2 x 7	13.0
8069MPNH-SSS-133	3/4 x 7	60.0	8669MPNH-SSS-133	3/4 x 7	60.0
8089MPNH-SSS-133	1 x 8	90.0	8689MPNH-SSS-133	1 x 8	90.0
8110MPNH-SSS-133	1 1/4 x 10	150	8710MPNH-SSS-133	1 1/4 x 10	150
8112MPNH-SSS-133	1 1/2 x 14	200	8712MPNH-SSS-133	1 1/2 x 14	200
8116MPNH-SSS-133	2 x 14	350	8716MPNH-SSS-133	2 x 14	350
8120MPNH-SSS-133	2 1/2 x 14	500	8720MPNH-SSS-133	2 1/2 x 14	500
8124MPNH-SSS-133	3 x 14	750	8724MPNH-SSS-133	3 x 14	750
8132MPNH-SSS-133	4 x 14	1350	8732MPNH-SSS-133	4 x 14	1350

Series 8200MPNH			Series 8800MPNH		
Model	Probe OD"	Max L"	Model	Probe OD"	Max L"
8240MPNH-SSS-133	1/2	36	8840MPNH-SSS-133	1/2	36
8260MPNH-SSS-133	3/4	60	8860MPNH-SSS-133	3/4	60
8280MPNH-SSS-133	1	84	8880MPNH-SSS-133	1	84

Higher flow ranges are available, dependent upon process gas and flow specifications. Please consult the factory for details.

Thermal Flow Averaging Tubes

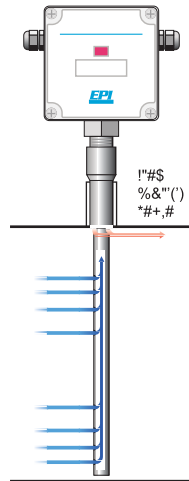
Patented

EPI's new thermal Flow Averaging Tubes (FAT™) provide accurate flow measurement in large pipes and ducts, offering a cost-effective solution for Heating, Ventilation, and Air Conditioning (HVAC) and Variable Air Volume (VAV) applications. The Master-Touch FAT™ probes utilize a flow averaging tube to give a stable flow signal in applications where the flow profile is less than ideal, such as downstream of a bend, valve, tee or obstruction.

Technology

The flow averaging tube has a number of large diameter (0.14") inlet ports along the length of the upstream impact surface. The impact pressure at each inlet port is averaged inside the tube to create the axial flow through the tube and across our thermal flow sensor. The gas flow then passes back into the main flow stream through the gas return ports located near the flow sensing elements.

Because the velocity impact pressure follows a square root function, the average velocity pressure in



the FAT™ probe may vary slightly from the average of the velocities at each inlet port. Accuracy shifts due to anomalies in the actual flow profile or installations in non-circular ducts may be corrected with a local C-Factor adjustment.

Configurations

As with our other product lines, the MP Series Flow Averaging Tubes have an explosion-proof enclosure mounted on the probe assembly. The MPNH Series Flow Averaging Tubes are intended for use in Ordinary, or non-hazardous, area locations and have ABS plastic enclosures mounted on the probe assembly. Series 9200MP and 9200MPNH instruments have the

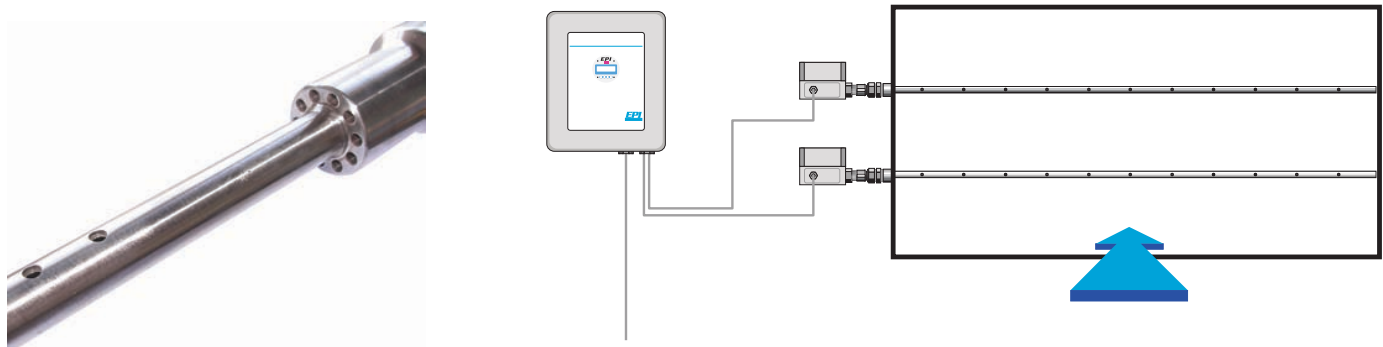
flow transmitter enclosure mounted on the probe assembly, with the signal processor electronics remotely mounted in a separate enclosure. The Series 9800MP and 9800MPNH instruments have all electronics mounted on the probe assembly.

The connections for input power and output signals for the Series 9200MP and 9200MPNH are located in the remote electronics. This configuration uses only a two-wire connection between the flow transmitter and the signal processor. All input and output connections for the Series 9800MP and 9800MPNH are accessed in the integral electronics enclosure.

The installation of the tubes in the pipe or duct typically uses tube to pipe compression fittings or flange mounts. Multiple tubes can be used with a Model 9601MP System Control Panel for an averaged output.



9601MP System Control Panel



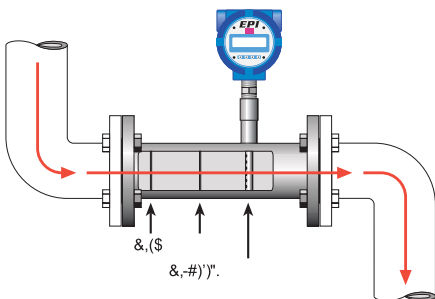
EPI's new thermal Flow Averaging Tubes (FAT™) are now adapted to inline applications for installations with extremely short straight runs such as retrofits for existing facilities or as replacements for other metering devices.

Installation

By itself, EPI's Flow Averaging Tube technology significantly reduces the traditional requirements for straight, unobstructed upstream piping. Depending upon the piping configuration, the traditionally required upstream straight run can be 10, 20, even 50 diameters. By measuring the cumulative flow velocities across one or more inside diameters, the Flow Averaging Tubes are far more tolerant of flow profile problems than other instrument technologies. This allows the required straight run to be greatly reduced from conventional requirements. In fact, by incorporating a Flow Straightening



Assembly, the upstream requirement can be reduced to as little as three diameters.



Series 9100MP-9100MPNH

The Series 9100MP flow averaging tubes have an explosion-proof flow transmitter mounted on the flow section and the signal processor electronics remotely mounted in a separate, NEMA 4X enclosure. The Series 9100MPNH flow averaging tubes have a NEMA 4X flow transmitter mounted on the flow section and the signal processor electronics remotely mounted in a separate, NEMA 4X enclosure. Input power for both series is supplied to the remote electronics. This configuration uses only a four- or six-wire connection between the flow transmitter and the signal processor. The flow sections have flow straightening screens as standard. Flow sections include ANSI 150# flanges as standard. For other mounting options, please consult the factory.



Series 9700MP-9700MPNH

The Series 9700MP flow averaging tubes have all electronics mounted on the flow section in an explosion-proof enclosure. The Series 9700MPNH flow averaging tubes have all electronics mounted on the flow section in a NEMA 4X enclosure. Input power for both series is supplied to the remote electronics. The flow sections have flow straightening screens as standard. Flow sections include ANSI 150# flanges as standard. For other mounting options, please consult the factory.



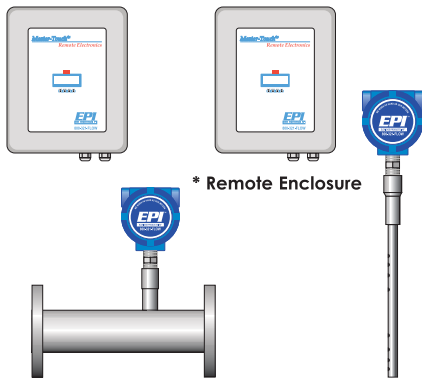
continued

Thermal Flow Averaging Tubes

Patented

Series 9100MP

Series 9200MP



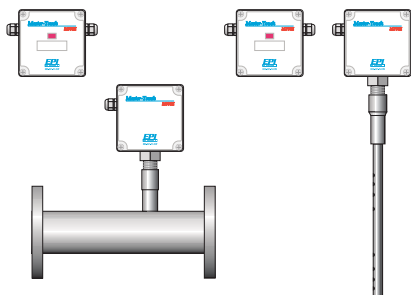
Specifications

Linear signal output
Relay Output
Computer Signal Interface

Accuracy, including linearity (Ref.: 21°C) with ideal flow profile
Repeatability
Sensor flow response time
Turn down ratio
Electronics temperature range
Gas temperature range
Gas pressure effect

0-5 VDC & 4-20 mA
Two 1-amp, user-selectable alarms
RS232 & RS485, Modbus RTU (optional HART-compatible)
±[1% of Reading + (0.5% + 0.05%/°C of Full Scale)]
±0.2% of Full Scale
1 second to 63% of final flow value
100:1 minimum (but not less than 50 SFPM)
-40°-85°C (-40°-185°F)
-40°-66°C (-40°-150°F)
Negligible over ± 10% of absolute calibration pressure

Series 9100MPNH Series 9200MPNH



Conduit/probe pressure rating range

Input power requirement

Flow Transmitter power requirements

Wetted materials

Standard temperature & pressure (STP)

NIST traceable calibration

MP Series:

Class I Division 1 Groups B, C and D; Class II E, F and G; Class III; Type 4X, 7; Ex d IIB+H2; AEx d IIB+H2, IP66; EEx d IIB+H2, IP66; T2 standard.

Vacuum to 150 PSIG standard; higher pressures, consult factory

24VDC @ 250mA
115 VAC 50/60 Hz optional
230 VAC 50/60 Hz optional

5 watts or less

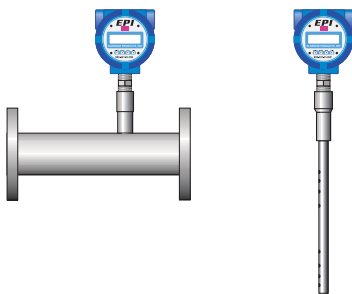
316 Stainless Steel

70°F & 29.92" Hg (Air .075 lb./cubic foot)

Standard

Series 9700MP

Series 9800MP



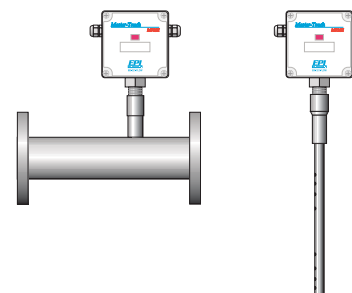
Certified to US requirements; Certified to Canadian requirements

Certified to European ATEX requirements 0344 KEMA 04 ATEX 2276

* Remote Enclosure (Series 8000MP-8200MP) and MPNH Series for use in Ordinary (Non-Hazardous) area locations: Type 4X, IP66

U. S. Patent No. 6,883,389 Other U.S. & foreign patents pending.

Series 9700MPNH Series 9800MPNH



Series 9100MP	Design
Model	Pipe OD" x L" SCFM
9116MP-SSS-133	2 x 14 1400
9120MP-SSS-133	2½ x 14 2000
9124MP-SSS-133	3 x 14 3000
9132MP-SSS-133	4 x 14 5400
9148MP-SSS-133	6 x 14 12000

Series 9200MP	Design
Model	Probe OD" Max L" SCFM
9240MP-SSS-133	1/2 36
9260MP-SSS-133	3/4 60
9280MP-SSS-133	1 84

Series 9700MP	Design
Model	Pipe OD" x L" SCFM
9716MP-SSS-133	2 x 14 1400
9720MP-SSS-133	2½ x 14 2000
9724MP-SSS-133	3 x 14 3000
9732MP-SSS-133	4 x 14 5400
9748MP-SSS-133	6 x 14 12000

Series 9800MP	Design
Model	Probe OD" Max L" SCFM
9840MP-SSS-133	1/2 36
9860MP-SSS-133	3/4 60
9880MP-SSS-133	1 84

Series 9100MPNH	Design
Model	Pipe OD" x L" SCFM
9116MPNH-SSS-133	2 x 14 1400
9120MPNH-SSS-133	2½ x 14 2000
9124MPNH-SSS-133	3 x 14 3000
9132MPNH-SSS-133	4 x 14 5400
9148MPNH-SSS-133	6 x 14 12000

Series 9200MPNH	Design
Model	Probe OD" Max L" SCFM
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9732MPNH-SSS-133	4 x 14 5400
9748MPNH-SSS-133	6 x 14 12000

Series 9800MPNH	Design
Model	Probe OD" Max L" SCFM
9840MPNH-SSS-133	1/2 36
9860MPNH-SSS-133	3/4 60
9880MPNH-SSS-133	1 84

Multipoint Systems



The Series 9000MP Multipoint Systems are designed to measure air and gas flow in systems where two or more sensing points are required due to large cross-sectional areas. The typical Series 9000MP Multipoint System includes one or more Series 9000MP Probe and a Series 9600MP System Control Panel. The new APS air purge system and support for multiple C-Factors make the Series 9000MP your complete solution.

Technology

The 9000MP flow transmitter probe assembly is the heart of the system. The probe assembly consists of two or more flow sensors (maximum of 5 sensors per probe) mounted in a 1½" OD probe shaft. Each sensor is matched to its own bridge board and is individually calibrated and linearized. The bridge board and microprocessor for each sensor are mounted outside of the flow duct in an enclosure at the end of the probe shaft.

The voltage output from each sensor and bridge board set is sent to its own microprocessor board for accurate linearization of the flow rate signal. The linearized output signals from the multiple sensors in



the probe are then averaged by the summer/averager module. Typically, the probe assembly's averaged output signal is transmitted to the remote system control panel for grand averaging with the signals from other probe assemblies. However, flow transmitter assemblies may be specified with either one average output signal and/or individual signals to allow individual sensor readings at the system control panel.

The Series 9601MP system control panel is housed in a 12" x 10" NEMA 4X fiberglass enclosure. This enclosure holds the power supply, the summer/averager board (required for systems with multiple probe assemblies), and a microprocessor board for control of the overall system output signal, and can be located from as little as a few feet to as much as thousands of feet from the transmitter probe assemblies.

The control panel provides the power for the probe assemblies. The flow transmitter sends its signal to the control panel over a 4-20 mA signal loop. This method requires a four wire connection per probe assembly (power supply positive, power ground, 4-20 mA average output and return). The control panel provides two analog output signals (0-5 VDC and 4-20 mA) linearized proportionally to the grand average flow rate, as well as RS232 and RS485 (Modbus RTU) digital interfaces for communication with a PC running EPICommunicator software. The 4-20 mA grand average output can drive up to 1200 ohms. A HART-compatible option is available

Air Purge System

The EPI Air Purge System (APS) provides a means of cleaning the sensors in applications where dry particulates may build up on the sensors and cause problems. A stainless steel tube is mounted on the downstream side of the probe support with a pair of outlet holes positioned at each sensor. The tube is connected to a tap located on the mounting flange. After basic installation of the multipoint system is complete, a pressurized gas line (typically compressed air) is connected to the tap. The pressurized gas is released at set intervals by the user to clean the sensor surface of any accumulated particulates. The frequency and duration of the the purging gas stream can be controlled by the Master-Touch software or externally by the customer.



The purge gas must be compatible with the process gas. Pre-heating the purge gas to the temperature of the process gas is recommended. By pre-heating the purge gas, one may avoid adhesion of certain particulate matter to sensor and probe surfaces. Consult the EPI factory for pre-heating solutions.

continued

Multipoint Systems

Specifying a Series 9000MP Multipoint System

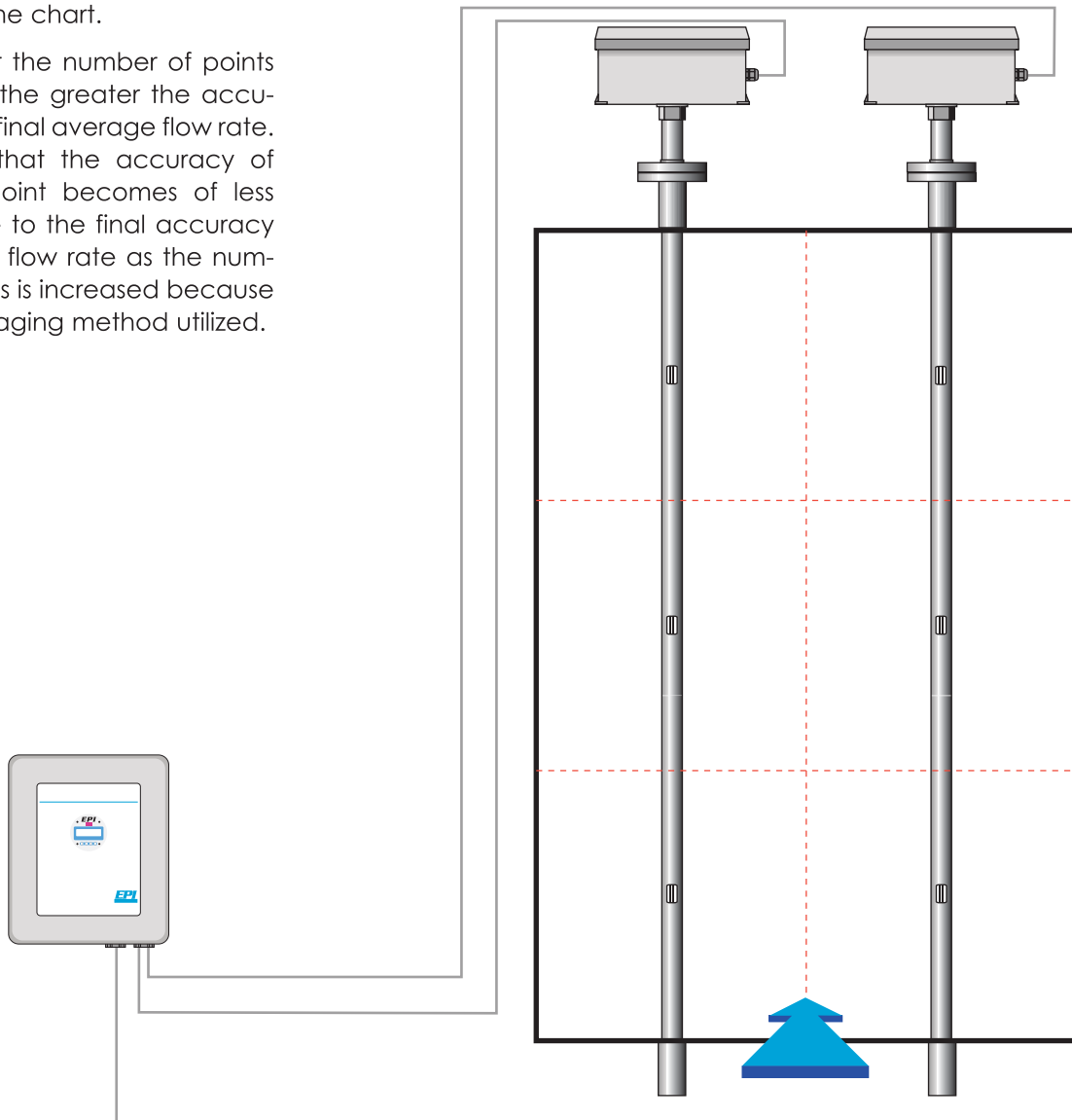
The chart to the right is a guideline for how many traverse points are suggested for a circular duct. Once the average flow rate is determined, the factory can specify the minimum number of sensors in a Series 9000MP Multipoint System. If the point of average flow cannot be determined, then a simple rule is to specify the number of points based on the chart.

The greater the number of points measured, the greater the accuracy of the final average flow rate. Also note that the accuracy of any one point becomes of less importance to the final accuracy of the total flow rate as the number of points is increased because of the averaging method utilized.

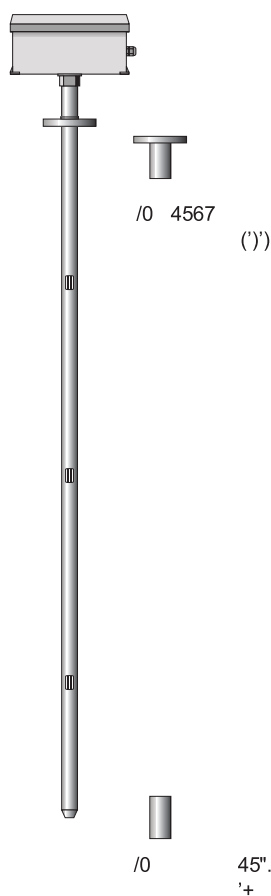
Duct Diameter	Suggested Number of Probes	Suggested Sensors per Probe	Total Number of Sensors
8" – 18"	1	2	2
18" – 24"	1	4	4
24" – 36"	2	2	4
36" – 60"	2	4	8

Larger Ducts and Stacks – Consult factory for configuration options.

Rectangular Ducts – Allow one to two square feet per point. Fewer traverse points may be used if a careful study shows that uniformity of flow exists.



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Specifications

Linear signal output	0-5 VDC & 4-20 mA
Relay Output	Two 1-amp, user-selectable alarm functions
Computer Signal Interface	RS232 & RS485, Modbus RTU (optional HART-compatible)
Accuracy, including linearity (Ref.: 21°C)	±[1.0% of Reading + (0.5% + 0.02%/°C of Full Scale)]
Repeatability	±0.2% of Full Scale
Sensor flow response time	1 second to 63% of final flow value
Turn down ratio	100:1 minimum (but not less than 15 SFPM)
Electronics temperature range	-40°-85°C (-40°-185°F); extended temperature optional
Gas temperature range (All calibrations performed in Ambient Temp. & Pressure Air)	-40°-66°C (-40°-150°F); extended range available, consult factory
Gas pressure effect	Negligible over ± 10% of absolute calibration pressure
Probe pressure rating range	Vacuum to 50 PSIG; higher pressures, consult factory
Input power requirement	24VDC @ 250mA per sensor 115 VAC 50/60 Hz optional 230 VAC 50/60 Hz optional
Series 9000/9600MP power requirements	5 watts or less per sensor
Series 9600MP enclosure	NEMA 4X fiberglass, 10" x 12" x 6"
Series 9000MP probe enclosure	NEMA 4X fiberglass, 8" x 10" x 4"
Wetted materials	316 Stainless Steel
Standard temperature & pressure (STP)	70°F & 29.92" Hg (Air .075 lb./cubic foot)
NIST traceable calibration	Standard

Series 9000MP

Model*	Description
9001MP-06-01-XX"-DESFC	Probe assembly with 1 sensor and hardware
9002MP-06-01-XX"-DESFC	Probe assembly with 2 sensors and hardware
9003MP-06-01-XX"-DESFC	Probe assembly with 3 sensors and hardware
9004MP-06-01-XX"-DESFC	Probe assembly with 4 sensors and hardware
9005MP-06-01-XX"-DESFC	Probe assembly with 5 sensors and hardware

* (XX" equals probe length)
-APS Air Purge System option (added to part number)

Series 9601MP

Model	Description
9601MP-133-1210-DC24	System Control Panel with 24 VDC input power
9601MP-133-1210-AC115	System Control Panel with 115 VAC input power
9601MP-133-1210-AC230	System Control Panel with 230 VAC input power

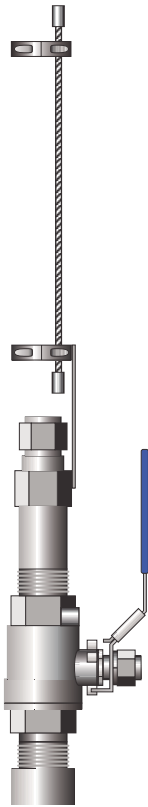
Ball Valve Retractor Assembly

Optional ball valve assemblies are available through EPI which allow the removal of the insertion style flow transmitter assemblies for service, calibration, cleaning, etc. The valve provides a means to seal off leaks of the process gas at the point of insertion after the probe assembly has been removed.

BVR0812 — ½" bore x ¾" NPT x 10" long

BVR1216 — ¾" bore x 1" NPT x 11" long

BVR1620 — 1" bore x 1¼" NPT x 12" long



Tube-to-Pipe Adapter

Bored thru tube-to-pipe adapter fittings are also available from the factory.



TPM0808T — ½" tube x ½" male pipe bored thru fitting with Teflon ferrule

TPM1212T — ¾" tube x ¾" male pipe bored thru fitting with Teflon ferrule

TPM1216T — ¾" tube x 1" male pipe bored thru fitting with Teflon ferrule

TPM1616T — 1" tube x 1" male pipe bored thru fitting with Teflon ferrule

TPMXXXXS — Same as above except stainless steel ferrule

Eldridge Products, Inc. Terms and Conditions

Specification Notice

Specifications contained herein are subject to change without notice. EPI cannot guarantee the applicability or suitability of our products in all situations, since it is impossible to anticipate or control every condition under which our products and specifications may be used.

Limited Acceptance

Acceptance of an EPI offer is limited to its terms. Acceptances or confirmations that state additional or differing terms from the price quote shall be operative as acceptances, but all additional or differing terms shall be deemed material alterations within the meaning of Commercial Code Section 2207(2)(b), and notice of objection to them pursuant to Commercial Code Section 2207(2)(c) is hereby given. The laws of the State of California govern the contract and venue is Monterey County. Risk of loss passes F.O.B. EPI factory. Payment due in full in US Dollars within credit terms granted from factory shipment. Additional fees shall include interest on unpaid balances that are outstanding for more than granted credit terms, plus all collection costs and attorneys' fees incurred in collecting any outstanding balance. Any and all additional or differing terms do not become part of the contract between EPI and any purchaser.

The terms of the offer are expressly limited to the terms detailed in any product brochure or price quote. Any modification to any of the terms of the offer must be in writing and must be signed by an officer of EPI.

Limited Warranty

Eldridge Products, Inc. (EPI) warrants its products to be free from defects in materials and workmanship for one year from the date of factory shipment. If there is a defect, the purchaser must notify EPI of the defect within the warranty period. Upon receipt of the defective product, EPI will either repair the defective product, or provide an EPI replacement, or refund the purchase price of the defective product, at its sole option. EPI MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AS TO THE PRODUCTS. EPI MAKES NO WARRANTY THAT THE GOODS SOLD TO ANY PURCHASER ARE FIT FOR ANY PARTICULAR PURPOSE. FURTHERMORE, EPI MAKES NO WARRANTY OF MERCHANTABILITY WITH RESPECT TO ANY PRODUCTS SOLD TO ANY PURCHASERS. There are no other warranties that extend beyond the description on any brochure or price quote.

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