series M Differential Pressure Transmitters



DESCRIPTION

The Series M family of differential pressure transmitters measure low pressures and feature a wide variety of analog signal outputs with low power consumption. A wide selection of standard pressure ranges and electrical ratings is available. These transmitters feature: no moving parts to wear out, reliable long term stability, and are virtually position insensitive. The Series M transmitters are typically used for monitor-ing cleanroom pressures, HVAC, velocity pressures, bubbler level systems, and leak detection; as well as filter differential, draft, fume hood and other low pressure applications.

The transmitters are housed in a compact heavy duty gasketted cast aluminum enclosure designed to IP 65 of IEC 529 standards and NEMA 4. The die cast aluminum enclosure incorporates a recessed neoprene gasket to prevent ingress of moisture or dust. Wall mounting holes are enclosed in the cast aluminum box and concealed by the cover. The wall mounting holes and the cover attaching screws are outside the gasketted area. Access to the terminals are made through knockouts on the front of the box. A choice of one or two knockouts and three hole sizes is available to accommodate usage of 1/2 inch conduit and metric sizes PG11 and PG13.

Pluggable terminal block connectors are provided with captive wire protection and captive terminal screws.

The Series M includes four models: Model M10, Model M20, Model M30 and Model M40.

These four models incorporate a variety of power and signal options. The span or zero adjustment is performed with a 20 turn potenti-

ometer for fine resolution.

The M Series transmitters have been tested by an accredited laboratory and comply with the European requirements of Council Directive 89/336/EEC for emission measurements per EN50081-1 and immunity tests per EN50082-1.

| M10 | 3-Wire DC Voltage In DC Voltage Out | M30 | 2-Wire DC Voltage In 4 - 20 mA Out |
|-----|--|-----|--|
| M20 | 4-Wire 24, 120, or 240 Vac In DC Voltage Out | M40 | 4-Wire 24, 120, 240 Vac In 4-20 mA Out |

OPERATION

The pressure sensing element is a differential capacitance cell for pressure measurements ranging from 0.1 to 5 inches of water (25 Pa to 1.0 kPa), or piezoresistive (silicon) sensors for pressure measurements ranging from 5 inches of water to 30 psi (1.0 kPa to 200kPa).

The capacitance cell is capable of sensing very low pressures, negative or differential pressures. A very lightweight, responsive diaphragm within the cell deflects a small amount when a small pressure is applied. This deflection results in a change in capacitance which is then detected and amplified electronically.

The piezoresistive sensor is a solid state device designed in a Wheatstone bridge configuration. When pressure is applied to the device, the resistance of the bridge changes by a small amount. The output of the bridge is ratiometric to the supply voltage, and a small change in resistance is detected as a change in output voltage.



DIMENSIONS ARE IN INCHES (MILLIMETERS)

SPECIFICATIONS

Performance Specification

Accuracy: ±1% of Span (including non-linearity and hysteresis) Calibration: (Traceable to N.I.S.T.)

Environmental

Operating temperature range: 0°C to 45°C (32°F to 115°F) Storage temperature: -30°C to 70°C (-20°F to 160°F) Effect of temperature on zero: ±0.05%/°C on span: ±0.02%/°C Operating humidity range: 10% to 90% R.H. non-condensing Shock resistance: 10G (11ms)

Vibration resistance: 5G to 50 Hz

Electrical Connectors

Polarized Euro plug/connectors Connections: Pluggable terminal block for wire 14 to 26 AWG Material: Glass filled polyester

Physical

Dimensions: 3.56"x4.54"x2.18" (90 x115 x55 mm) Material: Aluminum Alloy #A380 Cover screws: M4 Stainless Steel non-magnetic Finish: Black epoxy paint Knockout: Choice of 1 or 2 holes. Knockout hole sizes 1/2" conduit, PG11 or PG13 Cable glands not included Pressure port connection: 3/16" Dia. suitable for: -1/8" I.D. Tygon[™] or polyurethane tubing (3 - 4 mm) -1/4" O.D. polyethylene tubing (6mm) Weight: 1.27 lb max (576 g) Integral filters at both ports

Measures differential, gage pressure or vacuum Suitable for air or inert gases

MODEL M10

DC Power Input/Voltage Output

Diagram shows area of detail.

Please see inset diagrams for wiring of each individual model below.



SPECIFICATIONS

Electrical

Supply Voltage: 11 to 32 Vdc (14.5 to 32 Vdc for 10 Volts output) Protected against reversal of polarity Supply Current: 8mA Output:

0 to 5 Volts, linear 0 to 10 Volts linear Sink or source 3.5mA

Protected against short circuit



Terminal 1 is enclosure ground. Terminal 2 is positive signal voltage. Terminal 3 is positive supply voltage. Terminal 4 is common to both the DC power supply and the output signal.

MODEL M20

AC Power Input/Voltage Output



SPECIFICATIONS

Electrical

| Power Consumption | Operating Voltage Range |
|-------------------|---|
| 1.5W | 20 to 32 Vac |
| 1.5W | 90 to 140 Vac |
| 1.5W | 180 to 260 Vac |
| | Power Consumption 1.5W 1.5W 1.5W |

Output can sink or source 3.5mA Output voltage is protected against short circuit Isolation between power supply and output is 2500 Vrms



Terminals 1 and 2 are DC voltage output. Terminal 3 is ground. Terminals 4 and 5 are AC power input.

ORDERING INFORMATION

Order Number (See Table below and Reference Table A on page 26) M10 - IP - O - SO - KQ - KS

EXAMPLE: M10 - 01E - A - 5 - 1 - R

| IP = Input Pressure | <mark>0</mark> = Offset (See Note 1) | <mark>SO</mark> = Signal Output | KQ = Knockout Quantity | <mark>KS</mark> = Knockout Size |
|---------------------------|---|---------------------------------------|---------------------------|------------------------------------|
| See | - = No offset | 5 = 0-5 V | 1 = 1 Hole | R = 1/2" Conduit |
| Reference Table A | A = 1/4 offset | X = 0-10 V | 2 = 2 Holes | S = PG 11 |
| | B = 1/2 offset | | | T = PG 13 |

ORDERING INFORMATION

Order Number (See Table below and Reference Table A on page 26) M20 - IP - PS - SO - O - KQ - KS

| EXAMPLE: M20 | - 07P - C · | - 5 - A - ' | 1 - R |
|--------------|-------------|-------------|-------|
|--------------|-------------|-------------|-------|

| IP = Input Pressure | <mark>PS</mark> = Power Supply | <mark>SO</mark> = Signal Output | 0 = Offset (See Note 1) | <mark>KQ</mark> = Knockout Quantity | <mark>KS</mark> = Knockout Size |
|---------------------------|--------------------------------------|---------------------------------------|----------------------------|---|------------------------------------|
| See | C = 24 Vac | 5=0-5V | - = No offset | 1 = Hole | R = 1/2" Conduit |
| Reference | D = 120 Vac | X = 0 - 10 V | A = 1/4 offset | 2 = Holes | S = PG 11 |
| Table A | E = 240 Vac | | B = 1/2 offset | | T = PG 13 |

MODEL M30

Two Wire / 4-20mA Output

SPECIFICATIONS

Electrical

Supply Voltage: 11 to 32 Vdc (See diagram below for maximum loop resistance) Protected against reversal of polarity

Output limited to approx. 3.85mA at low end of span and approx. 27mA at upper end of span





ORDERING INFORMATION

Order Number (See Table below and Reference Table A on page 26) M30 - IP - O - KQ - KS

EXAMPLE: M30 - 06E - B - 1 - R

| IP = Input Pressure | <mark>0</mark> = Offset (See Note 1) | <mark>KQ</mark> = Knockout Quantity | KS = Knockout Size |
|------------------------|---|--|-----------------------|
| See Reference Table A | - = No offset | 1 = Hole | R = 1/2" conduit |
| | A = 1/4 offset | 2 = Holes | S = PG 11 |
| | B = 1/2 offset | | T = PG 13 |

NOTES

Note 1:

If the measured differential pressure is expected to go from positive to negative, a transmitter with offset (elevated zero) should be ordered. Three options are available:

- "-" No offset. At zero differential pressure, the output signal is: 4mA (4 to 20mA range) 0V (0 to 5V range)

 - OV (0 to 10V range)
 - Pressure excursion: 0% to 100% of Range, see Table A
- "A" 1/4 span offset. At zero differential pressure, the output signal is: 8mA (4 to 20mA range) 1.25V (0 to 5V range)
 - 2.5V (0 to 10V range)

Pressure excursion: -33% to 100% of Range see Table A

MODEL M40

AC Power Input / 4-20mA Output

SPECIFICATIONS

Electrical

| Nominal Input Voltage | Power Consumption | Operating Voltage Range | | |
|-----------------------|--------------------------|-------------------------|--|--|
| 24 Vac | 1.5W | 20 to 32 Vac | | |
| 120 Vac | 1.5W | 90 to 140 Vac | | |
| 240 Vac | 1.5W | 180 to 260 Vac | | |

Isolation between power supply and output is 2500 Vrms Receiver resistance can be from 0 to 650 Ohms Output limited to approx. 27mA at the upper end of span



Terminals 1 and 2 are 4-20 mA current output. Terminal 3 is the enclosure ground. Terminals 4 and 5 are AC power input.

ORDERING INFORMATION

Order Number (See Table below and Reference Table A on page 26) M40 - IP - PS - O - KQ - KS

EXAMPLE: M40 - 03M - C - A - 1 - R

| IP = Input Pressure | <mark>PS</mark> = Power Supply | <mark>0</mark> = Offset (See Note 1) | KQ = Knockout Quantity | KS = Knockout Size |
|------------------------|-----------------------------------|---|---------------------------|-----------------------|
| See Reference | C = 24 Vac | - = No offset | 1 = Hole | R = 1/2" Conduit |
| Table A | D = 120 Vac | A = 1/4 offset | 2 = Holes | S = PG 11 |
| | E = 240 Vac | B = 1/2 offset | | T = PG 13 |

"B" 1/2 span offset. At zero differential pressure, the output signal is: 12mA (4 to 20mA range)
2.5V (0 to 5V range)
5V (0 to 10V range)
Pressure excursion: -100% to 100% of Range, see Table A

To order: determine the positive pressure range; from Table A find the corresponding pressure code, then add the required offset (none, A, or B).

For example, M30 05E A___, is a transmitter with a maximum range of 1" of H_2O at 20mA and a minimum range of -0.33" of H_2O at 4mA.

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TABLE A—STANDARD PRESSURE RANGES

| | ENGLISH | | METRIC UNITS | | | | | |
|----------|------------------------------|-------------------------|--------------|----------------|---------------------|----------|-----------------------------|---------------------|
| Pressure | Pressure Range | Max. Safe Momentary | Pressure | Pressure Range | Max. Safe Momentary | Pressure | Pressure Range | Max. Safe Momentary |
| Code | English | Overpressure | Code | Pascals | Overpressure | Code | Pascals | Overpressure |
| 01E | 0-0.100 in. H ₂ 0 | | 01P | 0-25.0 Pa | | 01M | 0-2.50 mm H ₂ 0 | |
| 02E | 0-0.200 in. H ₂ 0 | 5 in. H ₂ 0 | 02P | 0-50.0 Pa | 1.25 kPa | 02M | 0-5.00 mm H ₂ 0 | 125 mm |
| 03E | 0-0.300 in. H ₂ 0 | | 03P | 0-75.0 Pa | | 03M | 0-7.50 mm H ₂ 0 | |
| 04E | 0-0.500 in. H ₂ 0 | | 04P | 0-100.0 Pa | | 04M | 0-10.00 mm H ₂ 0 | |
| 05E | 0-1.00 in. H ₂ 0 | | 05P | 0-250 Pa | | 05M | 0-25.0 mm H ₂ 0 | |
| 06E | 0-2.00 in. H ₂ 0 | 20 in. H ₂ 0 | 06P | 0-500 Pa | 5 kPa | 06M | 0-50.0 mm H ₂ 0 | 500 mm |
| 07E | 0-3.00 in. H ₂ 0 | | 07P | 0-750 Pa | | 07M | 0-75.0 mm H ₂ 0 | |
| 08E | 0-5.00 in. H ₂ 0 | | 08P | 0-1.00 kPa | | 08M | 0-100 mm H ₂ 0 | |
| 09E | 0-10.0 in. H ₂ 0 | 5 psid | 09P | 0-2.50 kPa | 35 kPa | 09M | 0-250 mm H ₂ 0 | 3.5 m |
| 11E | 0-20.0 in. H ₂ 0 | | 11P | 0-5.00 kPa | | 11M | 0-500 mm H ₂ 0 | |
| 12E | 0-30.0 in. H ₂ 0 | | 12P | 0-7.50 kPa | | 12M | 0-750 mm H ₂ 0 | |
| 13E | 0-50.0 in. H ₂ 0 | | 13P | 0-10.0 kPa | | 13M | 0-1.00 m H ₂ 0 | |
| 14E | 0-100 in. H ₂ 0 | 15 psid | 14P | 0-25.0 kPa | 100 kPa | 14M | 0-2.5 m H ₂ 0 | 10 m |
| 15E | 0-1.00 psid | | 15P | 0-50.0 kPa | | 15M | 0-5.0 m H ₂ 0 | |
| 16E | 0-2.00 psid | | - | - | | - | - | |
| 17E | 0-3.00 psid | | - | - | | - | - | |
| 18E | 0-5.00 psid | | - | - | | - | - | |
| 19E | 0-15.0 psid | 30 psid | 16P | 0-100 kPa | 200 kPa | 16M | 0-10.0 m H ₂ 0 | 20 m |
| 20E | 0-30.0 psid | 60 psid | 17P | 0-200 kPa | 400 kPa | 17M | 0-20.0 m H ₂ 0 | 40 m |

TABLE B—STANDARD PRESSURE RANGES FOR W SERIES

| | ENGLISH UNIT | S | METRIC UNITS | | | | | |
|------------------|---|--------------------------------------|------------------|--|--------------------------------------|------------------|--|---|
| Pressure Code | Differential Pressure Range, psid | Operating Static Pressure, psi | Pressure Code | Differential Pressure Range, kPA | Operating Static Pressure, psi | Pressure Code | Differential Pressure Range, k mm H ₂ 0 | Operating Static Pressure k mm H ₂ 0 |
| 31E | 0-6 psid | | 31P | 0-50 kPa | | 31M | 0-5.0 k mm H ₂ 0 | |
| 32E | 0-10 psid | 0-100 nsi* | 32P | 0-75 kPa | 0 - 700 kPa* | 32M | 0-7.5 k mm H ₂ 0 | 0-70 k mm H ₂ 0 |
| 33E | 0-15 psid | 0 100 poi | 33P | 0-100 kPa | | 33M | 0-10 k mm H ₂ 0 | |
| 34E | 0-30 psid | | 34P | 0-200 kPa | | 34M | 0-20 k mm H ₂ 0 | |
| 35E | 0-60 psid | | 35P | 0-500 kPa | 0.000015.i | 35M | 0-50 k mm H ₂ 0 | 0.200 k mm H 0 |
| 36E | 0-100 psid | 0 - 300 psi* | 36P | 0-750 kPa | 0 - 2000 kPa* | 36M | 0-75 k mm H ₂ 0 | 0-200 K 11111 1120 |
| 37E | 0-150 psid | | 37P | 0-1000 kPa | | 37M | 0-100 k mm H ₂ 0 | |
| 38E | 0-200 psid | | 38P | 0-1500 kPa | | 38M | 0-150 k mm H ₂ 0 | |

* Maximum safe momentary overpressure at any port is 2X the maximum operating static pressure

TABLE C—STANDARD PRESSURE RANGES FOR MANOMETER

| | ENG | LISH | | METRIC UNITS | | | | | | | |
|----------|------------------------------|-----------|---------------------|--------------|----------------|-----------|------------------------|----------|-------------------|-----------|------------------------|
| Pressure | Pressure | Displayed | Max. Safe | Pressure | Pressure Range | Displayed | Max. Safe Momentary | Pressure | Pressure Range | Displayed | Max. Safe Momentarv |
| Code | Range | Units | Overpass | Code | Pascals | Units | Overpass | Code | mm of H_2O | Units | Overpass |
| 01E | 0-0.100 in. H ₂ 0 | .100 | | 01P | 0-25.0 Pa | 25.0 | | 01M | 0-2.50 mm | 2.50 | |
| 02E | 0-0.200 in. H ₂ 0 | .200 | 5 in H_20 | 02P | 0-50.0 Pa | 50.0 | 1.25 kPa | 02M | 0-5.00 mm | 5.00 | 125 mm |
| 03E | 0-0.300 in. H ₂ 0 | .300 | | 03P | 0-75.0 Pa | 75.0 | | 03M | 0-7.50 mm | 7.50 | |
| 04E | 0-0.500 in. H ₂ 0 | .500 | | 04P | 0-100 Pa | 100.0 | | 04M | 0-10.0 mm | 10.0 | |
| 05E | 0-1.00 in. H ₂ 0 | 1.000 | | 05P | 0-250 Pa | 250 | | 05M | 0-25.0 mm | 25.0 | |
| 06E | 0-2.00 in. H ₂ 0 | 1.999 | 2H ₂ 0 | 06P | 0-500 Pa | 500 | 5 kPa | 06M | 0-50.0 mm | 50.0 | 500 mm |
| 07E | 0-3.00 in. H ₂ 0 | 3.00 | | 07P | 0-750 Pa | 750 | | 07M | 0-75.0 mm | 75.0 | |
| 08E | 0-5.00 in. H ₂ 0 | 5.00 | | 08P | 0-1.00 kPa | 1.000 | | 08M | 0-100 mm | 100.0 | |
| 09E | 0-10.0 in. H ₂ 0 | 10.00 | | 09P | 0-2.50 kPa | 2.50 | | 09M | 0-250 mm | 250 | |
| 11E | 0-20.0 in. H ₂ 0 | 19.99 | 5 psid | 11P | 0-5.00 kPa | 5.00 | 35 kPa | 11M | 0-500 mm | 500 | 3.5 m |
| 12E | 0-30.0 in. H ₂ 0 | 30.0 | | 12P | 0-7.50 kPa | 7.50 | | 12M | 0-750 mm | 750 | |
| 13E | 0-50.0 in. H ₂ 0 | 50.0 | | 13P | 0-10.0 kPa | 10.00 | | 13M | 0-1.00 m | 1.000 | |
| 14E | 0-100 in. H ₂ 0 | 100.0 | | 14P | 0-25.0 kPa | 25.0 | | 14M | 0-2.50 m | 2.50 | |
| 15E | 0-1.00 psid | 1.000 | 5 psid | 15P | 0-50.0 kPa | 50.0 | 100 kPa | 15M | 0-5.00 m | 5.00 | 10 m |
| 16E | 0-2.00 psid | 1.999 | | 16P | 0-100 kPa | 100.0 | | 16M | 0-10.0 m | 10.00 | |
| 17E | 0-3.00 psid | 3.00 | | 17P | 0-200 kPa | 199.9 | | 17M | 0-20.0 m | 19.99 | |
| 18E | 0-5.00 psid | 5.00 | | | | | | | | | |