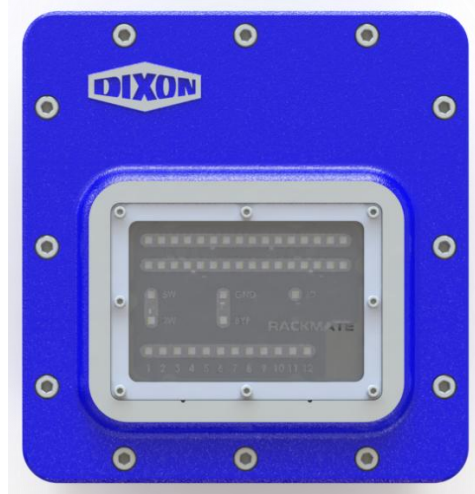


Installation, Maintenance, & Operating Instructions for FT7100 Series Rack Monitors



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Certifications

Dixon FT7100 series rack monitors are designed in accordance with the below standards for installation and use in Class 1 Division 1 Group CD, and Class 1 Zone 1 Group CD locations. The enclosure has explosionproof, flameproof, IP66 certifications.

DIXON BAYCO - WEST CHESTER, OH, USA		TYPE: FT71XXXXX	IEC60529 IP66	SERIAL: YYMMDD-000
Ex/AEx db Ib [Ia Ga][Ib Gb] IIB T4 Gb -40°C<Ta<60°C		TYPE 4 ENCLOSURE		
 SUITABLE FOR CL I DIV 1 GP C&D HAZ LOC AND PROVIDES I.S. CONNECTIONS FOR CL I DIV 1 GP C&D HAZ LOC IN ACCORDANCE WITH DIXON CONTROL DWG 11340EX. REFER TO CONTROL DWG BEFORE INSTALLING OR OPERATING. SEAL FITTINGS REQD WITHIN 18" OF ENCL ENTRY FOR NORTH AMERICAN INSTALLATION. ENTRY THREADING: 1/2" NPT. WARNING - DO NOT OPEN WHILE ENERGIZED. REFER TO MANUAL FOR FURTHER WARNINGS AND INSTL REQTS. NE PAS OUVRIR LE BOÎTIER LORSQU'IL EST SOUS TENSION. RÉFÉRER AU MANUEL POUR LES PROCÉDURES D'INSTAL.				
CSA 80211248	 204225	RELAY CONTACTS:	MAINS SUPPLY:	
CSA N° 25ATEX1199X		MAX 250VAC 5A	110-240VAC 50-60HZ	
IECEx CSAE 25.0048X			0.06-0.12A 11-18W	
			  	

This product is compliant with the following standards:

CSA C22.2 NO. 60079-0:11	UL 60079-0	IEC 60079-0:2017	EN 60079-0:2018
CSA C22.2 NO. 60079-1:11	UL 60079-1	IEC 60079-1:2014	EN 60079-1:2014
CSA C22.2 NO. 60079-11:14	UL 60079-11	IEC 60079-11:2011	EN 60079-11:2012
CSA C22.2 NO. 61010-1-12	UL 61010-1	IEC 60529	
CSA C22.2 NO. 61010-2-201	UL 61010-2-201		
CSA C22.2 NO. 157-92	UL 913		
CSA C22.2 NO. 30-M1986	UL 1203		
CAN/CSA C22.2 NO. 60529-16	ANSI/UL 60529-2004		

Specific Conditions of Use

- The enclosure is manufactured from low copper aluminum alloy. In rare cases, ignition sources due to impact and friction sparks could occur.
- Cover bolts:
 - Property class: C-50
 - Yield Strength: 70,000 psi (482MPa)
 - Type: M10 x 1.5 30 mm long SHCS

Fasteners shall only be replaced with identical M10 x 1.5 DIN 912 fasteners
- Instructions are provided with each shipment, identifying proper torque values for cover bolts. (See Technical Specifications)
- Instructions are provided with each shipment, identifying proper torque values for conduit stopping plugs / blanking elements and conduit adapter. (See Technical Specifications)
- Cross-sectional area of PE conductors must be equal to or greater than the cross-sectional area of phase conductors.
- For installations using cable glands:
 - When insert tap is removed in order to install the proper cable, the integrity of sealing rings have to be checked, in order to guarantee the correct tightness.

- b. If necessary, sealing rings have to be replaced with new ones (original spare parts only).
 - c. Only EPDM rubber or Silicone sealing rings are permitted for installations with this equipment.
 - d. Polyamide dome plug is not permitted for installation with this equipment.
7. The supply connection to the FT7100 must be made with rigid metal conduit or armoured cable or other means which provides adequate equipotential bonding of the equipment.
8. WARNING - UNDER CERTAIN EXTREME CIRCUMSTANCES, THE NON-METALLIC PARTS INCORPORATED IN THE ENCLOSURE OF THIS EQUIPMENT MAY GENERATE AN IGNITION-CAPABLE LEVEL OF ELECTROSTATIC CHARGE. THEREFORE THE EQUIPMENT SHALL NOT BE INSTALLED IN A LOCATION WHERE THE EXTERNAL CONDITIONS ARE CONDUCIVE TO THE BUILD-UP OF ELECTROSTATIC CHARGE ON SUCH SURFACES. IN ADDITION, THE EQUIPMENT SHALL ONLY BE CLEANED WITH A DAMP CLOTH.

AVERTISSEMENT: AFIN DE PREVENIR L'INFLAMMATION D'ATMOSPHERES DANGEREUSES, NE CHANGER LES BATTERIES QUE DANS DES EMPLACEMENTS DESIGNES NON DANGEREUX.

9. The equipment shall only be installed and operated in a controlled environment complying to Pollution Degree 2 as prescribed in Annex F of 60079-11. The environment shall be maintained to Pollution Degree 2 while the equipment is in service.

Product Overview

Dixon prides itself in the quality and reliability of their products. Their mechanical and electronic equipment is designed to withstand the harsh environments that tankers are exposed to. Products are developed with safety, reliability, usability, and customer satisfaction as our primary focus.

Our overfill prevention equipment has been in use in the field since 2000 and continues to set the standard for reliability in the tanker industry. The FT7100 rack monitor is the missing piece to a full Dixon overfill prevention system. With Dixon products end-to-end, racks and haulers can operate with less downtime and greater confidence in the reliability of their rack.

Compatibility

The FT7100 series rack monitors are designed to be compatible with overfill sensors and systems designed to meet the API 1004 and/or EN13922 standards. Most industry standard equipment will fall under one or both standards. The monitor may also work with products not explicitly designed to either standard, if their operation is similar.

The table below lists the various FT7100 models and a summary of their compatible equipment.

	2W Sensors ¹	5W Sensors ²	Bypass ³	Estop Deadman ⁴	Ground Verification ⁵	TIM ⁶	Terminal Automation ⁷
FT7150BG	YES	YES	MAGNETIC	YES	YES	NO	BASIC
FT7150BGT	YES	YES	MAGNETIC+ EXTERNAL	YES	YES	YES	ENHANCED

1. Two Wire Sensors

1-8 Dixon FT150 or similar

2. Five Wire Sensors

1-12 Dixon FT100 or similar

3. Bypass

Units with magnetic bypass include magnetic bypass fob that can be used to enter and exit bypass mode. Units with external bypass will include the magnetic bypass functionality and fob, but also includes connections supporting mechanical keyswitch bypass functionality, or an external RFID reader.

4. Emergency stop and Deadman

Normally-Open emergency stop or deadman switch can be wired direct to the FT7100 unit.

5. Ground Verification

Supports ground verification through a direct chassis bond, or through ground ball or ground bolt style devices.

6. Trailer Identification Modules

Models with support for trailer identification modules can read the digital serial number from a

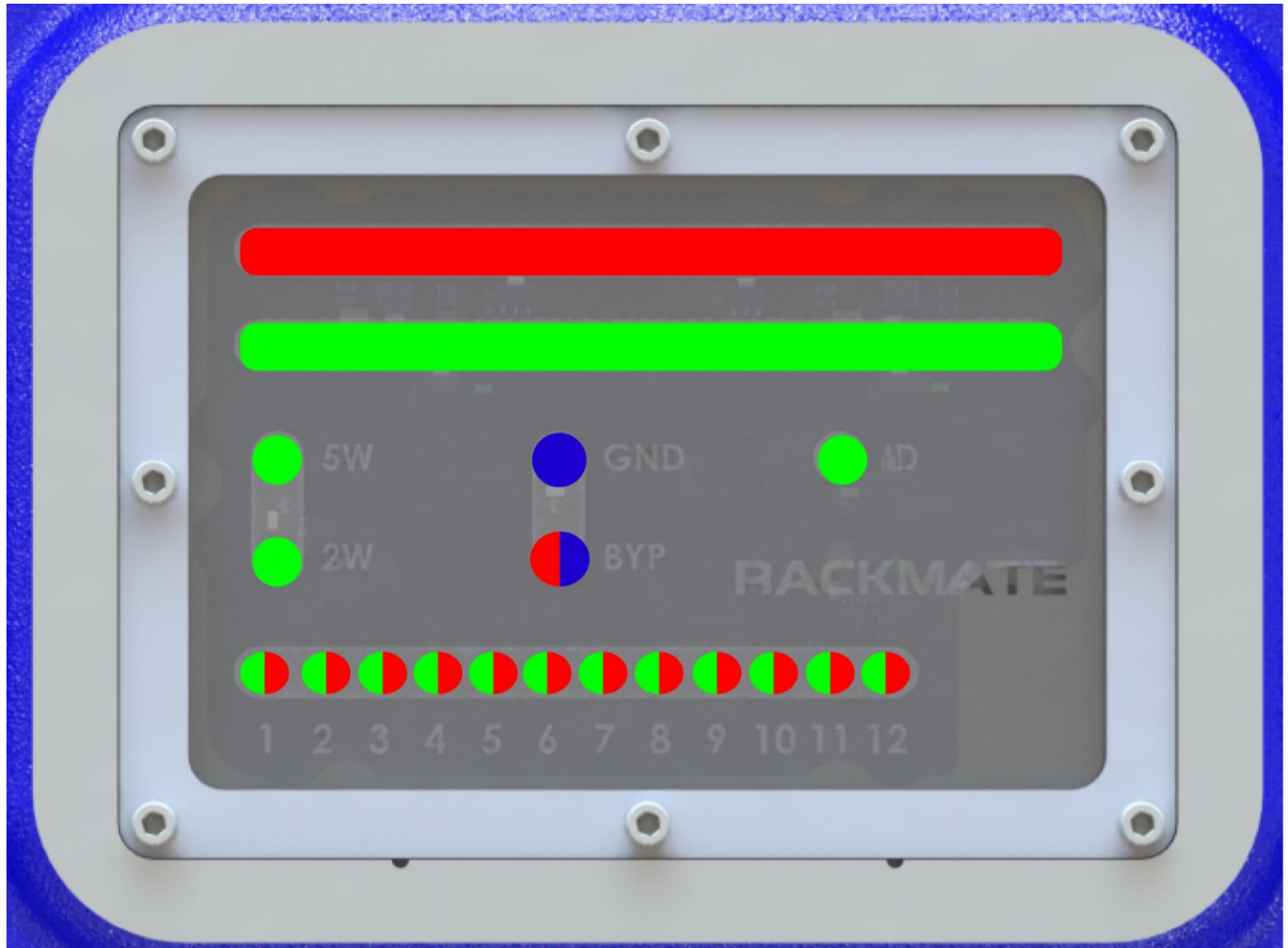
connected truck/trailer. This information can be used for process control by the terminal automation system.

7. Terminal Automation

Models with basic terminal automation compatibility are connected using relay outputs from the FT7100. The terminal automation system can monitor the ground and permit relays and respond to these outputs accordingly. Models with enhanced terminal automation capability feature ethernet connectivity, enabling Modbus-TCP communication with the FT7100. Through this Modbus interface, further details of the unit can be viewed.

Interface

NOTE: NOT ALL FT7100 UNITS HAVE ALL OF THE INDICATORS SHOWN BELOW. THIS DIAGRAM IS FOR INFORMATIONAL PURPOSES ONLY.



1. **NON-PERMIT** – The top row of indicators will illuminate red to reflect the state of the permit relays. While the indicators are on, the permit relays are de-energized.
2. **PERMIT** – The second row of indicators will illuminate green to reflect the state of the permit relays. While the indicators are on, the permit relays are energized.
3. **5WIRE SENSOR MODE** – Illuminates to indicate a trailer having 5 wire type sensors has been connected and identified.
4. **2WIRE SENSOR MODE** – Illuminates to indicate a trailer having 2 wire type sensors has been connected and identified.
5. **GROUND-OK** – The GND indicator will illuminate blue to reflect the state of the ground relay. While the indicator is on, the ground relay is energized. If no ground configurations are enabled the ground indicator and relay will be active constantly.
6. **BYPASS ACTIVE** – Indicator shows red when Overfill bypass is active, and blue when Ground bypass is active. During pairing, this indicator will flash various colors to indicate the current type of card.

7. **ID FOUND** – The ID indicator will show green when a valid trailer identification module is found. When an unknown or expired trailer identification module is found the indicator will flash green.
8. **COMPARTMENT INDICATORS** – Each compartment indicator can show either red or green to show the wet or dry status of the sensors, respectively. Indicators will be off if the compartment/sensor is not found, or unknown.

Output Relays

Every FT7100 features 2 DRY FORM C (SPDT) relays, having Normally Open, Normally Closed, and Common contacts available. All output relays are failsafe, featuring several methods of protection against failure

The relays feature a hardware feedback system that constantly monitors for any stuck or welded contacts. Should any relay's contacts become stuck or welded, the rack monitor will become non-permissive and de-energize all relays. Redundant relays are used to ensure the contacts will always open even if one becomes stuck or welded. A hardware timeout circuit will automatically de-energize a relay that has not been verified within 400ms.

- **PERMIT** – The permit relay will energize once all enabled requirements have been met. This relay is often wired into the loading pump circuit, to interrupt loading if an unsafe condition occurs. The Relay will reflect the same state that the green and red indicators shown on the front of the unit. Green indicates the permit relay is energized, while red indicates it is not energized.
- **GROUND**
The ground relay will energize when any of the enabled ground devices has been found. This relay will match the ground indicator on the front display. Removing the ground device will de-energize the relay. This relay is also protected by a relay failure circuit and a redundancy secondary relay.

Bypass

Trailers attempting to load may have a bad sensor, a wiring issue, or a faulty ground verification. In these situations, the terminal operator may deem the trailer safe to load and authorize a bypass using a bypass fob, key, or card (on supported models). Once the FT7100 has been put into bypass mode, any of the following conditions will end the bypass:

- An additional sensor becoming wet
- Bypass is manually ended by using a bypass key, fob, or card.
- 30 minutes has elapsed from the start of bypass

Standard bypass fobs must complete a sequence of actions before the FT7100 will enter bypass mode. This is intended to prevent accidental and unauthorized use of the bypass functionality. Details on this sequence can be found below under Operation > Bypass Procedure.

Units supporting RFID bypass may have two levels of bypass:

- **OVERFILL BYPASS CARD - This card will bypass ALL safety checks and can place the rack monitor into a permissive state.**
- **GROUND/TIM BYPASS CARD - This card will only bypass the ground checking function of the rack monitor.** Overfill sensors must still be operational.

Bypass cards can be removed or added, with a limit of 25 registered to an FT7100 at any given time. The same card may be used with several different FT7100 units. Refer to the Bypass Card Pairing Procedure for more information.

Accessories

Estop/Deadman

Some FT7100 rack monitors can be set up to utilize either a Deadman switch or Emergency Stop switch. The switch must be Normally Open. A deadman switch will require the driver to actively hold a switch during the entirety of the loading process. Releasing the switch while loading will cause the FT7100 to go non-permissive.

External Bypass

Models featuring support for external bypass can utilize a mechanical keyswitch, or an external customer-supplied RFID card reader. External RFID readers with Wiegand or Clock-and-data interfaces are supported. Dixon's recommended RFID bypass is the **HID MiniProx 5365**.

Technical Specifications

	MIN	MAX	NOMINAL
INGRESS PROTECTION (IP RATING)			IP66
ENCLOSURE TYPE PROTECTION			TYPE 4 ENCLOSURE
SUPPLY VOLTAGE	110VAC	240VAC	
SUPPLY FREQ	50Hz	60Hz	
SUPPLY CURRENT	0.06A	0.12A	
SUPPLY POWER	11W	18W	
SUPPLY CIRCUIT OVERCURRENT PROTECTION (BREAKER)		15A	
SUPPLY CIRCUIT OVERCURRENT PROTECTION BREAKING CAPACITY	5000A		
OVERVOLTAGE CATEGORY		II	
ENVIRONMENTAL CONDITIONS			
POLLUTION DEGREE		2	
OPERATING TEMPERATURE	-40C/-40F	60C/140F	
HUMIDITY	0%	100%	
ALTITUDE		2000m above sea level	
WET LOCATION			PERMITTED
INDOOR & OUTDOOR USE			PERMITTED
LENGTH			333mm/13.13"
WIDTH			316mm/12.44"
DEPTH			104mm/4.09"
WEIGHT			14.5KG/32LBS
RELAY CONTACT RATING		250VAC 5A	
OUTPUT RELAY WIRE GAUGE (J6)	12AWG	18AWG	
SUPPLY WIRE GAUGE (J1)	12AWG	18AWG	
SENSOR AND ESTOP WIRE GAUGE (J3 & J4)	18AWG	24AWG	
LID SCREW TORQUE			35lb-ft/48Nm
CONDUIT FITTING TORQUE			25lb-ft/32Nm
TERMINAL BLOCK SCREW TORQUE			5in-lb
TERMINAL WIRE STRIP LENGTH	8mm	10mm	

Entity Parameters

FT7100 I.S. CIRCUIT ENTITY PARAMETERS						
TERMINAL	POS.	Uo(V)	Io(mA)	Po(mW)	Co(μF)	Lo(mH)
J3	1	14.3V	32mA	114mW	4.28μF	138mH
J3	2	GND	N/A	N/A	N/A	N/A
J4	1	14.3V	32mA	114mW	4.28μF	312mH
J4	2	14.3V	32mA	114mW	4.28μF	312mH
J4	3	14.3V	32mA	114mW	4.28μF	312mH
J4	4	14.3V	32mA	114mW	4.28μF	312mH
J4	5	14.3V	32mA	114mW	4.28μF	312mH
J4	6	14.3V	32mA	114mW	4.28μF	312mH
J4	7	14.3V	32mA	114mW	4.28μF	312mH
J4	8	14.3V	96mA	343mW	4.28μF	15mH
J4	9	±7.5V	52mA	98mW	174μF	160mH
J4	10	GND	N/A	N/A	N/A	N/A
J5	1	5.9V	1547mA	1813mW	720μF	59mH
J5	2	6.3V	25mA	23mW	720μF	236mH
J5	3	6.3V	25mA	23mW	720μF	236mH
J5	4	GND	N/A	N/A	N/A	N/A
J5	5	5.9V	1547mA	1813mW	720μF	59mH

Installation

INSTALLATION TO BE COMPLETED BY A QUALIFIED HAZARDOUS LOCATION TECHNICIAN.

L'INSTALLATION DOIT ÊTRE COMPLÉTÉ PAR UN TECHNICIEN QUALIFIÉ.

The FT7100 Rack monitor is suitable for installation in Class I Division 1/Zone 1 hazardous locations as defined by CEC/NEC and IECEx standard 60079. Installation to be performed by a qualified professional.

Wall Mounting

This equipment is designed to be securely mounted to a wall using four mounting holes located at the corners of the unit. For safe installation and reliable operation, **it is essential that all four mounting points are anchored into structurally sound material.** Installation should conform with requirements of the International Building Code (IBC) or equivalent local construction code.

Mounting Options

- **Through-Hole Mounting (Included Hardware)**

This unit includes a set of fasteners designed for through-hole mounting. In this method, bolts pass entirely through the wall and are secured on the opposite side with washers and nuts.

- Use this method when the wall is accessible from both sides (e.g., Unistrut, utility rooms, unfinished walls, or installations with service access behind the wall).
- Ensure the wall structure can accommodate the through-bolts and that the hardware on the opposite side is either protected or periodically accessible for inspection.
- Included hardware is intended for mounting to metal support members such as a solid plate, or strut. If mounting to thicker walls, longer fasteners may be required and will need to be provided by the installer.

- **Blind Fastener Mounting (Installer-Supplied Hardware)**

If through-hole mounting is not feasible, blind fasteners (e.g., lag bolts, or masonry anchors) may be used. Due to the spacing between mounting holes, direct alignment with standard 16" wall studs is unlikely. As such, mounting onto standard-spacing wood framed walls is not recommended. Blind mounting onto masonry may be acceptable if done by a trained installer qualified to make mounting and installation judgements.

- The installer must provide appropriate fasteners based on the wall material (concrete, brick, block).
- Machine-thread anchors are recommended. Course-thread 'Lag' style screws/anchors are not recommended.
- Fasteners must be certified and rated to support at least 128 lbs. in both tension/pull-out and shear loads.
- Installers must follow anchor manufacturer's recommendations including drill diameter, embedment depth, installation torque, and derating for combination of shear and tension. Installers must also follow anchor manufacturers guidelines for required compressive strength of substrate, minimum spacings, and Masonry must be in-tact and without cracks.
 - ¼-20 Size anchors of approximately 2-1/4" long, are typically recommended.
 - Washers must be between 7/16" and 0.7" in outside-diameter

- Concrete is typically required to be 4000psi grade or higher. Consult fastener/anchor requirements.
- Special consideration should be given to hollow masonry such as concrete blocks. Position of the anchor in the block, and rating of the block's sidewall must be considered.

Structural Support Requirements

Regardless of mounting method, each of the four mounting holes must be anchored into solid structural backing. If the existing wall framing does not provide suitable locations:

- Install horizontal bracing or blocking between vertical members using metal strapping or strut to create solid mounting points aligned with the hole pattern.
- Secure bracing using code-compliant fasteners into the wall framing.

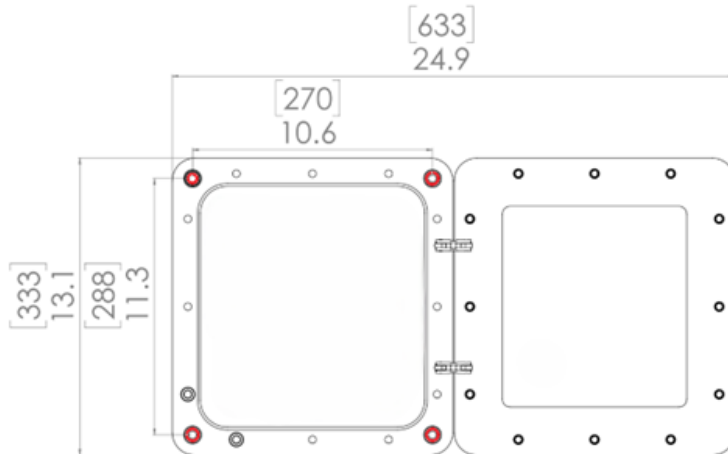
Improper installation or inadequate anchoring may lead to equipment failure, wall damage, or personal injury. If in doubt, consult a qualified contractor or structural specialist.

Mounting location considerations and requirements

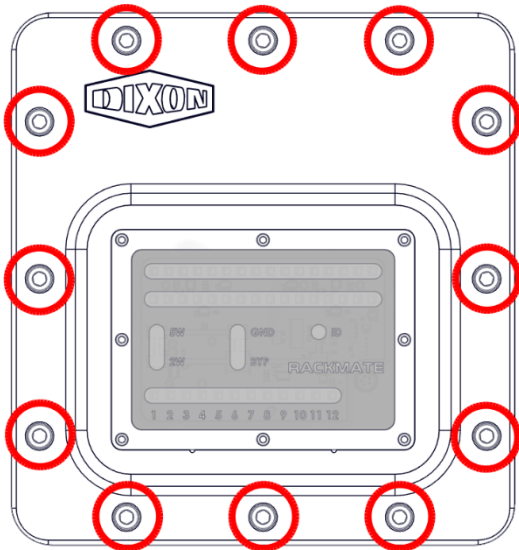
- The unit should be installed in a location that provides clearance for the lid to open 180 degrees to the right of the body. Refer to the mounting template below for dimensions:
- Conduit entries **MUST** be used for their intended connections, and internal wiring must enter/exit through the nearest conduit entry. Internal wiring may not cross over the internal circuitry to exit an unintended conduit entry. Plan for adequate access to the left, right, and bottom sides of the monitor appropriately.
- The FT7100 should be positioned vertically at approximately eye level.
- Ideally the unit should face the working area (e.g., the terminal lane) it is intended to monitor and be unobstructed. Installing the unit close to the area where it will be used will provide the optimal user experience.
- The unit is designed to withstand continual outdoor exposure, but shielding it from the elements will extend the lifespan of the unit. Position the monitor under a canopy if possible to shield from the elements.
- Using the bypass function will require the face of the FT7100 to be reachable.

Mounting Instructions

- Using the bolt pattern provided below, locate a sturdy area, large enough to install the monitor.



- For install surfaces with mounting holes already in place, such as strut channel, skip to step 3.
 - Through-bolt mounting: If the rear side of the install surface is accessible, level the bolt pattern and drill four clearance holes marked on the pattern using an 11mm or 7/16" bit.
 - Blind-bolt mounting: Refer to the recommendations from the anchor manufacturer.
- Remove the twelve lid screws, then open the lid. Ensure that the rubber gasket remains in position.

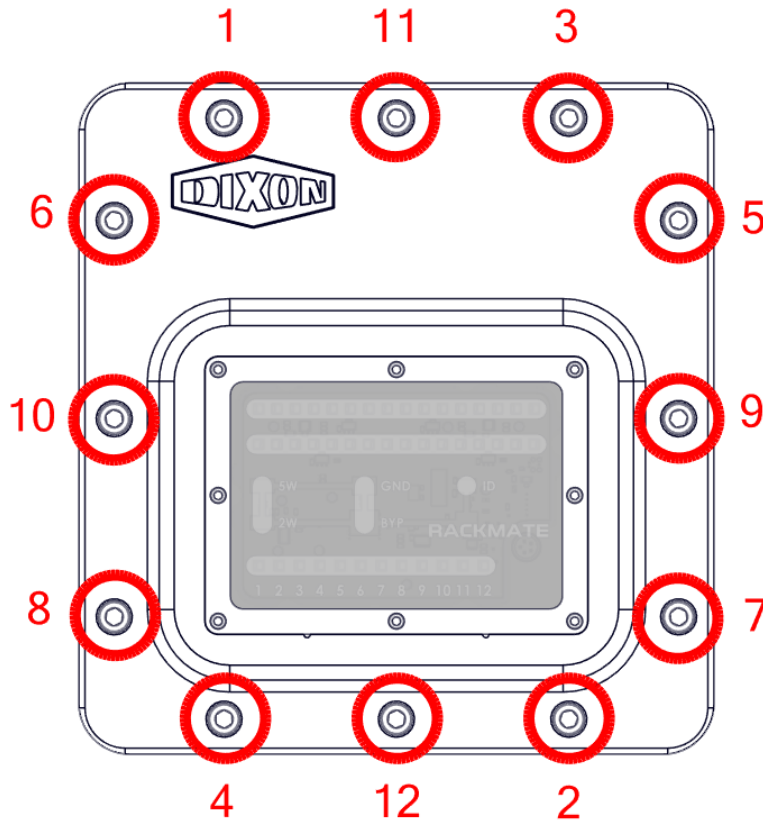


- With the lid open, have another person lift the monitor into position in front of the mounting holes.
- Install the mounting screws, observing manufacturer's recommendations, then tighten and ensure the monitor is secure.
- Once the unit is securely installed, proceed to electrical installation and configuration sections detailed below. Do not close the unit before completing the electrical and configuration steps.
- Once electrical installation and configuration are complete, close the lid.

WARNING – WHEN CLOSING THE LID, ENSURE THAT NO WIRES ARE CAUGHT IN THE JOINT.

TIGHTENING THE LID WHILE WIRES ARE IN THE FLAME PATH MAY IMPAIR SAFETY OR DAMAGE THE WIRES.

8. Install all 12 lid screws. Hand tighten the screws then torque all screws to the 'LID SCREW TORQUE' specified in Technical Specifications section above, following the bolt pattern shown below:



Electrical

The electrical connections are designed to be a drop-in replacement for any existing rack monitor. Be sure to check that the relay contact limits are not exceeded by the equipment it is to control. Refer to the Technical Specifications section of this manual to find the output relay limitations.

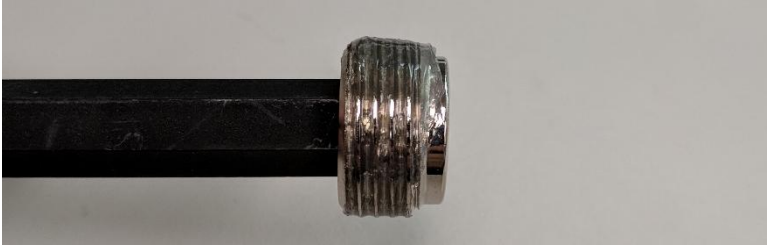
Warning

ELECTRICAL INSTALLATION MUST BE COMPLETED BY HAZARDOUS LOCATION QUALIFIED ELECTRICIAN.

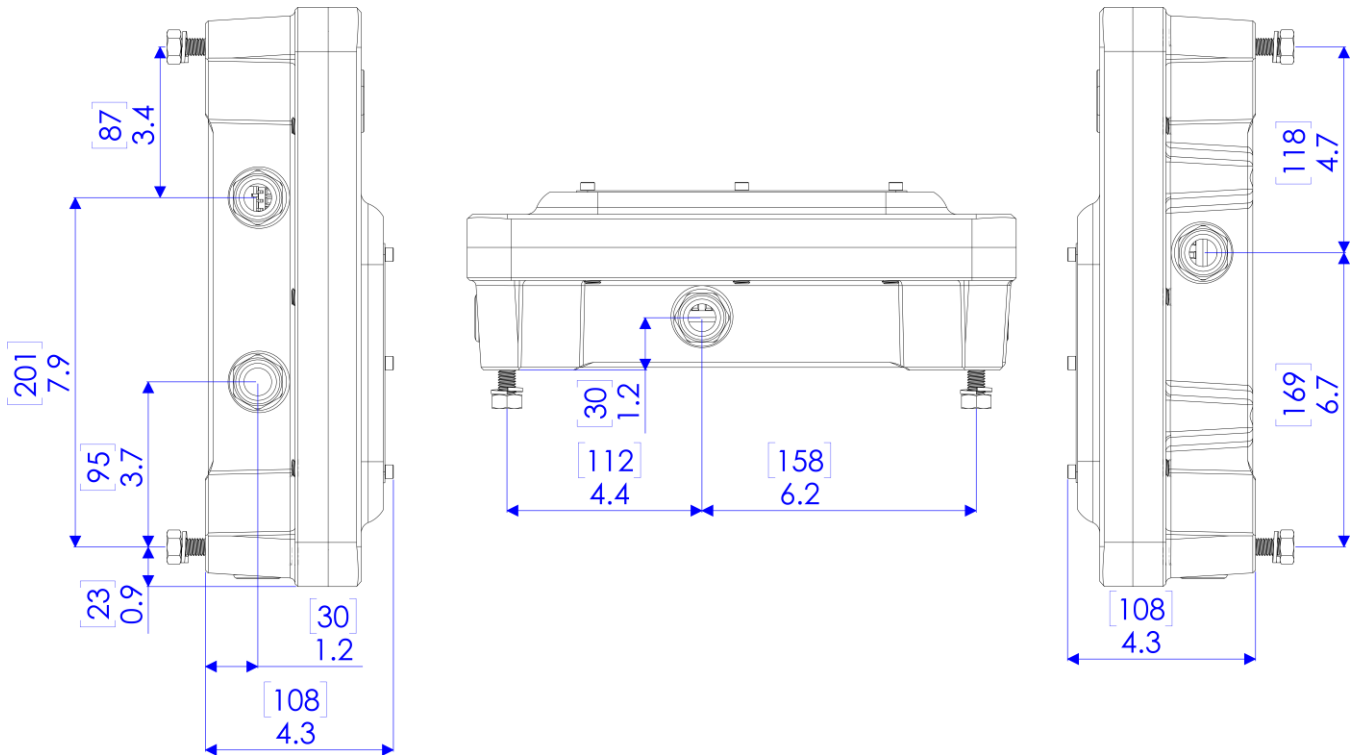
Electrical installation Requirements and Warnings

- ENSURE THE ELECTRICAL CIRCUIT SUPPLYING THE FT7100 IS CURRENT-LIMITED BY AN APPROPRIATELY RATED CIRCUIT BREAKER. REFER TO TECHNICAL SPECIFICATIONS FOR RECOMMENDED BREAKER CAPACITY.
- MAINS SUPPLY MUST BE FED FROM A CIRCUIT BREAKER PROTECTED CIRCUIT. THE CIRCUIT BREAKER IN-LINE WITH FT7100 MUST HAVE A BREAKING CAPACITY OF 5,000A OR MORE.
L'ALIMENTATION SECTEUR DOIT ÊTRE ASSURÉE PAR UN DISJONCTEUR. LE DISJONCTEUR EN LIGNE DU FT7100 DOIT AVOIR UN POUVOIR DE COUPURE DE 5000 A OU PLUS.
- DIFFERENT REGIONS WILL REQUIRE DIFFERENT ELECTRICAL INSTALLATIONS. THE INSTALLER SHOULD BE FAMILIAR WITH LOCAL REGULATIONS AND REQUIRED INSTALL TECHNIQUES.
- CAUTION - SEALING FITTINGS REQUIRED WITHIN 18" INCHES OF THE ENCLOSURE FOR NORTH AMERICAN INSTALLATIONS.
ATTENTION - SCELLER LES ENTRÉES À MOINS DE 18" DE L'ENCEINTE.
- CAUTION - SEALING FITTINGS REQUIRED AT ENCLOSURE FOR ATEX/IECEX INSTALLATIONS.
RACCORDS D'ÉTANCHEITE REQUIS AU NIVEAU DU BOITIER POUR LES INSTALLATIONS ATEX / IECEX.
- THE SUPPLY CONNECTION TO THE FT7100 MUST BE MADE WITH RIGID METAL CONDUIT OR ARMoured CABLE OR OTHER MEANS WHICH PROVIDES ADEQUATE EQUIPOTENTIAL BONDING OF THE EQUIPMENT.
LA CONNEXION D'ALIMENTATION AU FT7100 DOIT ÊTRE FAITE AVEC UN CONDUIT MÉTALLIQUE RIGIDE, UN CÂBLE BLINDE OU D'AUTRES MOYENS QUI FOURNISSENT UNE LIAISON EQUIPOTENTIELLE ADEQUATE DE L'EQUIPEMENT.
- ANY UNUSED CABLE ENTRIES MUST USE THE INCLUDED STOPPING PLUGS.
TOUTE ENTRÉE DE CÂBLE NON UTILISÉE DOIT UTILISER LES BOUCHONS D'ARRÊT FOURNIS.
- TERMINALS SHOWING THIS SYMBOL MUST BE WIRED USING CABLES RATED FOR AT LEAST 194°F (90°C). LES TERMINAUX AVEC CE SYMBOLE DOIVENT ÊTRE BRANCHÉ AVEC DES CÂBLES APPROUVÉ A AU MOINS 194°F (90 °C) 
- TERMINALS SHOWING THE  SYMBOL ARE INTENDED FOR CONNECTION OF CURRENT LIMITED AC MAINS.
- TERMINALS SHOWING THE  SYMBOL ARE INTENDED FOR CONNECTION THE PROTECTIVE EARTH GROUND.
- APPLY A GENEROUS AMOUNT OF GREASE TO MALE THREADS OF CONDUIT OR FITTINGS, SPREAD GREASE OVER ENTIRE SURFACE OF THREADS, THREAD INTO HOUSING, THEN WIPE AWAY EXCESS GREASE. USE DIXON 10613 GREASE OR ANY LITHIUM OR SILICONE BASED CORROSION INHIBITING

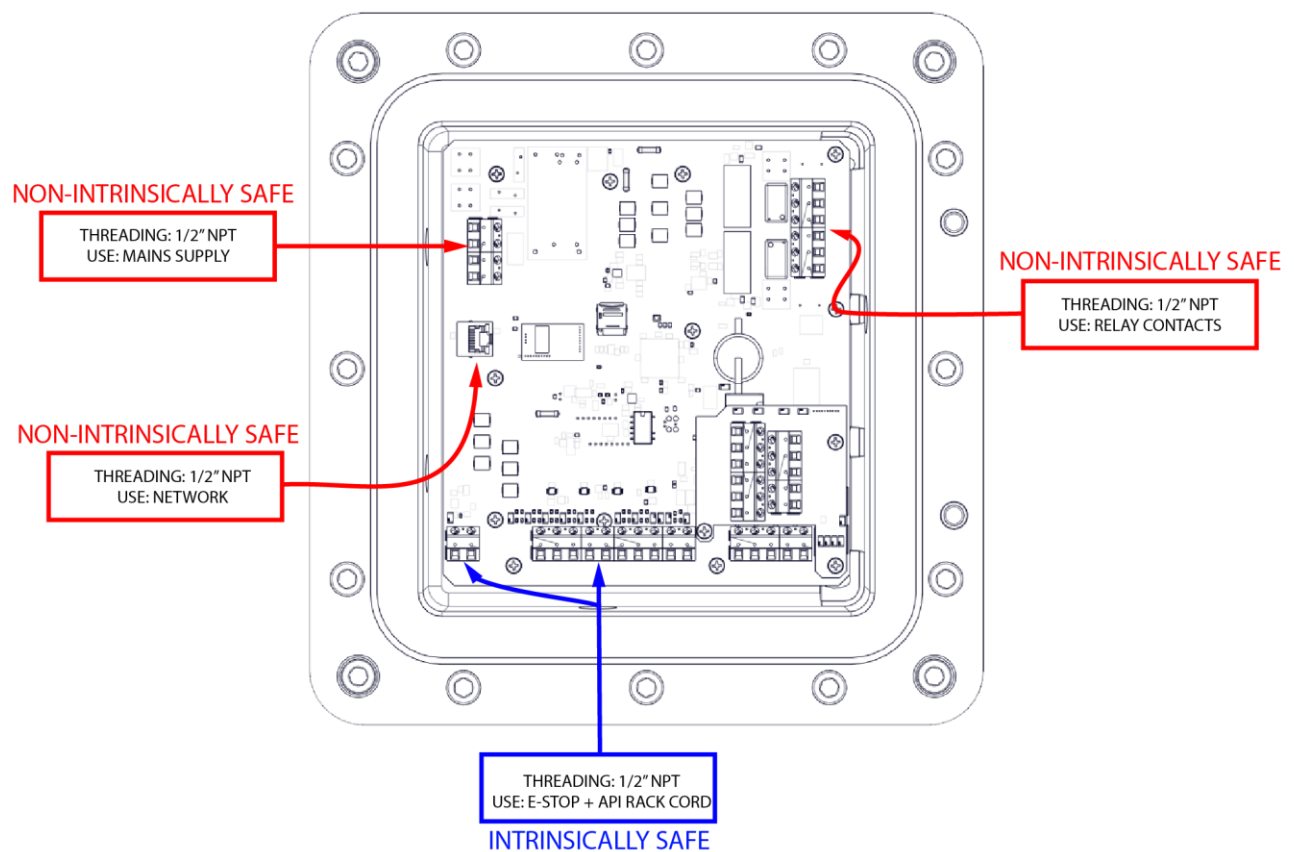
GREASE.



- IF THE EMERGENCY STOP/DEADMAN SWITCH INPUT IS USED, IT MUST BE CONNECTED TO SUITABLY RATED SIMPLE APPARATUS, DESIGNED FOR USE IN HAZARDOUS ENVIRONMENTS. REFER TO DIXON CONTROL DRAWING 11340EX AND J3 ENTITY PARAMETERS SECTION FOR REQUIRED RATINGS.

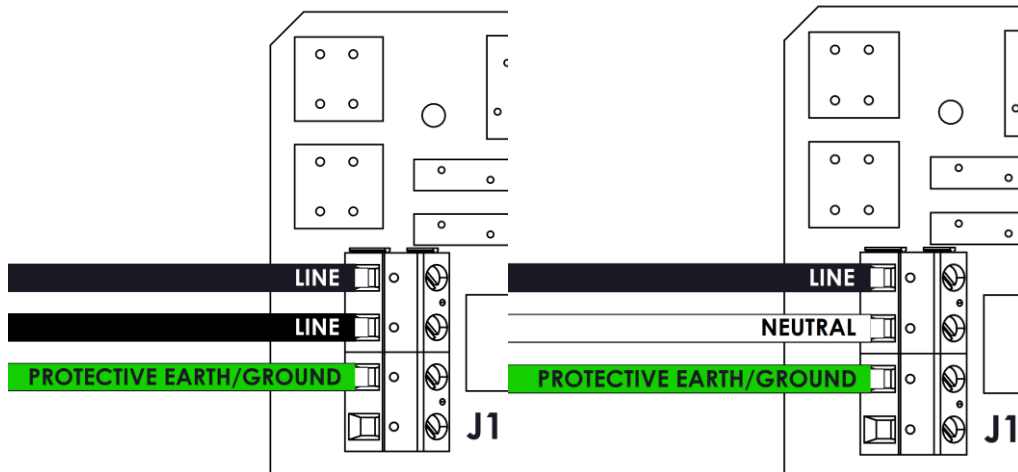


Each enclosure entry point is intended for a specific connection to the FT7100. Refer to the image below for **intended usage** and threading for each cable entry. **DO NOT DEVIATE FROM THE INTENDED USAGE OF EACH CABLE ENTRY; I.S. AND NON-I.S. CABLING MUST NOT USE THE SAME CABLE ENTRY. NE JAMAIS INTERCHANGER LES ENTRÉES DE CÂBLES. PAR EXEMPLE, LES CÂBLES I.S. ET NON I.S. NE DOIVENT PAS UTILISER LA MÊME ENTRÉE DE CÂBLE.**



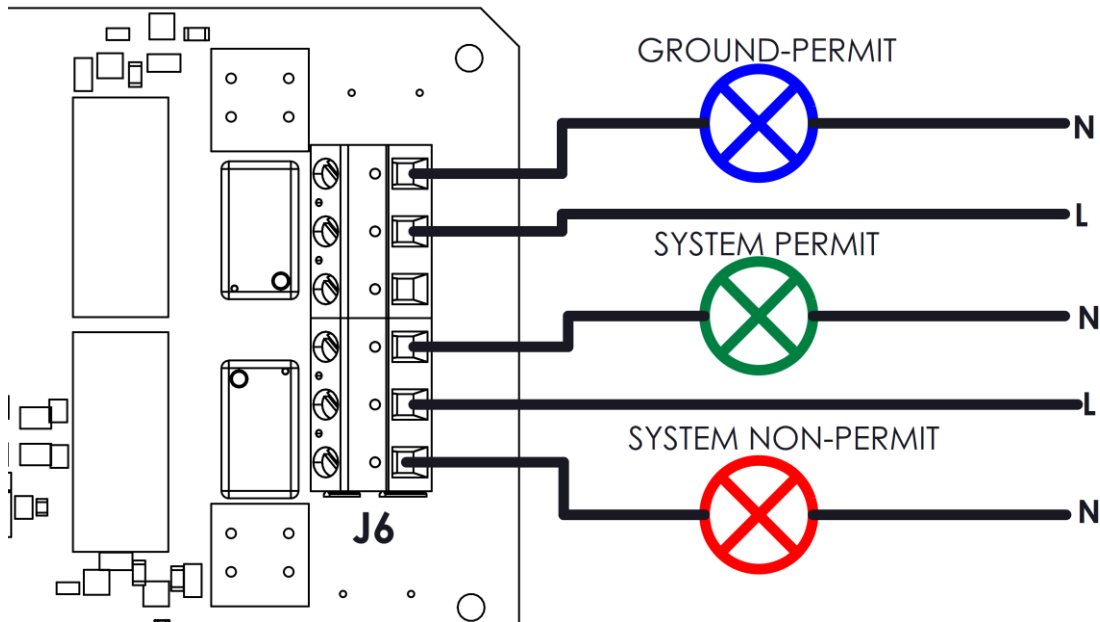
Electrical Installation Instructions

1. Install wiring into the appropriate terminals of J1 for your region's electrical service, referring to the diagrams below:



The FT7100 will autoswitch to work with the supply voltage.

2. Connect loads to the output relay terminal block J6, as necessary. Each relay is Single Pole Double Throw (Form C), having a common, normally closed, and normally open contact. Refer to the relay section in technical specifications above for details of relay contact limits. **Below are examples of wiring diagrams, but other configurations are possible.**



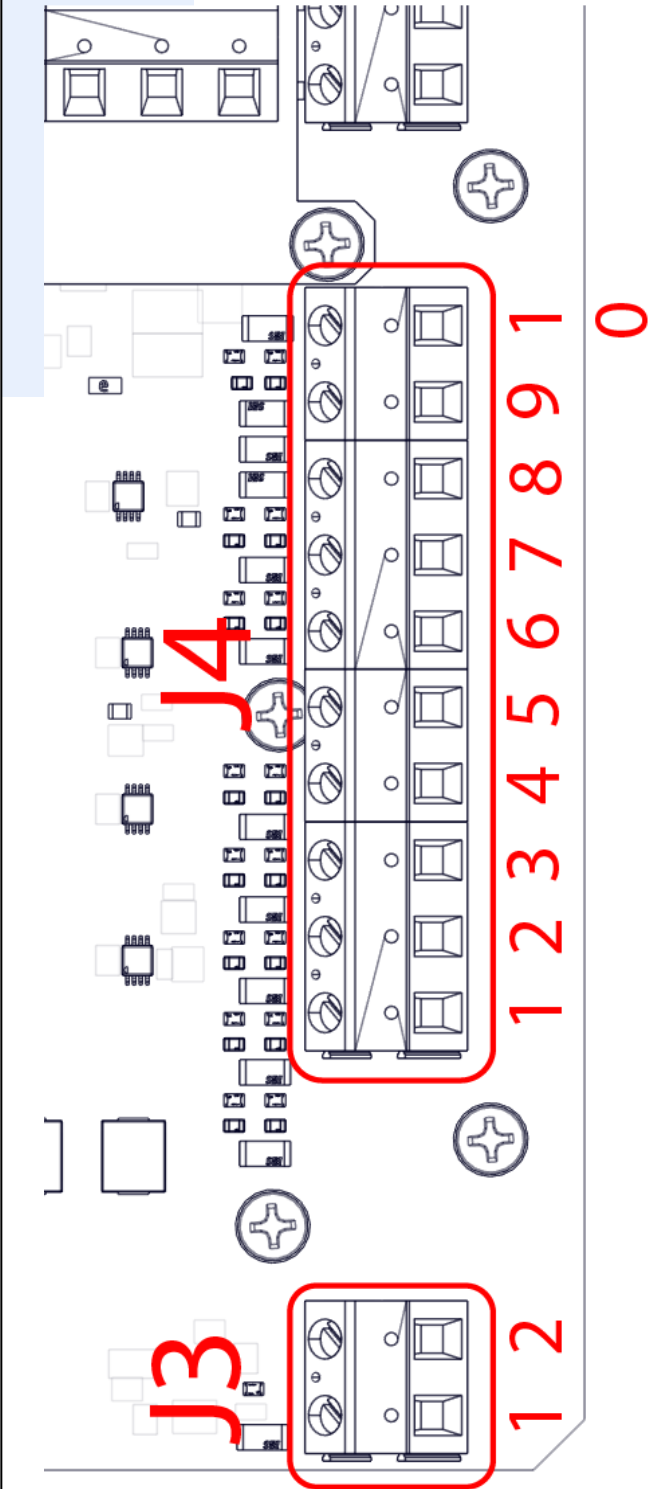
If the installation requires an ESTOP or DEADMAN switch, install the switch wires into the terminals of J2. Polarity does not matter for this connector. The deadman and estop wiring should exit the enclosure from the bottom Intrinsically safe enclosure entry.

3. Install the API rack cable connections into the API CABLE CONNECTION terminal J4 following the diagram below.

J4 (API CABLE CONNECTION) ON RACK MONITOR	API OPTIC WIRE COLOR (5 WIRE)	API THERMISTOR WIRE COLOR (2 WIRE)	FLOTECH RACK CORD WIRE COLOR*	J560 WIRE COLOR	J560 PLUG PIN LABEL	API RACK PLUG PIN NUMBER
1			RED W/BLACK			1
2			GREEN W/BLACK			2
3		BROWN - COMPARTMENT 1 SENSOR	WHITE W/BLACK	WHITE W/BLACK	BRN	3
4	YELLOW - PULSE TO SENSOR	GREEN - COMPARTMENT 2 SENSOR	GREEN	GREEN	GRN	4
5	GREEN - DIAGNOSTIC	RED - COMPARTMENT 3 SENSOR	RED	RED	RED	5
6	ORANGE - RETURN FROM SENSOR	YELLOW - COMPARTMENT 4 SENSOR	ORANGE	ORANGE	YEL	6
7		BLACK - COMPARTMENT 5 SENSOR	BLACK	BLACK	BLK	7
8	RED - SENSOR POWER	BLUE - COMPARTMENT 6 SENSOR	BLUE	BLUE	BLU	8
9	WHITE - GROUND BOLT/TIMODULE	WHITE - GROUND BOLT/TIMODULE	ORANGE W/BLACK	ORANGE W/BLACK	A(long side)	9
10	BLACK - SENSOR GROUND	WHITE - SENSOR GROUND	WHITE	WHITE	WHT	10

*WIRE COLORS ARE SPECIFIC TO DIXON-FLOTECH RACK CORDS. OTHER MANUFACTURERS MAY NOT FOLLOW THE SAME COLORING SCHEME. REFER TO CORD MANUFACTURER'S DATASHEET

***WIRE COLORS ARE SPECIFIC TO DIXON/FLOTECH RACK CORDS. OTHER MANUFACTURERS MAY NOT FOLLOW THE SAME COLORING CONVENTION. REFER TO CORD MANUFACTURER'S DATASHEET**



4. If the installation requires an external bypass, and the unit is outfitted with this capability
 - a. Mechanical keyswitch: The keyswitch should have two conductors. These conductors must be run through the bottom conduit entry. The wiring is from the keyswitch should connect to the bypass daughterboard at terminal JX as shown below:

Polarity does not matter for this connector. The deadman and estop wiring should exit the enclosure from the bottom Intrinsically safe enclosure entry.

5. Verify that all cable entries are either used, or sealed using the appropriately rated stopping plugs.
6. Before closing the enclosure or energizing the FT7100, complete the configuration section below.

WARNING – WHEN CLOSING THE LID, ENSURE THAT NO WIRES ARE CAUGHT IN THE JOINT. TIGHTENING THE LID WHILE WIRES ARE IN THE FLAME PATH MAY IMPAIR SAFETY OR DAMAGE THE WIRES.

ALL CONDUIT AND CABLE GLAND THREADS TO BE INSTALLED INTO THREADED ENCLOSURE ENTRIES SHOULD USE TEFLON TAPE.

Configuration

The rack monitor operation is determined by setting the switches found inside the enclosure.

CAUTION - DO NOT OPEN ENCLOSURE WHILE UNIT IS ENERGIZED.

ATTENTION - NE PAS OUVRIR LE BOÎTIER QUAND L'APPAREIL EST ALIMENTÉ.

CAUTION - DO NOT OPEN ENCLOSURE WHILE EXPLOSIVE ATMOSPHERE IS PRESENT.

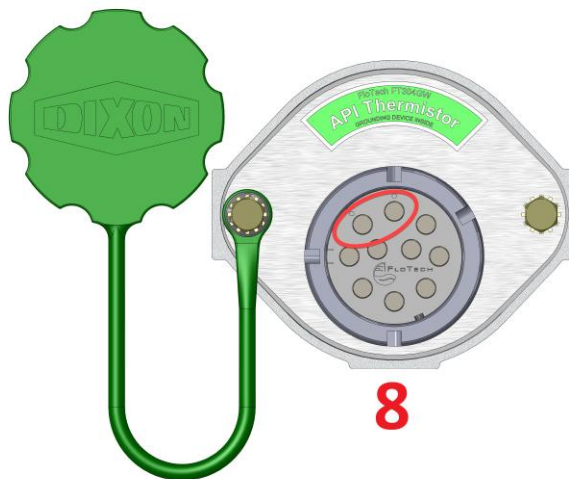
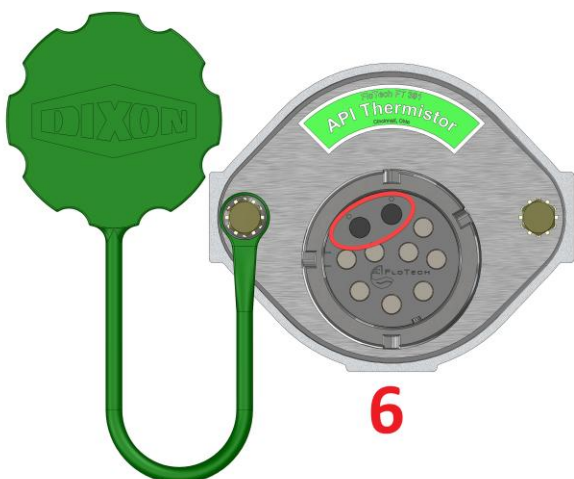
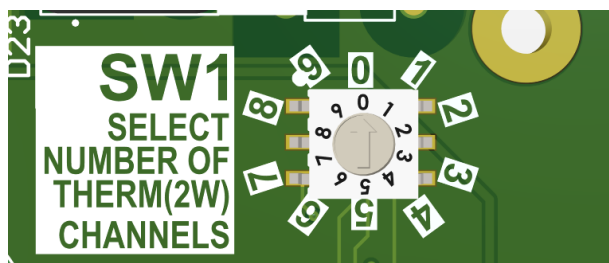
ATTENTION - NE PAS OUVRIR LE BOÎTIER DANS UN ENVIRONNEMENT EXPLOSIF.

Do not modify the switches while the rack is in operation. The unit must be reset after any configuration changes for the changes to take effect. Pressing the on-board reset switch will cause the unit to reset.

Each switch is outlined below, along with a more detailed explanation of each setting.

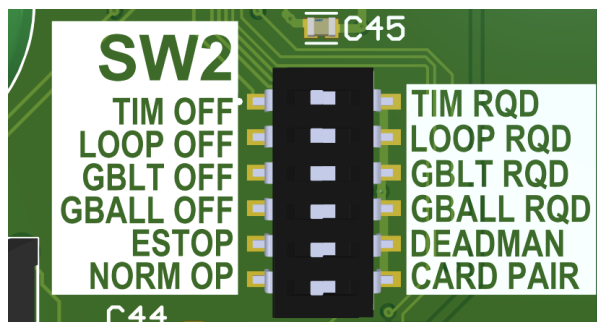
- **SW1 2-WIRE SENSOR CONFIGURATIONS**

- Turn the dial to select the number of two wire sensor channels wired on trailers. NOTE: THIS MAY NOT BE THE NUMBER OF COMPARTMENTS IN A TRAILER. REFER TO THE SOCKET DIAGRAMS BELOW TO DETERMINE THE APPROPRIATE SETTING.



- **TIM, GROUND VERIFICATION METHOD, ESTOP, DEADMAN, BYPASS CARDS**

- If the **TIM RQD** switch is ON, the rack will require a validated TImodule, such as Dixon's FT470, to become permissive. This requires that each trailer have a TIM installed, and the FT7100 be connected to a terminal automation system to maintain a



list of approved TIM serial numbers.

- If the **LOOP RQD** switch is ON, the rack will accept trailers having API pins 9 and 10 bonded on the trailer as a valid means of ground verification. This connection should be less than 8K Ω .
- If the **GBLT RQD** switch is ON, the rack will accept a Dixon FT450 ground-bolt or Dixon FT452 ground-wire as a valid ground verification device.
- If the **GBALL RQD** switch is ON, the rack monitor will accept a Dixon FT451 ground-ball as a valid means of ground verification.
- If the **ESTOP/DEADMAN** switch is to the right(ON), the rack will treat the connection on J3 as a deadman switch. The deadman switch should be normally open and must be held at all times to enable the rack's output relays.
- If the **ESTOP/DEADMAN** switch is to the left(OFF), the rack will treat the connection on J3 as an emergency stop switch. An ESTOP switch should be normally-open. The monitor will latch the estop if the button is pressed, until a bypass card is used to remove the ESTOP.
- The **NORM OP/CARD PAIR** switch is used in the bypass key pairing process. Under normal operation the switch should be to the left(OFF).

Maintenance

**SERVICE SHOULD BE COMPLETED ONLY BY A QUALIFIED HAZARDOUS LOCATION TECHNICIAN.
LE SERVICE DOIT ÊTRE COMPLÉTÉ PAR UN TECHNICIEN QUALIFIÉ.**

**DO NOT OPEN ENCLOSURE WHILE UNIT IS ENERGIZED.
NE PAS OUVRIR LE BOÎTIER QUAND L'APPAREIL EST ALIMENTÉ.**

**CAUTION - DO NOT OPEN ENCLOSURE WHILE EXPLOSIVE ATMOSPHERE IS PRESENT.
ATTENTION - NE PAS OUVRIR LE BOÎTIER DANS UN ENVIRONNEMENT EXPLOSIF.**

**DO NOT TOUCH OR CLEAN THE EQUIPMENT WHILE EXPLOSIVE ATMOSPHERE IS PRESENT.
NE TOUCHEZ PAS ET NETTOYEZ PAS L'ÉQUIPEMENT LORSQUE L'ÉQUIPEMENT EST DANS UN
ENVIRONNEMENT EXPLOSIF.**

**REPLACE PARTS WITH GENUINE DIXON OR APPROVED EQUIVALENT PARTS; SUBSTITUTION MAY
IMPAIR INTRINSIC SAFETY.**

**DIXON OU UN ÉQUIVALENT APPROUVÉ SONT LES SEULES RECOMMANDÉES POUR LE REMPLACEMENT
DES PIÈCES; LA SUBSTITUTION PEUT EMPÊCHER L'EFFICACITÉ ET LA SÉCURITÉ.**

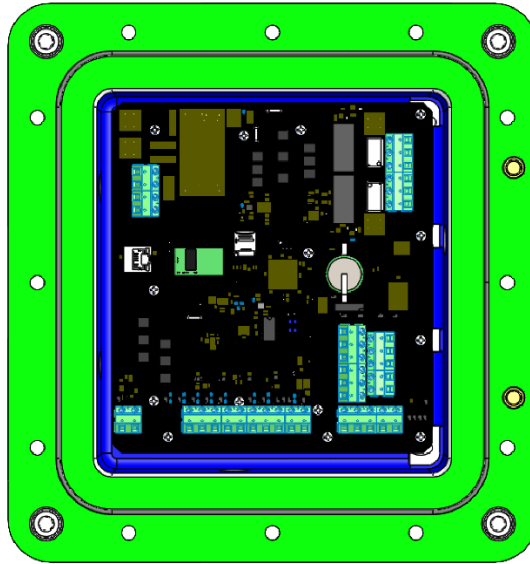
**DO NOT REPAIR ANY FLAMEPROOF JOINTS; REPAIR MAY IMPAIR ENCLOSURE'S FLAMEPROOF
PROTECTION. CONTACT DIXON IF FLAMEPROOF JOINT IS DAMAGED.**

**NE RÉPAREZ PAS LES JOINTS À L'ÉPREUVE DES FLAMMES; CECI PEUT EMPÊCHER LA PROTECTION ANTI-
INFLAMMABLE DE LA PIÈCE. CONTACTEZ DIXON SI LE JOINT ANTI-INFLAMMABLE EST ENDOMMAGÉ.**

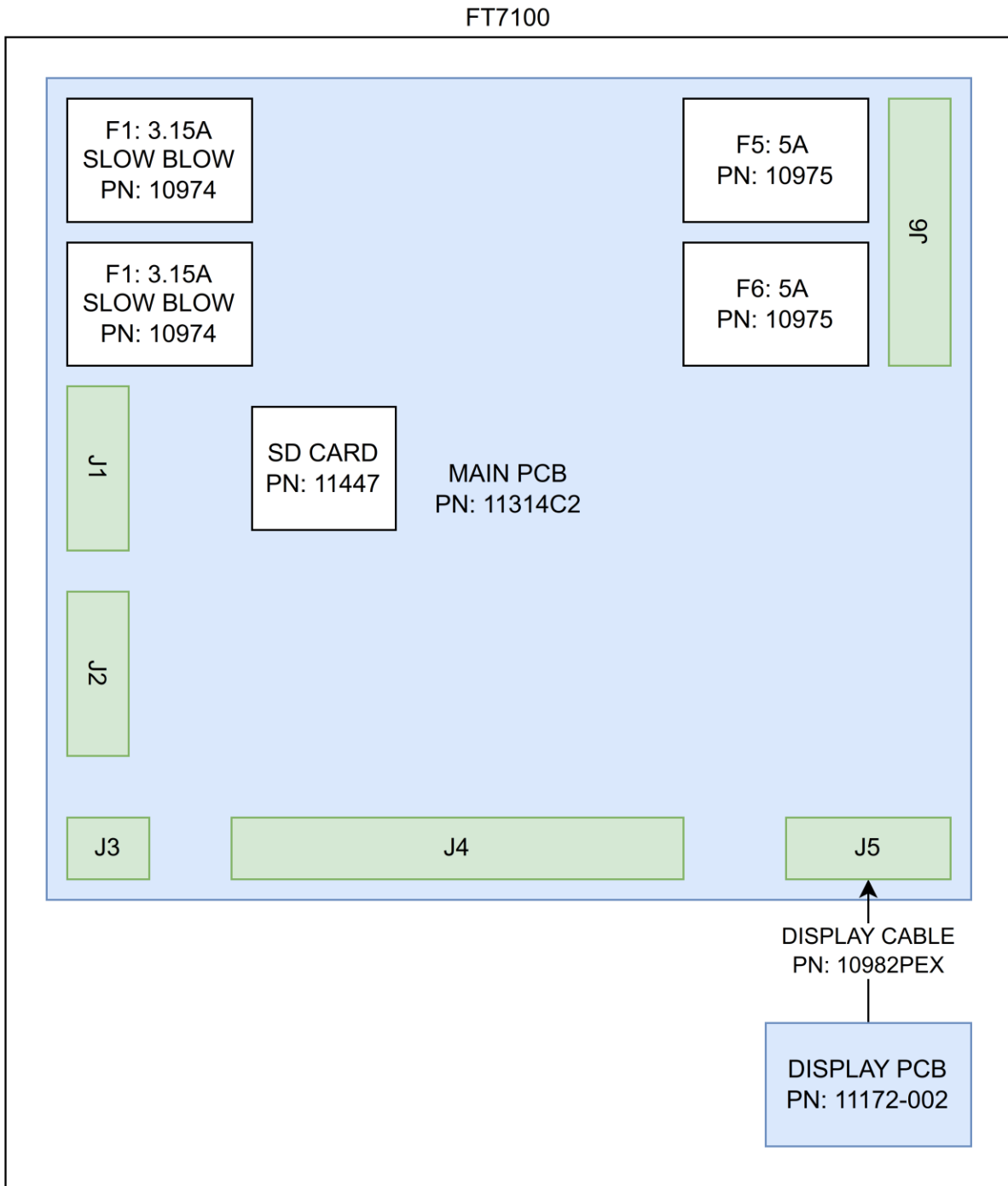
The FT7100 has few parts that will require regular maintenance, however it is important to service annually to extend the life of the monitor. Unsheltered units should be serviced in dry weather to prevent rainwater from entering the enclosure and minimize moisture exposure.

1. Once the unit has been powered down and hazardous gases have dissipated, remove the 12 lid screws.
2. Open the lid, then verify the O-ring gasket is in good condition and secured into the O-ring track. If the O-ring is loose or damaged, replace and secure using ordinary superglue.
3. Inspect the interior of the enclosure for condensation or pooled water. The presence of water will cause corrosion and/or failure and should be fixed immediately.
If water or condensation is present, replace O-ring, inspect cable entry threads and reapply corrosion inhibiting grease if needed. For conduit installations, verify the conduit-sealing fitting is filled. For non-conduit installations, verify the cable gland is tightened properly to seal against the cable jacket. If necessary, add sealing compound to fortify water tight seal. Re-inspect after next rain to ensure water has not entered the enclosure. If water still enters enclosure, contact Dixon support for further assistance.
4. Inspect flame path for coating of grease. If the flame path is not thoroughly coated, apply a lithium or silicone based grease to the areas highlighted. Recommended grease: Dixon 10613.
5. Replace corrosion inhibiting foam, Dixon 10977.
6. Verify all wire terminals are tight.

7. Replace any fuses necessary, referencing the diagram below



AREAS TO APPLY GREASE



8. Replace corrosion inhibitor.
9. Close lid, and tighten all 12 lid screws.
10. Restore power to unit.

Replacement Parts

Description	Part Number
CORROSION INHIBITOR	10977
SILICONE DIELECTRIC GREASE	10613
SUPPLY FUSE 3.15A SLOW-BLO	10974
RELAY CONTACT FUSE 5A	10975
MICROSD CARD	11447
MAGNETIC BYPASS FOB	11432PL
GROUND BYPASS CARD	10978
OVERFILL BYPASS CARD	10964
LID SCREW	10968SS
O-RING	10476EP
CABLE GLAND	10962BR
STOPPING PLUG	10963BR
DISPLAY CABLE ASSEMBLY	10982
DISPLAY ASSEMBLY	11172-002
MAIN BOARD	11314C2
NETWORK MODULE	11342
BYPASS DAUGHTERBOARD	11410EX

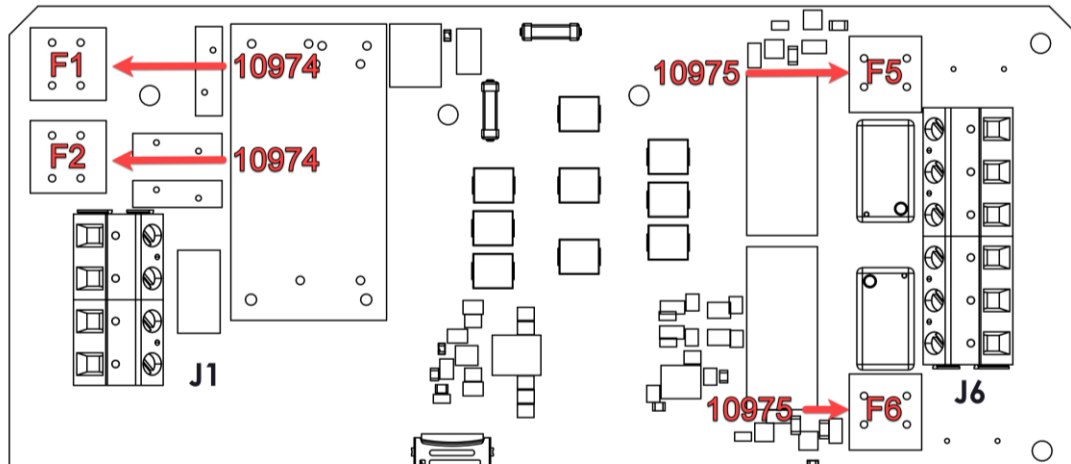
- **CORROSION INHIBITOR – Replacement Part Number: 10977**

This rack monitor comes with a corrosion inhibitor located inside of the enclosure. This inhibitor must be removed from its' plastic packaging once the rack is properly installed. The inhibitor should be replaced every 12 months for continual protection of the monitor's electronics. This will help to extend the life of the rack monitor.



- FUSES – Replacement Part Number: 10974/10975**

The stated rating for all replaceable fuses should not be exceeded, however if a fuse does burn out, replace the fuse with a Dixon brand or Dixon approved fuse. Replacing the fuse with a non-approved fuse may alter the normal operation of the monitor or impede the intrinsic safety of the device.



To replace the fuse:

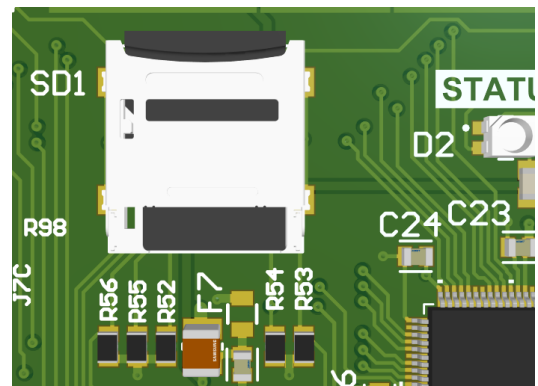
1. Turn the fuse holder cap approximately 1/8th of a turn.
2. The cap will pop out, allowing the cap and internal fuse to be removed.
3. Separate the bad fuse from the cap, discard the old fuse, and replace with an approved fuse.
4. Insert the fuse and cap into the fuse-holder.
5. Push down and turn the cap into place.

- MICROSD CARD – Replacement Part Number: 11447**

The rack monitor is outfitted with a MicroSD card reader. The reader will accept SDHC, and SDXC cards. Cards may be formatted to FAT, or FAT16.

The SD card is used to log the time that the rack monitor changes relay states. Details the SD log will record:

- The time that any output relay changes states
- The type of sensors connected at the time of relay change
- Type of ground connected at time of relay change
- TIM serial number at time of relay change
- WET/DRY status of sensors at time of relay change



The SD card may also function as a means to update the rack monitor's software. The current software version is visible when powering on the rack monitor. It will show the four version numbers sequentially in red. Zero will show as compartment 10.

Contact Dixon support to find if a newer version of the software is available.

- **Magnetic Bypass Fob – Replacement Part Number: 11432PL**



- **OVERFILL RFID BYPASS CARD – Replacement Part Number: 10964**



- **GROUND RFID BYPASS CARD – Replacement Part Number: 10978**



The FT7100 does not have native RFID card reading capability, but this can be added through an external RFID card reader on some models. RFID bypass cards are not included, but can be purchased separately. Bypass cards must be paired with an FT7100 unit after purchase. For pairing instructions refer to 'Managing Bypass Cards' and for a description of the bypass functionality refer to the 'Bypass Procedure' section below.

- **Silicone Dielectric Grease Packet – Replacement Part Number: 10613**



Managing Bypass Cards

FT7100 models that support RFID bypass and have an external RFID reader installed, will need to be paired with bypass cards before they can be used. Bypass cards may be paired/added, removed, or replaced following the procedure below.

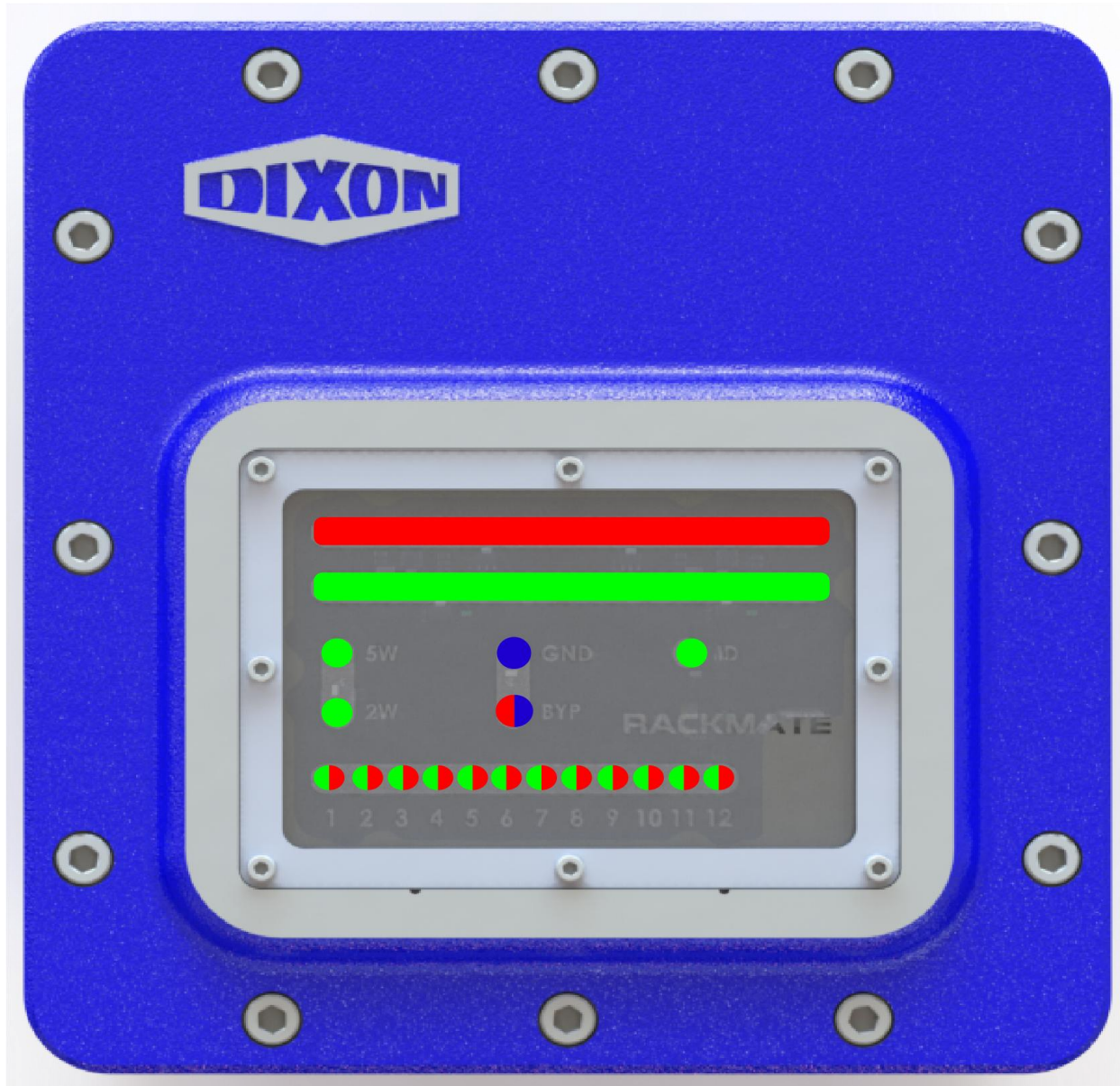
1. Begin by powering off the rack monitor.
2. Remove the 12 lid screws and open the lid to access the configuration switches.
3. Move the 'CARD PAIR' switch to the right(ON) position.
4. Close the rack monitor lid.
5. Restore power to the rack monitor.
6. One at a time, place a bypass card than needs to be added/removed/modified in front of the bypass indicator on the monitor, then remove the card.
7. With each successive swipe of the card, the bypass indicator will cycle blue -> red -> off -> blue... The blue bypass light indicates that the card is recognized as a ground bypass card, while the red bypass light indicates the card is recognized as an overfill bypass card. When the light is off after removing the card, this indicates the card has been unpaired.
8. Repeat steps 6 and 7 with all bypass cards to be used with the monitor.
9. Remove power from the rack monitor.
10. Open the lid to access the configuration switches.
11. Move the 'CARD PAIR' switch to the left(OFF) position.
12. Close the rack monitor lid.
13. Screw in the 12 lid screws.
14. Restore power to the rack monitor.

Operation

WARNING - USING THE FT7100 IN A MANNER NOT DEFINED IN THIS MANUAL MAY IMPAIR SAFETY.

AVERTISSEMENT- L'UTILISATION DU FT7100 D'UNE MANIÈRE NON DÉFINI DANS CE MANUEL POURRAIT NUIRE À LA SÉCURITÉ

While loading a trailer, the front of the FT7100 will indicate the status of the monitor's outputs, as well as the trailer's sensors and accessories.



1. **NON-PERMIT** – The top row of indicators will illuminate red to reflect the state of the permit relays. While the indicators are on, the permit relays are de-energized.
2. **PERMIT** – The second row of indicators will illuminate green to reflect the state of the permit relays. While the indicators are on, the permit relays are energized.

3. **5W** – The 5W indicator will illuminate green when the monitor connects to a five-wire ‘optic’ overfill system.
4. **2W** – The 2W indicator will illuminate green when the monitor connects to a two-wire ‘thermistor’ overfill system.
5. **GROUND-OK** – The GND indicator will illuminate blue to reflect the state of the ground relay. While the indicator is on, the ground relay is energized. If no ground configurations are enabled the ground indicator and relay will be active constantly.
6. **BYPASS ACTIVE** – Indicator shows red when Overfill bypass is active, and blue when Ground bypass is active.
7. **ID FOUND** – The ID indicator will show green when a valid trailer identification module is found. When an unknown or expired trailer identification module is found the indicator will flash green.
8. **COMPARTMENT INDICATORS** – Each compartment indicator can show either red or green to show the wet or dry status of the sensors, respectively. Indicators will be off if the compartment/sensor is not found, or unknown.

Loading Procedure

The rack monitor will default to a NON-PERMISSIVE mode. While non-permissive, the non-permit indicator bar will be illuminated solid red, and the rack will continually check for trailers.

Once the monitor is connected to a trailer it will then verify the incoming signals from the overfill system and continuously check for any of the enabled ground devices. If no ground devices are enabled in the monitor configuration, the monitor will not require any ground verification to become permissive. Once a valid ground device is found, and the overfill system is detected as dry, the monitor will become permissive.

The FT7100 will remain permissive until any requirement is lost. During a normal load, the FT7100 will remain permissive throughout the entire load, then become non-permissive as the trailer disconnects.

While the monitor is permissive it will continually verify that the overfill sensors are dry, and the ground device is connected. If a sensor becomes wet, the monitor will immediately become non-permissive.

NOTE: INTERMITTENT CONNECTIONS WILL PREVENT THE MONITOR FROM STAYING PERMISSIVE THROUGHOUT A LOAD.

NOTE: IF AN ESTOP IS TRIGGERED, THE MONITOR WILL BE LOCKED IN THIS STATE UNTIL A BYPASS KEY IS READ BY THE MONITOR.

Deadman

Some installations will require the use of a deadman pendant to keep the driver's focus and presence throughout the filling process. Once the trailer is connected and all safety requirements have been met, the FT7100 will show a flashing green permit bar. This indicates the unit is ready and waiting for the deadman input to be held.

The deadman input is momentary (non latching) so the FT7100 will only remain permissive while the deadman input is being held. Once released, the unit will go back to green flashing. If a safety requirement is lost, the deadman switch will not circumvent this requirement. It does not function like a bypass.

Emergency Stop

As an added safety measure, the FT7100 can be connected to an emergency stop button. This offers an additional means to interrupt the loading process if an unexpected situation occurs. The emergency stop function can be engaged at any time by closing the emergency stop contacts. Once engaged, the function is latched, meaning it will remain engaged even after the emergency stop switch is released.

While an emergency stop is engaged, the FT7100 will flash the red non-permit bar, and remain non-permissive. The emergency stop will de-energize the output control relays through hardware.

Once an emergency stop has been engaged, the only way to clear the emergency stop function is by scanning a bypass card. Scanning a bypass card while an emergency-stop is latched will not engage a bypass.

Bypass Procedure

If a trailer cannot satisfy the requirements of the monitor, a bypass function will allow the monitor to become temporarily permissive. Engaging the bypass will deactivate some or all of the rack monitor's safety functions, so this should be used with extreme caution.

CAUTION: ENTERING BYPASS MODE MAY ALLOW UNSAFE CONDITIONS TO OCCUR!

ATTENTION: L'UTILISATION DU MODE « BYPASS » PEUT ENGENDRER DES SITUATIONS NON SÉCURITAIRES.

Once the FT7100 has been put into bypass mode, any of the following conditions will end the bypass:

- An additional sensor becoming wet
- Bypass is manually ended by using a bypass key, fob, or card.
- 30 minutes has elapsed from the start of bypass

Standard Bypass

While the FT7100 is non-permissive, the operator will begin by bringing the bypass fob to the face of the unit. The fob should be in either of the two positions shown below:



The rack monitor will detect the fob presence, then begin flashing the compartment LEDs yellow for 6 seconds. After this, the compartment LEDs will change to a 'chasing' red pattern. This chasing pattern is the confirmation step, which will require the operator to scan the bypass fob again. The operator will have 6 seconds to bring the bypass fob to the face of the unit again, in either of the two positions shown above to confirm the bypass.

The bypass indicator will show red to show a system level bypass is active. The bypass can be cleared by scanning the fab against the face of the FT7100 in either of the positions shown above.

Mechanical Keyswitch Bypass

To engage a rack monitor bypass using a physical key, insert the key into the key operator box and rotate it to the bypass position. The monitor will remain bypassed while the key is in this position. Removal of the key is prevented while in the bypass position. The key must be returned to the normal operation mode before the key can be removed.

RFID Bypass

To engage a bypass using an RFID bypass card, the FT7100 unit must support external bypass scanners, and have an external RFID scanner installed. If a terminal operator has deemed the trailer as safe, the operator will hold their bypass card to the bypass indicator. Once the FT7100 has read the bypass card, and verified it is paired, the unit will enter bypass mode.

Ground bypass cards can only enter ground bypass mode, indicated by a blue bypass light.

Overfill bypass cards can only enter overfill bypass mode, indicated by a red bypass light.

Subsequent scans of the bypass card will disengage the bypass.

FAQ & Troubleshooting

- Lost bypass card
 - If the lost bypass card needs to be deactivated for security reasons, the operator will need to repair all remaining bypass cards. Powering on the monitor while in pairing mode clears all paired bypass cards. Follow the pairing procedure to pair each active card. Up to 10 bypass cards total can be paired to the monitor.
- Monitor output does not change, even though display does.
 - The relays are all protected by fuses located in the enclosure. Disconnect power, open the enclosure, and verify fuses F1, F2, F3, and F4 are all intact. Refer to the maintenance section of this manual if any fuses need to be replaced.
 - In extreme cases, a permit relay contact could become welded together. Should this occur, the system will detect a failure and enter a failsafe mode to prevent further damage or unsafe operation. Please contact Dixon support if this is the suspected failure.
- No lights are showing when powering on the monitor
 - Power off the monitor, then open the enclosure. Check that fuses F18, and F20 are intact. Refer to maintenance section of this manual if any fuses need to be replaced.
- ESTOP occurred and monitor appears to be stuck non-permissive
 - A bypass card is necessary to exit failsafe mode. Hold up either the Overfill bypass card or the Ground/TIM bypass card to the bypass indicator to reset the ESTOP lock.
- The lid will not open.
 - Once the lid screws are removed the lid should droop slightly and rest on the hinges. If the hinges have become out of alignment with the lid opening direction, the lid will not pivot open. To realign the hinges, pull the lid away from the base of the box, then use a 7/16" [12mm] open-end wrench to rotate the hinge until the lid can open.

Warranty

For warranty claims and information regarding coverage, please contact Dixon Support at

+1 (513) 874-8499

Support

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