Installation Guide

Connect P

(Premium Series 6+18 Pin)

Document Revision 1.0.14

May 19, 2022

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DOCUMENT REVISION HISTORY

DOCUMENT REVISION	DATE	AUTHOR	CHANGES
1.0.1		David	INTERNAL
1.0.2		David	INTERNAL
1.0.3		David	INTERNAL
1.0.4		David	INTERNAL
1.0.5		David	INTERNAL
1.0.6		David	INTERNAL
1.0.7	Dec. 8, 2021	David	INTERNAL
1.0.8	Dec. 9, 2021	David	Content for Continental-MMS team. (This guide NOT delivered to customer.)
1.0.9	Dec. 14, 2021	David	Minor changes. Content for Continental-MMS. (This guide NOT delivered to customer.)
1.0.10	Jan 6, 2022	David	**Changed to generic Questar guide.** Includes Questar company name, logo and colors. Content improvements/additions.
1.0.11	Feb 3, 2022	David	Text/graphics improvements.
1.0.12	April 20, 2022	David	Minor text updates. Added DOCUMENT REVISION HISTORY table (page 2).
1.0.13	May 19, 2022	David	**PAGE 7** Power Supply 7-52VDC (max 1.5 amps) Backup Battery 1250mAmp Fuses (F1, F2, F3, F4) **PAGE 9** IP Rating (IP 42) PENDING Questar Catalog Numbers (updated) Molex Manufacturing Numbers (new)
1.0.14	May 19, 2022	David	Important text changes.

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1. Introduction

Message to Our Partners and Installers

Read this Guide

This guide contains descriptions, illustrations, warnings and technical notes that enable the safe and valid installation of Questar hardware units. All installers are required to read this guide thoroughly before performing any installations.

Authorized Installations ONLY

For the hardware to operate correctly, it must be installed according to our installation procedures by qualified and authorized installers. We make maximum efforts to provide accurate and detailed instructions. We also require that installers have strong automotive background, full knowledge of electrical/mechanical systems, and solid experience with the vehicle types on which they are installing our hardware.

Manufacturer Warranty for Vehicle

To ensure that the vehicle warranty remains fully valid – it is essential that all manufacturer instructions be followed for all wire harnesses and connections. If any questions arise, please contact Questar support.

Questar Disclaimer

Questar disclaims any liability for installations that are performed:

- With parts, methods or procedures not described in this guide.
- By non-authorized or non-qualified technicians.
- In contradiction to any manufacturer instructions.

Best Practices for Installation

Please help us go the “extra mile” in providing excellent service to our customers:

- Perform all tasks in a professional and responsible manner.
- Treat all customers with respect and courtesy.
- Make maximum efforts to arrive on time and finish on schedule.
- Coordinate any timetable changes with the Questar Service Center.
- Be sure to double-check your installation before leaving the installation site. Or better yet – have a second team member check your work.
- Contact Questar support if you have any questions.

General Installation Guidelines

Pre-Installation Safety Precautions

- Disconnect negative terminal of vehicle battery.
- Verify that ignition switch is turned OFF and start key is removed.

Electrical Inspection Warnings

- Use LED tester or voltmeter for any electrical checks.
- DO NOT USE an incandescent lamp for checking, as it may damage vehicle systems.

Unit Positioning Tips

- Attach the unit firmly in order to minimize vibration during vehicle operation.
- Position the unit to allow for technical service or disassembly (if needed).
- Distance the unit from any moving components and from any components that need to be disassembled during routine maintenance.
- Conceal the unit as much as possible, without leaving any projecting parts that might be easily bumped or damaged.

Wire Connection Practices

- Connect unit wires using soldering or crimping - and properly isolate unit wires using insulation tape or heat shrink insulation.
- Wherever possible, run unit wiring alongside existing wiring and use existing ducting and wire conduits. No drilling should be performed for the unit's wire connections.
- Use appropriate methods to isolate any unit wires that pass through or near metal surfaces. For example, if a unit wire passes through a hole, the hole requires a rubber grommet.
- Do not undo any "Twisted Pair" wire connections, except for small sections that connect to the CAN Bus.
- Ensure that wires are not exposed, rubbing together or creating tension.

Reception & Interference Issues

- To ensure optimal reception, it is essential that the unit be distanced from any metal, electrical or magnetic devices that might cause interference.
- When possible, mount the unit on a plastic or rubber surface and not on a metal surface. Installing directly on a metal surface may cause interference, and so it is preferable to distance the unit at least 10mm from any metal surface.
- It is important to install the unit in a location where there are no metal objects blocking skyward reception.

2. Technical Specification

Connect P Models (6+18 Pin)

- 2G (TRF 1010170)
- 4G CATM (TRF 1010177)
- 4G CAT1-EU (TRF 1010182)

Model	Modem	GSM/GPRS	GNSS
2G	Modem MC60	**GSM/GPRS** Quad-Band: 850/900/1800/1900MHz	**GNSS (MC60 Built-In)** Internal Antenna Internal SIM **SUPPORTING** GPS L1 Band Receiver (1575.42MHz) GLONASS L1 Band Receiver (1601.7MHz): C/A Code Galileo E1 Band Receiver (1575.42MHz): C/A Code BeiDou B1 Band Receiver (1561.098MHz): C/A Code QZSS L1 Band Receiver (1575.42MHz) **SENSITIVITY** Acquisition: -149dBm Tracking: -167dBm Reacquisition: -161dBm
4G CATM	Modem BG600		**GNSS L76** Internal Antenna **SUPPORTING** GPS, GLONASS, Galileo, BeiDou, QZSS **SENSITIVITY** Acquisition: -148dBm Tracking: -167dBm Reacquisition: -160dBm
4G CAT1-EU	Modem EG91-EU	**GSM/GPRS** LTE FDD B1/B3/B7/B8/B20/B28A	**GNSS L76** Internal Antenna **SUPPORTING** GPS, GLONASS, Galileo, BeiDou, QZSS **SENSITIVITY** Acquisition: -148dBm Tracking: -167dBm Reacquisition: -160dBm

Main Features	
Micro Controller	STM32F413VGT6
ROM	1024 KB
RAM	320 KB
AES	256 Bit
Serial Flash Size	8MB
EEPROM Size	64KB
Log Recorder	8MB internal flash
Firmware Updates	OTA (over-the-air)
Internal Sensors & Relays	
Internal Accelerometer + Gyro (IMU)	6 axis accelerometer
Internal Latch Relay	4A
External Sensors	
Temperature	Up to 5 external temperature sensors
Driver Identification	Dallas iButton, Keypad DMAS
Power	
Power Supply	7-52VDC (max 1.5 amps) Protection against over current, over voltage, temperature fluctuation and reverse polarity
Power Consumption	5mA sleep mode 50mA operational average at 24VDC
Backup Battery	Internal Li-Ion backup battery (1250mAmp) (up to 24 hours while sending position every 30 minutes)
Wakeup	Triggered by ignition, timer, driver identification, accelerometer, CAN Bus, Dallas, RS485, BLE, etc.
Fuses	F1 – One Wire PTC fuse: Hold Current 0.25A, Trip Current 0.5A F2 – Push Pull PTC fuse: Hold Current 0.25A, Trip Current 0.5A F3 – Open-Drain PTC fuse: Hold Current 0.25A, Trip Current 0.5A F4 – Power in PTC fuse: Hold Current 2A, Trip Current 3.5A
Physical Traits	
Dimensions	Length 11.1 cm, Width 6.4 cm, Height 2.6 cm
Weight	76 grams (without backup battery)
Temperature Range	Operational (-20°C to 60°C) Storage (-20°C to 85°C) OPTIONAL: Operational (-40°C to 65°C)

Wireless Communications (short range)	
Short Range RF	RF433 MHz (internal antenna) SUB 1GHz RF433 Supports multiple external sensors
WIFI (OPTIONAL)	Murata 802.11b/g/n (internal antenna)
Bluetooth (OPTIONAL)	Murata BLE 4.1 (internal antenna)
Wired Communications	
CAN Bus	FMS compatible CAN Bus interface (x2) J1939 support up to 1 Mbps ISO-15765 (OBDII) with termination option OPTIONAL: CAN FD up to 8Mbps
RS485/J1708	RS485 interface compatible with J1708 (with termination option by DIP switch)
RS232	RS232 interface supporting up to 115,200Kbps max (RX/TX only)
1-Wire	Dallas bus supporting multiple 1-Wire devices (Dallas, iButton, Keypad, DMAS, sensors, etc.)
Input/Output	
Switched Negative Output	Open drain output with 450mA max
Switched Positive Output	Push-pull 7-42VDC output with 450mA Max
Analog Inputs (x3)	Three analog inputs are available with pull-up or pull-down configuration. Factory selectable resolution (up to 12bit) and range (up to 42VDC)
Ignition	Ignition analog + digital input OPTIONAL: Device wakeup from low power mode by ignition signal
Vehicle Battery	Internal analog battery measurement input 10Amp/h OPTIONAL: 20Amp/h

Certification

Certification		
EMC (Europe)	EN 301 489-1/3/17/19/52 UN ECE R10 (2G/4G) UN ECE R10 E-Mark (2G/4G)	**PENDING** **PENDING** **PENDING**
Radio (Europe)	EN 300 200-1/2 EN 300 328 EN 301 511 EN 303 413 EN 310 908-13	**PENDING** **PENDING** **PASSED** **PASSED** **PASSED**
EMC (USA)	FCC Part 15 Subpart B (2G/4G)	**PASSED**
Radio (USA)	FCC Part 15 Subpart C	**PENDING**
Safety	EN 62368-1 (Europe) IEC 62368-1 (International) UL/CSA 62368-1 (USA/CAN)	**PASSED** **PASSED** **PASSED**
IP Rating	IP 42	**PENDING**

Questar Catalog Numbers

#	Item	Questar C/N	Description
1	FMS Harness	8086303	
2	DTCO Harness	8086306	
3	CAN Harness	8086305	
4	9 Pin Splitter Harness	8086304	
5	OBD Harness	8086307	
6	Connect P Filter Harness	8086308	
7	Connect P Unit (2G modem)	1010170	
8	Connect P Unit (4G modem)	1010177	
9	Connect P Bracket	1020008	

Molex Manufacturing Numbers

In case of self-harness production, the end point connectors can be ordered directly from Molex. (These connectors are not supplied by Questar.)

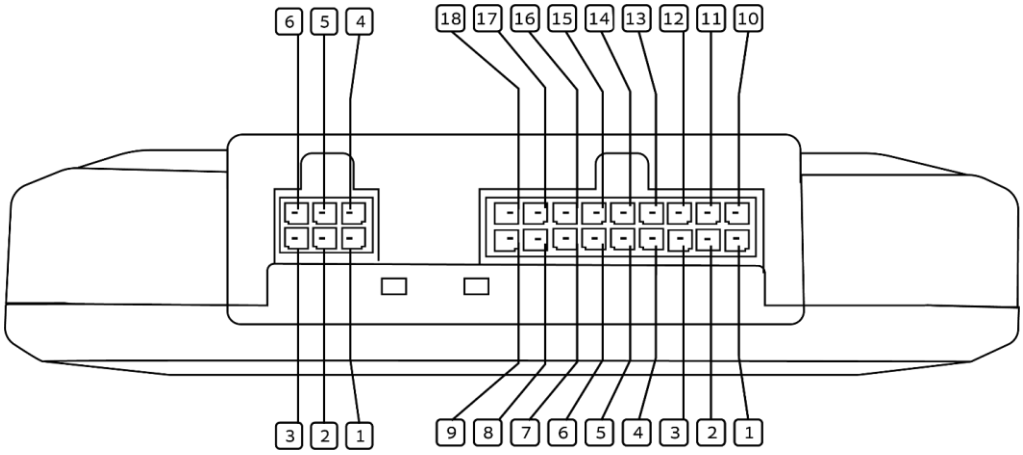
Category	Molex M/N	Description
Micro-Fit Connector System	43025-1800	Micro-Fit 3.0 Receptable Housing, Dual Row, 18 Circuits
Micro-Fit Connector System	43025-0600	Micro-Fit 3.0 Receptable Housing, Dual Row, 6 Circuits
Micro-Fit Connector System	43030-0001	Micro-Fit 3.0 Crimp Terminal

3. Cable Connections

Cable with Two Connectors

The **Connect P** cable attaches to the unit by means of two connectors:

- J4 (6 pin)
- J8 (18 pin)



J4 Pin Diagram (6-Pin) 3x2 Micro Fit

PIN	SIGNAL	DESCRIPTION	WIRE COLOR IN HARNESS
1	(+)	Main power for unit	Red
2	IGN	Ignition sense input / analog input	Green
3	Analog IN3	Analog input #3 with pullup options	Orange
4	CAN 0 High	Read-write by default	Orange / White
5	CAN 0 Low	Read-write by default	Yellow / White
6	(-)	Battery negative (GND)	Black

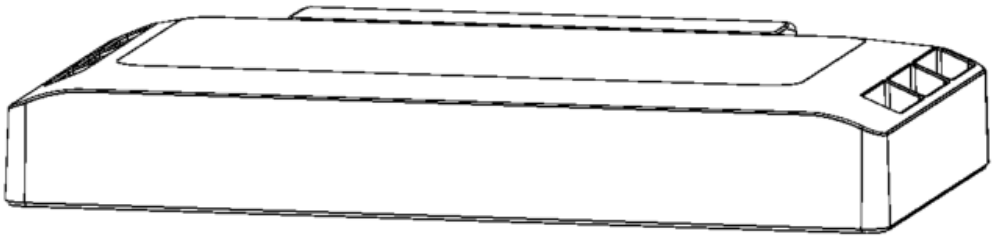
J8 Pin Diagram (18-Pin) 9x2 Micro-Fit

PIN	SIGNAL	DESCRIPTION	WIRE COLOR IN HARNESS
1	RS232 RX	RS232 data in	Light Blue
2	CAN 1 High	Read-write by default	Orange / Black
3	RS485 B	Read-write by default	Yellow / Purple
4	Dallas Bus (1-Wire)	Dallas, iButton, Keypad, DMAS, sensors	Gray
5	OUT 1	Push/Pull 450mA output	White
6	Analog IN 1	Analog input 1 with pullup option	White
7	CAN Bus 3 FD Low (OPTIONAL)	Read-write by default	Orange / Green
8	OUT 2	Open drain 450mA output	White
9	Relay Latch NO	Relay Latch Normally Open	Black
10	RS232 TX	RS232 data out	Pink
11	CAN 1 Low	Read-write by default	Yellow / Black
12	RS485 A	Read-write by default	Orange / Purple
13	Keypad / Buzzer +	Power output for keypad/buzzer (200mA)	Red
14	GND	Outward ground for unit	Black
15	Analog IN 2	Analog input 2 with pullup option	White / Green
16	CAN Bus 3 FD High (OPTIONAL)	Read-write by default	Yellow / Green
17	Relay Latch NC	Relay Latch Normally Close	Black
18	Relay Latch COM	Relay Latch Common	Black

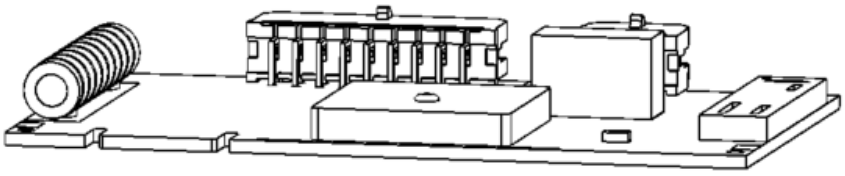
4. Overview of Unit Components

The unit consists of three main components, as shown below.

- Upper Enclosure (plastic only)
- PCB (snaps into lower enclosure)
- Lower Enclosure (contains battery)



Upper Enclosure



PCB

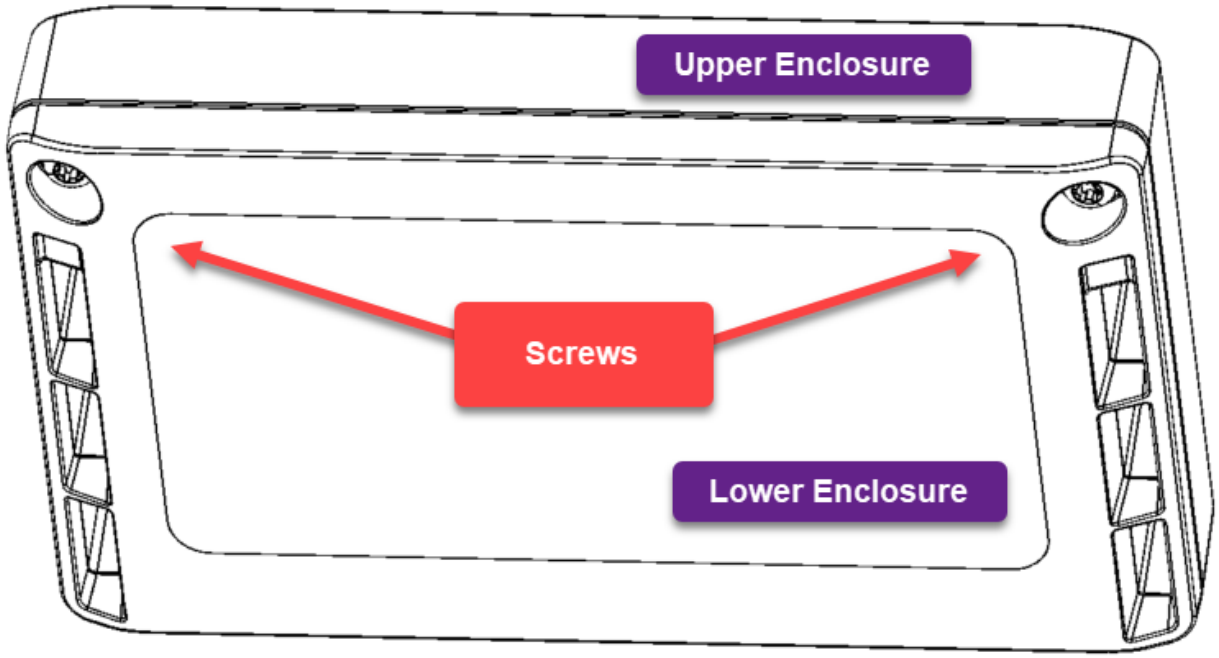
Lower Enclosure

5. Opening Unit

Follow these steps to open the unit.

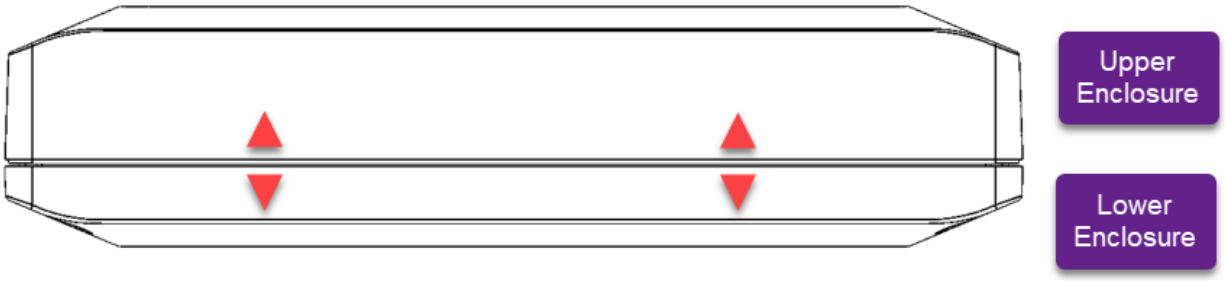
STEP A: Remove Two Screws from Lower Enclosure

Remove the two screws to separate the upper and lower enclosures.

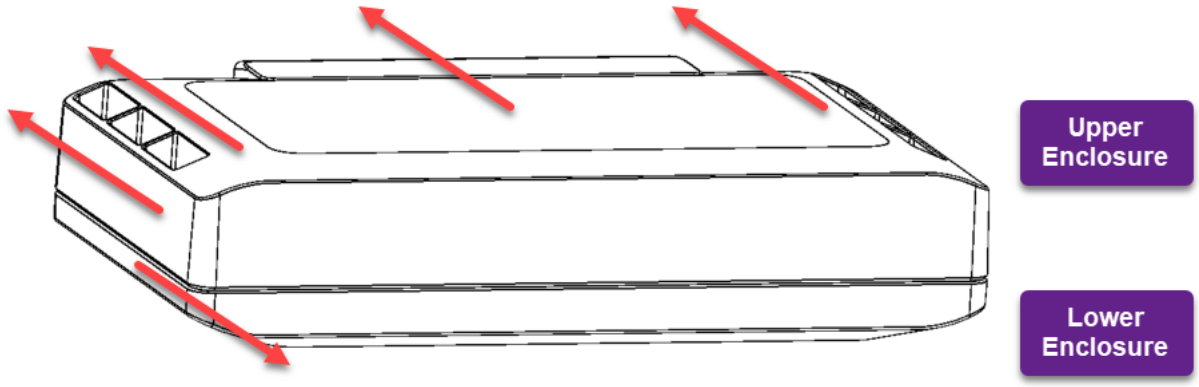


STEP B: Slide Upper Enclosure out of Lower Enclosure

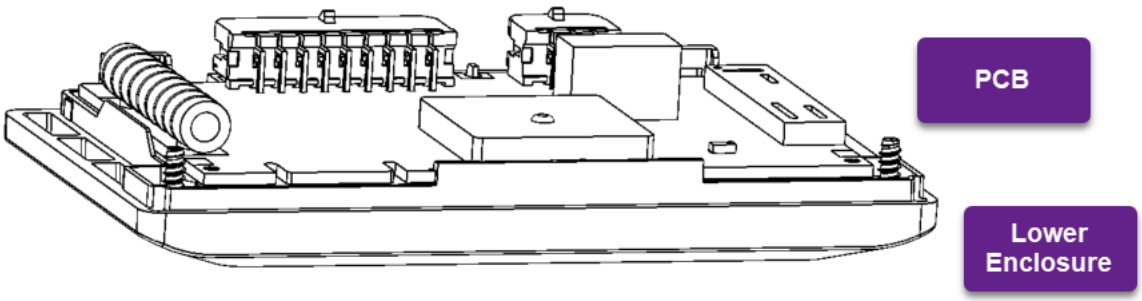
Separate upper/lower enclosures by about 8-10 millimeters.



Slide the upper enclosure backwards (about 4-6 millimeters) to snap it out of place.

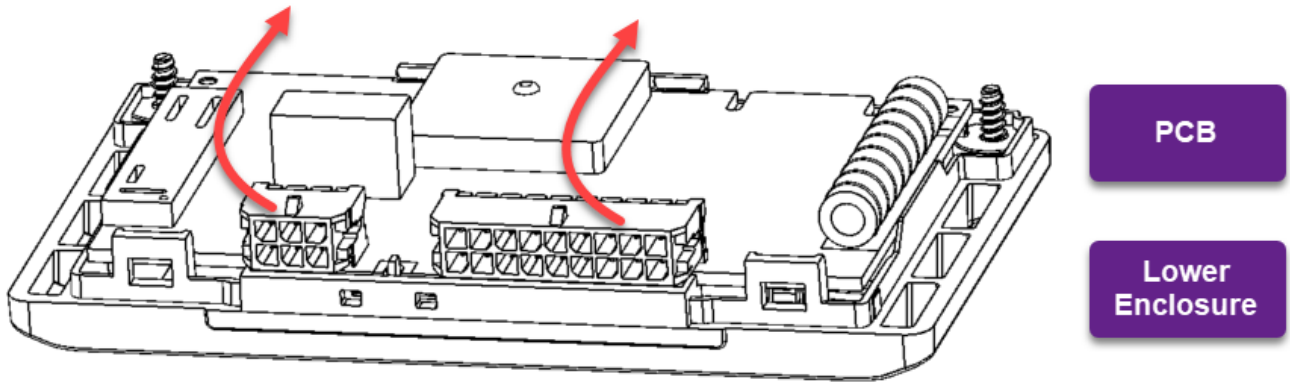


Remove the upper enclosure from the lower enclosure (to view PCB).

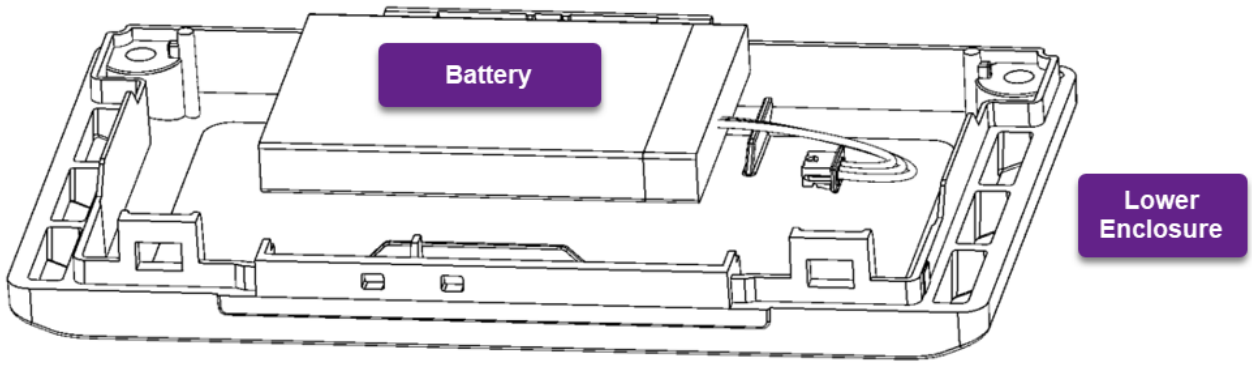


STEP C: Remove PCB from Lower Enclosure

Gently swivel PCB upwards (about 30-40 degrees).



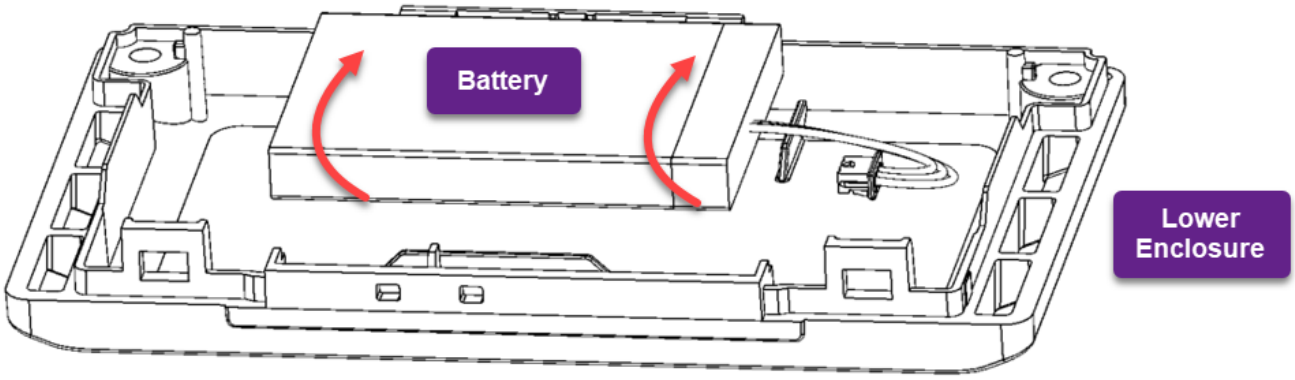
Remove PCB from lower enclosure (to access battery in lower enclosure).



6. Replacing Backup Battery in Unit

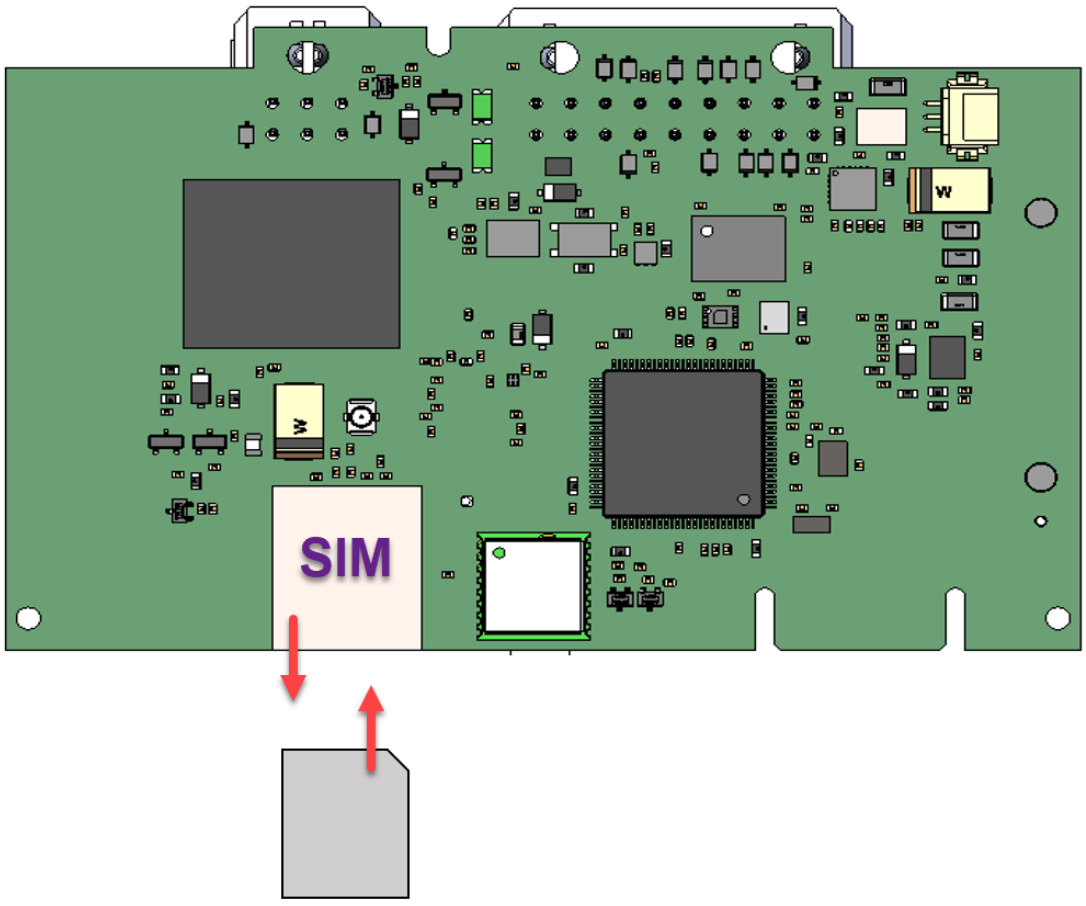
To replace an existing battery:

- Detach battery cable.
- Gently pull off the existing battery.
- Attach new battery with double-stick tape.
- Attach battery cable to the micro-connector on the lower side of the PCB.



7. Replacing SIM in Unit

To replace an existing SIM, pull it from the SIM slot on the PCB, and then insert the new SIM.

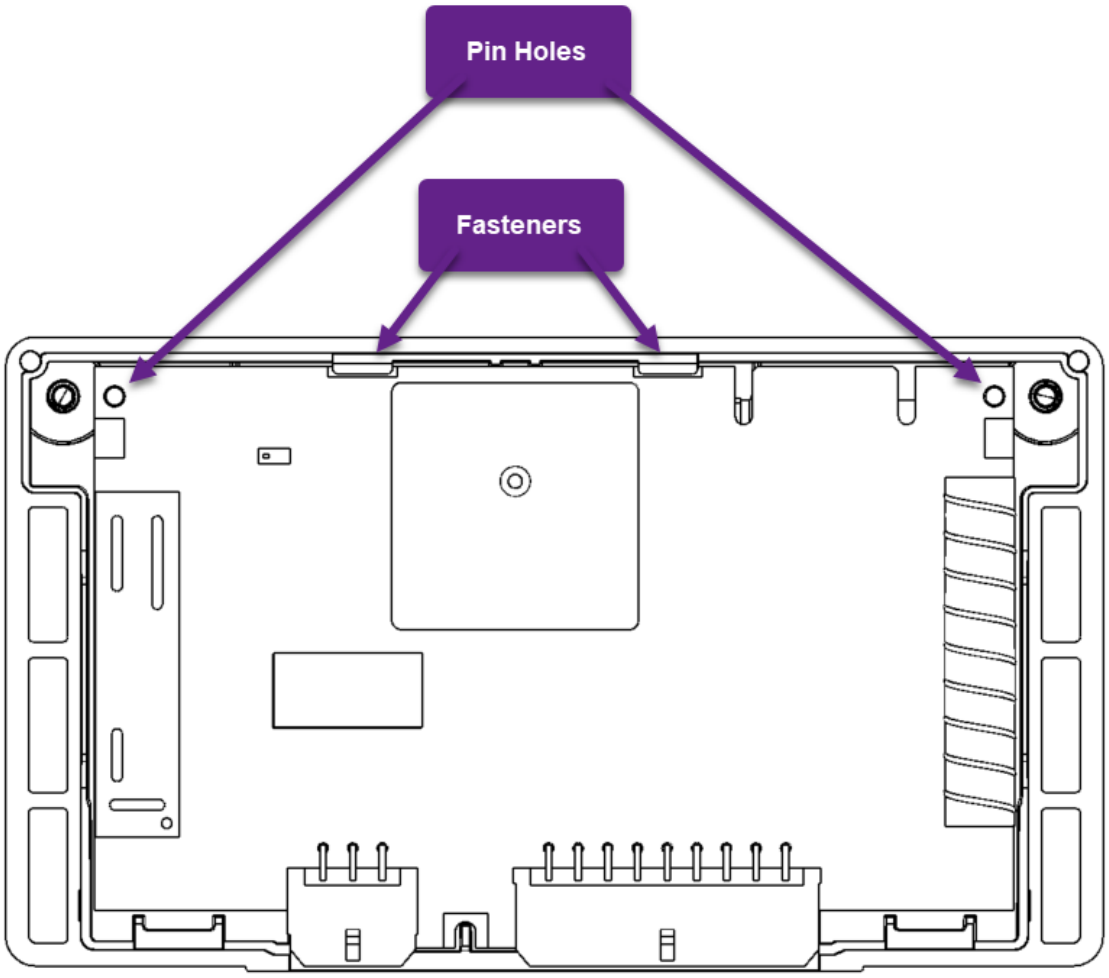


8. Closing Unit

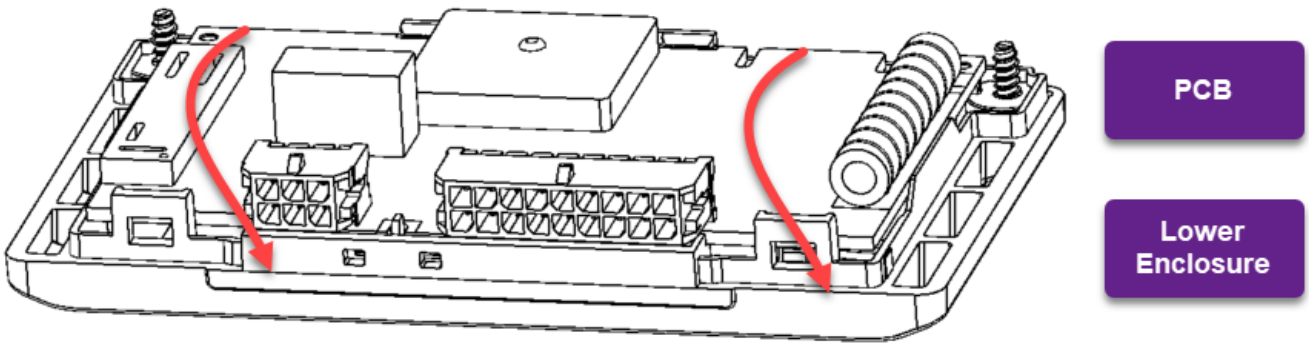
Follow these steps to close the unit.

STEP A: Insert PCB into Lower Enclosure

Place the PCB edge at a 30-40 degree angle under the two plastic fasteners, while aligning the two plastic stubs over the pin holes.

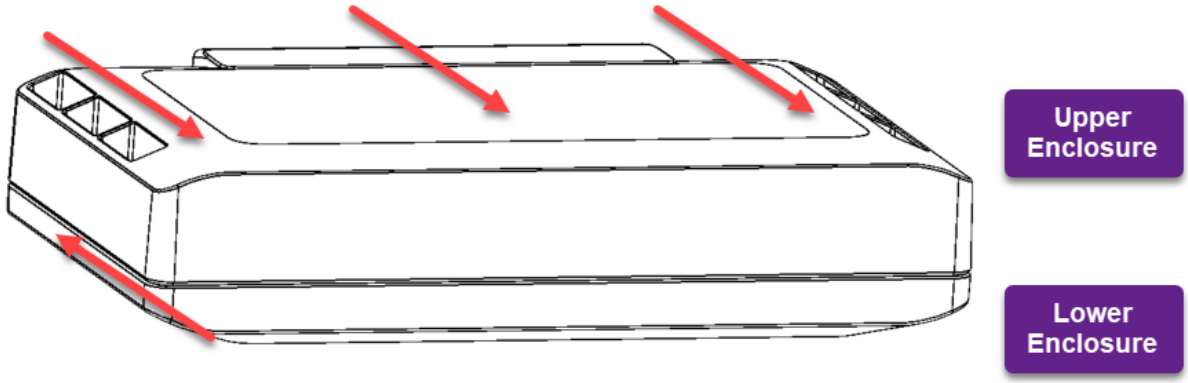


Swivel the PCB down into lower enclosure.

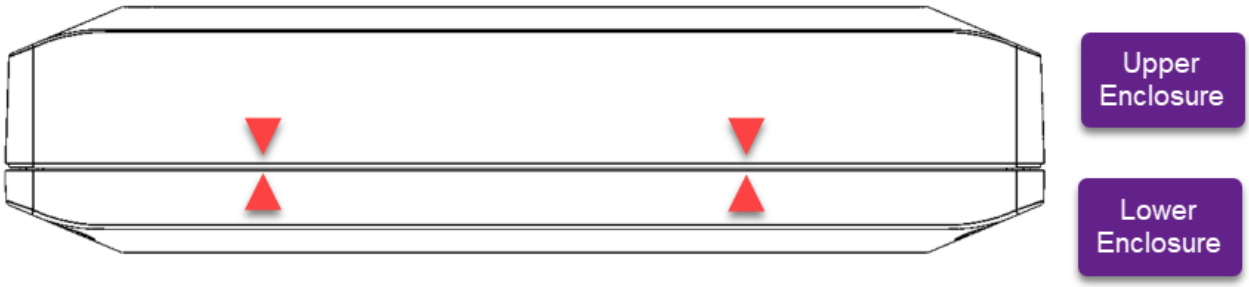


STEP B: Slide Upper Enclosure into Lower Enclosure

Slide upper enclosure into lower encloser.

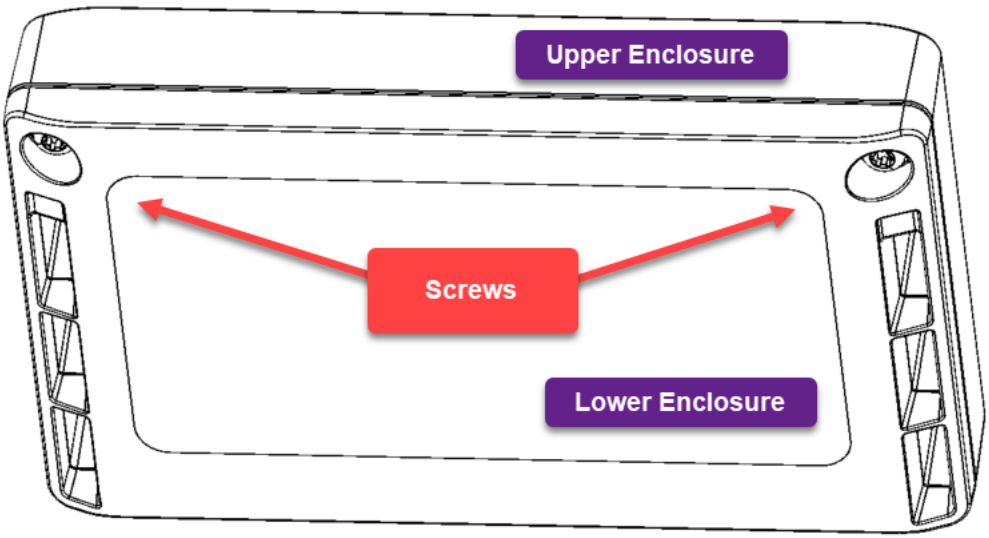


Close upper/lower enclosures.



STEP C: Insert Two Screws in Lower Enclosure

Insert two screws to fasten together upper/lower enclosures.



9. Mounting Unit on Vehicle

There are two methods for mounting the **Connect P** unit.

- Mount with Tie Strips
- Mount with Bracket

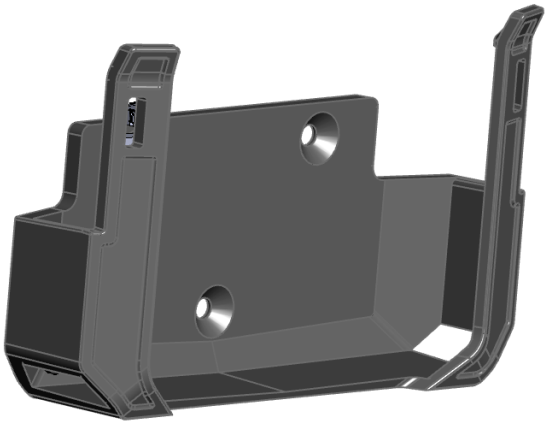
Mount Unit with Tie Strips

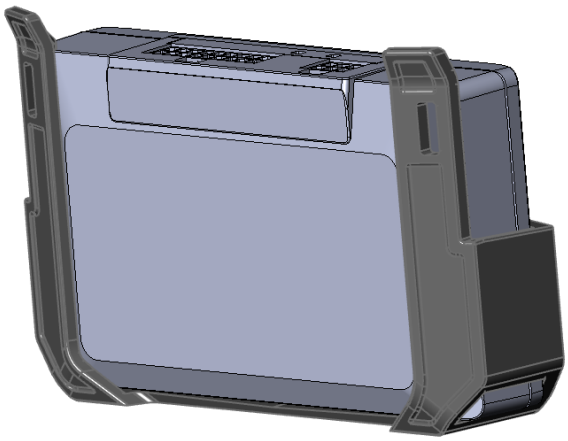
The **Connect P** ships with plastic tie strips for strapping the unit to the vehicle.

- Tie strips are useful in cases where you need to get started quickly (before permanent installation).
- Tie strips are also useful in cases where drilling is not possible.

Mount Unit with Bracket

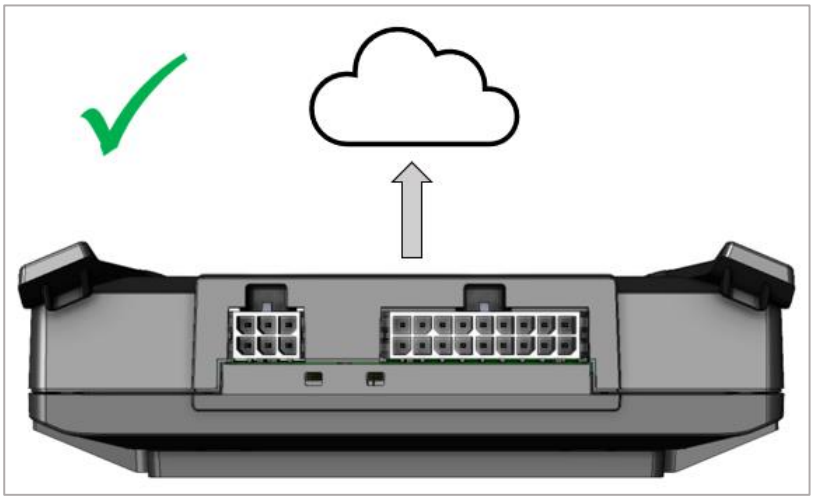
First attach the bracket to the vehicle. Then just slide in the unit.

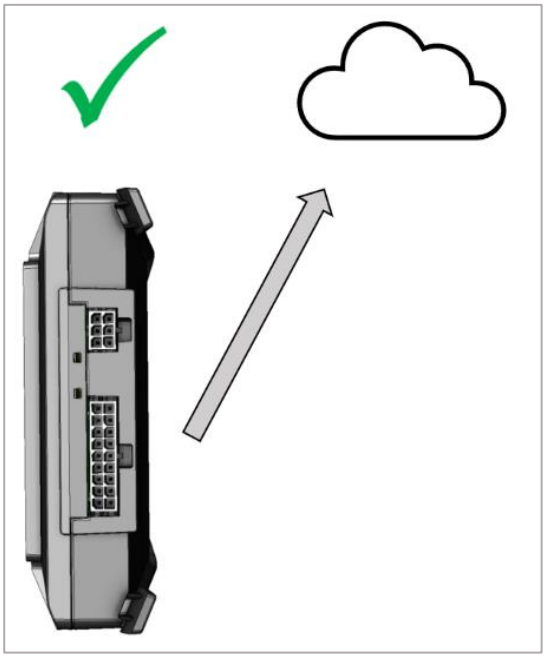


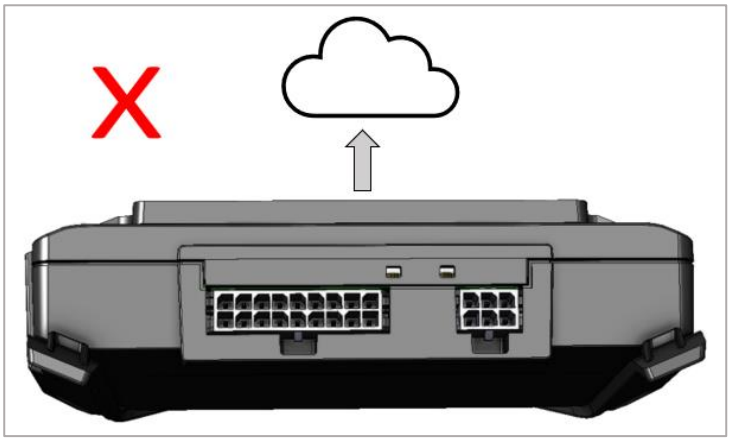


Position Unit Facing Skyward

For best reception, be sure to mount unit with the upper enclosure fully (or partially) facing skywards.







10. Connecting Unit for Operations

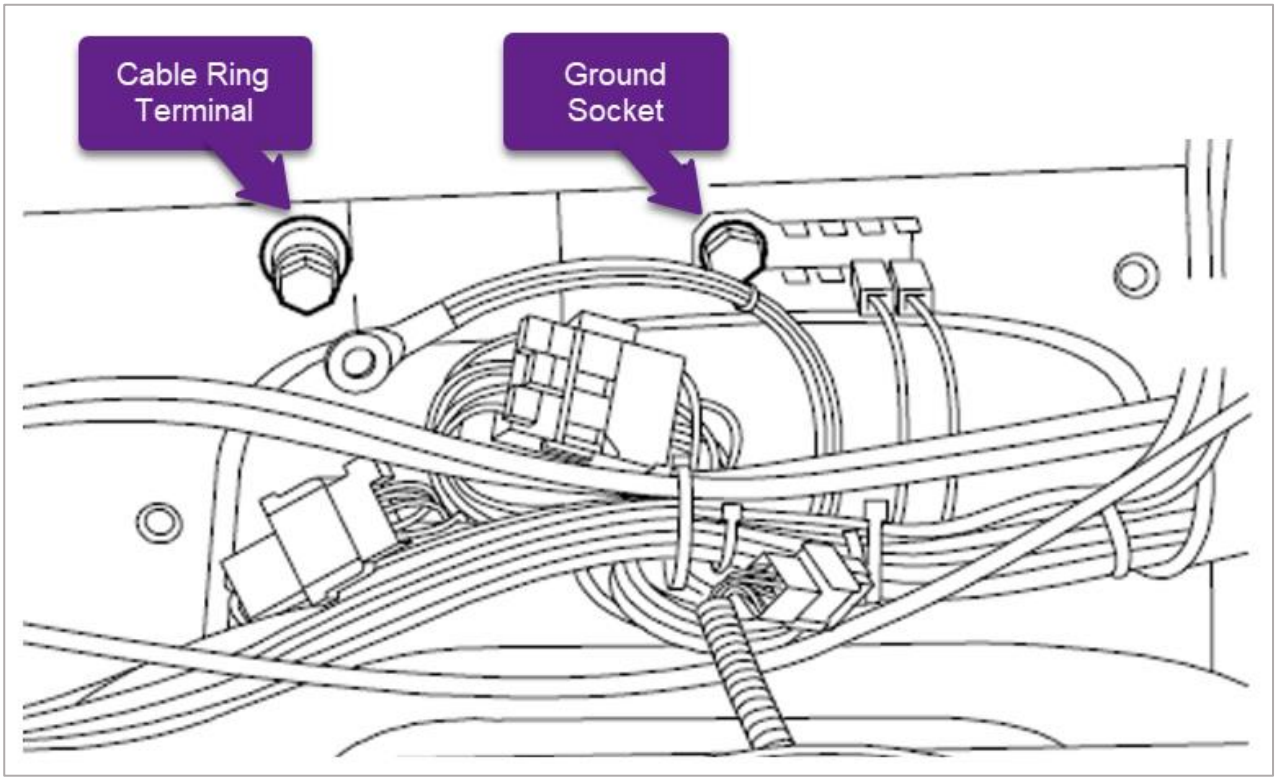
Connect Unit to Ground

There are several options for connecting the unit ground (black wire in harness):

OPTION 1
Attach GND directly to the metal body of the vehicle.

OPTION 2
Attach GND to a cable ring terminal (see example below).

OPTION 3
Attach GND to a ground socket (see example below).



⚠	Connecting or soldering the unit to another ground wire is prohibited.

Connect Unit to Power

The **red wire** in the unit harness is used to receive constant power from the vehicle. The **red wire** needs to be connected to a main power socket (+30) at the vehicle fuse box.

If no power socket is available at the vehicle fuse box, another solution is to solder the **red wire** to the main power cable of the vehicle. Be sure to use isolate tape or shrink crimp for correct isolation.

Connect Unit to Ignition

The **green wire** in the unit harness is used to receive ignition power from the vehicle. The **green wire** needs to be connected to an ignition socket (+15) behind the ignition switch.

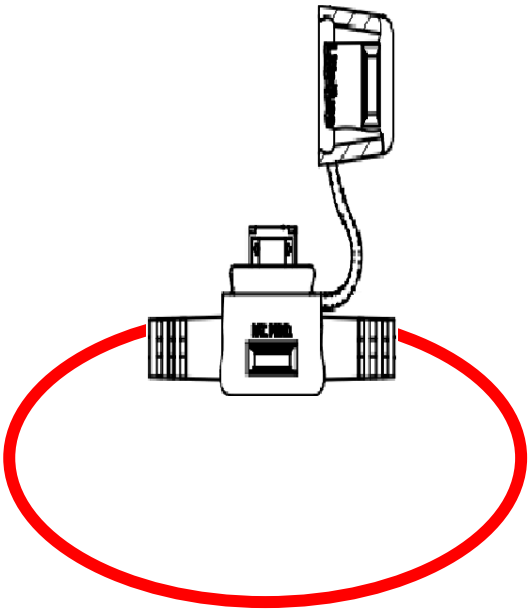
If no ignition socket is available, another solution is to solder the **green wire** to the main ignition cable (+15) of the vehicle. Be sure to use isolate tape or shrink crimp for correct isolation.

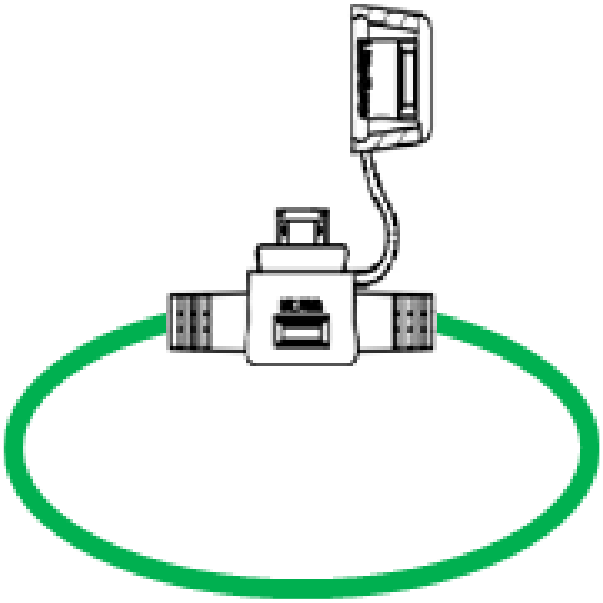
Connect Safety Fuses

The installation kit includes two safety fuses for isolating the main power line and the main ignition line from the unit. These fuses can be installed by soldering. Be sure the fuses are in safe and accessible locations - in case they need to be replaced.

If a fuse burns out, you must disconnect the **Connect P** unit before replacing the fuse.

⚠	The fuses must be installed before turning on the vehicle.

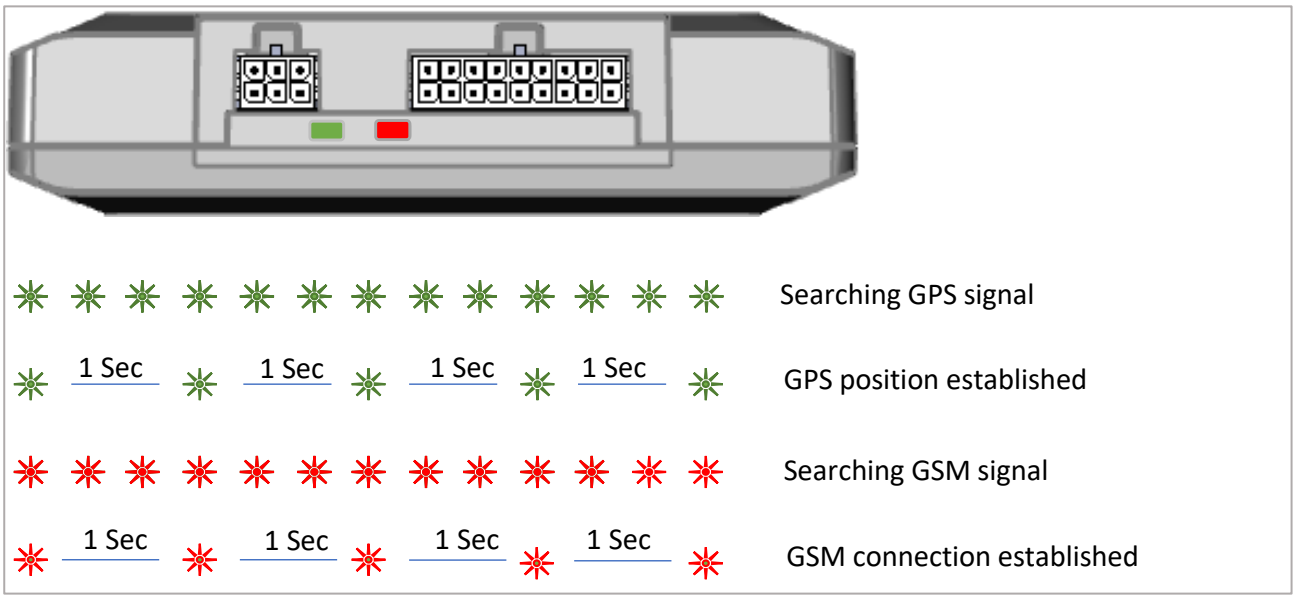




11. Troubleshooting with LED Indicators

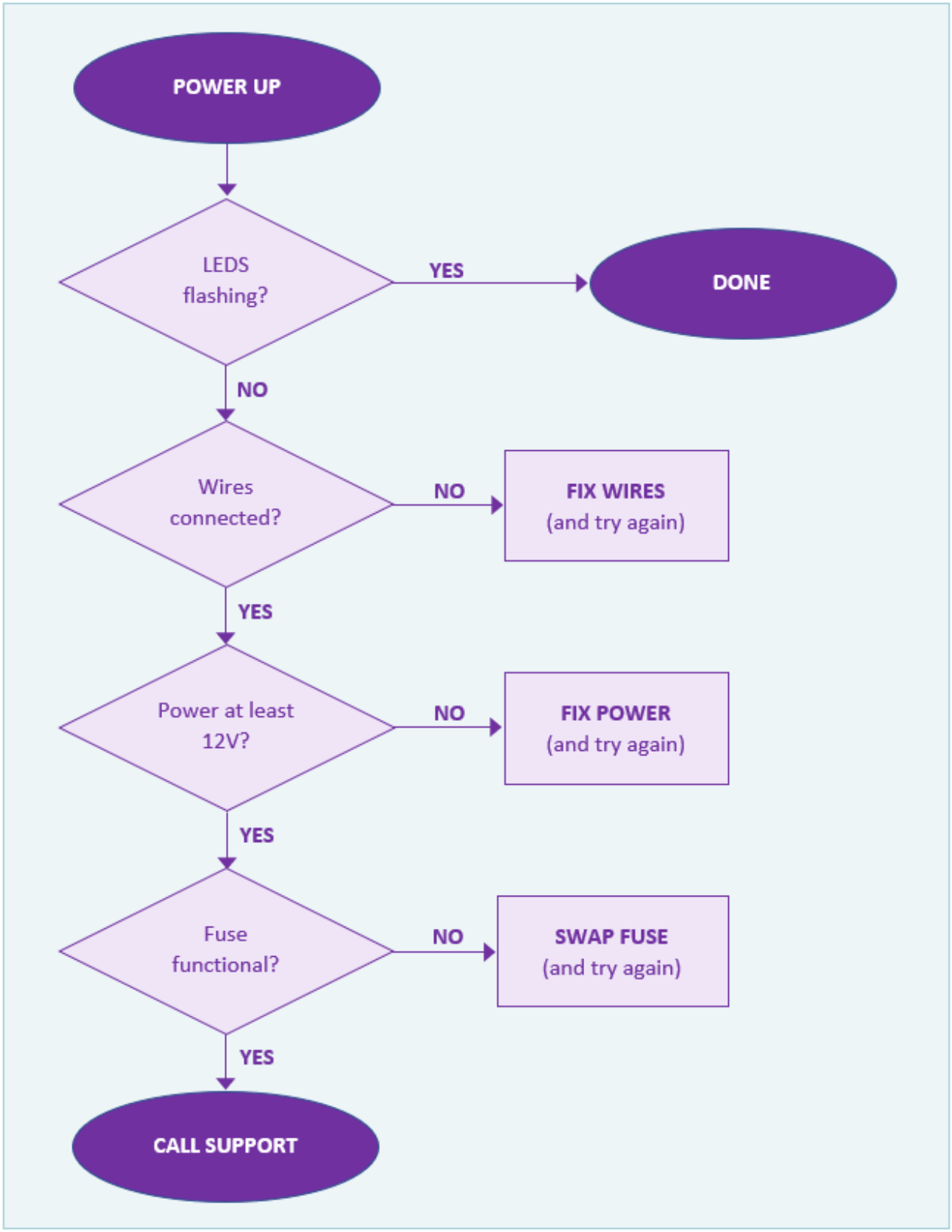
View LED Status

The **Connect P** includes two LEDs for observing GPS/GSM status, as shown below.



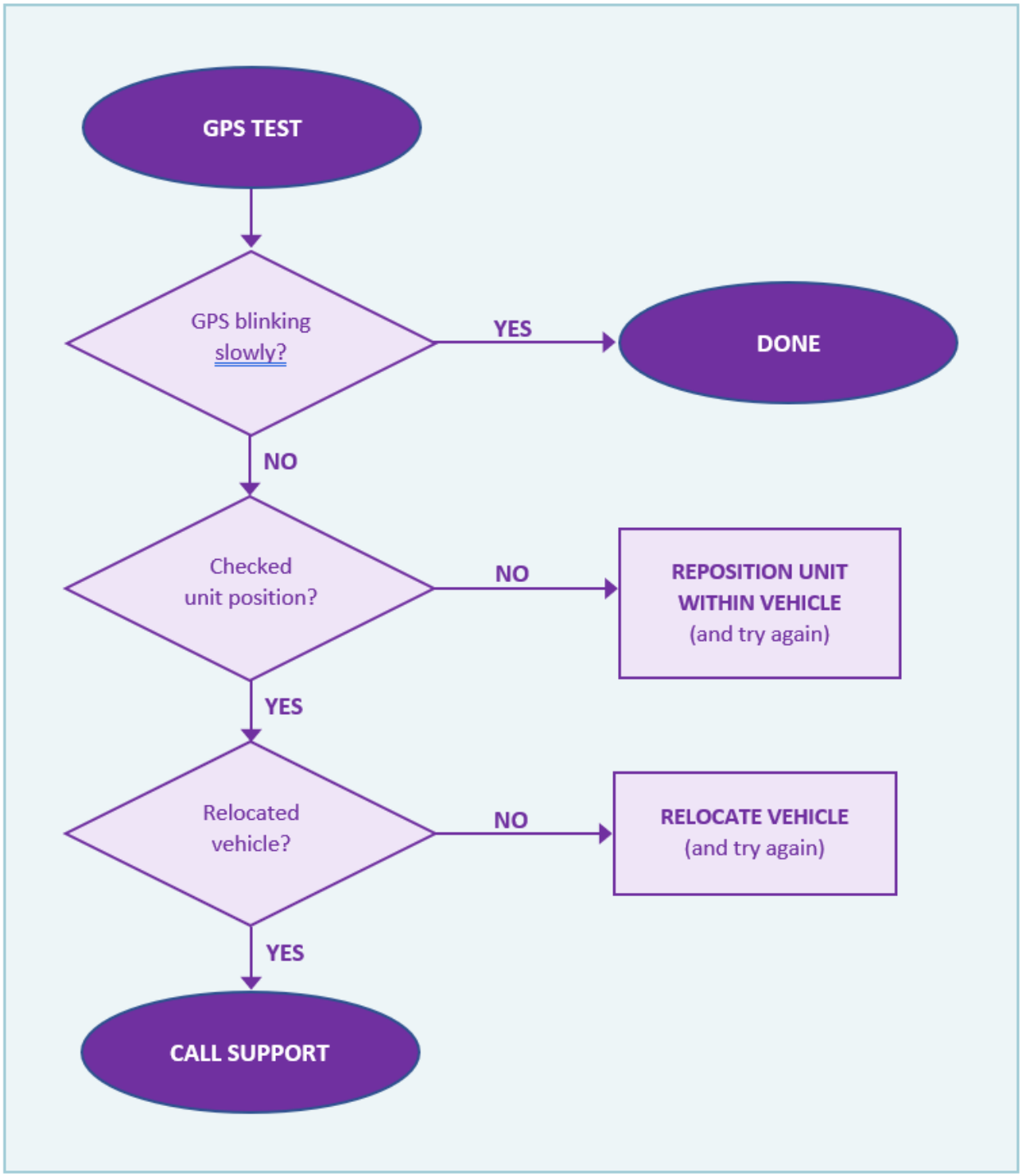
Troubleshoot Inactive LEDs

When installation is complete, you should see the two LEDs flashing rapidly. If the two LEDs are inactive, use this flowchart for troubleshooting.



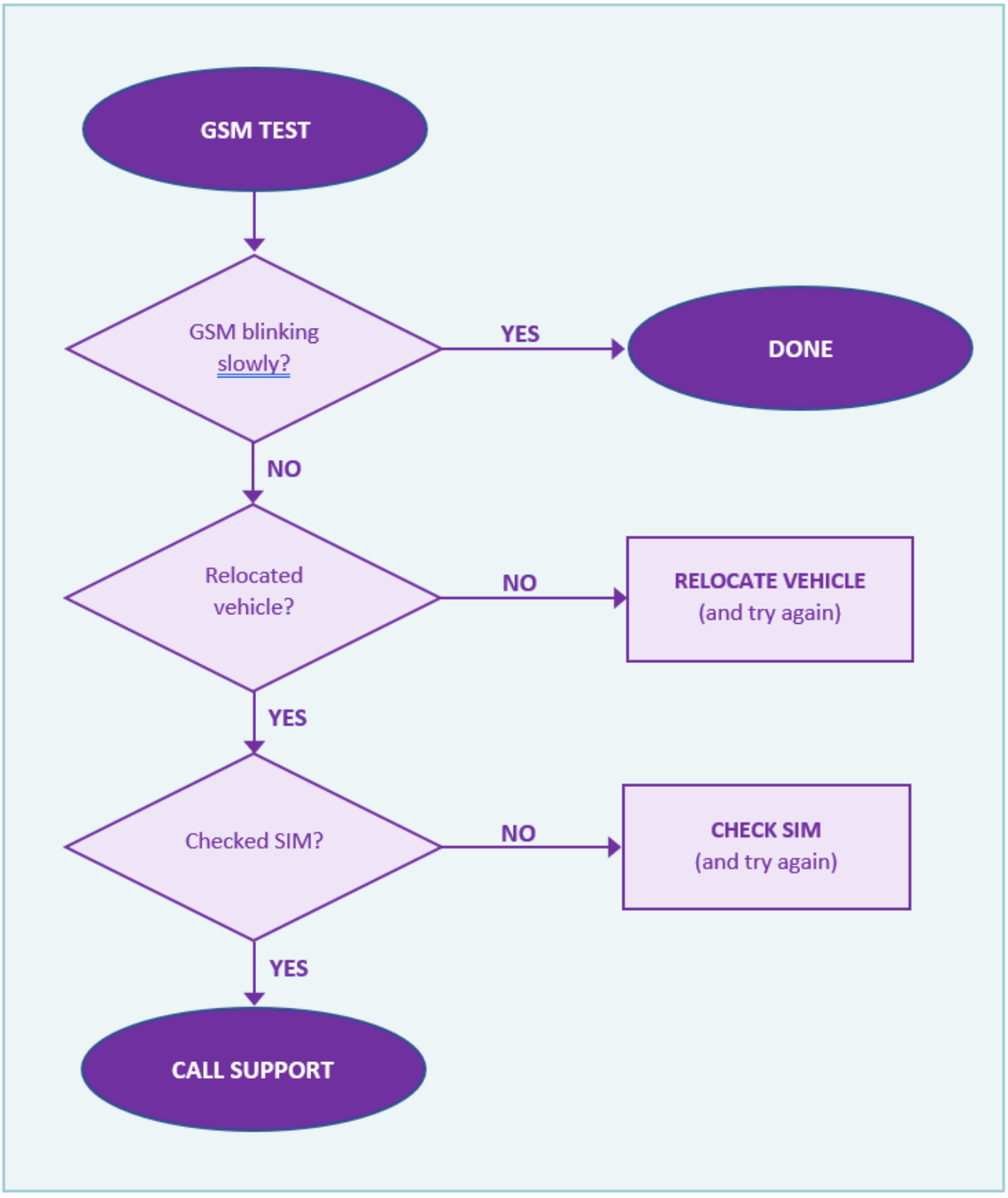
Troubleshoot GPS LED (green)

If the **GPS LED (green)** is flashing rapidly, it should change to a slow blink within 10 minutes. If it continues to flash rapidly, use this flowchart for troubleshooting.



Troubleshoot GSM LED (red)

If the **GSM LED (red)** is flashing rapidly, it should change to a slow blink within 10 minutes. If it continues to flash rapidly, use this flowchart for troubleshooting.



12. Verifying Your Installation

To verify your installation, follow these instructions.

Inspect Hardware

Perform the following hardware checks:

- Unit and wires are fixed and stable.
- Any excess cabling is rolled up and secured with cable ties.
- All connections are properly soldered or crimped - and are properly insulated with electrical tape or heat shrink isolation.
- No warning indicator lights are lit on the vehicle dashboard.

Check Communications

Call the Questar Service Center and perform the following tests:

- Vehicle is located correctly on the map, with the vehicle ignition turned on (and then turned off).
- Diagnostic data is being transmitted correctly.
- Fill in the “installation from” and send to Questar Service Center.

Perform Cleanup

- Collect any leftover materials from the vehicle and from the surroundings.

Submit Form

- Fill in the “installation form” and send to Questar Service Center.