Remote Monitoring Unit

SL-RMU

Installation & Service Manual - V1.0

Sealite®

"We Believe Technology Improves Navigation."

Manual Update Register

Version No.	Description	Date	Reviewed	Approved	Design
1.0	SL-RMU Manual Launch	April 2021	P. Naidu	W. Evans	M. Sugars

Contents

1.0 Introduction

Congratulations! By choosing to purchase an Sealite product, you have become the owner of one of the most advanced products in the world.

Sealite draws on more than 25 years of experience in the design and manufacture of navigation aids, and particular care has been taken to ensure your product gives years of trouble-free service.

As a commitment to producing the highest quality products for our customers, Sealite has been independently certified as complying with the requirements of ISO 9001:2015 quality management system.

By taking a few moments to browse through this booklet, you will become familiar with the versatility of your lighting solution, and be able to maximise its operating function.

Please remember to complete the Sealite warranty registration card accompanying your product.

2.0 Technology

Sealite is a world-class solar lighting systems manufacturer with a proven reputation for rapid, innovative, and agile technology solutions designed specifically for defence, government, civil and humanitarian aid operations in the most remote, toughest environments.

Electronics

Sealite employs leading in-house electronic engineers in the design and development of software and related circuitry. All individual electronic components are sourced directly by Sealite procurement staff ensuring that only the highest quality components are used in our products.

LED Technology

All Sealite lights use the latest advancements in LED (Light Emitting Diode) technology as a light source. The major advantage of LED's over traditional light sources is well established in that they typically have an operational life in excess of 100,000 hours, resulting in substantial savings to maintenance and servicing costs.

Precision Construction

Commitment to investing in the design and construction of injection-moulded parts including optic lenses, light bases and a range of other components ensures that all Sealite products are of a consistent and superior quality.

Optical Performance

Sealite manufactures a range of aviation LED lenses moulded from multi-cavity dies. The company has superior in-house lens manufacturing capabilities to support outstanding optical performance.

Award-winning, Patented Technology

Several United States and Australian patent registrations are held on Sealite's range of innovative designs, with other regional patents pending in Canada, United Kingdom and Europe.

3.0 SL-RMU

The Remote Monitoring Unit (RMU) is a connectivity device that allows products without internal telemetry hardware to still be able to transfer data and communicate with an overarching Control and Monitoring or Asset Management System. As a result, the product is able to be remotely monitored, managed, maintained and controlled by asset owners.

Designed to perfectly integrate and supplement Sealite products, the RMU is able to receive data from a connected asset (and power supply) and transfer this to a high-level control and monitoring system such as Star2M using its SATCOM interface connected through Iridium.

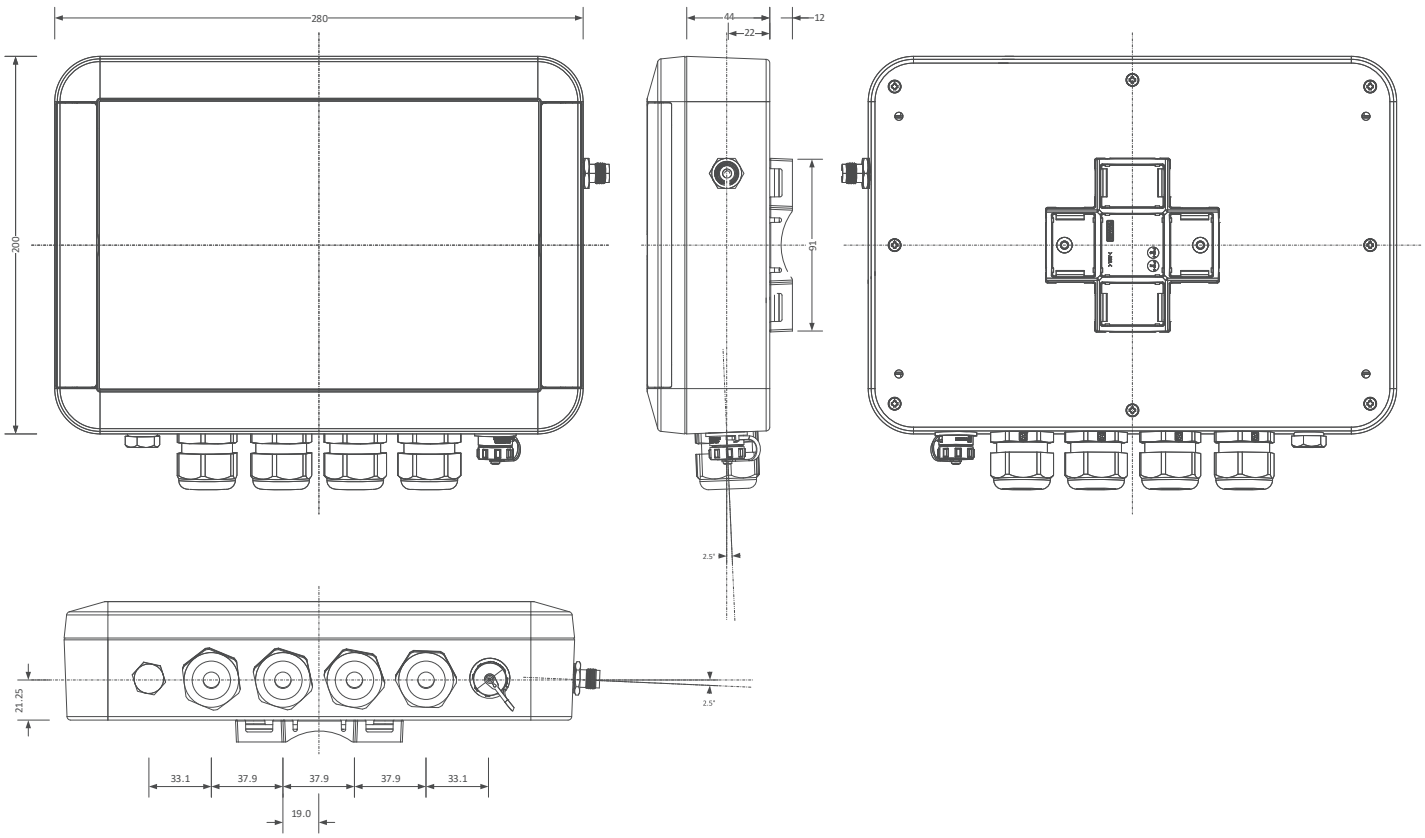
When connected with Star2M, the RMU supports bi-directional communication, meaning that commands can also be sent back to the connected product for control or monitoring purposes. As standard, the RMU supports a minimum of four discrete IOs via General Purpose Inputs (2) and Outputs (2). The SATCOM interface supports the transmission of a minimum of two generic alarms which the user can then map to the two General Purpose Inputs via a customised Alarm Configuration in the Star2M Web Portal.

The RMU is available as a complete, standalone mechanical assembly and supports either a low current or high current variant.

Note: This installation and service manual must be used in conjunction with the Star2M manual

Remote Monitoring Unit

Note: Mounting bracket hardware and serial communication cable are included.



4.0 SL-RMU Data Sheet

SL-RMU	DC	
Electrical Characteristics		
Input Voltage	12 - 48 VDC	
Operating Temperature	-40 to 55°C	
Max Rated Load	Low Current: 3A	High Current: 12A
Max Rated Charge	Low Current: 3A	High Current: 12A
Power Consumption		
Peak	8.66W	
Average	0.07W	
Interfaces		
Standard	• Serial Communication Interface • Input Power Monitoring • Solar Charge Monitoring • Load monitoring • Discrete IO via General Purpose Input/Outputs • Satellite Communication	
Control and Monitoring	Star2M	
Physical Characteristics		
Body Material	White, ASA UL94HB	
Height (mm/inches) • Enclosure • SATCOM Antenna	 64.92 / 2.56 36.50 / 1.44	
Width (mm/inches) • Enclosure • SATCOM Antenna	 280 / 11.02 78 / 3.07	
Depth (mm/inches) • Enclosure • SATCOM Antenna	 200 / 7.87 (excluding mounting bracket) 78 / 3.07	
Mass (kg/lbs) • Enclosure • SATCOM Antenna	 1.559 / 3.437 (excluding mounting bracket) 0.152 / 0.336 (Antenna + Cable)	
Service Life	12+ years	
Environmental Standards		
Shock	MIL-STD-202G, method 213B	
Vibration	MIL-STD-202G, method 204D	
Humidity	0 to 90%	
Compliance		
FCC (North America)	FCC Part 415B/ICES 003	
CE (Europe)	EN 301489-1/17/19/20/52 EN 301908-1, EN 301441, EN 300328, EN 303413, EN 62311 EN 61000-6-2:2019 EN 61000-6-4:2019	
RCM (Australia/New Zealand)	EN 55032, AS/CA S042.1, AS/CA S042.4, RSE AS/NZS 62368.1, AS/NZS 2772.2, IEC 62368.1, IEC 60529 ARPANSA RPS3	
Quality Assurance	ISO9001:2015	
Protection Rating	IP67	
Other		
Intellectual Property	SEALITE® is a registered trademark of Sealite Pty Ltd. Star2M® is a registered trademark of Sealite Pty Ltd.	
Warranty*	3 years	
Terms and Conditions	Warranty Terms and Conditions available on www.avlite.com	

5.0 Safety Information

Before proceeding with installation or service, make sure the following conditions are met:

- Ensure power lines are not 'live' (NO ELECTRICAL HAZARD).
- Avoid touching live circuits!
- Avoid touching any component or any part of the circuitry while the unit is operating. Do not change components or make adjustments inside the unit with power on.
- When installing, comply with all local electrical code(s).
- Mains power should always be disconnected when work is being done in close proximity to electrical fittings, and electrical work should only be done by a licensed electrician.
- To ensure that the equipment functions safely and correctly, use cable in compliance with the effective local electrical code.
- Dispose of the product according to the local laws and regulations for your region, for example, at a recycling centre that accepts electronic devices.

6.0 Operation and Setup

The RMU allows a means of communication between Sealite supplied products and Star2M via its SATCOM interface, connected via Iridium.

As a result, the RMU is able to provide monitoring of input power, load and solar charge of a connected lantern and power supply. This information is relayed from the lantern to the RMU via the Serial communication interface in conjunction with integrated current and voltage sensing circuits. The information is then transmitted to Star2M in the form of a daily update which includes the following parameters:

- Load Current-Instantaneous
- Charge Current-Instantaneous
- Battery Voltage-Instantaneous
- Maximum Charge Current-24hr
- Total Charge Current-24hr
- Total Load Current-24hr
- Maximum Battery Voltage-24hr
- Minimum Battery Voltage-24hr

The transmission of generic alarms from the lantern to Star2M is also supported via two General Purpose Inputs when triggered by the lantern or power supply.

Mounting hardware in the form of a bracket is included with the RMU enclosure for pole mounting, although wall mounting is also suitable (mounting accessories not supplied). A mounting bracket is also provided for the external SATCOMs Antenna.

Serial Communication is achieved either via serial cable (supplied) or direct wiring.

7.0 Unpacking, Installation, Wiring and Setup

7.1 Unpacking

Unpack all hardware and inspect for damage. If there is any damage, please contact your Sealite Office.

Retain original packing material for possible future use in shipping.

7.2 Installation

7.2.1 Warnings and Cautions

WARNING:

DO NOT connect directly to any unregulated power source. Connecting to an unregulated source may result in damage.

WARNING:

Always follow the instructions outlined in the product manual when cleaning equipment. Improper cleaning methods and use of unauthorized cleaning agents can damage equipment.

WARNING:

Ensure the external Antenna is installed such that there is a clear line of site to the sky for satellite communications.

7.2.2 Factory Configuration

Preassembled RMU complete with internal wiring, external antenna and serial cable. Mounting bracket included for pole mounting.

7.2.3 Cabling Requirements

The installation of the RMU requires the following cables:

External Connection Interface	Cable Type	Min	Max	Max Length
Input Power Monitoring	Power cable, 2 Conductor	1.0mm^2 8-17mm cable diameter	6.0mm^2 8-17mm cable diameter	Application specific
Solar Charge Monitoring	Power cable, 2 Conductor	1.0mm^2 8-17mm cable diameter	6.0mm^2 8-17mm cable diameter	Application specific
Load Monitoring	Power cable, 2 Conductor	1.0mm^2 8-17mm cable diameter	6.0mm^2 8-17mm cable diameter	Application specific
Alarming/Monitoring via GPIOs	Power & Data cable, 2-6 Conductor	0.5mm^2 8-17mm cable diameter	2.5mm^2 8-17mm cable diameter	Application specific
Serial comms via connector **OR**	Serial Cable 4 Core Bulgin Connector	NA	NA	3m Standard, 10m maximum
Serial comms via direct wiring GND,Tx, Rx *SL-PEL installations only	Power & Data Cable, 3-10 Conductor	0.75mm^2 8-17mm cable diameter		10m maximum

NOTICE:

Cables for the serial communication interface (via connector or direct wiring) are Sealite supplied. Cables for Input Power, Solar Charge, Load monitoring as well as Alarming via GPIO are user supplied.

7.2.4 Installation Recommendation

Standard Installation

NOTICE:

The sequence of steps can be adjusted for site requirements.

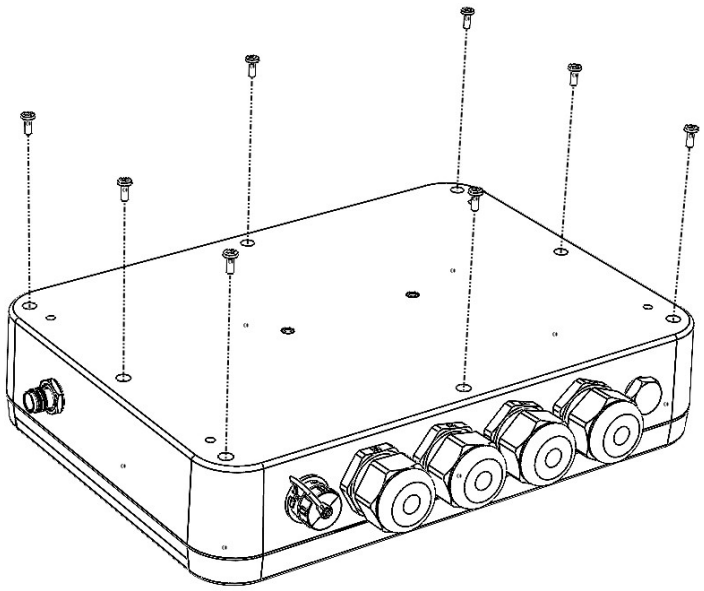
NOTICE:

The high current variant of the RMU with SATCOM remote monitoring is shown throughout this installation procedure.

1. **Open the RMU enclosure**

   a. Loosen and remove the 8 X M3 screws at the back of the enclosure.

   b. Remove the top cover.

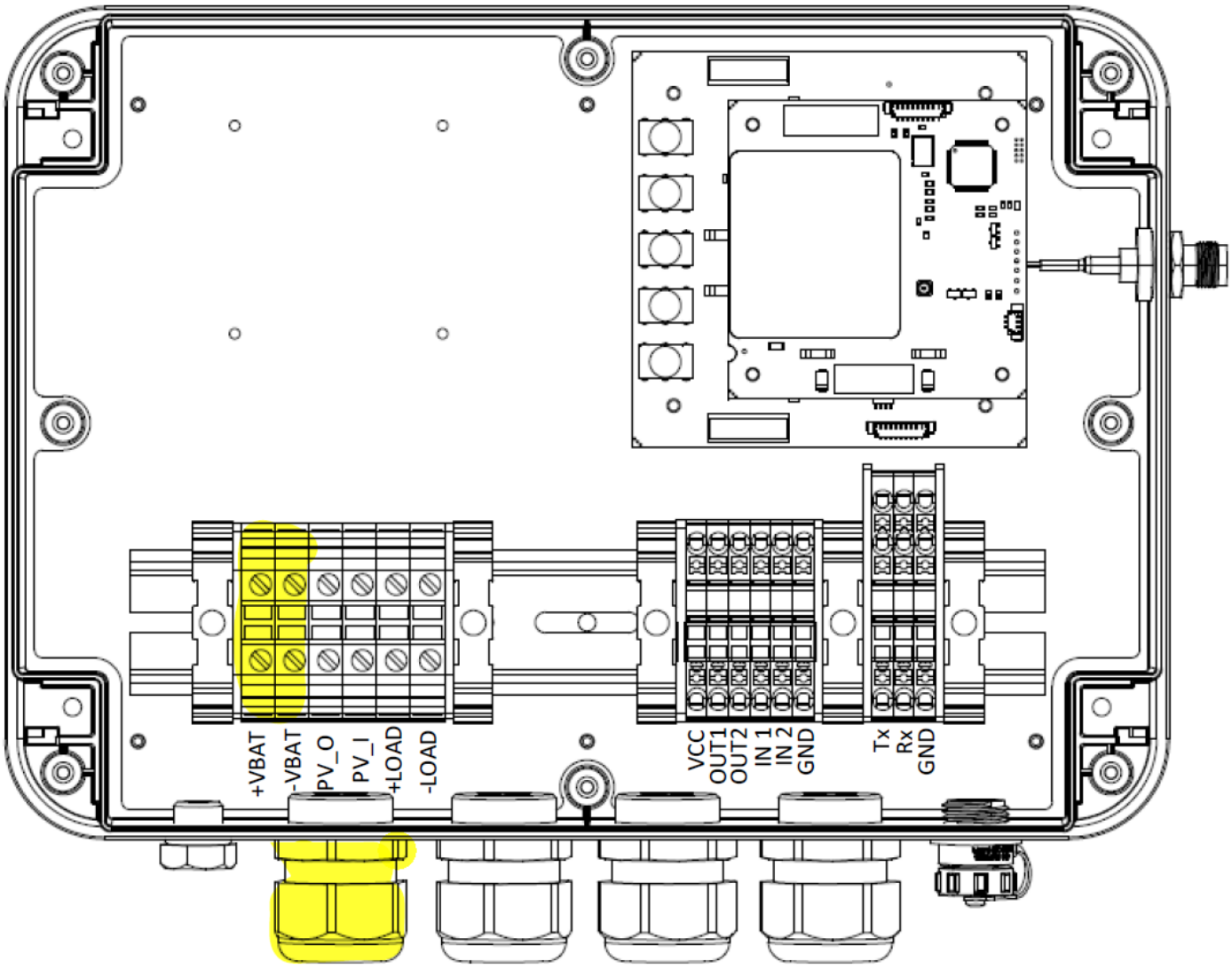


2. **Complete wiring for applicable External Connection Interfaces**

   a. Connection for Input Voltage Monitoring

   Wiring instructions - Power Cable:

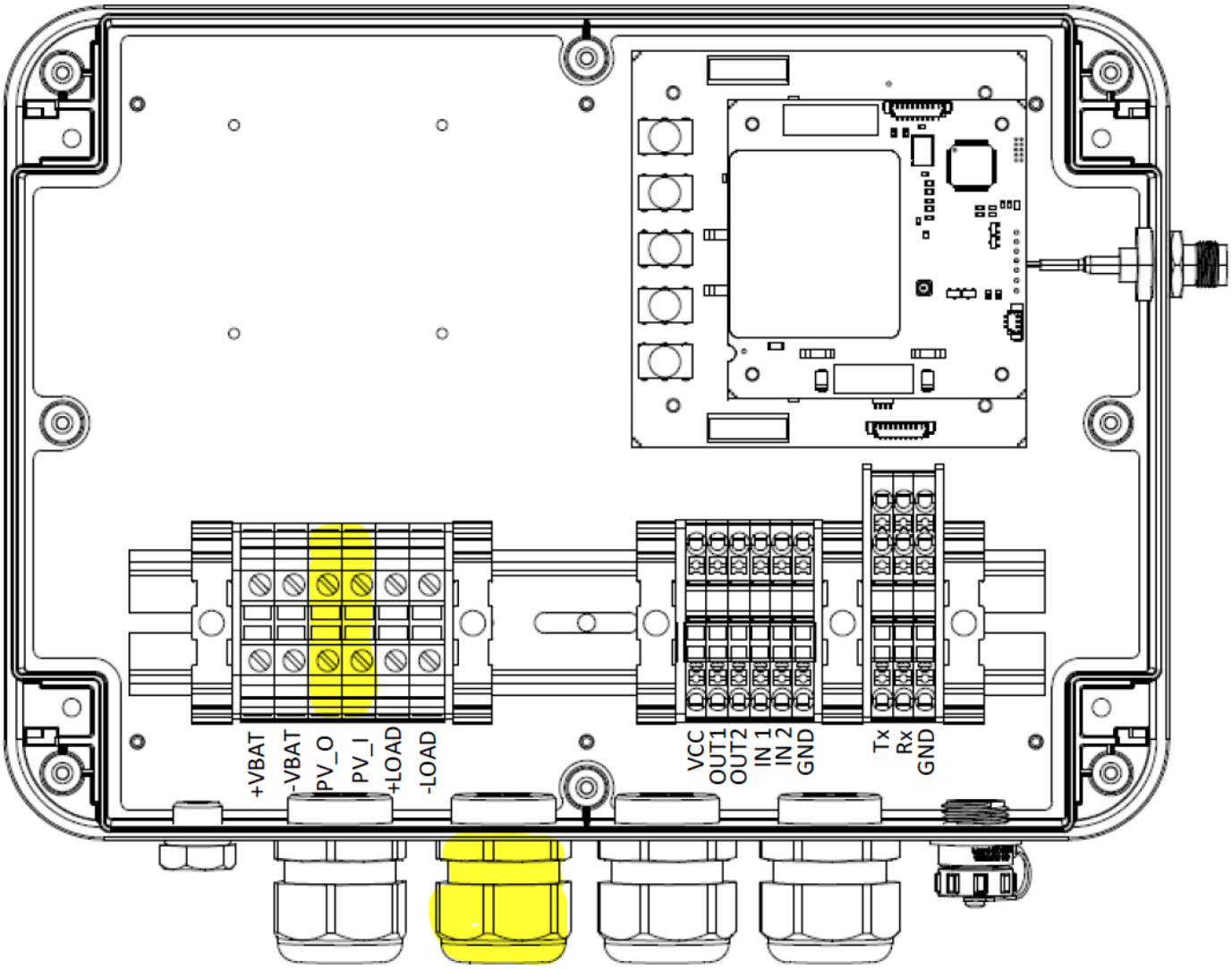
   - Thread the power cable from the battery terminals through the 'Power' cable gland in the RMU.
   - Connect the positive conductor from the lantern to the "+VBAT" labelled terminal in the RMU.
   - Connect the negative conductor from the lantern to the "-VBAT" terminal in the RMU.



b. Connection for Solar Charge Monitoring

Wiring Instructions - Power Cable:

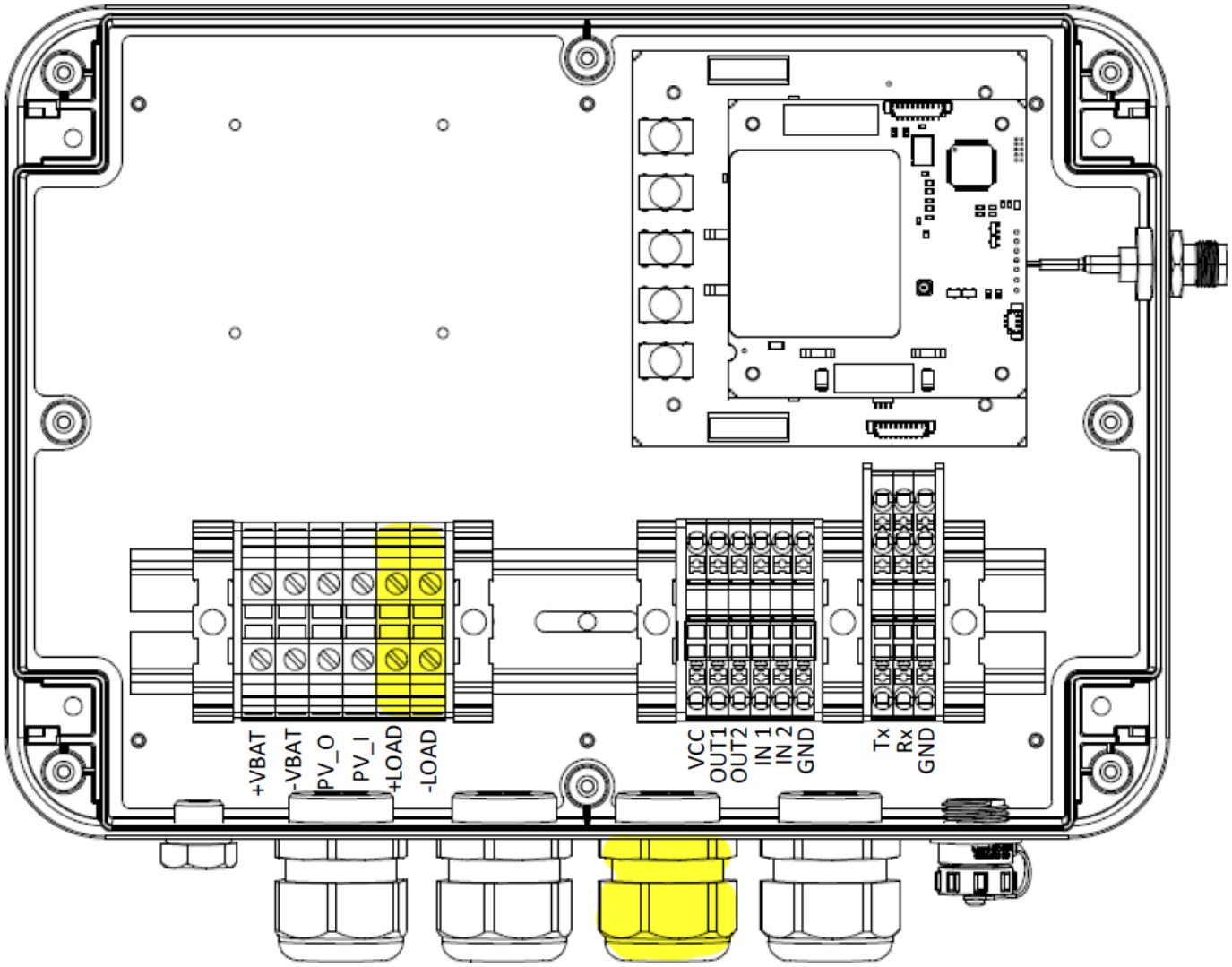
- Thread the power cable from the solar regulator or solar power supply through the “PV” cable gland in the RMU.
- Connect the PV output conductor to the “PV_O” terminal in the RMU.
- Connect the PV input conductor to the “PV_I” terminal in the RMU.



c. Connection for Load Monitoring

Wiring Instructions - Power Cable:

- Thread the power cable from the lantern through the “Load” cable gland in the RMU.
- Connect the positive conductor to the “+LOAD” terminal in the RMU.
- Connect the negative conductor to the “-LOAD” terminal in the RMU.



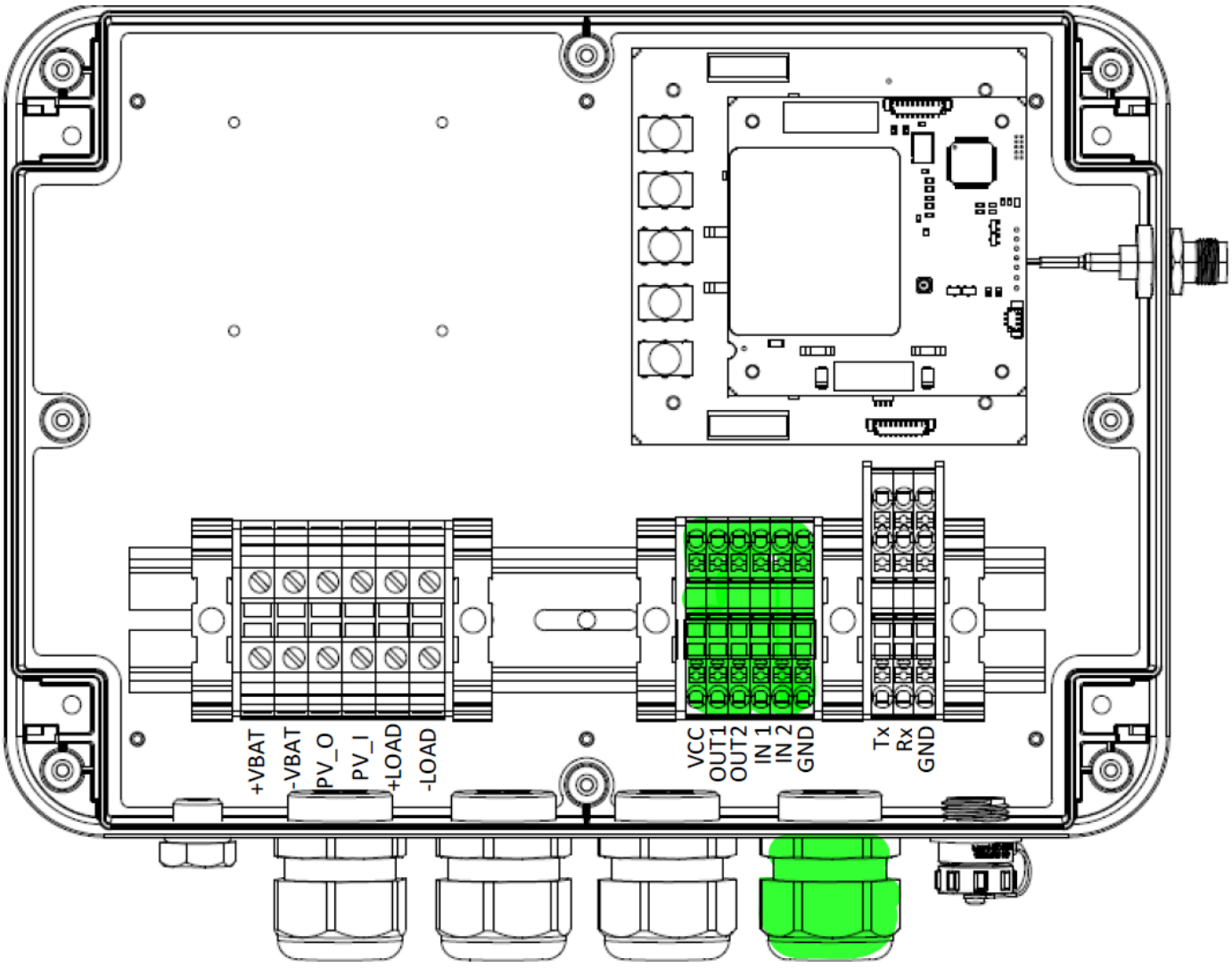
d. Connection for Alarming/Monitoring via GPIO

NOTICE:

Wire applicable conductors as specified by product variant.

Wiring Instructions - Power and Data Cable:

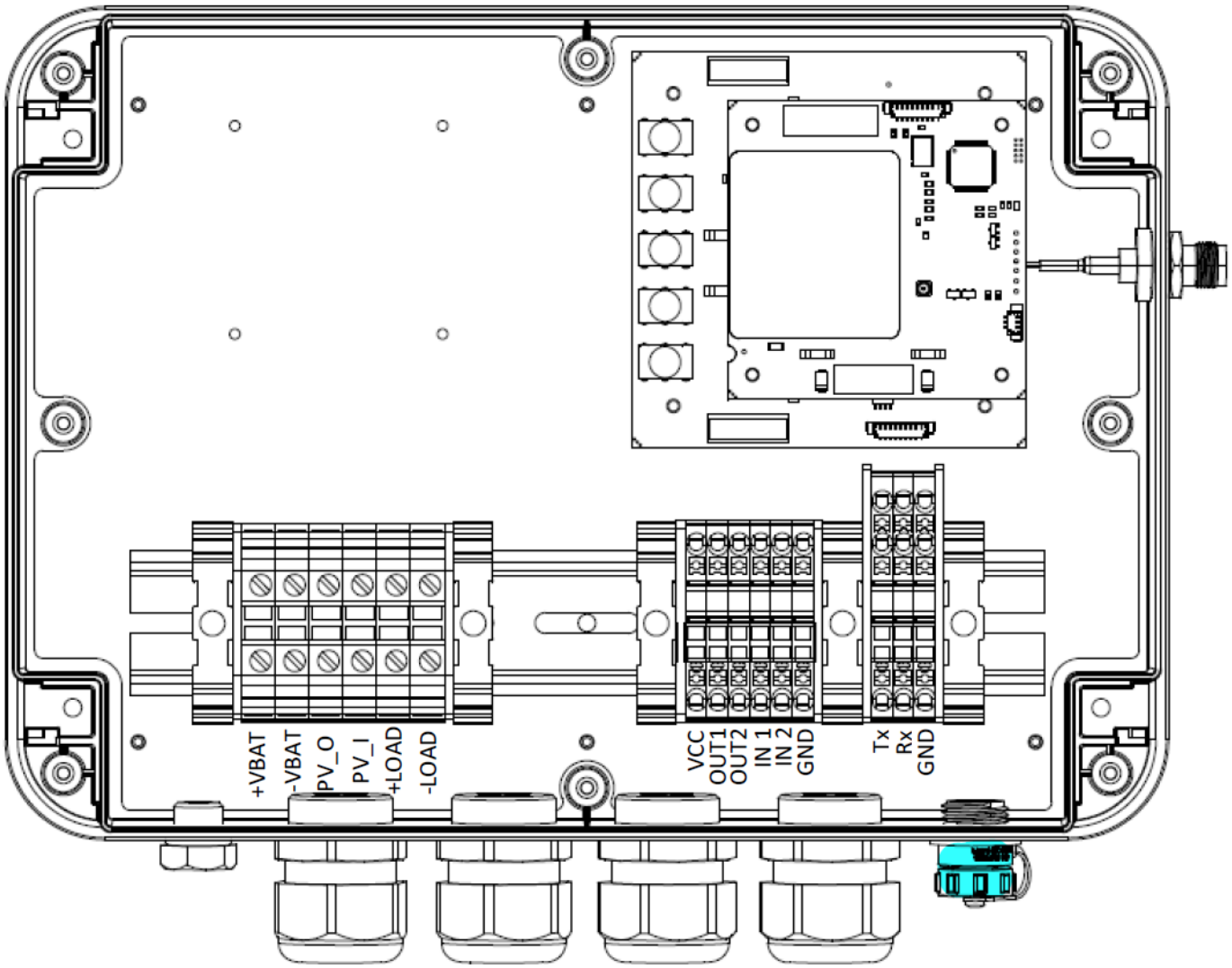
- Thread the power and data cable from the lantern through the “I/O” cable gland in the RMU.
- Connect the applicable conductor to the “VCC” terminal in the RMU.
- Connect the applicable conductor to the “OUT1” terminal in the RMU.
- Connect the applicable conductor to the “OUT2” terminal in the RMU.
- Connect the applicable conductor to the “IN 1” terminal in the RMU.
- Connect the applicable conductor to the “IN 2” terminal in the RMU.
- Connect the applicable conductor to the “GND” terminal in the RMU.



e. Connection for Serial Comms Monitoring

- Option 1: Connection via Serial Cable.

Plug in the supplied serial cable from the lantern into the “Serial” connector on the RMU.



- Option 2: Connection via Terminals.

Please see section 'Serial Communication Interface via Direct Wiring: SL-PEL Installation' for wiring instructions.

3. **Close the RMU enclosure**

Replace the 8 x M3 screws from the back of the enclosure, replace the lid and tighten the screws. (see image in step 1).

NOTICE:

Ensure that the rubber gasket is placed properly in the bottom base to ensure a watertight seal when the RMU is closed.

NOTICE:

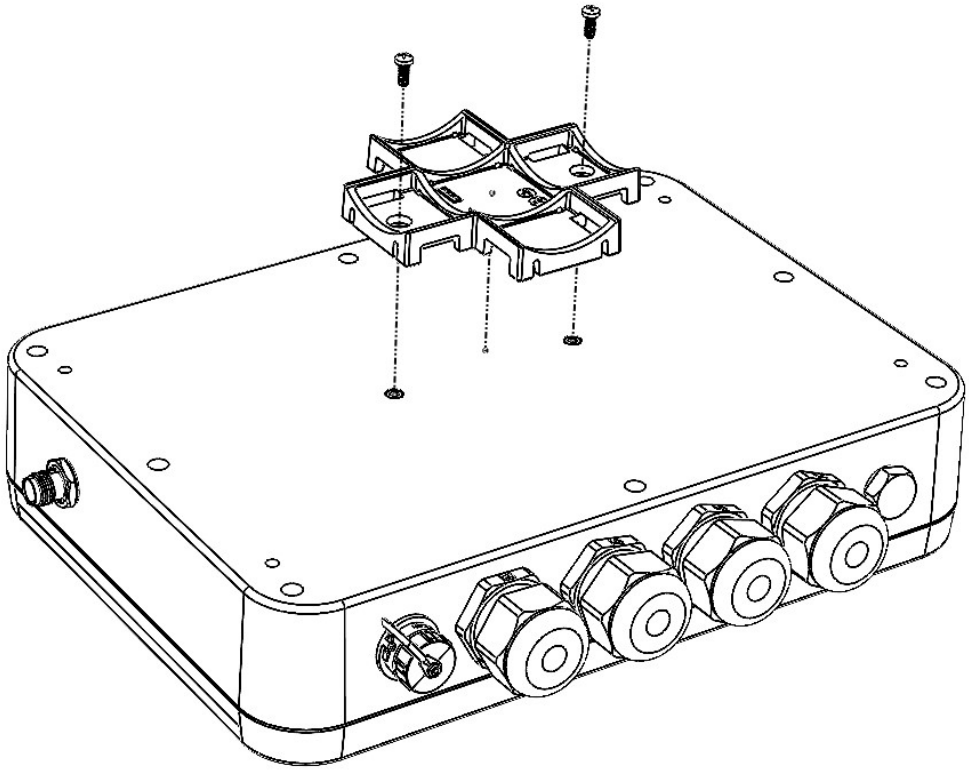
If not in use, ensure that the PV and/or I/O cable glands are sealed using the provided bungs.

4. **Mount the RMU enclosure**

The RMU should be mounted at eye level in close proximity to the lantern and power supply to ensure that it is easily accessible for servicing and maintenance.

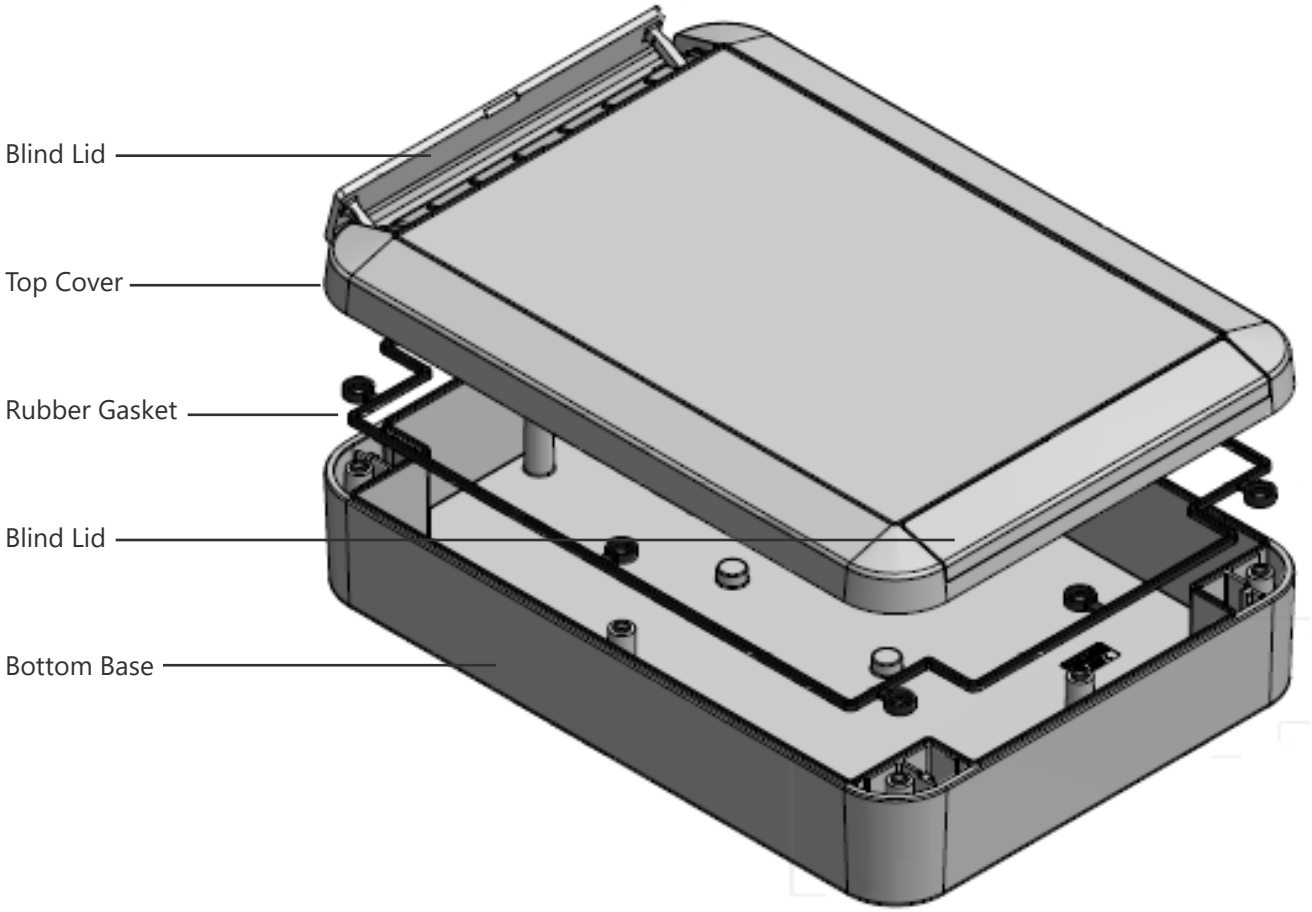
Pole Mounting:

The RMU can be mounted to a pole by first attaching the mounting bracket (supplied) to the back of the RMU enclosure using the two supplied screws (see image below). The enclosure can then be attached to the pole using steel cable ties (not supplied).



Wall Mounting

The RMU enclosure can be mounted to a wall through the holes under the blind lids in the top cover. Bolts or U-clamps may be used (not supplied).



5. Connection for Remote Monitoring

SATCOM Monitoring

a) Mount the provided antenna mounting bracket to the pole or wall.

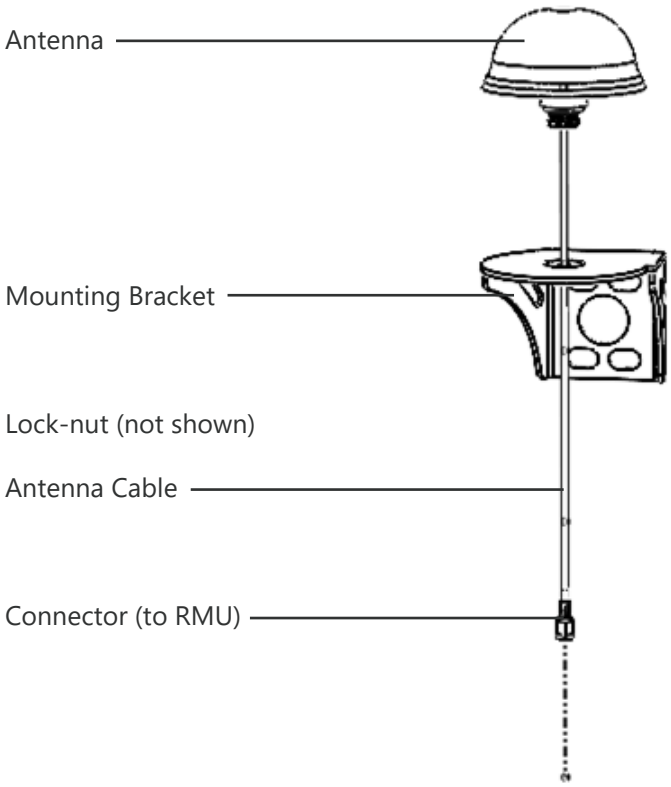
NOTICE:

The Antenna cable is 500mm long and hence the mounting bracket should not exceed this distance from the RMU when installed.

NOTICE:

Ensure the external Antenna has a clear line of site to the sky for satellite communication.

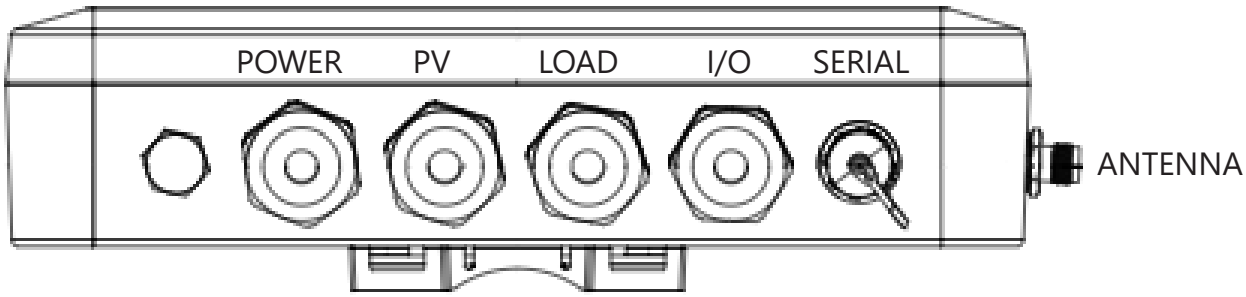
b. Thread the antenna cable through the top of the bracket and fasten the lock-nut to the Antenna from underneath the mounting bracket.



c. Plug the antenna cable into the side of the RMU enclosure (see image below).

NOTICE:

The Antenna cable path should allow for relaxed bend radius and should not be tightly coiled, folded or stretched.



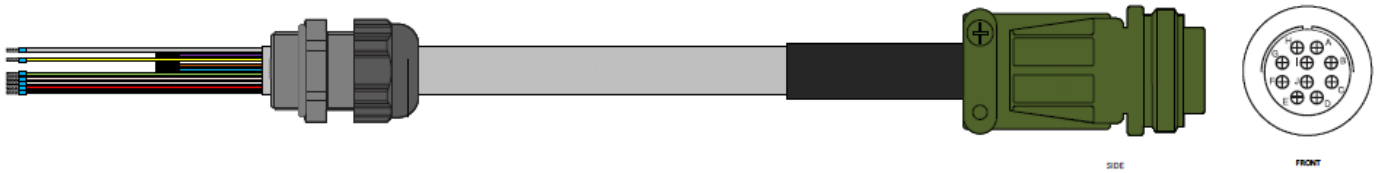
6. Configure the RMU in Star2M

g. Use the IMEI number on the RMU enclosure to create a SATCOMs Asset in Star2M. (Please see the "Assets" section in the Star2M Manual for further information).

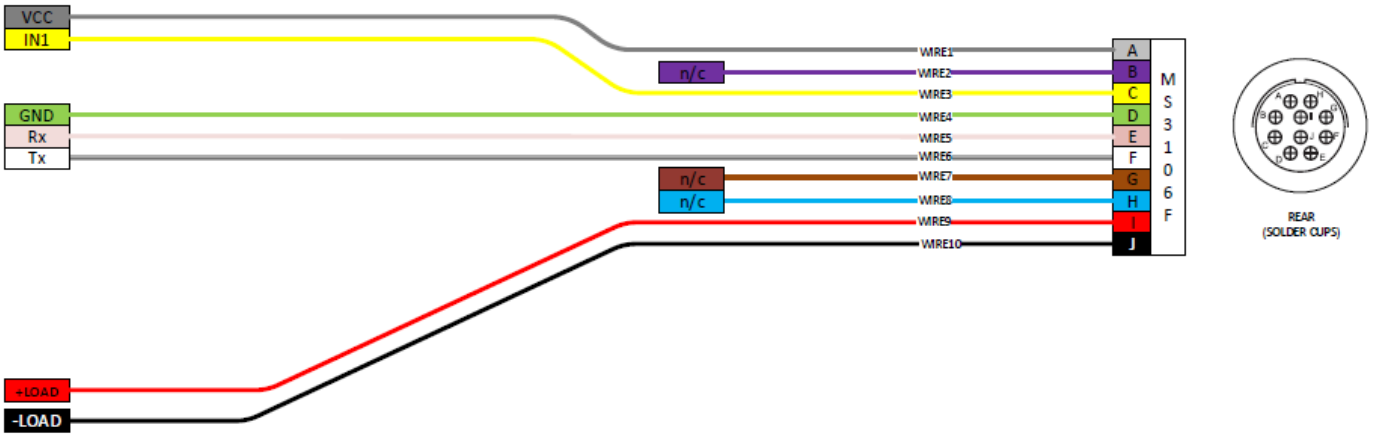
h. If alarming is required, create an Alarm Configuration and rename RTU IN1 State and RTU IN2 State if preferred. (Please see the "Alarms Configuration" section in the Star2M manual for further information).

Serial Communication Interface via Direct Wiring: SL-PEL Installation

The serial communication interface for the SL-PEL is achieved via the Sealite supplied power and data cable (shown below).



The number of conductors range from two to 10 depending on customer requirements. Wiring instructions for the 10 conductor variant is described below.

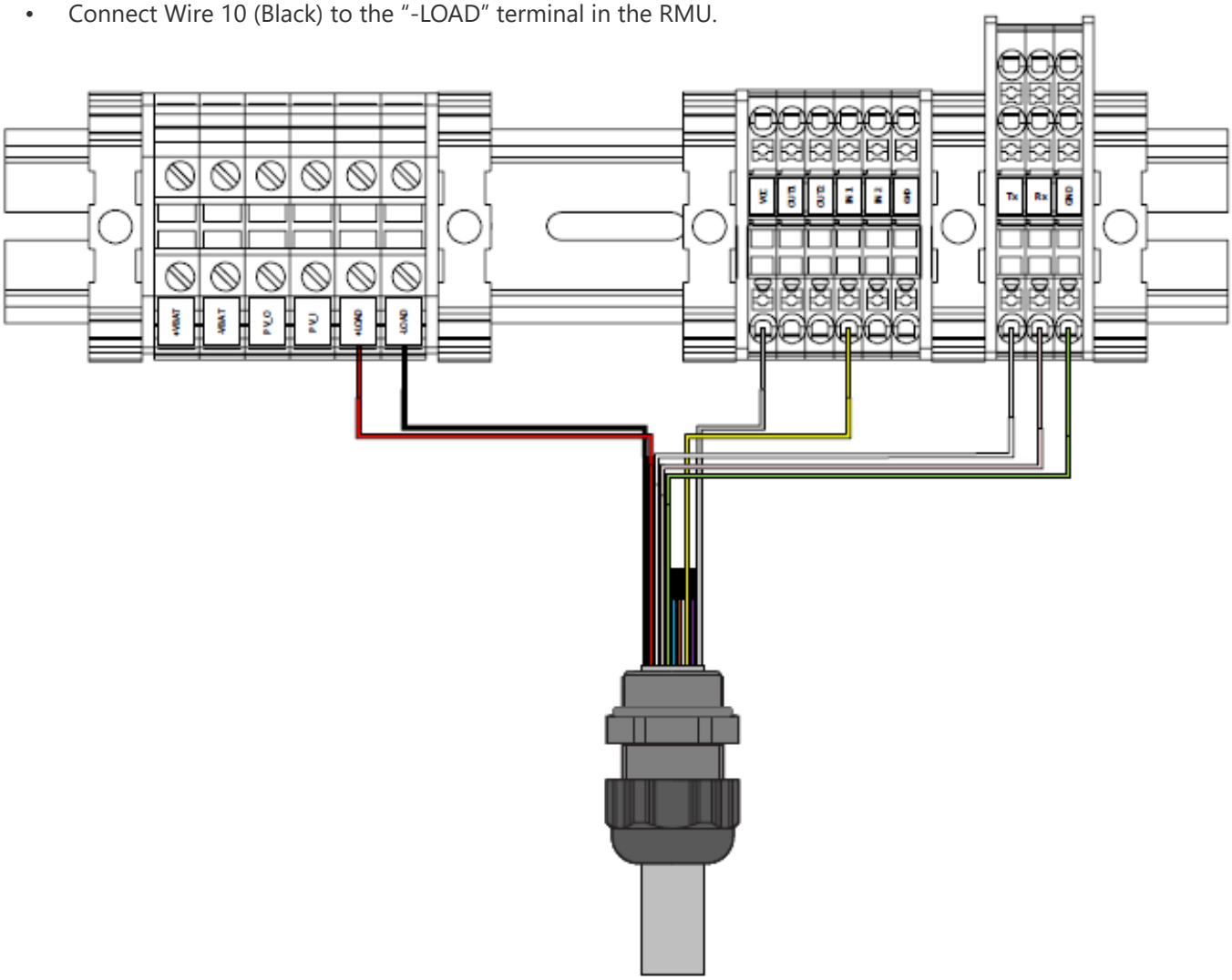


MS-3106F CAVITY	TO	CONDUCTOR	COLOUR	WIRE GAUGE (mm^2)
MS-3106F-A	VCC	Wire1	Grey	0.75
MS-3106F-B		Wire2	Violet	0.75
MS-3106F-C	IN1	Wire3	Yellow	0.75
MS-3106F-D	GND	Wire4	Green	0.75
MS-3106F-E	Rx	Wire5	Pink	0.75
MS-3106F-F	Tx	Wire6	White	0.75
MS-3106F-G		Wire7	Brown	0.75
MS-3106F-H		Wire8	Blue	0.75
MS-3106F-I	+LOAD	Wire9	Red	0.75
MS-3106F-J	-LOAD	Wire10	Black	0.75

NOTICE:

Wire conductors applicable to specific product variant.

- Plug the connector of the power and data cable into the SL-PEL.
- Thread the other end of the cable through the “Load” cable gland in the RMU.
- Connect Wire 1 (Grey) to the “VCC” terminal in the RMU.
- Connect Wire 3 (Yellow) to the “IN 1” terminal in the RMU.
- Connect Wire 4 (Green) to the “GND” terminal in the RMU.
- Connect Wire 5 (Pink) to the “Rx” terminal in the RMU.
- Connect Wire 6 (White) to the “Tx” terminal in the RMU.
- Connect Wire 9 (Red) to the “+LOAD” terminal in the RMU.
- Connect Wire 10 (Black) to the “-LOAD” terminal in the RMU.



8.0 Maintenance and Servicing

Inspect the RMU enclosure for evidence of dust or water penetration.

Inspect the rubber gasket for damage. Repair gasket or conduit entries as required.

Inspect control wiring for failing insulation, open conductors or other wiring flaws and repair as required.

9.0 Replacement Parts

If replacement parts are required, please call a local Sealite distributor and reference the Product or Configuration Code called out in the “Product Configuration and Options” section of the corresponding product data sheet.

10.0 Warranty

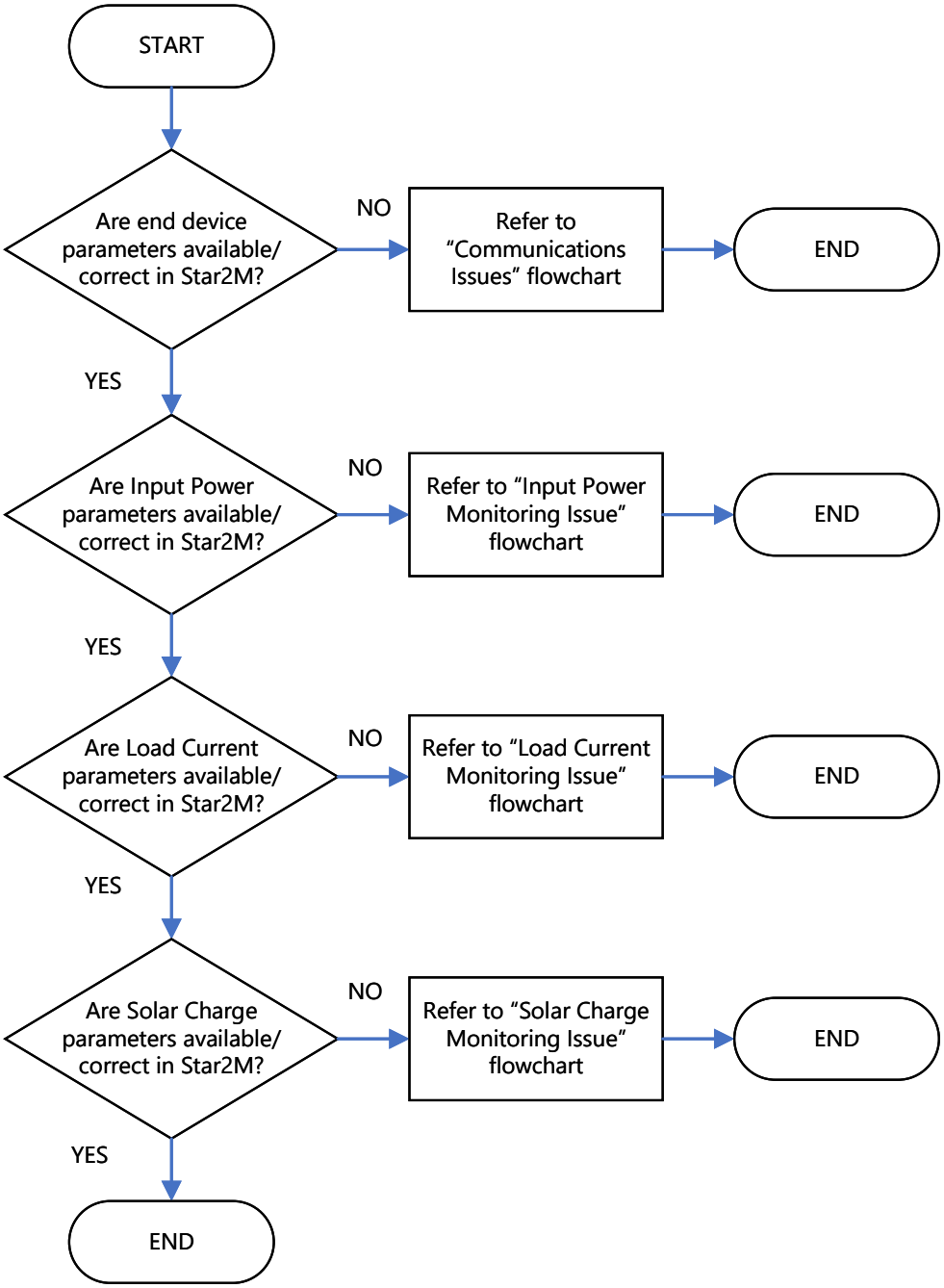
Refer to Sealite website at www.sealite.com.

11.0 Troubleshooting

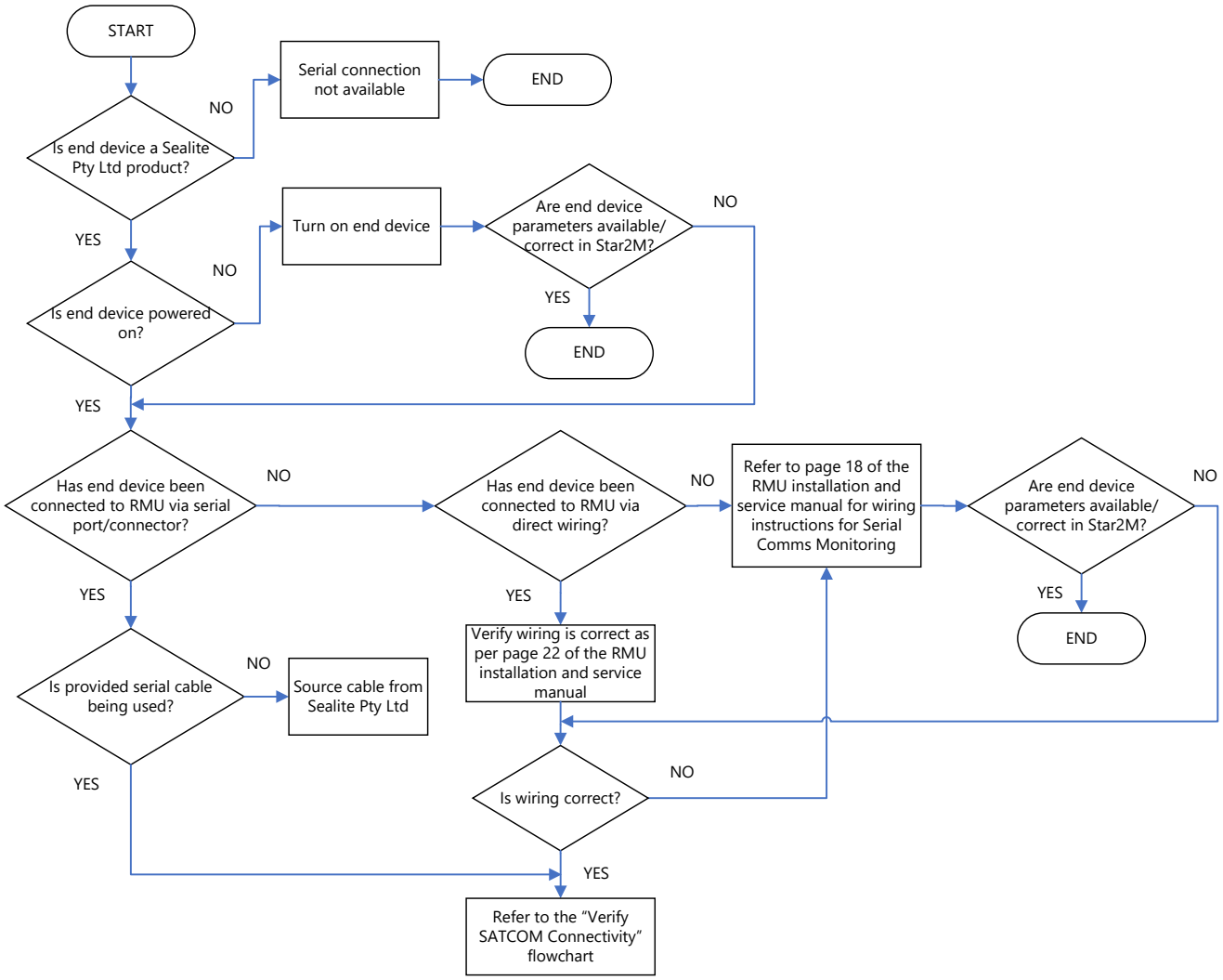
The RMU has been designed to require minimal maintenance and offer years of trouble-free service. However, in the occurrence of any faults or issues (the cause of which could be a number of factors) a series of flowcharts have been provided to guide you through a structured approach to identify and solve the problem as a preliminary step to contacting the Sealite technical services team.

***Note:** End device parameters are available only for activated units in Star2M.

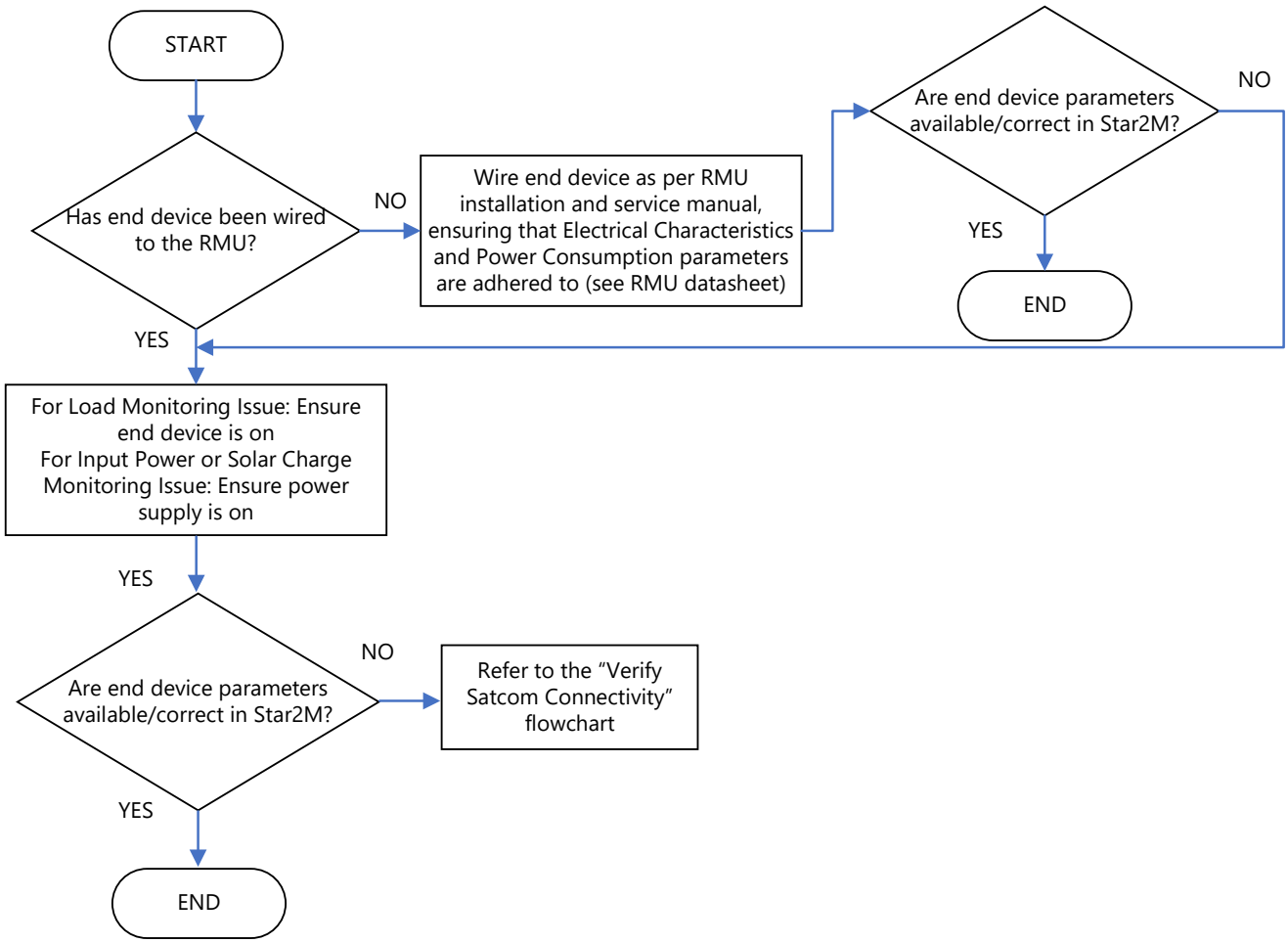
11.1 Identifying the problem



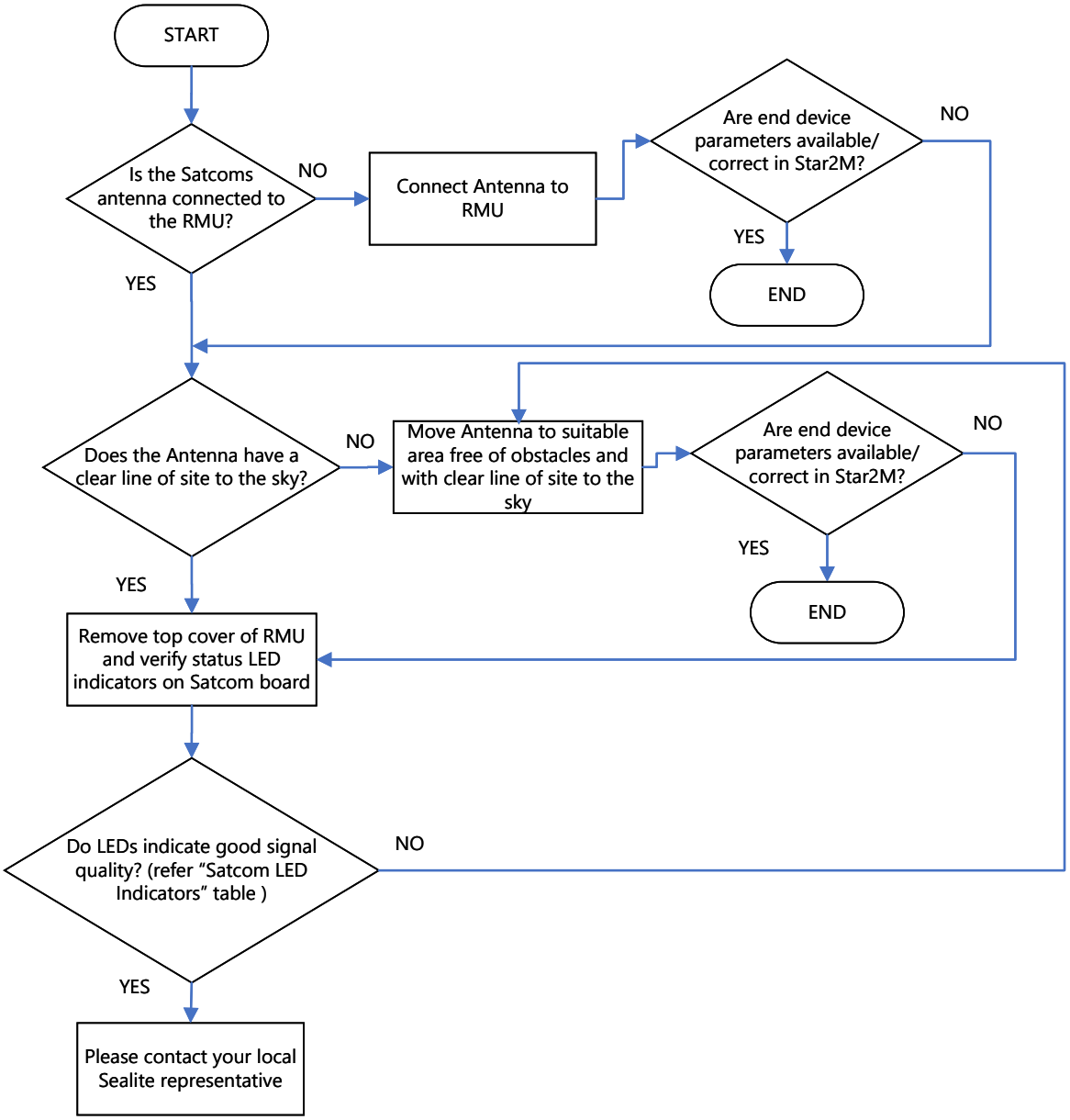
11.2 Communications Issues



11.3 Input Power, Solar Charge or Load Monitoring Issues



11.4 Verify SATCOM Connectivity



11.4 SATCOM LED Indicators

This page defines the meaning of the various flash patterns as displayed on the SATCOMs PCBs.

Green LED	Red LED	Yellow LED	Condition
-	Off	Slow	The firmware is powering up the SATCOM module.
-	Off	Fast	The firmware is checking the presence and operation of the SATCOM module.
Steady	Steady	Steady	The setup of the SATCOM module has failed. Check that the module is present. Reset the unit and try again. Note: The unit will automatically reset within 1 hour and try again.
	-	-	An error occurred with the SATCOM module during normal usage. The module will be put to sleep until the next wake cycle.
Slow	-	-	An SBD session is pending. This may be because: • Recent module power-up requires registering with the portal. • A ring alert has been received. • A reply or report message has been generated and should be sent to the gateway.
	-	-	The SATCOM module is awake with no pending SBD session.
Fast	-	-	A message is being processed.
-	Slow	Fast	A fault with the antenna has been detected. Check the antenna and connection.
	Slow	Off (No Signal) 1 Quick (Poor) 2 Quick (Low) 3 Quick (Good) 4 Quick (Max)	The SATCOM module setup is complete. The device is acquiring the network and awaiting better signal.
	Fast		The micro is exchanging message data with the SATCOM module.
	1 Quick		The signal is detected. The network is acquired with good signal quality.
	Steady		The network is ready. The device is attempting to exchange SBD data with the gateway.
1 Quick	Off	Off	The SATCOM module is asleep. SBD sessions completed successfully.
Slow	Off	Off	An SBD session failed to complete for a significant time (see section 3.6.1) and the SATCOM module has been put to sleep.

12.0 Notes

Contact Us!

Sealite's solutions are easy-to-install and scalable. We have a solution for every budget.

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