TechnipFMC

FUEL-FACS+ DET

Installation Manual

Bulletin MN06050 Issue/Rev. 0.0 (9/24)

Important

All information and technical specifications in this document have been carefully checked and compiled by the author; however, we cannot completely exclude the possibility of errors. TechnipFMC is always grateful to be informed of any errors; contact us at TechnipFMC.com.

Caution

The default or operating values used in this document and in the configuration parameters of the AccuLoad IV are for factory testing only and should not be construed as default or operating values for your metering system. Each metering system is unique and each configuration parameter must be reviewed and programmed for that specific metering system application.

Disclaimer

TechnipFMC hereby disclaims all responsibility for damages, including but not included to consequential damages arising out of or related to the inputting of incorrect or improper program or default values entered in connection with the AccuLoad IV.

Technical Support

Field Service Response Center
24/7 Technical Support/Schedule a Technician: +1 844.798.3819

System installation supervision, startup, and commissioning services are available.

Customer Support

Customer Service
TechnipFMC
Measurement Solutions
1602 Wagner Avenue
Erie, PA 16510 USA
+1 814.898.5000
MS.ResponseCenter@TechnipFMC.com
TechnipFMC.com

Literature Library
https://info.smithmeter.com/literature/online_index.html

Contents

1 Introduction

This manual provides guidance for the installation of FUEL-FACS+ DET NEMA 4 and explosion-proof models. When installed following the guidelines contained in this manual, the FUEL-FACS+ DET will provide many years of safe, accurate, and reliable use. This manual addresses the requirements specific to the FUEL-FACS+ DET and it is assumed that the installation designers and fabricators are familiar with the applicable industrial facility construction standards specific to the particular facility. The explosion-proof model is designed for use in Class I, Division 1, and Ex db Zone 1 hazardous locations, while the NEMA Type 4 model is designed for Class I, Division 2 environments. If questions arise, please contact our Field Service Response Center or Customer Support.

1.1 Warnings and Precautions

Before you begin, please read all of the following warnings and cautions to reduce the risk of injury, equipment damage, or malfunction.

1.1.1 Configuration

The FUEL-FACS+ DET is shipped from the factory in a completely initialized state and must be properly configured for the specific installation prior to operation. The unit will not operate until the configuration is completed. All configuration parameters are accessible through the touch screen.

1.1.2 Hazardous Voltages

Hazardous voltages are involved in the installation and maintenance of the FUEL-FACS+ DET. Only qualified individuals should perform this installation.

1.1.3 Hazardous Locations

The explosion-proof model is approved for use in an explosive environment (Class I Division 1, Groups C and D and Zone 1 Ex db ia, IIB Gb), but specific installation methods are required to produce a comprehensive explosion-proof system. This manual only provides guidance for the installation of the FUEL-FACS+ DET. In general, keeping the front cover bolted closed in accordance with the instructions in section 8.1: Securing Explosion-Proof Housing on page 17 is the key to maintaining explosion protection.

Any modification of the FUEL-FACS+ DET housing invalidates the hazardous location rating of the FUEL-FACS+ DET. For example,

- Do not replace the bolts in the front cover except with those supplied by the manufacturer. Using unapproved bolts invalidates the explosion-proof rating of the enclosure.
- Do not drill or machine the housing.
- Do not attempt to replace the touch screen or glass except as part of the factory-supplied assembly.

1.1.4 Electrostatic Discharge Precautions

The electronic components in the FUEL-FACS+ DET are susceptible to damage by static discharge. To minimize the risk of damage, the following precautions should be followed:

- Before touching a circuit board with hands or tools, personnel and tools should be grounded using a wrist strap.
- Avoid touching components or traces on the circuit boards and handle by the edges or mounting holes.
- Circuit boards should be kept in conductive bags when not installed.

1.1.4.1 Electrostatic Discharge Precautions in Hazardous Locations

Note the following additional precautions when operating the FUEL-FACS+ DET in hazardous locations:

- The touch screen features a plastic screen protector installed from the factory which has a surface area exceeding the area specified in IEC/EN 60079-0, and as such requires the following statement: “Warning: Clean display with a damp cloth only.” This is to ensure that stray static charges are not built up on that surface, which could lead to a static discharge.

  ATEX-approved installations have special requirements; see section 3.1: Electrical Installation on page 7 for details.

  To ensure the correct operation, see section 7: General Wiring Notes on page 14 for field input/output wiring diagrams.

- Special care must be taken with shielding termination to ensure signal integrity. See section 3.2: General Requirements on page 9 for more information.

- The AC and DC wiring should be physically separated (do not use the same conduit/ entry) to avoid induced noise.
- The A4M module can supply a maximum of 1.0 amps at 24 volts direct current (VDC).

1.1.5 RF Radiation

The FUEL-FACS+ DET generates, uses, and can radiate radio frequency (RF) energy and, if not installed and used in accordance with this manual, may cause interference to radio communications. It has not been tested to comply with the limits pursuant to Part 15 (CFR 47) of FCC Rules, as electronic control equipment used by an industrial complex is exempt from the rules.

Operation of this equipment in a residential area may cause interference, in which case the user, at their own expense, will be required to take whatever measures that may be required to correct the interference. The FUEL-FACS+ DET has been evaluated against the standard EN 61326-1: “Electrical equipment for measurement, control, and laboratory use” and has been found to comply to the European Community EMC Directive 2014/30/EU.

2 Pre-Installation Considerations

2.1 Environmental Considerations

2.1.1 All Models of the FUEL-FACS+ DET

In areas where the ambient temperature is very high, it is recommended that the equipment be installed under a canopy or sun shield to limit direct sunlight radiation.

In areas of high humidity (tropical) or with varying temperature swings, it is recommended to place TechnipFMC P/N 647 001 443 or similar desiccant packs inside of the enclosures and to maintain these while in service.

2.1.2 Stainless Steel (N4) Model

The enclosures are manufactured from stainless steel and offer a higher resistance to corrosive environmental atmospheres. See section 9: Enclosure Maintenance on page 24 for additional information.

2.1.3 Explosion-Proof (XP) Model

The enclosure of the explosion- and flame-proof model is manufactured from aluminum alloy, and is designed to be operated in normal environmental conditions free of corrosive agents.

In areas including but not limited to environmentally corrosive atmospheres, special considerations for additional environmental protection should be made if installing into near-shore areas that are subject to wind-borne salty seawater spray and subject to possible continuous accumulations of salt water on the equipment. The recommended protection is exclusion of the environment by placing the equipment into a secondary protected environment, such as a kiosk or control room. If exclusion of the environment is not possible, then extra means must be taken to maintain the equipment's integrity, including frequent cleaning and inspection intervals. See enclosure maintenance details in Section 9 for additional information.

2.2 Mechanical Installation

In addition to all previous warnings and cautions, the following installation recommendations should be reviewed before installation:

- A solid bracket (rear- or bottom-mount) should be used to support the FUEL-FACS+ DET. Refer to the FUEL-FACS+ DET Specification (SS06050) for the weight and mounting dimensions.
- The location and the height of the FUEL-FACS+ DET should permit easy operation of the front touch screen and allow for a near-perpendicular viewing angle to minimize parallax effects.
- Leave room for the front panel of the FUEL-FACS+ DET to open at least 90 degrees to provide access for servicing the FUEL-FACS+ DET. Note that the covers are hinged on the left.
- Although the FUEL-FACS+ DET is rated to operate in ambient temperatures up to 60 degrees Celcius (°C), it is advisable to keep all electronics as cool as possible to reduce thermal stress on the electronic components.

2.3 Electrical

In addition to the following installation recommendations, all previous warnings and cautions should be reviewed before installation:

- All wiring must be routed into the FUEL-FACS+ DET through the cable entries. Do not route direct current (DC) and alternating current (AC) wiring through the same conduit.
- The DC signal wires must be shielded multi-conductor cable of 18 to 24 American Wire Gauge (AWG) minimum stranded copper.
- For Ethernet connections, a minimum of Category 5 (CAT 5) rated cable should be used and standard Ethernet wiring practices should be followed.
- Connectors are sized for a maximum of 14-gauge wire; consult your local electrical codes for the minimum wire size required for your application.
- All AC wiring should be stranded copper and must comply with federal, state, and local codes and specifications.
- For proper operation, the FUEL-FACS+ DET must be earth grounded. The grounding point should be as close to the unit as possible. To ensure proper earth

grounding, the resistance between the ground lug in the FUEL-FACS+ DET and the grounding point must not exceed 2 ohms. The proper grounding point is a ½ inch to ¾ inch diameter copper stake that extends into the water table. Where this is not practical, a ground plane may be used.

> Electrical conduit, piping, and structural steel are not considered proper grounding points for equipment using electronics.

3 Installation

The general steps in the installation process are to physically mount the FUEL-FACS+ DET, electrically connect it to the associated equipment, and then tailor the configuration parameters to suit the specific operational environment. The following sections cover the mounting and wiring. Refer to the FUEL-FACS+ DET Specification (SS06050) for the mounting dimensions.

3.1 Electrical Installation

3.1.1 ATEX- and IECEx-Approved Installations (Explosion-Proof (XP) Model Only)

3.1.1.1 Standards Used

The following standards are used:

- International Electrotechnical Commission (IEC) 60079-0 7.0th Edition, EN 60079-0:2018, Underwriter Laboratories (UL) 60079-0 6th Edition, Canadian Standards Association (CAN/CSA) C22.2 No. 60079-0:11
- IEC 60079-1 7.0th Edition, EN 60079-1:2014, UL 60079-1 6th Edition, CAN/CSA C22.2 No. 60079-1:11
- IEC 60079-11 6th Edition, EN 60079-11:2012, UL 60079-11 6th Edition, CAN/CSA C22.2 No. 60079-11:14

3.1.1.2 Cable Entry

Cable entries must be in accordance to IEC 60079-1 Section 13:

- For wiring systems using cable glands, the gland or thread adapter must be Ex d certified. The cable end must be securely installed and, depending on the cable type, be properly protected from mechanical damage. Requirements outlined in Section 10.4 of IEC 60079-14 should be followed.
- For wiring systems using conduit, an Ex db certified sealing device must be immediately at the entrance of the enclosure. Any unused entry must be suitably blocked with an Ex db IIB IP65 certified plug for ATEX, IECEx and UKEx applications. For North American Zone applications, the plug must be listed close up type.

3.1.1.3 Equipment Bonding

Equipment bonding shall be provided at the external grounding facility terminal, external connection is not required when using metallic conduit or armored cable. External grounding facility terminal wire range: 10-12 AWG (5.26 sq mm to 3.31 sq mm wire).

3.1.1.4 Installation

General installation to be in accordance with IEC 60079-14, wiring system to be in accordance with section 9: Enclosure Maintenance on page 24.

3.1.1.5 Special Conditions for Safe Use

Special conditions for safe use include:

- Contact the manufacturer at the following address for information about the dimensions of the flameproof joints:

  Guidant Measurement
  1602 Wagner Avenue
  Erie, PA 16510 USA

- All unused apertures must be closed using Certified Ex db 11B Gb IP65 blanking elements.
- The special fasteners that secure the cover to the base are steel grade 12.9, M8 x 1.25 6g.
- For systems utilizing conduit, an Ex db IIB certified sealing device must be used immediately at the entrance of the enclosure.

3.1.1.6 Warnings

To prevent the ignition of hazardous atmospheres, disconnect from power supply before opening the enclosure. Keep tightly closed when circuits are alive. Contains internal battery-powered circuit; to prevent the ignition of hazardous atmospheres, do not open the enclosure unless the area is known to be non-hazardous. To reduce the risk of ignition of hazardous atmospheres, conduit runs must have a sealing fitting connected within 18 inches of the enclosure. Substitution of components may impair intrinsic safety.

3.1.1.7 Grounding

The touch keypad sensor is protected by an intrinsic safe barrier, the enclosure must be grounded as per national electrical code regulations, such as National Electrical Code (NEC)/Canadian Electrical Code (CEC).

Equipment bonding should be provided at the external grounding facility terminal; external connection is not required when using metallic conduit or armored cable.

The external grounding facility terminal wire range is 10 to 12 AWG (5.26 square millimeters (mm^2) to 3.31 mm^2) wire.

3.2 General Requirements

It is imperative that the electrical installation be performed by a competent individual that is familiar with associated risks involved with the installation, operation, and maintenance of electrical equipment in hazardous (classified) locations. This individual must possess knowledge of local and national electrical codes and ordinances concerned with hazardous location safety requirements. It is recommended (and may be required in some jurisdictions) that the final installation should be verified and inspected by the authority having jurisdiction before placing the equipment into service.

Electrical installations in hazardous areas have features specifically designed to make them suitable for use in such locations and it is the operator's responsibility to maintain the integrity of those special features.

The operator must ensure that electrical equipment is:

- Installed and operated correctly
- Monitored on a regular basis
- Maintained with due regard to safety

Additionally, the following guidelines should be followed:

- AC circuits must be isolated from DC circuits and brought into the unit through their respective conduit openings.
- Ensure all connections on the terminal blocks are tight.
- A ground lug is provided in the unit; the wire from the lug should be connected to the proper grounding point.
- Typical electrical installation diagrams are provided in the following sections to show the electrical connection between the FUEL-FACS+ DET and ancillary equipment. Before wiring the ancillary equipment, refer to its installation manual.

4 FUEL-FACS+ DET Models

Two models of the FUEL-FACS+ DET are available: the explosion-proof and NEMA 4 models, shown below.

Figure 1: FUEL-FACS+ DET N4 (NEMA 4) Model (with or without Card Reader)

Figure 2: FUEL-FACS+ DET XP (explosion-proof) Model

A common set of electronic modules are used in the different FUEL-FACS+ DET models, as follows:

- THMI—The touch screen display module mounted in the front panel of the unit
- A4M—Board with power supply, limited input/output, and serial communication
- Card Reader—Proximity card reader with serial communications interface
  - Integrated—Only available on the NEMA 4
  - Standalone version available for Division 1, Zone 1 applications

5 Wiring Connections

The following figures identify the wiring connections on each of the electronic modules:

Figure 3: THMI Module Connectors

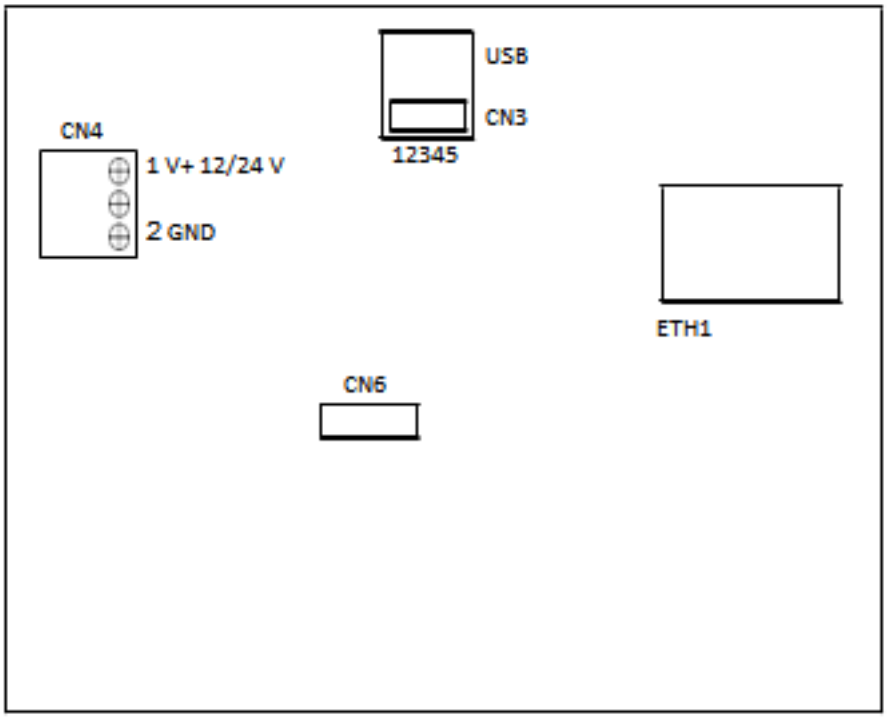
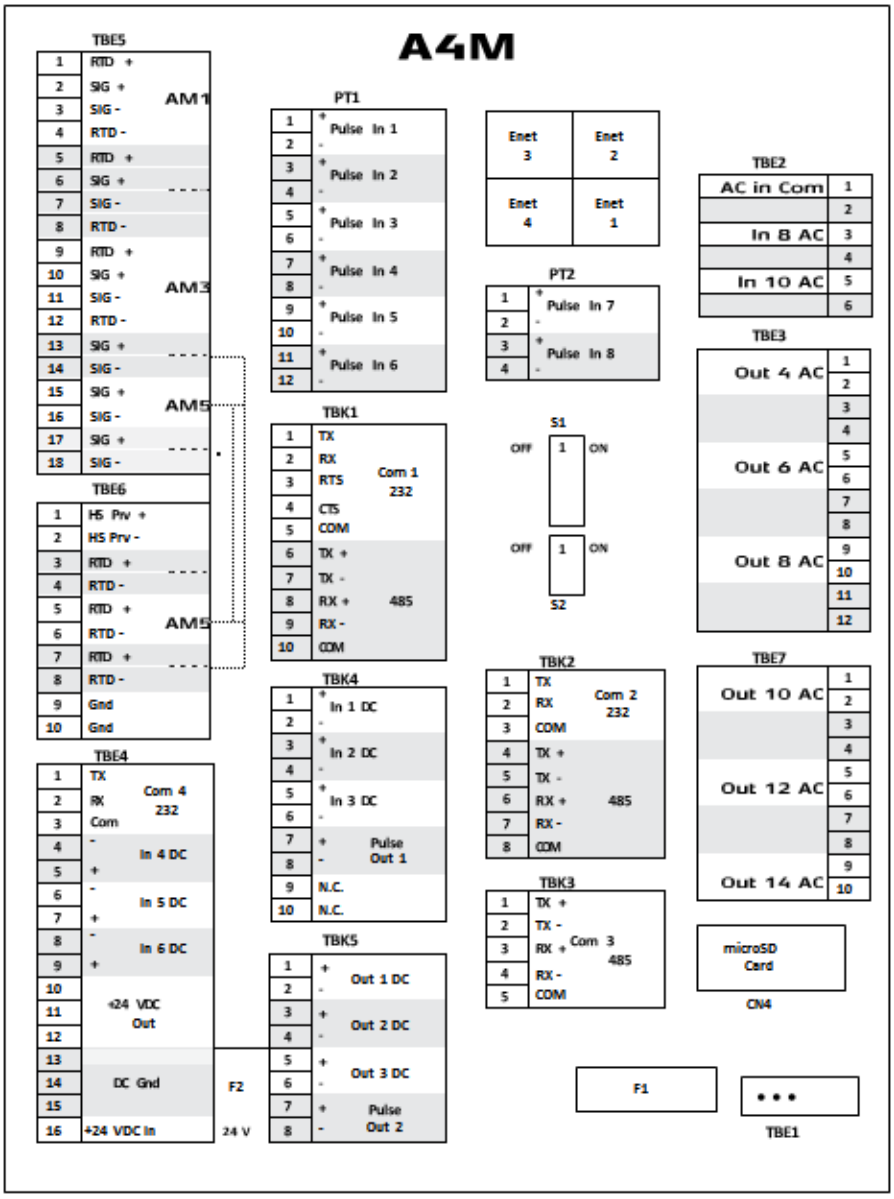


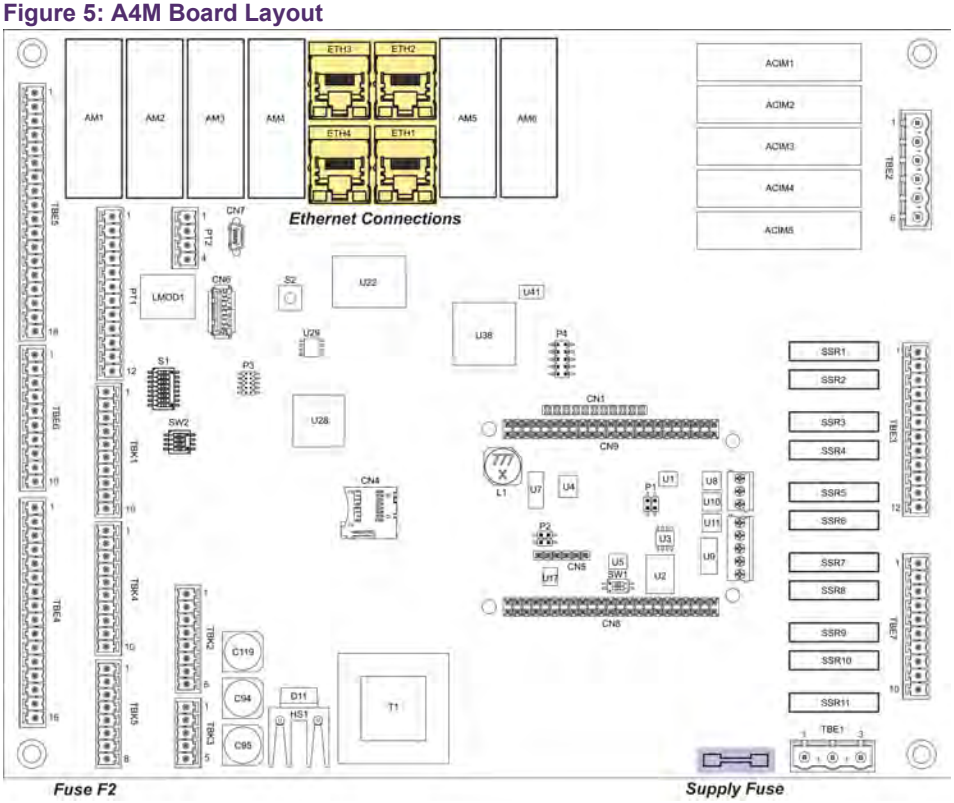
Figure 4: A4M Connections



6 Electronic Module Layout

The location of the parts on the electronic assemblies is shown in the following figure. The only field-replaceable part on the DET A4M board is the supply fuse. Refer to the AccuLoad IV Models ST, QT, N4, SA, and DET Parts List (PO06200) for details.

Figure 5: A4M Board Layout

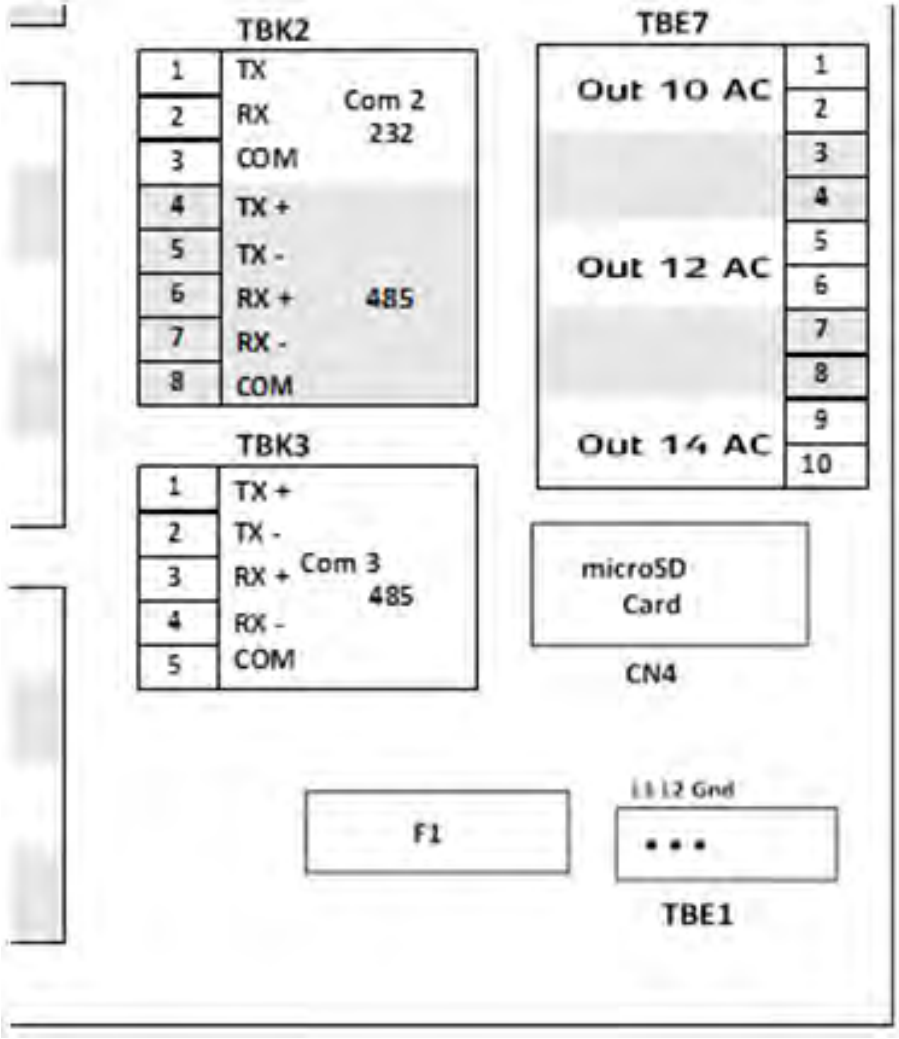


7 General Wiring Notes

7.1 Input Power

AC power inputs to TBE1 on the FUEL-FACS+ DET A4M board. This powers the FUEL-FACS+ DET's electronics. The instrument power should be clean and must meet the requirements listed in the FUEL-FACS+ DET Specification (SS06050).

Figure 6: A4M Board's TBE1 Location



7.2 Grounding

The FUEL-FACS+ DET must be properly grounded to ensure safe and reliable operation.

The FUEL-FACS+ DET requires a single-point earth ground dedicated to the FUEL-FACS+ DET provided by a grounding rod. The resistance between the ground lug of the FUEL-FACS+ DET's enclosure and the grounding rod must be less than 2 ohms.

7.3 Communications Wiring

7.3.1 Ethernet

For Ethernet communications to the FUEL-FACS+ DET, the Ethernet cable must be plugged directly into the Ethernet port on the back of the THMI (display unit).

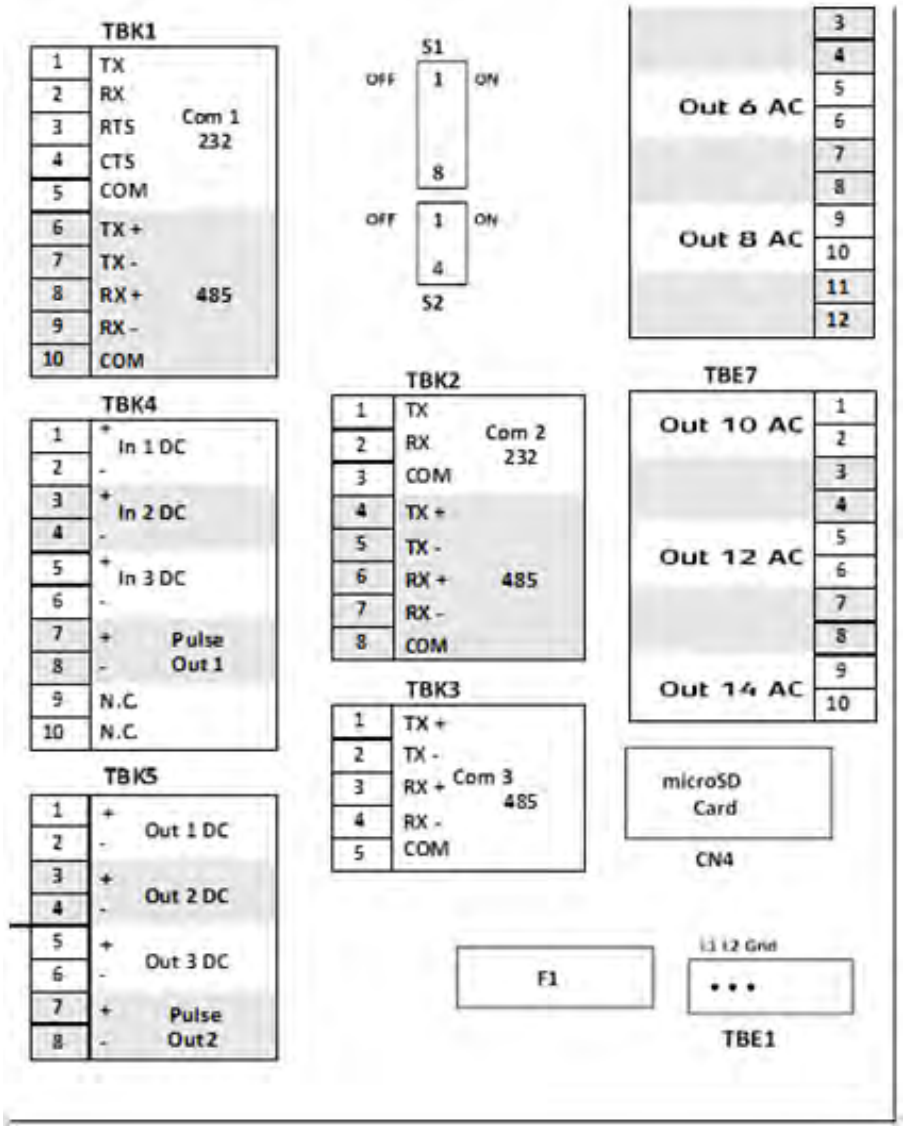
7.3.2 Serial

The FUEL-FACS+ DET supports RS-232 and RS-485 serial communications.

When using serial communications, an Ethernet cable must be installed between the THMI (display unit) Ethernet port and ETH2 on the A4M board.

On the A4M board, TBK1 (Com 1), TBK2 (Com 2), and TBK3 (Com 3 485 only) may be used, although TBK1 is most commonly used.

Figure 7: A4M Board's Serial Communication Terminal Blocks



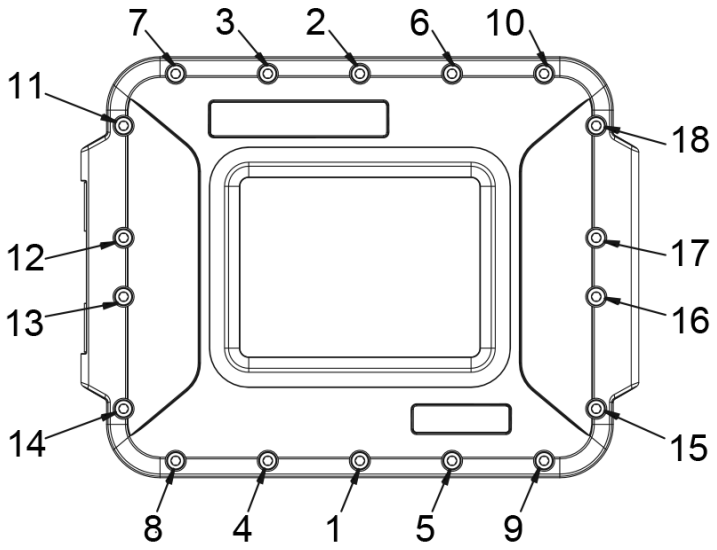
8 Completing the Installation

8.1 Securing Explosion-Proof Housing

When fastening the front cover of the explosion-proof FUEL-FACS+ DET, use the following procedure to ensure the unit is properly sealed and is safe to operate in a Division 1, Zone 1 environment:

1. Inspect the door seal O-ring for damage and replace if damaged. The O-ring is not required to maintain the explosion-proof rating; however, it is required to maintain the IP65 Ingress Protection rating. Grease the cover flange with petroleum jelly or TechnipFMC grease (part number 644886401) before attaching the cover to the housing.
2. Verify that the mating areas between the front cover and the main housing are not scratched, corroded, or otherwise damaged such that the surface contact (flame path) between them would be compromised.
3. Close the cover and tighten the cap screws around the perimeter of the front cover using the sequence shown below. The final torque should be 20 foot-pound (ft·lb) (27.1 newton meter (N·m)). Be sure to note the locations for the two longer bolts (16 and 17) used for the security seal wire.

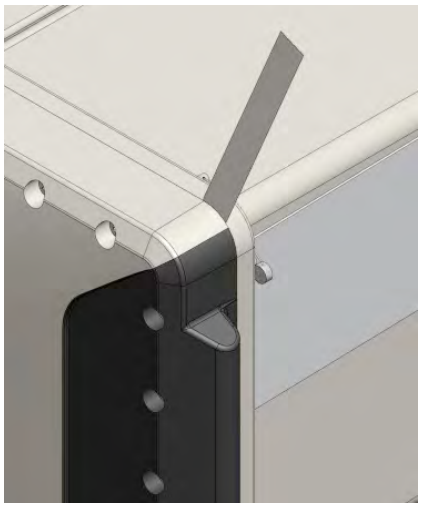
Figure 8: Cover Bolt Torque Pattern



4. Check that the enclosure is properly sealed by verifying the cover to enclosure joint gap with a 0.0015 inch (0.0381 mm) feeler gauge. The feeler gauge must not enter

the joint for more than ¼ inch (6 mm) at any point around the perimeter of the cover to housing joint; see 8: Completing the Installation on the previous pagefor an example.

Figure 9: Flame Path Verification



5. Feeler-gauge test the cover flame path joint and inspect the joint around the complete perimeter using a 0.0015 in (0.0381 mm) feeler gauge.

8.2 Connecting to FUEL-FACS+ FBS

After verifying the installation has been properly completed, apply power to the FUEL-FACS+ DET and allow the unit to fully boot to the Ready screen.

Figure 10: Ready Screen

8.2.1 Accessing the Configuration Menu

1. Press the top of touch screen five times, then once at bottom of touch screen to reveal the Settings icon in top right corner.

Figure 11: Revealing the Settings Icon

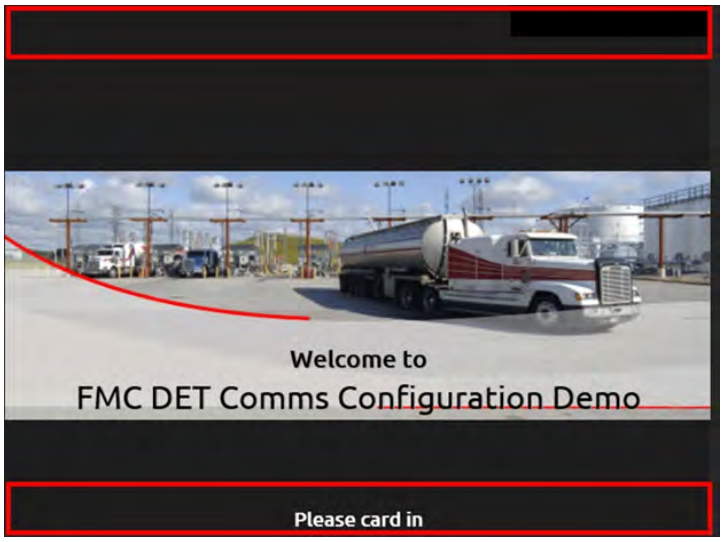
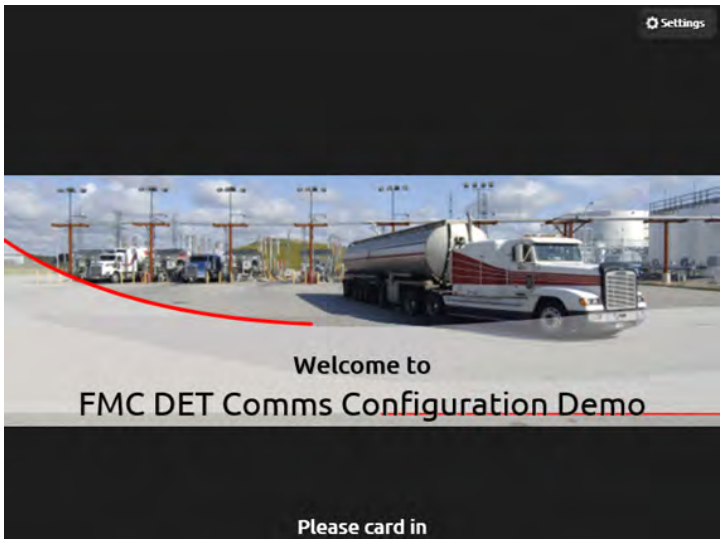


Figure 12: Settings Icon



2. Click on the Settings icon in the top-right corner of the screen, and then enter "1234" as the security code to unlock the configuration console.

Figure 13: Unlocking the Security Code

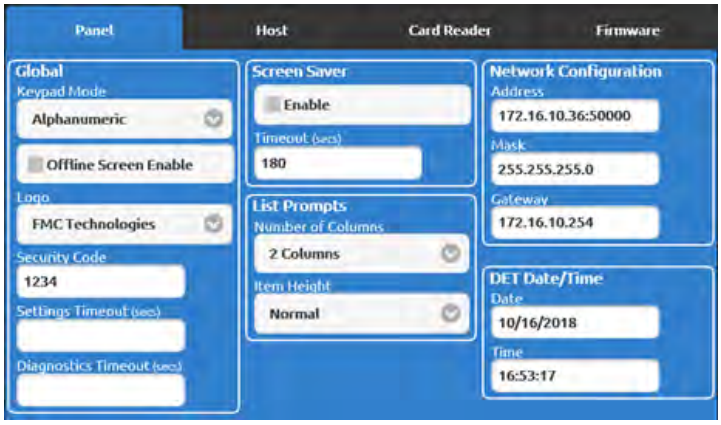
> Note that you can change the default password in the Panel options in the next step if needed.

8.2.2 Configuring an Ethernet Connection

If you are using an Ethernet connection to communicate with FBS:

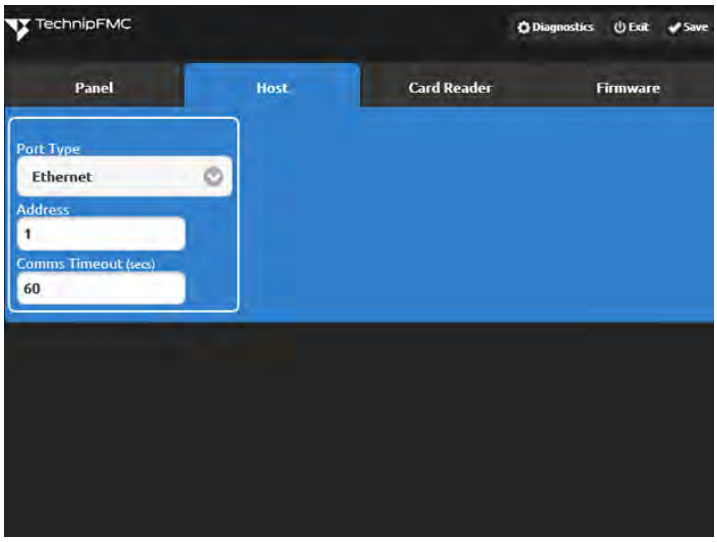
1. Navigate to the Panel tab to set up the local IP settings.

Figure 14: Panel Tab



2. Select the Host tab to configure the port type and address values as needed.

Figure 15: Host Tab

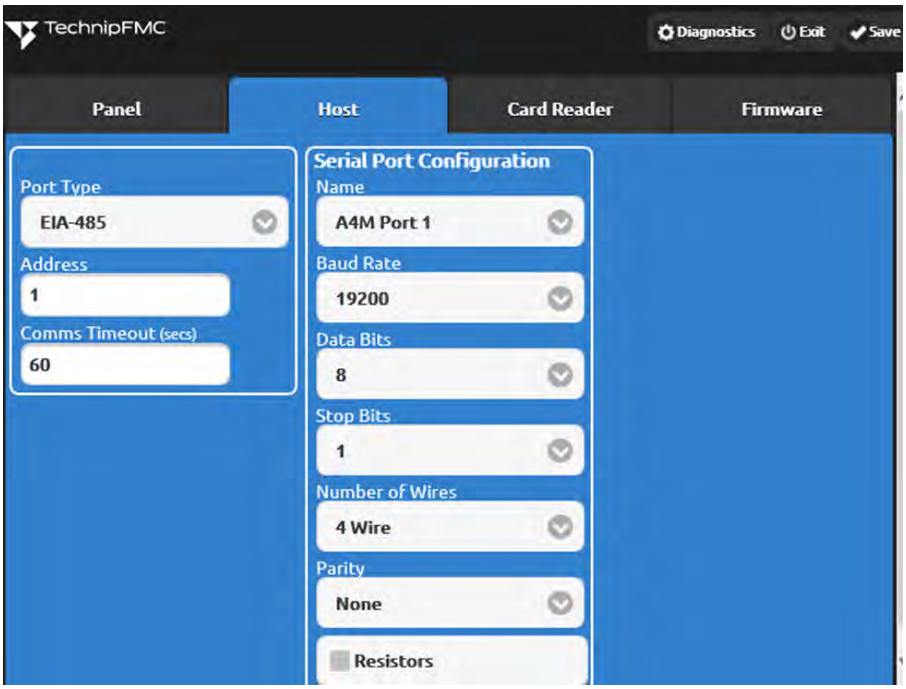


8.2.3 Configuring a Serial Connection

If you are connected to the FBS host via a serial connection:

- Ethernet cable must be installed from THMI (display module) to A4M Ethernet switch port ETH2.
- No external ethernet can be plugged in to A4M ethernet switch while using serial communications through the A4M.

Changing the port type to a serial protocol will change the second section on the screen to have fields for the appropriate configuration parameters. Configure these parameters as previously defined for the terminal server in step 3. This example shows A4M Com Port 1 where RS 485 is wired on TB 6-10 as defined in the A4M Reference Drawing. Note that saving the settings will cause the system to reboot so the changes take effect.



8.2.4 Configuring the (Optional) Card Reader

If the DET includes an integral card reader, then the configuration from the factory should already have been set up to communicate with the DET via the THMI's integral serial port.

8.3 Setting up FUEL-FACS+ to Communicate with the DET

> Note: Fuel-FACS+ must not be running during this procedure.

The IP address in the host file must be configured and a four-character alphanumeric code must be assigned.

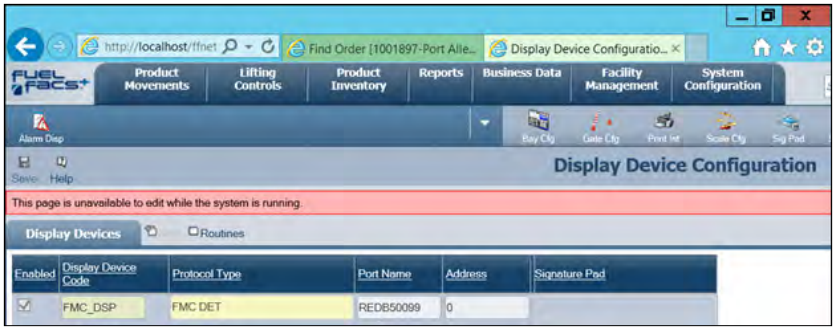
```
127.0.0.1       RED
172.16.50.70    TS1
172.16.50.165   ACCUA
172.16.50.168   REDA
127.0.0.1       HTML
172.16.50.200   REDB
```

1. Navigate to Facility Management > Hardware > Display Device Configuration and then complete the following steps:

   > For instructions about setting up FUEL-FACS to communicate with the DET, see https://kb.fuelfacs.com/index.php?View=entry&EntryID=972.

   1. Select NEW.
   2. Verify that the ENABLED box is checked.
   3. In Display Device Code, give DET a unique name.
   4. In Protocol Type, select FMC DET.
   5. In Port Name, put the four-character alphanumeric code as designated in the host file in Step 1, followed by the five-digit port number configured in the DET.
   6. In Address, put the address you configured in the DET.
   7. Click Save.

   Figure 16: Display Device Configuration

2. Navigate to Facility Management > User Interfaces and select the page of the User Interface to which this DET will be assigned.

   1. Select the page of the User Interface to which this DET will be assigned.

9 Enclosure Maintenance

9.1 Ex Enclosure Flame Path Inspection

Maintenance of the FUEL-FACS+ DET's explosion- and flame-proof enclosure includes the following inspection criteria:

- Installation, inspection, maintenance, repair, overhaul, and reclamation of the FUEL-FACS+ DET in the European Union must be performed by qualified personnel in accordance with the applicable requirements of EN 60079-14, EN 60079-17, and EN 60079-19 standards, in addition to all local codes and regulations.
- Installation, inspection, maintenance, repair, overhaul, and reclamation of FUEL-FACS+ DETs relying upon the IECEx certification must be performed by qualified personnel in accordance with the applicable requirements of IEC 60079-14, IEC 60079-17, and IEC 60079-19 standards, as required by local codes and regulations.
- Guidance for equipment inspection and maintenance is provided by EN/IEC 60079-17, regarding electrical apparatus for explosive gas atmospheres and electrical installations inspection and maintenance and should be used for inspection and maintenance processes.
- When performing maintenance that requires opening the enclosure cover, all flame paths (defined as the machined-flanged surface between the housing and the cover) should be inspected to ensure that they are clean and undamaged—no scratches, nicks, corrosion, or other defects that would affect the integrity of the flame path are permitted. If defects are detected, the equipment should not be placed back into service until the issues are resolved.
- Verify that all tapped cover-bolt-threaded locations in the enclosure are clean and intact without any missing or stripped threads.
- Verify that the cover bolts are the required M8 x 1.25-6g, DIN 912, steel grade 12.9. Prior to reassembly, apply a light coating of nickel-based anti-seize lubricant, such as Loctite Anti-Seize Lubricant (TechnipFMC part number 646002-401) to all bolt threads.
- Verify that any blind-threaded cover bolt holes do not have excessive grease or anti-seize lubricant packed into them, as this could cause hydraulic fractures of the enclosure when the bolts are tightened.

- Inspect to ensure that the environmental O-ring is correctly installed (seated into the groove) and in good condition (no cracks, etc.). If the O-ring is defective, replace it to maintain environmental protection. Grease the cover flange with petroleum jelly or Super Lube Multi-Purpose Synthetic Grease with Syncolon (TechnipFMC part number 644886-401) before reattaching the cover to the housing.
- Follow the cover bolt torquing procedure as outlined in section 8: Completing the Installation on page 17. When complete, verify the flame path gaps as per the procedure.

9.2 Special Environments

In corrosive environments—such as near salt water—it is the user's responsibility to increase inspection intervals for verification of the flame path integrity. Inspection intervals should vary based on local conditions and it is the user's responsibility to select appropriate intervals.

The most effective preventive maintenance is periodic wash downs of the enclosure to remove salt buildup on outside surfaces. It is recommended to use a mild soap applied with a sponge or cloth, followed by a low pressure, non-saline water rinse.

It also is very important to maintain the exterior painted finish of the equipment. If exterior corrosion is detected, the finish should be cleaned and any corrosion should be removed by mechanical means and prepared for painting. The affected area should be repainted with a corrosion-inhibiting paint. The factory paint is Sherwin-Williams Polane T Polyurethane Enamel in Precision Tan and Carbide Black.

It is required to apply a coating of petroleum jelly or Super Lube Multi-Purpose Synthetic Grease with Syncolon (TechnipFMC part number 644886-401) to flanged metal surfaces to offer a protective barrier to reduce the effects of exposure to saline solution (such as wet salt air). This surface should be cleaned and new grease reapplied every time the cover is opened for inspection or maintenance.

9.3 NEMA 4 Enclosure Maintenance

The enclosure used for the FUEL-FACS+ DET NEMA 4 model is manufactured from stainless steel and does not require special maintenance. The door gasket should be verified that it is in good condition to maintain the environmental protection rating.

This document takes precedence over and supersedes in their entirety all previous versions or revisions.

Bulletin MN06050 Issue/Rev. 0.0 (9/24)

TechnipFMC.com

TechnipFMC Corporate Headquarters
13460 Lockwood Road
Building S01
Houston, TX 77044 USA
+1 281.591.4000

USA Operations
1602 Wagner Avenue
Erie, PA 16510 USA
+1 814.898.5000

Germany Operations
Smith Meter GmbH
Regentstrasse 1
25474 Ellerbek, Germany
+49 4101 304.0