POLAR
MONITORING

Polar Monitoring Gateway – LTE

USER MANUAL

Contents

Safety Instructions

Only trained personnel, with proper qualifications, understanding familiar with the CFW-11 and associated machinery shall plan and implement the installation, starting, operation, and maintenance of this equipment.

The personnel shall follow all the safety instructions described in this manual and/or defined by the local regulations.

Failure to comply with the safety instructions may result in death, serious injury, and equipment damage.

Introduction

This document will serve as a guide on technical specifications, installation procedures, device setup and configuration of the Polar Monitoring Gateway(PM Gateway). It will include all technical data and technical specifications required for installation of the PM Gateway.

Overview
The Polar Monitoring Gateway is an LTE Cat-1 to RS-485 communications gateway that allows data to be sent and received from the Polar Monitoring Cloud portal to numerous different devices and sensors in the field. It can connect to several types of RS485 enabled devices including but not limited to:

- Variable Speed Drives
- Electricity meters
- Generators & Power Correction Systems
- Magnetic and ultrasonic flow meters
- Pressure sensors
- Temperature and Humidity Sensors
- Water Quality Sensors
- Many more

Features
The system is designed around usability and function. It is designed from the ground up to be compatible with a multitude of brands, device types and sensor types that have RS-485 communications. Install the Gateway onto the device or sensor in the field, follow the setup steps on the Polar Portal and the system will by defualt monitor and present data to the Cloud.

Supported Devices
For the full list of currently supported makes, models and devices please go to the supported devices page at:
polarmonitoring.com/supported-devices

New devices are constantly being added and this list will be updated as they do.

Installation Procedures

Installation of the product is straight forward. Knowledge is required on Modbus RS-485 networking especially when connecting multiple devices to a single PM Gateway. Basic power wiring skills are required for connecting the unit up to power.

The complete installation procedure will be as follows:

1. Mechanical installation
2. Electrical installation
3. Field devices communication parameters and settings
4. First time setup on the cloud portal
5. Configuring parameters to monitor from the Cloud Portal
6. Setting up Cloud Portal user access and control
7. Setting up Cloud Portal alerts and notifications
8. Setting up Cloud Portal reports

Steps five onwards will be covered in the Polar Portal User guide

Installation Procedures

Mechanical Installation

The PM Gateway is a din rail mounted device. The unit has a water and dust ingress rating (IP Rating) of IP40. This means that it will require additional protection from the elements and should be mounted inside of an electrical panel or housing.

Mounting Instructions Gateway

Mount the unit to a din rail using the clips on the back of the device. The clip to remove the unit off the din rail is located at the top of the unit

The PM Gateway should be placed at least 100mm away from any high-power devices and must not be placed above any device that produces heat in the panel.

Care must be taken when mounting to allow for the communication cables, power cables and antenna wires to fit into the unit without obstructing or being obstructed by any other devices in the enclosure.

Mounting the Antenna

The Antenna for the PM LTE Gateway is essential for its operation. It will allow the PM Gateway to get the GSM signal it needs to connect to the Polar Portal.

The antenna must be placed outside of the enclosure and as physically high up off the ground as possible. It must not be obstructed by walls, power lines, poles etc.

In low signal areas a high gain antenna should be used to give the best connectivity possible.

The Antenna should **never** be placed inside of a metal enclosure, if concerns over vandalism are present an anti-vandalism antenna should be used.

Once the device is powered on there will be indication of the signal strength of the PM Gateway to the GSM network. See **Indicators** for a description of signal strengths on the faceplate of the device. Additional signal strength information will be provided during device setup on the Polar Portal.

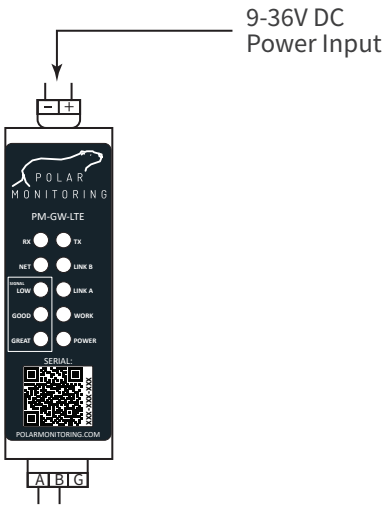
Installation Procedures

Electrical Installation

Electrical installation is done as two parts, wiring in power and secondly wiring in the serial communications.

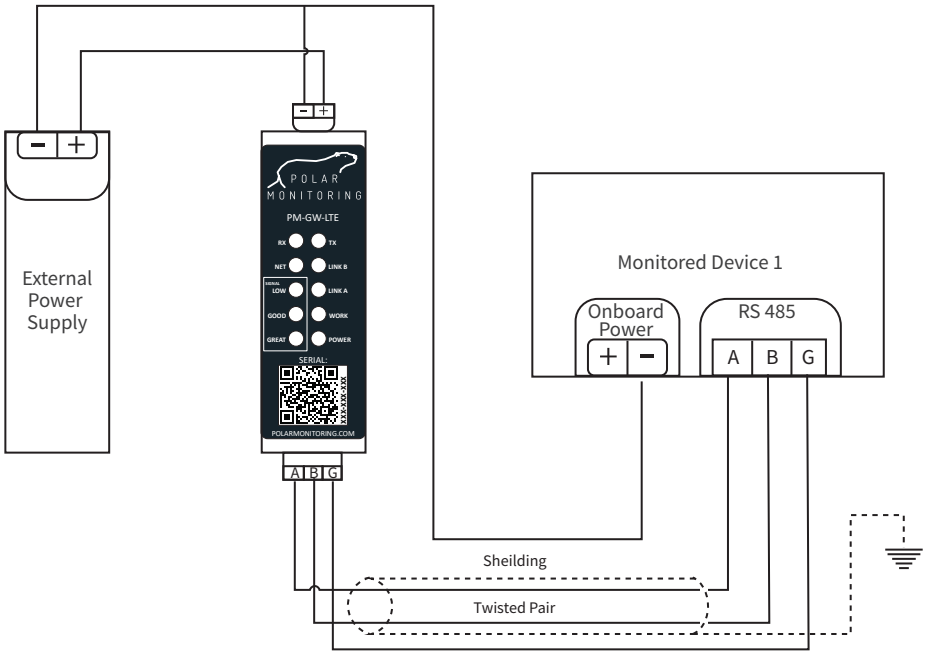
Power to the PM Gateway

The PM Gateway runs off 9-36V DC only and is connected via its two power connection pins in the top of the unit.



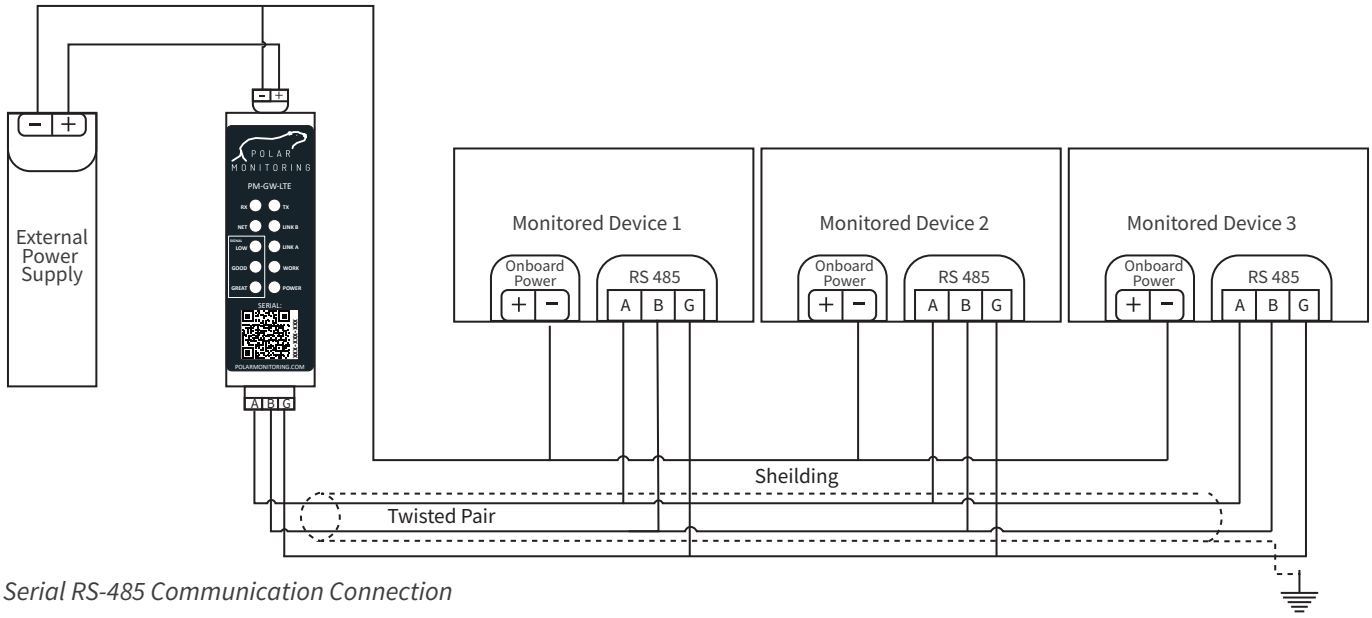
In cases where the PM Gateway is getting power from the device it is monitoring the 0V pins are already connected.

In cases where the PM Gateway is monitoring a device that is not on the same power supply as the PM Gateway then an additional wire must be connected to the monitored devices 0V DC from its power supply to the 0V DC of the PM Gateway. This is to ensure that all the 0V DC terminals



When the PM Gateway is monitoring multiple devices on a single Gateway then each of the 0V DC points on the devices must be wired together to avoid ground loops on the system.

Specifications



Serial RS-485 Communication Connection

The communication port is for RS-485 connection only. It will connect the device to be monitored to the PM Gateway and therefore to the cloud. Care must be taken to connect this correctly as improper wiring can compromise the data collection procedure.

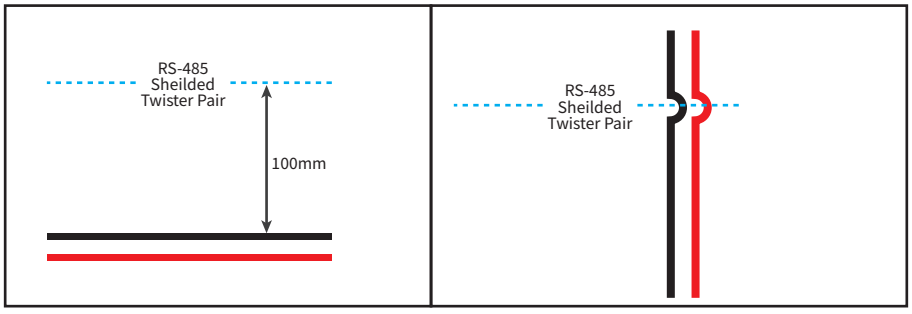
The table to the right stipulates the Modbus RS-485 communication settings predefined in the PM Gateway. It is important that the device connecting to it has the same communication settings.

Parameters	Value
Modbus Mode	master
Baud Rate	9600bps
Data bits	8
Parity	None
Stop bits	1

Wiring Connection to the serial port

When connecting the RS-485 cables into the serial port of the Gateway it is important that is done correctly. Placement of wire runs, and elimination of Electro Magnetic Interference (EMI) is vital to the system working reliably. The type of cable to be used is RS-485 cable which has an outer shield and twisted pair for the Transmission (Tx) and Receiving (Rx)

When planning and running the communications cable care must be take not to run the lines parallel with any high voltage or high current power lines. It is acceptable for the communications cables to cross over these high voltage cables perpendicular, however these junctions should be kept to a minimum.



Installation Procedures

Communications cables should be kept at least 100mm distance from any high-power cables.

RS-485 connection points are labeled **(A)** and **(B)** or **(+)** and **(–)** depending on the manufacture of the device you wish to connect. Generally **(A+)** and **(B)** In some cases, it will be found that the markings are **A-** and **B+**. In these applications one will need to follow the **(+)** and **(–)** signage on the RS485 Serial Connection points to have the correct communications.
As the Gateway functions on such a wide variety of devices it is important to note the Positive and Negative connections when wiring in the serial port as Different manufacturers will use different standards.

First time startup

Final wiring checks
At this point of installation, it is time to power on the PM Gateway and the device(s) that are connected to it. A final check should be made of the wiring connections to ensure that everything is correctly wired and that there will be no shorts or incorrect voltages.

Also take this time to ensure proper connection of the GSM Antenna and that the SMA connection is securely in place.
Once checks have been done and it is safe to power on the devices and the Gateway then power on the system.

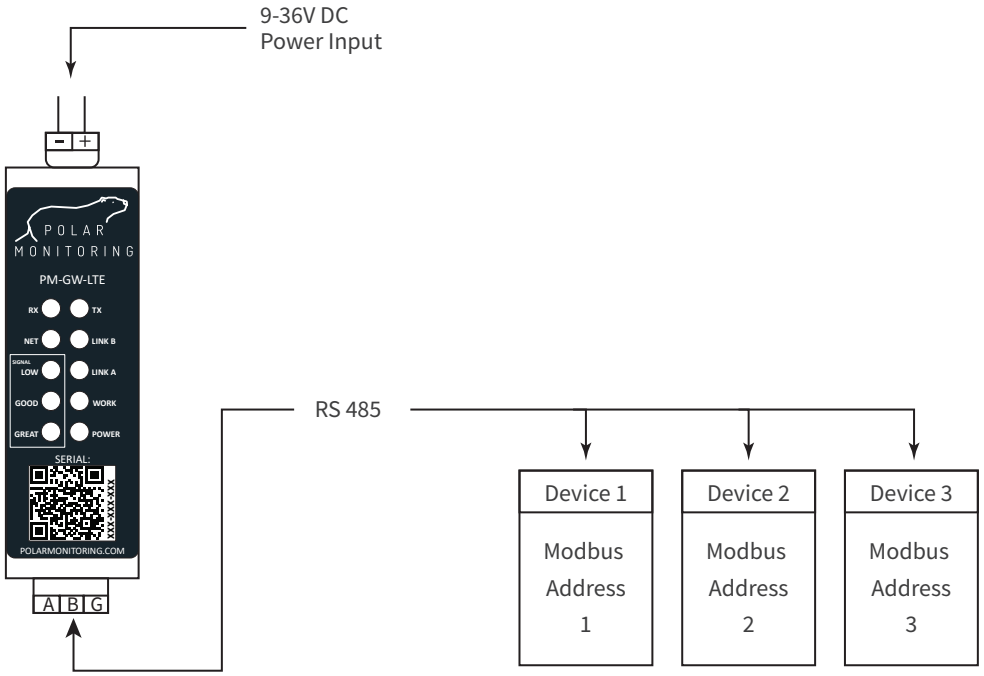
Setting device communications
Once the device or devices are wired to the Gateway and it is safe to power on the system one will need to set the parameters for communication on each device being monitored.

The default settings for the parameters on the various devices will be different based on device type and manufacturer. The following parameters will need to be set appropriately for the Polar Portal to communicate with the device attached to the Gateway:

Parameters	Value
Modbus Address / Field Address / Slave Id	1 to 256 (this value MUST be unique per device on the network)
Baud Rate	9600 bps
Data	8
Parity	None
Stop bits	1
Modbus Communication	Modbus RTU RS-485

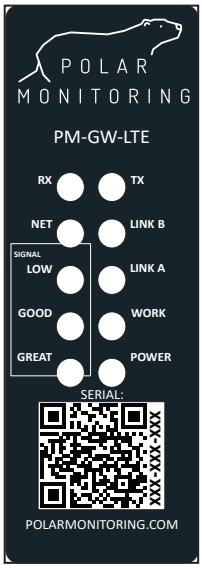
Installation Procedures

When multiple devices are connected to one gateway each device should be set to a different Modbus ID. When following the device setup on the Polar Portal one will use the Modbus Address as the Slave ID



Lights on the faceplate of the PM Gateway

Once the PM Gateway has been powered on, several lights will illuminate on the front face of the Gateway. The table below highlights what each light means and its function.



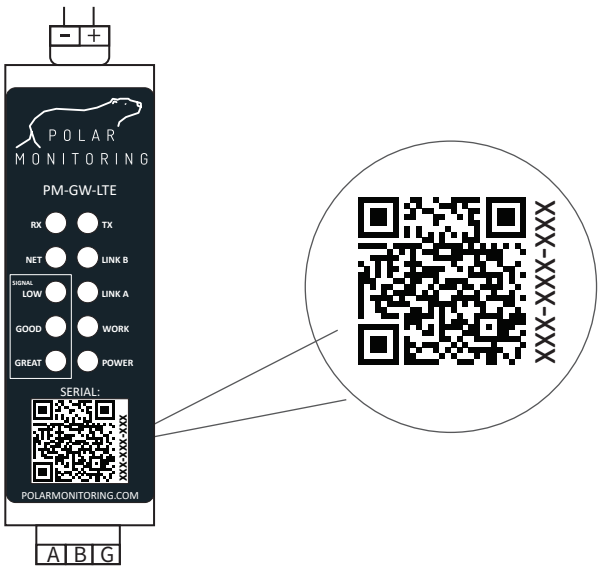
Installation Procedures

Parameters	Function	Status
POWER	Indicates power is on the PM Gateway	Always On when power in on the device
WORK	PM Gateway is working	Flashes during normal operation
NET	Indicates when the PM Gateway is has registered on the GSM network	Flashes when connected to the network. Two flashes mean connection to GPRS (2G) Four flashes means connection to LTE (4G)
LINK A	Indicates connection status to the Polar Monitoring Cloud Portal	Always on when PM Gateway is connected to Polar Monitoring Cloud Portal. If this light is off the cloud portal will not work.
TX	Serial port is sending data	Will flash when the Gateway is transmitting data
RX	Serial port is receiving data	Will flash when the Gateway is receiving data
Signal LOW	Low signal indicator	Always on when signal strength greater than 13%
Signal GOOD	Good signal indicator	Always on when signal strength is greater than 50%
Signal GREAT	Great signal indicator	Always on when signal strength is greater than 70%

In order to proceed to the next step, the POWER, NET and LINK A lights will all need to be illuminated.
From startup this process of the lights all illuminating should take roughly 5min to complete as the PM Gateway will run communication setups and sim activation procedures.

Setting up PM Gateway on the Polar Monitoring Cloud Portal
Once the above procedures have been followed for the lights on the PM Gateways as well as the settings on the devices being monitored are changed it is time to set the Gateway up on the Polar Portal.

On the Faceplate of the PM Gateway there will be a serial number and QR Code



Installation Procedures

Scan the QR code with your phone camera and follow the link to begin the setup procedure of the PM Gateway. Or alternative go to: https://portal.polarmonitoring.com/r/link/ begin the setup .

The system will take the user through the steps of adding a new user to the platform and then adding and linking the new Gateway to your account and finally linking the field devices the Gateway is monitoring.

For more info on using the Polar Monitoring Cloud Portal please view the Cloud Portal User Manual.

This can be found along with any other guides and manuals at: https://polarmonitoring.com/support/

Once the required data is coming through to the Polar Portal the Gateway is considered to be installed correctly. Changes to what data is monitored from the devices can be done remotely as required.

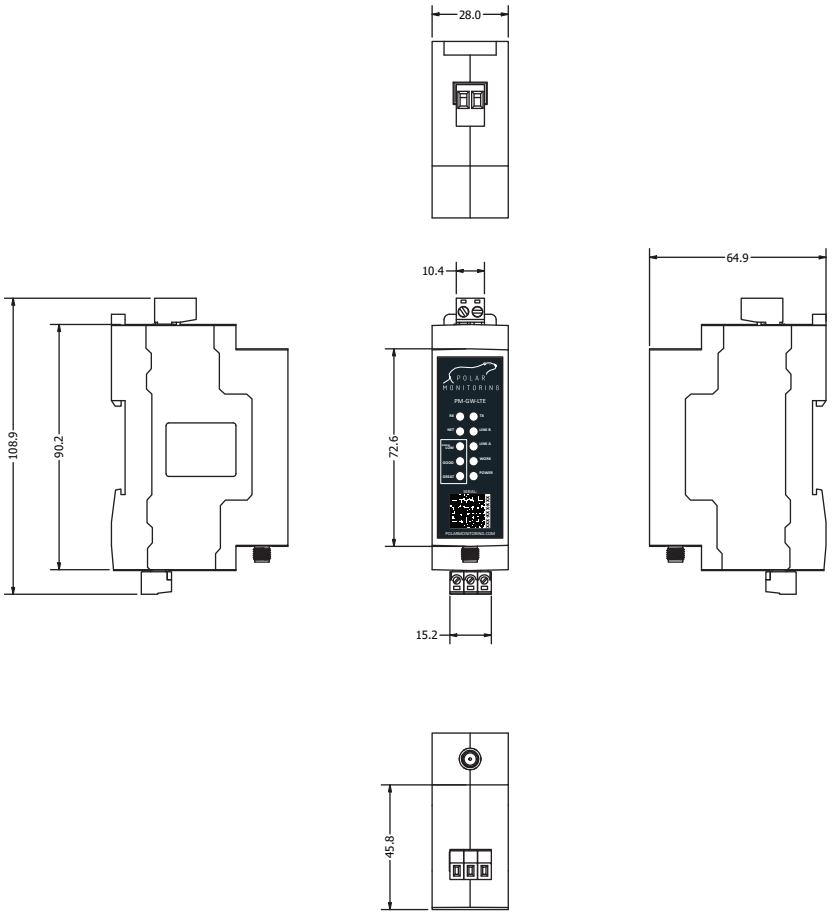
Specifications

Below is a table describing connectivity and specifications of the PM Gateway

Parameters		Description
Basic Parameters	Power	9-36V DC
	Operating Current (12V)	Average: 21mA - 50mA Max: 54mA
	Serial Interface	RS-485 Baud Rate: 9600pbs
	Antenna Interface	SMA Female
	SIM	Pre-installed, managed by Polar Monitoring
Environmental	Dimensions	28 x 64.7 x 109.7 CAD File: polarmonitoring.com/support/
	Weight	110g
	Operating Temperature	-20°C to +50°C
	Storage Temperature	-30°C to +50°C
	Operating Humidity	5% to 90% (non-condensating)
	Water and Dust Protection (IP rating)	IP40
Transmission Speeds	LTE Cat 1	Download: 10Mbps Upload: 5Mbps
	GPRS	Download: 85.6Kbps Upload: 85.6Kbps
GSM Bands	LTE Cat 1	B1 / B3 / B7 / B8 / B20
	GPRS	900/1800Mhz
Software	Operating Mode	Through Polar Monitoring Cloud
	Updates	Automatic

Installation Procedures

Dimensions



Optional accessories

Antennas

- Standard – Product Code: pm-ant-std
- High Gain – Product Code: pm-ant-van
- Anti-Vandalism - Product Code: pm-ant-high

Cables

Part Number	Description
pm-cab-pwr-2	Power Cable - 2M
pm-cab-pwr-5	Power Cable - 5M
pm-cab-pwr-10	Power Cable - 10M
pm-cab-rs-2	RS485 Cable - 2M
pm-cab-rs-5	RS485 Cable - 5M
pm-cab-rs-10	RS485 Cable - 10M
pm-cab-delta-2m	Delta Coms Cable 2M
pm-cab-delta-5m	Delta Coms Cable 5M
pm-cab-delta-10m	Delta Coms Cable 10M
pm-cab-eth-2m	Ethernet Comms cable 2M
pm-cab-eth-5m	Ethernet Comms cable 5M
pm-cab-eth-10m	Ethernet Comms cable 10M