



# **StarLink Tracker SF iRF**

## **Installation Manual**

**2G/GPRS, 3G and 4G LTE CAT4 models**

Release 4.2

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# Table of Contents

<b>GENERAL INFORMATION .....</b>	<b>2</b>
1 SAFETY INSTRUCTIONS.....	2
2 GENERAL INSTALLATION INSTRUCTIONS .....	2
<b>PRODUCT DETAILS .....</b>	<b>4</b>
3 DESCRIPTION .....	4
4 KEY FEATURES.....	4
5 TECHNICAL SPECIFICATIONS .....	5
<b>INSTALLATION PROCEDURE .....</b>	<b>7</b>
6 INSTALLING STARLINK DEVICES .....	7
6.1 I/O Ports Specification .....	7
6.2 Configuring the device per vehicle type .....	9
6.3 SIM card insertion .....	9
6.4 Positioning StarLink Devices in the vehicle .....	10
7 CONFIGURATION.....	12
7.1 Connect to a PC .....	12
7.2 Configuring and Setting StarLink Functions .....	15
8 TROUBLESHOOTING.....	15
8.1 LED lights for diagnostics .....	15
8.1.1 Green LED blink patterns: .....	16
8.1.2 Red LED blink patterns: .....	16
<b>ERM CONTACT INFORMATION .....</b>	<b>16</b>

## FCC Warning

This device complies with 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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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. 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.

## Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

## GENERAL INFORMATION

### 1 SAFETY INSTRUCTIONS

Personal safety is of paramount importance. Please follow all safety instructions when installing ERM products:

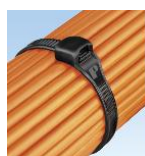
- Always disconnect power when performing installation by removing the negative connection of the vehicle battery. Never work when power is connected.
- Always connect the positive wire using a 3A fuse.
- Reconnect the battery only after the installation is fully completed, making sure all wires are safely insulated.
- Use appropriate work tools.
- Maintain good ventilation and lighting in the work area.
- Never leave bared wires. Trim all wires not in use in such a way that no bare conductors remain, and fix them securely in place.
- For none IP rating products perform installation in a dry environment.
- Install ERM devices away from any heat sources.
- Do not install ERM devices in the engine compartment or on the vehicle's exterior.
- Install ERM devices away from large metallic bodies and never install them in small gaps between metallic objects.

### 2 GENERAL INSTALLATION INSTRUCTIONS

- Install the device with the THIS SIDE UP label facing upwards.



- Make sure no metal objects obstruct the device.
- Use cable ties to hold wires in place and create tidy wire bundles.



- Double-sided adhesive stickers could be used for securing the device in its selected location.



- Instructions for soldering wires:
- Strip the ends of the wires to be soldered together.
- Slide an appropriate length of heat-shrink insulation tubing on to one of the wires.



- Solder the wires.



- Slide the heat-shrink insulation over the solder joint.



- Use a heater-gun to heat the insulation. The insulation shrinks until it sits snugly on the solder joint.



- Tie the wire with a cable tie in such a way as to relieve stress from the new solder joint

## PRODUCT DETAILS

### 3 Description

StarLink Tracker SF iRF is a tracking device with multiple dedicated functions and features.

The device includes several I/O ports to monitor vehicle data and triggers, external Add-Ons and Accessories. It uses cellular communication to communicate with a cloud server, and several location technologies to determine its exact location. The location and any additional data collected by the device, is transmitted to the cloud server over cellular data communication in pre-defined frequencies.

StarLink technology is using ERM's proprietary dynamic protocol which enables control over thousands of parameters reflecting the device and its Add-Ons and accessories functionality. These parameters can be OTA remotely updated by SMS or cellular data communication.



Bottom view



Top view

### 4 Key Features

StarLink Tracker SF iRF comes with the following key features:

- 2G or 3G or 4GLTE CAT4 Modem
- Highly configurable functionality
- GPS/GLONASS 99 channels location module
- Embedded Cellular and GPS antennas
- Comprehensive I/O, input and output ports
- Dedicated single wire com port, enabling the use of ERM's wide range of accessories
- GPRS and/or Text alerts
- Self-tracking mode
- Enhanced battery management
- Reduced size for quick and easy installation
- Home/Roaming management
- Geo-Fence management and alert
- Remote immobilizing capabilities

- Configurable speed alert
- Immobilizer output
- Panic button support
- OLP (Output Logic Programming) for complex output signal generation
- Cellular jamming detection
- Firmware & configuration update Over-The-Air (OTA)
- Remote Safety engine-kill function (using eCut immobilizing system or relay)
- Vehicle battery diagnostic: charge, voltage and life (i.e.: SoH)
- Vehicle starter diagnostic: start time and grading
- Built-in data logger: 10,000 records (up to 20,000 optional)
- Driver ID: internal management of up to 500 drivers
- Full scale driving behavior reports
- 20 predefined maneuver types auto identification in 3 levels: Normal, Aggressive, Dangerous
- External visual and audio alerting system
- Internal backup battery

## 5 Technical Specifications

<b>Cellular</b>	4GLTE CAT4, Bands: 1,2,3,4,5,7,8,28 + Optimized antenna
<b>Location</b>	99 channels, GPS/GLONASS, Active antenna, Sensitivity -165 dB, NMEA0183 acquisition (normal): cold 34s, warm 34s, hot 1s, accuracy: 2.5m CEP + Embedded optimized antenna
<b>Communication</b>	TCP/IP over GPRS/UMTS/EDGE/HSPA, text messages
<b>Connectors</b>	10-pin Molex connector
<b>Input ports</b>	4 inputs for general use, Additional I/Os with external HUB/junction box
<b>Output ports</b>	2-4 outputs for general use, active low, 1A
<b>Analogs ports</b>	2 inputs using an external adaptor 0-12V and 0-5V (optional using EDA Analog)
<b>Dedicated port</b>	Ignition port, one wire data wire for ERM accessories (eNet protocol)
<b>Accelerometer</b>	Highly sensitive 3D accelerometer, +/-8G
<b>Power Supply</b>	9-32VDC, 20-30mA, Low power mode (GPS off) < 10mA, Power save mode (Standby) < 3.0mA (average)
<b>Back up battery</b>	Rechargeable, 3.6V, 750mAh (Li-Poly or Li-ion)
<b>Car interface</b>	Ignition On/Off, Engine On/Off (by voltage), VSS, CANBUS (optional using eData/CANalog/eCAN)
<b>Configuration/ Firmware Update</b>	OTA/Via Standard PC USB Port, parameters setup, software programming
<b>Data Logger</b>	5,000 messages (up to 60,000 optional)

<b>Operating temperature</b>	0 to 45°C
<b>Storage temperature</b>	-20 to 85°C
<b>Dimensions</b>	9.2cm x 6.5cm x 2.8cm
<b>Weight (NET)</b>	120g
<b>Durability</b>	Water and vibration resistance
<b>Max. relative humidity</b>	90+/-5%



*Note: iRF (Bluetooth) Supported Devices: To pair a device, please refer to the instructions/config as listed in the StarLink protocol*

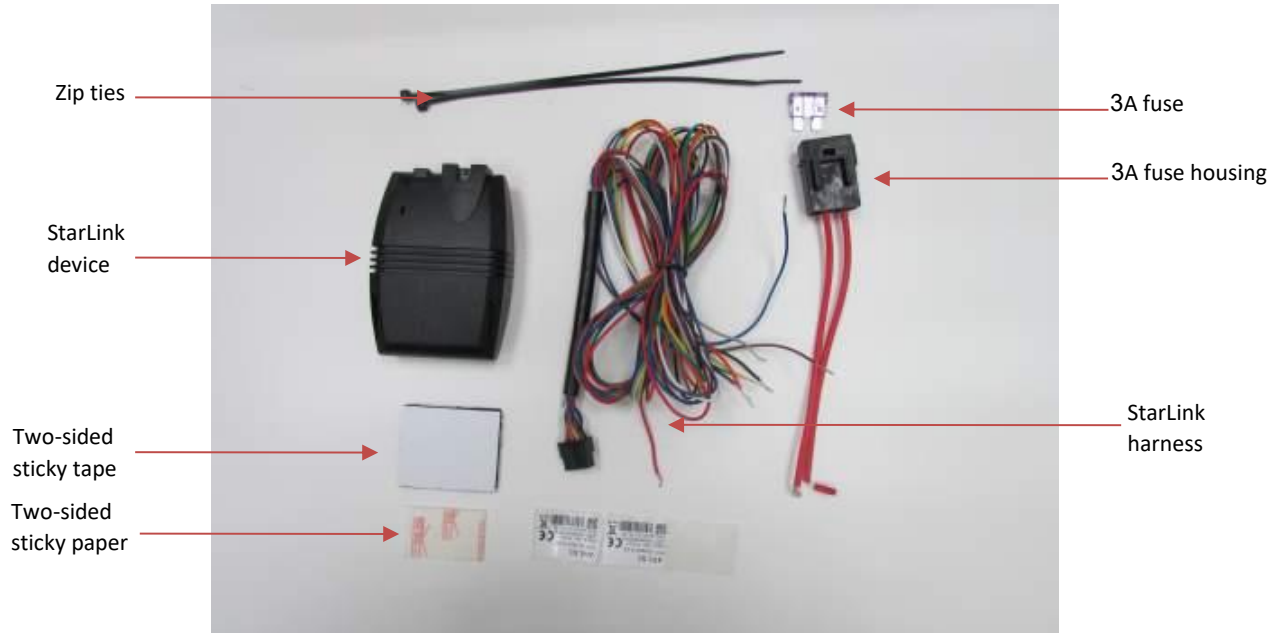


*iRF illustration Diagram*

## INSTALLATION PROCEDURE

### 6 Installing StarLink Devices

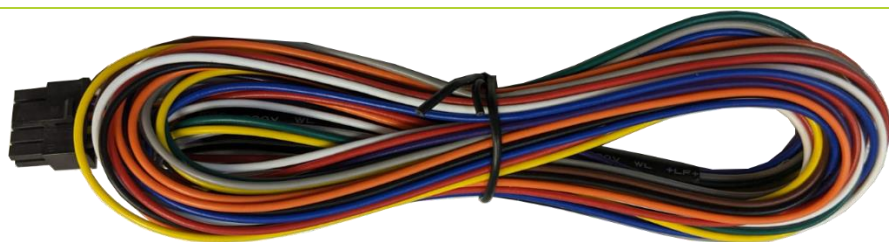
Make sure your package includes all the following components:



This procedure describes the standard connections required to operate StarLink devices.

#### 6.1 I/O Ports Specification

- Before connecting the harness refer to the StarLink wiring/color connector diagram blow:



**StarLink Harness: 10-pin connector, 20AWG thickness, 1m wiring length**





Port#	Color	Description	Connect To	Notes
1	Brown	Port A	output	Active low
2	Yellow	Port B	output	Active low
3	Orange	Port C	Output #3 / Input #1	Configurable to either Active low input or output
4	Purple	Port D	Output #4 / Input #2 / 1wire	Configurable to either active low Input/Output or 1wire Dallas communication
5	White	Port E	Input #3	Active low
6	Black	Ground (-)	GND	
7	Blue	Port F	Input #4 / VSS	Configurable to either Vss or Active High input
8	Grey	LIN	For EDA/Add-on and configuration	PC Communication (eNet) interface
9	Green	Ignition input	Ignition switch	(+15)
10	Red	Power (+12/24v)	Main power (fused)	(+30)

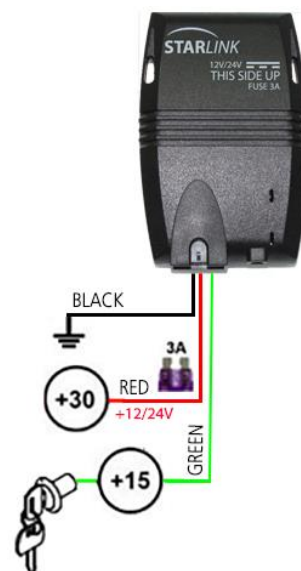
- Connect the red wire (pin #10) via a 3A fuse to the (+30) vehicle battery (+12V/+24V). Insert the fuse ONLY after the installation is finished.
- Connect the black wire (pin #6) to the vehicle chassis or any grounded part of the vehicle (GND). Make sure the connection is free of paint or dirt to ensure a good conductive ground connection
- Connect the green wire (pin #9) to the vehicle Ignition switch (IGN +15).
- Use the hereunder basic wire connecting illustration:



*Unused wires should be isolated and tied neatly so they do not interfere with any other parts or systems.*



*Keep in mind that you may need to use some of the wires in the future*



## 6.2 Configuring the device per vehicle type



*Prior to installing the device, make sure the device is properly configured with the vehicle and gear type. Failure to configure essential parameters will prevent the functionality of the device and result with bad performances. For assistant: refer to ERM Protocol or use ERM support services*

## 6.3 SIM card insertion

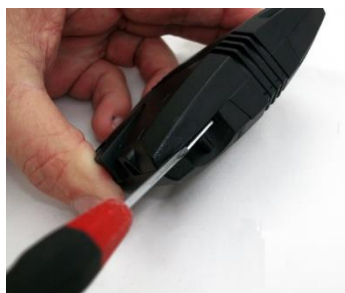
- Using a small, flat screwdriver, remove the cover of the SIM slot on the device side.



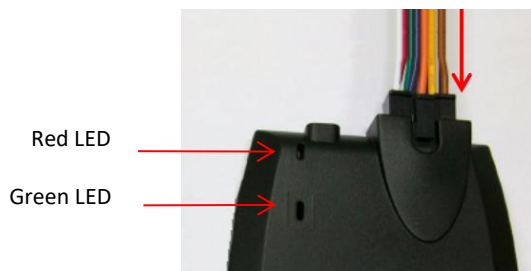
- Slide the SIM card into the SIM slot and gently push it in (note the SIM polarity).



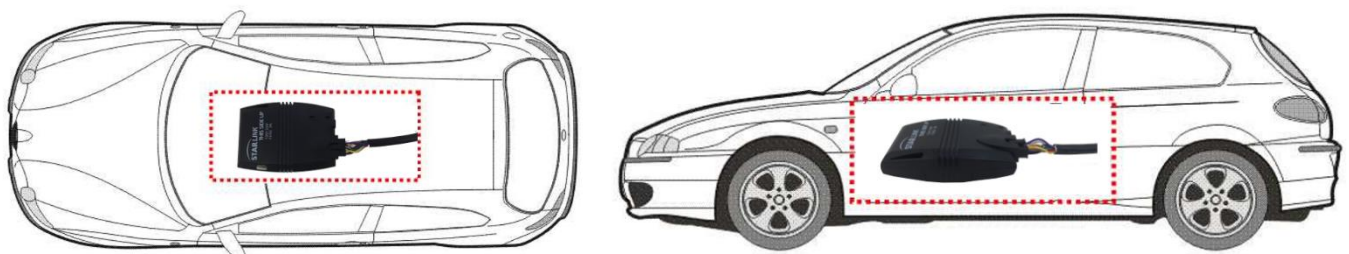
- Use a screwdriver to push and lock the SIM card in place.
- Replace the cover of the SIM slot.



- Plug the harness connector into the device socket. Approximately 10 seconds after powering up the device, both the red and green LEDs should start blinking.



- The GREEN LED indicates GPS reception.  
The RED LED indicates communication with the GSM and a connection with the server.  
Before finally fixing the device in place, make sure it is properly registered on your server and data has been transmitted as expected
- To finalize the installation, fix the device with the connector side facing REAR while the marking THIS SIDE UP is facing UP. Use a double-side adhesive sticker or cable ties. (as shown in the next page).
- Reassemble any vehicle components you may have dismantled.
- Fix the device with the connector side facing REAR as illustrated hereunder:



#### 6.4 Positioning StarLink Devices in the vehicle

- Install the StarLink device in a dry environment where there is no possibility of water penetration.
- Affix the StarLink device firmly to the vehicle with cable ties or double-side adhesive sticker.
- Place the StarLink device away from heat sources.
- Place the StarLink device away from vehicle computers.
- The StarLink GPS antenna is located on the top surface of the device (see the THIS SIDE UP marking). Do not cover this area with metallic parts.
- For Optimal Reception Quality, Identify the desired location for the device installation. This location should be concealed (inaccessible to

unauthorized personnel), clean, and free of water, heat, and large metallic objects. For the best reception install the StarLink device underneath the top part of the front dashboard.

- Make sure that the GPS antenna is facing upwards. (THIS SIDE UP)
- Verify no metallic objects are covering the device.
- If necessary, dismantle vehicle components to gain access to the selected concealed location.
- Place the device in the selected location but do not affix it yet.
- The StarLink device should be installed horizontally, with its LEDs facing up.
- Do not install the StarLink device in close proximity to a metallic surface.
- If the vehicle's windows are metallic tempered the angle should be 0° (completely flat) toward the vehicle window.
- When installing the device keep at least 20 cm away from any metal plate or metal components that might block the GPS signal.
- Make sure that the component / metal plate does not cover the upper side of the StarLink.



*Please note for the following remarks while installing the StarLink:*

- Avoid installation next to any heat sources or moving parts.
- The installation position must be waterproof.
- The StarLink device should be installed inside the cabin or the trunk.
- The StarLink device should not be installed behind the fuse box.
- The StarLink device should be facing upwards to enable good GPS reception.
- Never install the StarLink device with the antenna side next to metal objects.

- The StarLink device must be installed by qualified personnel only.
- All wires must be insulated after installation.

The following example presents a good installation position:

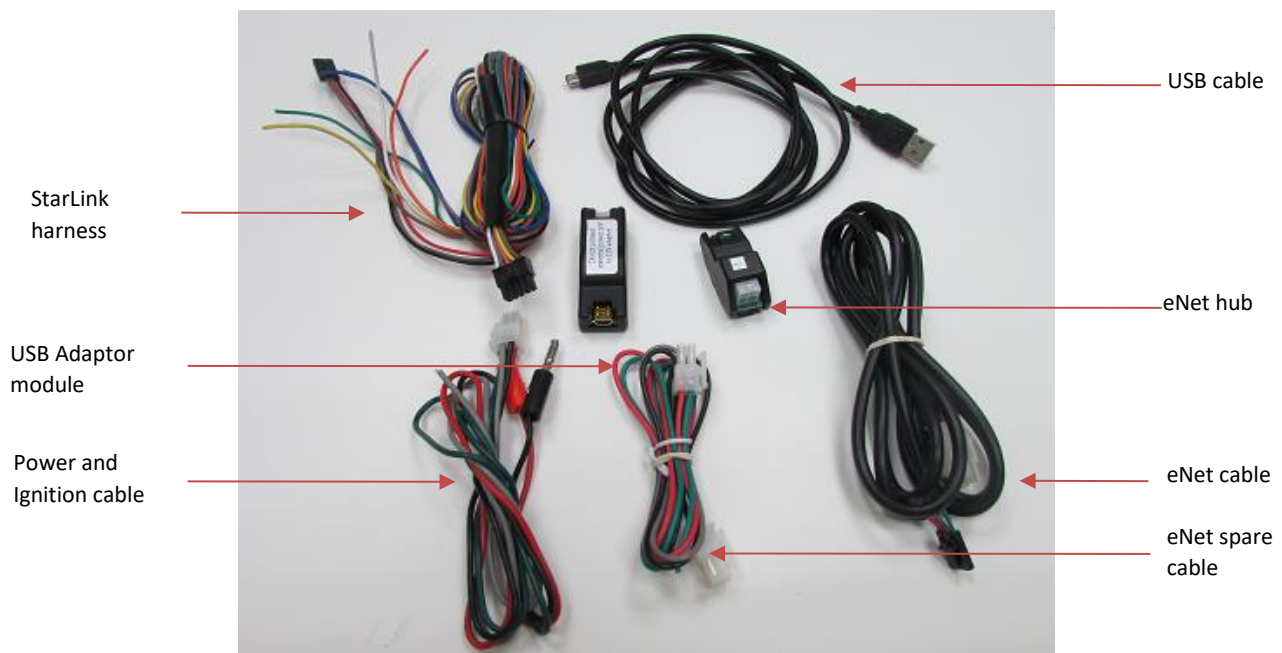


## 7 Configuration

### 7.1 Connect to a PC

Configuring StarLink devices can be performed with a PC. To connect the device to a PC, use the USB adapter as described in the following procedure.

- Verify that the USB adapter kit contains all the items as described in the following diagram:



- Using the eNet cable, connect the eNet hub to the USB Adapter, then connect the other end to the eNet hub:



- If the eNet cable includes four wires (some only have three), cut the red strand to prevent supplying 12V directly to the USB adapter.
- You can use any port on the eNet hub to connect any of the cables.
- Connect the StarLink device and the USB cable:



Connect the StarLink harness to the eNet hub



Connect the USB cable to the USB Adapter

- Connect the power supply:



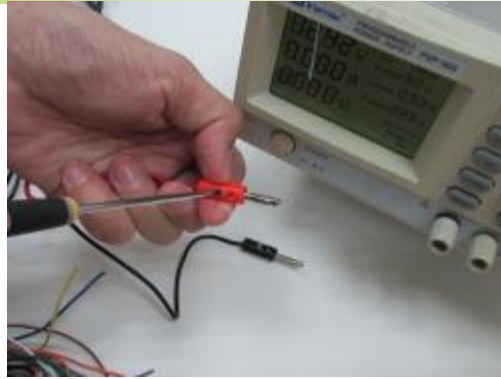
Connect one side of the power cable to the eNet hub



Use the red and black wires for the power supply (see section 5)

- Connect the power supply cable to a 12V power supply. you can use the red and black connectors as described in the pictures below:



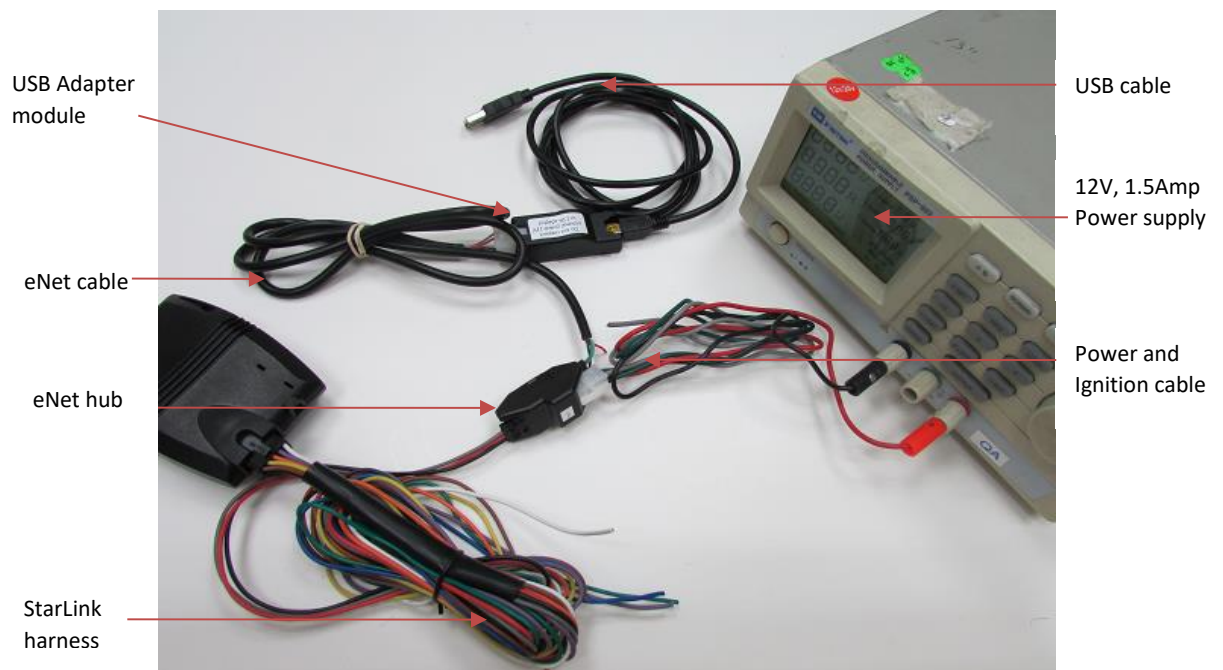


Use a screwdriver to connect the two RED and BLACK connectors to the red and black cables



Connect the connectors to the power supply, remember to use 12V 1.5Amp power supply

- The final on-the-table assembly is shown in the following figure:



- Turn “on” the power supply and verify that the StarLink RED LED begins blinking after a few seconds.
- You are now ready to configure your StarLink device. Connect the USB cable to your PC and install the USB DRIVER as follows:
  - Use your ERM username (given by ERM support) and password to enter the ERM Portal at: <http://erm.co.il/protocol>
  - Go to the Tools link at the lower left.
  - Click the USB Driver link, download the tool to your computer and install it.

For the full installation instructions please refer to the tutorial's session on ERM's YouTube Channel using the following link:

<http://www.youtube.com/ermtelematics>

## 7.2 Configuring and Setting StarLink Functions

All StarLink functions can be set by using either a PC via USB Adaptor or SMS/Data commands sent over the air. In order to configure and set parameters by using a PC, do the following:

- Connect the StarLink to the PC using the USB Adaptor (use the procedure in section 7.1)
- Download the relevant software program for the function to be configured. All software programs can be downloaded from ERM protocol site at: <http://erm.co.il/protocol>



*Note: Prior to installation, make sure the SF variant StarLink devices are configured with the right vehicle model and gear type (ie: Midi-bus, Bus, Sport car, 18-wheels truck and Gear type: manual or automatic).*

- For more details, configuration information and instructions such as selecting and setting the right vehicle type for the SF functionality or setting up Bluetooth nodes to communicate with the StarLink device, additional software programs to use etc... please refer to ERM portal at: <http://erm.co.il/protocol>

## 8 Troubleshooting

- StarLink Monitor doesn't show that device is connected
  - Make sure the StarLink device is connected correctly to the USB adaptor.
  - See online instructions:  
[How to connect the USB adapter with power supply](#)  
How to connect the USB adapter without a power supply
- The server doesn't show any data received from the StarLink device
  - Make sure that the SIM card is inserted into the StarLink Device.
  - Make sure that the SIM card is configured correctly with the cellular provider and it has Data plan with enough available data to consume.
  - Check device configuration and make sure APN, IP and Port are configured properly.

### 8.1 LED lights for diagnostics

- StarLink devices comes with two standard LED's:
  - GREEN - Unit and GPS status
  - RED - Cellular modem status



#### 8.1.1 Green LED blink patterns:

On duration	Off duration	Status
10ms	20 seconds	GPS is turned off or no main power
100ms	4 seconds	GPS is turned on, with a valid position
100ms	400ms	GPS is turned on, no position
Always on	-	GPS is turned on, no communication with GPS

#### 8.1.2 Red LED blink patterns:

On duration	Off duration	Status
-	Always off	Unit has no external power, Modem is turned off, SIM card not inserted or locked
100ms	10 seconds	Unit is in low power consumption mode, modem still on
100ms	4 seconds	Unit is connected to network
100ms	1 second	Unit is connecting to network
Always on	-	Modem is connected to server

## ERM CONTACT INFORMATION

### ERM Support:

Skype: erm.support

StarLink online protocol site: <http://erm.co.il/protocol>

ERM's YouTube Channel: <http://www.youtube.com/ermtelematics>

### ERM Advanced Telematics

16 Hasar Shapira Street, Rishon Lezion, 7570418, Israel

Telephone: +972-(0)3-941-3313, Fax: +972-(0)3-941-3330

Web: [www.ermtelematics.com](http://www.ermtelematics.com)