TMX08 USER MANUAL

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1. Preface

This guide provides the user with an overview of the features available on the TMX08 device. In this manual, Platform means the ThingsX Service Platform.

2. Introduction

2.1 Overview

TMX08 is an IoT data collection and monitoring device with an I/O interface to accommodate a variety of sensors including distance and temperature monitoring. Integrated CAN bus design allows for sensor customization to meet the demands of any application.

Additional details are as follows:

- Built-in higher capacity rechargeable battery
- IP65 rating
- Provides location, temperature, and approximate internal available space/capacity
- Reports collected data to/through the cloud-based IoT management platform using available cellular networks
- Supports LTE Cat M1 North America networks

2.2 Specification

More detailed specifications are as follows:

Table 1 - TMX08 Specification

Category	Specification	Description
Cellular Network	Cat M1	B2/B4/B5/B12/B13/B26
Electrical	Power Supply	External, 6~18V DC
	Battery	3000mAh, 3.8V (rechargeable)
		10 days @ 1 report/hour (with battery)
Physical	Size	129x80x36mm
	IP Rating	IP65
	External Sensors	Temperature
		Electric Current
		Ultrasonic
Data Transfer	Cat M1	375kbps DL; 375kbps UL
Location	LBS	Supported
	GPS	Supported
	Sensitivity	Cold Start -146dbm
	Accuracy	<2.5m CEP
Environmental	Temperature	-20°C ~ 75°C
	Humidity	95%RH
Antenna/SIM	GPS Antenna	External
	Cellular Antenna	External
	SIM Form Factor	Micro-SIM (3FF)
Certification	FCC	Completed
	PTCRB	Completed
	AT&T	Completed
	RoHS	Completed
	Hg	Completed
Device Management	Data Monitoring	Supported
	Device Configuration	Supported
	Firmware Upgrade	Supported

2.3 Main Features and Use Cases

Table 2 - TMX08 Features

Supported Features	Configuration on the Platform required
Position Monitor	No
LBS	No
Data Reporting	No
Power supply alarm	No
Temperature alarm	Yes
Blind Zone Compensation	No

2.3.1 Position Monitor

The Position Monitor feature is enabled by default, which means the TMX08 will report location information in every report. The information includes: Position fix technology (LBS/GPS), longitude and latitude, cellular signal strength, battery voltage, Cell ID, etc. All the device's information reported is displayed on the Platform.

For further information, please refer to **Assets Management Service - Device List** section in ThingsX Service Platform User Guide.

2.3.2 LBS

The LBS provides the location information by utilizing the carrier network signal. It is enabled when the TMX08 does not have GPS location information. *Please note that LBS is largely dependent on distance to surrounding network cell sites, which could be up to a few miles away in worst case scenarios. It is not as accurate as GPS.*

This feature is enabled by default. The LBS data is displayed on the Platform. Please refer to **Assets Management Service - Device List** section in ThingsX Service Platform User Guide to get further information.

2.3.3 Data reporting

The IoT wireless device will report collected data such as temperature and volume, so that the customer can monitor overall status. With a default configuration, the TMX08 reports the following data:

- Location (GPS or LBS)
- Temperature
- Measured distance

This feature is enabled by default. The reported data is displayed on the Platform. Please refer to **Assets Management Service - Device List** section in ThingsX Service Platform User Guide to get further information.

2.3.4 Power Supply Alarm

If the external power supply fails, the device will automatically switch to the internal battery and send an alarm to the Platform to report the loss of external power.

This feature is enabled by default. The reported data is displayed on the Platform. Please refer to **Assets Management Service - Device List** section in ThingsX Service Platform User Guide to get further information.

2.3.5 Temperature Alarm

The TMX08 has an external temperature sensor. The device uploads real-time temperature data, which is displayed on the Platform. When the temperature is out of the preset threshold, an alarm will be sent to the Platform.

The device will report the temperature information without any additional configuration on the Platform. The temperature information is displayed on the Platform by default. Please refer to **Assets Management Service - Device List** section in ThingsX Service Platform User Guide to get more details. If the user requires a temperature alarm, this can be enabled in the Platform. Please refer to **Data Management Service - Policy** section in ThingsX Service Platform User Guide.

2.3.6 Blind Zone Compensation

When the device enters a cellular connectivity/coverage blind zone (limited or no cellular signal), it will store the collected data according to the preconfigured reporting frequency, and will upload this data to the Platform once the cellular signal is recovered.

This feature is enabled on the Platform.

3 Working Mode

3.1 Introduction

The TMX08 has two working modes: Periodic and Sleep.

3.2 Parameter Table

Table 3 - TMX08 Parameter

Category	Parameter	Definition	Remark
Refresh Timer	Report Timer	Report Timer	*Unit: second. The default value is 1800* For example, setting the parameter " Report Timer: 1800", will cause the device to wake up and report data every 1800s.
	Power Save Report Timer	Power Save Report Timer	*Unit: second. The default value is 3600*
	Heartbeat timer	TCP Keep alive Timer	*Unit: second. Range:60~14400*
firmware	Version	version	*Default: /*
	Sensor version	Sensor version	*Default: /*
	Server	server	*Default: ftp.thingsmatrix.io*
	Port	port	*Default: 21*
	Username	username	*Default: user*
	Password	password	*Default: 123456*
	Sensor filename	Sensor filename	*Default: sensorFilename*
Sensor Policy	Temperature	temperature	*Default value: 255C, that also disables the parameter.*
	Distance	distance	*Default value: 65535mm, that also disables the parameter.*
Device Area	Lat	Latitude	*Default: 0*
	Lng	Longitude	*Default: 0*
	Radius	Radius	*Default: 0m*
Other Settings	Power saving mode	Power Saving Mode	*Users can select the required Power saving mode through the drop-down box.* *There are three options: NON-POWER SAVING, SLEEP MODE, FULL POWER SAVING MODE.* For example, selecting the “SLEEP MODE” option will cause the device to activate the “SLEEP MODE” when the external power supply fails.
	Sensor buffer size	Sensor Buffer Size	*Sensor Buffer Size, 1~30.*

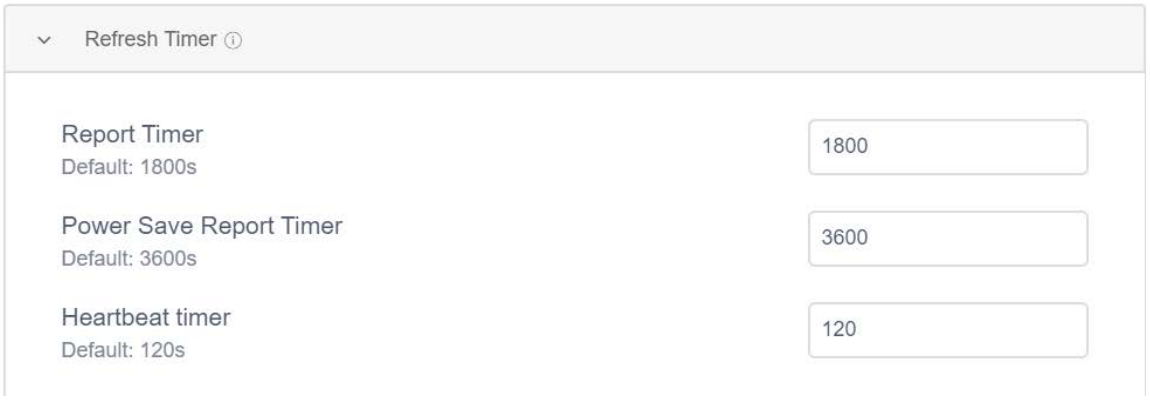
3.3 Periodic Mode

3.3.1 Introduction

Periodic Mode is enabled by default. In Periodic Mode, the device can only report data in fixed intervals. The default value is 30 minutes.

3.3.2 Configuration Example

If the device is required to report data every 30mins, Periodic Mode can be configured as follows:



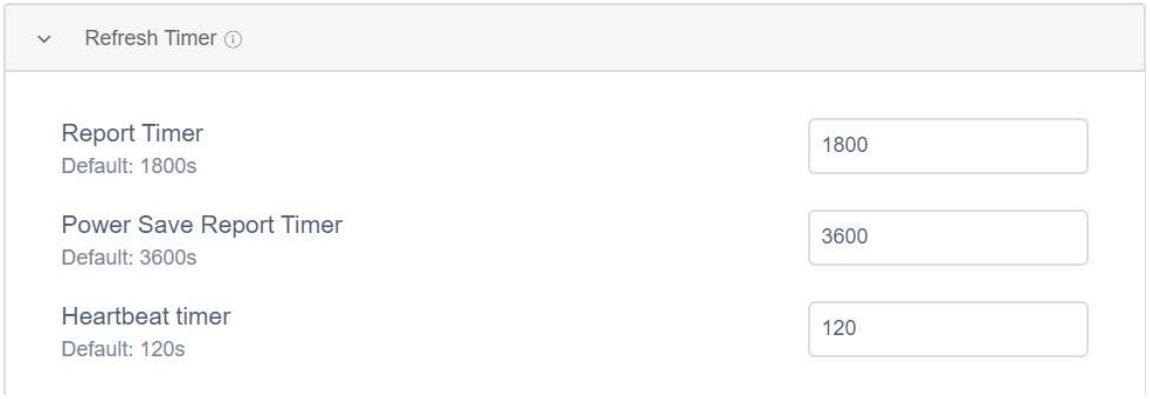
3.4 Sleep Mode

3.4.1 Introduction

When the external power supply fails, the device will automatically be powered by its own battery and the working mode will be switched to Sleep Mode.

3.4.2 Configuration Example

If the device is required to report data every 60mins under Sleep Mode, Sleep Mode can be configured as follows:



4 Device Data Fields

The IoT Gateway parses the data fields from the device's communication protocol and converts it to a JSON-formatted data payload. The user can view the data fields in the device's Status and Statistics tabs on the Platform or via the API. The data fields supported by the device are listed in the table below.

Table 4 - TMX08 Data Fields Definition

Field	Definition	Description
time	Time	It shows the data generated time.
lat	Latitude	It shows the latitude of the device.
lng	Longitude	It shows the longitude of the device.
altitude	Altitude	It shows the altitude of the device.
Sn	Device SN	Each device will have a unique serial number for identification.
speed	Speed	It shows the speed of the device.
CHARGE_ALERT	Power Supply	It shows the Power Supply.
current	Current Sensor	It shows the Current Sensor.
battery	Battery	It shows the remaining power of the battery as a percentage.
voltage	Voltage	It shows the voltage of the battery.
ipAddress	IP Address	It shows the IP Address.
direction	Direction	It shows the direction of the device. The north begins with a clockwise of 0-degree direction.
firmware	Firmware Version	It shows the Firmware Version.
sensorVersions	Sensor Versions	It shows the Sensor Versions.
imei	Network Module IMEI	It shows the IMEI of the cellular module.
iccid	SIM ICCID	It shows the SIM ICCID.
net	Network Type	It shows Mobile Network Type.
mcc	Country Code	It shows Mobile Network Country Code.
mnc	Network Code	It shows Mobile Network Code.
lac	Area Code	It shows Mobile Network Area Code.
cellId	Cell ID	It shows Mobile Network Cell ID.
signalStrength	Signal Strength (dBm)	It shows Cell Signal Strength.
gpsLocating	Location Mode	It shows the Location Mode: GPS, LBS, BeiDou, GLONASS, GalileoIt.
internal_temperature	Internal Temperature	It shows Device Internal Temperature.
dataType	Data Type	It shows Type of Data: Real-time, Delayed(1: Real-time/0: Delayed).
radius	Location Accuracy	It shows Radius of Location Accuracy.

5 Trouble shooting

This section provides information to help the user troubleshoot general problems with the device.

Please refer to **TMX08_Trouble shooting** to get more details.

6. Installation Instructions

Device's external view is as follows:

6.1 Get Started

To use the device, the user needs to open the cover, insert the SIM card correctly, close the device and then install the device. The user can open the cover by removing the 4 screws in the corners using a Philips screwdriver.

6.2 SIM Card Installation

Insert the SIM card into the SIM card holder. Ensure that the SIM card is properly placed. Close the SIM card cover.

Please take note of the ICCID on the SIM card and make sure that the SIM card has an active subscription for the required cellular connectivity.

6.3 Device Installation

A complete kit for TMX08 is as follows:

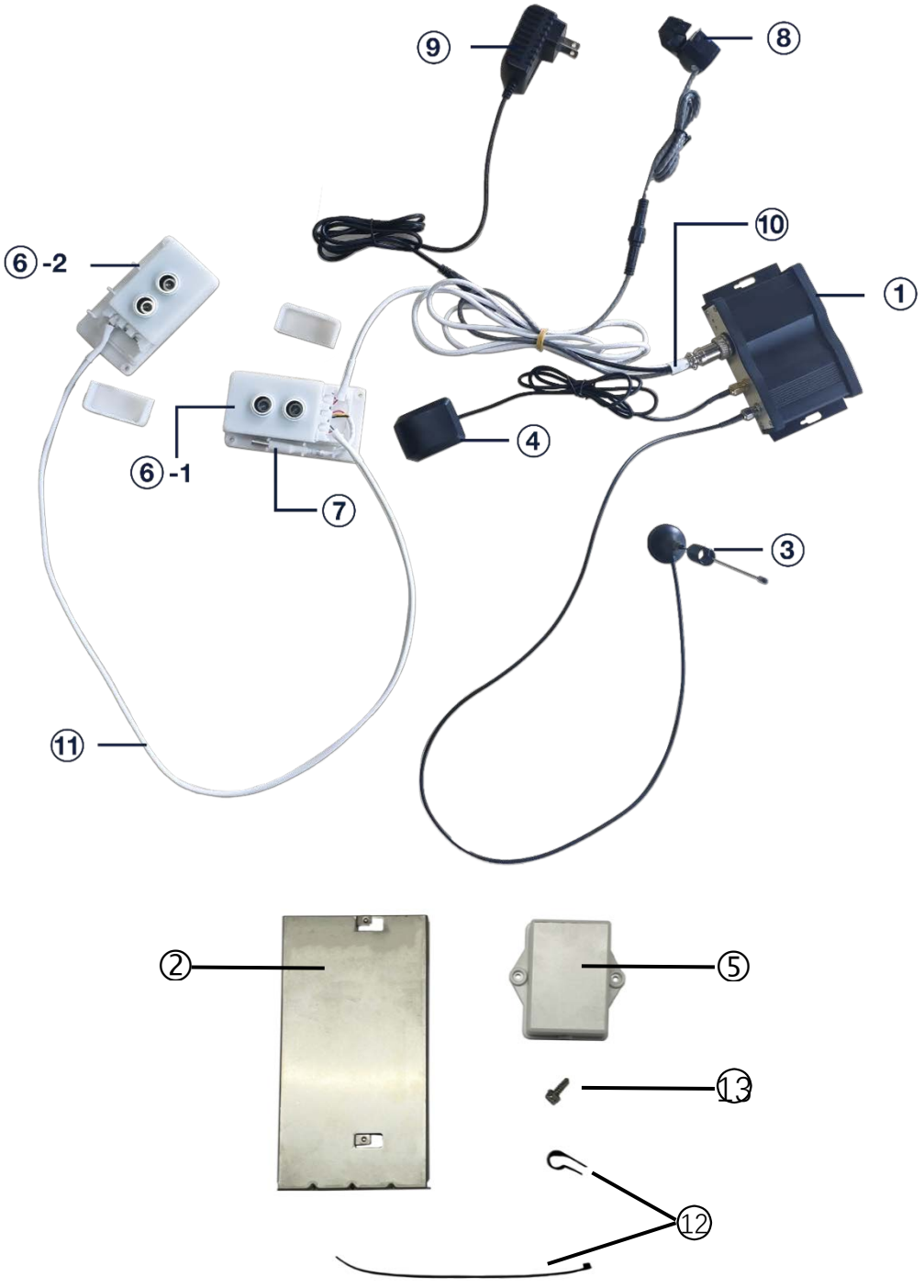


Table 5 – Packing list

Category	Part No.	Quantity	No.
Device	TMX08	1	①
Device mounting bracket	TMX08-DMB01	1	②

External cellular antenna	TMX08-ECA01	1	③
External GPS antenna	TMX08-EGA01/*TMX08-EGA02	1	④
External GPS antenna enclosure	TMX08-GAE01	1	⑤
Ultrasonic sensor	TMX08-US01	2	⑥-1; ⑥-2
Temperature sensor	TMX08-TS01	1	⑦
Electric current sensor	TMX08-CDS01	1	⑧
Power supply adapter	TMX08-PSA01	1	⑨
Main connector harness	TMX08-MC01/*TMX08-MC02	1	⑩
Sensor cable	TMX08-SC01	1	⑪
Cable clamps & ties	TMX08-CC01	6	⑫
Screws	TMX08-S01	13	⑬

NOTE:

For some "low profile" equipment, TMX08-EGA02&TMX08-MC02 will be used instead of TMX08-EGA01&TMX08-MC01.

Front panel of TMX08 is as follows:

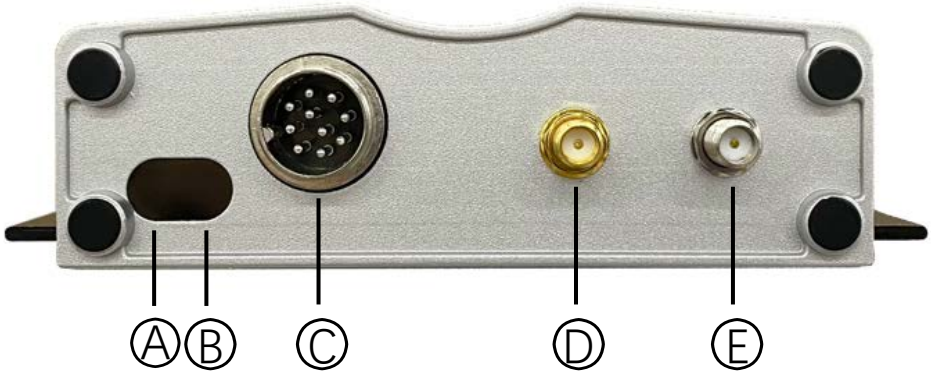
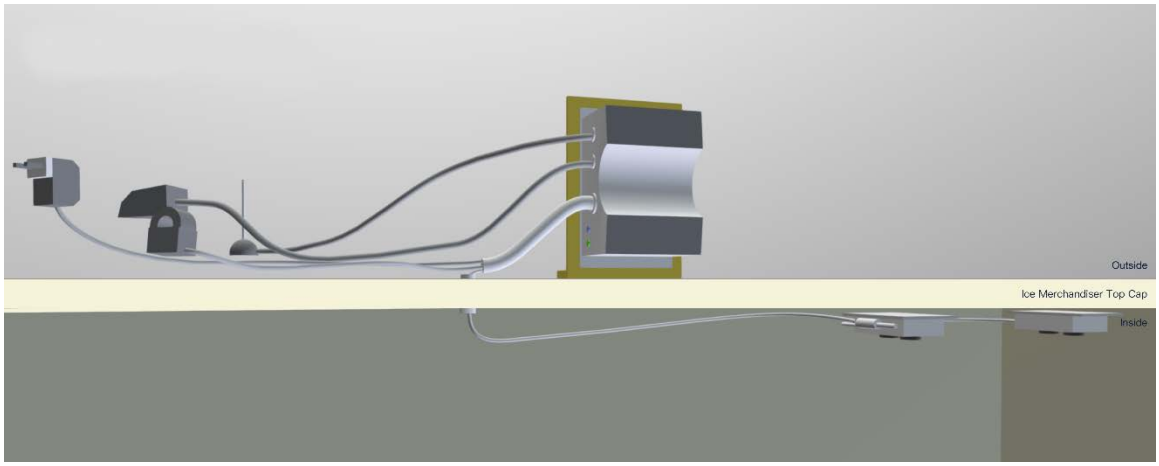
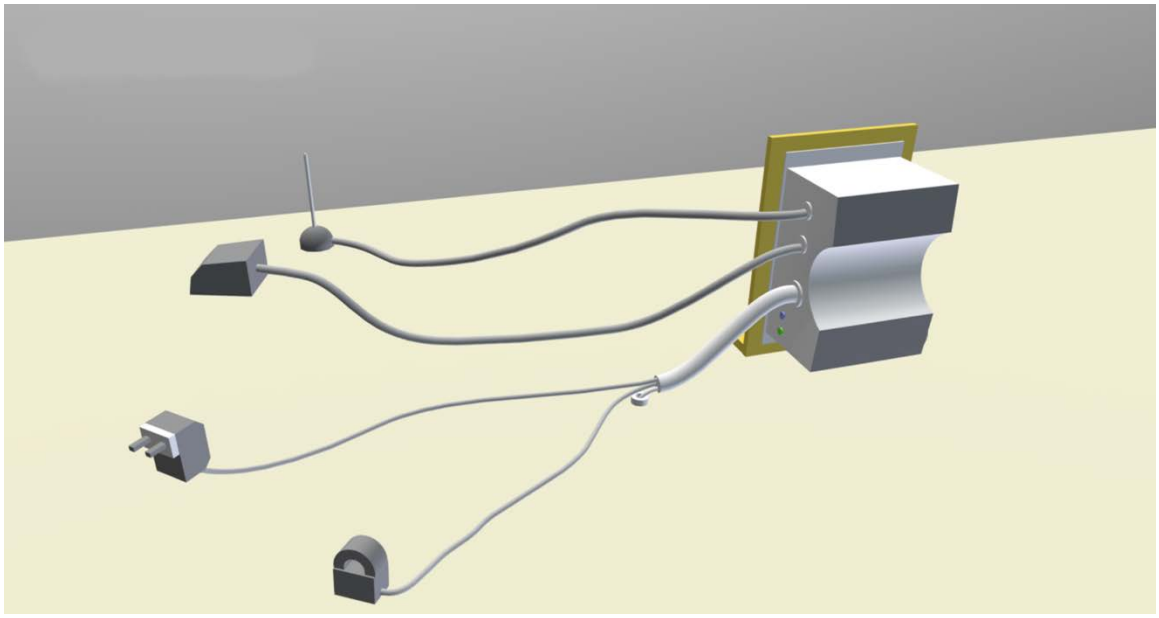


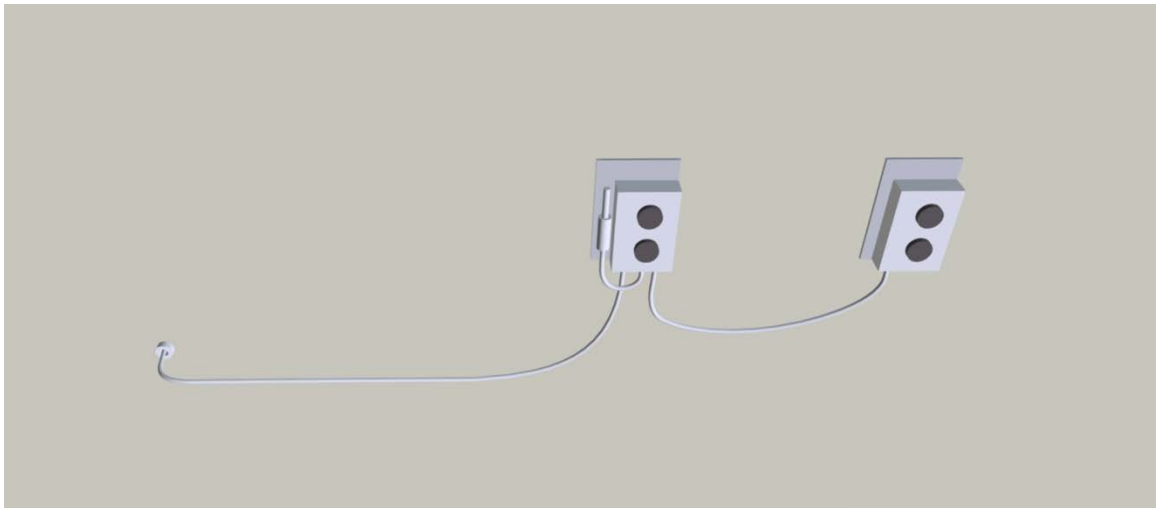
Table 6 - Ports and indicators

A		LED 0
B		LED 1
C		Main Connector(10pin)
D		GPS SMA
E		Cellular SMA

Installation Overview as follows:







Device Installation Steps:

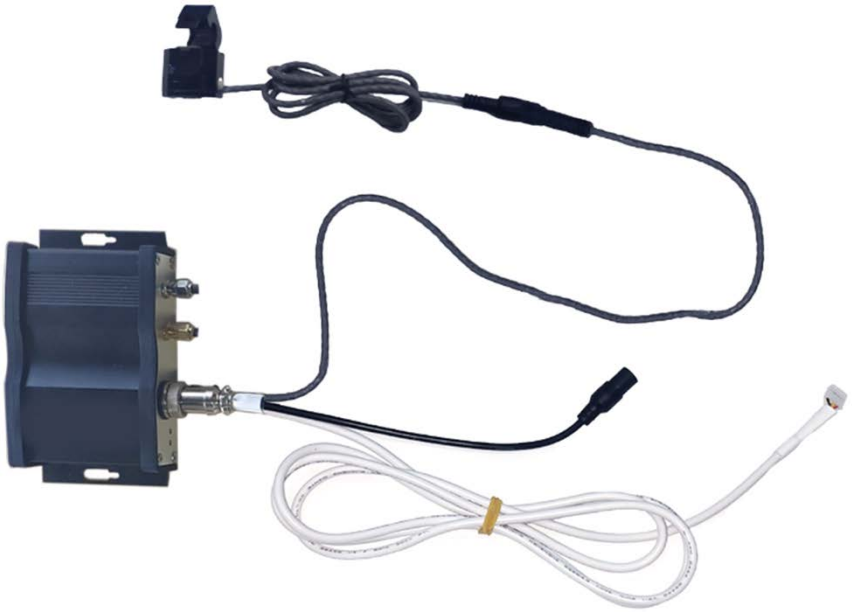
Warning: From a safety perspective, the power supply to the equipment MUST be shut down before installation procedure is completed.

- Ultrasonic and Temperature Sensors Installation
  1. Determine best location for sensor installation on the monitored equipment.
  2. Install ultrasonic and ultrasonic/temperature sensors (⑥-1 and ⑥-2/⑦) on the ceiling of the equipment with 2 screws (⑬) each. Follow the same procedure if a single sensor is to be used.

- Cable connection
  1. The main connector harness ⑩ with 10-pin connector shall be left outside of the equipment, while the white data cable of the main connector harness ⑩ needs to be routed from outside to inside of the equipment.

  2. The end user can adjust the cable length to connect the ultrasonic and temperature sensors ⑥-1 and ⑥-2/⑦.
     a) Open the cover of the ultrasonic and temperature sensors ⑥-1/ ⑥-2/⑦ and plug the white data cable into one of the 4-pin sockets (any 4-pin socket is ok). If two ultrasonic sensors (one with temperature sensor) are needed, then connect the sensor cable⑪ to the open 4-pin socket of the sensor.
     b) Use the cable clamps, cable ties, and screws to secure the cable in place.

- Device Installation
  1. Use 2 screws ⑬ to secure the device mounting bracket ② at a selected location on the outside of the equipment.
  2. Slide and lock the device ① onto the bracket ②.
- Power Adaptor installation
  1. Connect the adaptor cable ⑨ to the power socket of the main connector harness⑩.
- Electric Current Sensor installation
  1. Plug the current sensor ⑧ (2-pin) to the matching socket in the main connector harness ⑩.
  2. Release the latch on the side of the current sensor ⑧. Place the compressor's power cable inside, and close it back. Use insulating tape to hold the cables together.



- GPS Antenna installation
  1. Connect the GPS antenna ④ cable to the Gold-Colored SMA RF connector
  2. Place the GPS antenna on a location with line of sight to the sky, ensuring that there is no metal over the GPS antenna obstructing the GPS signal. Fix the GPS enclosure ⑤ over the GPS antenna and bolt it down with screws ⑬.

- Cellular Antenna installation
  1. Connect the cellular antenna③ cable to the silver SMA RF connector
  2. Place the magnetic base of the antenna onto the selected area on the rooftop of the equipment.

- Fasten all cables
  1. After all accessories were installed, connect the Main connector harness⑩ to the Device①.
  2. Use cable ties to fix all the cables to the wanted location(s).

- Power-up check
  1. Plug the power adaptor into the AC power outlet
  2. Observe the LED signaling
     a) LED 0 (Green): transition from slow blinking to fast blinking to steady on – Success
     b) LED 1 (Blue): transition from fast blinking to steady on – Success

Table 7 – LED Functions

LED	Activity	Description
LED 0	Link Status	Off — the device power off Green Slow Blinking — Acquiring LTE-M network Green Fast Blinking — LTE-M network Acquired, Server connecting Green Steady On — Server connected Green Slow Blinking is defined as the LED will be on for 0.1 seconds and off for 0.9 seconds

		Green Fast Blinking is defined as the LED will be on for 0.1 seconds and off for 0.1 seconds
LED 1	GPS Status	Off — GPS not configured Blue Slow Blinking — GPS Malfunction Blue Fast Blinking — Acquiring GPS Blue Steady On — GPS Acquired Blue Slow Blinking is defined as the LED will be on for 0.2 seconds and off for 2 seconds Blue Fast Blinking is defined as the LED will be on for 0.1 seconds and off for 0.9 seconds