Eldridge Products, Inc.

Master-Touch™

Thermal Mass Flow Meters

MPNH Series

Approved for use in Ordinary (Non-Hazardous) Locations

CSA/CUS

Installation, Wiring, and Dimensions

CE

EPI™
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Applicable Models:

Series 8000MPNH-8200MPNH, 8600MPNH-8800MPNH

Series 9100MPNH-9200MPNH, 9700MPNH-9800MPNH

Approvals

For use in Ordinary (Non-Hazardous) locations:

C US

Class 2252-03 Process control equipment for Ordinary Locations

Class 2252-83 Process control equipment for Ordinary Locations – Certified to US Requirements

CSA Enclosure Type 4X & IP66

Table of Contents

Introduction, Power Requirements, and Signal Interface

Introduction

Your MPNH Master-Touch™ flow meter includes a flow sensing element, temperature sensing element, digital SIM/Base board, digital controller board and a transmitter enclosure. The flow sensor is mounted in an insertion probe support / averaging tube or an inline flow section. Depending upon your requirements, all these components may be integrated into one flow transmitter assembly, or you may have a flow transmitter and a second, remote electronics enclosure. In either standard configuration, the digital controller converts the nonlinear input signal received from the flow sensor to a linear 4–20 mA flow output signal. RS485 Modbus RTU communications are embedded in the firmware. 4-20mA temperature and 0-5VDC or 0-10VDC flow & temperature analog outputs are optionally available. HART, BACnet, and Profibus DP-compatible modules are optionally available.

Unpacking Your Instrument

Although your Master-Touch™ thermal mass flow meter instruments are rugged, they should be inspected upon delivery to assure that no damage has taken place during transit. *If upon inspection it is found that damage has occurred, notify the carrier immediately and place a claim for damaged goods*. The shipping container or crate should be handled with care and carefully opened to avoid possible damage to the contents. After the container is opened the contents should be carefully removed and the individual pieces checked against the packing list. Please note that the packing list will show all the options that were ordered for your instrument. Most of these options will be incorporated into the flow meter itself and will not be separate components. The last verification is to check that the equipment and calibration range as shown on the documentation match your purchase order specifications. *If you discover a discrepancy or have any questions about what you have received, contact EPI immediately*.

Power Requirements

Power requirements for Valumass™ flow meters with the “-DC24” option is user-supplied 18 to 24 Volts DC @ 250 mA.
Power requirements for Valumass™ flow meters with the “-AC115” option is 100 - 120 VAC 50/60 Hz standard.
Power requirements for Valumass™ flow meters with the “-AC230” option is 210 - 240 VAC 50/60 Hz Standard.
Our recommendation on wire size is 18 Ga. stranded for all AC wiring. If conduit is used to enclose the power input line, it should be suitable for the application, electrically conductive, and connected within the enclosure to the earth ground. If the flow meter includes a remote electronics assembly, then the flow transmitter power is provided by the connection to the remote assembly. Ten feet of five-wire connection cable is provided with the standard remote assembly. If more cable is required, please inform your EPI sales representative at the time of order. The transmitter is independent of cable length and will not suffer any signal degradation with length changes. The 4–20mA analog output wire should be sized for no more than 5 Ohms resistance across the loop and not less than 22 AWG.

Signal Interface

All MPNH Series Master-Touch™ flow meters provide a 4–20 mA flow output signal and Modbus RTU communications. Optional 4-20 mA temperature, 0-5/10VDC flow and temperature are available output signals but must be specified at the time of order. Additional communications protocols such as HART, BACnet, and Profibus DP are available as options. Voltage signals should not be sent over long distances due to small currents causing voltage drops across the wire pair. If the voltage is to be sent over a distance (i.e., 50 feet), the wire AWG should be sized to reduce the voltage drop to acceptable levels. Knowing your load impedance is the only way this calculation may be achieved. Our 4–20 mA signal is provided to prevent this sort of signal loss. Current loops are normally not susceptible to noise and are not affected by voltage drops around the loop. However, it is important when using a current loop not to exceed the level of load resistance that the current loop may drive.

Note: Resistance loop - is the wire loop (resistance) out to and back from customer control panel, plus the series resistance (typically 250 Ohm) at customer control panel. A 250-ohm series resistor can be placed across the signal input terminals, at the customer control panel, to produce a 1-5 VDC signal input, from the 4-20 mA DC current loop signal. The maximum resistance less this 250 Ohms is available for the wire loop resistance and wire gage (AWG) sizing. We recommend using an AWG size to allow a minimum margin of 10% less than the loop maximum resistance.

Examples:	DC Voltage Input		Coefficient		Resistance Loop Ohms Max.
*24 VDC Powered EPI Flowmeter Power Input Supply:	24	x	32.708	=	785
115/230 VAC Powered EPI Flowmeter Power Input Supply:	20	x	32.708	=	654
Isolated - Customer Powered 4-20 mA Current Loop:	24	x	34.167	=	820
*Isolated - Customer Powered 4-20 mA Current Loop:	20	x	34.167	=	683

*Same formula applies for less than 24 VDC input, substitute lesser value in equation.

In our standard configuration, our flow meters are not loop-powered devices. However, this option is available upon request. If a flow meter must be changed from the standard configuration to loop-powered in the field, contact the factory for assistance.

General Installation and Guidelines

The Master-Touch™ thermal dispersion sensor must be exposed to the flowing gas within the process pipe at a location that provides a uniform and consistent flow profile across the pipe diameter. Anomalies in the actual flow profile or installations in non-circular ducts may require adjustments for the best accuracy. Although changes to the process gas composition, gas temperature, line pressure, etc. can affect the overall accuracy of the flow readings, these effects are often minimal when compared to their effect on other flow measurement technologies.

The temperature parameters for the transmitter are listed in the specification section of this manual. Acceptable limits for the gas temperature and the environmental temperature limits to which the transmitter electronics may be subjected are also provided.

We recommend installing the flow meter at a location where the gas is dry or above the dew point temperature. Installations which allow large droplets of water to condense and contact the sensing element must be avoided. Applications with large quantities of gas-borne particulates should also be avoided as the sensor may become dirty which could affect the heat loss to the flowing gas and therefore have a negative impact on the overall accuracy of the flow readings. Gas purge options are available, if necessary. Consult the factory for options.

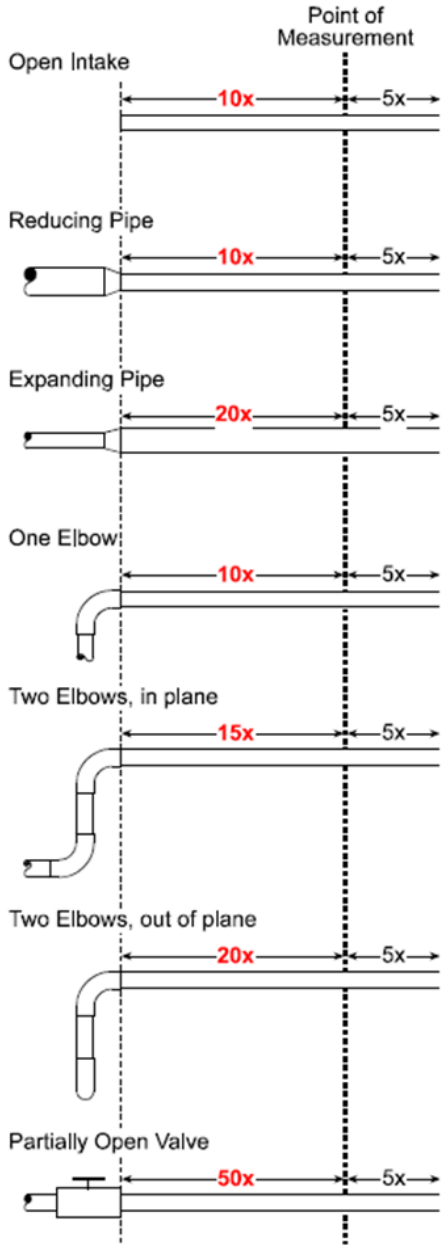
Optimum installation requires sufficient straight run to allow a uniform, non-swirling, fully developed flow profile within the flow conduit. ***The illustration on the next page is provided as a general guideline for minimum straight run requirements.*** Depending upon the specific location details, straight run requirements to produce a satisfactory flow profile may vary. It is best to avoid installations which are immediately downstream of bends, abrupt cross-sectional area increases or decreases, fans, louvers, or other equipment installed in the line. These situations can cause non-uniform flow profiles and swirl which can result in signal errors. Problematic flow profiles require flow conditioning to improve meter performance.

Our inline style flow meters are calibrated with the sensors in a fixed position within the provided flow section. Our insertion flow meters are calibrated near the ANSI Point-of-Average- Flow (.243r) positioning in the process line with a fully developed flow profile. You may need to make minor adjustments in the sensor position for best results in your process line. With either style of flow meter, you may also need to utilize the Master-Touch™ software in situ flow signal adjustments for the most accurate flow readings due to a non-uniform flow profile in your process line.

Please see the EPITerm or EPICom Live User Manual for complete description of Master-Touch software menus and their functions or consult the factory for additional information.

Straight Run Requirements

General Guideline for Minimum Straight Run Requirements



Note:

10x within the illustration represents 10 ID lengths and 15x represents 15 ID lengths and so forth.

Some of EPI inline flow meters come with flow conditioning plates that can assist with shorter upstream conditions. Consult the factory for additional information concerning options to reduce the required straight run.

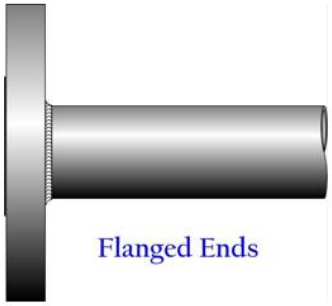
Installation of Inline Flow Meters

The inline style flow meter assembly includes the flow sensing element, temperature sensing element, digital SIM/Base board, digital controller board, transmitter enclosure, and flow section. Depending on the flow section size and/or other requirements, the flow section may include a nozzle or flow conditioning plates. The flow section is typically specified to match the user's flow conduit and is plumbed directly in the flow line. Inline mounting styles are available through EPI for line sizes 1/4" pipe and larger. Consult our factory for flow section end mounting options.

Inline flow meters are calibrated with the flow sensing element mounted in place within the flow section. The sensor should not be removed as the accuracy of the flow signal will be affected. Should ever it become necessary to remove the sensing element for any reason, the element should be replaced in the same alignment as it was originally positioned. Please consult the factory before disassembling.

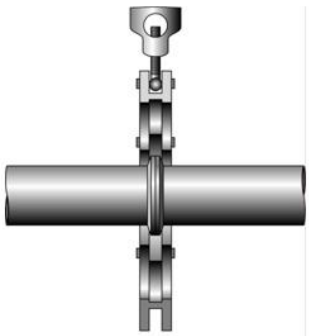
Inline flow meters will have the flow direction marked on their flow section for a visual reference during installation.

Available end connection styles

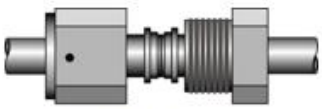


Flanged Ends

MNPT Ends



Tri-Clamps



VCR Fittings

Installation of Insertion Flow Meters

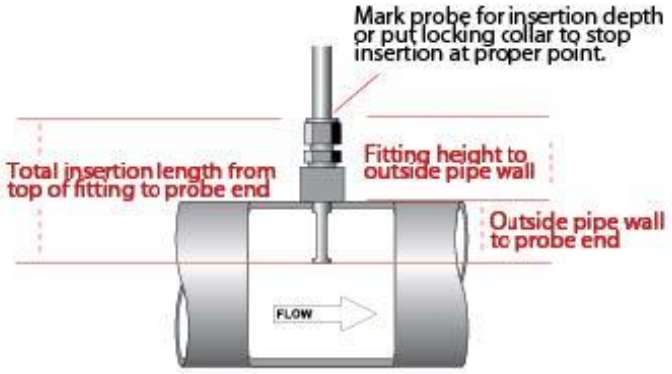
The insertion style flow meters include the flow sensing element, temperature sensing element, digital SIM/Base board, digital controller board, transmitter enclosure, and the probe assembly which supports the sensing elements. This design requires the probe assembly to be inserted into the process gas flow conduit.

Insertion models are available with 1/2", 3/4" or 1" OD probes. Insertion style flow meters may be installed with properly sized bored-through tube fittings to mount them in place. Tube fittings, with or without mounting flange, are available from the factory as an option. Installing the tube fitting consists of preparing the flow conduit to accept the fitting by first drilling a clearance hole for the transmitter probe assembly, welding it in place, or threading it into the proper size half coupling which has been welded to the flow conduit. The tube length will be determined by EPI based upon the installation specifications.

Optional ball valve assemblies are available through EPI which allow the removal of the insertion style averaging tubes 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. The ball valve assembly installation requires fitting the flow section to which the insertion probe assembly will be inserted with a threaded half coupling of the proper size to accommodate the ball valve retractor. In some instances, this requires direct threading together (or with a reducing bushing) of the retractor assembly. In other cases, it requires welding the half coupling in place and drilling a clearance hole through for the probe assembly. If the flow section is under pressure, a hot tap drill rig (not available through EPI) may be required.

The maximum pressure for insertion style flow meters is stated in the General Specifications section of this manual. To reduce the possibility of personal injury when servicing the flow meter, each size is rated such that the maximum force applied to the transmitter is approximately 25 pounds. ***Caution should be exercised if applying higher pressure and a holding device may be required to prevent the transmitter from being projected out of the process line when removing or replacing the transmitter assembly.***

Visual representation of installation at the recommended insertion depth



Insertion Depth Guidelines

***The information below assumes a well-developed flow profile in the process line**

Sch 40 Nominal Pipe Size	Inside Diameter (I.D.) (inches)	Wall Thickness (inches)	X-modifier (Inches)	Cross-sectional Area (ft2)	Pipe OD to Probe End (inches) Depth
2"	2.067	0.154	1.19	0.0233	1.6
2.5"	2.469	0.203	1.11	0.0332	1.6
3"	3.068	0.216	1.02	0.0513	1.6
4"	4.026	0.237	0.97	0.0884	1.7
6"	6.065	0.28	0.8	0.2006	1.8
8"	7.981	0.322	0.8	0.3474	2.1
10"	10.02	0.365	0.8	0.5476	2.4
12"	12	0.375	0.8	0.7854	2.6
14"	13.25	0.375	0.8	0.9575	2.8
16"	15.25	0.375	0.8	1.2684	3
18"	17.25	0.375	0.8	1.623	3.3
20"	19.25	0.375	0.8	2.0211	3.5
24"	23.25	0.375	0.8	2.9483	4

(Table Above does not apply to Flow Averaging Tubes™)

For other pipe sizes, please use the equation below. Round value to nearest tenth.

(Comparing your ID to the table above, Pick an X value that is closely related to your ID)

1. (New Pipe ID / 2) * 0.243 + “new pipe wall thickness” + X-modifier = Depth (Pipe OD to probe end)
2. Depth + Fitting Height = Total depth from top of fitting to probe end.

Example with 3-1/2” Sch10 Pipe using a 1.8” compression fitting

ID = 3.76”, Wall thickness = 0.12”, X-modifier = 1 (Estimated value near closely related ID)

1. (3.76/2) * 0.243 + 0.12 + 1 = 1.57; round to 1.6
2. 1.6” (depth) + 1.8” (fitting height) = 3.4” (total depth from top of fitting to probe end)

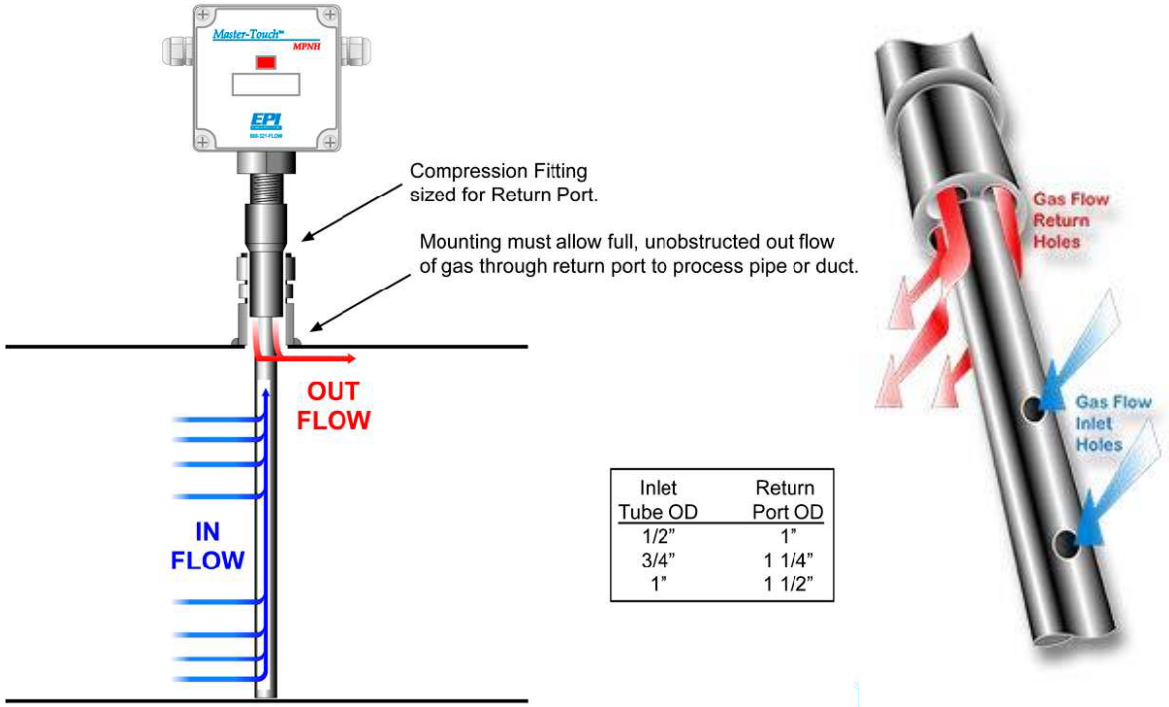
Installation of Insertion Style Flow Averaging Tube™ (FAT™)

The insertion style Flow Averaging Tube™ flow meter includes the flow sensing element, temperature sensing element, digital SIM/Base board, digital controller board, transmitter enclosure, Flow Averaging Tube™, return port which houses the sensing elements, and a coupling connecting the FAT™ to the transmitter enclosure.

This design requires the probe assembly to be inserted into the process gas flow conduit with the flow access ports aligned upstream to allow the process gas to flow across the sensor assembly. The access opening in the process pipe must allow an unobstructed flow of the gas out of the return ports and back into the general flow stream. The insertion style flow averaging tube probe assembly may be inserted into any suitable flow section, pipe, or duct. Insertion styles are available with 1/2", 3/4" or 1" OD probes. Please note that the return ports for each size are ½" larger than the averaging tube itself.

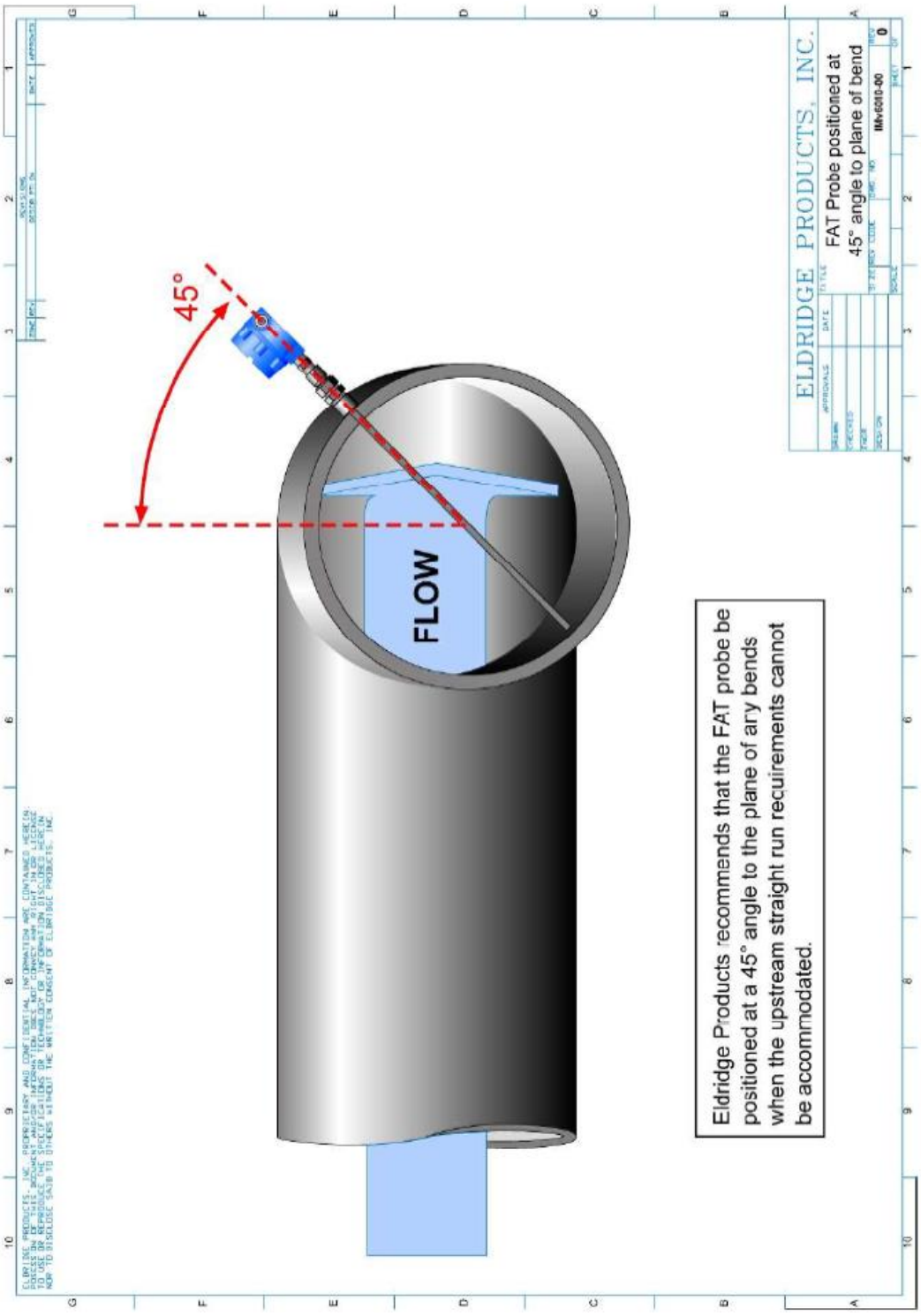
The maximum pressure for insertion style flow meters is stated in the General Specifications section of this manual. To reduce the possibility of personal injury when servicing the flow meter, each size is rated such that the maximum force applied to the transmitter is approximately 25 pounds. ***Caution should be exercised if applying higher pressure and a holding device may be required to prevent the transmitter from being projected out of the process line when removing or replacing the transmitter assembly.***

Visual representation of Insertion FAT installed



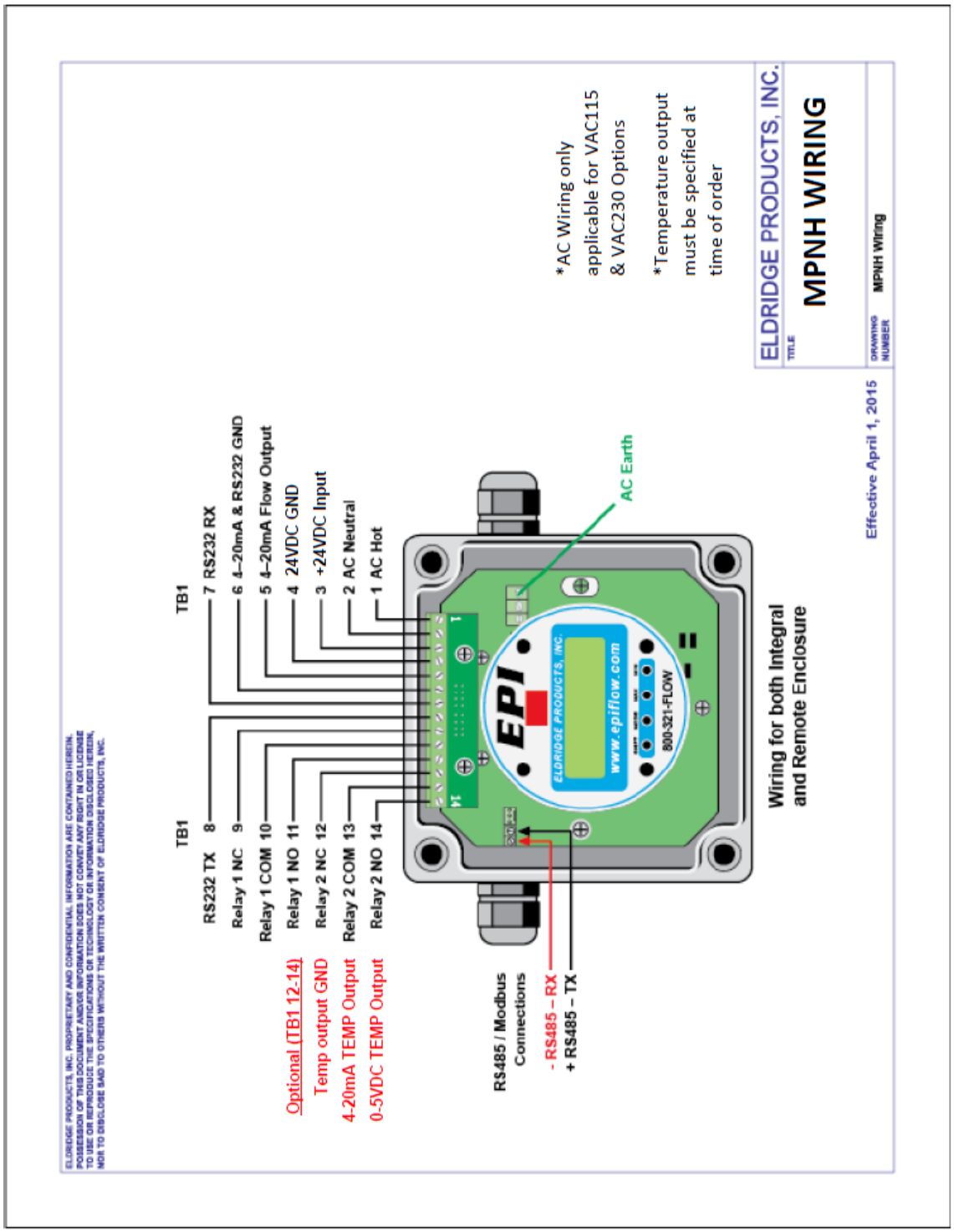
Inlet Tube OD	Return Port OD
1/2"	1"
3/4"	1 1/4"
1"	1 1/2"

FAT Probe installation near pipe bend

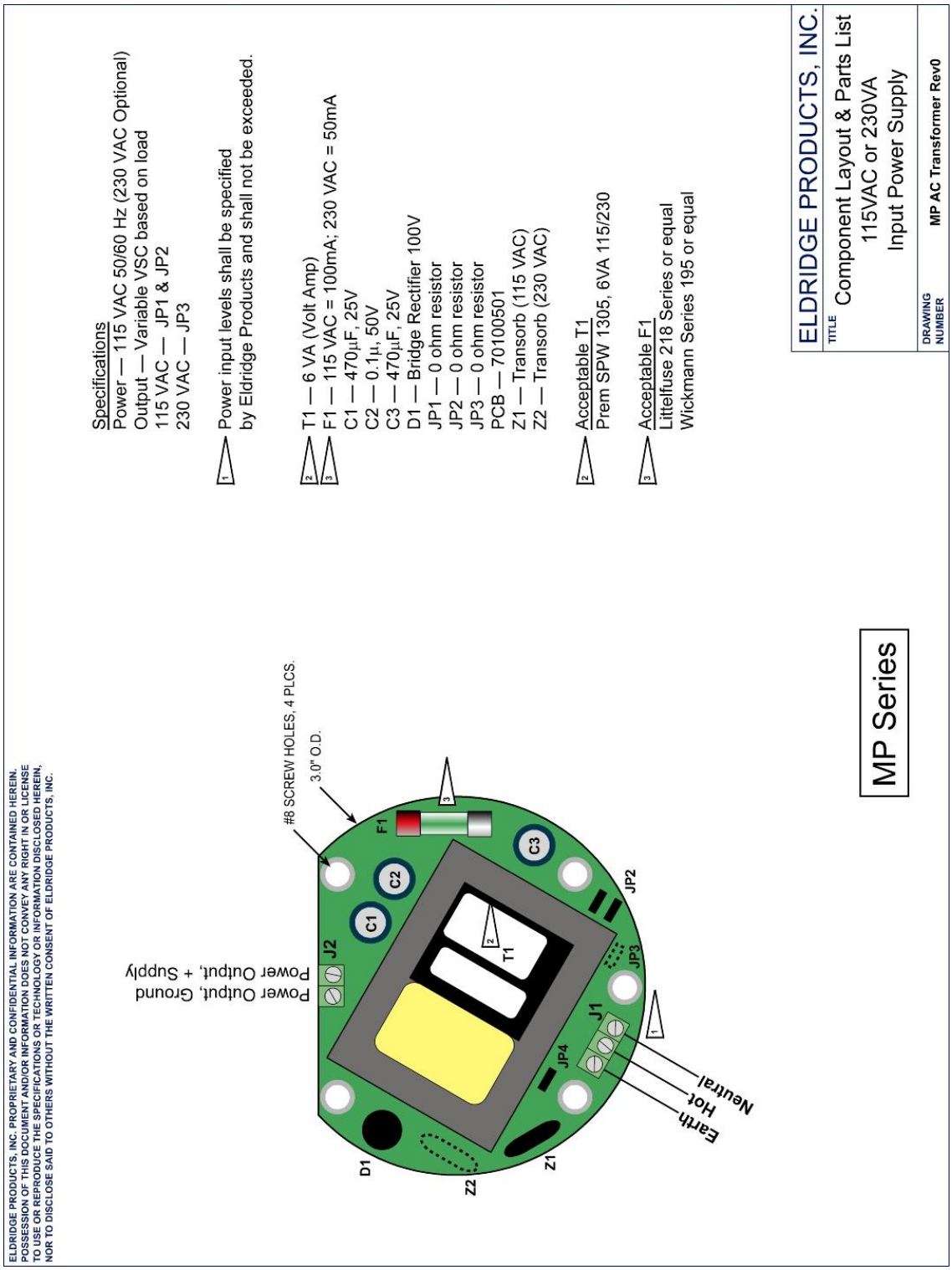


Wiring Diagrams

MPNH Series

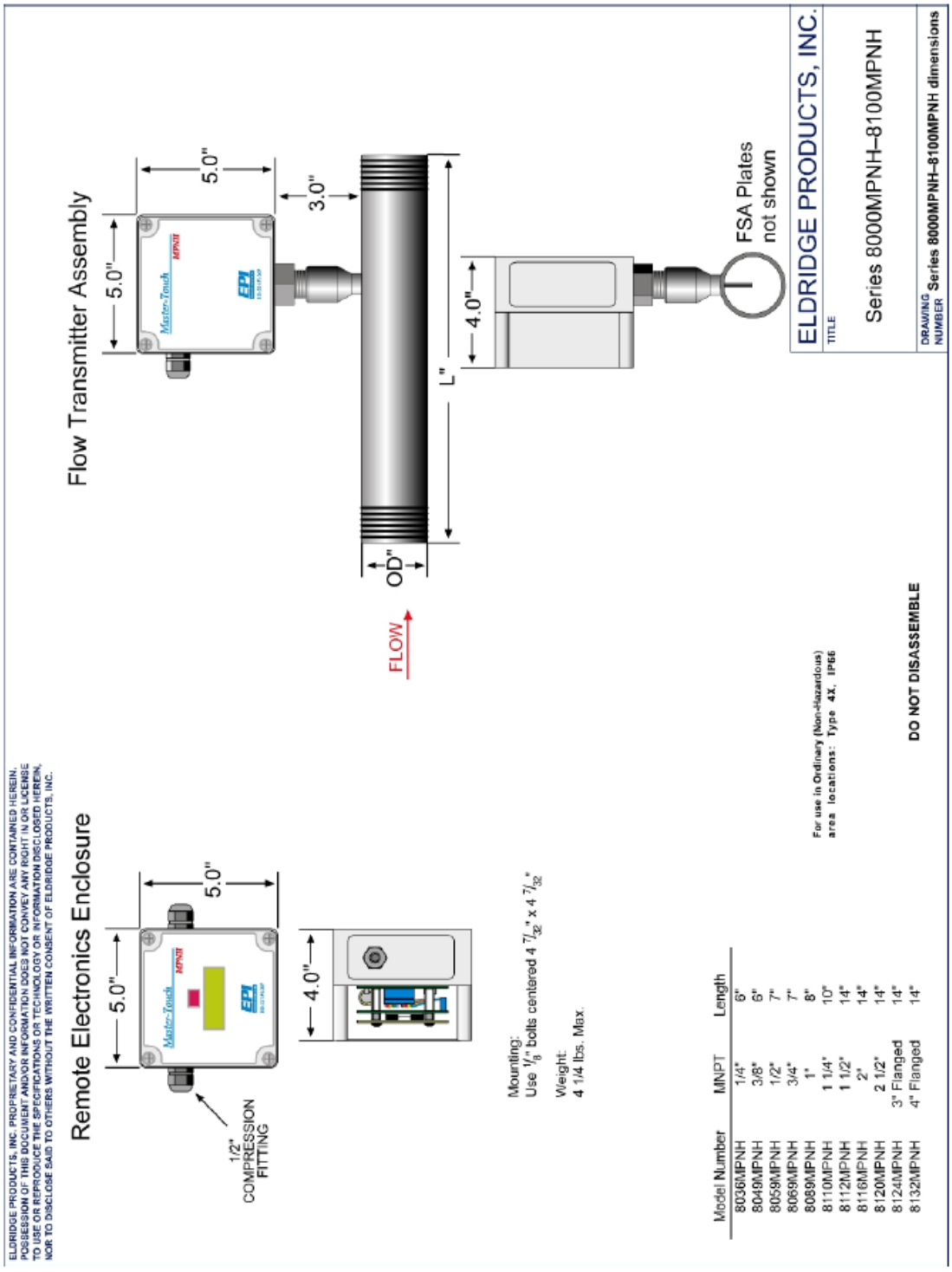


AC Transformer



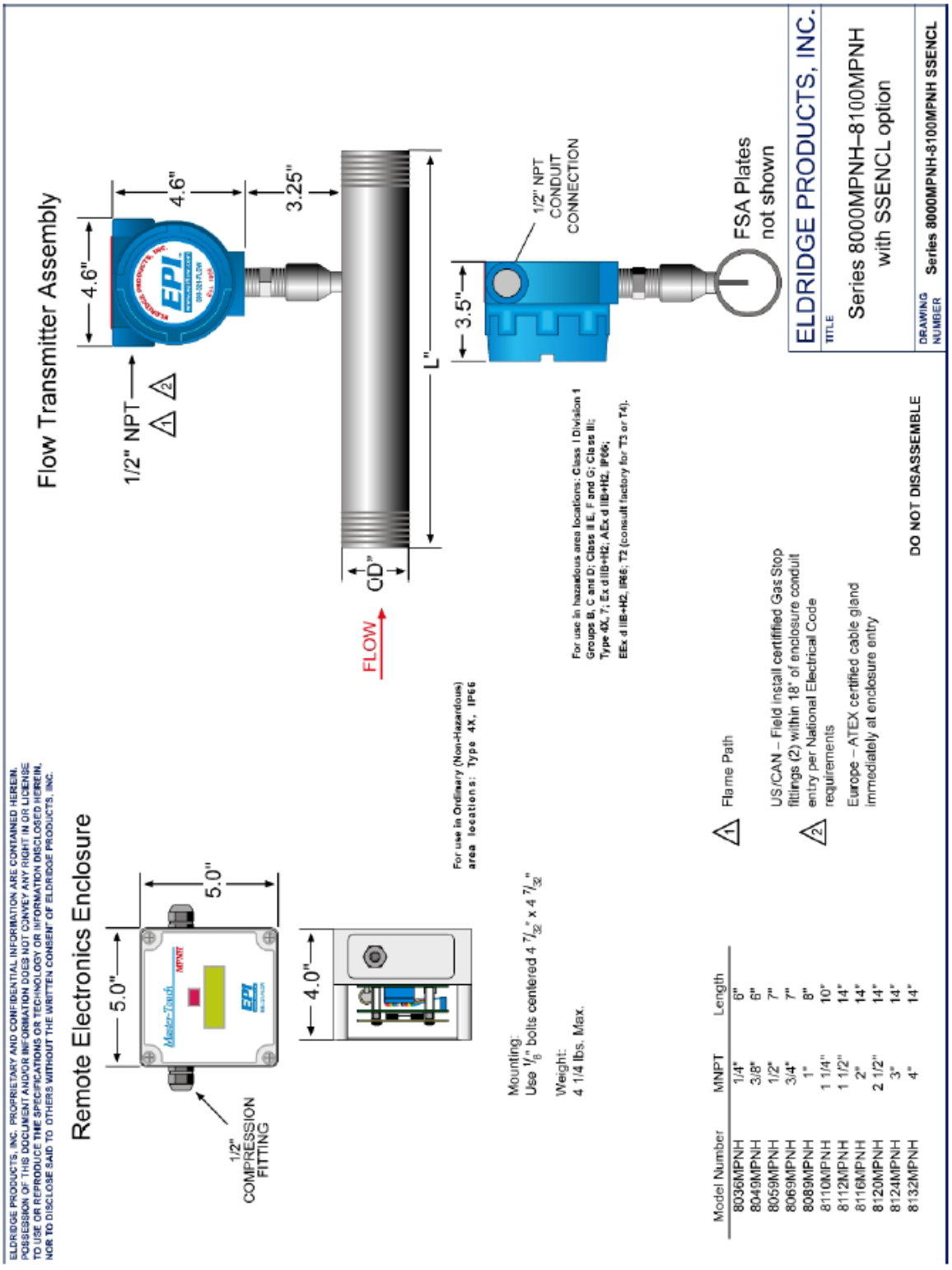
Dimensional Diagrams

Series 8000MPNH-8100MPNH



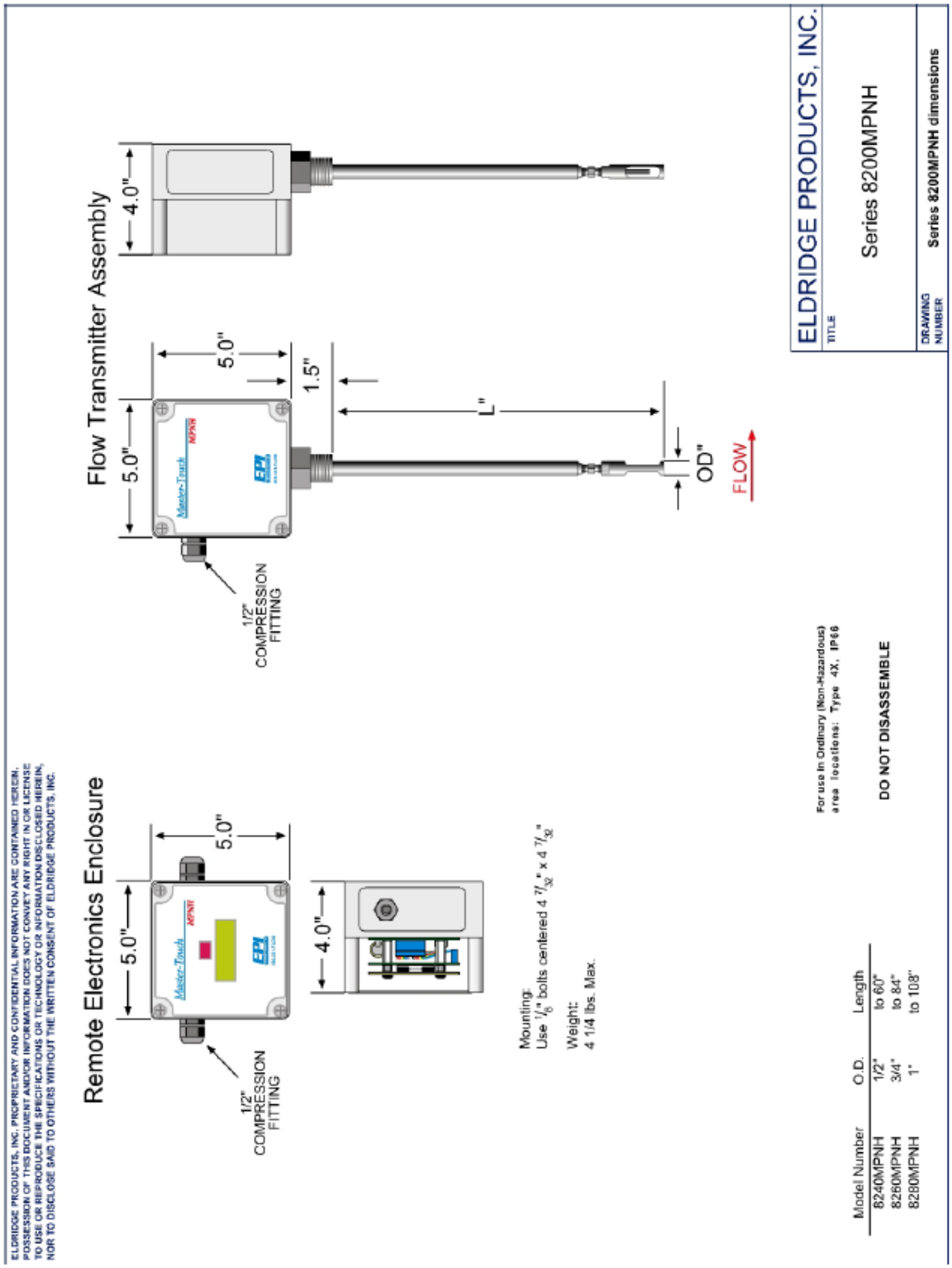
Model Number	MNPT	Length
8036MPNH	1/4"	6"
8048MPNH	3/8"	6"
8059MPNH	1/2"	7"
8069MPNH	3/4"	7"
8089MPNH	1"	8"
8110MPNH	1 1/4"	10"
8112MPNH	1 1/2"	14"
8116MPNH	2"	14"
8120MPNH	2 1/2"	14"
8124MPNH	3" Flanged	14"
8132MPNH	4" Flanged	14"

Series 8000MPNH-8100MPNH with SSENCL Option

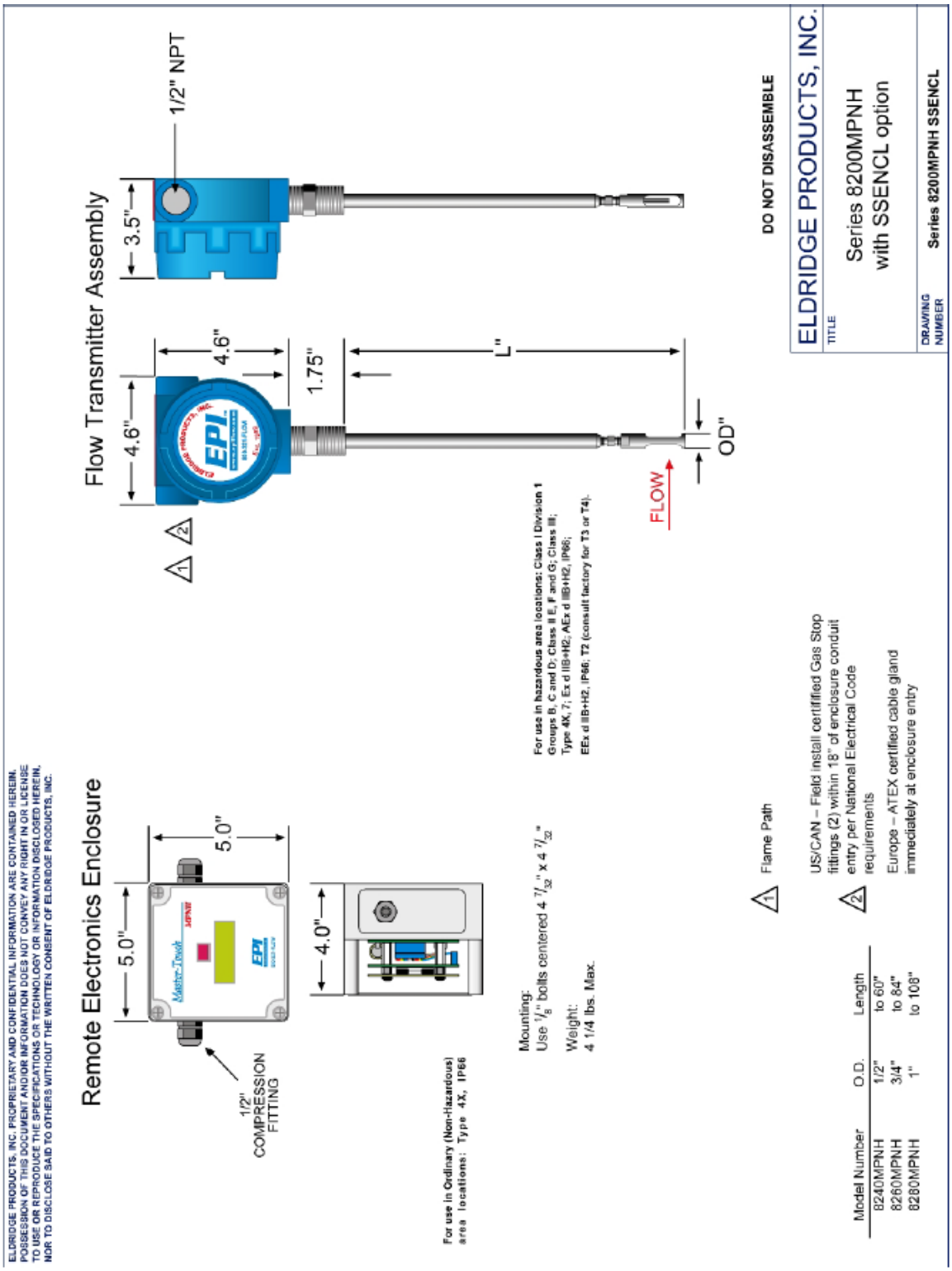


Model Number	MNPT	Length
8036MPNH	1/4"	6"
8049MPNH	3/8"	6"
8059MPNH	1/2"	7"
8069MPNH	3/4"	7"
8089MPNH	1"	8"
8110MPNH	1 1/4"	10"
8112MPNH	1 1/2"	14"
8116MPNH	2"	14"
8120MPNH	2 1/2"	14"
8124MPNH	3"	14"
8132MPNH	4"	14"

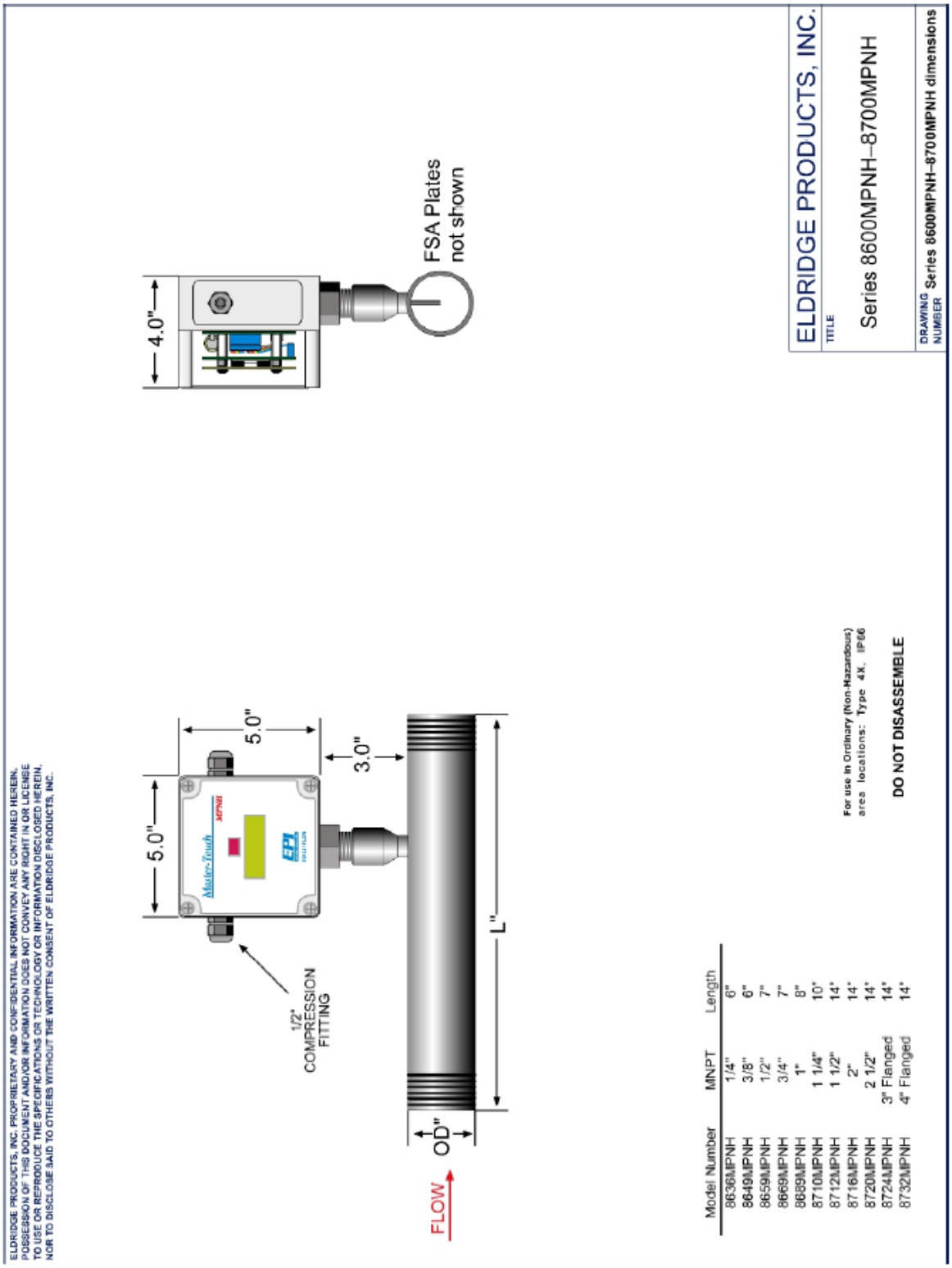
Series 8200MPNH



Series 8200MPNH with SSENCL Option

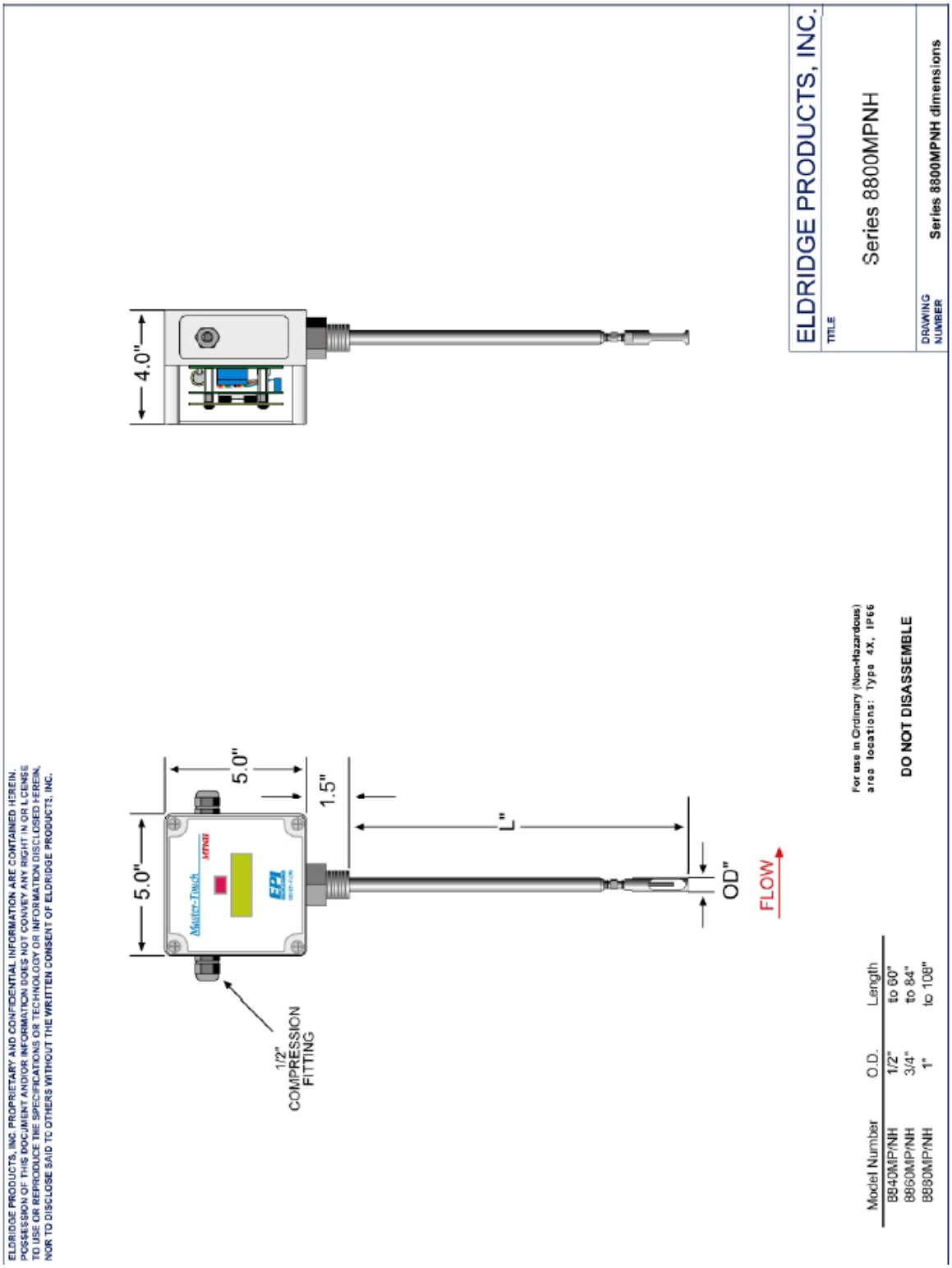


Series 8600MPNH-8700MPNH

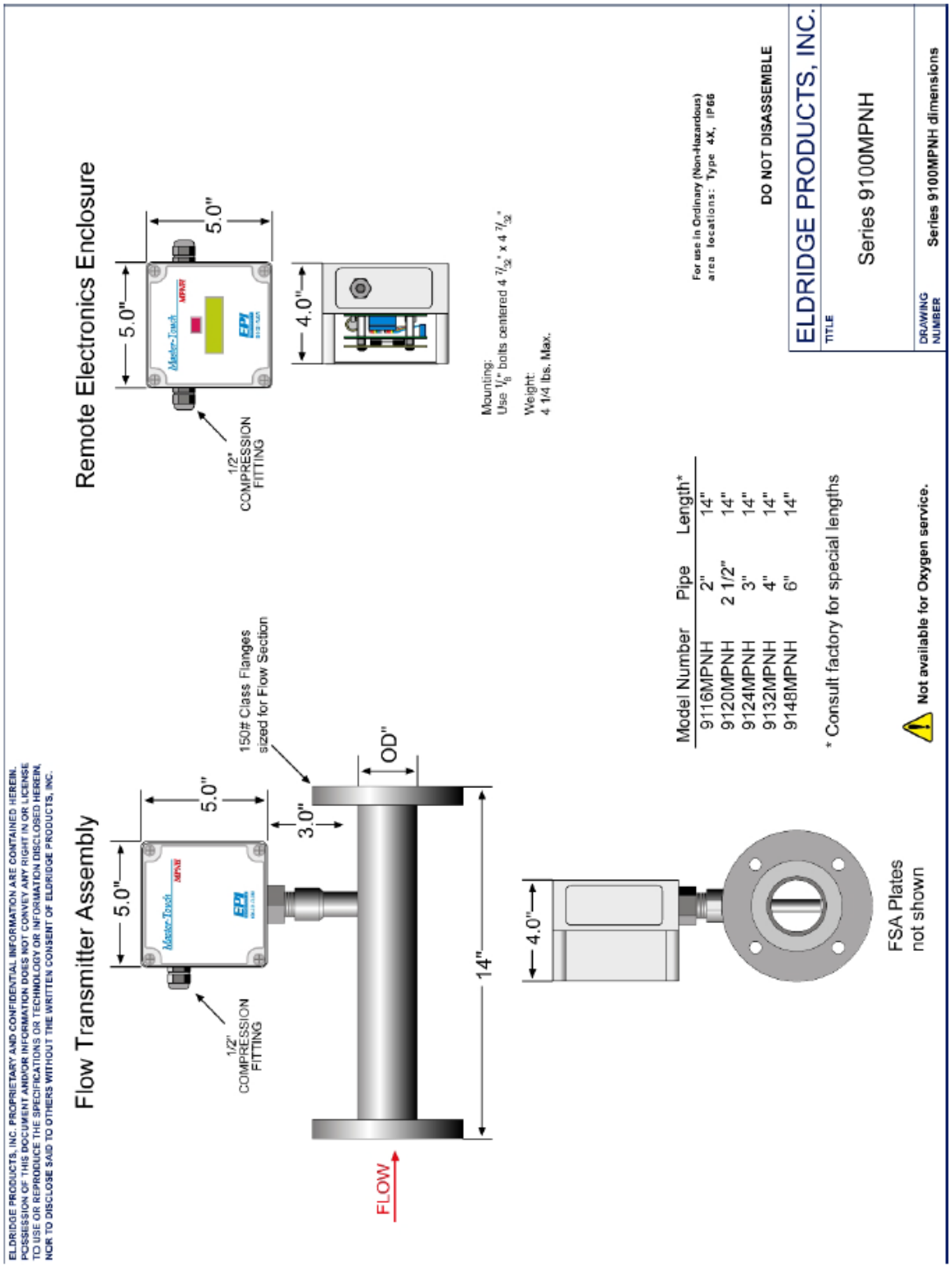


Model Number	MNPT	Length
8636MPNH	1/4"	6"
8649MPNH	3/8"	6"
8659MPNH	1/2"	7"
8669MPNH	3/4"	7"
8689MPNH	1"	8"
8710MPNH	1 1/4"	10"
8712MPNH	1 1/2"	14"
8716MPNH	2"	14"
8720MPNH	2 1/2"	14"
8724MPNH	3" Flanged	14"
8732MPNH	4" Flanged	14"

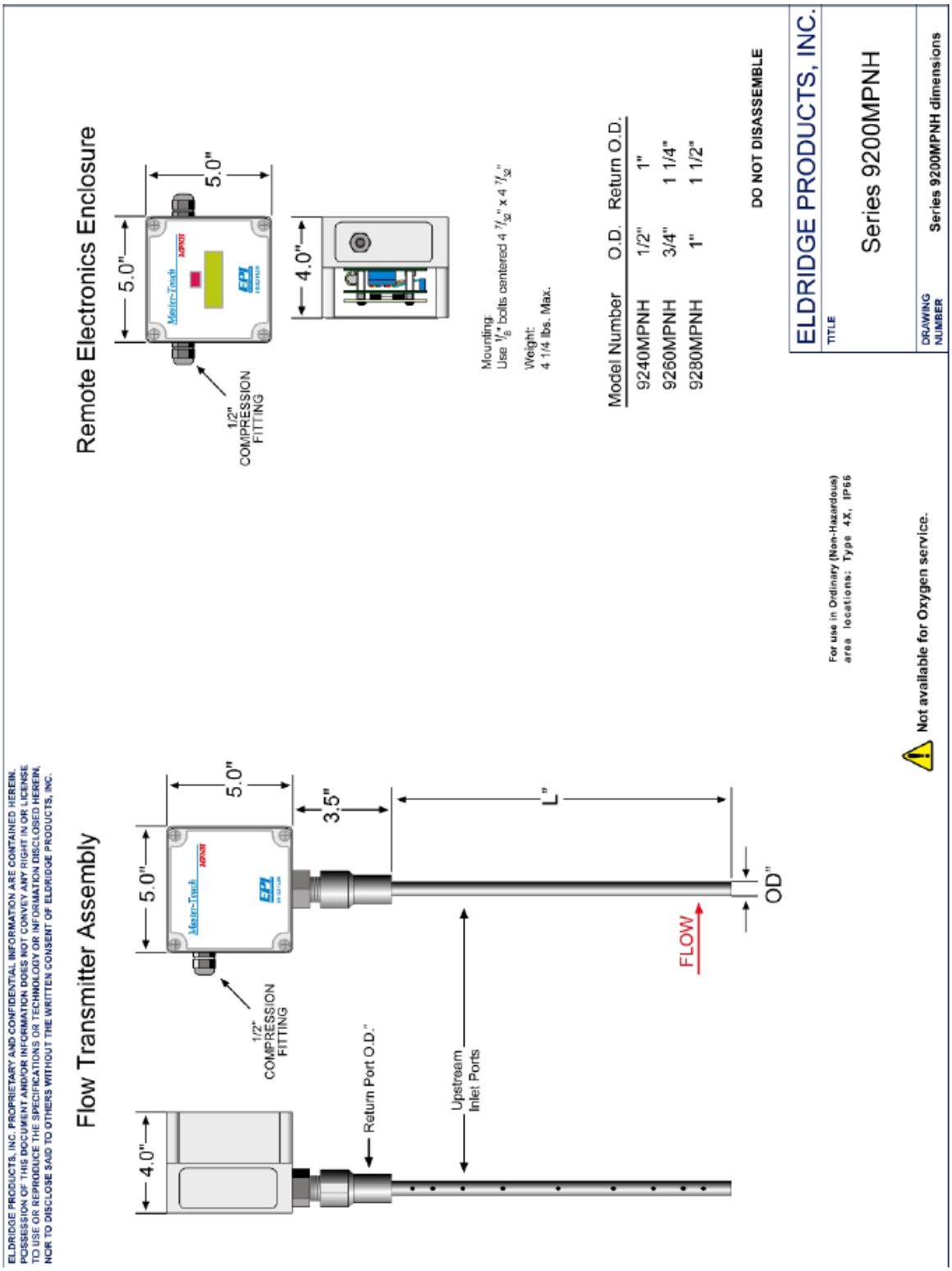
Series 8800MPNH



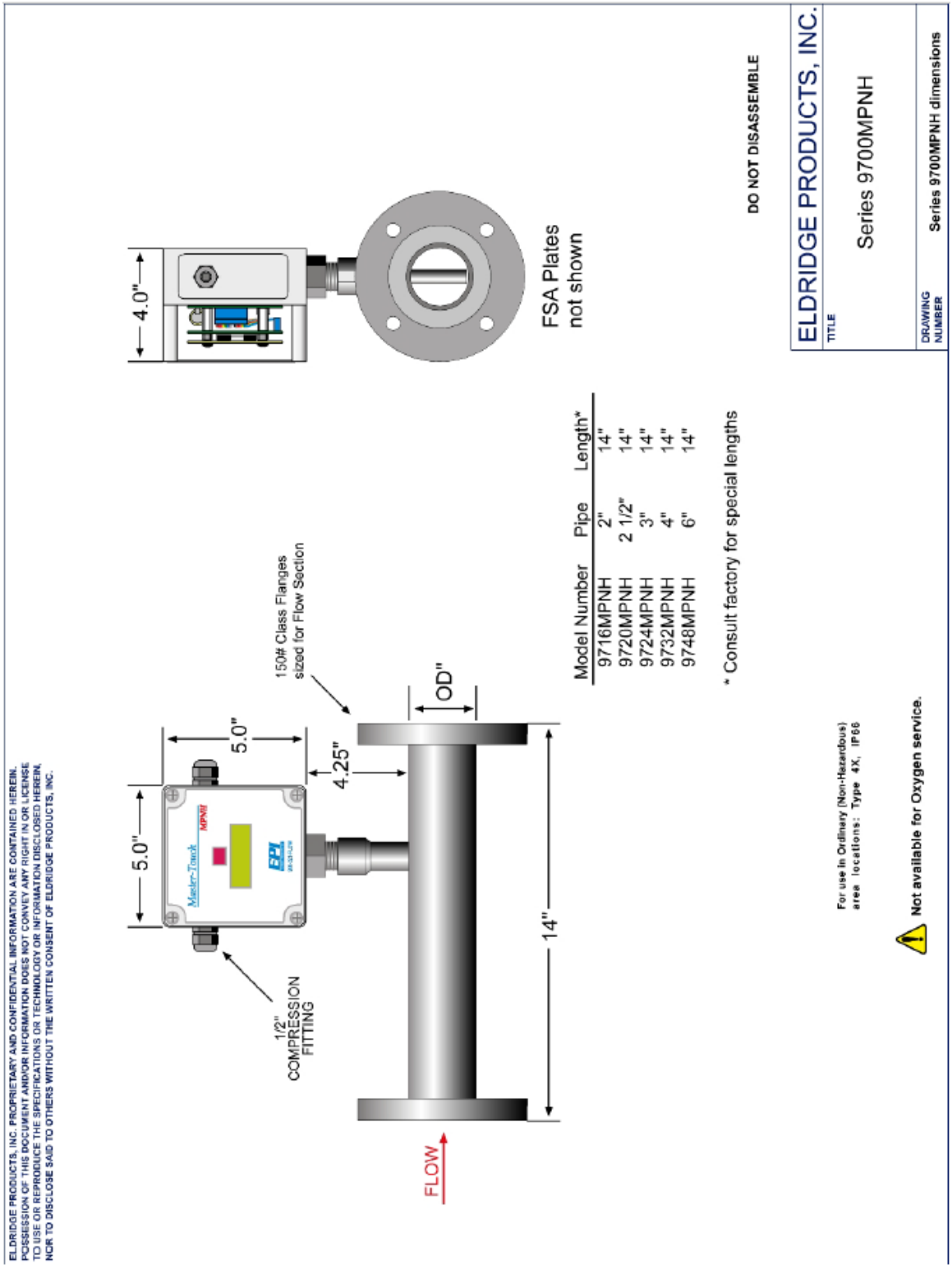
Series 9100MPNH



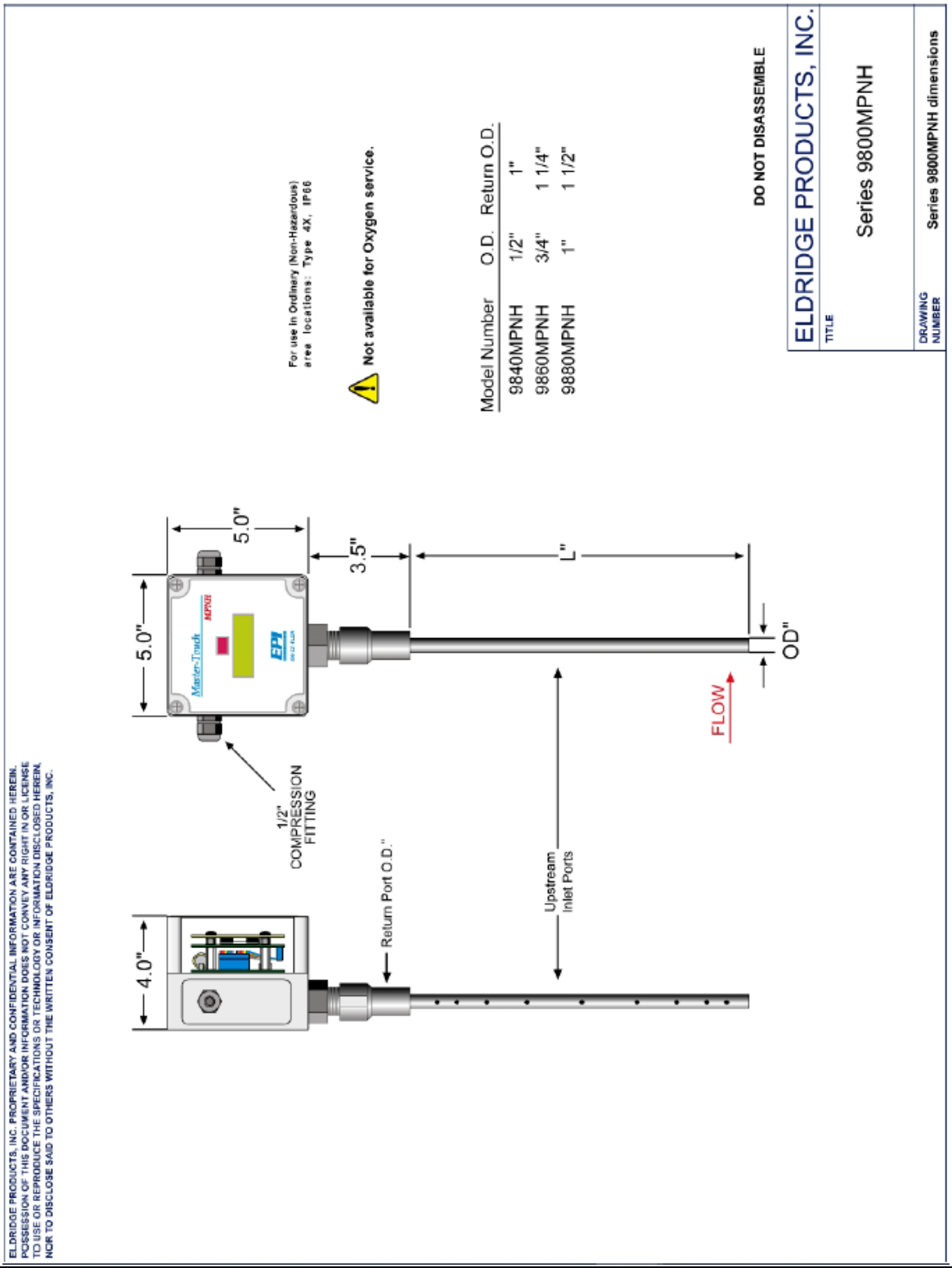
Series 9200MPNH



Series 9700MPNH



Series 9800MPNH



Factory Calibration

The factory calibration of an Eldridge Products Inc. thermal gas mass flow meter is a complex process. Our first step is to perform a temperature compensation of each flow sensor to eliminate temperature effects on the flow readings within a specified gas temperature range. Once this calibration process has been performed, it need not be done again, unless the sensor or sensor interface module be replaced.

Next, we perform a flow calibration of every flow meter. Although all flow curves are similar, they are different enough to require individual calibrations to be run for each flow meter to yield the best accuracy.

Lastly, we program the flow meter's microprocessor with the linearizing coefficients, specific flow range values, etc. as required to meet the requirements for each flow meter.

Flow calibration is a process of comparing or verifying the meter under strict test conditions against a meter of better accuracy used as a calibration standard. EPI flow calibrations are traceable to NIST through traceability of the instrumentation and equipment used.

Flow readings are checked against a calibration standard at many flow points and the data is graphed. From this graph the non-linearity of the raw flow signal is determined and aligned through our signal processor to yield a linear flow output signal.

Although thermal gas mass flow meters have good, long-term stability, EPI recommends a factory calibration and certification be performed as necessary to conform to most quality assurance programs. Where quality assurance programs do not require recertification, it shall be left at the users' discretion when to recertify.

Every calibrated flow meter is shipped with both product quality certificate of conformance and calibration accuracy forms.

THE PRODUCT QUALITY CERTIFICATE OF CONFORMANCE CONTAINS:

- ✓ PRODUCT INSPECTION & QUALITY STATEMENT
- ✓ CONFORMANCE STATEMENT
- ✓ CUSTOMER AND ORDER INFORMATION
- ✓ FLOW METER INFORMATION AND CALIBRATION PARAMETERS
- ✓ CUSTOMER STATED PROCESS CONDITIONS
- ✓ APPROVALS (IF APPLICABLE)

THE CALIBRATION ACCURACY FORM CONTAINS:

- ✓ ACCURACY SPECIFICATION
- ✓ PASS OR FAILURE OF CALIBRATION VALUES
- ✓ CUSTOMER STATED PROCESS CONDITIONS
- ✓ CONFORMANCE STATEMENT

General Specifications and Information

MPNH Series

Linear Signal Output	4-20mA flow standard; Optional 4-20mA and 0-5 VDC flow and temperature outputs
Mechanical Event Relays	Two 1-Amp @ 30 VDC, user-selectable alarm functions (See EPITerm or EPICom Manual for list of functions)
Communication Protocols	RS232 & RS485 Modbus RTU; Optional HART, BACnet, or Profibus DP
Display LCD 2-line 16-character	Rate, Total, milliwatts, Temperature, Event
Accuracy including linearity*	+/- (1% of reading + 0.5% of full scale + GTC)
Repeatability	+/- 0.2% of full scale
Sensor response time	1 second to 63% of final value
Turn down ratio	100:1 @ 1500 SFPM / 7.6 NMPS minimum full scale
Withstands ambient temperature (electronics)	-40° to 130° F (-40° to 55° C)
Suitable process gas temperature range**	0°F to 392° F (0°C to 200° C) Up to 525°C with High Temperature model
Gas temperature coefficient (GTC)	0.02 % full scale/°C
Gas pressure effect	Negligible over +/- 20% of absolute calibration pressure
Pressure rating maximum	Inline: 500 PSI Std. Insertion (Stainless steel ferrule): 500 PSIG Insertion (Teflon ferrule): 25 PSIG
Input power requirement	6 Watts 24 Vdc @ 250mA (Standard) 120 Vac 50/60 Hz (Optional) 240 Vac 50/60 Hz (Optional)
Flow Meter power requirements	5 watts maximum
Date/Time RAM Back-up	Lithium Battery, 2.5-3.5v, 10-year life
Wetted materials	316L Stainless Steel unless specified (Optional Hastelloy C276)
Standard temperature & pressure (STP)	70°F & 29.92" Hg (Air 0.075 lb./cubic foot) Optional 0°C & 1.0132 BarA (Air 0.081 lb./cubic foot) Or user specified STP at time of order
NIST traceable calibration	Standard

*EPI is not responsible for measurement errors due to flow profile irregularities caused by installation, piping configurations, surface corrosion or scale, valve placement, etc.

** Specify overage process operating temperature, with high & low limits.

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.

Terms and Conditions

Eldridge Products Inc. Terms & Conditions are available on www.epiflow.com

Approvals

For use in Ordinary (Non-Hazardous) locations:

Class 2252-03 Process control equipment for Ordinary Locations

Class 2252-83 Process control equipment for Ordinary Locations – Certified to US Requirements

CSA Enclosure Type 4X & IP66

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 or replace 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.

Limited Acceptance

Acceptance of any offer is limited to its terms. Acceptances or confirmations that state additional or differing terms from this 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 this 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. All additional or differing terms do not become part of the contract between EPI and any purchaser.

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

Service Work

If repair work or calibration is desired; Please contact service@epiflow.com or call the factory and a return materials authorization (RMA) number will be issued for each job.

All units sent in for service work shall include the entirety of the flow meter(s) with a completed RMA form. Please make sure the sensor and/or probe are protected, and all flow meters are packaged with foam or bubble wrap to avoid damage.

All meters should be shipped to:
Eldridge Products, Inc.
465 Reservation Rd.
Marina, CA. 93933
Attn: Service Department [RMA Number]

Each flow meter returned is subject to evaluation. THERE IS MINIMUM METER EVALUATION CHARGE OF $250. THIS CHARGE INCLUDES ANALYSIS OF FUNCTIONALITY, HARDWARE, FIRMWARE, VISUAL INSPECTION, AND PAYABLE WITH OR WITHOUT SUBSEQUENT ADDITIONAL REPAIR/SERVICE WORK.

Storage

EPI recommends equipment and instrumentation be stored in an environmentally controlled storage shelter or warehouse when not in use. All openings should be sealed off to prevent foreign materials from entering the instrumentation.

Additional References

EPITerm Software

Please follow link for EPITerm Software

EPITerm Interface User Manual

Please follow link for EPITerm Interface User Manual

EPICom Live User Manual

Please follow link for EPICom Live User Manual

EPI Live Modbus User Manual

Please follow link for EPI LIVE Modbus User Manual

EPIVal Quick Start Guide

Please follow link for EPIVal Quick Start Guide

BACnet Quick Start Guide

Please follow link for BACnet Quick Start Guide

Customer Satisfaction Survey

Thank you for your recent business with Eldridge Products Inc. and hope you will participate in our customer satisfaction survey. It takes 5-10 minutes

Take the EPI Customer Satisfaction Survey now

About this survey: Your information and responses will remain anonymous, while its contents will be used for improving our company offerings.

***Once completed:** save a copy, and email it to Service@epiflow.com

Eldridge Products, Inc.

465 Reservation Road

Marina, CA 93933

Tel: 800-321-3569 or 831-648-7777

Fax: (831) 648-7780

Email: Sales@epiflow.com or Service@epiflow.com