

Fisher™ 846 Electro-Pneumatic Transducer

The Fisher 846 electro-pneumatic transducer is a rugged, field-mountable transducer that accepts an electrical input signal and converts it to a pneumatic output signal. Typically, the 4 to 20 mA is converted to 0.2 to 1.0 bar (3 to 15 psi). In the most common application, the transducer converts an electrical output signal from a controller to a pneumatic signal necessary to operate a control valve actuator or pneumatic positioner.

The transducer includes a deflector/nozzle design (figure 1) that consists of two nozzles positioned so that the constant air flow exiting the supply nozzle is directed at the entrance of the receiver nozzle. Each nozzle has a large bore of 0.41 mm (0.016 inches), which provides good resistance to plugging. The input current positions a deflector bar within the nozzle's flow stream. As the input signal changes, the

deflector bar moves to alter the flow stream to the receiver nozzle, establishing a pilot pressure at the receiver nozzle. The pilot pressure, in turn, controls the booster stage and output of the transducer.

An electronic feedback control network constantly compares the value of the pneumatic output signal with the input current signal. A solid-state pressure sensor is part of the electronics package monitoring the pneumatic output (figure 3). A comparator circuit in the control network detects input-output deviations and adjusts the output by moving the deflector in the pilot stage to a corrected position. Because of this feedback network, the transducer can correct for error-producing effects such as variations in supply pressure and downstream leakage.



X0234

FISHER 846 ELECTRO-PNEUMATIC TRANSDUCER



W6307-1

846 MOUNTED ON FISHER 667 ACTUATOR

Specifications

Input Signal

4-20 mA DC, field adjustable split ranging

Equivalent Circuit

See figure 4

Output Signal

Standard Performance: ■ 0.2 to 1.0 bar (3 to 15 psi). Rangeability between 0.1 to 1.2 bar (1 and 18 psi)
Multirange Performance: ■ 0 to 1.2 bar (0 to 18 psi), ■ 0.4 to 2.0 bar (6 to 30 psi), and ■ 0 to 2.3 bar (0 to 33 psi) nominal ranges. Actual rangeability available between 0.03 to 2.3 bar (0.5 and 33 psi)
Action: ■ Direct (increasing input signal increases transducer output) (Minimum span, 6 psi) or ■ Reverse (increasing input signal decreases transducer output) (Minimum span, 11 psi)

Supply Pressure

Standard Performance: 1.2 to 1.6 bar (18 to 24 psi)
Multirange Performance:
Minimum: 0.2 bar (3 psi) [0.14 bar (2 psi) for a 2.3 bar (33 psi) output] greater than the maximum calibrated output pressure.
Maximum: 2.4 bar (35 psi)

Supply Pressure Medium

Clean, dry air
 Per ISA Standard 7.0.01
 A maximum 40 micrometer particle size in the air system is acceptable. Further filtration down to 5 micrometer particle size is recommended. Lubricant content is not to exceed 1 ppm weight (w/w) or volume (v/v) basis. Condensation in the air supply should be minimized.
 Per ISO 8573-1
Maximum particle density size: Class 7
Oil content: Class 3
Pressure Dew Point: Class 3 or at least 10°C less than the lowest ambient temperature expected

Maximum Steady-State Air Consumption⁽¹⁾

0.3 m³/hr (12 scfh) at 1.4 bar (20 psi) supply pressure

Output Air Capacity⁽¹⁾

Standard Performance: 6.4 m³/hr (240 scfh) at 1.4 bar (20 psi) supply pressure

Multirange Performance: 9.7 m³/hr (360 scfh) at 2.5 bar (35 psi) supply pressure

Temperature Limits

Operating: -40 to 85°C (-40 to 185°F)
Storage: -40 to 93°C (-40 to 200°F)

Humidity Limits

0-100% condensing relative humidity

Performance⁽²⁾

Linearity, Hysteresis, and Repeatability: ± 0.3% of span

Temperature Effect (total effect including zero and span): ± 0.07%/°C (0.045%/°F) of span

Vibration Effect: ± 0.3% of span per g during the following conditions:
 5-15 Hz at 4 mm constant displacement
 15-150 Hz at 2 g, 150-2000 Hz at 1 g, per SAMA Standard PMC 31.1, Sec. 5.3, Condition 3, Steady State

Shock Effect: ± 0.5% of span, when tested per SAMA Standard PMC 31.1, Sec. 5.4

Supply Pressure Effect: Negligible

Electromagnetic Interference (EMI): Tested per IEC 61326-1:2013. Meets emission levels for Class A equipment (industrial locations) and Class B equipment (domestic locations). Meets immunity requirements for industrial locations (Table A.1). Immunity performance is shown in table 1.

Leak Sensitivity: Less than 1.0% of span for up to 4.8 m³/hr (180 scfh) downstream leakage

Overpressure Effect: Less than 0.25% of span for misapplication of up to 7.0 bar (100 psi) supply pressure for less than 5 minutes to the input port

Reverse Polarity Protection: No damage occurs from reversal of normal supply current (4-20 mA) or from misapplication of up to 100 mA

Connections

Supply and Output Pressure: 1/4-18 NPT internal connection
Electrical: 1/2-14 NPT internal conduit connection

- continued -

Specifications (Continued)

Adjustments

Zero and Span: Screwdriver adjustments located in terminal compartment

Remote Pressure Reading (optional)

ON or OFF; jumper selectable
Frequency Range: 0-10,000 Hz
Amplitude: 0.4-1.0 V_{p-p}

Required Operating Voltage

Min. 6.0 V (at 4 mA)
Max. 7.2 V (at 20 mA)
with Remote Pressure Reading ON
Min. 6.4 V (at 4 mA)
Max. 8.2 V (at 20 mA)

Electrical Classification

Hazardous Area
see Bulletin 9.2:001 ([D103222X012](#))
CSA C/US—Intrinsically Safe, Explosion-proof, Non-Incendive
FM—Intrinsically Safe, Explosion-proof, Non-Incendive
ATEX—Intrinsically Safe, Flameproof, Type n
IECEX—Intrinsically Safe, Flameproof

Electrical Housing

Tropicalization (Fungus test per MIL-STD-810)
CSA C/US—Type 4X
FM—Type 4X
ATEX—IP66⁽³⁾
IECEX—IP66⁽³⁾

Other Classifications/Certifications

CUTR—Customs Union Technical Regulations (Russian, Kazakhstan, Belarus, and Armenia)
ESMA—Emirates Authority for Standardization and Metrology - ECAS-Ex (UAE)
INMETRO—National Institute of Metrology, Quality, and Technology (Brazil)
KGS—Korea Gas Safety Corporation (South Korea)
NEPSI—National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation (China)
PESO CCOE—Petroleum and Explosives Safety Organization - Chief Controller of Explosives (India)
Contact your [Emerson sales office](#) for classification/certification specific information

Construction Materials

Housing
■ ASTM: A03600 material composition alloy or
■ CF8M
O-Rings
Nitrile, except silicone for sensor O-rings

Mounting

■ Actuator, ■ pipestand, or ■ surface

Weight

Aluminum: 2.9 kg (6.5 lb) excluding options
Stainless Steel: 6.7 kg (14.8 lb) excluding options

Options

■ Fisher 67CFR filter regulator, ■ supply and output gauges, ■ remote pressure reading, or ■ stainless steel mounting bracket

NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 - Process Instrument Terminology
1. Normal m³/hr: normal cubic meters per hour (m³/hr, 0°C and 1.01325 bar, absolute). Scfm: standard cubic feet per minute (ft³/min, 60°F and 14.7 psig).
2. Performance values are obtained using a transducer with a 4 to 20 mA dc input signal, a 3 to 15 psig output, and 20 psig supply pressure.
3. ATEX and IECEx Flameproof—IP66 per CSA Letter of Attestation.

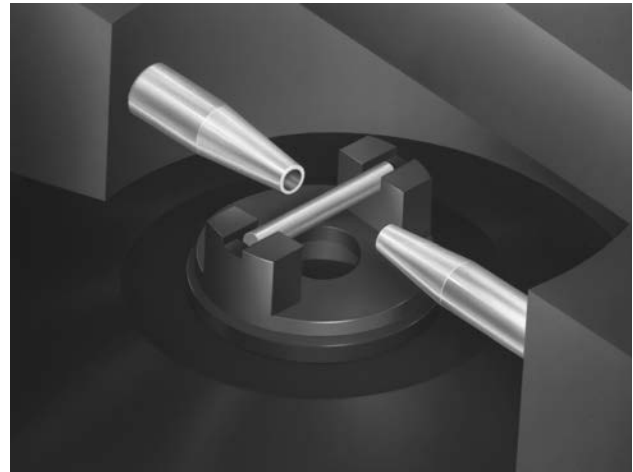
Table 1. EMC Immunity Performance Criteria

Port	Phenomenon	Basic Standard	Test Level	Performance Criteria ⁽¹⁾
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact 8 kV air	A
	Radiated EM field	IEC 61000-4-3	80 to 1000 MHz @ 10V/m with 1 kHz AM at 80% 1400 to 2000 MHz @ 3V/m with 1kHz AM at 80% 2000 to 2700 MHz @ 1V/m with 1kHz AM at 80%	A
I/O signal/control	Burst (fast transients)	IEC 61000-4-4	1 kV	A
	Surge	IEC 61000-4-5	1 kV (line to ground only, each)	B
	Conducted RF	IEC 61000-4-6	150 kHz to 8 MHz at 3 Vrms	B
			8 MHz to 80 MHz at 3 Vrms	A
Specification limit = ±1% of span 1. A = No degradation during testing. B = Temporary degradation during testing, but is self-recovering.				

Features

- **Vibration Resistant**—The low-mass pilot stage, mechanically damped deflector bar, and rugged construction provide stable performance in vibration.
- **Large Diameter Nozzles**—Large diameter nozzles, free-flow pilot stage design, and large internal pneumatic supply passages provide excellent tolerance to reducing the effects of contaminant buildup and erosion.
- **Increased Accuracy, Reduced Sensitivity to Supply Pressure Variations and Downstream Leakage**—The electronic feedback control network monitors the pneumatic output signal, detects any input-output deviations and corrects them. This provides very high accuracy and allows the transducer to sense changes in the final element condition and rapidly optimize its air delivery.
- **Easy Maintenance**—Major mechanical and electrical components are incorporated into a single field-replaceable “master module” (figure 2). The transducer does not have to be removed from its mounting to facilitate troubleshooting or service. A separate field wiring compartment eases installation and maintenance.

Figure 1. Detail of Deflector/Nozzle Pilot Stage



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- **Quick Diagnostic Checks and Remote Performance Monitoring**—With *Stroke Port*, a constant bleed from the pilot stage vents through a hole in the module cover. Covering the hole increases the transducer output to confirm the proper operation of the pilot and booster stages and stroke the actuator. With optional *Remote Pressure Reading*, a frequency directly proportional to the output pressure is superimposed on the input signal wires.

Using a frequency counter, an operator can monitor the 846 output pressure.

Figure 2. Master Module Construction

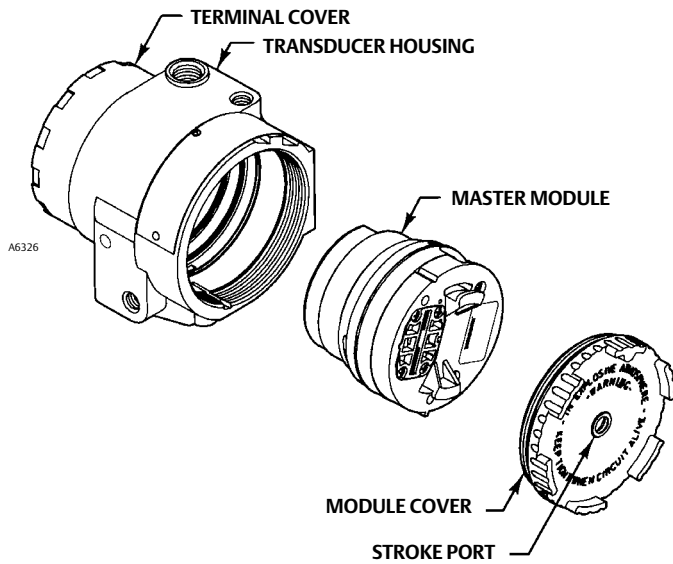
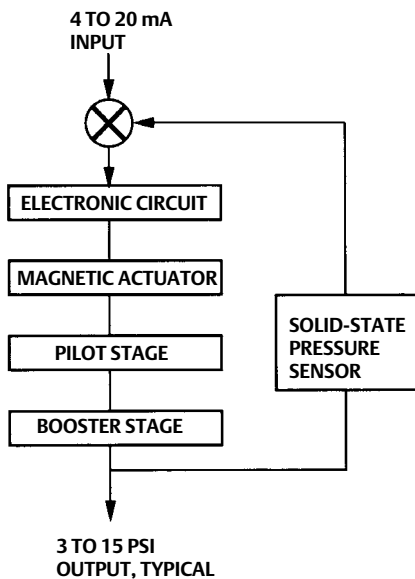
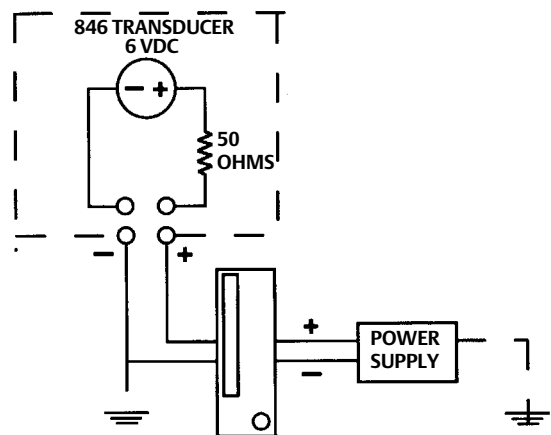


Figure 3. Functional Block Diagram



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Figure 4. Equivalent Circuit



Note:
The 846 is not a constant resistor in series with an inductor. It is better modeled in the loop as a 50 ohm resistor in series with a 6 volt DC voltage drop with negligible inductance.

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Installation

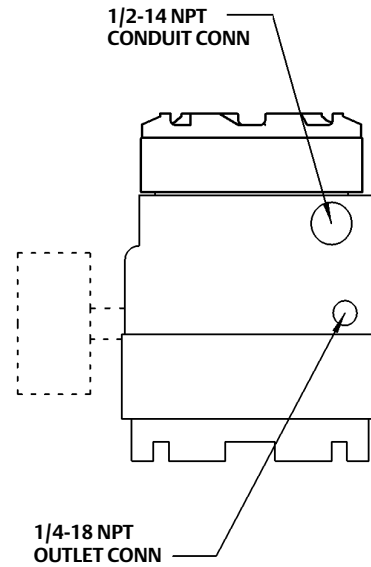
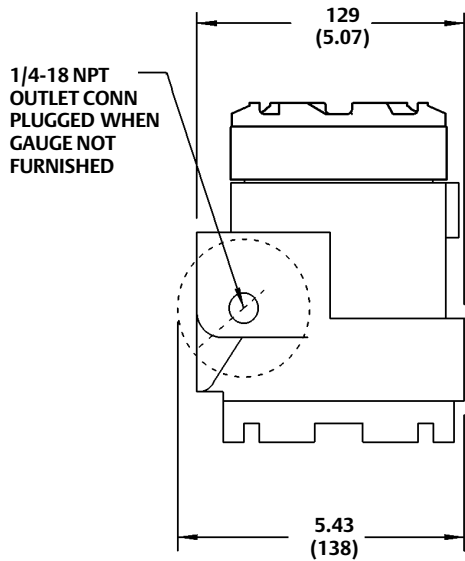
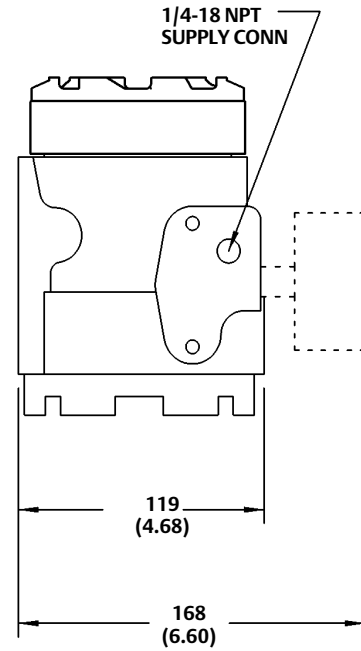
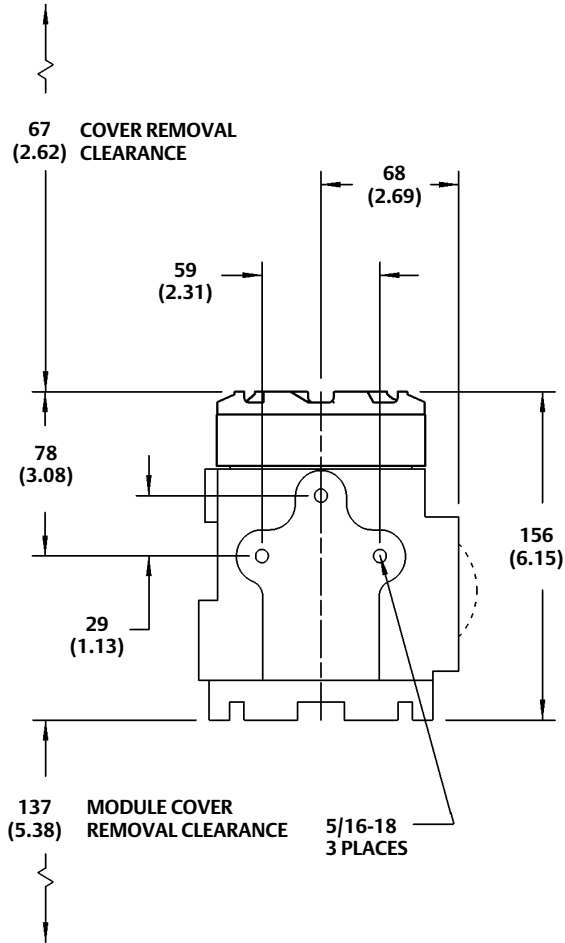
The transducer may be actuator, wall, panel, or pipestand mounted. Dimensions are shown in figures 5, 6, 7, and 8.

Ordering Information

To determine what ordering information is required, refer to the specification table. Carefully review the description of each specification. Specify the desired choice whenever there is a selection available.

When ordering mounting parts, specify actuator, surface, or pipestand mounting. For actuator mounting, specify the actuator type, size, travel, and diaphragm pressure range. For all 657 and 667 actuators except size 80, specify whether actuator yoke or actuator casing mounting is desired (yoke mounting only is available on size 80 actuators).

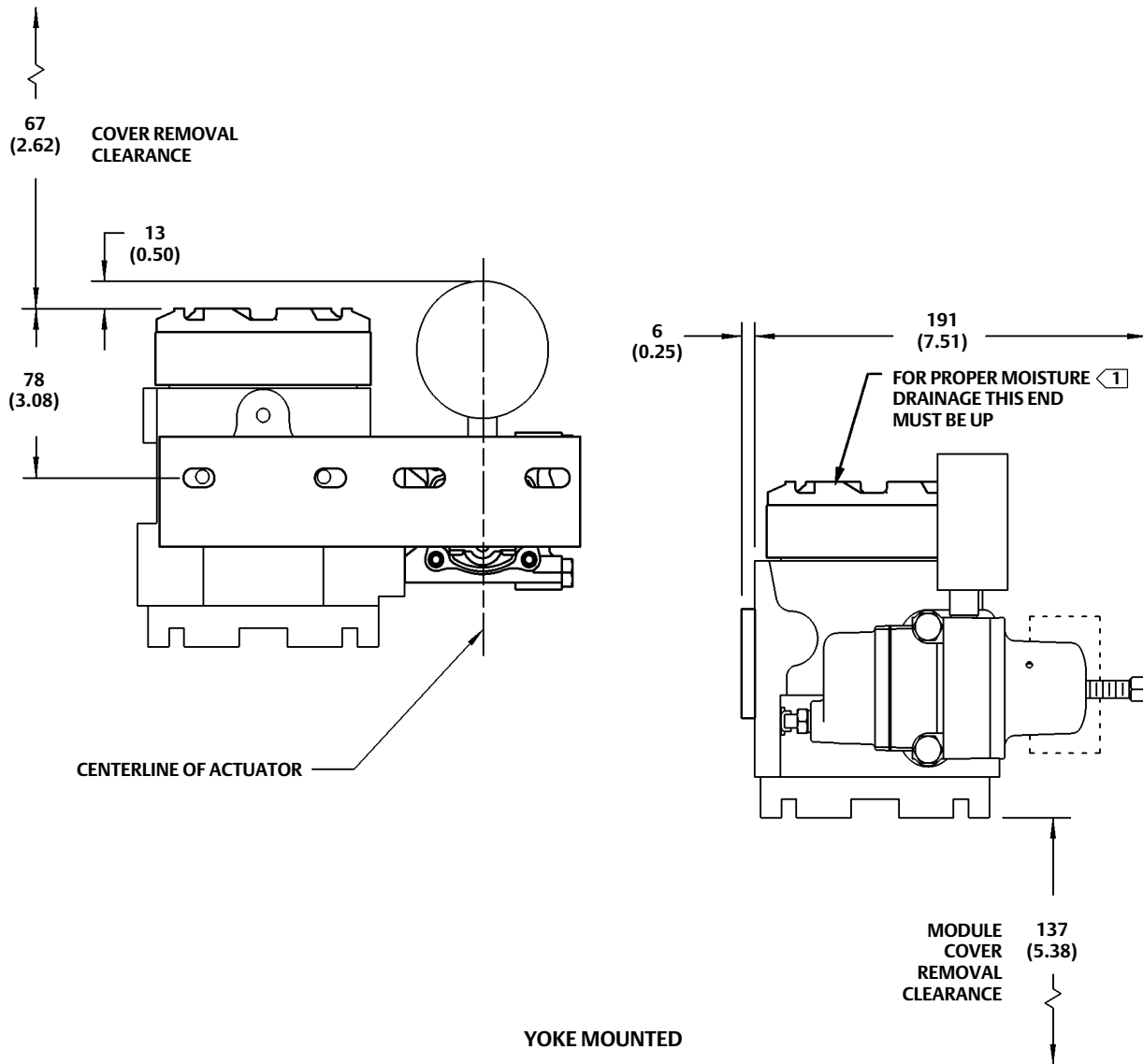
Figure 5. Dimensions



mm
(INCH)

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Figure 6. Dimensions with Optional Fisher 67CFR Filter-Regulator (Yoke Mounted)



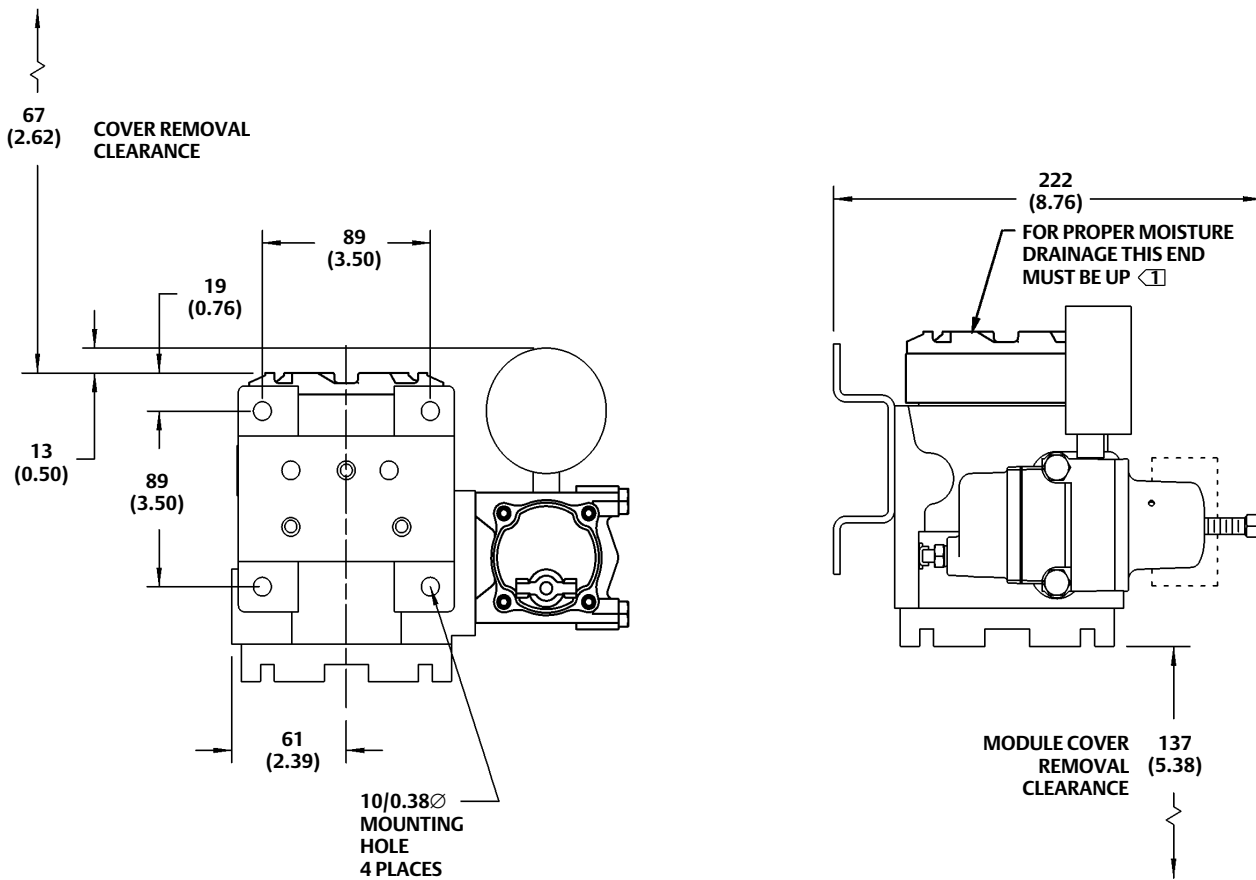
mm
(INCH)

Note:

① The mounting positions shown allow any moisture buildup in the terminal compartment to drain to the signal wire conduit entrance. Do not mount the transducer with the terminal compartment cover on the bottom; moisture may accumulate in the terminal compartment or pilot stage, preventing proper transducer operation. The vertical mount is most effective for moisture drainage in wet applications.

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Figure 7. Dimensions with Optional Fisher 67CFR Filter-Regulator (Surface/Wall Mounted)



SURFACE/WALL MOUNTED

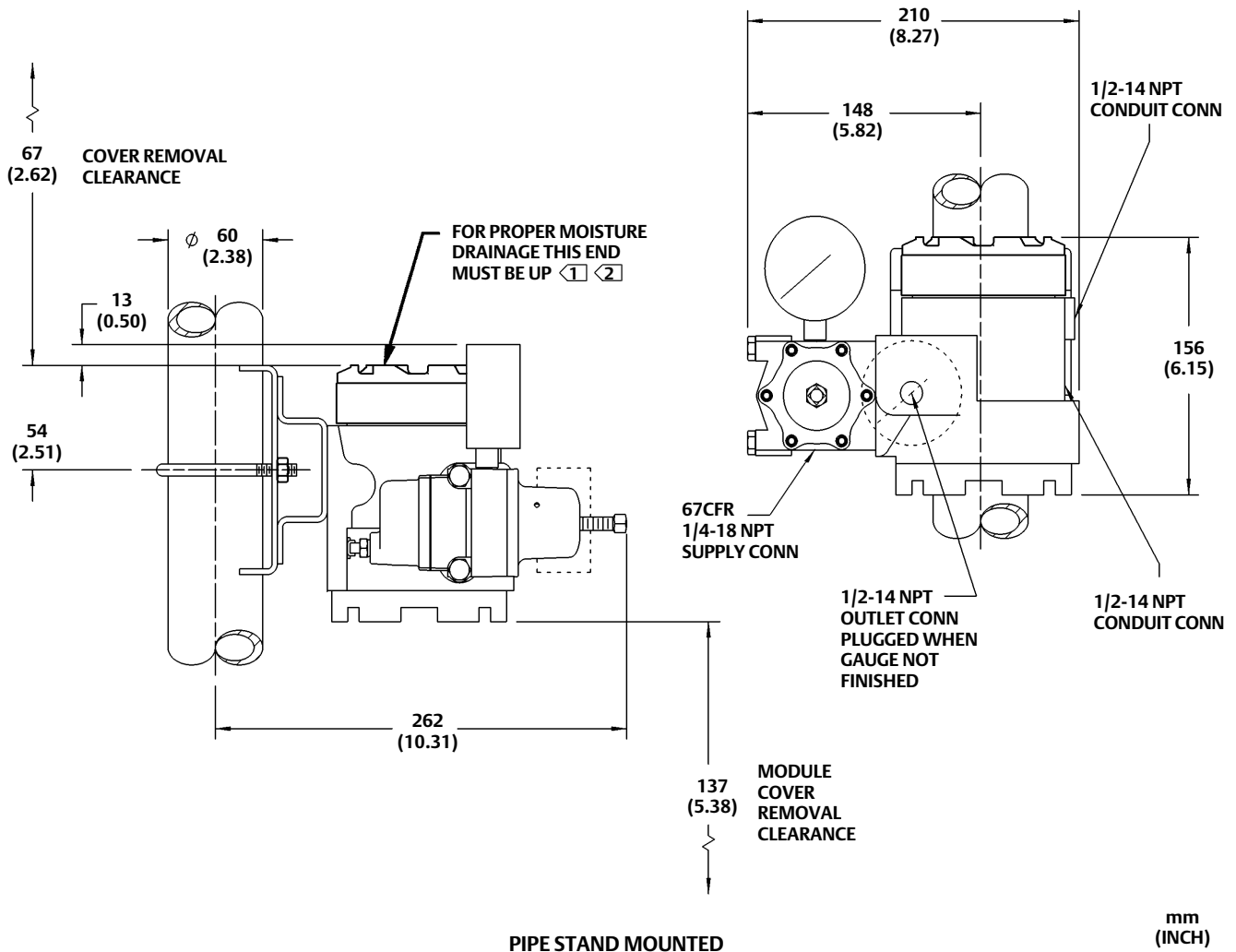
mm
(INCH)

Note:

1 The mounting positions shown allow any moisture buildup in the terminal compartment to drain to the signal wire conduit entrance. Do not mount the transducer with the terminal compartment cover on the bottom; moisture may accumulate in the terminal compartment or pilot stage, preventing proper transducer operation. The vertical mount is most effective for moisture drainage in wet applications.

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Figure 8. Dimensions with Optional Fisher 67CFR Filter-Regulator (Pipe Stand Mounted)



Notes:

- 1 The mounting positions shown allow any moisture buildup in the terminal compartment to drain to the signal wire conduit entrance. Do not mount the transducer with the terminal compartment cover on the bottom; moisture may accumulate in the terminal compartment or pilot stage, preventing proper transducer operation. The vertical mount is most effective for moisture drainage in wet applications.
- 2 If mounted on horizontal pipe, the I/P must be on top of the pipe for proper moisture drainage.

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