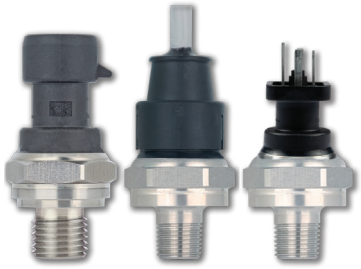
MIP SERIES

32354483
Issue H

Heavy-Duty, Media-Isolated Pressure Transducers
1 bar to 70 bar | 15 psi to 1000 psi



DESCRIPTION

The MIP Series offers a heavy-duty, media-isolated pressure transducer using piezoresistive sensing technology with ASIC (Application Specific Integrated Circuit) signal conditioning in a compact stainless-steel housing. The MIP Series transducers are fully calibrated and temperature compensated from -40°C to 125°C [-40°F to 257°F]. MIP Series transducers are developed for use with a wide range of media including aggressive fluids and water, and provide a cost-competitive solution for wide-ranging applications in tough environments.

DIFFERENTIATION

- **Great customer value:** Multiple configuration possibilities provide flexibility of use in the application with no upfront NRE or tooling charges
- **Durable:** Provide the tough environmental specifications needed, including insulation resistance and dielectric strength, and EMC performance

Certified to NSF/ANSI/CAN 61

PORTFOLIO

Honeywell offers a variety of heavy duty pressure transducers for potential use in industrial and transportation applications. To view the entire product portfolio, **click here**.

FEATURES

- Pressure range:
  - 1 bar to 70 bar absolute
  - 15 psi to 1000 psi absolute
  - 8 bar to 70 bar sealed gage
  - 100 psi to 1000 psi sealed gage
- Rugged, stainless steel construction
- Ratiometric output: 0.5 Vdc to 4.5 Vdc
- Current output: 4 mA to 20 mA
- Regulated output: 1 Vdc to 6 Vdc, 0.25 Vdc to 10.25 Vdc, 0.5 Vdc to 4.5 Vdc and 1 Vdc to 5 Vdc
- Operating temperature: -40°C to 125°C
- Total Error Band:
  - Ratiometric output: ±0.75 %FSS to ±1.0 % FSS
  - Current and regulated output : ±1 %FSS to ±2.0 %FSS
- Industry-leading accuracy as low as ±0.15%FSS BFSL
- Long term stability: ±0.25 %FSS
- Radiated immunity: 100 V/m
- Drinking water approval: NSF/ANSI/CAN 61
- UL, CE, UKCA, RoHS, REACH compliant
- Insulation resistance: >100 MΩ, 1000 Vdc (in dry, non-ionized air)
- Multiple industry-standard pressure port types provide greater flexibility and configurable options for hermetically sealed process connection
- Load dump protection for transportation application as per ISO7637-2 & ISO 16750-2
- Reverse voltage protection in regulated and current output variants
- Surge immunity: ±1 kV line to ground per IEC 61000-4-5

VALUE TO CUSTOMERS

- **Cost-effective:** Small size helps engineers to reduce design and manufacturing costs while maintaining the performance and reliability of the systems
- **Accuracy:** Total Error Band (TEB) as low as ±0.75 % within -40°C to 125°C compensated temp range and wide pressure range enable engineers to enhance system performance by improving resolution and system accuracy
- Wide supply voltage range, variety of pressure ports, output options and wide operating temperature range simplify the use in the application
- High insulation resistance and dielectric strength
- **Ratiometric output:** 0.5 to 4.5V output with sensor diagnostics for debugging internal and external failures
- **Current output:** 4 mA to 20 mA output Supports transmission of output signals over longer distances
- **Regulated output:** Multiple voltage output variants available. Transportation variant consists of load dump protection. Over and reverse voltage protection
- **EMC performance:** Operates reliably in the presence of electromagnetic fields, such as wireless signals, RF communication, and electrical devices
- **Hermetically welded design:** Supports almost all media without the use of an internal seal. The sensors are designed to be used in harsh environments with aggressive media

Honeywell

HEAVY DUTY, MEDIA-ISOLATED PRESSURE TRANSDUCERS
MIP SERIES

TABLE 1. APPLICATIONS

Industry	Media
Industrial: pumps compressors process	 water, hydraulic fluids compressed air food, beverage, oil, gas, steam
HVAC/R	refrigerants (butane, propane, ammonia, CO_2, R134A, R407C, R410A, R448A/Solstice® N40, R32 and R1234ze, R1234yf, glycol + water
Transportation	gasoline, diesel fuel, engine oil, brake fluid, coolants, CNG
Medical	O_2, N_2, CO_2, N_2O, air

TABLE 2. ELECTRICAL SPECIFICATIONS (AT 25°C [77°F] AND UNDER UNLESS OTHERWISE NOTED.)

Characteristic	Ratiometric Output (AA)	Current Output (CH)	Regulated Output (BC,BD,BE,BG)
Supply voltage (V_s)	5.0 Vdc ±0.25 Vdc	8 Vdc to 30 Vdc[1]	BC, BE & BG : 8 Vdc to 32Vdc[3] BD : 12 Vdc to 32 Vdc[3]
Output transfer function	10 % to 90 % of V_s	4 mA to 20 mA	BC : 1 Vdc to 6 Vdc BD : 0.25 Vdc to 10.25 Vdc BE : 0.5 Vdc to 4.5 Vdc BG : 1 Vdc to 5 Vdc
Output load (pull up or pull down)	≥ 2 kΩ	(V_s - 8) x 50Ω[2]	≥ 10 kΩ
Short circuit protection	yes	yes	yes
Current consumption	6.5 mA ±1 mA	—	5 mA ±1 mA
Over/reverse voltage	±40 Vdc	±35 Vdc	±36 Vdc

[1] **Supply voltage:** Must be de-rated to 8 Vdc to 25 Vdc for above 100°C to 125°C [212°F to 257°F].
[2] Applies at 25°C [77°F]. See Figure 4 for Current Output Supply Voltage.
[3] For Regulated cable variant with load dump requirement, the minimum supply voltage should be greater than output voltage by +4 V

TABLE 3. ENVIRONMENTAL AND MECHANICAL SPECIFICATIONS

Characteristic	Parameter
Shock	100 G per MIL-STD-202, Method 213, Cond. C (at 25°C [77°F])
Vibration	20 G sweep, 10 Hz to 2000 Hz (at 25°C [77°F])
Ingress protection: Metri-Pack 150 version cable harness version DIN version	 IP65, IP67 IP65, IP67, IP69K IP65
External freeze/thaw resistance	>6 cycles from -30°C to 50°C [-22°F to 122°F] (Metri-Pack 150 version only)
Wetted materials: port diaphragm external seal for ports	 stainless steel 304L stainless steel 316L nitrile (-30°C to 100°C [-22°F to 212°F]) (other materials available)
Electrical connector material	PBT 30 %GF (UL V-0)
Cable material (jacket and insulation)	TPE (Thermoplastic Elastomer) flame retardant-type cable is FT1 rated per CSA AWM-I-A/B-II-A/B specification, -40°C to 125°C [-40°F to 257°F], three 24 AWG wires.

TABLE 4. SENSOR PRESSURE TYPES

Pressure type	Description
Absolute	Output is calibrated to be proportional to the difference between applied pressure and a fixed reference to a perfect vacuum (absolute zero pressure).
Sealed gage[1]	Sensor construction is identical to the absolute version, with a built-in reference at zero pressure in order to minimize measurement error over temperature. The output is calibrated to be proportional to the difference between applied pressure and a reference of 1 standard atmosphere (1.012 barA | 14.7 psiA). Example: 100 psi sealed gage has a calibrated pressure range from 14.7 psi absolute to 114.7 psi absolute.

[1] Sealed gage option only available in pressure ranges at or above 8 bar | 100 psi.

TABLE 5. PERFORMANCE SPECIFICATIONS (AT 25°C [77°F] AND UNDER UNLESS OTHERWISE NOTED.)

Characteristic	Ratiometric Output (AA)	Current Output (CH)	Regulated Output (BC,BD,BE,BG)
Total Error Band[1]	>10 bar or >150 psi: ±0.75 %FSS (-40°C to 125°C) ≤10 bar or ≤150 psi: ±1.0 %FSS[2] (-40°C to 125°C)	±1.0 %FSS (-20°C to 85°C) ±2.0 %FSS (-40°C to 125°C)	±1.0 %FSS (-20°C to 85°C) ±2.0 %FSS (-40°C to 125°C)
Operating temperature range	-40°C to 125°C [-40°F to 257°F]		
Accuracy BFSL[3]	±0.15 %FSS	±0.25 %FSS	±0.25 %FSS
Long term stability (1000 hr, 25°C)	±0.25 %FSS		
Typical output resolution	0.05 % Full Scale Pressure		
Typical response time[4]	1 ms	2 ms	2 ms
Startup time[5]	7 ms		
EMC rating (CE Conformity): surge immunity (all leads) electrostatic discharge radiated immunity fast transient burst immunity to conducted disturbances radiated emissions	±1 kV line to ground per IEC 61000-4-5 ±4 kV contact, ±8 kV air per IEC 61000-4-2 10 V/m (80 MHz to 1000 MHz) per IEC 61000-4-3 ±1 kV per IEC 61000-4-4 3 V (150 kHz to 80 MHz) per IEC 61000-4-6 40 dBµV (30 MHz to 230 MHz), 47 dBµV (230 MHz to 1000 MHz) per CISPR 11		
Radiated immunity	100 V/m (200 MHz to 2.5 GHz) per ISO 11452-2	100 V/m (300 MHz to 2.7 GHz) per ISO 11452-2 100 V/m (100 kHz to 400 MHz) per ISO 11452-5	100 V/m (200 MHz to 2.7 GHz) per ISO 11452-2
Bulk current injection - common mode	–	–	60 mA, 1 MHz to 200 MHz for Industrial 100 mA, 1 MHz to 200 MHz for Transportation
Insulation resistance	>100 MΩ at 1k Vdc (60 s)		
Dielectric strength	<1 mA at 500 Vac (60 s)	<1 mA at 1000 Vac (60 s)	<1 mA at 1000 Vac (60 s)
Life	>10 million full scale pressure cycles		
UL Conformity	Compliant[6]	Compliant[6]	Compliant[6]

[1] **Total Error Band:** The maximum deviation from the ideal transfer function over the entire compensated temperature and pressure range.Includes all errors due to offset, full scale span, pressure non-linearity, pressure hysteresis, pressure non-repeatability, thermal effect on offset, thermal effect on span, and thermal hysteresis (see Figure 5).

[2] **TEB:** Above 100°C [212°F] for pressure ratings less than 4 bar [58 psi], TEB is ±1.5 %FSS for ratiometric outputs and 2.0 % FSS for other outputs.

[3] **Accuracy:** The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range at 25°C [77°F]. Includes all errors due to pressure non-linearity, pressure hysteresis, and pressure non-repeatability.

[4] **Response time:** The time taken by the transducer to change output from 10 % to 90 % of full scale in response to a 0 % to 100 % full scale step input pressure.

[5] **Startup time:** The time needed to receive valid output after power up.

[6] UL marking currently not applicable for all transducers above 60 bar pressure range.

TABLE 6. PRESSURE RATINGS

BAR			PSI		
OPERATING PRESSURE	OVER-PRESSURE[1]	BURST PRESSURE[2]	OPERATING PRESSURE	OVER-PRESSURE[1]	BURST PRESSURE[2]
1 to 3	6	207	15 to 43.5	87	3000
>3 to 12	24		>43.5 to 174	348	
>12 to 70	120		>174 to 1000	1740	

[1] **Overpressure:** The maximum pressure which may safely be applied to the product for it to remain in specification once pressure is returned to the operating pressure range. Exposure to higher pressures may cause permanent damage to the product.

[2] **Burst Pressure:** The maximum pressure which may be applied without causing escape of pressure media. The product should not be expected to function after exposure to the burst pressure.

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Figure 1. Nomenclature and Order Guide

For example, **MIPAN1XX010BSAAX** defines an MIP Series Heavy Duty, Media Isolated Pressure Transducer, Metri-Pack 150 electrical connector type, 1/4-18 NPT pressure port type, 10 bar pressure range, sealed gage pressure reference, ratiometric: 5 Vs, 10% to 90% Vs output transfer function.

MIP A N1 X X 010B S AA X[1]

Series

MIP	Media Isolated Pressure

Electrical Connector Type

A	Metri-Pack 150, Standard (UL V-0)
C	DIN-C, Standard (EN 175301-803C)
K	Cable harness[2,5] 0,5 m [1.3 ft] cable length
E	Cable harness[2,5] 1,0 m [3.2 ft] cable length
F	Cable harness[2,5] 2,0 m [6.6 ft] cable length
G	Cable harness for CH output transfer function[2], 3,0 m [9.8 ft] cable length
H	Cable harness for CH output transfer function[2], 5,0 m [16.4 ft] cable length

Three-wire

Two-wire

Special

X	No selection
L	Load dump protection[5]

Output Transfer Function

AA	Ratiometric: 5.0 Vs, 10% to 90% Vs
CH	Current: 4 mA to 20 mA
BC	Regulated: 1 Vdc to 6 Vdc
BD	Regulated: 0.25 Vdc to 10.25 Vdc
BE	Regulated: 0.5 Vdc to 4.5 Vdc
BG	Regulated: 1 Vdc to 5 Vdc

Pressure Reference

A	Absolute
S	Sealed gage[4]

Pressure Range

bar				psi			
001B	1 bar	020B	20 bar	015P	15 psi	500P	500 psi
1.6B	1.6 bar	025B	25 bar	030P	30 psi	600P	600 psi
002B	2 bar	035B	35 bar	050P	50 psi	667P	667 psi
004B	4 bar	040B	40 bar	060P	60 psi	700P	700 psi
006B	6 bar	046B	46 bar	100P	100 psi	750P	750 psi
008B	8 bar	050B	50 bar	150P	150 psi	800P	800 psi
010B	10 bar	055B	55 bar	200P	200 psi	850P	850 psi
012B	12 bar	060B	60 bar	250P	250 psi	870P	870 psi
016B	16 bar	070B	70 bar	300P	300 psi	01KP	1000 psi

Special

X	
X	

Pressure Port Type

F1	7/16-20 UNF	M1	M12 x 1.5[3]	N2	1/8-27 NPT	S1	9/16-18 UNF[3]
G1	G1/4 A-G[3]	M3	M14 x 1.5[3]	R1	R1/4-19 BSPT	S2	7/16-20 UNF[3]
G2	G1/4 A-L[3]	N1	1/4-18 NPT	R2	R1/8-28 BSPT	S3	3/8-24 UNF[3]

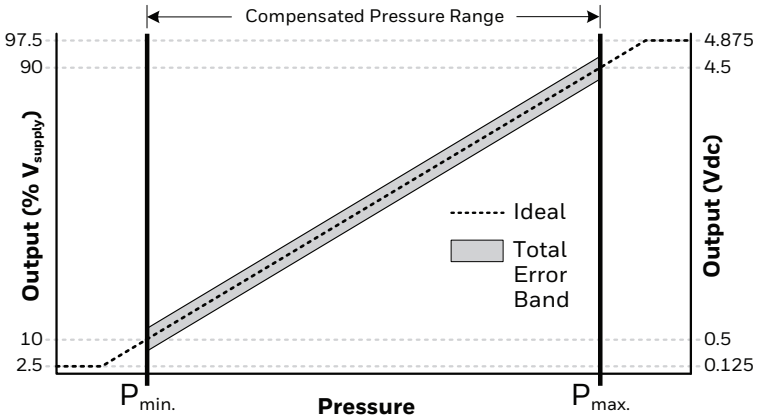
[1] Contact Honeywell Sales for custom configurations.
[2] See Table 3 for cable material specifications.
[3] Other external seal materials are available for G1, G2, M1, M3, S1, S2, and S3 pressure port types.
[4] Sealed gage option only available in pressure ranges at or above 8 bar | 100 psi.
[5] Load dump protection is available for regulated output with cable harness only.

CAUTION
PRODUCT MISUSE

- Ensure torque specifications are determined for the specific application. Values provided are for reference only. (Mating materials and thread sealants can result in significantly different torque values from one application to the next.)
- Use appropriate tools (such as an open-ended wrench or deep well socket) to install transducers.
- Ensure that the proper mating electrical connector with a seal is used to connect the transducer. Improper or damaged seals can compromise ingress protection, leading to short circuits.
- Ensure that filters are used upstream of the transducers to keep media flow free of particulates. MIP Series transducers are dead-end devices. Particulate accumulation may clog the port or damage the diaphragm.
- Ensure that the transducer is mounted in a vertical position with the process connection (pressure port) downward to avoid particular deposits.
- Ensure that the media does not create a residue when dried. Build-up of residue inside the transducer may affect its output.
- Ensure that the transducer housing is properly grounded.
- For cable harness versions, ensure that the cable bend radius is maintained at a minimum of 38 mm [1.50 in] in the end application assembly.

Failure to comply with these instructions may result in product damage.

Figure 2. Ratiometric Output Transfer Function
The transfer function shown here is applicable to a ratiometric output ranging between 10 % V_{supply} at null pressure to 90 % V_{supply} at full scale pressure.



$$\text{Output (V)} = \frac{0.8 \times V_{supply}}{P_{max.} - P_{min.}} \times (\text{Pressure}_{applied} - P_{min.}) + 0.10 \times V_{supply}$$

Figure 3. Absolute vs. Sealed Gage
Example shown is for 100 psi.

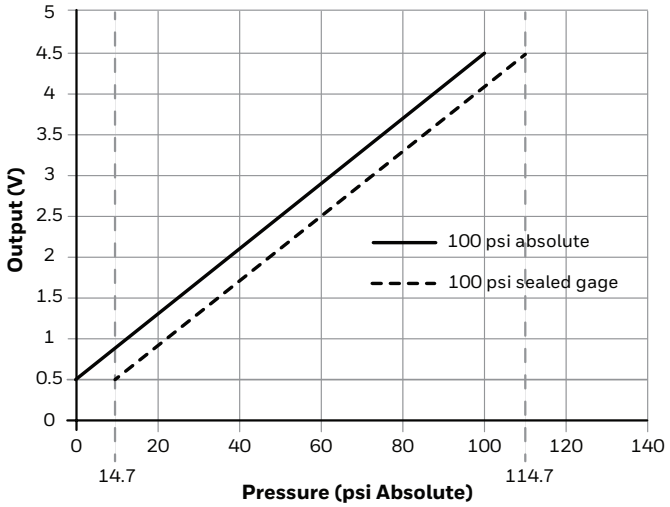
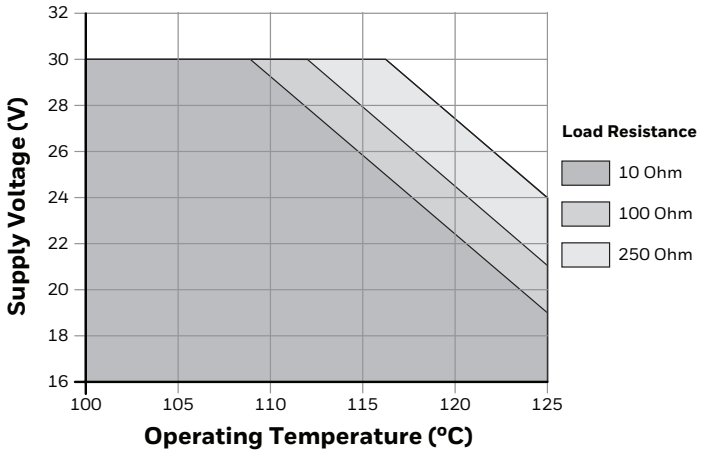


Figure 4. Current Output Supply Voltage vs. Temperature



Transfer Function for Regulated and Current Output Pressure Examples

$$\text{Pressure} = \frac{(\text{Output} - \text{Output}_{min.}) * (P_{max.} - P_{min.})}{\text{Output}_{max.} - \text{Output}_{min.}} + P_{min.}$$

Where:

$\text{Output}_{max.}$ = Ideal output at maximum pressure
$\text{Output}_{min.}$ = Ideal output at minimum pressure
$P_{max.}$ = maximum value of pressure range [bar/psi]
$P_{min.}$ = minimum value of pressure range [bar/psi]
Pressure = Transducer pressure reading [bar/psi]
Output = Transducer Voltage/current output

Example listing: MIPAN1XX010BSCHX -
10 bar sealed gage, 4 mA to 20 mA output
$\text{Output}_{max.}$ = 20 mA
$\text{Output}_{min.}$ = 4 mA
$P_{max.}$ = 11.012 bar
$P_{min.}$ = 1.012 bar
Output from the sensor = 12 mA
Calculated pressure = ((12-4)*(11.012-1.012)/(20-4)) + 1.013 = 6.013 bar

Example listing: MIPAN1XX010BABEX -
10 bar absolute, 0.5 Vdc to 4.5 Vdc output
$\text{Output}_{max.}$ = 4.5 Vdc
$\text{Output}_{min.}$ = 0.5 Vdc
$P_{max.}$ = 10 bar
$P_{min.}$ = 0 bar
Output from the sensor = 2.5 Vdc
Calculated pressure = ((2.5-0.5)*(10-0)/(4.5-0.5)) + 0 = 5 bar

TOTAL ERROR BAND

Total Error Band (TEB) is a single specification that includes the major sources of sensor error. TEB should not be confused with accuracy, which is actually a component of TEB. TEB is the maximum error that the sensor could experience.

Honeywell uses the TEB specification in its datasheet because it is the most comprehensive measurement of a sensor's true accuracy. Honeywell also provides the accuracy specification in order to provide a common comparison with competitors' literature that does not use the TEB specification.

Many competitors do not use TEB—they simply specify the accuracy of their device. Their accuracy specification, however, may exclude certain parameters. On their datasheet, the errors are listed individually. When combined, the total error (or what would be TEB) could be significant.

Figure 6. TEB Components for the MIP Series

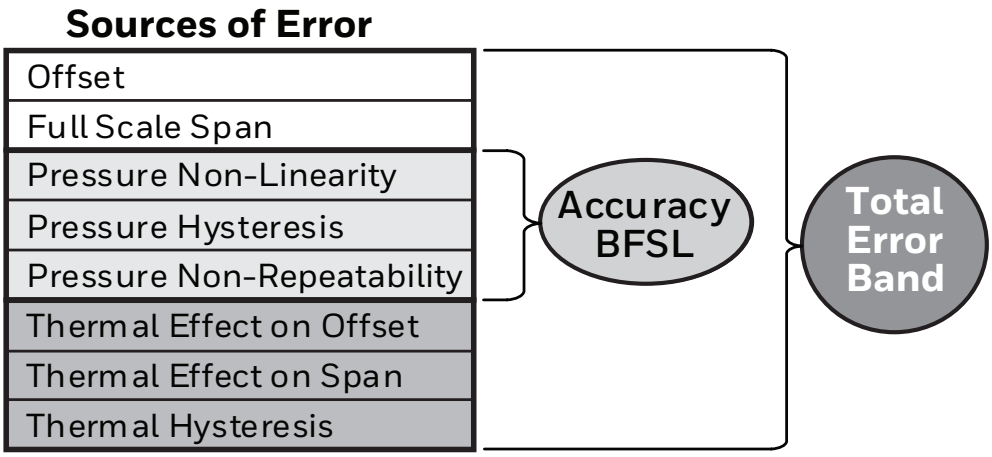


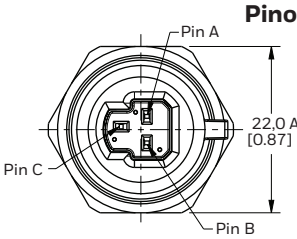
TABLE 7. OUTPUT DIAGNOSTIC CODE FOR RATIOMETRIC OUTPUT

FAULT CONDITION	ANALOG DIAGNOSTIC RAIL
Sensor internal failures	97.5 % of V_{supply} (See Figure 2.)
Over pressure	97.5 % of V_{supply} (See Figure 2.)
Under pressure (for sealed gage only)	2.5 % of V_{supply} (See Figure 2.)
Power or ground loss	high (external pull-up resistor)
Power or ground loss	low (external pull-down resistor)

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MIP SERIES

Figure 7. Metri-Pack 150 Mounting Dimensions (for reference only. mm [in])

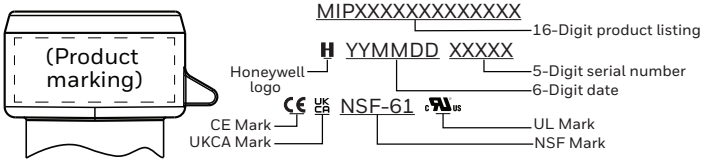
Pinout



Ratiometric & Regulated Voltage Output
Pin A = Ground
Pin B = V+
Pin C = V_{out}

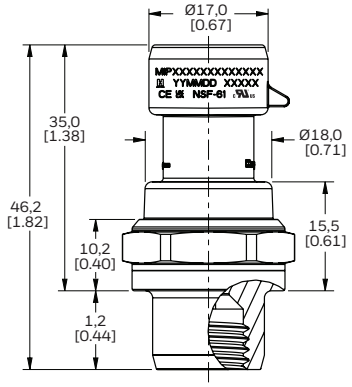
Current Output
Pin A = Return
Pin B = Supply
Pin C = Not connected

Product Marking



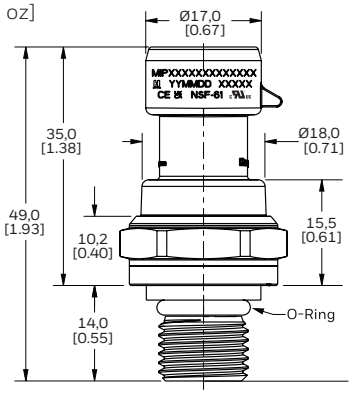
F1: 7/16-20 UNF 1/4 inch 45° Flare Female Schrader (SAE J512)

Seal: 45° cone
Mating geometry: SAE J512
Installation torque: 17 N m [12 ft-lb]
Weight: 36 g [1.3 oz]



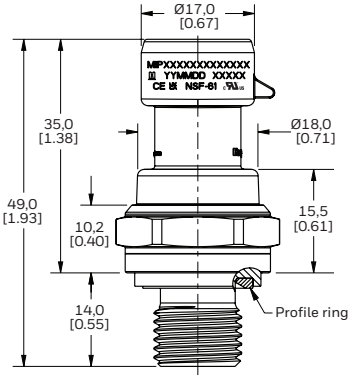
G1: G1/4 A-G (ISO 1179-3)

Seal: O-ring (included) and retaining ring ISO 1179-3-G1/4 (not included)
Mating geometry: ISO 1179-1
Installation torque: 20 N m [14.7 ft-lb]
Weight: 33 g [1.1 oz]



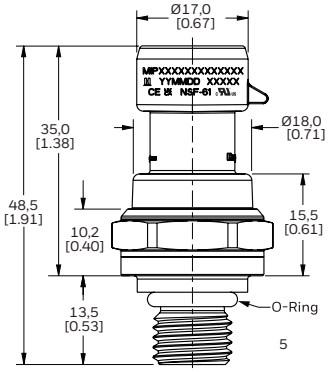
G2: G1/4 A-L (ISO 1179-2)

Seal: ISO 9974-2/DIN 3869 profile ring (included)
Mating geometry: ISO 1179-1
Installation torque: 20 N m [15 ft-lb]
Weight: 36 g [1.3 oz]



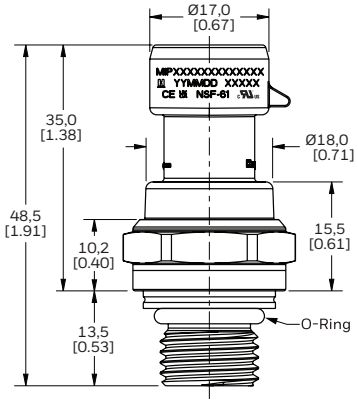
M1: M12 x 1.5 (ISO 6149-3)

Seal: O-ring (included)
Mating geometry: ISO 6149-1
Installation torque: 20 N m [15 ft-lb]
Weight: 34 g [1.2 oz]



M3: M14 x 1.5 (ISO 6149-2)

Seal: O-ring (included)
Mating geometry: ISO 6149-1
Installation torque: 30 N m [22.1 ft-lb]
Weight: 39 g [1.4 oz]



N1: 1/4-18 NPT

Seal: Pipe thread
Mating geometry: ANSI B1.20.1
Installation torque: Two to three turns from finger tight
Weight: 38 g [1.3 oz]

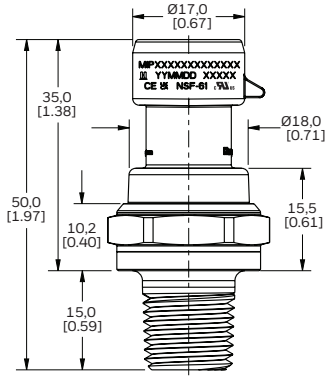
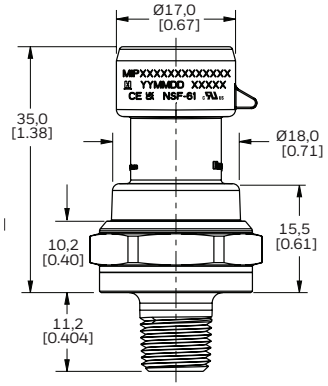
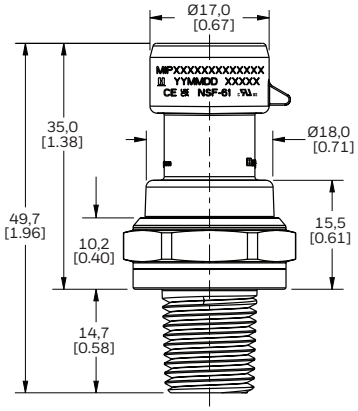


Figure 7. Metri-Pack 150 Mounting Dimensions (continued)

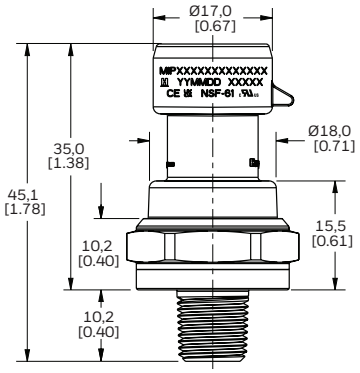
N2: 1/8-27 NPT
Seal: Pipe thread
Mating geometry: ANSI B1.20.1
Installation torque: Two to three turns from finger tight
Weight: 30 g [1.0 oz]



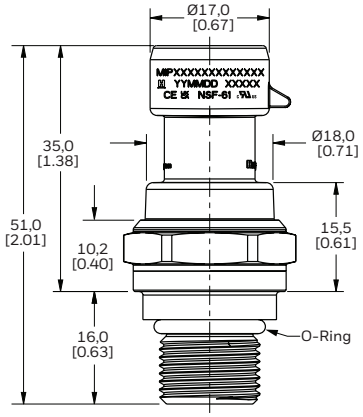
R1: R1/4-19 BSPT (ISO 7-1)
Seal: Pipe thread
Mating geometry: ISO 7-1
Installation torque: Two to three turns from finger tight
Weight: 36 g [1.3 oz]



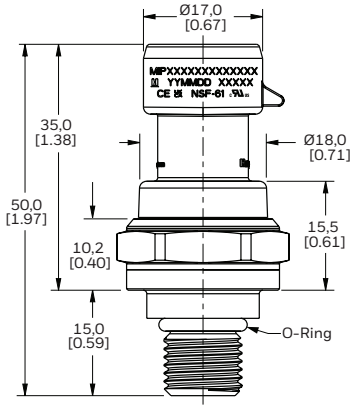
R2: R1/8-28 BSPT (ISO 7-1)
Seal: Pipe thread
Mating geometry: ISO 7-1
Installation torque: Two to three turns from finger tight
Weight: 29 g [1.0 oz]



S1: 9/16-18 UNF (SAE J1926-2)
Seal: O-ring (included)
Mating geometry: SAE J1926-1
Installation torque: 30 N m [22.1 ft-lb]
Weight: 44 g [1.6 oz]



S2: 7/16-20 UNF (SAE J1926-2)
Seal: O-ring (included)
Mating geometry: SAE J1926-1
Installation torque: 18 N m [13.3 ft-lb]
Weight: 36 g [1.3 oz]



S3: 3/8-24 UNF (SAE J1926-2)
Seal: O-ring (included)
Mating geometry: SAE J1926-1
Installation torque: 10 N m [7.4 ft-lb]
Weight: 32 g [1.1 oz]

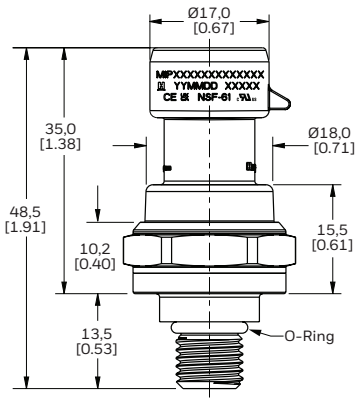
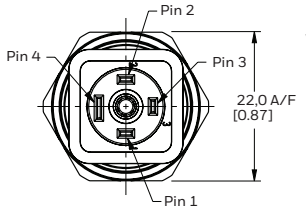


Figure 8. DIN-C Mounting Dimensions (for reference only. mm [in])

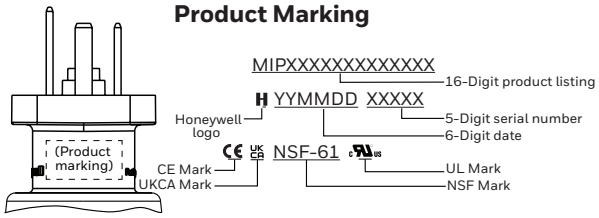
Pinout



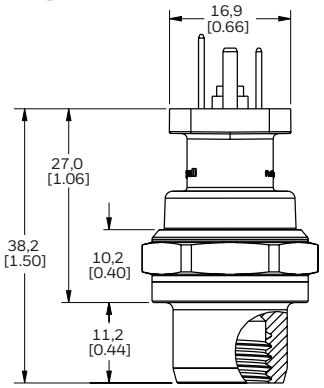
Ratiometric and Regulated Voltage Output
Pin 1 = Ground
Pin 2 = V+
Pin 3 = V_{out}
Pin 4 = N/A

Current Output
Pin 1 = Return
Pin 2 = Supply
Pin 3 = N/A
Pin 4 = N/A

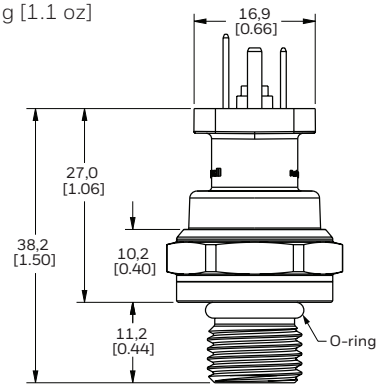
Product Marking



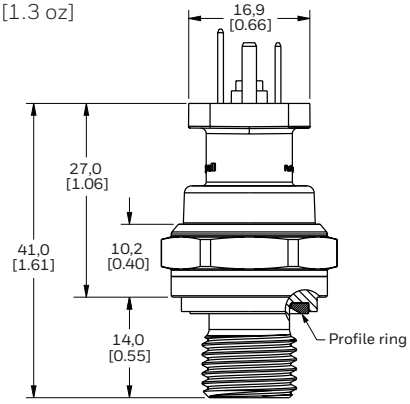
F1: 7/16-20 UNF 1/4 inch 45° Flare Female Schrader (SAE J512)
Seal: 45° cone
Mating geometry: SAE J512
Installation torque: 17 N m [12 ft-lb]
Weight: 36 g [1.3 oz]



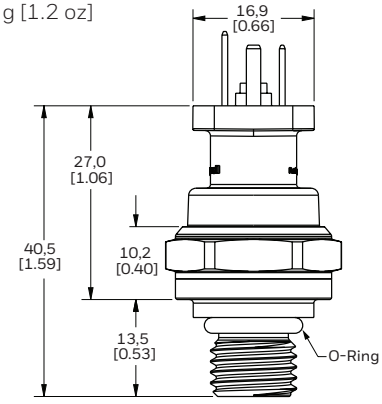
G1: G1/4 A-G (ISO 1179-3)
Seal: O-ring (included) and retaining ring ISO 1179-3-G1/4 (not included)
Mating geometry: ISO 1179-1
Installation torque: 20 N m [14.7 ft-lb]
Weight: 33 g [1.1 oz]



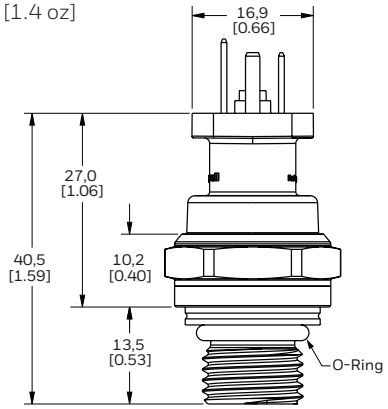
G2: G1/4 A-L (ISO 1179-2)
Seal: ISO 9974-2/DIN 3869 profile ring (included)
Mating geometry: ISO 1179-1
Installation torque: 20 N m [15 ft-lb]
Weight: 36 g [1.3 oz]



M1: M12 x 1.5 (ISO 6149-3)
Seal: O-ring (included)
Mating geometry: ISO 6149-1
Installation torque: 20 N m [15 ft-lb]
Weight: 34 g [1.2 oz]



M3: M14 x 1.5 (ISO 6149-2)
Seal: O-ring (included)
Mating geometry: ISO 6149-1
Installation torque: 30 N m [22.1 ft-lb]
Weight: 39 g [1.4 oz]



N1: 1/4-18 NPT
Seal: Pipe thread
Mating geometry: ANSI B1.20.1
Installation torque: Two to three turns from finger tight
Weight: 38 g [1.3 oz]

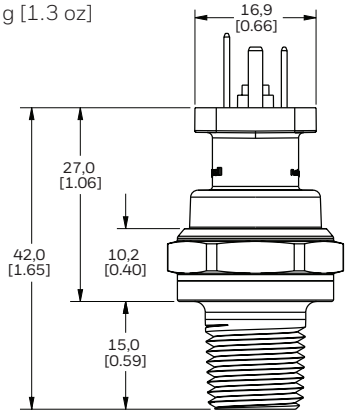
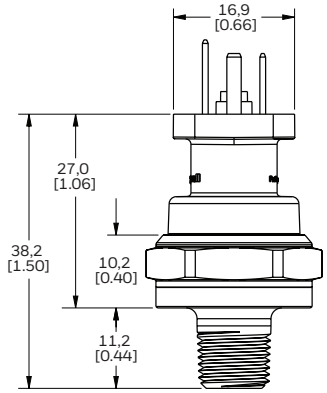
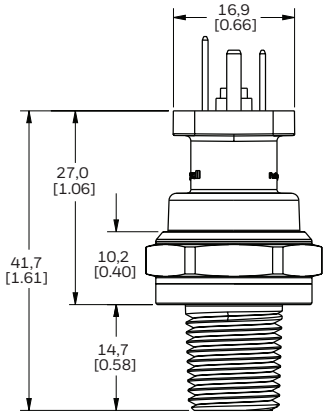


Figure 8. DIN-C Mounting Dimensions (continued)

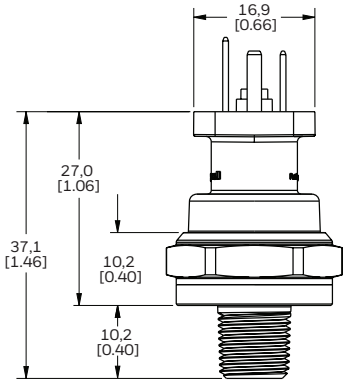
N2: 1/8-27 NPT
Seal: Pipe thread
Mating geometry: ANSI B1.20.1
Installation torque: Two to three turns from finger tight
Weight: 30 g [1.0 oz]



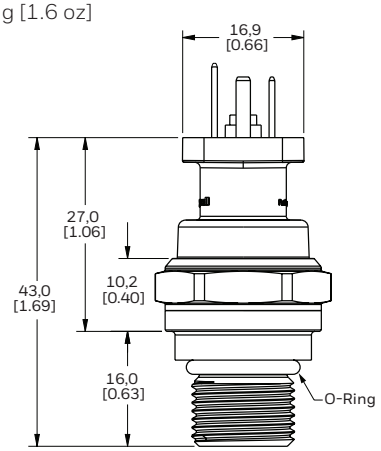
R1: R1/4-19 BSPT (ISO 7-1)
Seal: Pipe thread
Mating geometry: ISO 7-1
Installation torque: Two to three turns from finger tight
Weight: 36 g [1.3 oz]



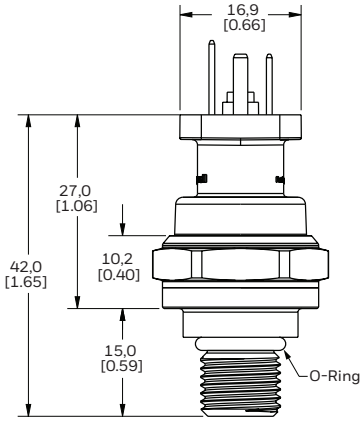
R2: R1/8-28 BSPT (ISO 7-1)
Seal: Pipe thread
Mating geometry: ISO 7-1
Installation torque: Two to three turns from finger tight
Weight: 29 g [1.0 oz]



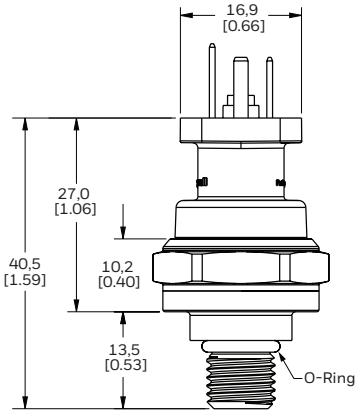
S1: 9/16-18 UNF (SAE J1926-2)
Seal: O-ring (included)
Mating geometry: SAE J1926-1
Installation torque: 30 N m [22.1 ft-lb]
Weight: 44 g [1.6 oz)



S2: 7/16-20 UNF (SAE J1926-2)
Seal: O-ring (included)
Mating geometry: SAE J1926-1
Installation torque: 18 N m [13.3 ft-lb]
Weight: 36 g [1.3 oz]



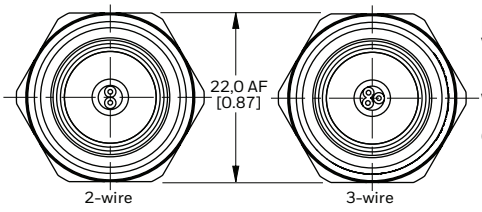
S3: 3/8-24 UNF (SAE J1926-2)
Seal: O-ring (included)
Mating geometry: SAE J1926-1
Installation torque: 10 N m [7.4 ft-lb]
Weight: 32 g [1.1 oz]



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Figure 9. Cable Harness Mounting Dimensions (for reference only. mm [in])

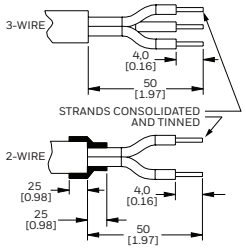
Wireout with Free Ends



Ratiometric and Regulated Voltage Output
Black = Ground
Red = V+
White = V_{out}

Current Output
Black = Return
Red = Supply

Wire Lead Dimensions

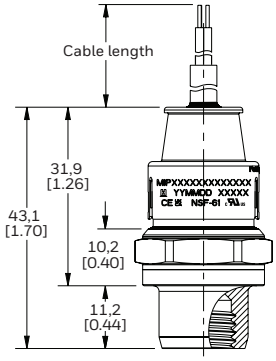


Product Marking



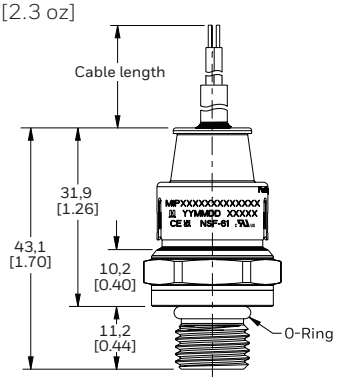
F1: 7/16-20 UNF 1/4 inch 45° Flare Female Schrader (SAE J512)

Seal: 45° cone
Mating geometry: SAE J512
Installation torque: 17 N m [12 ft-lb]
Weight: 68 g [2.4 oz]



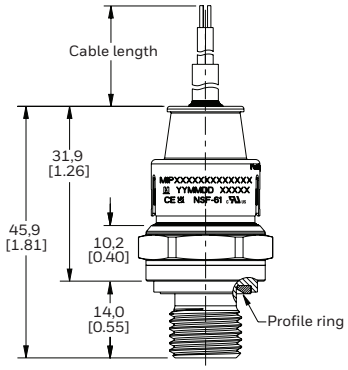
G1: G1/4 A-G (ISO 1179-3)

Seal: O-ring (included) and retaining ring ISO 1179-3-G1/4 (not included)
Mating geometry: ISO 1179-1
Installation torque: 20 N m [14.7 ft-lb]
Weight: 65 g [2.3 oz]



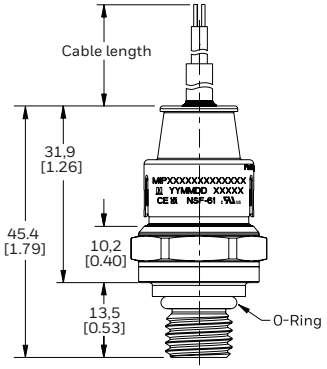
G2: G1/4 A-L (ISO 1179-2)

Seal: ISO 9974-2/DIN 3869 profile ring (included)
Mating geometry: ISO 1179-1
Installation torque: 20 N m [15 ft-lb]
Weight: 68 g [2.4 oz]



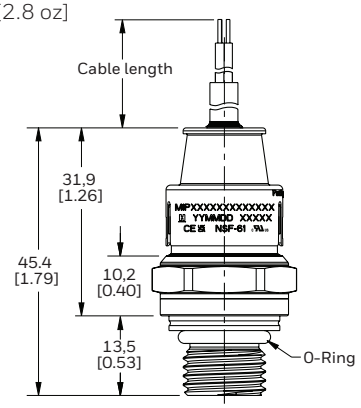
M1: M12 x 1.5 (ISO 6149-3)

Seal: O-ring (included)
Mating geometry: ISO 6149-1
Installation torque: 20 N m [15 ft-lb]
Weight: 66 g [2.3 oz]



M3: M14 x 1.5 (ISO 6149-2)

Seal: O-ring (included)
Mating geometry: ISO 6149-1
Installation torque: 30 N m [22.1 ft-lb]
Weight: 80 g [2.8 oz]



N1: 1/4-18 NPT

Seal: Pipe thread
Mating geometry: ANSI B1.20.1
Installation torque: Two to three turns from finger tight
Weight: 79 g [2.5 oz]

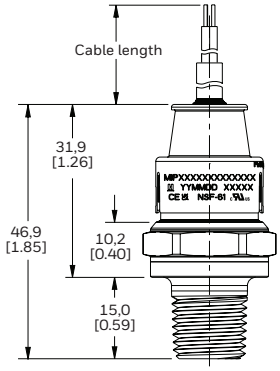
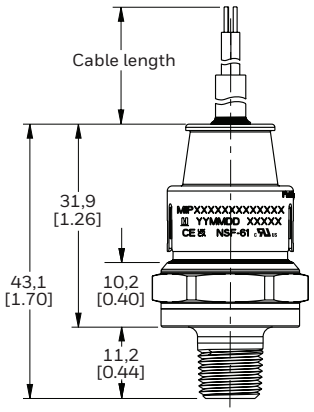
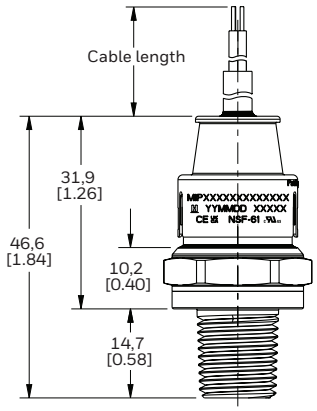


Figure 9. Cable Harness Mounting Dimensions (continued)

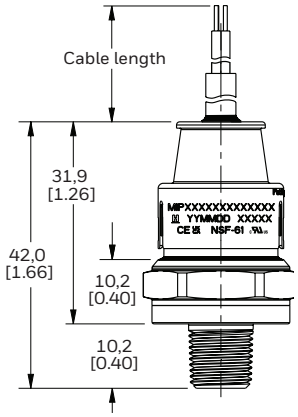
N2: 1/8-27 NPT
Seal: Pipe thread
Mating geometry: ANSI B1.20.1
Installation torque: Two to three turns from finger tight
Weight: 62 g [2.2 oz]



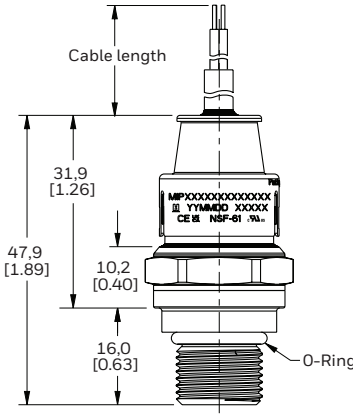
R1: R1/4-19 BSPT (ISO 7-1)
Seal: Pipe thread
Mating geometry: ISO 7-1
Installation torque: Two to three turns from finger tight
Weight: 77 g [2.7 oz]



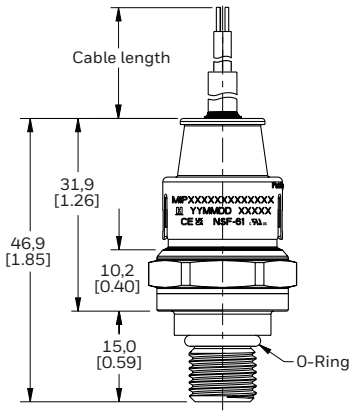
R2: R1/8-28 BSPT (ISO 7-1)
Seal: Pipe thread
Mating geometry: ISO 7-1
Installation torque: Two to three turns from finger tight
Weight: 70 g [2.5 oz]



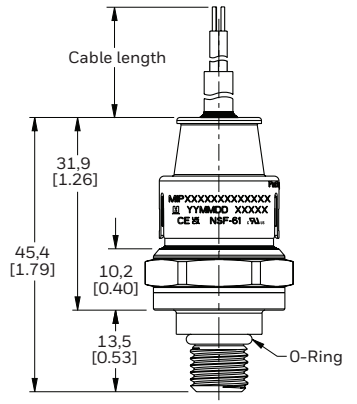
S1: 9/16-18 UNF (SAE J1926-2)
Seal: O-ring (included)
Mating geometry: SAE J1926-1
Installation torque: 30 N m [22.1 ft-lb]
Weight: 85 g [3.0 oz]



S2: 7/16-20 UNF (SAE J1926-2)
Seal: O-ring (included)
Mating geometry: SAE J1926-1
Installation torque: 18 N m [13.3 ft-lb]
Weight: 77 g [2.7 oz]



S3: 3/8-24 UNF (SAE J1926-2)
Seal: O-ring (included)
Mating geometry: SAE J1926-1
Installation torque: 10 N m [7.4 ft-lb]
Weight: 73 g [2.6 oz]



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