The Weir Group PLC

Weir Mechatronics
1 Marden St
Artarmon, NSW
2064, Australia
Tel: +61 2 9934 5100

Weir Industrial Gateway Setup guide

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Document Approval

	Name	Designation	Date	Signature
Submitted By	C.Strudwicke	Principle Control Systems Engineer		
Accepted By	C.Strudwicke	Principle Control Systems Engineer		
Approved By	B.Baker	Head of Mechatronics		

Document History

Revision	Date	Author	Details
0.1	9-3-2017	C.Strudwicke	First version
0.2	21-03-2017	C.Strudwicke	Addition of feedback relating to certification requirements
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0.5	11-15-2017	W. Cooke	Document name change to match regulatory documents

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1 Introduction and Safety

1.1 Introduction

The purpose of this manual is to provide details on how to install the Weir Industrial Gateway in a generic sense ie independent of product type.

Read this manual carefully before installing and using the product.

1.2 Scope

The three main items covered in this guide are :

- Power supply Module : PSM
- Main Processor Module : MPM
- Remote Signal Processor : RSP

The important specifications of these devices and the basic installation process will be covered.

1.3 Target Audience

This document is directed towards maintenance fitters, technicians and any staff involved in installing this system.

1.4 Safety

1.4.1 Safety Terminology and Symbols

You must observe the instructions contained in this manual. Failure to do so could result in damage to equipment and/or injury or death.

1.4.2 User Safety

Use Personal Protective Equipment (PPE) according to the site regulations for that work area. This may include, but is not limited to:

- Hard hat
- Safety goggles
- Protective shoes
- Protective gloves
- Hearing protection

Notice:

Never work on equipment unless the correct lockout procedures have been followed

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1.4.3 Warnings

WARNING: THE SAFETY OF ANY SYSTEM INCORPORATING THIS EQUIPMENT IS THE RESPONSIBILITY OF THE ASSEMBLER OF THE SYSTEM.

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT OPEN COVERS. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

WARNING: EXPLOSION HAZARD. DO NOT CONNECT OR DISCONNECT CABLES WHEN ENERGIZED IN A HAZARDOUS LOCATION ENVIRONMENT. DO NOT CONNECT OR DISCONNECT ANY CABLES WHILE CIRCUIT IS LIVE OR ULESS THE AREA IS FREE OF IGNITABLE CONCENTRATIONS.

WARNING: IN HAZARDOUS LOCATION ENVIRONMENTS THE EQUIPMENT MUST BE OPERATED AT ALL TIMES WITH THE CONNECTOR SHROUDS INSTALLED.

WARNING: DISCONNECTING CABLES IN A HAZARDOUS LOCATION ENVIRONMENT CAN CREATE A SPARK. CABLES ARE ONLY TO BE DISCONNECTED BY QUALIFIED SERVICE PERSONNEL.

AVERTISSEMENT: LA SÉCURITÉ DE TOUT SYSTÈME INCORPORANT CET ÉQUIPEMENT EST LA RESPONSABILITÉ DE L'ASSEMBLÉE DU SYSTÈME.

AVERTISSEMENT: POUR ÉVITER LE RISQUE D'INCENDIE OU DE CHOCS, NE PAS OUVRIR LES COUVERTURES. AUCUNE PIÈCE DE SERVICE UTILISABLE À L'INTÉRIEUR. CONSULTER L'ENTRETIEN AU PERSONNEL DE SERVICE QUALIFIÉ.

AVERTISSEMENT: RISQUE D'EXPLOSION. NE PAS CONNECTER OU DÉCONNECTER DES CÂBLES QUI SONT ENERGISÉS DANS UN ENVIRONNEMENT DE LOCALISATION DANGEREUSE. NE PAS CONNECTER OU DÉCONNECTER TOUS LES CABLES, SI LE CIRCUIT EST VIVANT OU ULTÉRIEUR, LA ZONE EST LIBRE DE CONCENTRATIONS IGNITABLES.

AVERTISSEMENT: DANS LES ENVIRONNEMENTS DE LOCALISATION DANGEREUSES, L'ÉQUIPEMENT DOIT ÊTRE FONCTIONNÉ À TOUTES LES HEURES AVEC LE CONNECTEUR SHROUDS INSTALLÉ.

AVERTISSEMENT: LA DÉCONNEXION DES CABLES DANS UN ENVIRONNEMENT DE LOCALISATION DANGEREUSE PEUT CRÉER UNE SPARK. LES CABLES SONT SEULEMENT DÉCONNECTES PAR UN PERSONNEL DE SERVICE QUALIFIÉ.

1.4.4 Determination That Equipment Can be Used Safely in the Intended Area

The installation of this system requires that the equipment be mounted in such a way that it can withstand impacts from use and vibration from the machinery it is attached to. The following should be checked to ensure that the installation is safe:

- Cables should be supported such that the supports carry the weight of the cable and the connectors are not being pulled from the weight of the cable.
- In hazardous location areas, the air surrounding the equipment should have an oxygen concentration of not greater than 21 percent by volume; and a pressure of 80 kPa (0.8 bar) to 110 kPa (1.1 bar)
- The ambient temperature range is from -30°C ≤ Tamb ≤ 70°C.
- The mains that the equipment is attached to have a 15A circuit breaker installed outside of the hazardous area for hazardous locations.
- All connections are tight and in hazardous location areas, all locking mechanisms on the connectors are attached.
- All connections are watertight, with Nitto No 15 self-amalgamating tape used on the RF connections to ensure that water cannot get into the connector.
- The sensors are installed in such a manner that they will not come off from operation, and the sensor cables will not interfere with equipment operation. It is preferable that sensor cables do not get very close to electric motor windings, which can generate significant amounts of magnetic field, which may affect the sensor sensitivity.
- The sensor electrical connections are waterproof.

The transient limiting of lightning, surges, and other transients coming from the mains power is done within the power supply by the use of transient/surge absorbers. These are connected line to line, as well as line to chassis ground. The characteristics of these transient absorbers are as follows:

Part No	Varistor Voltage (V)	Maximum Allowable Voltage	Clamping Voltage At 8/20µs Max (V)	Ip (A)	Maximum Peak Current at 8/20µs (A) 1 time	2 times
Panasonic ERZ-V20D431	430 (387 to 473)	275Vac, 350 Vdc	745	5	800	600
			710	10	1750	1250
			710	25	3500	2500
			710	25	3500	2500
			710	50	6000	4500
			710	100	10000	6500

Figure 1-1 Transient Protection Parameters, Line to Line and Line to Ground

The Continuous operating temperature of the gaskets are as follows:

<ADD GASKET COT INFORMATION HERE>

2 Transportation and Storage

2.1 Consignment receipt and unpacking

- Inspect the package for damaged or missing items upon delivery. All items should be checked against the delivery note
- Note any damaged or missing items and inform the supplier and relevant parties

2.2 Transportation Guidelines

- The gateway and its components are designed to be lifted and man-transported without cranes or other lifting equipment

2.3 Storage

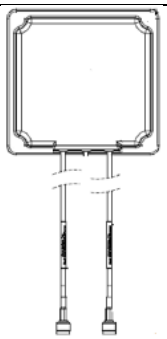
For long term storage, ensure connector caps are firmly secured on the all gateway connectors

3 System components

A number of main components are common across many of the product implementations. These are :

- Power Supply Module (PSM)
- Main Processor Module (MPM)
- Remote Signal Processor (RSP)

Name	Acronym	Description	
Power Supply Module	PSM	24Vdc 500W power supply for MPM, able to supply fully loaded system at extremes of environmental ratings	
Main Processor Module	MPM	Module that runs the Node Engine software, processes data & connects to the enterprise	

Remote Signal Processor	RSP	Device that interfaces with sensors on the equipment	
Junction Boxes	Various	A number of junction boxes and cables are used to connect the RSP to sensors on the equipment, example shown to right	
WiFi Antenna (2.4GHz)		Default WiFi antenna (2.4GHz) 6dB Omnidirectional (Mobilemark)	
Cellular Antenna		Default Cellular band Antenna 9dB Omnidirectional (Mobilemark)	
WiFi Antenna (2.4GHz/5GHz)		Dual Band Operation (Laird)	

Along with these are a range of standard cables that connect these main components to the sensors on the equipment.

54 System architecture

The Weir Industrial Gateway MPM & RSP system is arranged in a modular manner shown in the figure below.

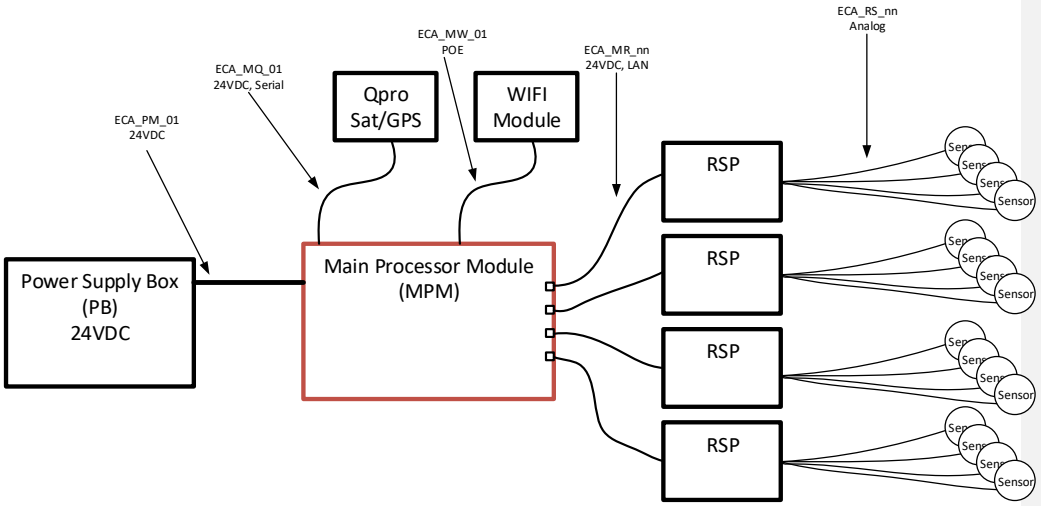


Figure 4-1 System diagram

- MPM can support 4 x RSPs directly wired via Ethernet
- PSM is rated to support MPM + 4 x RSPs + all other optional items
- Each RSP is located near a piece of equipment being monitored while the MPM may be remotely located with a maximum of a 100m cable run. Option to have RSP connected to the MPM via an external WiFi module but this arrangement requires a local 24Vdc supply to the RSP.
- Qpro amd WiFi module are optional items and not covered in this guide

~~6~~5 PSM – Power Supply Module

The PSM is a switch mode power supply that operates of mains AC power and provides the 24Vdc that the whole system operates from.

~~6.1~~5.1 Parameters relevant to installation and operation

- Model # : SPSM-000001
- DELL SKU : IP67IPS500-24
- Supply : 90 to 264 VAC, 47 to 400 Hz
- Output: 20A@24Vdc (Nominal 500W)
- IP rating : 67
- IK rating : 09
- Hazloc : Certified for Class 1 Div 2 environment
- Temperature range (operating) : -30°C ≤ Tamb ≤ 70°C
- Mass : 1.587kg
- MTBF : > 500,000 hours
- Casing material : Powder coated die cast aluminium
- Mounting orientation : Connectors facing downwards

Comment [CS1]: Is this a Sanmina part# ?

Figure 5-1 Iso view of PSM

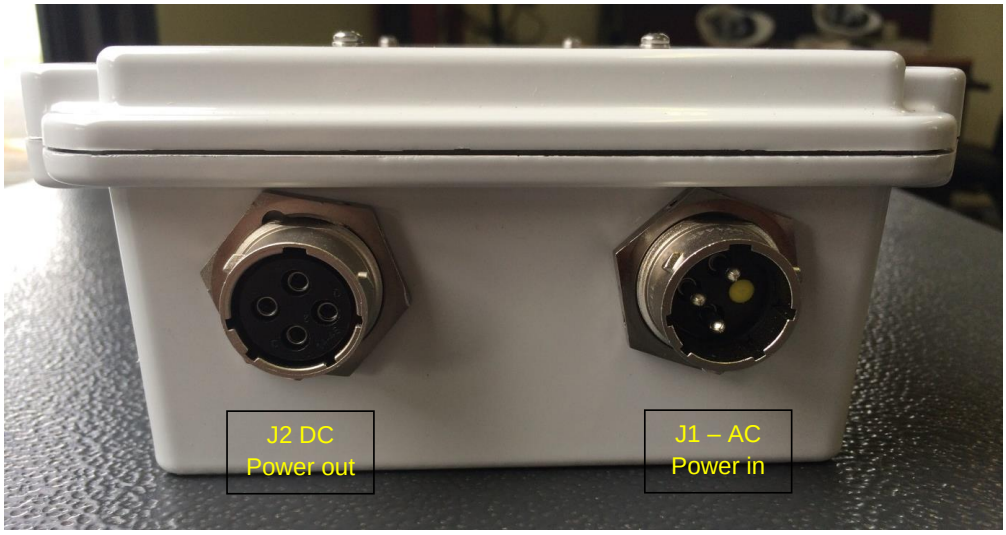


Figure 5-2 PSM Connectors

The cables provided with the power supply are as follows:
AC Cable: PN# LFS04876 connects to the 3 pin port marked "power in".
DC Cable: PN# LFS04875 connects to the 4 pin port marked "power out".

~~6.2~~5.2 Installation

Physical installation of the PSM is covered in section 6.4. Electrical installation must include a current limiting device (fuse or circuit breaker) rated to protect the AC supply cable connected to J1. This circuit breaker should be rated to 15A.

~~7~~6 MPM – Main Processing Module

The primary functions of the MPM are:

- Run the Node Engine application(s) required for each piece of equipment
  - Convert signals captured by the RSP or other devices into TAG Metrics
  - Perform secure authentication with the Synertrex Enterprise
  - Provide remote access mechanism to allow diagnosis and analysis of issues on site

The MPM is housed in a rugged enclosure fitted with signal conditioning, data acquisition, data processing and cloud interfacing systems.

~~7.1~~6.1 Parameters relevant to installation and operation

- Supply : 14.6A@24Vdc
- IP rating : 66
- IK rating : 09
- Hazloc : Certified for Class 1 Div 2 environment
- Temperature range (operating) : -30°C ≤ Tamb ≤ 70°C
- Mass : 16.7 kg / 36.8 lb
- Casing material : Powder coating over allodyned aluminium
- Mounting orientation: On vertical plate/wall with all connectors facing down

~~7.2~~6.2 Images

Figure 6-1 MPM perspective view (cables and protective shroud removed)

Figure 6-2 MPM with connector shroud installed

Connector shroud must be installed at all times once connectors are in place to prevent slurry/mud etc getting onto the connectors AND to meet hazardous location standards.

Figure 6-3 MPM connector view - protective caps installed

Connector caps shown are to be left installed for all connectors without a cable assembly attached. This is required for hazardous location approvals.

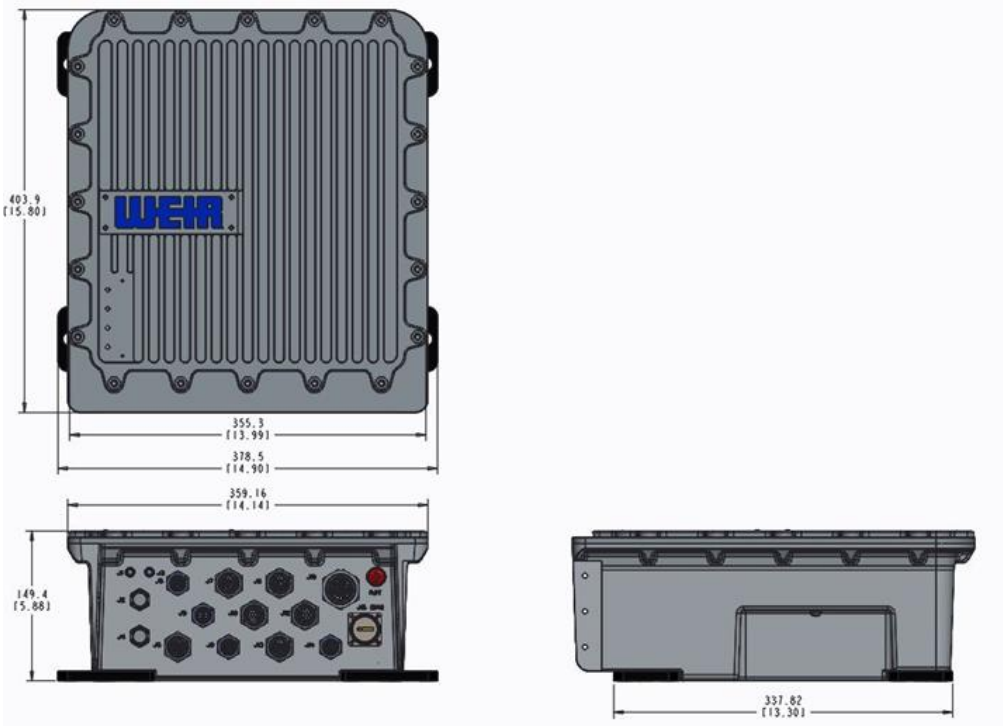


Figure 6-4 MPM External dimensions

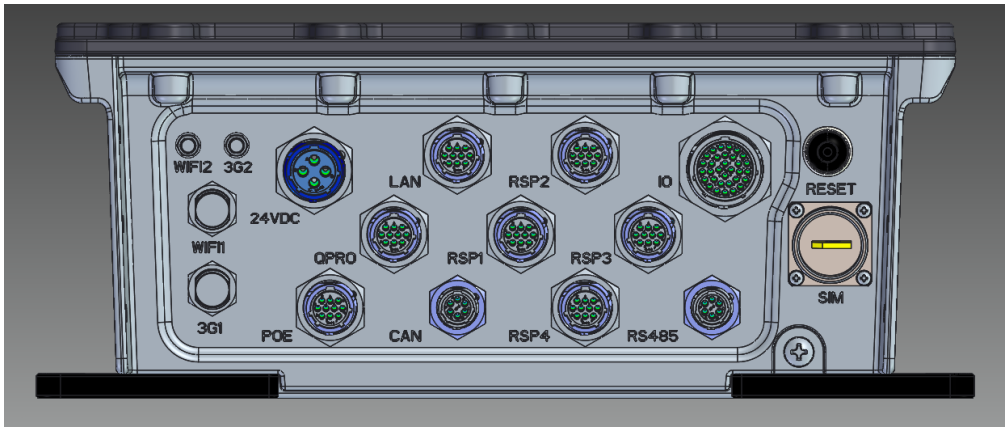


Figure 6-5 Connector view

~~7.3~~6.3 Connector Keying Types

The multi-conductor cables have three different keying types, which are shown below. One of the tabs is moved in order to provide keying, this tab is shown with the orange arrow.

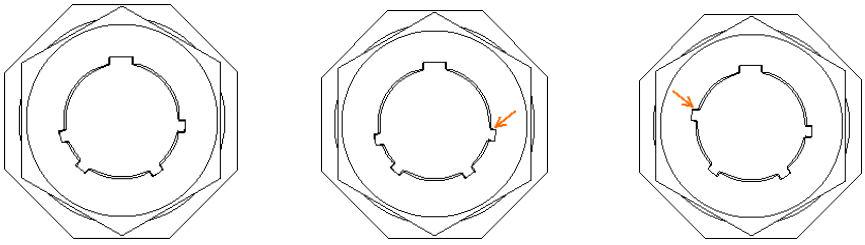


Figure 6-6 Connector Keying, View from MPM Connector

~~8~~7 External Name	~~9~~8 Description	~~10~~9 Cable Part Number	~~11~~10 Keying Type If Used
Wifi 1	WiFi primary connector to EG5100 WiFi	CA120/195-XX	N/A
Wifi 2	WiFi connector to EG5100 WiFi	CA120/195-XC	N/A
3G 1	WWAN primary connector to EG5100	CA120/195-XX	N/A
3G 2	WWAN connector to EG5100	CA120/195-XC	N/A
Qpro	Qpro (GPS receiver) power and signal	LFS04869	SNH
POE	POE Lan port	LFS04870	SWH
LAN	LAN	LFS04870	SWH
RS485	RS485	LFS04880	SNH
CAN	CAN	LFS04872	SWH
RSP 1	RSP #1	LFS04873	SYH
RSP 2	RSP #2	LFS04873	SYH
RSP 3	RSP #3	LFS04873	SYH
RSP 4	RSP #4	LFS04873	SYH
24VDC	Power input	LFS04875	SNH
IO	Analog/Digital IO	LFS04873**4**	SWH

Figure 6-7 - MPM connector names and locations

~~11.1~~10.1 LED Indicators

There are 4 LEDs on the MPM front face. The status of these LEDs are as follows::

1.) Green LED 1 – Power
2.) Green LED 2 – System running
3.) Green LED 3 – Wi-Fi Good
4.) Green LED 4 – Enterprise connected.

~~11.2~~10.2 Installation

~~11.2.1~~10.2.1 Mounting plate & Hardware

The minimum recommended protective equipment for mounting this equipment would be as follows: eye protection, gloves, hard hat, steel cap boots, long sleeves and trousers. Danger tape to cordon off area below if installing at height is also recommended.

The mounting of the MPM, RSP, and power supply needs to be customized to the particular system that it is intended for. In general a mounting plate made of 16 guage sheet steel would be sufficient to provide adequate strength. A representative diagram of a mounting plate is provided below:

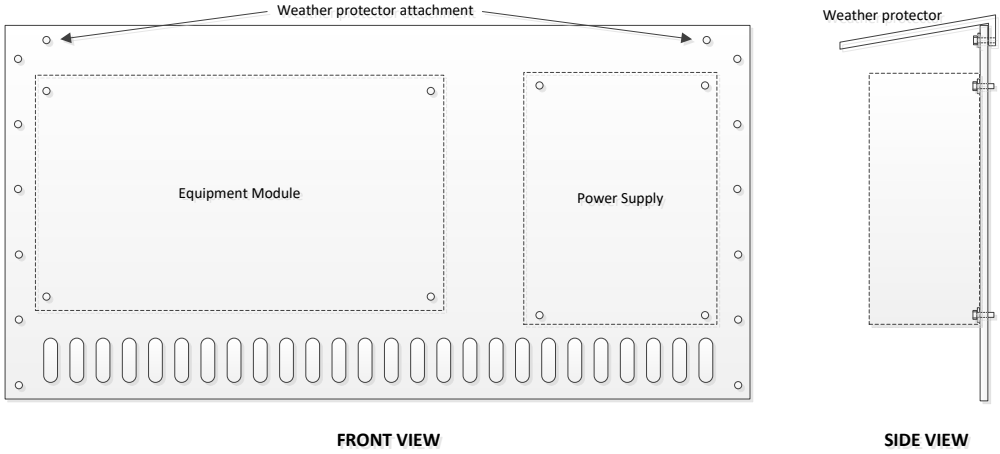


Figure 6-8 MPM & PSM generic mounting plate

~~11.2.1.1~~10.2.1.1 Installation

1. The mounting plate must be mounted in the vertical plane and as level as possible.
2. Fasten or weld the mounting plate to a structure near the equipment with the following conditions:
    a. No more than 50m from the equipment (100m cable run)
    b. Attach to a solid structure, relatively free from vibration, ensuring that it is capable of supporting the combined mass of approximately 30kg and the additional loading from any vibration.
    c. Ensure there is sufficient clearance (~10mm) for bolts to protrude through the rear of the plate

3. A sun visor/slurry shield is recommended to be added to the mounting plate, which is shown in the diagram.

~~11.2.2~~10.2.2 MPM & PSM

~~11.2.2.1~~10.2.2.1 *Equipment and materials required*

- Tools
  - Allen keys, wrench/spanner to cover sizes 6, 8 & 10mm cap screws and nuts
  - Side cutters/scissors or similar to cut self-amalgamating tape
- Consumables
  - Self-amalgamating tape : Nitto No 15

  - AC supply cable : PN# TBD (note that the mains cable has open wires to allow connection to a fuse box or the appropriate connector to suit the customers power outlet)
  - DC out cable : DELL SKU: LFS04875-012M00
  - 4 - M5 self tapping screws for mounting
- Provisioned SIM card

~~11.2.2.2~~10.2.2.2 *Hazards*

- *The MPM is relatively heavy (16kg) and requires 2 people to transport and assist each other during mounting.*
- *If dropped from height this module is a potentially deadly hazard hence the area below the installation must be cordoned off with danger tape.*
- *Mains power is a potentially deadly hazard and hence must only be modified or connected by a certified Electrician.*

~~11.2.2.3~~10.2.2.3 Installation

1. Ensure the serial number on the MPM and PSM correspond with the equipment to be monitored and installation location
2. Ensure the protective caps remain on the MPM & PSM connectors until cables are installed
3. Install the MPM & PSM in the arrangement shown below in Figure 6.8. Ensure a fastener is used for each mounting hole. The mounting of the PSM is done using M5 self tapping screws.

Figure 6-9 - MPM & PSU installed on mounting plate

4. If SIM card has not been installed, insert this now into J15 on the MPM. The protective shroud needs to be removed to do this (needs Torx T27 driver). Be sure to re-install the protective cap afterwards.

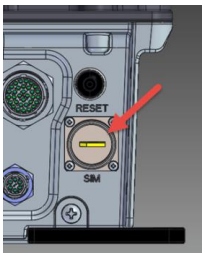


Figure 6-10 SIM card receptacle in MPM

5. Connect 24Vdc power lead (PN# LFS04875-012M00) from PSM J2 into DC power input port (J14) on MPM

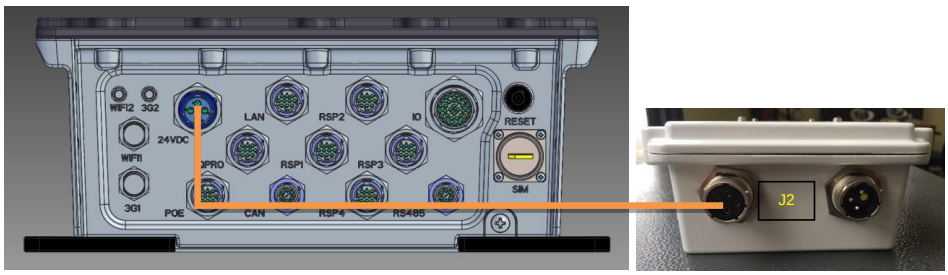


Figure 6-11 24Vdc power connection from PSM to MPM

6. Ensure the customer mains outlet is either isolated or turned off and locked
7. Connect the mains power lead from the customer power outlet to the AC input port J1 on the PSM using cable PN# LFS04876.

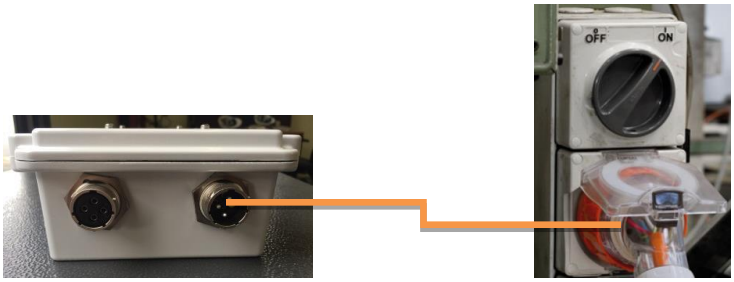


Figure 6-12 Mains AC power connection to PSM

8. Locking clips need to be installed on the power supply connectors for hazardous location compliance. These locking clips shall only be removed by qualified service personnel. The installation of these clips is as follows:

Figure 6-13 Installation of Locking Clips

WARNING: EXPLOSION HAZARD. DO NOT CONNECT OR DISCONNECT CABLES WHEN ENERGIZED IN A HAZARDOUS LOCATION ENVIRONMENT.

AVERTISSEMENT: RISQUE D'EXPLOSION. NE PAS CONNECTER OU DÉCONNECTER DES CÂBLES QUI ENERGISES DANS UN ENVIRONNEMENT DE LOCALISATION DANGEREUSE.

9. Protective earth grounding of the system is provided by the earth ground connection from the power supply AC cable, and connection of the enclosures of the MPM and PSM to earth ground is optional.

~~11.2.3~~10.2.3 Hazardous Location Requirements

The enclosure of the power supply and the MPM will need to be grounded to earth ground according to local building codes for hazardous location use. The back side of the power supply is bare metal, allowing it to be grounded to the mounting plate when it is bolted in place. The mounting plate will need to have no coating where the power supply is installed in order to provide electrical conductivity.

The MPM has an M6 sized external grounding screw for protective earth grounding. Insulated 10AWG wiring is needed to connect this grounding screw to the mounting plate, along with the use of M6 sized ring connectors for 10AWG wire. The connection to the mounting plate should be made using a lock washer or lock nut to ensure that the connection cannot loosen from vibration. If this mounting plate is not directly connected to earth ground through the machinery then the mounting plate will also need to be grounded to earth with the use of 10AWG wire and ring connectors.

The location of the grounding screw for the MPM is as follows:

Figure 6-14 Location of Protective Earth Grounding on MPM

The connector shroud must be installed at all times once connectors are in place to prevent slurry/mud etc getting onto the connector threads AND to meet the standards certified against for Hazardous Location operation.

WARNING: THE POE AND 24 AUX PORTS SHALL NOT BE USED IN HAZARDOUS LOCATION AREAS.

WARNING: EXPLOSION HAZARD. DO NOT CONNECT OR DISCONNECT CABLES WHEN ENERGIZED IN A HAZARDOUS LOCATION ENVIRONMENT.

AVERTISSEMENT: LE POE ET LES 24 PORTES AUX AUTRES NE SONT PAS UTILISÉS DANS LES ZONES DE LOCALISATION DANGEREUSES.

AVERTISSEMENT: RISQUE D'EXPLOSION. NE PAS CONNECTER OU DÉCONNECTER DES CÂBLES QUI ENERGISES DANS UN ENVIRONNEMENT DE LOCALISATION DANGEREUSE.

~~11.2.4~~10.2.4 Antenna

Up to four Antennae may be utilised per MPM :

- Cellular (default)
- Wifi (default)
- Dual Band WiFi (optional)
- GPS module (optional)

The installation position and orientation are crucial to the optimal operation of an antenna –

- Ensure it is mounting in a vertical orientation

- Install away from metal objects such as walls, beams, posts etc
- If mounted on a post, the radiating section of the antenna (above aluminium base) needs to be level or above the post

~~11.2.4.1~~10.2.4.1 *Equipment and materials required*

- Minimum recommended PPE:
  - eye protection, gloves, steel cap boots, hard hat, long sleeves and trousers, danger tape to cordon off area below if installing at height
- Spanner/wrench :
  - 7/16" / 11mm (open ended)
- Cellular antenna
  - OD-850 (Mobilemark) : Longer antenna (comes with mounting bracket)
  - Cable assembly : CA120/195-XX (Mobile Mark)
- Wi-Fi antenna (Default)
  - OD-2400 (Mobilemark) shorter antenna
  - Cable assembly : CA120/195-XX (Mobile Mark)
- Wi-Fi antenna (Optional)
  - Laird PVD24515-DE1

~~11.2.4.2~~10.2.4.2 Hazards

- *If dropped from height the antenna(e) are a potential hazard for people below*
- *Working from height while installing the antenna(e) is a hazard hence standard procedures to work at height should be followed to reduce risks.*

~~11.2.4.3~~10.2.4.3 Installation

1. Mount the antenna to the supplied plate using the hardware provided

Figure 6-15 Antenna mount attached

2. Tighten the nuts and lock nuts (thinner of the two) on the two smaller U-Bolts
3. Mount the plate with antenna to your mast/pole using two larger U-bolts

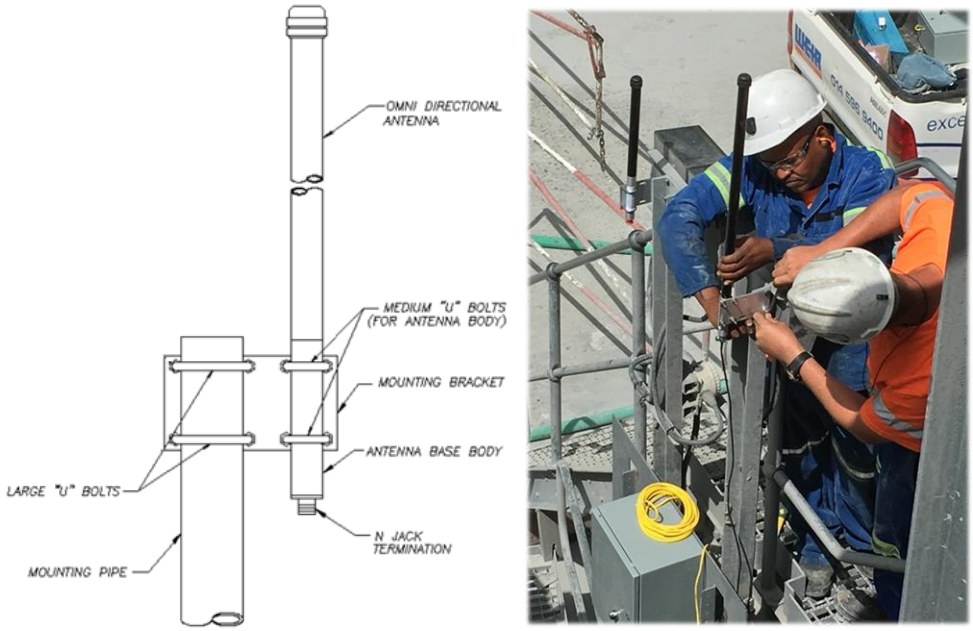


Figure 6-16 Installation of Antenna(e)

4. Remove the red protective cap and connect the antenna cable to the antennas coax connector

Figure 6-17 Antenna with and without cable attached

5. Wrap connector interface with self-amalgamating tape to protect from slurry, etc. This is required for hazardous location compliance.

Figure 6-18 Antenna connector wrapped in protective tape

6. Connect the other end of the cable(s) to the MPM Antenna ports

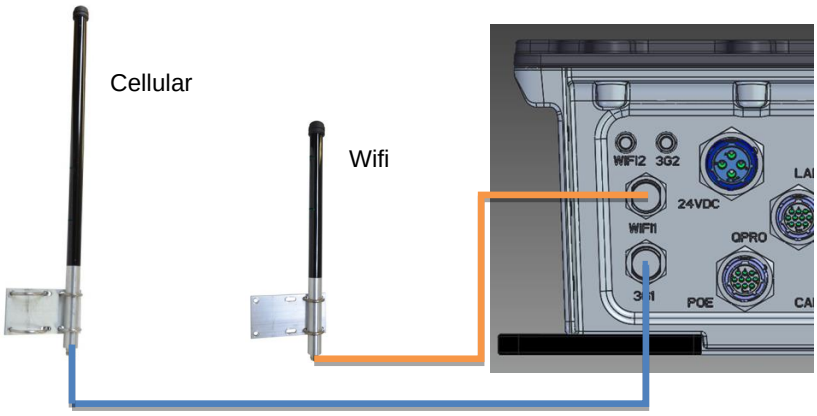
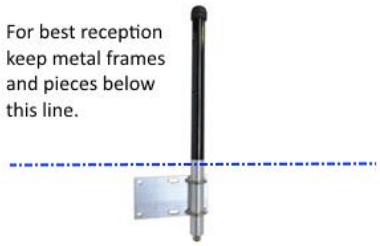


Figure 6-19 Schematic of Wifi and Cellular antennae connections to MPM

For best results:

- Mount the antenna as high up as the cable length / location permits, with optimal line-of-sight to the receiver
- Attach to a pipe / mast if possible
- If mounted near other antenna, maintain a separation of at least 300mm (~1 foot)
- Avoid placement near close metal objects as unpredictable disturbance can result
- Avoid placing on the side of a building or tower as directivity can be expected
- Mount antenna facing vertically for proper polarization and avoid mounting up-side down as the antenna will not drain correctly.



~~12~~11 RSP – Remote Signal Processor

The RSP is housed in a rugged enclosure fitted with signal conditioning, data acquisition and data processing systems.

~~12.1~~11.1 Parameters relevant to installation and operation

- Supply : 4.2A@24Vdc
- IP rating : 66
- IK rating : 09
- Hazloc : Certified for Class 1 Div 2 environment
- Temperature range (operating) : -30°C ≤ Tamb ≤ 70°C
- Mass : 10.5kg / 23.1 lb
- Casing material : Powder coated die cast aluminium
- Mounting orientation: On vertical plate/wall with all connectors facing down

~~12.2~~11.2 Images

Figure 11-1 RSP Overview

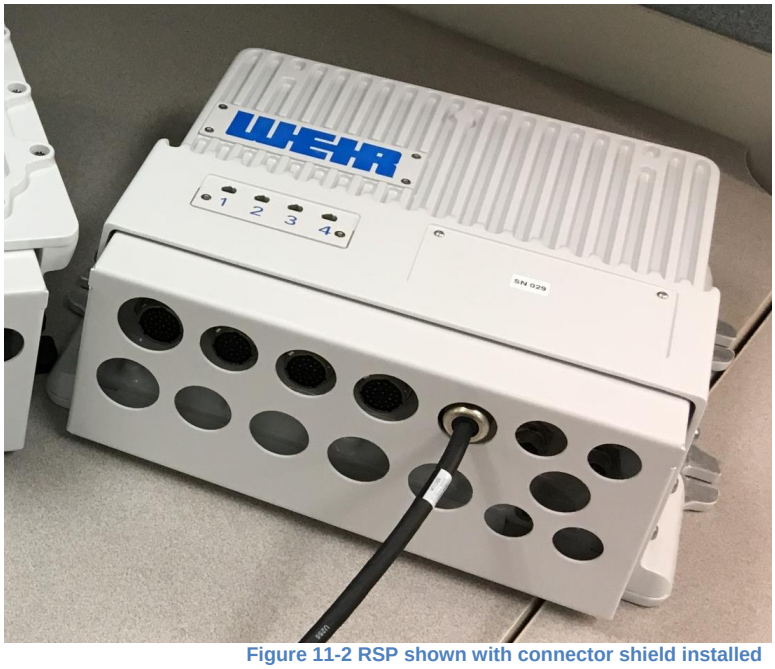


Figure 11-2 RSP shown with connector shield installed

Connector shroud must be installed at all times once connectors are in place to prevent slurry/mud etc getting onto the connector threads AND to meet the standards certified against for Hazardous Location operation.

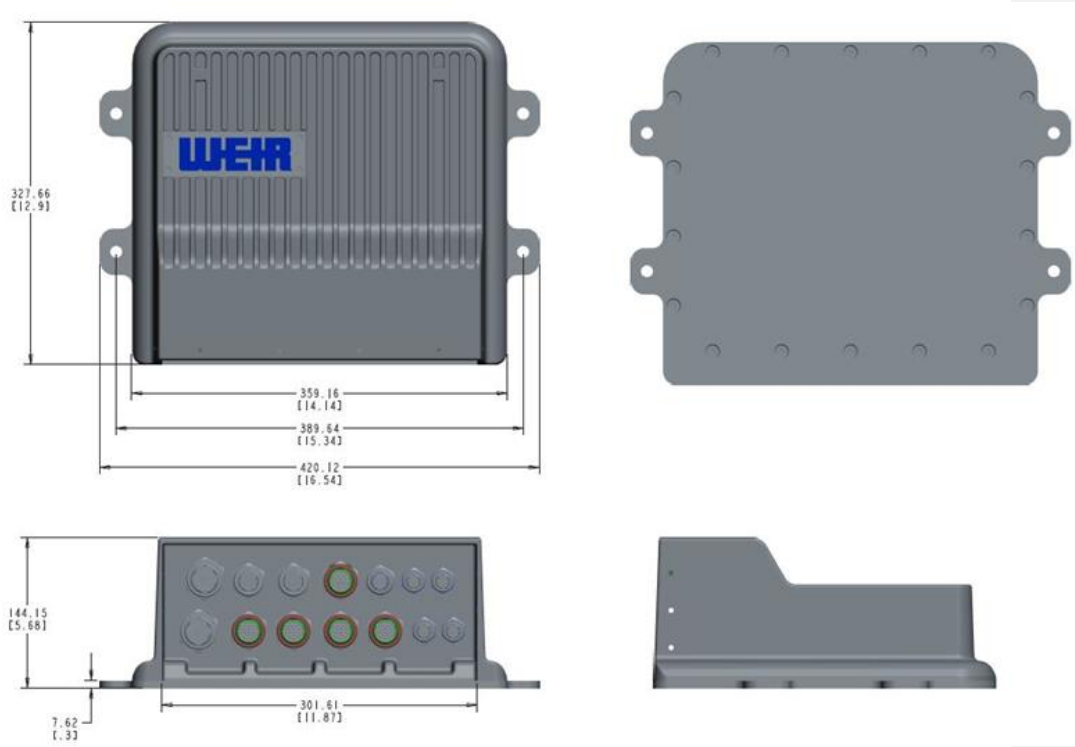


Figure 11-3 RSP Physical dimensions

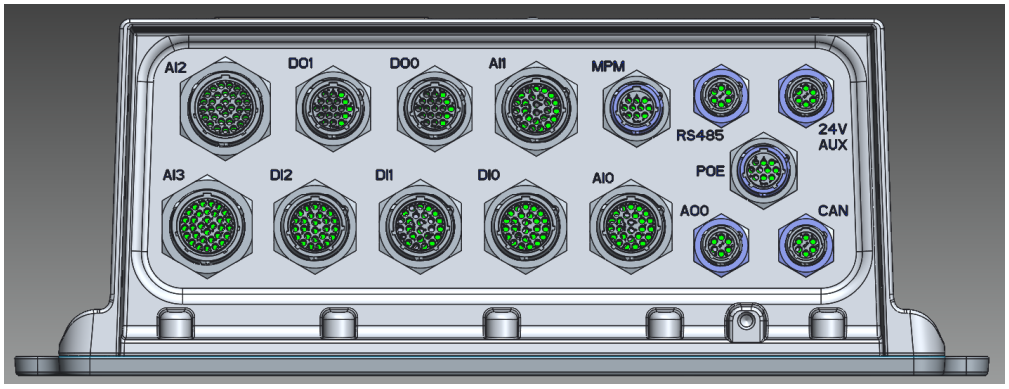


Figure 11-4 RSP Connector layout and descriptions

~~12.3~~11.3 Connector Keying Types

The multi-conductor cables have three different keying types, which are shown below. One of the tabs is moved in order to provide keying, this tab is shown with the orange arrow.

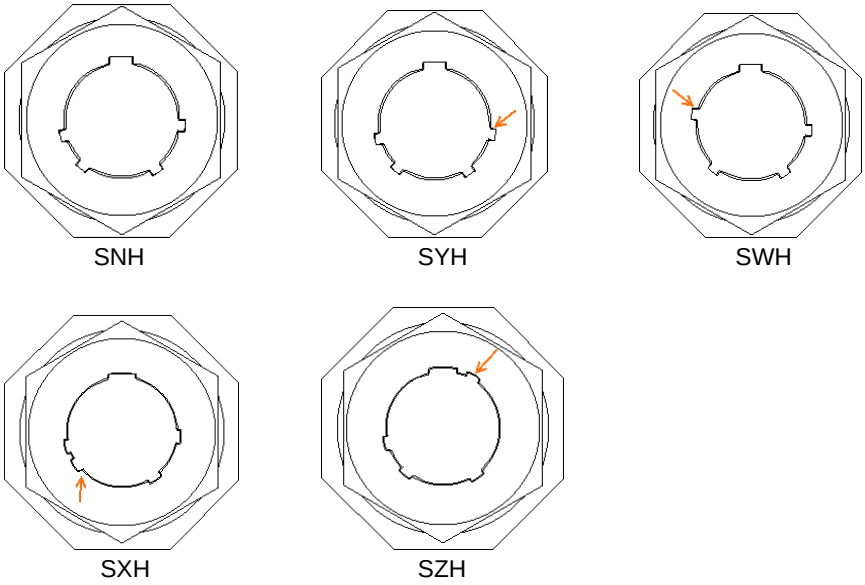


Figure 11-5 Connector Keying, View from RSP Connector

External Name	Description	Cable Part Number	Keying Type If Used
24V Aux	Auxiliary 24V power input	LFS04897	SXH
RS485	RS485/RS232 input	LFS04880	SNH
POE	POE port	LFS04870	SWH
CAN	Can bus port	LFS04872	SWH
MPM	Main MPM connector	LFS04873	SYH
AO0	Analog Output Bank 0	No Application	SZH
AI0	Analog Input Bank 0	LFS05179	SNH
AI1	Analog Input Bank 1	LFS05179	SNH
DO0	Digital Output Bank 0	LFS04879	SNH
DO1	Digital output Bank 1	LFS04879	SNH
DI0	Digital Input Bank 0	LFS04878	SWH
DI1	Digital Input Bank 1	LFS04878	SWH
DI2	Digital Input Bank 2	LFS04878	SWH
AI2	Analog input bank 2	LFS04877	SNH
AI3	Analog input bank 3	LFS04877	SNH

Figure 11-6 RSP Connector port descriptions

~~12.4~~11.4 LED Indicators

There are 4 LEDs on the MPM front face. The status of these LEDs are as follows::

5.) Green LED 1 – Power
6.) Green LED 2 – System running
7.) Green LED 3 – MPM Communication Status

8.) Green LED 4 – I/O Status

~~12.5~~11.5 Installation

This section covers the generic installation process for the RSP. It is important to note that product specific installation such as sensors, junctions boxes etc will only be covered generically and product specific instructions are covered in the IOM Manual.

~~12.5.1~~11.5.1 Physical mounting

The mounting dimensions are as follows. Use M10 bolts to fasten the RSP to the mounting location.

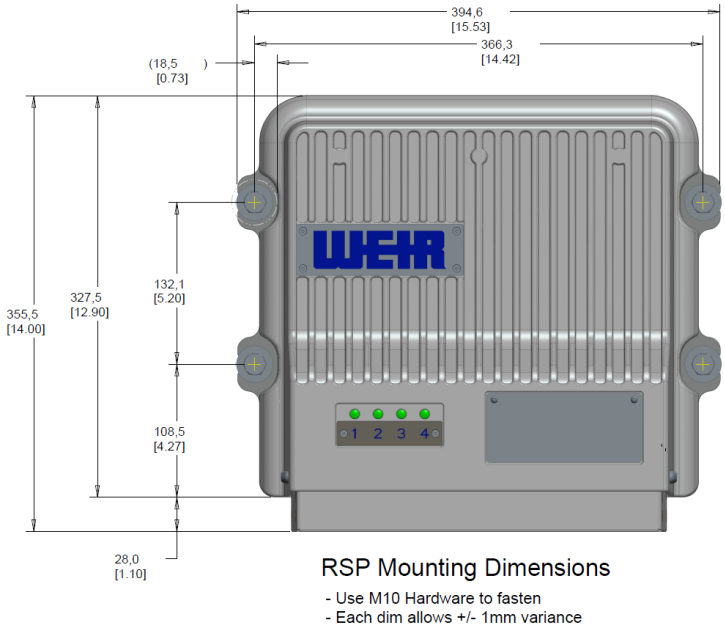


Figure 11-7 RSP Mounting Dimensions

~~12.5.2~~11.5.2 Hazardous Location Compliance

The enclosure of the RSP will need to be grounded to earth ground according to local building codes for hazardous location use. The RSP has an M6 sized external grounding screw for protective earth grounding. Insulated 10AWG wiring is needed to connect this grounding screw to the mounting plate, along with the use of M6 sized ring connectors for 10AWG wire. The connection to the mounting plate should be made using a lock washer or lock nut to ensure that the connection cannot loosen from vibration. If this mounting plate is not directly connected to earth ground through the machinery then the mounting plate will also need to be grounded to earth with the use of 10AWG wire and ring connectors.

The location of the grounding screw for the RSP is as follows:

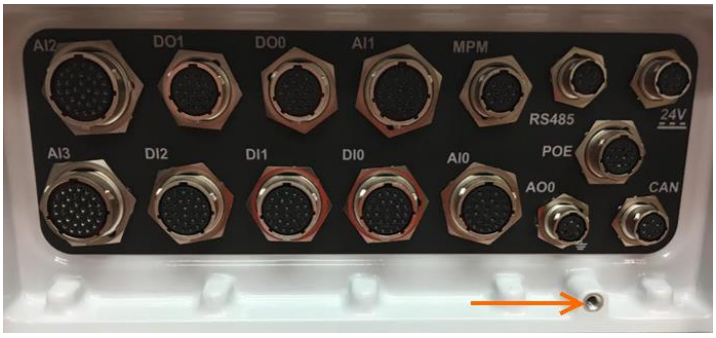


Figure 11-8 Location of Protective Earth Grounding on RSP

The connector shroud must be installed at all times once connectors are in place to prevent slurry/mud etc getting onto the connector threads AND to meet the standards certified against for Hazardous Location operation.

WARNING: EXPLOSION HAZARD. DO NOT CONNECT OR DISCONNECT CABLES WHEN ENERGIZED IN A HAZARDOUS LOCATION ENVIRONMENT.

AVERTISSEMENT: RISQUE D'EXPLOSION. NE PAS CONNECTER OU DÉCONNECTER DES CÂBLES QUI ENERGISES DANS UN ENVIRONNEMENT DE LOCALISATION DANGEREUSE.

~~12.5.3~~11.5.3 Protective Earth Grounding for Non Hazardous Locations

Protective earth grounding of the system is provided by the earth ground connection from the power supply AC cable, and connection of the enclosures of the RSP to earth ground is optional.

~~12.5.3.1~~11.5.3.1 Hazards

The RSP may be difficult to mount without the assistance of a second person; there is a significant risk of dropping the unit without help. This could be a significant hazard for bystanders if installing at height.

~~12.5.4~~11.5.4 Connection to MPM

~~12.5.4.1~~11.5.4.1 *Equipment & materials required*

- Recommended minimum PPE
  - Gloves, long sleeve shirt, trousers, eye protection
- MPM to RSP Ethernet + power cable :
  - 5m : SKU# LFS04873-015M00
  - 20m : SKU# LFS04873-0120M00 TBC
  - 50m : SKU# LFS04873-0150M00 TBC
- MPM with spare RSP port

- Tools required to remove and replace slurry guards
    - Torx T27 driver

~~12.5.4.2~~11.5.4.2 Hazards

- No direct hazards of note

~~12.5.4.3~~11.5.4.3 Installation

1. Run the cable between the MPM and RSP
2. **RSP :** Remove connector shroud

Images needed showing screw locations

3. **RSP :** Remove the connector cap from J5

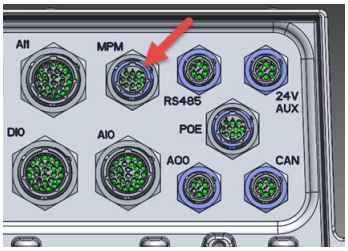


Figure 11-9 MPM Comms + power connector on RSP

4. **RSP :** Pass the MPM -> RSP comms + power cable through the hole in the shroud associated with J5 and make the connection by pushing and turning the bayonet fitting.
5. **RSP :** Ensure that all other connectors not being utilised have their protective caps installed
6. **RSP :** Re-install the connector shroud per Fig 7.2
7. **MPM:** Remove the connector shroud, ensuring that the retaining screws are secured ie do not lose these (no spares are shipped)
8. **MPM:** Feed the MPM<->RSP cable through the shroud hole associated with the port being used for this RSP ie one of the four shown below

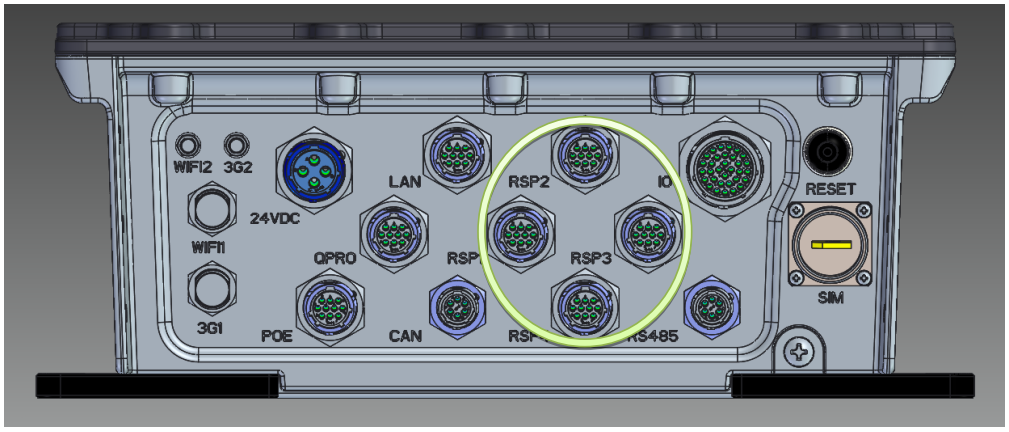


Figure 11-10 RSP comms + power connectors on MPM

9. **MPM:** Mate the connectors with a push and twist motion (bayonet style)
10. **MPM:** Reinstall the shroud
11. **MPM:** Turn on power to the MPM
12. **MPM:** Confirm that the following LEDs are lit
    a. LED 1 – power
    b. LED 2 – System running
13. **RSP:** Confirm that the following LEDs are lit
    a. LED 1 – power
    b. LED 2 – System running
14. If all above LEDs are lit, the configuration process may begin, if not contact the Synertrex Operations team for assistance with troubleshooting and/or refer to the troubleshooting guide within the IOM Manual.

Figure 11-11 PSM, MPM and RSP connected

~~13~~12 Junction boxes and cables

The RSP has a generic signal interface designed to support a wide range of product types. Therefore to match the RSP to any particular product a specific set of cables, junction boxes and sensors are needed.
The complete list of junction box types and how they connect to the RSP is described in this section.

~~13.1~~12.1 List of cables

~~13.1.1~~12.1.1 Connecting to RSP

Description	Part #	RSP mating connectors	Junction box connector type
High speed Analog input	TBD	AI2, AI3	32pin
Low speed Analog input	TBD	AI0, AI1	32 pin
Digital Input	TBD	DI0, DI1, DI2	19 pin
Digital output	TBD	DO0, DO1	19 pin
Analog Output	TBD	AO	TBD

Comment [CS2]: Require part numbers fro Sanmina

~~13.1.2~~12.1.2 Junction Box to sensor

Sensor type	Sensor connector	Cable Part number (example where XX is length in m)	Lengths available (m)
Gland water flow meter	M12x1 4 pin	IndProx_8_DigitalInJB_Cable_XXm	10, 20
Inductive Prox	M12x1 4 pin	IndProx_8_DigitalInJB_Cable_XXm	10, 20
Uniaxial accelerometer	2 pin Amphenol MS3106F10SL-4S	Accel_8_AnalogInJB_Cable_XXm	3, 6, 10, 20
Triaxial accelerometer	4 pin Amphenol PT06W8-4S(SR)	TriAccel_8_AnalogInJB_Cable_XXm	10, 20
Glandwater pressure transducer	6 pin Amphenol PT06W10-6S(SR)	GlandPressure_8_AnalogJB_Cable_XXm	10
Temperature RTD	3 pin Marlin 1211U 3 PIN MINI JACK		2, 5, 10

~~13.2~~12.2 List of Junction Boxes

Description	Part#	RSP cable(s)	Sensor cables supported
4 Channel AI	4_AnalogIn_JB	32 <-> 24 pin (part# TBD) 32 <-> 32 pin (part# TBD)	All single channel analog
8 Channel AI	8_AnalogIn_JB	32 <-> 24 pin (part# TBD) 32 <-> 32 pin (part# TBD)	All single channel analog
4 Tri + 4 GP AI	4Tri-4GP_AnalogIn_JB	32 <-> 32 pin (part# TBD) 2 cables required	4 x Tri-axial Accelerometers + 4 x single channel analog
3 Tri + 7 GP AI	3Tri_7GP_AnalogIn_JB	32 <-> 32 pin (part# TBD) 2 cables required	3 x Tri-axial Accelerometers + 7 x single channel analog
4 x DI	4_DigIn_JB	19 <->19 pin (part# TBD)	IndProx_8_DigitalInJB_Cable_XXm
8 x DI	8_DigIn_JB	19 <->19 pin (part# TBD)	IndProx_8_DigitalInJB_Cable_XXm
4 x DO	4_DigOut_JB	19 <->19 pin (part# TBD)	TBD
8 x DO	8_DigOut_JB	19 <->19 pin (part# TBD)	TBD
2 x AO	TBD		

~~13.3~~12.3 Installation

This section covers the generic installation process for the junction boxes.

Locking clips need to be installed on the power supply connectors for hazardous location compliance. These locking clips shall only be removed by qualified service personnel. The installation of these clips is as follows:

Figure 12-1 Installation of Locking Clips

WARNING: EXPLOSION HAZARD. DO NOT CONNECT OR DISCONNECT CABLES WHEN ENERGIZED IN A HAZARDOUS LOCATION ENVIRONMENT.

AVERTISSEMENT: RISQUE D'EXPLOSION. NE PAS CONNECTER OU DÉCONNECTER DES CÂBLES QUI ENERGISES DANS UN ENVIRONNEMENT DE LOCALISATION DANGEREUSE.

~~14~~13 Sensors

A wide range of sensors are supported by default by the RSP and Junction box system.

~~14.1~~13.1 List of Approved Sensors

The following is the current list of supported sensors for non-hazardous location environments. For hazardous location environments a sensor approved for hazardous location use in the country of operation will need to be purchased.

Type	details	Manufacturer	Part #
Accelerometer	Tri-axial: 500mV/g	PCB	604B32
Accelerometer	Uni-axial: 500mV/g (cylindrical)	PCB	601A02
Accelerometer	Uni-axial: 500mV/g RA connector	PCB	602D02
Accelerometer	Tri-axial: 50g, 100mV/g	PCB	604B31
Accelerometer	Uni-axial: 100mV/g (cylindrical)	PCB	601A01
Accelerometer	Uni-axial: 100mV/g RA connector	PCB	602D01
Accelerometer mounting block	Tri-axial mounting cube	GVS	GVS-TB
Accelerometer mounting pad	Glue on mounting pad ¼" UNF	GVS	GVS-MP05-11
Temperature RTD	Donut style RTD with 1m flying lead and connector	Temperature Controls	TC10933
Speed	Inductive prox sensor for shaft speed measurement	Allen Bradley	872C-N8NP12-D4
Flow rate	Magnetic flow meter for Gland water	Omega	FMG94-PVDF

~~14.2~~13.2 Hazardous Location Non-Incendive sensors

The RSP provides non-incendive field wiring outputs for Class 1 Division 2 hazardous location environments, groups B, C, D, E, and F. The non-incendive field wiring outputs are rated to the following parameters:

Parameter	Value
Voltage V_O	24V
Current I_O	
Power P_O	
Capacitance C_O	
Inductance L_O	

WARNING: EXPLOSION HAZARD. DO NOT CONNECT OR DISCONNECT SENSORS WHEN ENERGIZED IN A HAZARDOUS LOCATION ENVIRONMENT.

AVERTISSEMENT — NE PAS CONNECTER OU DÉCONNECTER LES CAPTEURS DE SONDAGE QUAND IL EST ENERGISE DANS UN ENVIRONNEMENT DE LOCALISATION DANGEREUSE.

~~14.3~~13.3 Sensor Install Locations

The following diagram shows the locations that sensors can be placed on a liquid pump.

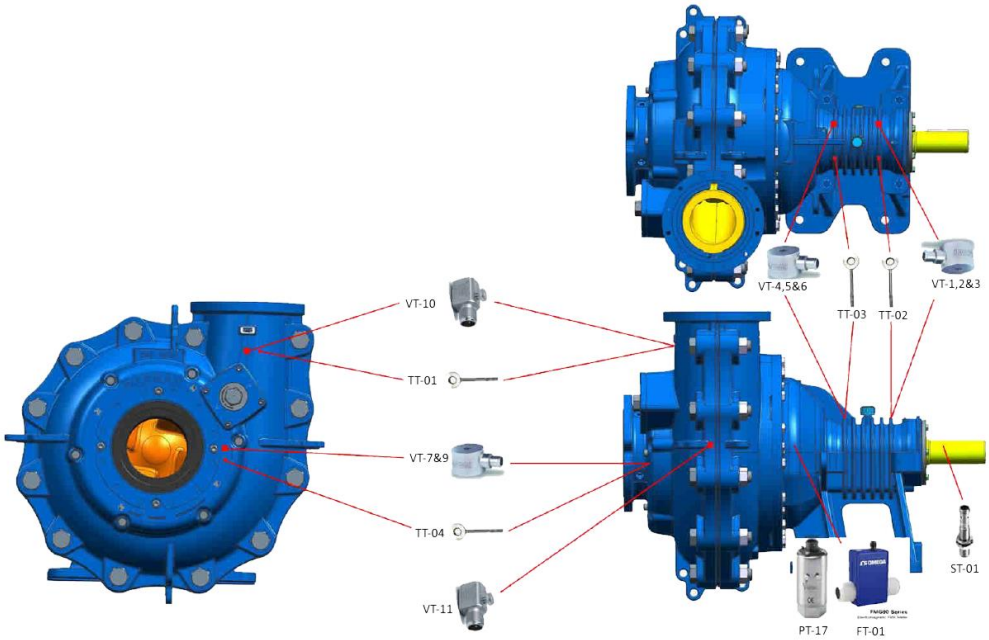


Figure 13-1 Sensor Install Locations

~~14.4~~13.4 Installation

Sensor Placement

Sensor	Orientation
VT-1,2&3	Connector points towards wet end
VT-4,5&6	Connector points towards drive end
VT-7&9	Connector points out horizontally
VT-10	Connector points downward
VT-11	Connector points downward
Refer to the IOM for pictures	

Vibration and Temperature sensor mounting options:
There are two options available for mounting vibration and temperature sensors to the pump. Choose the option that best suits your needs:

A. Directly to the pump via a drilled and tapped hole – typically used for bearing assembly locations and ductile iron parts, intended to be created at time of manufacture for all products where possible
B. Via an adhesively bonded mounting pad (fig 5.6 below). To be used when it is not possible to drill and tap.

It is also possible to change the orientation of a single axis sensor by placing a placing a tri-block mounting accessory in between the pump and the sensor. This is exclusively used for single axis sensor VT-10 as described in section x.x below.

Figure 13-2 Slurry pump installation - mounting puck

Figure 13-3 Triblock mounting accessory

~~14.4.1~~13.4.1 Mounting point Preparation

The first step in the installation is to determine what type of sensor mounting method is to be used for each sensor. There are 7 locations that need to be drilled and tapped, or have a mounting puck affixed. These locations are summarised in the quick start guide. As mentioned before, cast iron parts can be drilled and tapped; white iron parts require a mounting puck.

~~14.4.2~~13.4.2 Adhesively bonded mounting puck

This approach is used where it is not viable to create a drilled and tapped hole. The mounting pads provided a threaded hole to mount the sensor and a small magnet that assists in keeping the pad in place whilst the adhesive cures.You must wait a minimum of 24 hours for the adhesive to cure before attaching the sensor to the mounting puck.

~~14.4.2.1~~13.4.2.1 *Equipment and materials required*

- Minimum PPE : eye protection, gloves, hard hat, long sleeves and trousers
- Wire brush
- Clean cloth
- Adhesive : Loctite Hysol 9461
- Abrasive paper eg 120grit
    - A suitable portable drill tool can be used if approved by site
- Cleaning solvent eg isopropyl alcohol
- Plastic card or similar for mixing 2 part epoxy components

~~14.4.2.2~~13.4.2.2 *Hazards*

- Epoxy represents a minor hazard needs to be handled with recommended PPE and following manufacturer's instructions
- Solvents can be skin irritants. Wear protective gloves in addition to standard PPE

~~14.4.2.3~~13.4.2.3 *Process*

1. Clean area to be bonded using scraper and wire brush such that no paint, loose material or large particles of debris remain. All paint, oils and solvents must be removed for a good bond.

Insert picture of cleaned surface ready for bonding. Note area to be cleaned is ~= 30 mm and flat

2. Wipe are down with degreasing/cleaning spirit to remove all traces of oils, grease, dirt, water etc

3. Wipe mounting puck back surface and edges with cleaning sprit impregnated cloth

Insert picture of puck back surface, cloth and isopropyl

4. Allow both surfaces to dry such that no cleaning spirit/fluid/residue remains

5. Dispense epoxy onto mixing card and mix thoroughly

Show pictures of unmixed and mixed epoxy, make note to even amounts of A and B

6. Apply enough epoxy to mounting puck such that the entire back surface will be covered to at least 1mm thick

Show picture of puck covered with correct amount of epoxy

7. Place puck onto casing allowing magnet to hold in position during cure

Figure 13-4 Slurry pump - Mounting pump adhesively bonded to pump

8. Allow 24 hour cure time before installing sensors. Denso tape can be used to help secure vertically mounted pucks if needed.

Insert picture of sensor held in place with Denso tape

~~14.4.3~~13.4.3 *Drilled and tapped mount*

This method is most often utilised for bearing assemblies but can also be used on suction covers and casings made of cast iron. In this case, an official drawing will be provided by the DCO indicating approved locations and depths of the tapped holes.

~~14.4.3.1~~13.4.3.1 *Equipment and Materials required*

- Minimum recommended PPE: eye protection, hard hat, long sleeves and trousers – do not wear gloves when using rotating equipment.
- Drill, tap and facing kit HS-AA031 Series is available from Hansford Sensors. The product range includes all the necessary tools needed to accurately mount a vibration sensor onto the rotating machine. The packaged kit includes; tapping drill, taps, tap wrench and a spot facing tool. There are three versions of the kit available to allow for different mounting threads; ¼, M6 and M8. See http://www.hansfordsensors.com/wp-content/uploads/datasheets/TS161U.pdf for more information.

- Tapping compound/cutting fluid
- Battery drill

~~14.4.3.2~~13.4.3.2 *Hazards*

- Swarth associated with drilling can be sharp. Do not brush away with your hands.
- Ensure that any electrical equipment is in good condition and meets site requirements
- Do not wear gloves whilst using rotating machinery

~~14.4.3.3~~13.4.3.3 *Process*

1. Clean area to be tapped using scraper and wire brush such that no paint, loose material or large particles of debris remain
2. Measure and mark locations as per the DCO drawing
3. Drill hole(s) and face mounting location with combined drill and facing tool
4. Tap hole to ¼" UNF using the hand tap. Ensure thread extends to a depth of 10mm

~~14.5~~13.5 Accelerometer attachment

~~14.5.1~~13.5.1 Equipment and materials required

- PPE: gloves, eye protection, hard hat, long sleeves and trousers
- Spanner/wrench – 7/16” (ring or open ended)
- 3/16” Allen key
- 2x uni-axial accelerometers (part # 602D02)

- 3x Tri-axial accelerometers (part # 604B32)

- 1x tri-axial mounting block

~~14.5.2~~13.5.2 Installation

1. Ensure mounting puck or tapped hole and surrounding surface is clean and free of debris/particles
2. Connect each sensor cable to the allocated sensor making sure to use the correct cable and observe keyways (cables have stamped metal labels)
3. Wrap connector interface including nut and exposed thread with Nitto No.15 tape, as shown in Figure 13-5~~Figure 9-5~~.

Figure 13-5 Uni-axial accelerometer with connector and protective tape applied

4. Screw Accelerometer thru-bolt or cap screw into mounting puck or prepared threaded
5. Tighten to approximately 3 Nm using 3/16” allen key (tri-axial sensors) or 7/16” spanner/wrench (uni-axial sensors)

~~14.5.3~~13.5.3 VT-11

A tri-axial mounting block is used to mount the cutwater vibration sensor at right angles to the surface. This mounting block is fitted in between the pump and the sensor in order to change the orientation of the sensor.

1. Mount the tri-block to the pump as shown, using a 3/16” allen key.

Figure 13-6 Tri-Block

~~14.5.4~~13.5.4 Removal

1. Release cap screw or retaining bolt and remove sensor from mounting point
2. If required to disconnect sensor from cable :
    a. Unwrap protective tape
    b. Remove connector
    c. Install plastic bung/cap on both sensor and cable connectors

~~14.6~~13.6 Temperature RTD's

~~14.6.1~~13.6.1 Equipment and materials required

- Minimum recommended PPE : gloves, eye protection, hard hat, long sleeves and trousers
- Allen key. 3/16"
- Small Philips screwdriver
- ¼" UNF x 1" long cap screw and washer x qty 4
- RTD leads (part # SD014-3M) x qty 4

Figure (left): RTD ring at end of 3m lead
Figure (right): RTD fastened to magnetic mount

Figure 13-7 RTD

~~14.6.2~~13.6.2 *Hazards*

- No task specific hazards of note

~~14.6.3~~13.6.3 Installation

1. Ensure mounting puck/location surface is clean and free of debris/particles
2. Fasten the RTD's to the mount locations specified in section x.x
3. Screw cap-screw into mounting puck
4. Tighten to approximately 3 Nm using 3/16" allen key

~~14.6.4~~13.6.4 Removal

1. Release cap screw and remove sensor from mounting point
2. Install screw back into mounting hole to prevent slurry/crud from entering thread

~~14.7~~13.7 Gland Water Flow Meter and Pressure Transducer

~~14.7.1~~13.7.1 Equipment and materials required

- Minimum recommended PPE : gloves, eye protection, hard hat, long sleeves and trousers
- Spanner/wrench to suit pipe fittings
- 1 ¼" open end spanner/wrench (for Pressure transducer)
- 1x Flow Meter (part # xxxxxxx)
- 1x Pressure Tranducer (part # xxxxxxxx)
- Protective tape – Nitto Self-fusing Butyl Rubber Tape – No.15
- Plumbers thread tape

~~14.7.2~~13.7.2 *Possible Hazards*

- Water within the gland supply system may be at elevated pressure, enough to cause eye damage if accidentally directed into the eye
- Gland water supply is not likely potable water hence should not be ingested or allowed to come into contact with the face

~~14.7.3~~13.7.3 *Installation*

1. Ensure the gland supply is depressurised and the pump is not running
2. The pressure transducer and flow meter must be installed in series with the gland water supply
3. Fittings to install the pressure and flow sensors are site specific and not supplied. These should have been identified in the site survey and purchased ahead of time. This will include a suitable T fitting for the pressure sensor.
4. The suggested installation location is after an isolation valve (shown in image below).
5. Connect pressure and flow sensors to main cable harness.
6. Wrap connector interfaces with protective tape (Nitto No.15).

Replace image with new hardware

Figure 13-8 Gland water sensor installation

~~14.8~~13.8 Speed – Proximity sensor

~~14.8.1~~13.8.1 Equipment and materials required

- Spanner/wrench – as required for particular mounting bracket and bearing assembly
- Fasteners
- 1x Speed Sensor (Part # 872C-N8NP12-04)
- Mounting bracket (dwg xxxxx)
- Target bracket (dwg xxxxxx
- Protective tape – Nitto Self-fusing Butyl Rubber Tape – No.15
- Gap measurement tool
- Speed sensor integrity check tool

~~14.8.2~~13.8.2 *Hazards*

- The Pump Shaft speed sensor is mounted off the motor end of the bearing assembly.
- To install the speed sensor the motor must be turned off and tagged out for safety
- There may also be pinch or crush hazards when/if the shaft is rotated during the alignment process

Figure 13-9 Speed sensor mount example (new picture required)

~~14.8.3~~13.8.3 *Installation*

1. Clean shaft and bearing housing mount points of all slurry/debris
2. Loosely mount the target on the shaft.
3. Mount the sensor bracket onto the bearing assembly
4. Loosely secure the speed sensor into the sensor bracket
5. Align the speed sensor and the shaft target bracket so that the speed sensor is directly above the target
6. Tighten both the target collar to the shaft and the lateral adjustment of the speed sensor
7. Adjust the vertical motion of the speed sensor so that the gap is no more than 2mm and tighten
8. Rotate the shaft to the edge of target and measure the gap. Ensure it is no more than 1mm and that it is not touching the corner.
9. Connect the speed sensor to the test box. Rock the shaft back and forth, ensuring that the indicator LED on the test box illuminates each time the target passes under the sensor
10. Remove the test box from the sensor and connect the regular cable
11. Wrap connector interface with protective tape (Nitto No.15)

~~15~~14 Cleaning and Maintenance

The enclosure of the system is able to withstand slurry. This slurry should be removed periodically with the use of water and a stiff brush. The use of pressurized water can also used to clean the system.

There are no user serviceable parts inside the system. Technical support issues with this system are available at:

Attn: Richard Smith
Sanmina
Unit 3, Cherrywood, Chineham, Basingstoke, UK RG24 8WF
United Kingdom

Telephone: +44 1256 637371

~~16~~15 Regulatory Compliance

The Weir Industrial Gateway system comprising of the PSM, MPM, and RSP are designed and tested to comply with/meet the following standards:

~~16.1~~15.1 Electromagnetic Compatability

- FCC Part 15 Subject B class A
- CISPR 22 Class A, EN55022 Level B
- ICES-003 Class A
- AS/NZS CISPR 32:2013

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

~~16.2~~15.2 Hazardous Location Compliance

The MPM, RSP, and power supply are certified to meet the following hazardous location standards and gas groups

- Class I Division 2, Groups B,C,D T3
- Class I Zone 2, AEx nA IIB+H2 T3
- Ex II 3GD EEx nA IIB+H2 T3 Dc

Canada / US Hazardous Location Compliance

- ANSI/ISA 12.12.01: Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
- CAN/CSA C22.2 No. 213: Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations

European / International Hazardous Location Compliance

- EN 60079-0, IEC 60079-1 : Electrical Apparatus for Explosive Gas Atmospheres Part 0: General Requirements
- EN 60079-15, IEC 60079-15 : Electrical Apparatus for Explosive Gas Atmospheres Part 15: Electrical Apparatus with Type of Protection "n"

MPM IECEx certificate no: IECEx EMT 17.0018X

MPM ATEX certificate no: EMT17ATEX0043X

RSP certificate no: EMT17ATEX0044X

The sensors chosen to be used by this system will need to be certified to the hazardous location compliance directives applicable to the country where the installation takes place. External devices like a QPro radio and external model are not covered in a hazardous location and will need to be placed outside of the hazardous location area. All connections within a hazardous location area will need to have the locking connectors installed in order to prevent accidental disconnection of these connectors.

~~16.3~~15.3 Safety

- UL 61010-1, CSA C22.2 No. 61010-1, EN 61010-1, IEC 61010-1 : Safety Requirements for Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1

~~16.4~~15.4 Radio Approvals

- FCC Part 15 Subpart B, C, E
- FCC Part 22 Subpart H
- FCC Part 24 Subpart E
- FCC Part 27 Subpart E
- ETSI EN 301 489-1
- ETSI EN 301 489-17
- ETSI EN 301 489-52
- ETSI EN 300 328
- ETSI EN 301 893
- ETSI EN 301 511

Radio FCC ID: 2ANXR-STXMPM

<Radio Power levels also needed for hazardous location compliance>

This section includes user requirements for operating this product in accordance with National laws for usage of radio spectrum and operation of radio devices. Failure of the end-user to comply with the applicable requirements may result in unlawful operation and adverse action against the end-user by the applicable National regulatory authority.

Note: This product's firmware limits operation to only the channels allowed in a particular Region or Country. Therefore, all options described in this user's guide may not be available in your version of the product.

WWAN Antenna

This device has been designed to operate with the antennas listed below, and having a maximum gain of 3 dB. Antennas not included in this list or having a gain greater than 3 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

- Mobile Mark OD3-700/2700-BLK antenna, 694-960 MHz: 2 dBi; 1700-2700 MHz: 3 dBi

WLAN Antenna

This device has been designed to operate with the antennas listed below, and having a maximum gain of 12 dB. Antennas not included in this list or having a gain greater than 12 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

- Mobile Mark OD6-2400-BLK antenna, 6dBi
- Mobile Mark SCR12-2400-WHT high gain antenna, 12dBi

~~16.4.1~~15.4.1 FCC Requirements for Operation in the United States:

This product does not contain any user serviceable components and is to be used with approved antennas only. Any product changes or modifications will invalidate all applicable regulatory certifications and approvals.

~~16.4.2~~15.4.2 FCC RF Radiation Exposure:

The radio has been evaluated under FCC Bulletin OET 65C (01-01) and found to be compliant to the requirements as set forth in CFR 47 Sections, 2.1093, and 15.247 (b) (4) addressing RF Exposure from radio frequency devices. This model meets the applicable government requirements for exposure to radio frequency waves.

This equipment complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. The antennas used for this transmitter must be installed to provide a separation distance of at least 20 centimetres from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

To comply with FCC RF exposure compliance requirements, a separation distance of at least 33.9 centimetres must be maintained between the user and antenna when the product is used with the SCR12-2400-WHT high gain antenna.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

~~16.4.3~~15.4.3 Industry Canada Requirements for Radio Operation in Canada:

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This radio transmitter IC:23347-STX000004 has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio IC:23347-STX000004 a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

