Eldridge Products, Inc.

Master-Touch™

Thermal Gas Mass Flow Meters

CFG11B (DC)

MP-INTEGRAL

8600MP–8800MP

9700MP–9800MP

Approved for use in Hazardous locations

CSA/CUS, ATEX, IECEx, KOSHA

Installation, Wiring and Dimensions

80203101-CFG11B (Rev. 0)

CE

www.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

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Series 8000MP–8200MP, 8600MP–8800MP
Series 9100MP–9200MP, 9700MP–9800MP

English

For use in hazardous area locations:

CSA/CUS – FOR USE IN HAZARDOUS AREA LOCATIONS; CLASS I DIVISION 1, GROUP B,C,D; CLASS II GROUP E,F,G; CLASS III; ENCL TYPE 4X; CLASS I ZONE I; AEx d IIB+H2 IP66; Ex d IIB+H2 IP66; T2 OR T3 OR T4 AS MARKED; Ta = 0°C TO 50°C

ATEX – Ta = 0°C TO 50°C; IP66; Ex d IIB+H2 T4 Gb/EX t IIIC T135°C Db or; Ex d IIB+H2 T3 Gb/EX t IIIC T200°C Db or; Ex d IIB+H2 T2 Gb/EX t IIIC T300°C Db; SIRA 12ATEX1302

IECEx – FOR USE IN HAZARDOUS AREA LOCATIONS; T2 OR T3 OR T4 AS MARKED; Ta = 0°C TO 50°C; Ex d IIB+H2 T2...T4 Gb IP66; Ex tD A21 IP66 T135°C...T300°C; IECEx CSA 11.0014

KOSHA – FOR USE IN HAZARDOUS AREA LOCATIONS; T2 OR T3 OR T4 AS MARKED; Ta = 0°C TO 50°C; Ex d IIB+H2 T2...T4 Gb IP66; Ex tD A21 IP66 T135°C...T300°C

CAUTION: Disconnect from supply before opening. Keep covers tight while circuits are alive. Certified conduit seals/stopping boxes with filling compound must be installed within [18" (450mm), 25mm Ex d], of the enclosure per local installation requirements. Refer to the gas/dust surface temperature rating as marked "X" on the product label (T2, T3 or T4). Connect power supply as marked "X" on the product label (24 VDC @ ¼ A or 120 VAC @ 1/8 A or 240 VAC @ 1/16 A & 50/60 Hz). The maximum working pressure is 500 PSIG (3.4MPa) when properly installed. Attach by suitable means to prevent unintentional product removal and/or leaks.

Finnish

Käyttö räjähdysvaarallisissa tiloissa:

ATEX – Ta = 0°C TO 50°C; IP66; Ex d IIB+H2 T4 Gb/EX t IIIC T135°C Db or; Ex d IIB+H2 T3 Gb/EX t IIIC T200°C Db or; Ex d IIB+H2 T2 Gb/EX t IIIC T300°C Db; SIRA 12ATEX1302

VAROITUS: Kytke laite jännitteettömäksi ennen kannen avaamista. Käyttötilanteessa on kannen aina oltava kiinni. Vain Ex d –hyväksyttyjä kaapelin läpivientejä saa käyttää [18" (450mm), 25mm Ex d]. Tarkista ettei ympäröivän kaasun lämpötila ylitä merkkikilvessä olevia arvoja (T2, T3 tai T4). Kytke syöttöjännite riviliittimiin 24 VDC/ 0,25 A tai 240 VAC / 0,062 A 50/60 Hz. Maksimi käyttöpaine on 3,4 MPa.

French

Pour utilization dans des locations/zones classifiées dangereuses:

CSA/CUS – FOR USE IN HAZARDOUS AREA LOCATIONS; CLASS I GROUP B,C,D; CLASS II GROUP E,F,G; CLASS III; ENCL TYPE 4X; CLASS I ZONE I; AEx d IIB+H2 IP66; Ex d IIB+H2 IP66; T2 OR T3 OR T4 AS MARKED; Ta = 0°C TO 50°C

ATEX – Ta = 0°C TO 50°C; IP66; Ex d IIB+H2 T4 Gb/EX t IIIC T135°C Db or; Ex d IIB+H2 T3 Gb/EX t IIIC T200°C Db or; Ex d IIB+H2 T2 Gb/EX t IIIC T300°C Db; SIRA 12ATEX1302

AVERTISSEMENT : Débrancher l'alimentation avant d'ouvrir. Ne pas ouvrir le couvercle lorsque les circuits sont alimentés. Conduits électriques certifiés joints et/ou les barrières contre les gaz avec enduits devrons être installés dans une limite de [18 pouces (450mm), 25mm Ex d], du boitier selon les recommendations locales. Veillez vous référer à la classification de température de surface gaz/poussiere indiquée par un X sur l'étiquette du produit (T2, T3 or T4). Brancher le bloc d'alimentation tel qu'indiqué par un X sur l'étiquette du produit (24 VDC @ ¼ A or 120 VAC @ 1/8 A or 240 VAC @ 1/16 A & 50/60 Hz). La pression maximum de travail est 500 PSIG (3.4 Mpa) lorsque l'installation est adéquate. Fixer convenablement afin d'éviter le déplacement inutile et/ou afin d'éviter les fuites.

German

Zur Verwendung in explosionsgefährdeten Bereichen:

ATEX – Ta = 0°C TO 50°C; IP66; Ex d IIB+H2 T4 Gb/EX t IIIC T135°C Db or; Ex d IIB+H2 T3 Gb/EX t IIIC T200°C Db or; Ex d IIB+H2 T2 Gb/EX t IIIC T300°C Db; SIRA 12ATEX1302

ACHTUNG: Vor dem öffnen Spannung abschalten. Gehäusedeckel bei eingeschalteter Spannung verschlossen halten. Eine zertifizierte Leitungsdurchführung mit Füllmasse muss im Abstand von [18 Zoll (450 mm), 25mm Ex d], zum Gehäuse montiert werden. Die Temperatureinstufung (T-Klasse) der maximalen Oberflächentemperatur ist als „X“ auf dem Typenschild gekennzeichnet (T2, T3 oder T4). Die Spannungsversorgung ist ebenfalls als „X“ auf dem Typenschild gekennzeichnet (24 VDC @ ¼ A oder 120 VAC @ 1/8 A oder 240 VAC @ 1/16 A & 50/60 Hz). Der maximale Betriebsdruck beträgt 500 PSIG (3.4MPa) bei korrekter Installation. Befestigung mit geeigneten Mitteln um unbeabsichtigte mechanische Beanspruchung bzw. Bewegung des Gerätes und/oder Leckage zu vermeiden.

Itallian

Per uso in area classificata:

ATEX – Ta = 0°C TO 50°C; IP66; Ex d IIB+H2 T4 Gb/EX t IIIC T135°C Db or; Ex d IIB+H2 T3 Gb/EX t IIIC T200°C Db or; Ex d IIB+H2 T2 Gb/EX t IIIC T300°C Db; SIRA 12ATEX1302

ATTENZIONE: Interrompere l'alimentazione prima dell'apertura. Mantenere la custodia chiusa quando i circuiti sono alimentati. In caso di installazione in campo, i giunti di bloccaggio certificati, riempiti con sigillante, devono essere installati entro [18 pollici (450 mm), 25mm Ex d], dalla custodia. Verificare la classificazione della temperatura superficiale del gas o delle polveri dichiarata sulla targhetta dello strumento (T2, T3 oppure T4). Alimentare come dichiarato sulla targhetta dello strumento (24 VDC @ ¼ A oppure 120 VAC @ 1/8 A oppure 240 VAC @ 1/16 A & 50/60 Hz). Con una installazione corretta la Massima Pressione Operativa è pari a 500 psi g (3.4 MPa rel.) . Fissare lo strumento con mezzi appropriati per prevenirne la rimozione accidentale e/o eventuali perdite.

Polish

Do stosowania w strefach zagrożonych wybuchem:

ATEX – Ta = 0°C TO 50°C; IP66; Ex d IIB+H2 T4 Gb/EX t IIIC T135°C Db or; Ex d IIB+H2 T3 Gb/EX t IIIC T200°C Db or; Ex d IIB+H2 T2 Gb/EX t IIIC T300°C Db; SIRA 12ATEX1302

OSTRZEŻENIE: Bezwzględnie odłączyć urządzenie od zasilania przed otwarciem obudowy. Przy aktywnych obwodach wyjściowych obudowa musi być zamknięta. Należy stosować wyłącznie certyfikowane przepusty kablowe uszczelnienia i skrzynki połączeniowe zgodnie z lokalnymi wymaganiami instalacyjnymi dla urządzeń Ex d [18” (450mm), 25mm Ex d]. Należy stosować tylko dla gazów/pyłów o temperaturze powierzchni oznaczonej „X” na etykiecie urządzenia (T2, T3 lub T4). Należy stosować wyłącznie napięcie zasilania oznaczone na tabliczce znamionowej urządzenia (24 VDC @ ¼ A lub 120 VAC @ 1/8 A lub 240 VAC @ 1/16 A & 50/60 Hz). Przy prawidłowym montażu maksymalne ciśnienie robocze wynosi 500 PSIG (3.4Mpa). Dodatkowo należy zastosować środki chroniące przed przypadkowym demontażem urządzenia lub przeciekami.

Spanish

Para usar en localidades peligrosas entre estas líneas:

ATEX – Ta = 0°C TO 50°C; IP66; Ex d IIB+H2 T4 Gb/EX t IIIC T135°C Db or; Ex d IIB+H2 T3 Gb/EX t IIIC T200°C Db or; Ex d IIB+H2 T2 Gb/EX t IIIC T300°C Db; SIRA 12ATEX1302

PRECAUCION: Desconecte del suministro eléctrico antes de abrir. Mantenga las tapas y/o cubiertas ajustadas mientras los circuitos están cargados. Conduit y sellos certificados/cajas de paro con relleno compuesto deberán ser instaladas a [18" (450mm), 25mm Ex d], la cubierta requiere instalación local. La "X" marcada en la etiqueta del producto se refiere a gas/polvo y rango de temperatura de la superficie (T2, T3 o T4). Conecte al suministro eléctrico marcado con "X" en la etiqueta del producto (24 VCD @ 1/4 A, 120VCA @ 1/8 A, 240VCA 1/16 A, Y 50/60 Hz). La máxima presión de trabajo es de 500 PSIG (3.4MPa) cuando ha sido instalado apropiadamente. Adjunto por medio disponible para prevenir el movimiento intencional del producto y/o fuga.

Swedish

För användning i risk klassade utrymmen enligt:

ATEX – Ta = 0°C TO 50°C; IP66; Ex d IIB+H2 T4 Gb/EX t IIIC T135°C Db or; Ex d IIB+H2 T3 Gb/EX t IIIC T200°C Db or; Ex d IIB+H2 T2 Gb/EX t IIIC T300°C Db; SIRA 12ATEX1302

VARNING: Matningsspänningen måste brytas innan mätaren öppnas. Kåpor och tätningar skall vara monterad så länge som strömmen ej är bruten. Certifierade/klassade genomföringstätningar måste användas inom ett avstånd av [18” (450 mm) , 25mm Ex d], från varje installerad utrustning. Klassningen av yttemperaturen för gas/damm skall beaktas. Markeras med ett ” X ” på produktens etikett (T2, T3 eller T4). Anslut matningsspänningen som markeras med ett ” X ” på produktens etikett (24 VDC @ ¼ A eller 120 VAC @ 1/8 A eller 240 VAC @ 1/16 A & 50/60 Hz). Maximalt arbetstryck är 34 bar ö (3,4 Mpa) vid installation enligt anvisning. Ansluts på ett sådant vis, så att läckor förebyggs och att utrustningen ej oavsiktligt kan demonteras.

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Section A Introduction and Installation

Introduction

Your Master-Touch™ flow meter includes a flow sensing element, temperature sensing element, analog bridge 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 of 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 configuration, the digital controller converts the nonlinear input signal received from the flow sensor to linear 0–5 VDC & 4–20 mA output signals. RS485 Modbus RTU communications are embedded in the firmware. HART and Profibus DP-compatible modules are optionally available.

Unpacking Your Instrument

Your Master-Touch™ thermal mass flow meter is a precision piece of electronic flow instrumentation. Although these 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 of the options that were ordered for your instrument. Many, if not all, of those 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 Master-Touch™ flow meters with the "-DC24" option are user-supplied 18 to 24 Volts DC @ 250 mA.

Power requirements for Master-Touch™ flow averaging tubes with the "-AC115" option are 115 VAC 50/60 Hz standard, or 220 VAC 50/60 Hz with the "-AC230" option. 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. Our recommendation on wire size is 18 Ga. stranded for all AC wiring.

If the flow meter includes a remote electronics assembly, then the flow transmitter power is provided by the connection to the remote assembly (see the wiring instructions in Section G which correspond to your configuration). Ten feet of four or six wire connection cable is provided with the remote assembly (depending on signal requirements). If more cable is required, the 10' length should be replaced with a four- or six-wire, twisted pair shielded cable. The transmitter is independent of cable length and won't 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.

All wiring and conduits shall be installed per the local requirements as appropriate for the application and conditions.

Signal Interface

All Master-Touch™ flow meters provide both 0-5 Volts DC and 4-20 mA flow output signals and Modbus RTU communications. Additional communications protocols such as HART, Profibus DP etc. 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 (for example 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. The 250 ohm series resistor is 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 Mounting Guidelines

The Master-Touch™ thermal dispersion sensor must be exposed to the flowing gas 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 with compared to their effect on other flow measurement technologies.

The Master-Touch™ firmware supports three methods of in situ flow signal adjustments for superior accuracy: C-Factor, Point-Wise, or Secondary Coefficient adjustments to the factory linearization for the most accurate flow readings:

- The C-Factor (Menu 811) adjusts the linearized microprocessor output by a uniform percentage of the readings. This adjustment is applied before the others.
- Point-Wise adjustments (Menu 750 PW-Curve Fit) provide greater flexibility by allowing adjustments in increments of 5% of the Full Scale, i.e., 10–15% or 65–70%.

Please see the *Master-Touch™ Display/Keypad Menu System Manual* for complete description of these menus and their functions, or consult the factory for additional information.

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 out and to come in contact with the sensing element must be avoided. The design of the flow averaging tubes minimizes this risk, but it does not eliminate it. 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 below is provided as a general guideline for minimum straight run requirements. Depending upon the specific location details, more or less straight run may be required to produce a satisfactory flow profile. 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.

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. (Note: 10x below represents 10 ID lengths and 15x represents 15 ID lengths and so forth)

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 C-Factor adjustments of the Master-Touch™ software for the most accurate flow readings due to a non-uniform flow profile in your process line.

Installation of Inline Flow Meters

The inline style flow meter assembly includes the flow sensing element, temperature sensing element, bridge amplifier/signal output board, microprocessor circuit board, transmitter enclosure, and flow section. Depending on the flow section size and/or other requirements, the flow section may include flow conditioning plates. The flow section is typically specified to match the user's flow conduit and is plumbed directly in the flow line. This design has the sensing elements mounted directly in the flow section for exposure to the process gas. 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. Consult the factory before disassembling.

Installation of Insertion Flow Meters

The insertion style flow meters include the flow sensing element, temperature sensing element, bridge amplifier/signal output board, microprocessor circuit 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 styles 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. 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 considering applying higher pressures, and AT HIGHER PRESSURES, 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. ***EPI manufactures a custom high pressure retractor that can be seen in the image above where extraction is controlled using a threaded bolt. Contact the factory for more information on this high pressure retractor.***

Please note that the proper installation of insertion style Flow Averaging Tubes™ requires the unobstructed flow of the process gas through the return port to the process line. Therefore the clearance hole in the process pipe must be sized to return port, not the flow inlet tube. Also, FAT™ probe assemblies longer than 24" require support at the pipe or duct wall opposite the insertion point to avoid the potential of damage to the assembly.

Single Point Probe Insertion Depth Guidelines

For probe insertion depth, see the below table to determine the depth of the probe from the outside pipe wall to the end of the probe, then add the insertion fitting height to that value. This resulting value will be the total length of probe insertion and should be marked on the probe accordingly. The probe is then inserted into the fitting until the mark reaches the top of the fitting. Any potential blockage effect created by inserting the probe assembly into the pipe to the depth listed has been accommodated by EPI as part of the calibration for the pipe size specified for the initial factory calibration.

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

For other size pipes, use example at bottom of the table.

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™)

To find the insertion depth for other piping, please use the below recommended equation.

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

(Example: Your new ID = 3.5, use X-modifier value of .1)

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.

Section B Wiring Diagrams

MP Series Power Input and Signal Output Signal Wiring

Series 8600MP–8700MP

Model Number	O.D.	Length
8636MP	1/4"	6"
8649MP	3/8"	6"
8659MP	1/2"	7"
8669MP	3/4"	7"
8689MP	1"	8"
8710MP	1 1/4"	10"
8712MP	1 1/2"	14"
8716MP	2"	14"
8720MP	2 1/2"	14"
8724MP	3" Flanged	14"
8728MP	3 1/2" Flanged	14"
8732MP	4" Flanged	14"

Series 8800MP

Series 9700MP

Series 9800MP

Section C Factory Calibration

The factory calibration of an Eldridge thermal gas mass flow meter is a complex process. Our first step is to perform a temperature calibration 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. 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.

Section D General Specifications

Series 8000MP and 8000MPNH

Linear signal output	0-5 VDC & 4-20 mA (Flow and Temperature)
Relay Output	Two 1-amp @ 30 VDC, user-selectable alarm functions
Signal Interface	LCD (flow rate, flow total, gas temperature) RS232 & RS485 Modbus RTU *Optional HART or Profibus DP*
Accuracy* including linearity (Ref.: 21°C):	±(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 FS
Ambient electronics temperature range	-40° to 120°F (-40° to 50°C)
Gas temperature range	32°to 392°F (0 to 200°C) *Consult factory for extended range*
Gas temperature coefficient (GTC)	0.02% of Full Scale/°C
Gas pressure effect	Negligible over ±20% of absolute calibration pressure
Pressure rating maximum:	
Inline flow meters	500 PSI Std., >500 special
Insertion flow meters (*See note below*)	
.500" OD	125 PSI Std., >125 special
.750" OD	55 PSI Std., >55 special
1.000" OD	30 PSI Std., >30 special
Transmitter power requirements	5 Watts or less
RAM Back-up	Lithium Battery, 2.5-3.5v, >10 years
Wetted materials:	316SS, including sensor
Standard temperature & pressure (STP)	70°F & 29.92" Hg (Air .075 lb/cubic foot)
NIST traceable calibration	Standard

*** Accuracy specification applies to the instrument only. EPI is not responsible for measurement errors due to flow profile irregularities caused by installation piping configurations, corrosion on inner pipe surfaces valve placement, etc.**

Specifications are subject to change without notice. Consult factory at time of purchase.

Approvals

MP Series Flow Transmitter —	For use in hazardous area locations (See following page for specific approvals)
MP Series Remote Enclosure —	For use in Ordinary (Non-Hazardous) area locations: Type 4X, IP66 *Consult factory for optional enclosure.*
MPNH Series —	For use in Ordinary (Non-Hazardous) area locations: Type 4X, IP66

Insertion probe PSI assumes proper installation with stainless steel ferrule. Teflon ferrules are not acceptable. Above the listed pressure, flange-mounting is required to eliminate the potential of the probe being forced out of the line during installation or removal under pressure.

Series 9000MP and 9000MPNH

Linear signal output	0-5 VDC & 4-20 mA (Flow and Temperature)
Relay Output	Two 1-amp @ 30 VDC, user-selectable alarm functions
Signal Interface	LCD (flow rate, flow total, gas temperature) RS232 & RS485 Modbus RTU *Optional HART or Profibus DP*
Accuracy* including linearity (Ref.: 21˚C):	±(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 @ 15,000 SFPM/76 NMPS minimum FS
Ambient electronics temperature range	-40˚ to 120˚F (-40˚ to 50˚C)
Gas temperature range	40˚to 150˚F (5˚ to 65˚C)
Gas temperature coefficient (GTC)	0.05% Full Scale/˚C @ 40˚ to 100˚F (5˚ to 40˚C) 0.10% Full Scale/˚C @ 100˚ to 150˚F (40˚ to 65˚C)
Gas pressure effect	Negligible over ±20% of absolute calibration pressure
Pressure rating maximum:	
Inline flow meters	500 PSI Std., >500 special
Insertion flow meters (*See note below*)	
.500” OD	125 PSI Std., >125 special
.750” OD	55 PSI Std., >55 special
1.000” OD	30 PSI Std., >30 special
Transmitter power requirements	5 Watts or less
RAM Back-up	Lithium Battery, 2.5-3.5v, >10 years
Wetted materials:	316SS, including sensor
Standard temperature & pressure (STP)	70˚F & 29.92" Hg (Air .075 lb/cubic foot)
NIST traceable calibration	Standard

*** Accuracy specification applies to the instrument only. EPI is not responsible for measurement errors due to flow profile irregularities caused by installation piping configurations, corrosion on inner pipe surfaces valve placement, etc.**

Specifications are subject to change without notice. Consult factory at time of purchase.

Approvals

MP Series Flow Transmitter —	For use in hazardous area locations (See following page for specific approvals)
MP Series Remote Enclosure —	For use in Ordinary (Non-Hazardous) area locations: Type 4X, IP66 *Consult factory for optional enclosure.*
MPNH Series —	For use in Ordinary (Non-Hazardous) area locations: Type 4X, IP66

Insertion probe PSI assumes proper installation with stainless steel ferrule. Teflon ferrules are not acceptable. Above the listed pressure, flange-mounting is required to eliminate the potential of the probe being forced out of the line during installation or removal under pressure.

Approvals

CSA/CUS – FOR USE IN HAZARDOUS AREA LOCATIONS; CLASS I DIVISION 1, GROUP B,C,D; CLASS II GROUP E,F,G; CLASS III; ENCL TYPE 4X; CLASS I ZONE I; AEx d IIB+H2 IP66; Ex d IIB+H2 IP66; T2 OR T3 OR T4 AS MARKED; Ta = 0°C TO 50°C

ATEX – Ta = 0°C TO 50°C; IP66; Ex d IIB+H2 T4 Gb/EX t IIIC T135°C Db or; Ex d IIB+H2 T3 Gb/EX t IIIC T200°C Db or; Ex d IIB+H2 T2 Gb/EX t IIIC T300°C Db; SIRA 12ATEX1302

IECEx – FOR USE IN HAZARDOUS AREA LOCATIONS; T2 OR T3 OR T4 AS MARKED; Ta = 0°C TO 50°C;; Ex d IIB+H2 T2...T4 Gb IP66; Ex tD A21 IP66 T135°C...T300°C; IECEx CSA 11.0014

KOSHA – FOR USE IN HAZARDOUS AREA LOCATIONS; T2 OR T3 OR T4 AS MARKED; Ta = 0°C TO 50°C; Ex d IIB+H2 T2...T4 Gb IP66; Ex tD A21 IP66 T135°C...T300°C

Approved Flow Meter Labels

ELDRIDGE PRODUCTS, INC. PROPRIETARY AND CONFIDENTIAL INFORMATION ARE CONTAINED HEREIN. POSSESSION OF THIS DOCUMENT AND/OR INFORMATION DOES NOT CONVEY ANY RIGHT IN OR LICENSE TO USE OR REPRODUCE THE SPECIFICATIONS OR TECHNOLOGY OR INFORMATION DISCLOSED HEREIN, NOR TO DISCLOSE SAID TO OTHERS WITHOUT THE WRITTEN CONSENT OF ELDRIDGE PRODUCTS, INC.

Label for CSA/CUS approved flowmeters

Label for ATEX approved flowmeters

Label for IECEx approved flowmeters

Label for KOSHA approved flowmeters

The required information for each approved flowmeter is added prior to shipment.

ELDRIDGE PRODUCTS, INC.	
TITLE	MP ENCLOSURE LABEL, PRODUCT LISTINGS CSA/CUS, ATEX, IECEx & KOSHA
DRAWING NUMBER	Approval Labels — Rev. 0

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.

Service Work

In the event that service work is required or calibration and recertification is required, 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 a RMA, work instructions and be shipped prepaid. On receipt of your flow instrumentation, we will inspect the equipment and give a price quotation for service work to be performed, if not already given.

Storage

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

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. Any and 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.

A copy of the complete Eldridge Products, Inc. Terms and Conditions is available on our website, www.epiflow.com, or by request to the factory.

CUSTOMER SATISFACTION REPORT

Eldridge Products, Inc. is interested in your level of satisfaction with the purchase and operation of your new thermal gas mass flow meter(s) or switch(es). Please take a few moments to complete the following form and then either fax or mail it to EPI. Thank you for your cooperation.

Your Name:	Instrumentation Serial Number(s):
Company:	Date:
Fax No.:	Tel. No.:

Sales Order:

Did you receive a confirming Sales Order from Eldridge Products, Inc. for your review that was correct in its details for invoicing, order shipment, and the technical details of the required instrumentation?
Yes ___ No (Please explain):

_____
_____
_____
_____

Order Shipment:

Did you receive all instrumentation as ordered and per the Purchase Order shipping instructions?
Yes ___ No (Please explain):

_____
_____
_____
_____

Instrument Performance:

Did the instrumentation perform in accordance within factory specifications?
Yes ___ No (Please explain):

_____
_____
_____

EU Declaration of Conformity

This is to declare, in accordance with **Directives 2014/34/EU, 97/23/EC, 2004/108/EC, 93/68/EEC, 92/31/EEC, 89/336/EEC**, that the following products are designed and manufactured in accordance with the requirements of the directives. The product has been constructed with sound engineering practice and safety principles. Routine verification and testing has been performed.

Manufacturer:
Eldridge Products, Inc.
465 Reservation Road, Marina, California 93933, USA

Product Description:
Inline style Mass Flowmeters Integral and Remote, Series 8000MP, 8100MP, 8600MP, 8700MP, 9100MP & 9700MP
Insertion style Mass Flowmeters Integral and Remote, Series 8200MP, 8800MP, 9200MP & 9800MP
Note: For remote Flowmeters, flow transmitter is rated for explosive atmospheres, while the remote enclosure is rated for IP66 (Type 4X) ordinary locations.

Certifying Agency:
ATEX Notified Body SIRA 0518:
CSA Group
Unit 6 Hawarden Industrial Park
Hawarden, Deeside
CH5 3US
United Kingdom
Directive: 2014/34/EU
EC-Type Examination Certificate: SIRA 12ATEX1302
EN 60079-0:2012 EN 60079-1:2007 EN 60079-31:2009 (Gap analysis performed on EN 60079-31: 2014 and product remains compliant)

Product Certifications:
CE 0518
Ex II 2 G D
Ex d IIB+H_2 T4/T3/T2 Gb (refer to the description for temperature class and surface temperature)
Ex t IIIC T135˚C/T200˚C/T300˚ Db
Ta = 0˚C to +50˚C
Note: Refer to the product temperature code and "T" rating number as stamped on product label.
Pressure Equipment Directive 97/23/EC – As per 3.6 and indent 6 the following products do not exceed Category I as listed below and are covered by Directive 94/9/EC. Directive 97/23/EC tables 6 & 7 have been applied;

Insertion probe flowmeters Series 8200MP, 8800MP, 9200MP, 9800MP are volume-less and are exempt;

In-line Series 8000MP, 8100MP, 8600MP, 8700MP, 9100MP, 9700MP have the following ANSI inch pipe sizes (DN equivalent size) at maximum pressure limits in PSI (Bars).
Example: 1-1/2" @ 361 is a one and one half inch In-line pipe flowmeter with a maximum allowable pressure of 361 PSIG.

Group 1 fluids (Gas: explosive, flammable, toxic, oxidizing): Excluded from Directive 97/23/EC, standard engineering practice applied 1/4" thru 1" (DN10 thru DN25) @ 500(34.5)
Group 1 fluids (Gas: explosive, flammable, toxic, oxidizing): Category I, 1-1/4" (DN32) @ 452(31.2); 1-1/2" (DN40) @ 361(24.9); 2" (DN50) @ 289(19.9); 2-1/2" (DN65) @ 222(15.3); 3" (DN80) @ 180(12.4); 4" (DN100) @ 145(10);
Note: 1) Larger line sizes require insertion probe flowmeters. 2) Higher than listed pressures require insertion probe flowmeters.

Group 2 fluids (Gas: all other non Group 1 nonflammable gases): Excluded from Directive 97/23/EC, standard engineering practice applied 1/4" thru 1-1/4" (DN10 thru DN32) @ 500(34.5)
Group 2 fluids (Gas: all other non Group 1 nonflammable gases): Category I, 1-1/4" (DN32) @ 500(34.5); 1-1/2" (DN40) @ 500(34.5); 2" (DN50) @ 500(34.5); 2-1/2" (DN65) @ 500(34.5); 3" (DN80) @ 500(34.5); 4" (DN100) @ 500(34.5);
Note: 1) Larger line sizes require insertion probe flowmeters. 2) Higher than listed pressures require insertion probe flowmeters.

For and on behalf of Eldridge Products, Inc.

Mark F. Eldridge, President June 22, 2017