Installation, Maintenance and Operating Instructions

FT7200-SERIES RACKMATE SC

SINGLE CHANNEL RACK MONITOR WITH GROUND VERIFICATION

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PRODUCT OVERVIEW

The FT7200-series RackMate SC monitors are industrial overfill and static ground monitors intended for use with liquid transfer process control systems. These monitors ensure safe loading and unloading conditions are maintained throughout the duration of the liquid transfer.

This RackMate SC is designed as part of a reliable wet/dry sensing and static ground connection system for mobile vessels transporting hazardous and volatile liquids. The monitor is equipped to provide a grounding connection to safely dissipate any static buildup, providing a safe operating environment for the liquid transfer process to be conducted. Additionally, the monitor can verify this ground connection using one of three different ground verification methods.

Dixon prides itself in the quality and reliability of their products. With Dixon products end-to-end, operators of any size can work with less downtime and greater confidence in the reliability of the monitoring system. Dixon's 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 the primary focus.

Model (P/N)	Overfill Sensor	Ground Verification
FT 7215	2 Wire "Black and White"	Yes
FT 7247	None (ground verification only)	Yes

FEATURES AND BENEFITS

- Overfill detection and ground verification in a single unit
- Suitable for installation in hazardous locations
- 5 Amp form C relay
- Compatible with 2 Wire sensors meeting API1004 and/or EN13922 standards
- Provides grounding connection to safely dissipate any static buildup
- Configurable for different ground verification methods
- Bright multicolor indicators are clearly visible in all conditions
- Bypass system with key fob
- 120 VAC operation
- Rugged enclosure with 4 entries for easy configuration and installation

APPROVALS AND CERTIFICATIONS

Some components of this product carry approvals and/or certifications

Enclosure - The instrument housing carries UL, CSA, ATEX, and IECEx approvals.

UL	Class I, Division 1, Groups A, B, C and D; Class II, Division 1, Groups E, F and G; Class III; Class I, Zone 1, AEx db IIC Gb; Zone 21, AEx tb IIIC Db; Ex tb IIIC Db; IP66/IP68/TYPE 4X
CSA	Class I, Division 1, Groups A, B, C and D; Class II, Division 1, Groups E, F and G; Class III; Class I, Zone 1, AEx db IIC Gb; Zone 21, AEx tb IIIC Db; Ex tb IIIC Db; IP66/IP68/TYPE 4X
ATEX	Flameproof protection; II 2GD; Ex db IIC Gb; Ex tb IIIC Db; IP66/IP6
IECEx	Flameproof and dust protection; Ex db IIC Gb; Ex tb IIIC Db; IP66/IP68
CE	EU and IECEx Attestation of Conformity

Zener Barrier

UL	CoC 20190321 - E106378 RepRef 19960425 UL E106378 cULus
ATEX	ATEX certificate: BAS 01 ATEX 7005 ATEX marking: 1 II (1)G [Ex ia Ga] IIC, II (1)D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I ATEX certificate: TÜV 99 ATEX 1484 X ATEX marking: 1 II 3G Ex nA IIC T4 Gc
IECEx	IECEx certificate: IECEx BAS 09.0142 IECEx BAS 17.0091X IECEx marking: [Ex ia Ga] IIC , [Ex ia Da] IIIC , [Ex ia Ma] I Ex ec IIC T4 Gc
FM	FM 17 US 0370

Refer to included instruction manual for detailed requirements.

Relay

UL/C-UL	File No. E41515
VDE EN/IEC	IEC/EN 60335-1, IEC60079-15

DECLARATION OF CONFORMITY

The RackMate SC monitor is intended for installation and operation at industrial fluid transfer facilities, handling both hazardous and non-hazardous materials. As such, the RackMate SC series monitors are designed to meet all required safety standards to operate in these hazardous environments.

Table of applied design standards:

CSA C22.2 NO. 60079-0	UL 60079-0
CSA C22.2 NO. 60079-1	UL 60079-1
CSA C22.2 NO. 60079-11	UL 60079-11
CSA C22.2 NO. 61010-1-12	UL 61010-1
CSA C22.2 NO. 157-92	UL 913
CSA C22.2 NO. 30-M1986	UL 1203

The table below summarizes the hazardous locations in which the FT7200 RackMate SC™ series monitors are designed for:

	NEC 500			**NEC 505**			
	CLASS I			**CLASS I**			
	DIVISION	**1**	**2**	**ZONE**	**0**	**1**	**2**
Installation in		CD	CD			IIB	IIB
Connection to		CD	CD		IIB	IIB	IIB

CD/IIB = Ethylene and Propane

The use of the RackMate SC series monitors in the hazardous locations listed above assumes the following conditions are met and that all installation requirements are observed.

Specific Conditions of Use:

1. The ability of the RackMate SC monitor to interrupt the loading process and prevent an overfill is dependent upon proper integration into the loading

system. Interruption testing is a critical requirement during the commissioning process to verify that the monitor is ready to be put into service.
2. Substitution of parts may impair functional and intrinsic safety. Repair only with genuine Dixon components, following approved procedures.
3. Do not open enclosure while hazardous vapor is present, or while the unit is energized.
4. The electrical safety of the system is dependent upon using the monitor with appropriately rated sensor equipment. Consult an intrinsic safety system designer before connecting equipment to ensure the complete system is in compliance with applicable I.S. Standards.

Safety Protection Concepts

To achieve safe operation in hazardous environments, the following safety measures and protection concepts are employed in the monitor's design.

Flameproof/Explosionproof enclosure (Ex d/XP)

The monitor's enclosure has been independently tested and proven to withstand internal ignitions and prevent the transmission of any internal flames. The enclosure has also been independently verified to meet IEC60529 IP66/IP68 water and dust resistance requirements. See approvals and certifications section above for details. A certificate of compliance for the enclosure is included with each RackMate SC unit.

Intrinsically Safe Circuits (Ex ia)

Output circuitry coming from RackMate SC monitors are designed meet intrinsically safe requirements, making them incapable of causing an ignition. In addition to the intrinsic safety built into Dixon's module, a secondary intrinsic safety barrier is installed in the RackMate SC unit. The secondary barrier has been independently certified to CSA/UL 60079-11 standards for intrinsic safety protection, and the barrier's certificate of compliance is included with each RackMate SC unit. Even under a failure scenario, the intrinsically safe outputs will not exceed the entity parameters listed under IS CIRCUIT ENTITY PARAMETERS

Prospective Device markings

Ex/AEx db [ia Ga] IIB T4 Gb -20°C<Ta<60°C

TECHNICAL SPECIFICATIONS

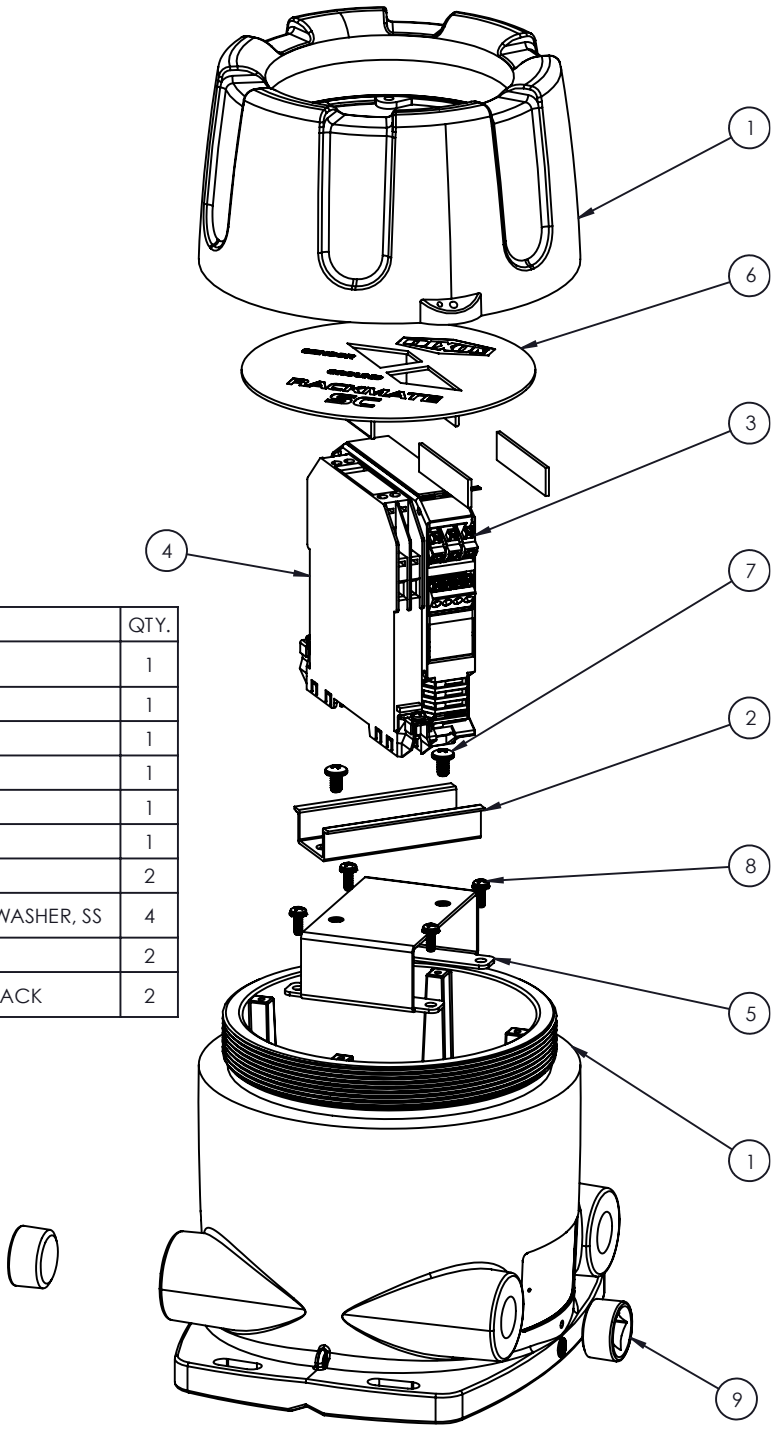
ELECTRICAL CHARACTERISTICS

SPECIFICATION	MIN.	NOM.	MAX.	UNITS
SUPPLY VOLTAGE	100		125	VAC
SUPPLY FREQUENCY	50		60	Hz
SUPPLY POWER			5	WATTS
SUPPLY WIRE GAUGE	18			AWG
RELAY CONTACT VOLTAGE			240	VAC
RELAY CONTACT CURRENT			5	A
RELAY/SENSOR WIRE GAUGE	20			AWG
OPERATING TEMPERATURE	-20 -4		60 140	°C °F
HUMIDITY	0%		100%	
LENGTH		6.42 163		in cm
WIDTH		7.97 202.4		in cm
DEPTH		8.45 214.5		in cm
WEIGHT		15		lbs
MAXIMUM GROUND LOOP RESISTANCE		2000		Ω

IS CIRCUIT ENTITY PARAMETERS

Zener Barrier Terminals	Uo / Voc (V)	Io / Isc (mA)	Po (W)	Groups Co/Ca (µF)			Groups Lo/La (mH)		
				A,B (IIC)	C,E (IIB)	D,F,G (IIA)	A,B (IIC)	C,E (IIB)	D,F,G (IIA)
1 or 4 to GND	16.8	143	0.6	0.38	1.13	3.04	1.63	4.89	13.04
1+4 to GND	16.8	286	1.2	0.38	1.14	3.04	0.24	0.72	1.92

EXPLODED VIEW AND BOM



ITEM	DESCRIPTION	QTY.
1	EX700 EXPLOSION PROOF ENCLOSURE	1
2	DIN RAIL, 15MM	1
3	FT7200 DIN PACKAGE ASSEMBLY	1
4	ZENER BARRIER	1
5	BRACKET, MOUNTING, FT7200	1
6	FACEPLATE, FT7200, ENGRAVED	1
7	SCREW	2
8	SCREW, #6-32 X 3/8" LG., W/ EXT. TOOTH WASHER, SS	4
9	PLUG, 3/4 NPT, EXPLOSION PROOF	2
10	TAPE, FOAM, POLYURETHANE, ADHESIVE BACK	2

Not all labelled parts are available for purchase individually

SETUP AND INSTALLATION

PRECAUTIONS

FT7200-series monitors are suitable for installation in ordinary and specific hazardous locations defined by NEC NFPA70, CEC C22.1, IEC 60079-10, or other standards applicable in the local jurisdiction.

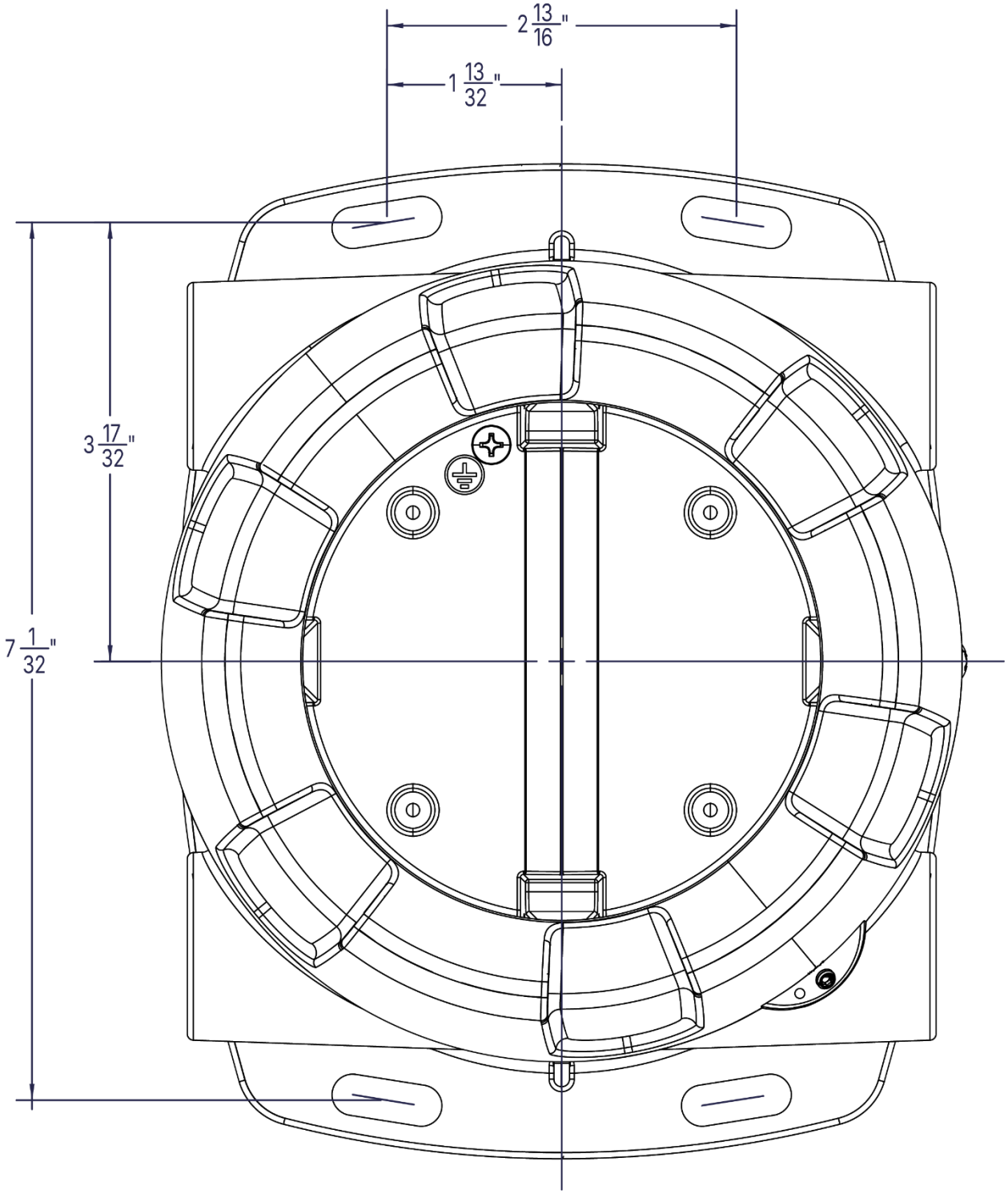
In order to make electrical connections to the RackMate SC, the outer housing should be opened and the DIN rail assembly (with barrier and monitor) removed and completely lifted out of the explosion-proof housing. This is accomplished by removing the two mounting screws that connect it to the mounting bracket and lifting the DIN rail and attached components out as one assembly.

⚠ INSTALLATION SHOULD BE PERFORMED BY AN APPROPRIATELY QUALIFIED PROFESSIONAL.

The RackMate SC is housed in an explosion-proof enclosure with a glass window featuring 4 conduit entries. A black faceplate visible through the window covers two DIN mount modules mounted at 45 degrees, these modules are the monitor and the Zener barrier. The Zener barrier is necessary to maintain safe operation in hazardous locations. It is recommended to wall mount the unit using stainless steel or galvanized steel hardware suitable for the Rackmate weight and the wall material.

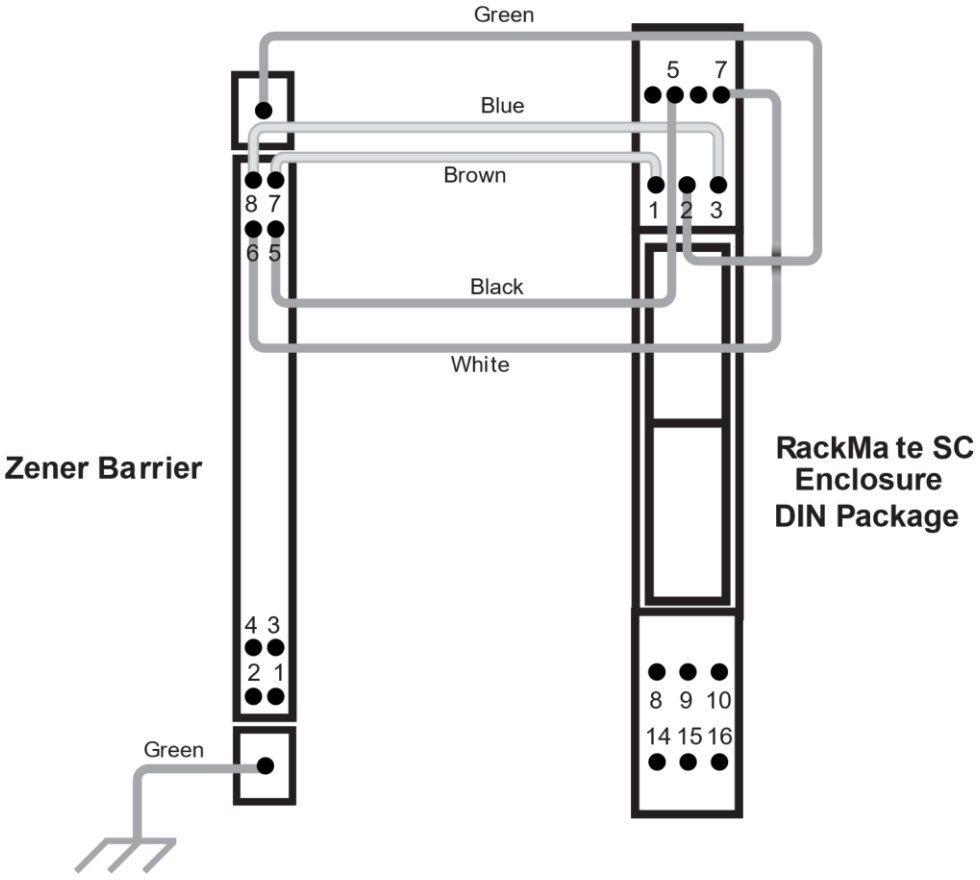
1. Locate a sturdy area, large enough to install the unit, the reference the diagram to drill mounting holes. The Rackmate SC should be positioned at eye level, with indicators facing the typical operator position for greatest visibility. The enclosure can withstand rain and sun exposure but will last longer when protected from the elements.
2. Level the bolt pattern and drill four holes.
3. Have another person lift the monitor into position in front of the drilled holes.
4. Insert the anchors or bolts through the slots in the explosion-proof enclosure.
5. Tighten all fasteners and check that the monitor is secure.

MOUNTING DIAGRAM



ELECTRICAL

WIRING DIAGRAM



The connections provided at terminals 1,2,3 and 4 are Intrinsically Safe and as such must be kept separate from *non-intrinsically safe* connections. In accordance with electrical code requirements, separate conduit entries must be used for *Intrinsically Safe* and *Non-Intrinsically Safe* connections such as relay connections and power supply lines.

All unused entries must be safely covered.

Table of Intrinsically Safe Electrical Connections

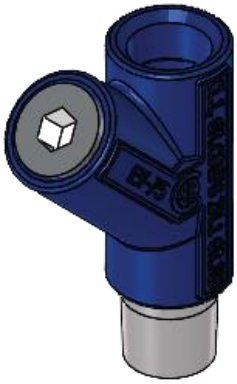
ZENER BARRIER	EXTERNAL CONNECTION	PERIPHERAL	RACK CORD PIN NO.
4	2W SENSOR BLACK	SENSOR	5
3	2W SENSOR WHITE ⏚	SENSOR	10
2	GROUND CONNECTION ⏚	TANK/TRAILER GROUND	GND
1	GROUND RECEIVE	TANK/TRAILER GROUND	9

Table of Non - Intrinsically Safe Electrical Connections

RackMate SC Terminal Position	Connection
1*	Ground
2*	Ground
3*	Ground Verification Connection
5*	Two Wire Signal (black)
7*	Two Wire Ground (white)
8	120 VAC Line
9	120 VAC Neutral
10	Ground
14	Normally Closed Relay Connection
15	Common Relay Connection
16	Normally Open Relay Connection

* Factory wired connections

SEAL FITTINGS



Seal fittings are required within 18 inches of each enclosure entry used. These prevent conduits from passing hazardous vapors or propagating flames. Sealing fittings are installed in line with the conduit, then filled with sealing compound once wiring has been installed and verified. Sealed downstream junction boxes containing Intrinsically Safe circuits may be serviced without danger.

Instructions provided below are general guidelines and may not cover local codes or requirements.

1. Sealing fittings required within 18” inches of the enclosure.

2. The supply connection to the monitor must be made with rigid metal conduit.

3. Any unused cable entries must be blocked with appropriately rated Ex stopping plugs.

4. Mains supply must be fed from a circuit breaker protected line. The circuit breaker in-line with RackMate SC must have a breaking capacity of 10,000A or more.

5. Each enclosure entry point is intended for isolated connection to the RackMate SC monitor. **I.S. AND NON-I.S. WIRING MUST NOT USE THE SAME CABLE ENTRY.**

6. Remove the lid from the enclosure by first loosening the lid setscrew, then rotate the lid counter clockwise. Exercise caution when removing the lid, as it is not tethered to the enclosure and COULD fall once threads disengage.

7. Remove the two mounting screws that attach the DIN rail to the mounting bracket and lift the DIN rail and attached components out as one assembly.

8. Install supply wiring into the appropriate terminals, referring to the diagram on the monitor DIN package.

9. A high-quality ground connection is critical to the operation of the RackMate SC. Ensure the monitor is fed by a low resistance ground circuit. Failure of the ground connection will prevent the monitor from operating normally.

10. Connect loads to the output relay terminals, as necessary. One single-pole-double-throw (Form C) relay is available for customer connection, having a common, normally closed, and normally open contacts.

11. Verify that all cable entries have either a sealing fitting or stopping plug installed.

12. Once electrical installation is complete, re-install the lid then tighten the set screw. **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.**

13. Verify proper functionality of system by testing before putting into service. **ALL CONDUIT AND CABLE GLAND THREADS TO BE INSTALLED INTO THREADED ENCLOSURE ENTRIES SHOULD USE TEFLON TAPE.**

CONFIGURATION

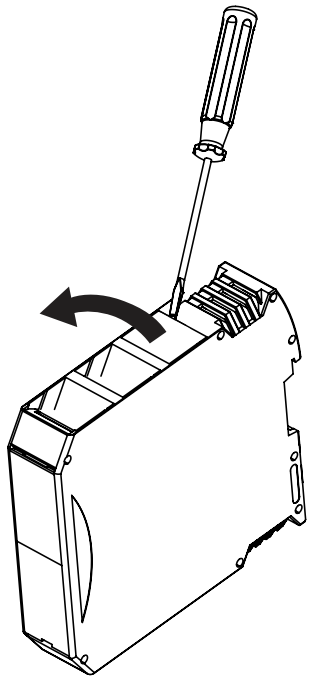
CHOOSING A COMPATIBLE WET/DRY OVERFILL SENSOR

The RackMate SC is compatible with overfill sensors designed to meet the API1004 and/or EN13922 standards. Most industry standard equipment will fall under one or both standards. The monitor may also work with other products if their operation is similar.

This is an example of a DIXON FloTech 2W (black and white) overfill probe P/N FT150.

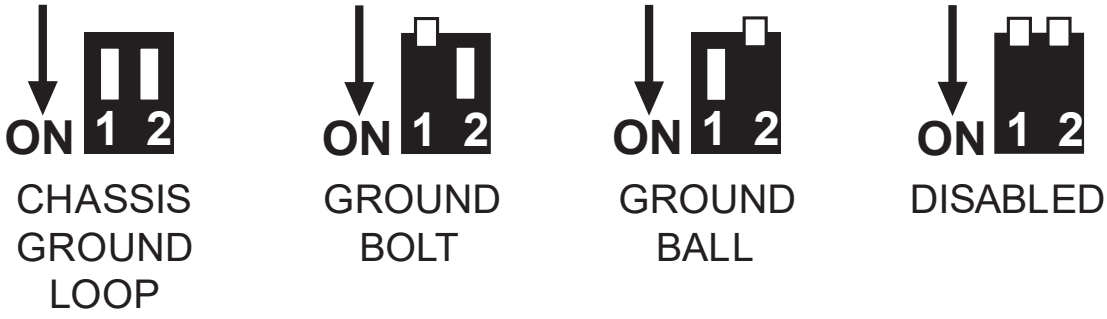
SELECTING A GROUNDING MODE

The ground verification mode must be selected before the unit is connected to power. Changing the ground verification mode can only be accomplished by removing the DIN package from the explosion-proof housing. Unsheltered units should be opened only in dry weather to prevent rainwater from entering the enclosure and minimize moisture exposure. Ground Verification Mode is set using the switches found underneath the cover on the top of DIN package.



The cover can be gently removed with the tip of a screwdriver, exposing the switch bank. Ground Verification mode selection depends on the customer's expected equipment hardware and will be unique for each installation.

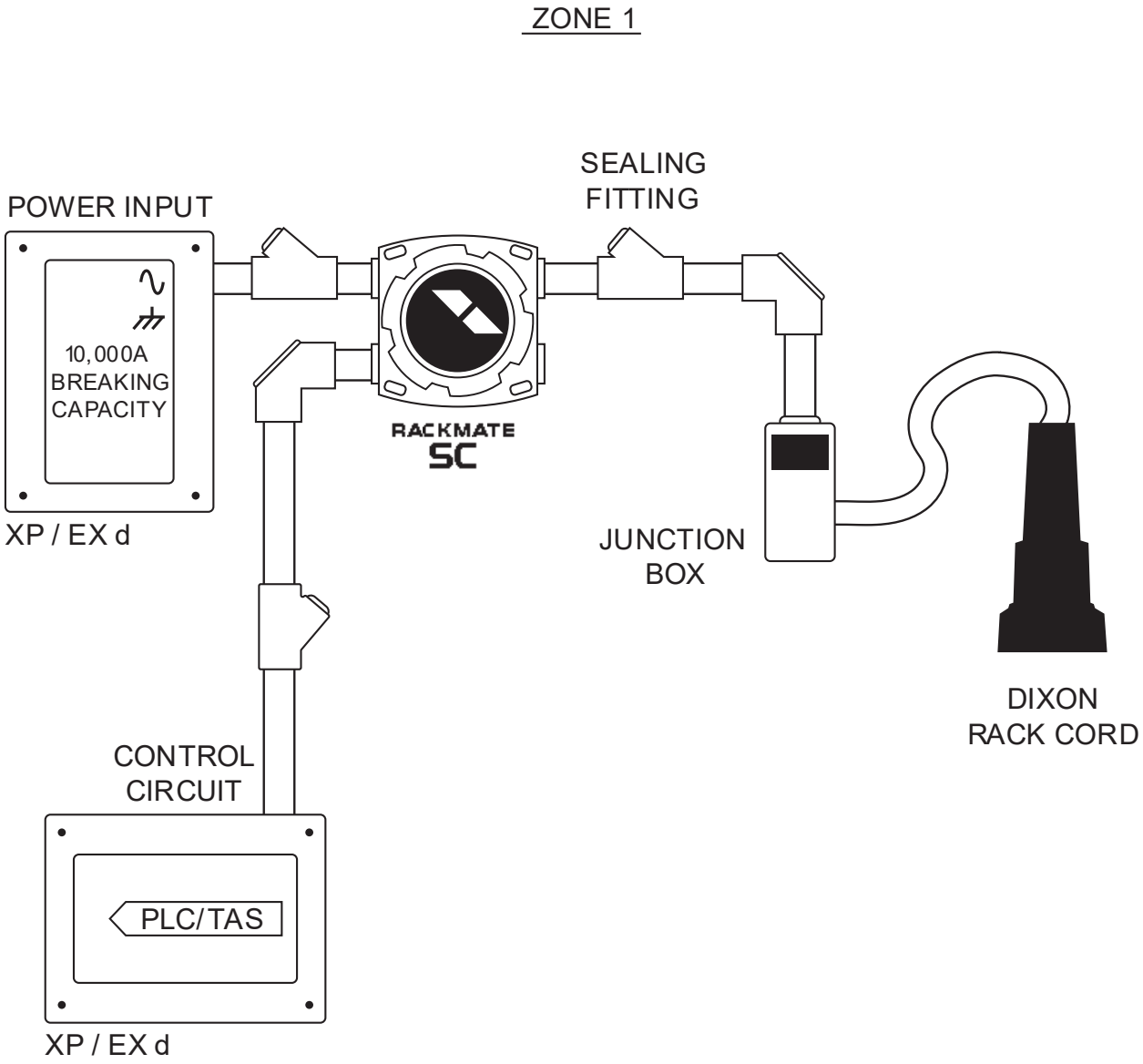
Switch combinations for each ground verification method:



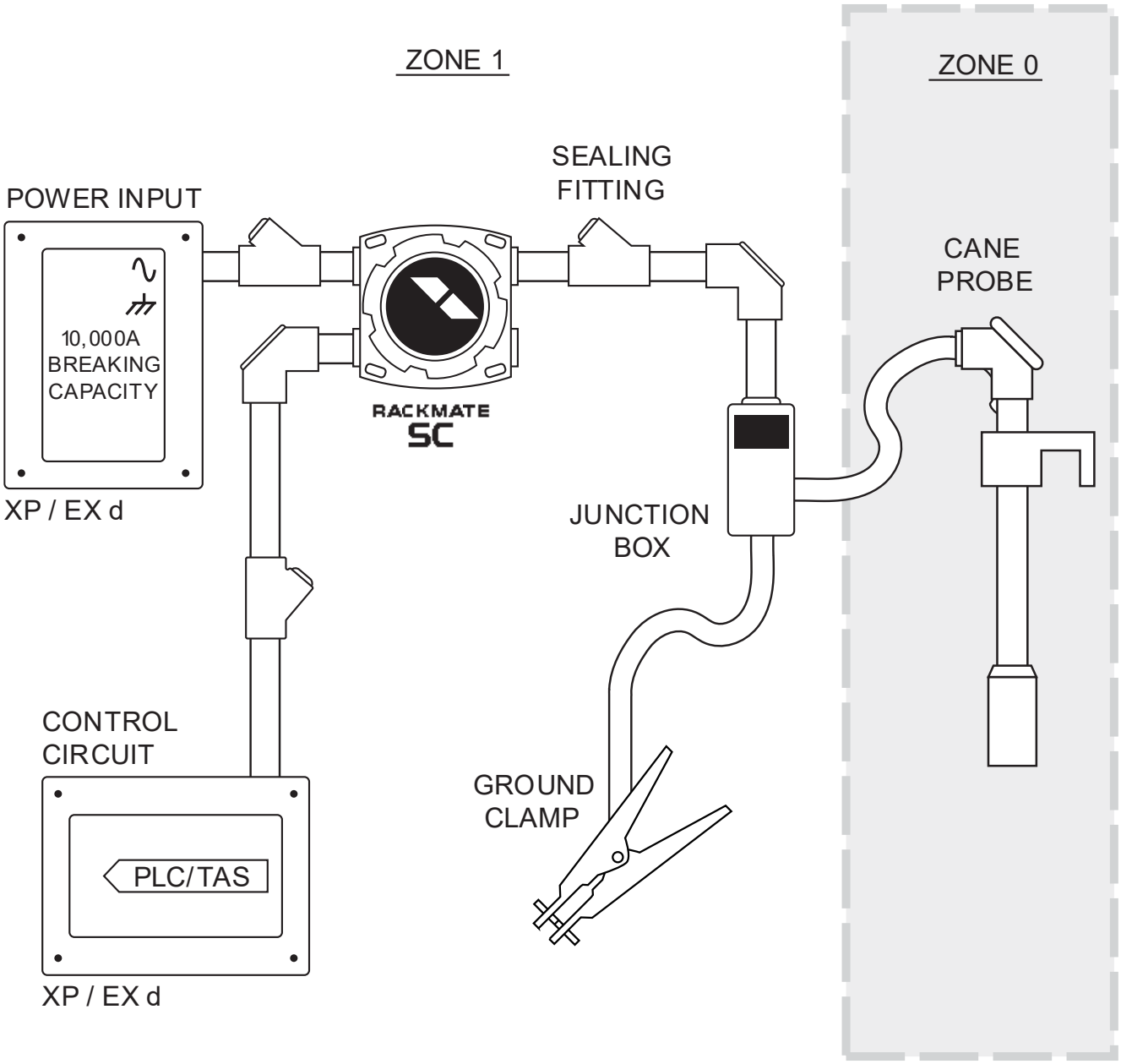
If a ground clamp is used, select “Chassis Ground Loop” mode. Chassis Ground-type ground verification is also typical for European tankers. Ground Bolt and Ground Ball monitoring are typical ground verification setups found on North American tanker trucks, particularly when transporting flammable or hazardous materials. Consult your trailer OEM for more information.

In some cases, no ground verification is necessary. This may be true particularly with non-explosive/non-hazardous location applications, where a static ground connection may not be necessary. For these situations, the monitors ground verification switches may be disabled. If you disable the ground verification circuit by setting both DIP switches OFF and disconnect the ground verification connection, the lower polygonal indicator will illuminate blue continuously and the relay will always be active and ready to be energized once the sensor indicates that it is dry.

INSTALLATION EXAMPLES



This is an installation showing the RackMate SC installed complete with sealing fittings and a Dixon Rack Cord for sensor and ground connection to the socket.



This is an installation showing the RackMate SC installed complete with sealing fittings and a Dixon Cane Probe for wet/dry sensing and a Dixon ground clamp providing ground connection.

OPERATION

When the sensor is dry and conditions for verified ground are met, the indicators light and the relay energizes.

INTERFACE

The RackMate SC has 2 trapezoid shaped indicators, the upper indicator shows wet/dry state of the sensor and the lower indicator shows ground verification state.

The lower indicator flashes pink when the unit is initially powered on. This is part of the firmware initialization routine.

The upper indicator lights up yellow when the monitor has been placed in bypass mode.

If the trapezoids are alternately flashing red, the monitor is in an error state. In case of error, please contact DIXON Technical Support +1 (513) 874 8499

There are no user-serviceable parts inside of the RackMate SC DIN package.

CONDITIONS

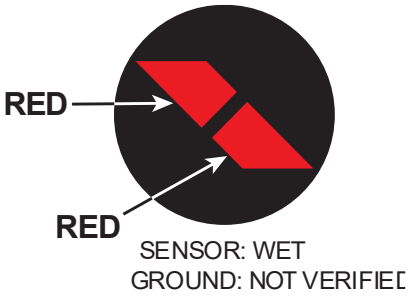
Under normal operation conditions, the lights will display as follows:

Sensor Wet: Upper trapezoid illuminates red

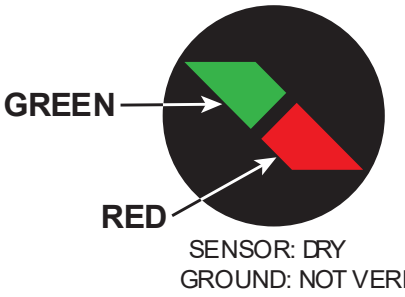
Sensor Dry: Upper trapezoid illuminates green

Ground Not Verified: Lower trapezoid illuminates red

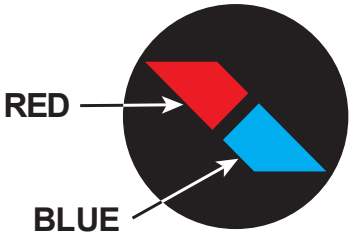
Ground Verified: Lower trapezoid illuminates blue



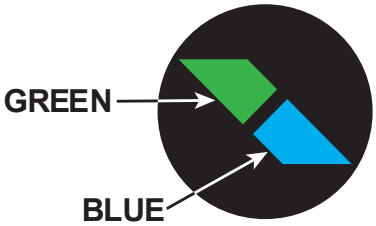
SENSOR: WET
GROUND: NOT VERIFIED



SENSOR: DRY
GROUND: NOT VERIFIED



SENSOR: WET
GROUND: VERIFIED

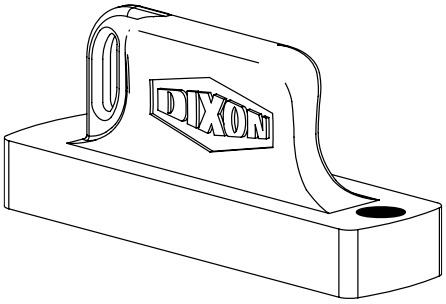


SENSOR: DRY
GROUND: VERIFIED

RELAY ENERGIZED

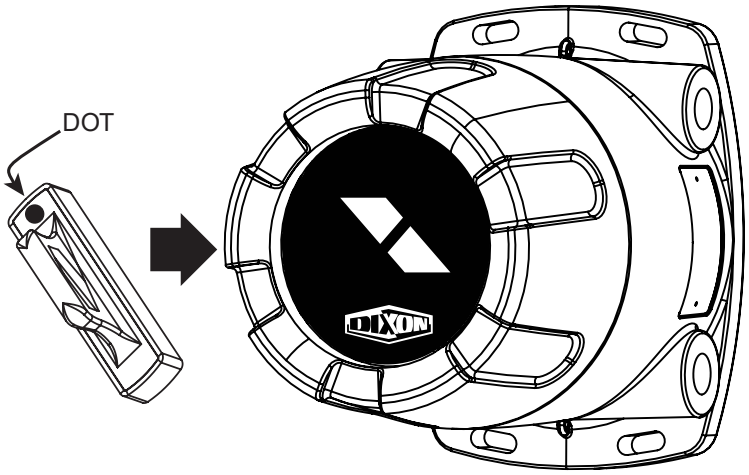
BYPASS

If the RackMate SC is connected to equipment that is unable to satisfy the permit conditions, the monitor may be bypassed to enable the loading/unloading process to proceed. Bypass mode is engaged by means of a plastic fob.



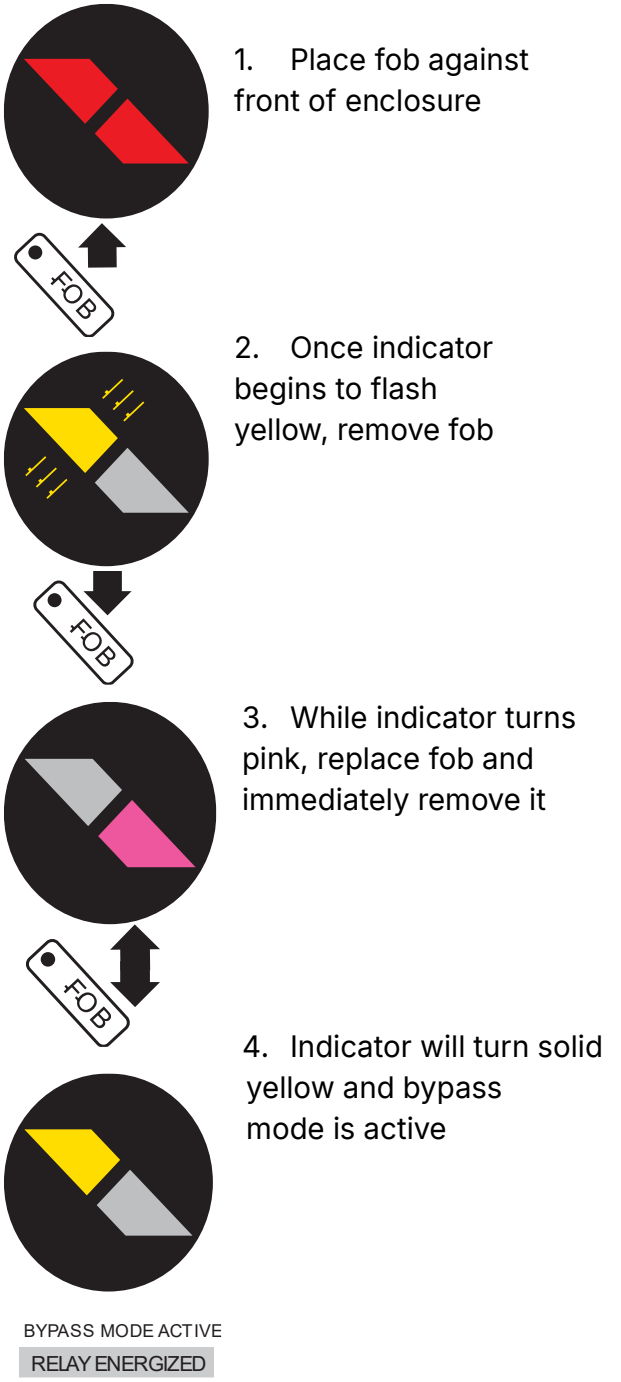
Bypassed wet/dry monitoring may result in overfills or fuel spills. Improper or inadequate grounding can lead to static discharge and ignition. *USE EXTREME CAUTION!*

Once the RackMate SC has been put into bypass mode, it will remain in the permit state until the bypass is manually ended (by the same sequence) or 30 minutes has elapsed.



⚠ **The relay is energized in this state and ALL safety checks are bypassed** ⚠

To engage the monitors bypass function, complete the following sequence:



1. Place fob against front of enclosure

2. Once indicator begins to flash yellow, remove fob

3. While indicator turns pink, replace fob and immediately remove it

4. Indicator will turn solid yellow and bypass mode is active

Once the RackMate SC has been put into bypass mode, it will remain bypassed until the bypass is manually ended (by repeating step 1 as described above), or automatically once 30 minutes has elapsed.

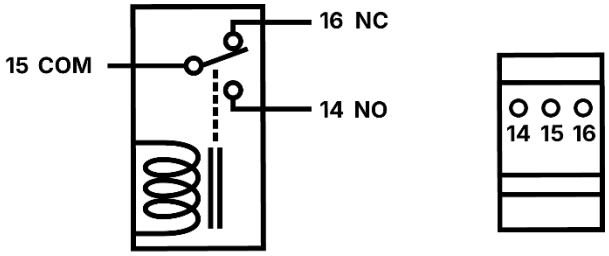
OUTPUT RELAY

Connections to the output relay should be made based on application specific logic and control requirements. RackMate SC models feature a single DRY FORM C (SPDT) relay with 3 contacts:

(NO) Normally Open

(COM) Common

(NC) Normally Closed



FORM C RELAY

The output relay is intended for switching low-power signals such as those typically used in control systems. It is rated for a 5 Amp load at 250VAC / 30VDC.

MAINTENANCE

SERVICE SHOULD BE COMPLETED ONLY BY 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.

DO NOT OPEN ENCLOSURE WHILE EXPLOSIVE ATMOSPHERE IS PRESENT. NE PAS OUVRIR LE BOÎTIER DANS UN ENVIRONMENT 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.

RackMate SC monitors have no parts that will require regular maintenance. If needed, clean only with a damp cloth. Corrosion inhibiting grease or soap thickened mineral oil (a type that does not harden because of ageing, does not contain an evaporating solvent, and does not cause corrosion of the joint surfaces) can be added to the base to lid threads.

Caution should be exercised when opening the enclosure to avoid the introduction of water or excess moisture. Moisture within the enclosure may lead to corrosion and shorten the lifespan of the unit.

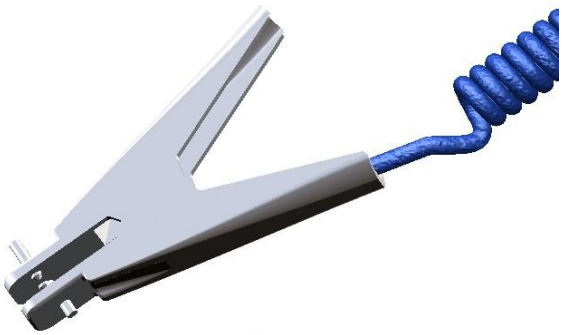
1. If service requiring the opening of the enclosure is required, first disconnect power from the unit.
2. Once the unit has been powered down and hazardous gases have dissipated, loosen the locking screw found on the cover
3. Unscrew the cover and verify the O-ring gasket is present and in good condition. Replace the O-ring if it is loose or damaged. 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 conduit entry threads and reapply corrosion inhibiting grease if needed. Verify integrity of the conduit-sealing fittings. If necessary, add sealing compound to fortify watertight 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. Verify all wire terminals are tight.
5. Install enclosure lid
6. Tighten setscrew
7. Re-energize unit
8. Verify operation before returning to service. If monitor is malfunctioning, contact Dixon support for further assistance.

ACCESSORIES

A540

The A540 Series ground clamps are key to creating a quality temporary connection for antistatic grounding applications. The clamp has three isolated stainless steel teeth, ensuring the clamp will penetrate dirt, corrosion and road grime when in use. The clamp operates by recognizing when it is disconnected and provides ground and a ground-verification signal in a single clamp. The clamp is tethered to a high durability coiled cord using a steel cable reducing strain on the cable joint and extending the life of the cable.

FT690



Dixon ground clamp assembly FT690 provides a quality temporary ground connection when required during loading and unloading operations.

NOTES

NOTES

TECHNICAL ASSISTANCE

WARRANTY

For warranty claims and information regarding coverage, please contact Dixon Support at
+1 (513) 874-8499 OR (877) 582 3569

SUPPORT

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The Right Connection®