

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 2) 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 in., which provides good resistance to plugging. The input current signal 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 4). 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.

Figure 1. Fisher 846 Electro-Pneumatic Transducer



X0234



W6307-1

846 MOUNTED
ON FISHER 667 ACTUATOR

Table 1. Specifications

Input Signal	Maximum Steady-State Air Consumption ⁽¹⁾
4 to 20 mA DC, Field adjustable split ranging.	0.3 m ³ /hr / 12 scfh at 1.4 bar / 20 psi supply pressure
Equivalent Circuit	Output Air Capacity ⁽¹⁾
See Figure 5	Standard Performance: 6.4 m ³ /hr / 240 scfh at 1.4 bar / 20 psi supply pressure Multirange: 9.7 m ³ /hr / 360 scfh at 2.5 bar / 35 psig supply pressure
Output Signal	Temperature Limits
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)	Operating: -40 to 85 °C / -40 to 185 °F Storage: -40 to 93 °C / -40 to 200 °F
Supply Pressure	Humidity Limits
Standard Performance: 1.2 to 1.6 bar / 18 to 24 psi Multirange Performance: 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	0 to 100% condensing relative humidity
Supply Pressure Medium	Performance ⁽²⁾
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. Pressure dew point: At least 10 °C less than the lowest ambient temperature expected Per ISO 8573-1 Maximum particle density size: Class 7 Oil content: Class 3 Pressure dew point: Class 3	Linearity, Hysteresis and Repeatability: ±0.5% of span Temperature Effect (total effect including zero and span): ±0.07%/ °C / 0.045%/ °F of span Vibration Effect: ±0.5% of span per g during the following conditions: 5 to 15 Hz at 4 mm constant displacement 15 to 150 Hz at 2 g. 150 to 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

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Table 1. Specifications (continued)

Performance (continued) ⁽²⁾	Hazardous Area Approvals and Other Classifications
<p>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 in the IEC specification document). Immunity performance is shown in Table 2.</p> <p>Leak Sensitivity: Less than 1.0% of span for up to 4.8 m³/hr / 180 scfh downstream leakage.</p> <p>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.</p> <p>Reverse Polarity Protection: No damage occurs from reversal of normal supply current (4 to 20 mA) or from misapplication of up to 100 mA.</p>	<p>CSA C/US – Intrinsically Safe, Explosion-proof, Non-Incendive (Canada and United States)</p> <p>FM – Intrinsically Safe, Explosion-proof, Non-Incendive (United States)</p> <p>ATEX – Intrinsically Safe, Flameproof, Type n</p> <p>IECEX – Intrinsically Safe, Flameproof</p> <p>CUTR – Customs Union Technical Regulations</p> <p>ESMA – Emirates Authority for Standardization and Metrology - ECAS-Ex (UAE)</p> <p>INMETRO – National Institute of Metrology, Quality and Technology (Brazil)</p> <p>KTL – Korea Testing Laboratory (South Korea)</p> <p>CCC – China Compulsory Compliance</p> <p>NEPSI – National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation (China)</p> <p>PESO CCOE – Petroleum and Explosives Safety Organization - Chief Controller of Explosives (India)</p> <p>UKEx – Intrinsically Safe and Dust, Flameproof, Type n and Dust (United Kingdom)</p> <p>Contact your Emerson sales office or refer to the 846 product page at Fisher.com for approval specific information</p>
<p>Connections</p>	
<p>Supply and Output Pressure: 1/4-18 NPT internal connection</p> <p>Electrical: 1/2-14 NPT internal conduit connection</p>	
<p>Adjustments</p>	
<p>Zero and Span: screwdriver adjustments located in terminal compartment.</p>	
<p>Remote Pressure Reading (Optional)</p>	
<p>ON or OFF; jumper selectable</p> <p>Frequency Range: 0 to 10,000 Hz</p> <p>Amplitude: 0.4 to 1.0 V_{p-p}</p>	
<p>Required Operating Voltage</p>	<p>Electrical Housing</p>
<p>Min. 6.0 V / at 4 mA</p> <p>Max. 7.2 V / at 20 mA</p> <p>with Remote Pressure Reading ON</p> <p>Min. 6.4 V / at 4 mA</p> <p>Max. 8.2 V / at 20 mA</p>	<p>Tropicalization (Fungus test per MIL-STD-810)</p> <p>CSA C/US – Type 4X</p> <p>FM – Type 4X</p> <p>ATEX – IP66 ⁽³⁾</p> <p>IECEX – IP66 ⁽³⁾</p>

- continued -

Table 1. Specifications (continued)

Construction Materials	Weight
Housing: ASTM: ■ A03600 material composition alloy or ■ CF8M O-rings: Nitrile, except silicone for sensor O-rings	Aluminum: 2.9 kg / 6.5 lb excluding options Stainless Steel: 6.7 kg / 14.8 lb excluding options
Mounting	Options
■ Actuator, ■ pipestand, or ■ surface	■ Fisher 67CFR filter regulator, ■ supply and output gauges, ■ remote pressure reading, or ■ stainless steel mounting bracket
<p>NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 - Process Instrument Terminology.</p> <p>1. Normal m³/hr – Normal cubic meters per hour (0 °C and 1.01325 bar, absolute). Scfh – Standard cubic feet per hour (60 °F and 14.7 psia).</p> <p>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.</p> <p>3. ATEX and IECEx Flameproof – IP66 per CSA Letter of Attestation.</p>	

Table 2. EMC Immunity Performance Criteria

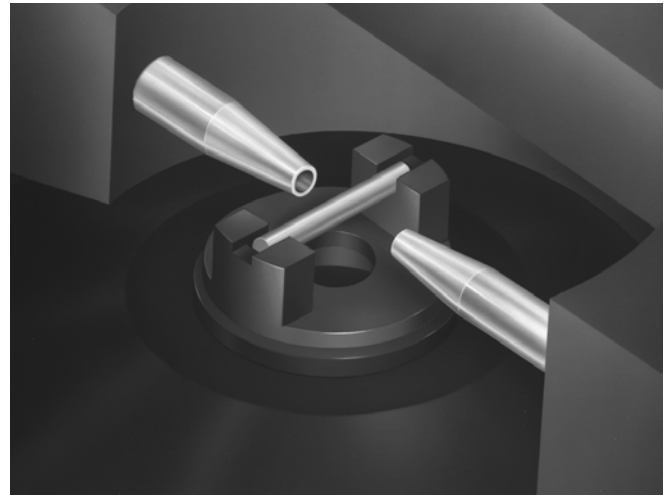
Port	Phenomenon	Basic Standard	Test Level	Performance Criteria ⁽¹⁾
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact 8 kV air	A
	Radiated EM field	IEC 61000-4-3	80 to 1000 MHz at 10 V/m with 1 kHz AM at 80% 1400 to 2000 MHz at 3 V/m with 1 kHz AM at 80% 2000 to 2700 MHz at 1 V/m with 1 kHz 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	
<p>Specification limit = ±1% of span</p> <p>1. A = No degradation during testing. B = Temporary degradation during testing, but is self-recovering.</p>				

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 3). 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.
- **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.

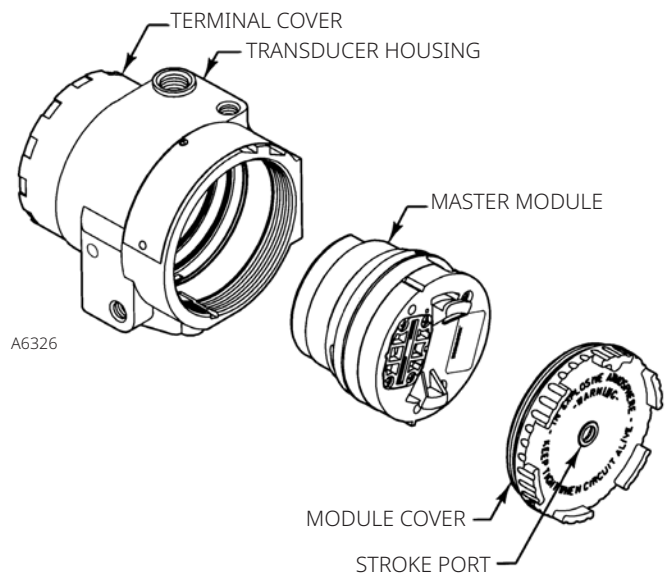
Using a frequency counter, an operator can monitor the 846 output pressure.

Figure 2. Detail of Deflector/Nozzle Pilot Stage



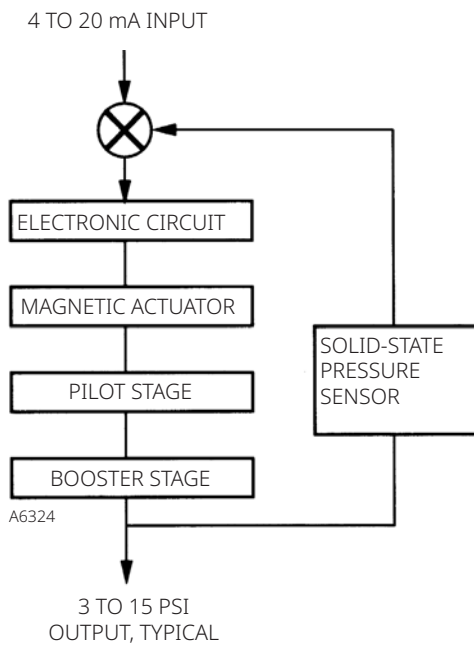
W6287

Figure 3. Master Module Construction



A6326

Figure 4. Functional Block Diagram



Installation

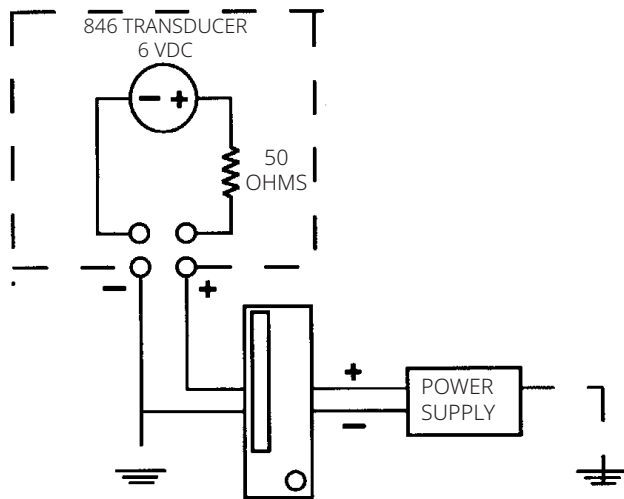
The transducer may be actuator, wall, panel, or pipestand mounted. Dimensions are shown in Figure 6, 7, 8, and 9.

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. 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.

Figure 6. Dimensions

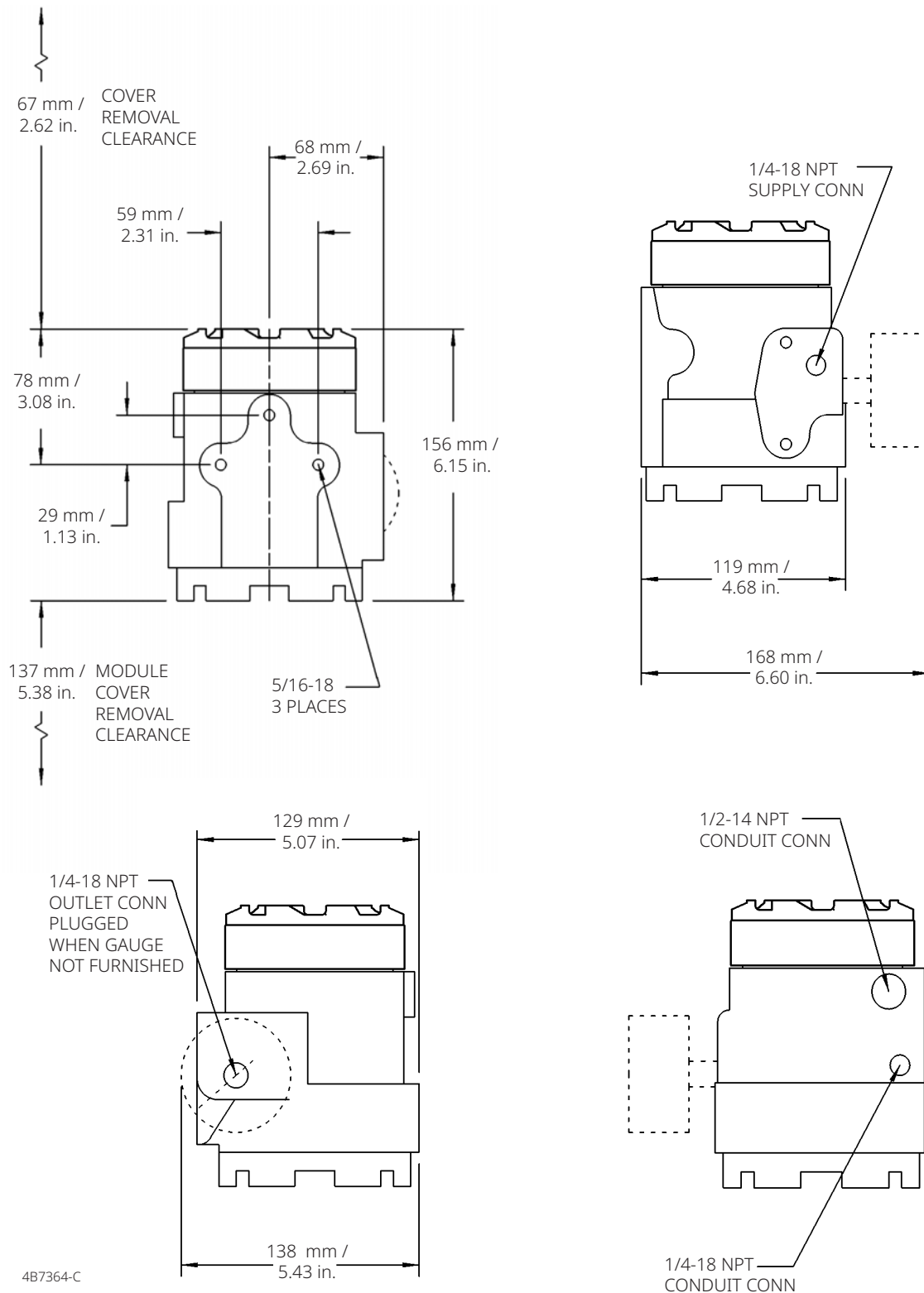
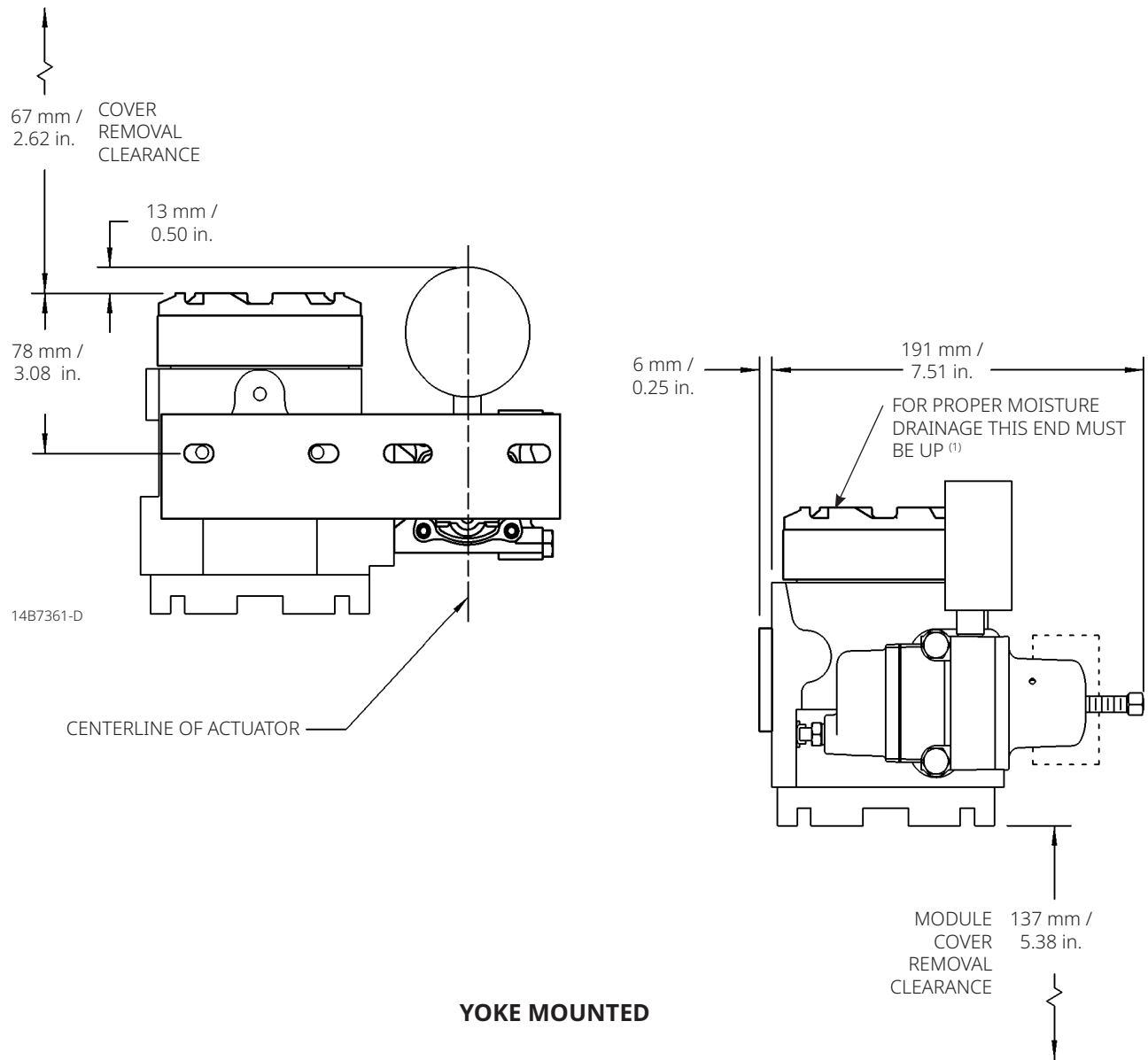


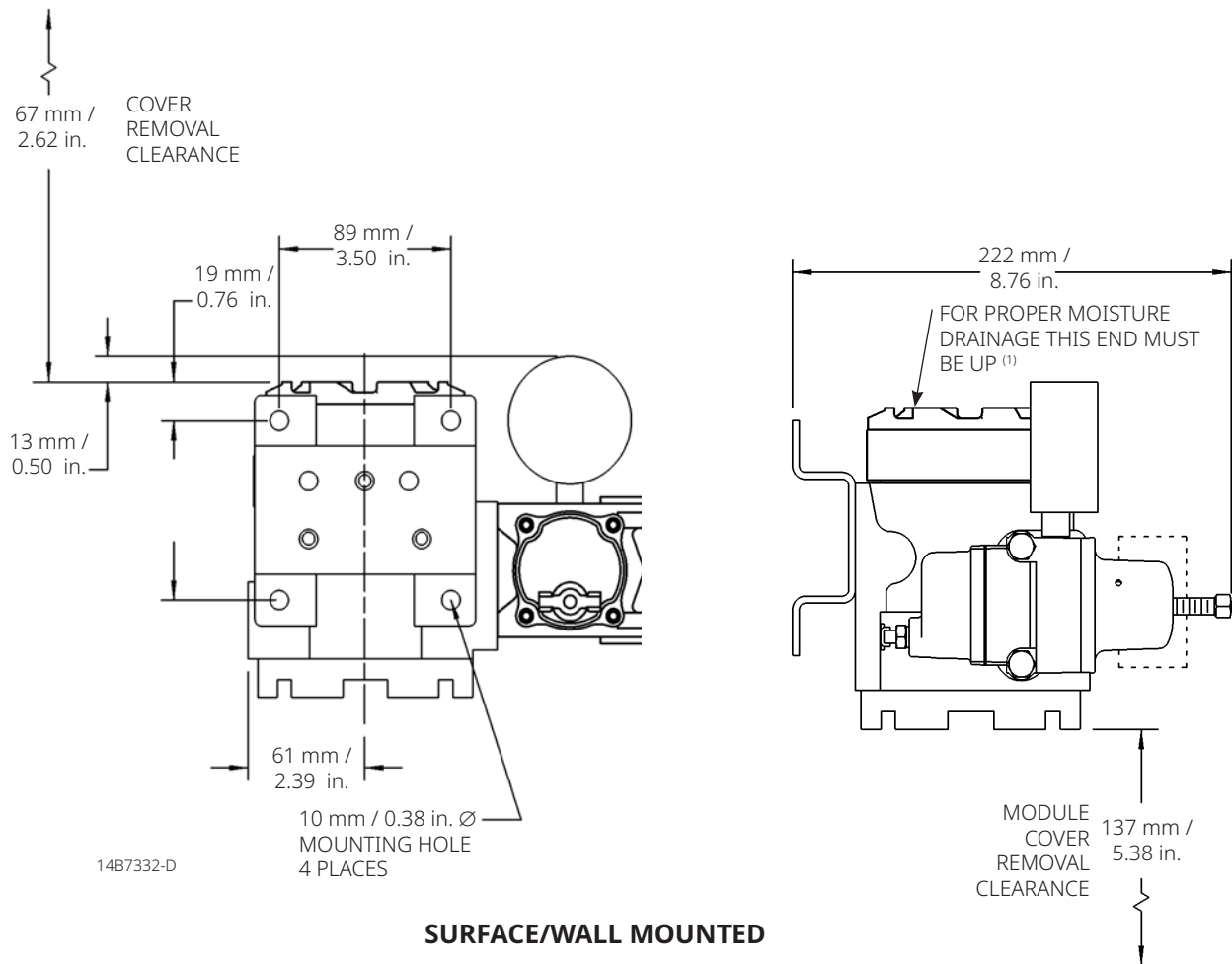
Figure 7. Dimensions with Optional Fisher 67CFR Filter-Regulator (Yoke Mounted)



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.

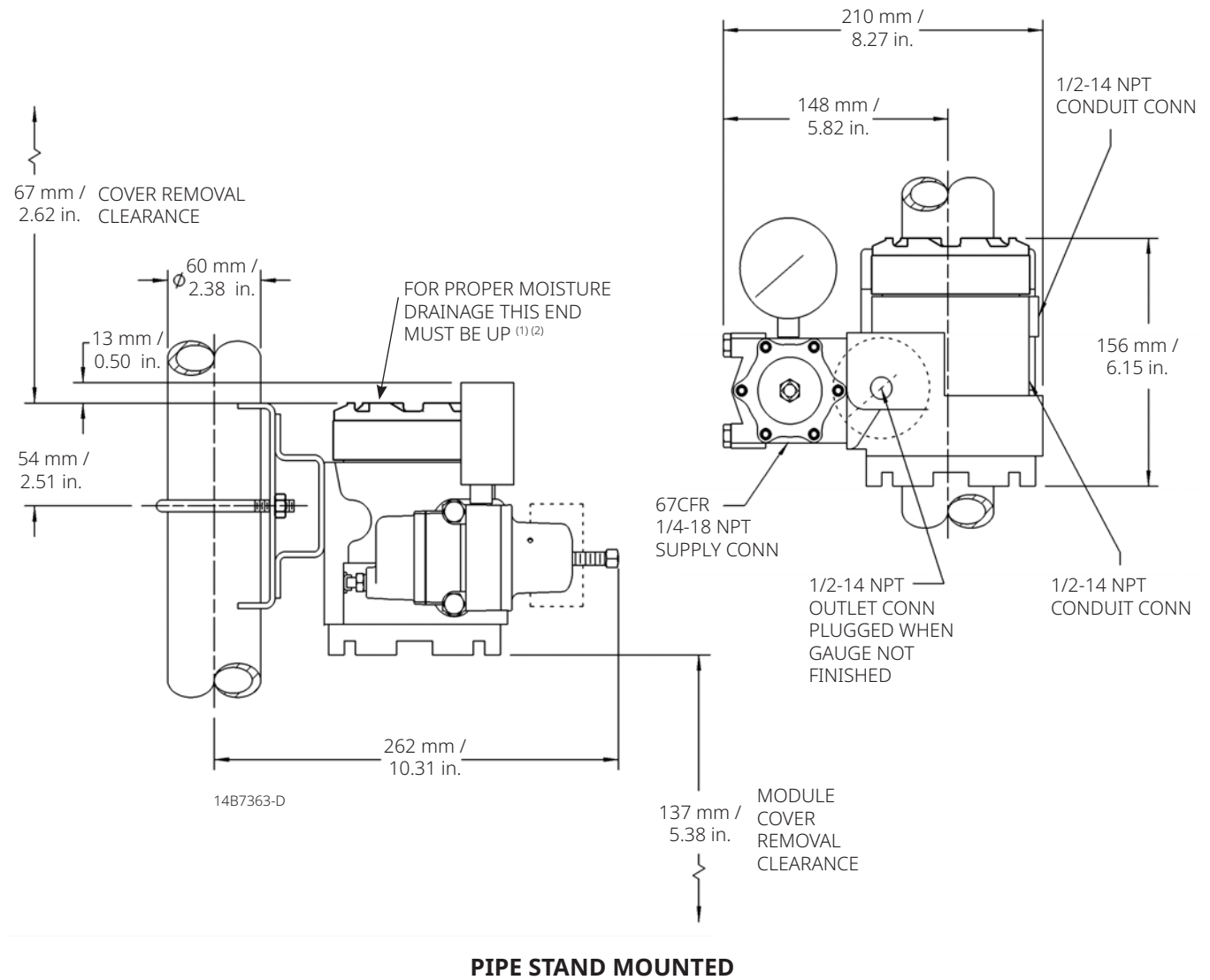
Figure 8. Dimensions with Optional Fisher 67CFR Filter-Regulator (Surface/Wall Mounted)



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.


Figure 9. Dimensions with Optional Fisher 67CFR Filter-Regulator (Pipe Stand Mounted)



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.
2. If mounted on horizontal pipe, the I/P must be on top of the pipe for proper moisture drainage.

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