



PRODUCT MANUAL

EXP System Controller Actuator Field Modules (AFM)

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1 INTRODUCTION

1.1 About This Manual

This manual is intended to be a complete reference for installing, operating, and maintaining the Fike Actuator Field Module (AFM). Others, such as engineers, sales and marketing personnel, etc., will also find the information in this manual valuable. The AFMs have no serviceable items. AFM maintenance shall be performed only by Fike-certified personnel.

The first-time installer and/or user should thoroughly read and understand the instructions contained within this manual before installing or using this device. The instructions contained in this manual must be followed to avoid damage to the equipment itself, adverse operating conditions caused by improper installation, and false activation of connected suppression/isolation systems.

1.2 Product Support

Fike has a worldwide distribution network. Each distributor sells, installs, and services Fike equipment. If you have any questions or encounter a problem not covered in this manual, contact Fike's Product Support at (800) 979-FIKE (3453), Option 21, Monday through Friday, 8:00 AM to 4:30 PM CST.

1.3 Safety Information

Important safety admonishments are used throughout this manual to warn of possible hazards to persons or equipment.

WARNING: Indicates the presence of a hazard that will or may cause personal injury, death, or loss of service if safety instructions are not followed or if the hazard itself is not avoided.

CAUTION: Indicates the presence of a hazard that will or may cause damage to the equipment if safety instructions are not followed or if the hazard is not avoided.

NOTE: Provides a helpful hint, sometimes a tip, to help the installer work more efficiently.



This "hard hat" symbol indicates a procedure **SHALL** be performed **ONLY** by factory-trained and certified personnel.

IEC 60417 - 5019, Protective earth; protective ground.
Function/description: To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode.



IEC 60417 - 5041, Caution, hot surface.
Function/description: To indicate that the marked item can be hot and should not be touched without taking care.



2 GENERAL DESCRIPTION

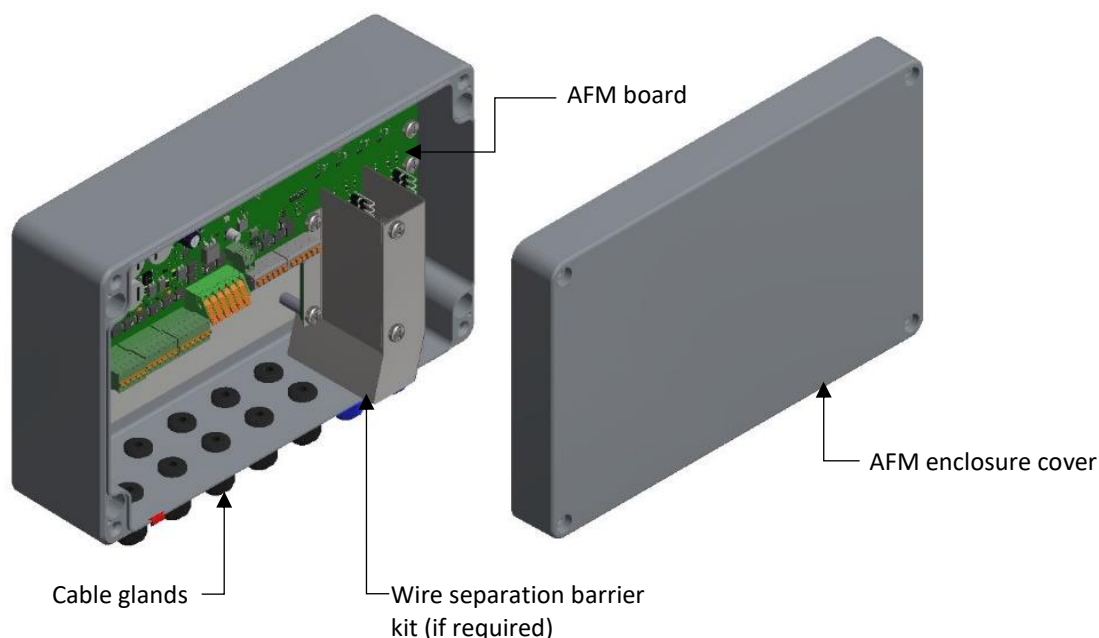
The Actuator Field Module (AFM) is used with the Fike EXP control panel to provide the interface for monitoring and controlling field components. One AFM is required per field component. The AFM is available in single and dual-input energetics versions designed to monitor and activate field components with GCA or Metron actuation devices. A solenoid version, designed to monitor and activate field components equipped with solenoid devices, is also available.

2.1 Scope of Materials Supplied

The AFMs can be ordered as a completed assembly or as a kit (see Section 12) to suit specific project requirements, as described below:

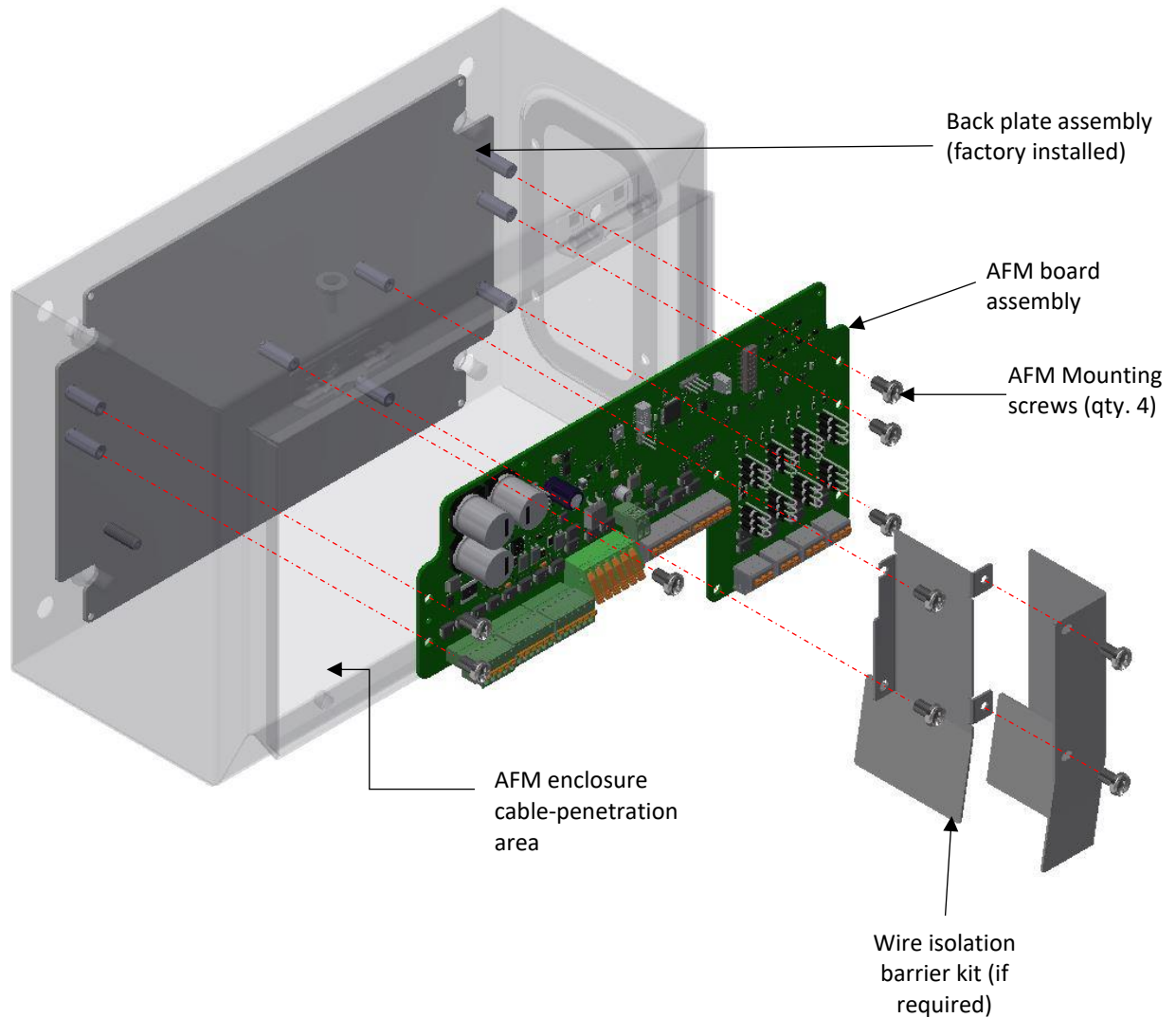
Option 1 - The AFM ships from the factory as a completed assembly with the AFM circuit board factory installed in the selected enclosure. A predetermined number of cable glands will be factory-installed in the enclosure to facilitate cable entry, as shown in **Figure 1**.

Figure 1 – AFM (factory assembled)



Option 2 - The AFM ships from the factory as a kit. The kit includes the selected enclosure with the mounting plate factory installed. The AFM circuit board is shipped in an anti-static bag and must be field installed. The wire-separation barrier kit is an optional component that is ordered separately. The kit components must be field assembled, and all enclosure penetrations for wire/cable entrance into the enclosure must be made in the field.

Figure 2 – AFM (field assembled)

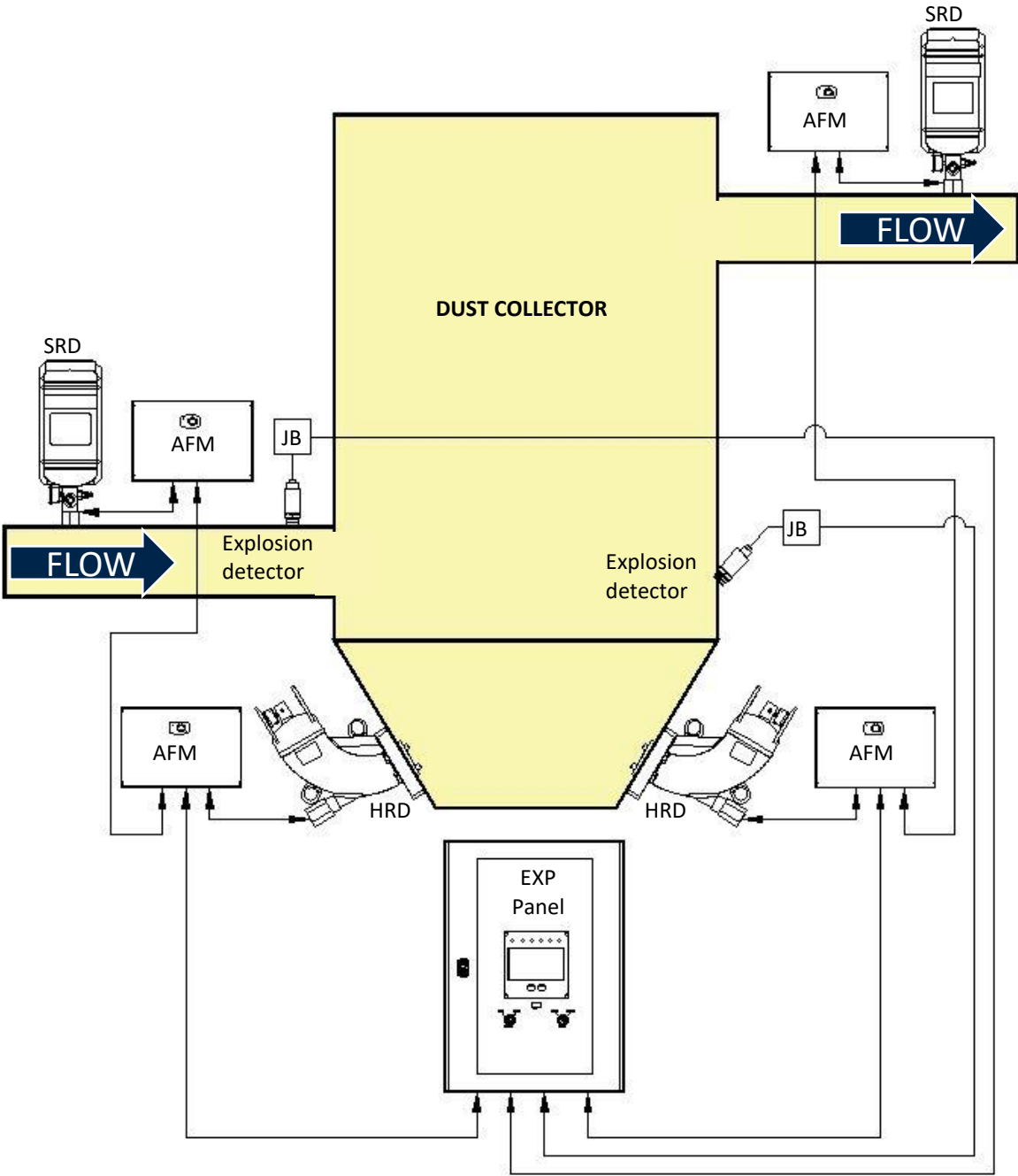


2.2 System Overview

Figure 3 shows how the AFM is incorporated into the EXP system. Junction Boxes must be used to facilitate the connection between the controller and detectors in accordance with design limitations.

NOTE: AFM placement may be affected by the container hardware selected.

Figure 3 – Example System Diagram



3 SPECIFICATIONS

The following limitations apply to all AFMs per Zone (A & B):

The combined load of all connected AFMs and solenoids shall not exceed 2A maximum, or 10 AFMs per zone, whichever is less.

3.1 Approvals

- Factory Mutual (FM)
- Conformité Européenne (CE)
- Atmosphères Explosibles (ATEX)

For exact certification listings, please reference the respective agency website.

3.2 Identification Tag

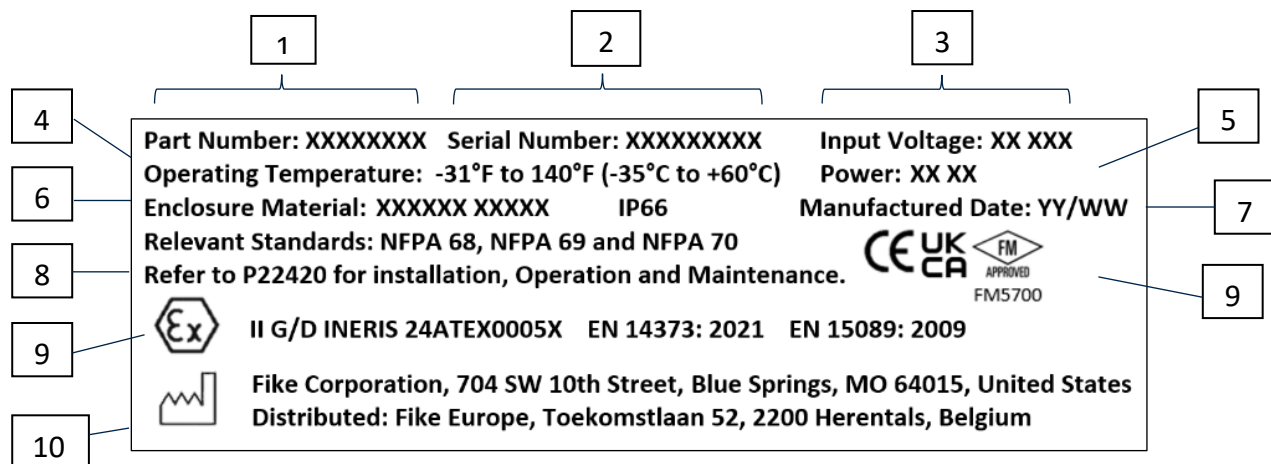


Table 1 – Label Parts

Item	Description
1	Part Number
2	Serial Number
3	Input Voltage
4	Operating Temperature
5	Input Frequency and Power
6	Enclosure Material, IP rating
7	Manufactured Date (YY/WW)
8	Manual Reference
9	Approvals and Standards
10	Manufacturer

3.3 Single Input Energetics AFM Board (P/N 10-3012)

The Single Input Energetics AFM provides circuits for monitoring and controlling the connected component. Its releasing output can be connected to a Fike GCA or Metron.

Figure 4 – Single Input Actuator Field Module (P/N 10-3012) Board Layout

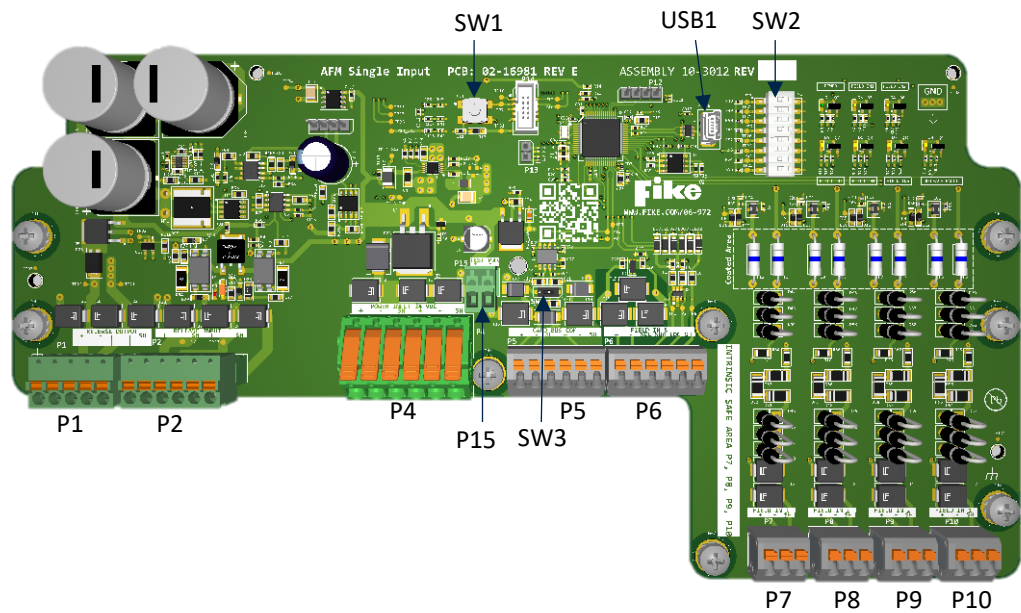


Table 2 – Component Functions, Actuator Field Module (Single Input)

Label	Description	Function
P1	Actuator Output	Connection point for Fike GCA's or Metrons
P2	Reverse Polarity Release Input	Connection to EXP Release Output A/B. Provides a reverse polarity signal for activating the actuator.
P4	24VDC Power Input	Connection to EXP Aux Power A/B
P5	Card Bus Communications	Connection to EXP Release Communications A/B. Provides communication between the Field Inputs and EXP.
P6	Pressure/Temp Sensor Input	(future use)
P7	Field Input 4	Provide a connection point for compatible field inputs (e.g., mechanical lock, low-pressure monitoring, position indicators), up to four inputs per AFM.
P8	Field Input 3	
P9	Field Input 2	
P10	Field Input 1	
P15	Test Power	24VDC power to AFM Test Tool (service use only)
SW1	Reset Button	Used to reset the module after setting the card address.
SW2	Card Address Dip-switch	Used to set the module's address on the panel's card bus comm circuit.
SW3	EOL Dip-switch	Used to enable the module's internal EOL.
USB1	Service Use Only	Firmware programming header via USB cable.

3.4 Dual-Input Energetics AFM Board (P/N 10-3054)

The Dual-Input Energetics AFM provides circuits for monitoring and controlling the connected component from two separate EXP releasing circuits. Its releasing output can be connected to a Fike GCA or Metron.

Figure 5 – Board Layout, Actuator Field Module (Dual-Input)

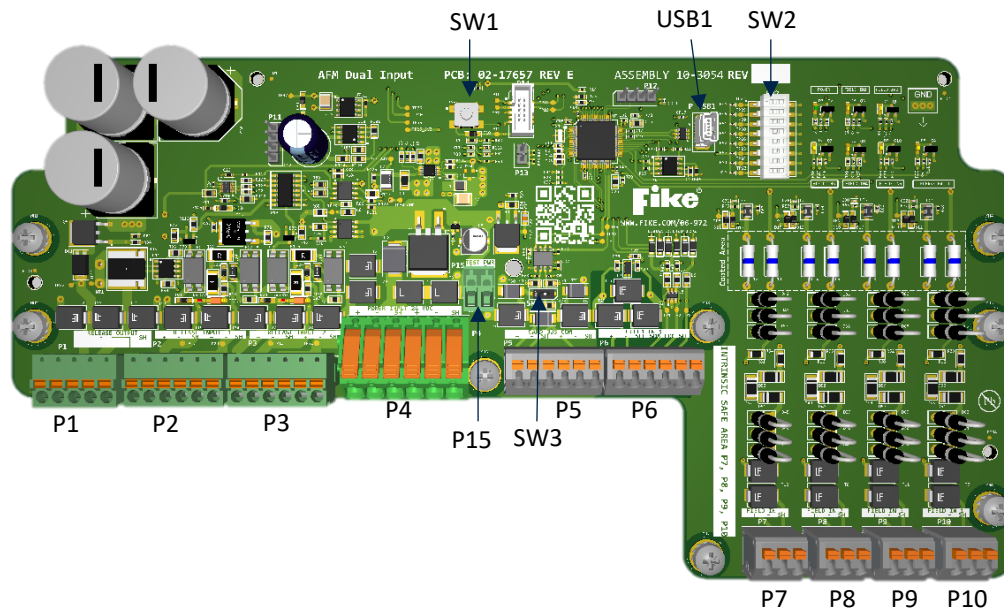


Table 3 – Component Functions, Actuator Field Module (Dual Input)

Label	Description	Functions
P1	Actuator Output	Connection point for Fike GCA's or Metrons
P2	Reverse Polarity Release Input 1	Connection to EXP Release Output A/B. Provides reverse polarity signal for activating the actuator.
P3	Reverse Polarity Release Input 2	
P4	24VDC Power Input	Connection to EXP Aux Power A/B
P5	Card Bus Communications	Connection to EXP Release Communications A/B. Provides communication between the Field Inputs and EXP.
P6	Pressure/Temp Sensor Input	(future use)
P7	Field Input 4	Provide a connection point for compatible field inputs (e.g., mechanical lock, low-pressure monitoring, position indicators), up to four inputs per AFM.
P8	Field Input 3	
P9	Field Input 2	
P10	Field Input 1	
P15	Test Power	24VDC power to AFM Test Tool (service use only)
SW1	Reset Button	Used to reset the module after setting the card address.
SW2	Card Address Dip-switch	Used to set the module's address on the panel's card bus communication circuit.
SW3	EOL Dip-switch	Used to enable the module's internal EOL.
USB1	Service Use Only	Firmware programming header via USB cable.

3.5 Dual Input Solenoid AFM Board (P/N 10-3055)

The Solenoid-Output AFM provides circuits for monitoring and controlling the connected component from two separate EXP releasing circuits. Its releasing output can be connected to explosion-protection components that utilize solenoid(s) for operation.

Figure 6 – Board Layout, Actuator Field Module (Solenoid Output)

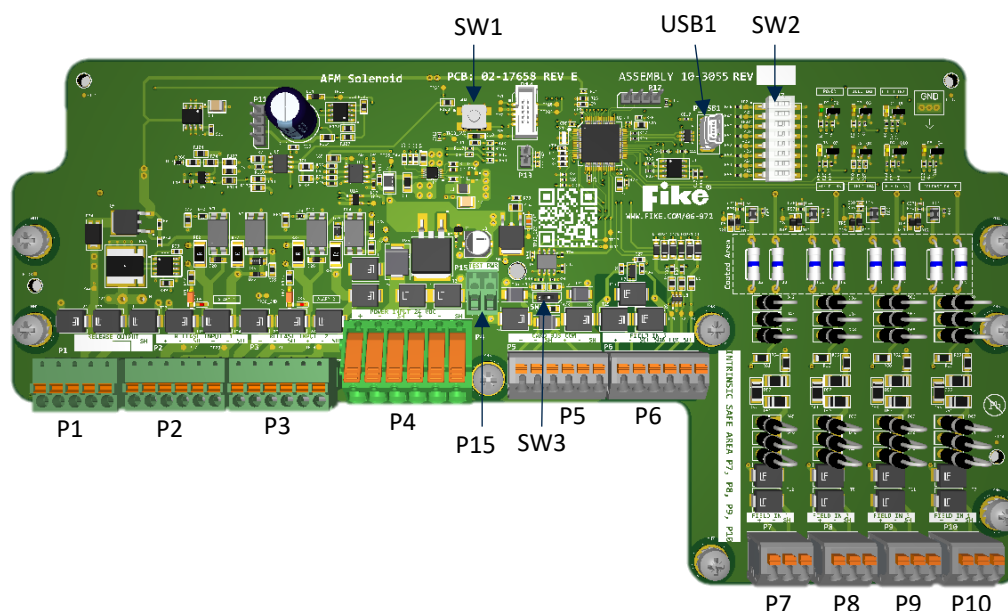




Table 4 – Component Functions, Actuator Field Module (Solenoid Output)



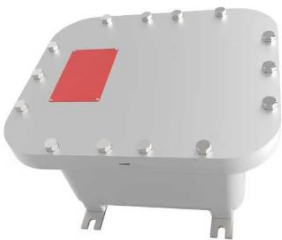
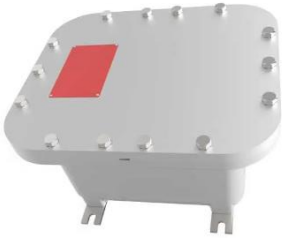
Label	Description	Functions
P1	Actuator Output	Connection point for compatible 6/12/24V solenoids
P2	Reverse Polarity Release Input 1	Connection to EXP Release Output A/B. Provides reverse polarity signal for activating the actuator.
P3	Reverse Polarity Release Input 2	
P4	24VDC Power Input	Connection to EXP Aux Power A/B
P5	Card Bus Communications	Connection to EXP Release Communications A/B. Provides communication between the Field Inputs and EXP.
P6	Pressure/Temp Sensor Input	(future use)
P7	Field Input 4	Provide a connection point for compatible field inputs (e.g., mechanical lock, low-pressure monitoring, position indicators), up to four inputs per AFM.
P8	Field Input 3	
P9	Field Input 2	
P10	Field Input 1	
P15	Test Power	24VDC power to AFM Test Tool (service use only)
SW1	AFM Reset Button	AFM must be reset after setting the dip switch.
SW2	AFM Card Address	AFM card address dip-switch
USB1	Service Use Only	Firmware programming header via USB cable.

3.6 AFM Enclosures

Fike offers five different enclosures for installing the AFM. Each enclosure provides a different level of protection to suit the hazardous-area requirements. A mounting plate and mounting hardware are provided to facilitate the mounting of the AFM circuit board within the enclosure. Each enclosure can be ordered with or without factory-installed cable glands. The required penetrations must be made in the field if the enclosure is ordered without cable glands. The specifications of each enclosure are listed in the following table.

Table 5 – Enclosure Specifications

Enclosure No. 1		
	PART NUMBER	06-16910
	MATERIAL	Carbon steel
	FINISH	Gray (RAL 7035), epoxy-polyester powder
	DIMENSIONS	H11.81 in x W7.87 in x D5.90 in (H300 x W200 x D150mm)
	ASSEMBLY WEIGHT	7.89 lbs. (3.58 kg)
	DEGREE OF PROTECTION	NEMA 1, 2, 3, 3R, 4, 4X, 5, 12, 13, IP66
	HAZARDOUS RATING	Class II, Div II equivalent – no hazardous approvals
	APPROVALS	UL, ULc
	MOUNTING	Wall mount or bracket mount
	DOOR	Solid, key-locked, hinged on the bottom
Enclosure No. 2		
	PART NUMBER	06-16911
	MATERIAL	304L stainless steel
	DIMENSIONS	H11.81 in x W7.87 in x D5.90 in (H300 x W200 x D150mm)
	ASSEMBLY WEIGHT	7.47 lbs. (3.39 kg)
	DEGREE OF PROTECTION	NEMA 1, 2, 3, 3R, 4, 4X, 5, 12, 13, IP66
	HAZARDOUS RATING	Class II, Div II equivalent – no hazardous approvals
	APPROVALS	UL, ULc
	MOUNTING	Wall mount or bracket mount
	DOOR	Solid, key-locked, hinged on the bottom

Enclosure No. 3		
	PART NUMBER	F0292626
	MATERIAL	316L stainless steel
	DIMENSIONS	H7.87 in x W11.81 in x D5.90 in (H200 x W300 x D121mm)
	ASSEMBLY WEIGHT	7.68 lbs. (3.48 kg)
	DEGREE OF PROTECTION	IG-EXe/IP66/NEMA 4
	APPROVALS	ATEX, ABS, CCOE India, EAC (TR CU), IECEx, INMETRO, UL Ex
	MOUNTING	Wall mount or bracket mount
	LID	Solid, secured with screws
Enclosure No. 4		
	PART NUMBER	F0290389
	MATERIAL	Aluminum
	DIMENSIONS	H7.08 in x W11.02 in x D3.97 in (H180 x W280 x D101mm)
	ASSEMBLY WEIGHT	6.95 lbs. (3.15 kg)
	DEGREE OF PROTECTION	Ex/IP66/NEMA 4
	APPROVALS	ATEX, ABS, CCOE India, EAC (TR CU), IECEx, INMETRO, UL Ex
	MOUNTING	Wall mount or bracket mount
	LID	Solid, secured with screws
Enclosure No. 5		
	PART NUMBER	F0292627
	MATERIAL	Cast aluminum, with 1/2" and 3/4" conduit penetrations
	DIMENSIONS	W8.0 in x L12.0 in x D6.0 in (203mm x 305mm x 152mm)
	ASSEMBLY WEIGHT	48.7 lbs. (22.09 kg)
	HAZARDOUS RATING	Class I, II, III, BCDEFG, Type 4
	MOUNTING	Wall mount only
	LID	Solid, secured with screws
Enclosure No. 6		
	PART NUMBER	F0293929
	MATERIAL	Cast aluminum, with M16 penetrations
	DIMENSIONS	W8.0 in x L12.0 in x D6.0 in (203mm x 305mm x 152mm)
	ASSEMBLY WEIGHT	48.7 lbs. (22.09 kg)
	HAZARDOUS RATING	Class I, II, III, BCDEFG, Type 4
	MOUNTING	Wall mount only
	LID	Solid, secured with screws

3.6.1 AFM Enclosure Dimensions

Figure 7 – Carbon Steel Enclosure 1 (P/N 02-16910)
inch [mm]

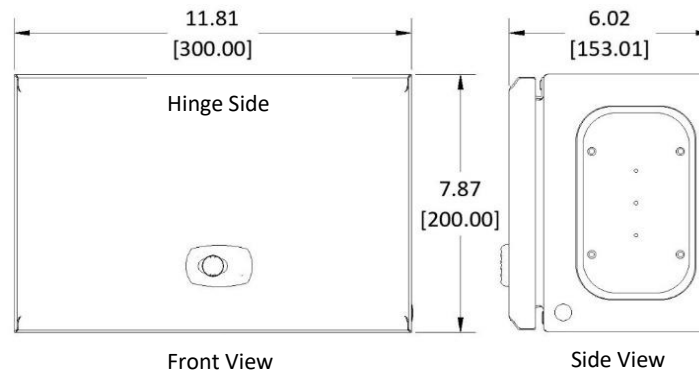


Figure 8 – Stainless Steel Enclosure 2 (P/N 02-16911)
inch [mm]

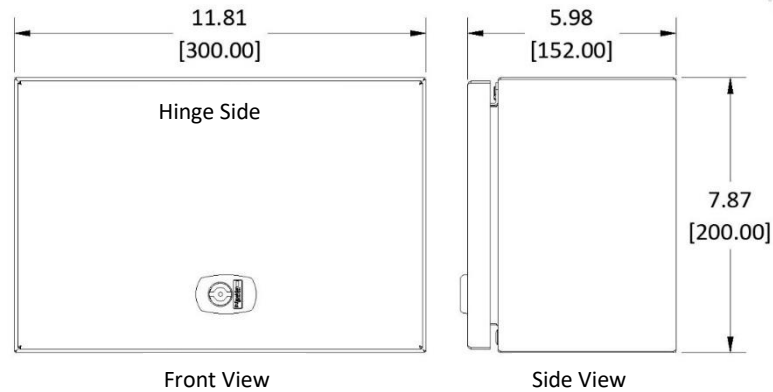


Figure 9 – Stainless Steel Enclosure 3 (P/N F0292626)
inch [mm]

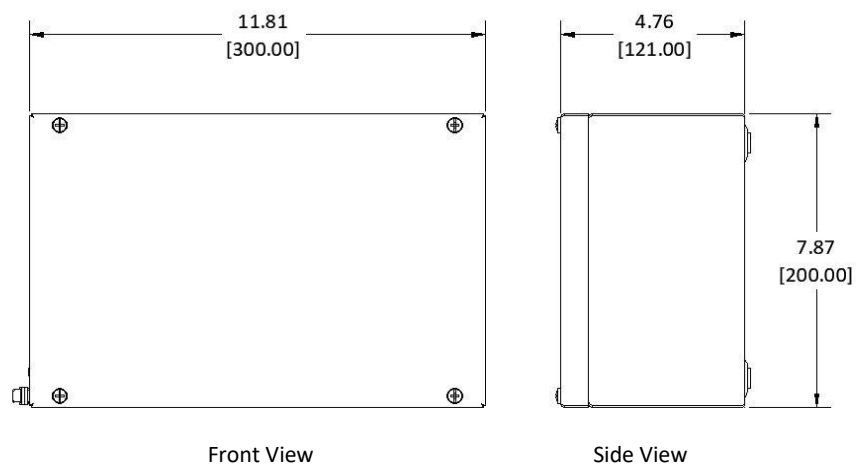


Figure 10 – Aluminum Enclosure 4 (P/N F0290389)
inch [mm]

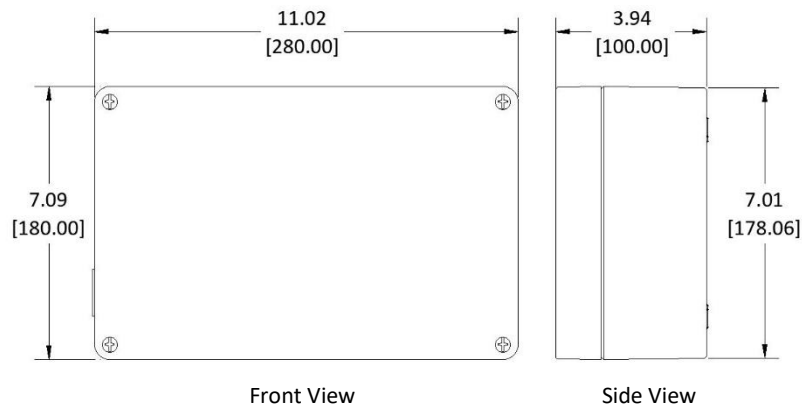
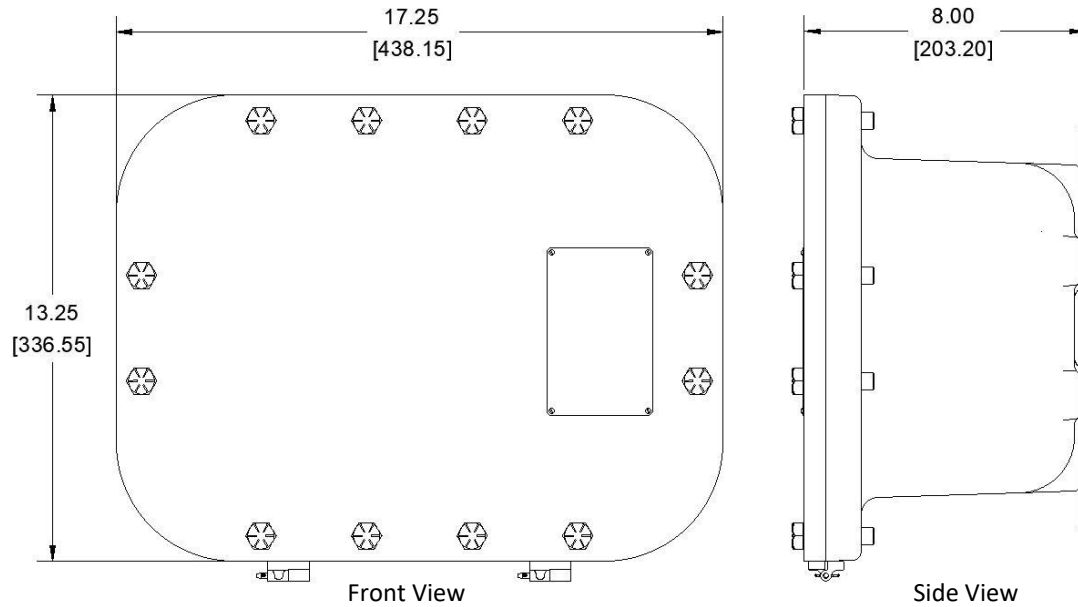


Figure 11 – Explosion-Proof, Cast Aluminum Enclosures 5 and 6 (P/Ns F0292627, F0293929)
inch [mm]



4 INSTALLATION

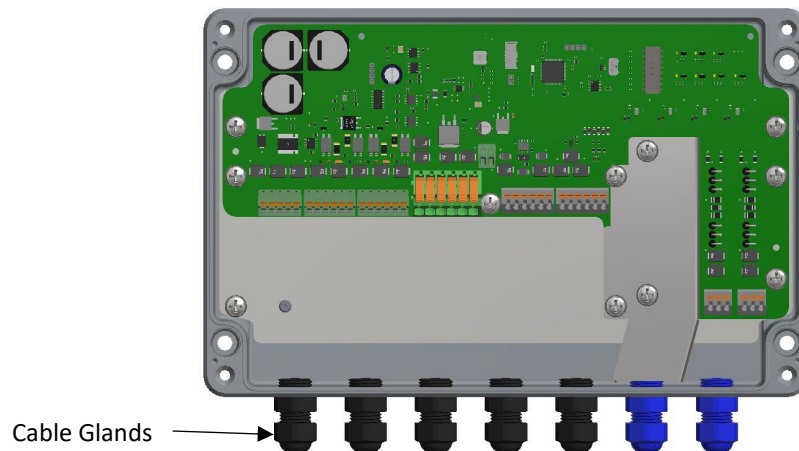
The AFM shall be located and installed in accordance with the approved installation drawings prepared for the project and the following general requirements. **Any deviation from the design drawings must be approved before installation.**

- a) The AFM shall be located in an indoor or outdoor area capable of maintaining an operating temperature from -31°F to 140°F (-35°C to +60°C) with non-condensing relative humidity not to exceed 93%.
- b) The preferred orientation for mounting the AFM is so that the cable glands or conduit penetrations are located at the bottom of the enclosure (facing down).
- c) If mounted remotely, AFM shall be in a readily accessible area that will not be subjected to mechanical damage.
- d) The mounting location shall be free of vibration and electromagnetically induced (EM) noise. To reduce the EM-induced noise to a level that will not affect the system's performance, verify all earth connections.
- e) The AFM mounting location shall include safe service, inspection, and maintenance access, including work platforms, as local workplace safety regulations require.
- f) AFMs shall be installed level, plumb, and true with the structure or other equipment.
- g) All materials and equipment, including hangers, supports, fasteners or fittings, and accessories, shall have corrosion protection suitable for the atmosphere in which they are installed (whether located indoors or outdoors). Care shall be taken during installation to ensure the integrity of the corrosion protection.
- h) Electrical installation shall comply with the requirements of the locally adopted installation standard and the requirements of the hazardous (classified) area.

4.1 Enclosure Preparation

To facilitate the entrance of wire/cable into the AFM enclosure, the AFMs can be ordered with cable glands factory installed or without any enclosure penetrations. Enclosures ordered with cable glands are shipped from the factory, with 14 black M16 cable glands preinstalled in the enclosure. Intrinsically Safe (blue) cable glands are provided with the order of the isolation barrier kit. See **Figure 12**.

Figure 12 –Typical AFM Enclosure with Cable Glands (enclosure cover removed)

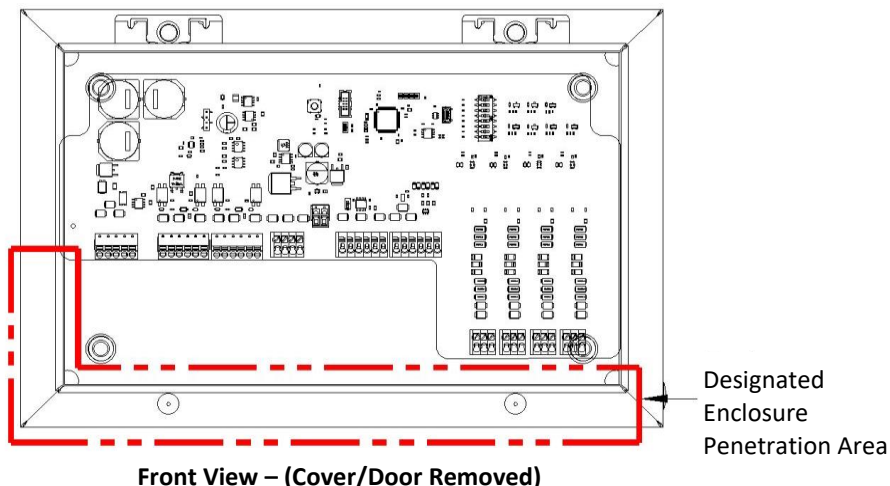


Before mounting the enclosure, all locations for wire/cable entry (penetrations) into the enclosure must be determined. If intrinsic safe circuits are not required, replace the blue glands with black glands. If not all cable glands are used, all unused ones shall be removed and a suitable blanking plug installed.

AFMs ordered without enclosure penetrations for wire/cable entry must be drilled in the field to suit project requirements. To prevent potential damage to the AFM components that could occur while drilling, the AFM circuit board and isolation barriers are shipped separately and must be installed in the field.

Refer to **Figure 13** for the designated areas for drilling the wire/cable entry penetrations into the AFM enclosure.

Figure 13 –AFM Enclosure Allowable Penetration Area



CAUTION: Do not drill into the enclosure with the AFM circuit board installed. Doing so may result in damage to the circuit board, requiring replacement.

Use the following steps to drill the conduit/wire penetrations into the AFM enclosure:

- Step 1.** For enclosures with removable covers, remove the screws securing the cover to the back of the box.
- Step 2.** Disconnect the ground wire from the cover and set it aside.
- Step 3.** Mark the location(s) for the conduit penetration(s), then use a center punch to mark the center of the hole. Verify adequate spacing between each penetration.
- Step 4.** Before drilling, verify hole location(s) in relation to the orientation of the AFM inside the enclosure.
- Step 5.** Drill and deburr each hole.
- Step 6.** Install conduit fittings suitable for the hazard where the enclosure is being installed.
- Step 7.** Thoroughly clean the interior of the enclosure, removing all debris.
- Step 8.** Reconnect the lid grounding wire if disconnected in Step 2.
- Step 9.** Reattach the removable cover to the box using the screws removed in Step 1.
- Step 10.** The AFM enclosure is now ready to be mounted.

4.2 Enclosure Mounting

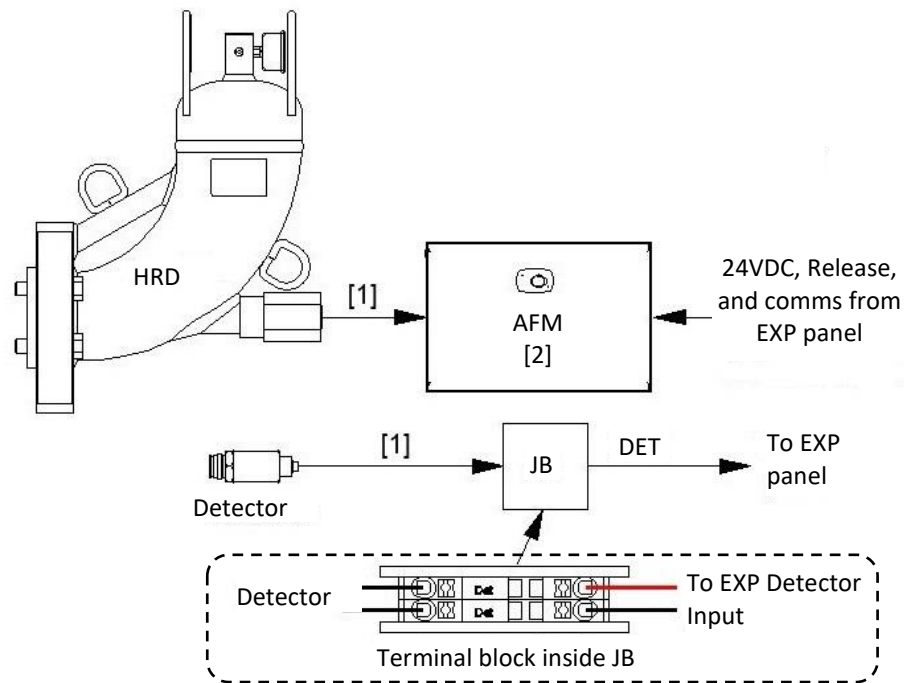
There are two methods for mounting the AFM enclosure. A description of each method is provided below.

4.2.1 Mounting Method One

Method one utilizes custom mounting brackets created by Fike to attach the AFM enclosure directly to the explosion protection component it serves. See **Figure 14**. The mounting brackets are ordered separately. Refer to Fike document P23702 for details.

NOTE: AFM Enclosures 5 and 6 can only be remotely mounted.

Figure 14- AFM Mounted to the Explosion Protection Component



[1] Component wire leads:

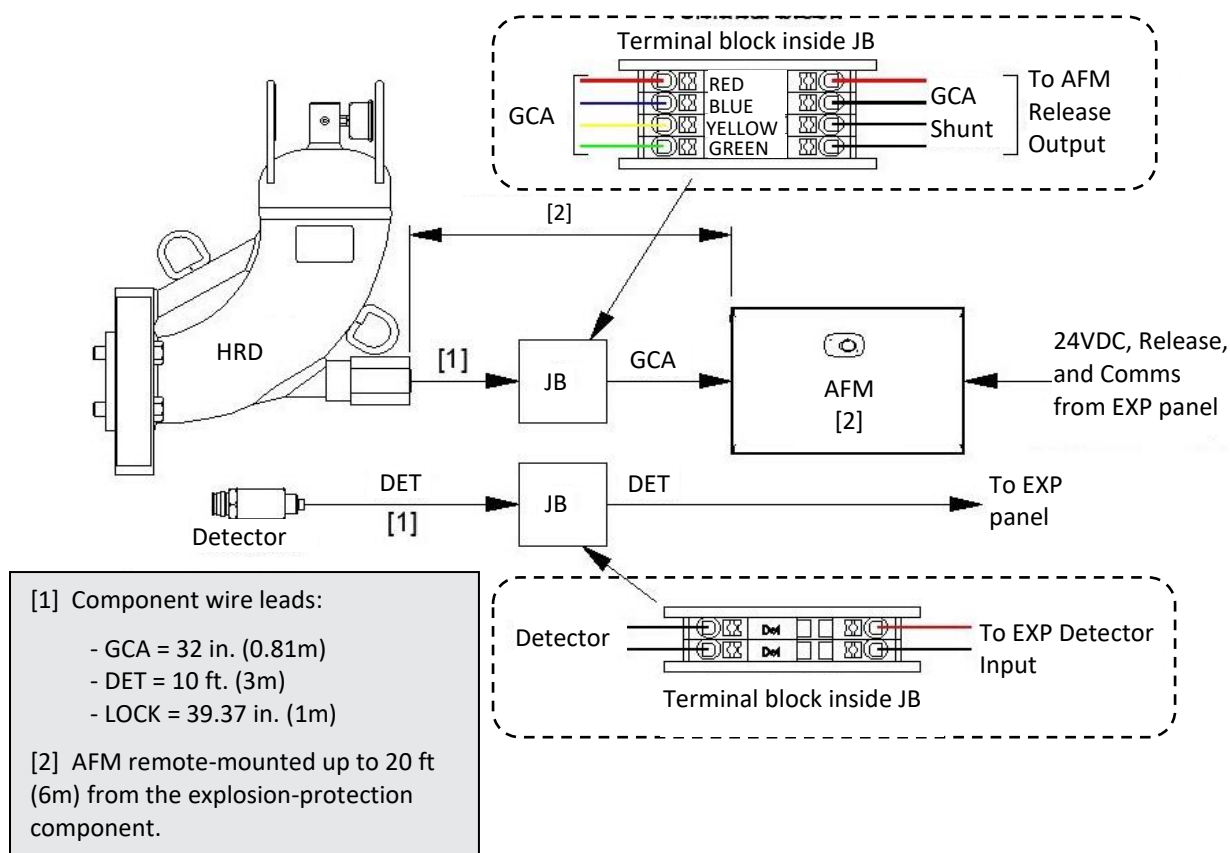
- GCA = 32 in. (0.81m)
- DET = 10 ft. (3m)
- LOCK = 39.37 in. (1m)

[2] AFM attached to the mounting bracket on the explosion-protection component

4.2.2 Mounting Method Two

Method two allows the AFM enclosure to be mounted a maximum of 20 feet (6.1 m) from the explosion protection component it serves. See **Figure 15**. The location for mounting the AFM enclosure shall comply with the criteria outlined at the beginning of this section.

Figure 15- AFM Remote Mounted



Use the following steps to install the AFM enclosure remotely:

- Step 1.** Verify that the mounting location for the enclosure complies with the criteria outlined at the beginning of this section.
- Step 2.** Mark and drill holes in the mounting surface. See Figures 16 through 19 for enclosure mounting measurements.
- Step 3.** Use suitable anchors to secure the enclosure firmly in place.
- Step 4.** Refer to section 4.3 for instructions on installing the AFM circuit board.

Figure 16 – Enclosure 1 (P/N 02-16910) or 2 (P/N 02-16911) Mounting
inch [mm]

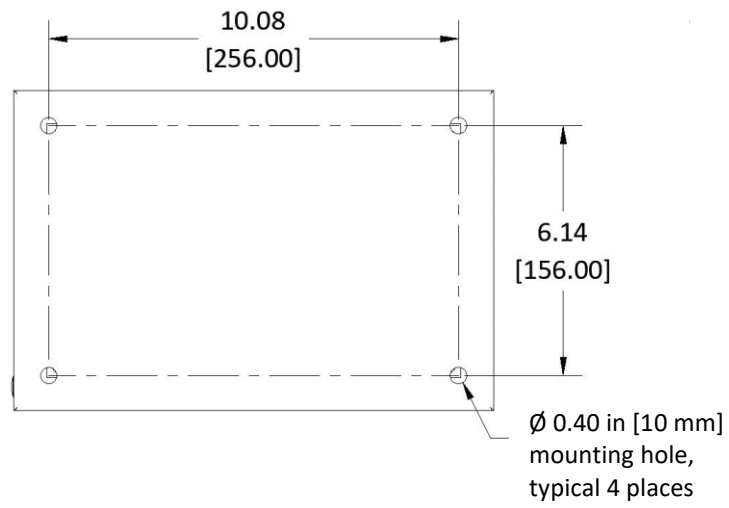


Figure 17 – Enclosure 3 (P/N F0292626) Mounting
inch [mm]

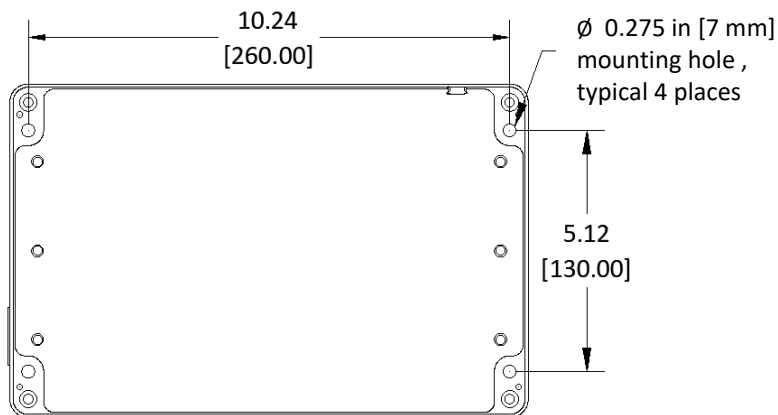


Figure 18 – Enclosure 4 (P/N F0290389) Mounting
inch [mm]

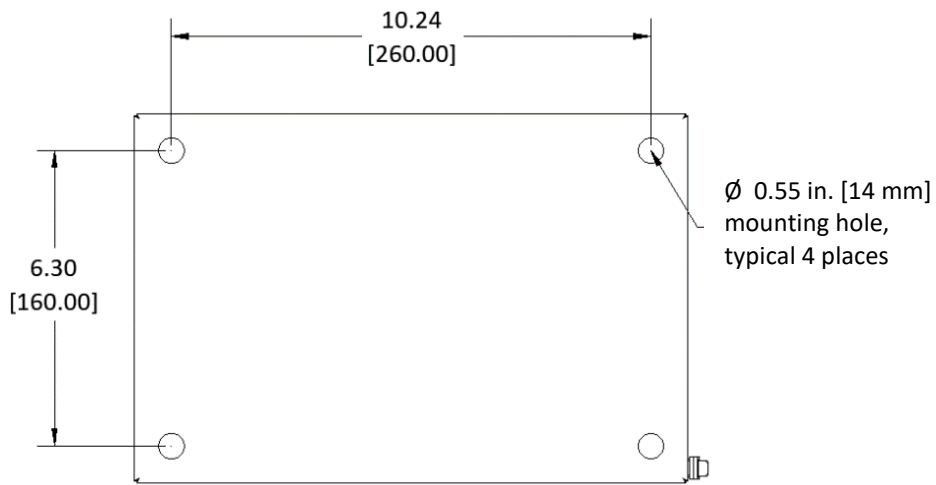
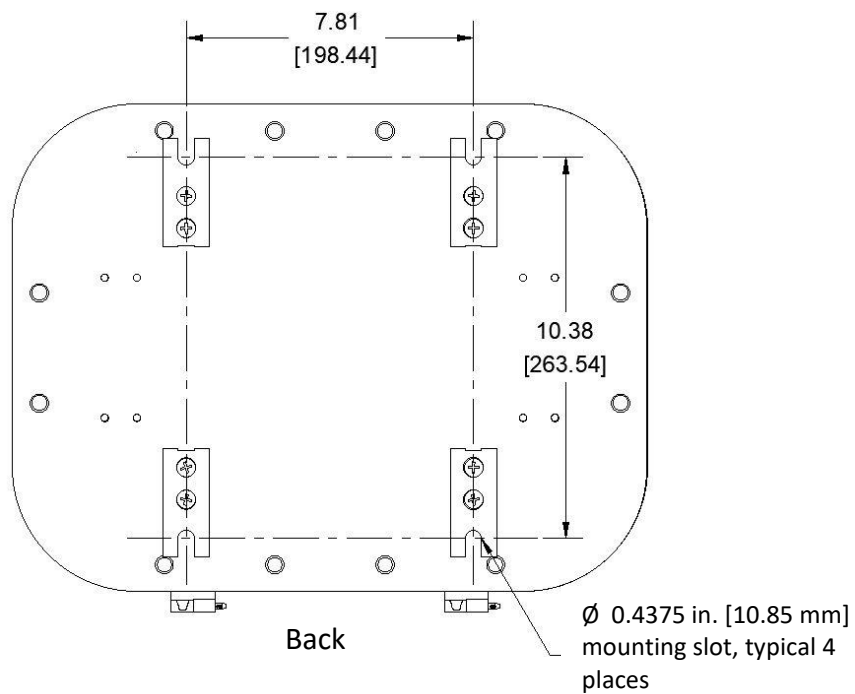


Figure 19 – Enclosure 5 (P/N F0292627) and 6 (P/N F0293929) Mounting
inch [mm]



NOTE: AFM Enclosures 5 and 6 can only be remotely mounted.

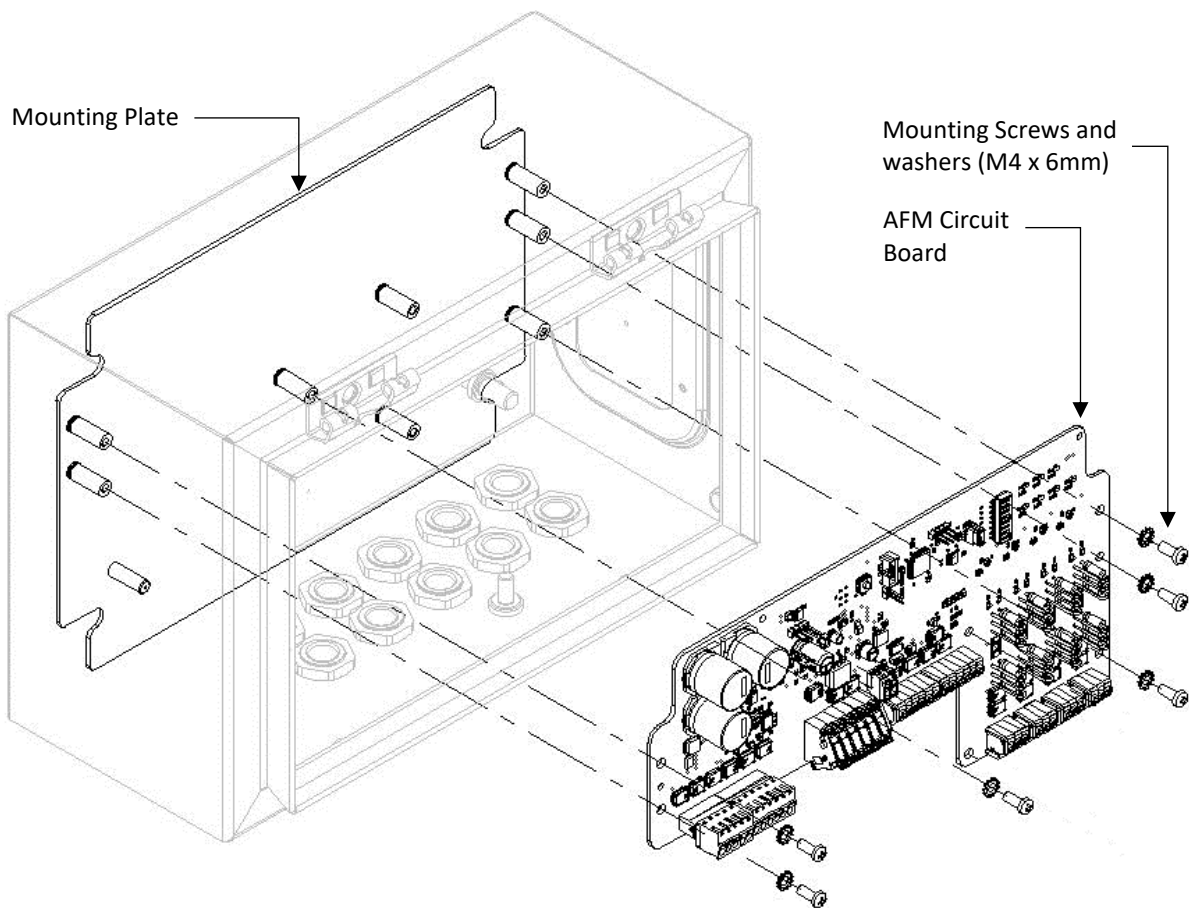
4.3 AFM Circuit Board Installation



For AFMs where the enclosure and circuit board are shipped separately (uninstalled), use the following steps to install the AFM circuit board into the enclosure. See **Figure 20**.

- Step 1.** After mounting the enclosure, thoroughly clean the enclosure to remove all debris and dust.
- Step 2.** Remove the circuit board from its anti-static packing. Take appropriate anti-static precautions before handling the board.
- Step 3.** Set the module's address. Refer to Section 5.
- Step 4.** Orient the circuit board so that the holes in the AFM board line up with the mounting plate standoffs.
- Step 5.** Secure the circuit board to the mounting plate inside the enclosure using the screws and washers provided.

Figure 20 – Typical AFM Installation (shown in Enclosure 1, P/N 02-16910)



4.4 Electrical Installation



The wiring diagrams in this section are typical for all AFM versions (i.e., Single Input Energetics, Dual Input Energetics, and Dual Input Solenoid). Electrical connections to AFM shall only be made after the field wiring has been properly inspected and tested.

CAUTION: If installing intrinsic safe and non-intrinsic safe wiring, verify that the separation between intrinsic and non-intrinsic safe wiring within the AFM enclosure is maintained correctly.

NOTE: Crimped-pin connectors (ferrules) are recommended for ease of use and longevity. Verify wires are correctly labeled to ensure connection to the correct circuits.

4.4.1 (P1) Actuator Output Wiring

The AFM's Actuator Output terminals provide a connection point for the actuator devices that activate Fike's explosion protection components (i.e., HRDs, SRDs, gate valves, pinch valves, etc.). Refer to the corresponding explosion component manual(s) for detailed instructions on connecting the AFM to the actuating devices.

The following figure shows how to connect the actuator devices to the AFMs Actuator Output terminals.

CAUTION: Connection of actuators to AFM(s) should be conducted after the system has been thoroughly tested and is ready for normal operation.

Figure 21 – (P1) Actuator Output Wiring

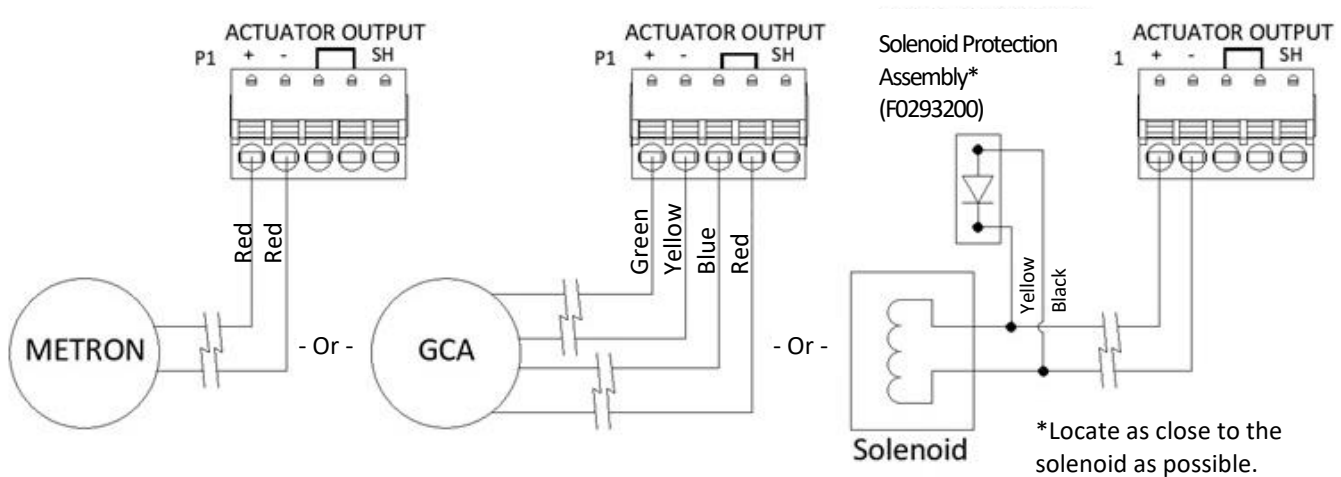


Table 6 – P1 Circuit Specifications

Compatible Releasing Devices	Fike GCA, Metron, or tested 6/12/24-volt solenoid
Output Current	3A for 3ms minimum; 2A maximum for solenoids
Recommended Wire Type	Twisted shielded pair with drain wire (LiYCY cable or Belden 9318, 9316 preferred)
Terminal Blocks Accept	20 AWG (0.50mm ²) minimum, 16 AWG (1.5mm ²) maximum
Wire Resistance	4 ohms maximum

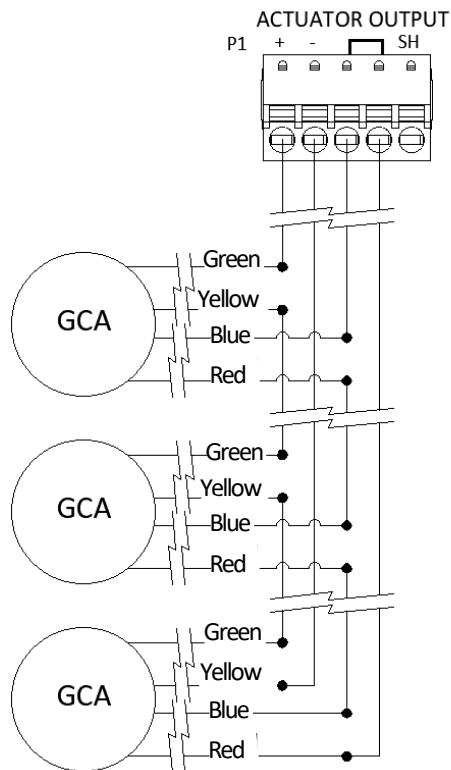
4.4.2 (P1) Release Output Wiring with Multiple GCAs

By default, only one actuator device should be connected to Actuator Output terminals; however, specific Fike explosion protection components require three energetic devices for activation.

The following figure shows how to connect multiple energetics to the AFM Actuator Output terminals.

CAUTION: The intent is for the AFM to be connected to only one field component. Connecting multiple energetic devices to a single AFM shall be limited to field components that require multiple energetic devices for activation.

Figure 22 – (P1) Series-Release Output Wiring



4.4.3 (P2 and P3) Release Input 1 and 2 Wiring

The AFM's Release Input terminals provide a connection point for the EXP panel's Release Output(s) circuit A or B. This connection provides a reverse polarity signal for activating the AFM Actuator Output.

The following figure shows how to connect the panel's Release Input circuit to the AFM Release Input terminals.

NOTE: The Dual Input and Solenoid AFMs have two Release Inputs, while the Single Input AFM has only one Release Input.

Figure 23 – (P2 or P3) Release Input 1 or 2 Wiring

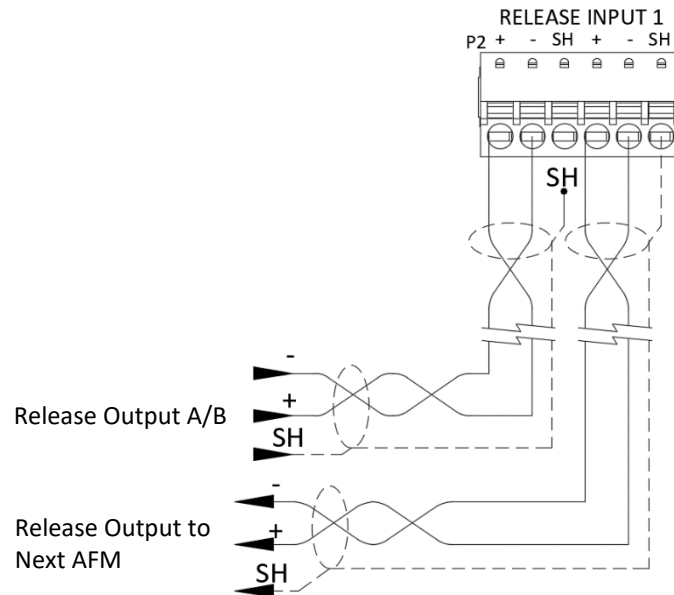


Table 7 – P2 & P3 Circuit Specifications

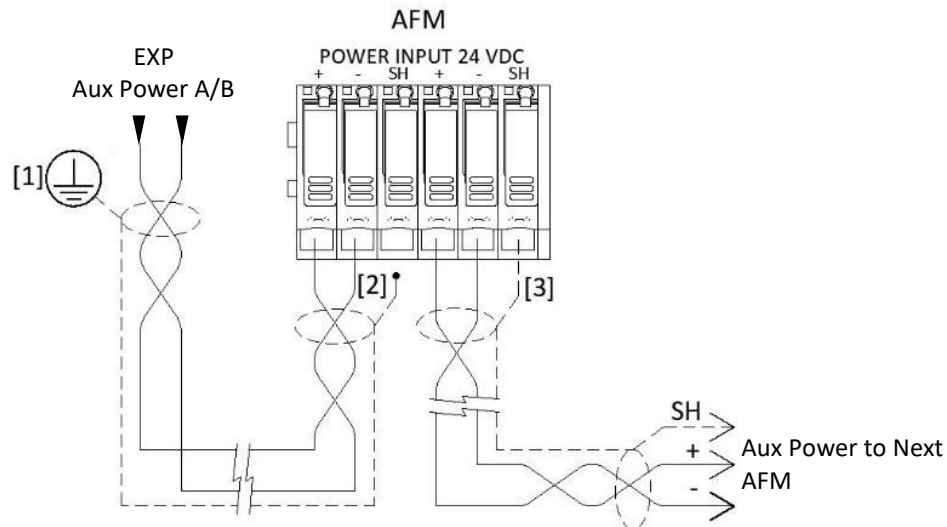
Current Consumption	0.012A @ 24 VDC (normal standby)
Voltage	24VDC nominal
Recommended Wire Type	Twisted shielded pair with drain wire (LiYCY cable or Belden 9318, 9316 preferred)
Terminal Blocks Accept	20 AWG (0.50mm ²) minimum, 16 AWG (1.5mm ²) maximum

4.4.4 (P4) Power Input 24 VDC Wiring

The AFM's Power Input terminals provide a connection point for the EXP panel's AUX Power circuit A or B. This connection provides 24VDC power to the AFM(s) for operation. The type and number of AFMs that can be connected to each of the EXP's Aux Power circuits is limited by the maximum 2 amp allowable current draw for each circuit. Refer to the system battery calculations for details.

The following figure shows how to connect the panel's AUX Power circuit to the AFM Power Input terminals.

Figure 24 – (P4) Power Input 24 VDC Wiring



- [1] Land shield wire to the Protective Earth bar in the EXP enclosure.
- [2] Insulate shield wire. DO NOT land.
- [3] Land shield wire to the AFM outgoing terminals only.

Table 8 – P4 Circuit Specifications

Current Consumption	0.013A @ 24 VDC (normal standby)
Voltage	24VDC nominal
Recommended Wire Type	Twisted shielded pair with drain wire (LiYCY cable or Belden 9318, 9316 preferred)
Terminal Blocks Accept	18AWG (0.75mm ²) minimum, 14AWG (2.5mm ²) maximum

CAUTION: To reduce the electromagnetically induced noise to a level that will not affect the required performance of the EXP system, verify all earth connections. It is preferred to have the enclosure and conduits connected to Protective Earth (similar to other building grounds)

4.4.5 (P5) Card Bus Com Wiring

The AFM's Card Bus Com terminals provide a connection point for the EXP panel's Card Bus Com circuit A or B. This connection enables the EXP panel to supervise the AFM operation.

The following figure shows how to connect the Card Bus Com circuit to the AFM.

Figure 25 – (P5) Card Bus Com Wiring

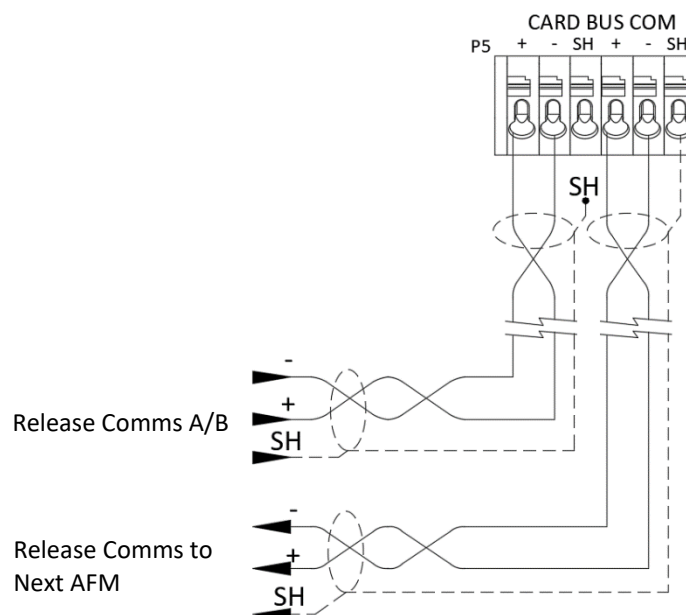


Table 9 – P5 Circuit Specifications

Data Communication Pulse	0 – 1VDC (should never be constant voltage or 0VDC)
Circuit Type	Class B only; t-tapping of the circuit is not allowed Power-limited and supervised
Wire Type	RS485 cable (Belden 9841 or equivalent)
Wire Length	4,000 ft. (1200 m) maximum
Wire Impedance	96Ω maximum
Wire Capacitance	0.0512 μF maximum
Terminals Blocks Accept	30 AWG (0.05mm ²) minimum, 16 AWG (1.5mm ²) maximum

4.4.6 (P7 – P10) Field Input Wiring

The AFM's Field Input terminals provide a connection point for compatible field inputs associated with the explosion protection components (i.e., container mechanical lock, container low-pressure monitoring, and position indicators). This connection enables the EXP panel to supervise the status of the explosion protection components.

The following figure shows how to connect the compatible field inputs to the AFM Field Input terminals, using either a normally-open switch or a normally-closed switch configuration.

NOTE: Ensure the EXP configuration setup agrees with the contact configuration of the switch installed.

Figure 26 – (P7 – P10) Field Input Wiring (N.O. switch)

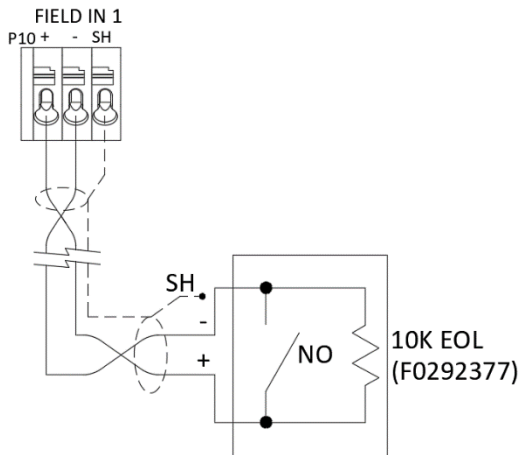


Figure 27 – (P7 – P10) Field Input Wiring (N.C. switch)

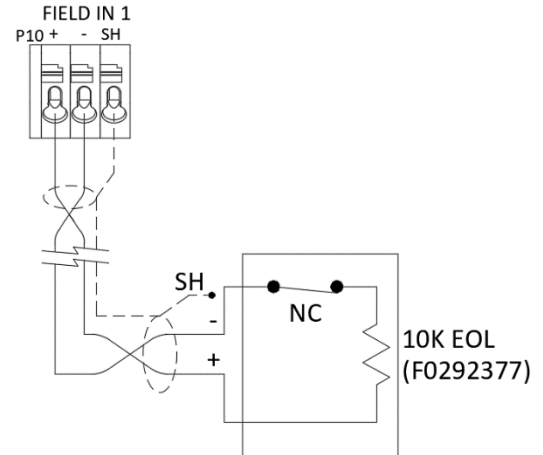


Table 10 – P7 – P10 Circuit Specifications

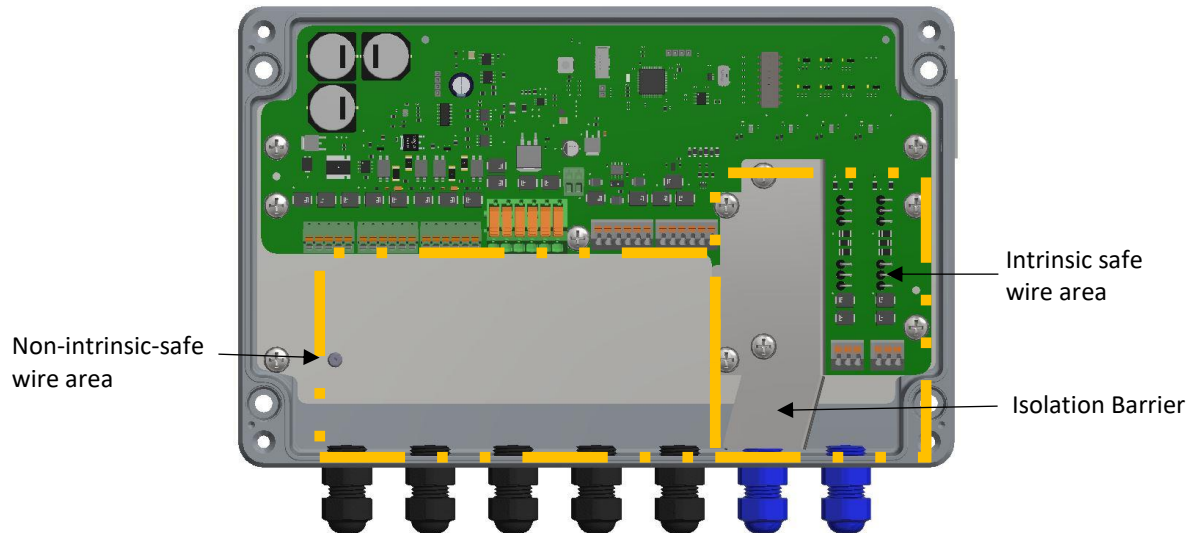
Contact Type	Normally Open or Normally Closed
Contact Rating	12VDC @ 2.1mA
Circuit Type	Class B only
Circuit EOL	10K EOLR (P/N F0292377)
Terminals Accept	30 AWG (0.05mm ²) minimum, 16 AWG (1.5mm ²) maximum

4.5 Intrinsic-Safe Wire Separation

Terminals P7, P8, P9, and P10 on each AFM circuit board can be connected to non-intrinsic-safe or intrinsic-safe circuits. The conductors for intrinsic safe circuits must be separated from conductors of any non-intrinsic safe circuit. To ensure continuous separation of the intrinsic safe circuits from the non-intrinsic-safe circuits, isolation barriers (ordered separately) must be installed. See section 13 for ordering.

Two barriers (“A” & “B”) are included with each kit. Barrier “A” allows all four field input circuits to be wired as intrinsically safe when installed. Installing both Barrier “A” and “B” allows two field input circuits to be wired as intrinsically safe.

Figure 28 – AFM with Isolation Barriers Installed



4.5.1 Barrier Installation Procedure



Use the following instructions to install the isolation barrier into the AFM enclosure. See **Figure 29**.

- Step 1.** Verify that the barrier kit is the correct part for the AFM enclosure.
- Step 2.** Verify which field input circuits are non-intrinsic versus intrinsic safe.
- Step 3.** Install Barrier “A” by removing the two screws used to secure the AFM circuit board to the mounting plate; then use the same screws to secure Barrier “A” and the AFM circuit board to the mounting plate.

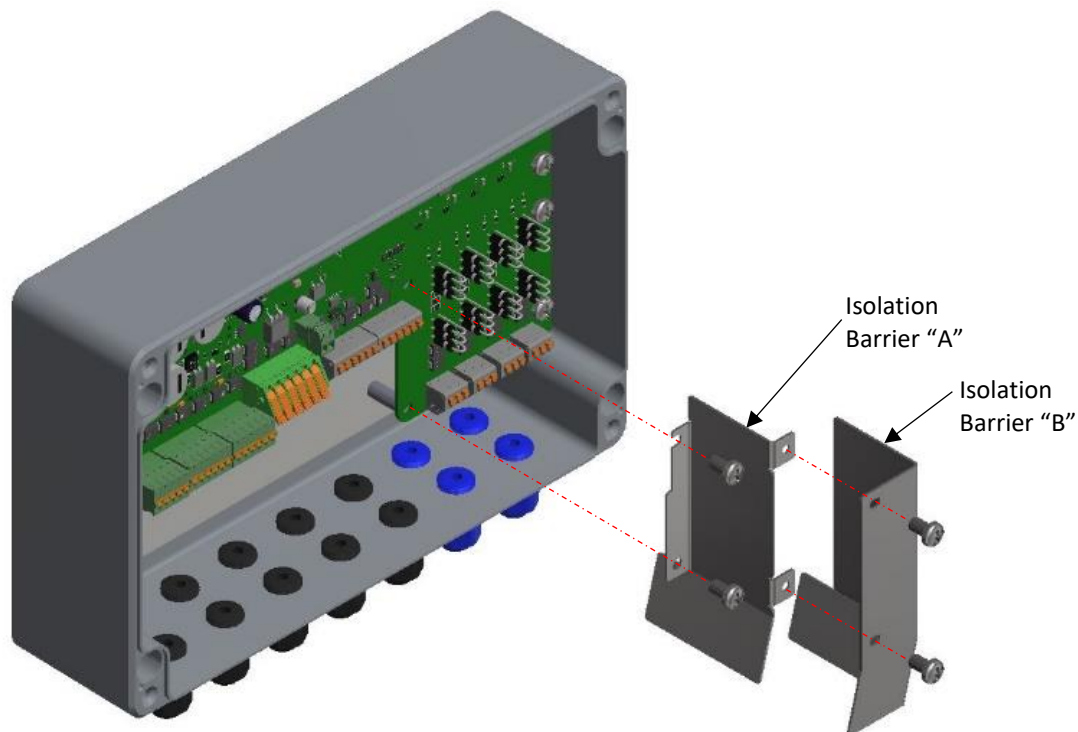
NOTE: Installing barrier “A” allows all four circuits to be wired intrinsically safe.

- Step 4.** Install Barrier “B” to Barrier “A” using the two screws provided with the kit.

NOTE: Installing barriers “A” and “B” allows two circuits to be wired intrinsically safe and the other two as non-intrinsically safe.

- Step 5.** Verify that the intrinsic safe wires are physically separated from the non-intrinsic safe wires.

Figure 29 – AFM Isolation Barrier Installation



5 SETTING THE AFM ADDRESS

Each AFM must be assigned a unique address (1 – 10) using dip-switch SW2. The address is used to identify each module on the panel's RS485 Card Communication Bus. Zone A AFMs must be assigned to addresses 1-10, and Zone B AFMs must be assigned to addresses 11-20. Refer to

Table 11 – AFM Binary Addressing to set the AFM address. In addition, the assigned AFM address must match the address assigned in the configuration loaded into the EXP panel. Failure to address the AFMs correctly will result in communication errors and erroneous system operation.



Use the following instructions to set the AFM address. See **Figure 30**.

- Step 1.** Locate DIP-switch SW2 on the AFM board.
- Step 2.** Referring to Table 11, set DIP switches 1-5 accordingly to set the address.

NOTE: Changing the AFM address with power applied to the EXP panel requires either that the SW1 reset button on the AFM be pressed or the system power supplied to the AFM be cycled before the address change will take effect.

Figure 30 – Setting the AFM Address

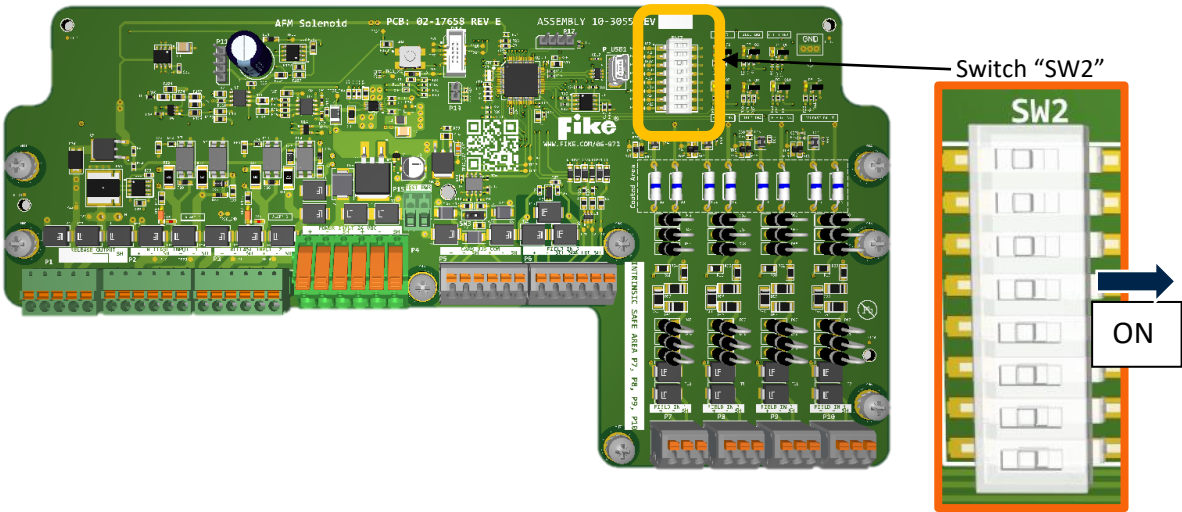


Table 11 – AFM Binary Addressing

Switch	1	2	3	4	5
Value	1	2	4	8	16
Zone A AFM Addresses	1	ON			
	2		ON		
	3	ON	ON		
	4			ON	
	5	ON		ON	
	6		ON	ON	
	7	ON	ON	ON	
	8				ON
	9	ON			ON
	10		ON		ON

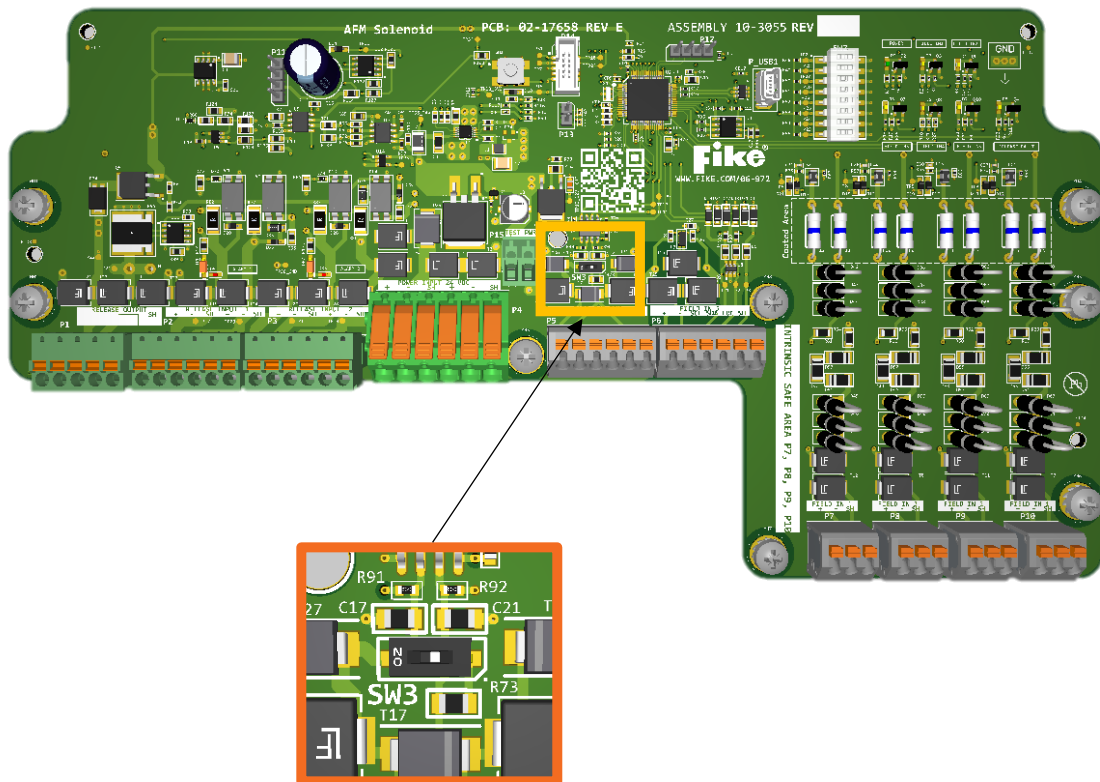
Switch	1	2	3	4	5	
Value	1	2	4	8	16	
Zone B AFM Addresses	11	ON	ON		ON	
	12			ON	ON	
	13	ON		ON	ON	
	14		ON	ON	ON	
	15	ON	ON	ON	ON	
	16					ON
	17	ON				ON
	18		ON			ON
	19	ON	ON			ON
	20			ON		ON

6 ENABLING THE AFM CARDBUS TERMINATION RESISTOR



If multiple AFMs are connected to the same releasing zone (circuit A or B), switch SW3 on the last AFM connected to the circuit must be set to the **ON** position. This enables the 120Ω EOL integral to the AFM. Switch SW3 on all other AFMs **MUST BE SET TO THE OFF POSITION**.

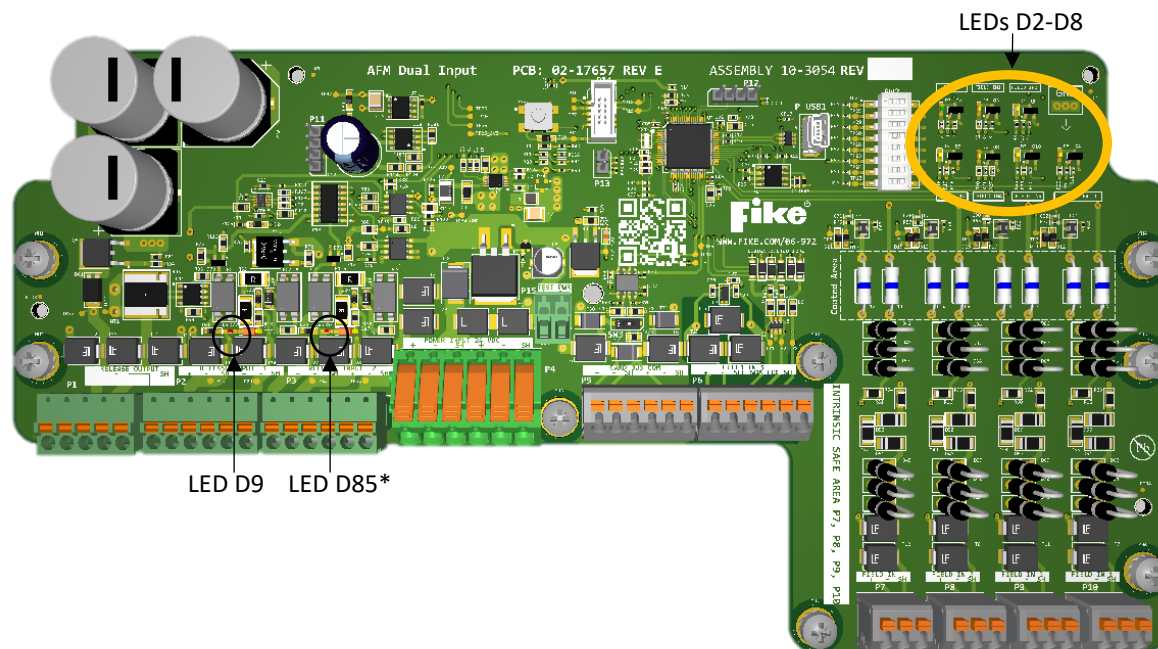
Figure 31 – Enabling the AFM Card Bus Termination Resistor



7 DIAGNOSTIC LEDs

Each AFM circuit board has several diagnostic LEDs that indicate the status of the AFM. The LEDs can be used for system troubleshooting.

Figure 32 – Diagnostics LEDs



***NOTE:** LED D85 does not apply to AFM, P/N 10-3012

Table 12 – AFM LED Indicators

LED	INDICATION
D2 Power - Green LED	Solid with DC Power supplied Blinking when AFM is communicating with the main panel.
D3 Field In1 - Yellow LED	Illuminates yellow when in a NOT NORMAL state. Indicates Fault or Input Active.
D4 Field In2 - Yellow LED	
D5 Field In3 - Yellow LED	
D6 Field In4 - Yellow LED	
D7 Field In5 - Yellow LED	For Future Use Only.
D8 Release Fault - Yellow LED	Indicates fault in Release Output Circuit. Check for open (high impedance) or short (low impedance—applicable only to Solenoid AFM)
D9 Release Input 1 - Red LED	Indicate input is Active
D85 Release Input 2 - Red LED	

8 INSPECTION AND TEST

AFMs must be inspected and tested as part of the EXP system. Refer to EXP System Controller Manual, P/N P22419, for testing requirements.

The release functionality of each AFM must be tested using the Fike Output Analyzer, P/N 10-2983. The frequency of this test shall coincide with the functional testing of the EXP system.

CAUTION: Disconnect the Actuator from each AFM before testing to prevent accidental activation of the explosion protection components.

9 SERVICE

The AFMs have no serviceable parts and must be replaced if visual signs of damage to the circuit board or improper operation is detected during testing.

10 CARE AND CLEANING

Use a non-corrosive detergent solution and a soft, nonabrasive cloth to clean the exterior of the AFM enclosure. Do not use corrosive cleaning solutions, abrasive cloths, etc. Remove any dust or debris from the interior of the AFM enclosure using compressed air during inspection and testing.

11 REMOVAL FROM SERVICE



Removing an AFM from service should only be performed by Factory Trained and Certified Personnel assigned to prepare and complete the removal of the AFM from service.

Refer to Fike document P/N P22419, **EXP System Controller Manual** for Removal from Service procedure.

12 AFM ASSEMBLIES AND KITS

Part Number	Description
F0292113	Factory Assembled, Single Input Energetics, Actuator Field Module, Carbon Steel enclosure (P/N 06-16910) with factory-installed M16 cable glands
F0292114	Field Assembled, Single Input Energetics, Actuator Field Module, Carbon Steel enclosure (P/N 06-16910)
F0292115	Factory Assembled, Single Input Energetics, Actuator Field Module, Stainless Steel enclosure (P/N 06-16911) with factory installed M16 cable glands
F0292116	Field Assembled, Single Input Energetics, Actuator Field Module, Stainless Steel enclosure (P/N 06-16911)
F0292117	Factory Assembled, Single Input Energetics, Actuator Field Module, Stainless Steel enclosure (P/N F0292626) with factory installed M16 cable glands
F0292118	Field Assembled, Single Input Energetics, Actuator Field Module, Stainless Steel enclosure (P/N F0292626)
F0292119	Factory Assembled, Single Input Energetics, Actuator Field Module, Aluminum enclosure (P/N F0290389) with factory installed M16 cable glands
F0292120	Field Assembled, Single Input Energetics, Actuator Field Module, Aluminum enclosure (P/N F0290389)
F0292121	Factory Assembled, Single Input Energetics, Actuator Field Module, EXd Cast Aluminum enclosure (P/N F0293929) with factory drilled conduit penetrations
F0295130	Factory Assembled, Single Input Energetics, Actuator Field Module, EXd Cast Aluminum enclosure (P/N F0292627) with factory installed M16 cable glands
F0292122	Factory Assembled, Dual Input Energetics, Actuator Field Module, Carbon Steel enclosure (P/N 06-16910) with factory-installed M16 cable glands
F0292123	Field Assembled, Dual Input Energetics, Actuator Field Module, Carbon Steel enclosure (P/N 06-16910)
F0292124	Factory Assembled, Dual Input Energetics, Actuator Field Module, Stainless Steel enclosure (P/N 06-16911) with factory installed M16 cable glands
F0292125	Field Assembled, Dual Input Energetics, Actuator Field Module, Stainless Steel enclosure (P/N 06-16911)
F0292126	Factory Assembled, Dual Input Energetics, Actuator Field Module, Stainless Steel enclosure (P/N F0292626) with factory installed M16 cable glands
F0292127	Field Assembled, Dual Input Energetics, Actuator Field Module, Stainless Steel enclosure (P/N F0292626)
F0292128	Factory Assembled, Dual Input Energetics, Actuator Field Module, Aluminum enclosure (P/N F0290389) with factory installed M16 cable glands
F0292129	Field Assembled, Dual Input Energetics, Actuator Field Module, Aluminum enclosure (P/N F0290389)

F0292130	Factory Assembled, Dual Input Energetics, Actuator Field Module, EXd Cast Aluminum enclosure (P/N F0293929) with factory drilled conduit penetrations
F0295131	Factory Assembled, Dual Input Energetics, Actuator Field Module, EXd Cast Aluminum enclosure (P/N F0292627) with factory installed M16 cable glands
F0292131	Factory Assembled, Dual Input Solenoid, Actuator Field Module, Carbon Steel enclosure (P/N 06-16910) with factory-installed M16 cable glands
F0292132	Field Assembled, Dual Input Solenoid, Actuator Field Module, Carbon Steel enclosure (P/N 06-16910)
F0292133	Factory Assembled, Dual Input Solenoid, Actuator Field Module, Stainless Steel enclosure (P/N 06-16911) with factory installed M16 cable glands
F0292134	Field Assembled, Dual Input Solenoid, Actuator Field Module, Stainless Steel enclosure (P/N 06-16911)
F0292136	Factory Assembled, Dual Input Solenoid, Actuator Field Module, Stainless Steel enclosure (P/N F0292626) with factory installed M16 cable glands
F0292137	Field Assembled, Dual Input Solenoid, Actuator Field Module, Stainless Steel enclosure (P/N F0292626)
F0292138	Factory Assembled, Dual Input Solenoid, Actuator Field Module, Aluminum enclosure (P/N F0290389) with factory installed M16 cable glands
F0292139	Field Assembled, Dual Input Solenoid, Actuator Field Module, Aluminum enclosure (P/N F0290389)
F0292140	Factory Assembled, Dual Input Solenoid, Actuator Field Module, EXd Cast Aluminum enclosure (P/N F0293929) with factory drilled conduit penetrations
F0295132	Factory Assembled, Dual Input Solenoid, Actuator Field Module, EXd Cast Aluminum enclosure (P/N F0292627) with factory installed M16 cable glands

13 SPARE PARTS

Part Number	Description
10-3012	AFM Circuit Board, Single Input Energetics
10-3054	AFM Circuit Board, Dual Input Energetics
10-3055	AFM Circuit Board, Dual Input Solenoid
29975289	Cable Gland M16X1.5 dia 4-8 MM EEXE IIKEMA EX-93.C9125 Black
29975489	Cable Gland M16X1.5 dia 4-8 MM EEXE II PTB EX-93.C3125 Blue
29972231	Cable Gland M16X1.5 dia 4-8 MM ATEX SST
29964489	Stopping plug M16x1.5 ATEX II G/D IP66 Black
F0299184	Nut for Cable Gland M16 Polyamide
F0299187	Nut for Cable Gland M16 1.4404 SST
F0290142	Bracket for PCB support
F0292377	10K EOL Assembly
F0292836	M4 Screw/Washer Kit (Qty 30/30)
F0292856	M6 Screw/Washer Kit (Qty 10/10)
02-12326	Bonding Wire, 10 in x 0.25 in (254mm x 6.35mm)
F0294597	Wire-Isolation Barrier kit for Intrinsically-Safe applications, CS/SS/Rose SS
F0294598	Wire-Isolation barrier kit for Intrinsically Safe applications, Aluminum enclosure
F0294599	Wire-Isolation Barrier kit for Intrinsically Safe applications, EX-D enclosure



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