Sensata IN



LX40 SERIES

User Guide



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LX40 General Device Information

1. Safety and legal information



- Do not disassemble the device. The housing must be opened to change the SIM card ONLY.
- Adjacent electronic devices may cause interference.
- Device may be damaged by water and high humidity.
- This product should be installed by qualified professionals only.

1.2. Description

LX40 is a robust device with GNSS and cellular connectivity designed for object tracking. It is able to acquire information on object location, speed, direction, etc. and transfer the data via cellular network. Bluetooth, RS232, CAN, and wired inputs of the device may be used to connect different external sensors/devices. Outputs of the device may be used to control external equipment remotely.

Flexible configuration allows partners to adjust LX40 to meet their specific requirements. All device settings and firmware are updated remotely via over-the-air remote management. It is possible to create setting templates for groups of vehicles, use mass updates and create unique device operation logic, fulfilling requirements of most cases on the market.

1.3. Package

LX40 as shipped includes all required components for operation, except a SIM card. Contact your local network provider to obtain a 4FF/nano SIM card. INSIGHTS recommends an M2M/industrial SIM card for best performance and reliability.

Technical Specifications - North America

Mechanical

Dimensions	91 mm W x 20 mm H x 68 mm D (3.6” W x 0.8” H x 2.7” D)
Weight	64g (2.3 oz)
Housing Material	PC, UL94 V-0
Seal	IP67 with optional case

Electrical

Input Voltage	12V / 24V DC nominal 9-36V DC range
Average idle current	40 mA @ 12V input
Full active current without load on outputs	100 mA @ 12V input
Deep sleep current	<2mA @ 12V input
Optional Battery	210 mAh or 850 mAh Lithium Ion
Connector	4, 8, or 16 pins by variant
RS232 port (in supporting variants) Harness Connector	True level signaling Common baud rates to 115K
RS485 port (in supporting variants)	Common baud rates to 115K
CAN ports (in supporting variants	11/29 bit ID supported, FD compatible Data rates up to 2 Mbps

Environmental

Operational Temperature	With internal battery: -20°to +60° C (-4° to +140° F) Without internal battery: -40° to +85° C (-40° to +185° F)
Storage temperature	-40° to +85° C (-40° to +185° F)

Communications

Cellular	4G LTE Cat M1, 2G fallback
Cellular Bands	4G LTE: B2, B4, B12 2G: 850/900/1800/1900 MHz
SIM card	4FF slot
Bluetooth	5.4 LE

Positioning

Constellation support	GPS L1, GLONASS L1, Galileo E1, QZSS L1
Time to first fix	Cold Start: 28s Hot Start: 1s
Sensitivity	Cold Start -148 dBm Reacquisition -160 dBm Tracking -167 dBm
Accuracy	1.5 m CEP50
Sensors	3-axis accelerometer

Certification

FCC, PTCRB, AT&T (pending)

Technical Specifications - EMEA

Mechanical

Dimensions	91 mm W x 20 mm H x 68 mm D (3.6” W x 0.8” H x 2.7” D)
Weight	64g (2.3 oz)
Housing Material	PC, UL94 V-0
Seal	IP67 with optional case

Electrical

Input Voltage	12V / 24V DC nominal 9-36V DC range
Average idle current	40 mA @ 12V input
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Communications

Cellular	4G LTE Cat 1 bis, 2G fallback
Cellular Bands	4G LTE: B1, B3, B7, B8, B20, B28 2G: 900/1800 MHz
SIM card	4FF slot
Bluetooth	5.4 LE

Positioning

Constellation support	GPS L1, GLONASS L1, Galileo E1, QZSS L1
Time to first fix	Cold start: 28s Hot start: <1s
Sensitivity	Cold start -145 dBm Reacquisition -159 dBm Tracking -159 dBm
Accuracy	2.5 m CEP50
Sensors	3-axis accelerometer

Certification

CE, RoHS

Physical Properties

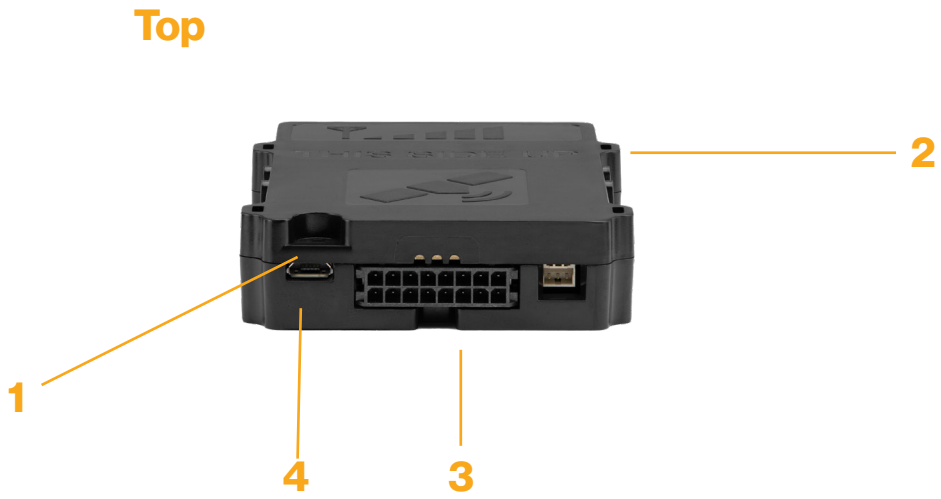


Figure 1. LX40 front view.

Note. To insert a SIM card, open the housing by lifting plastic holders from both sides.

Table 2. LX components.

No.	Short description
1	LED indicator
2	SIM card
3	Connector (shown with 16 pins; some LX40 models have fewer)
4	USB interface

I/O Options

Variant	LX41	LX42	LX43	LX44	LX45
Connector	4 pins	8 pins	16 pins	16 pins	16 pins
CAN Ports				2x	2x
RS232 Ports			1x	1x	1x
RS485 Ports			1x		1x
1-Wire Bus		1x	1x	1x	1x
Digital Inputs	1x	4x	4x	4x	4x
Digital Outputs	1x	2x	4x	4x	2x
Analog Inputs		3x	3x	3x	3x

Physical Properties

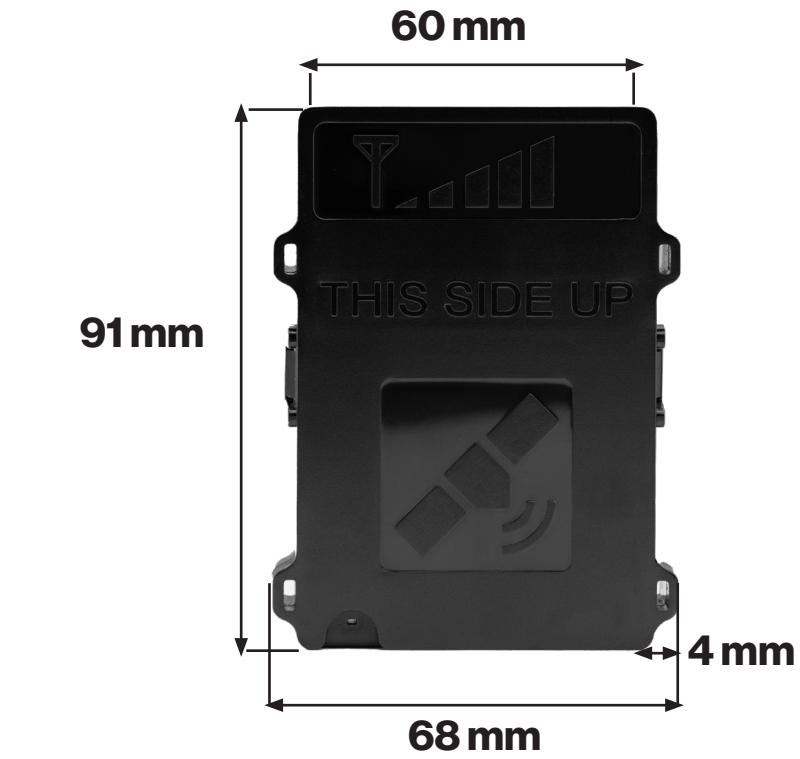




Figure 2. LX40

Installation instructions

General

LX40 is intended for mounting inside of the vehicle. It can not be installed in the engine compartment or in an area of exposure to direct external conditions. LX40 should be protected from moisture exposure and must be fastened in a stable position to avoid motion and vibration (affixing to cables and harnesses is strictly prohibited). LX40 must be mounted horizontally with its top flat surface oriented towards the sky. Precise orientation is of particular importance to proper operation of the system, especially for accelerometer-based event detection.

Vehicle Applicability

LX40 is intended for internal combustion engines, hybrid and electric vehicles, where power supply specifications are met. Device must be connected to the vehicle battery, ensuring constant power supply even if the engine is not working and ignition is off.

Basic instructions before beginning the installation

Quality of connections, location of the device, etc. play a significant role on accurate operation of the system. Below are some tips and rules for correct installation to attain professional quality and ensure maximum efficiency of the device.

Wiring and Routing

- To highest possible extent, cavities in the vehicle should be used for wiring. If you need to make a new hole, it must be protected against corrosion appropriately. Grommets are recommended to protect cables from damage.
- All wiring connections should have proper insulation and consider environmental and mechanical factors such as vibration. Do not use insulation with unknown resistance parameters.
- Efforts should be made to tie the new wiring into the car's standard wiring bales where possible.

Installation instructions

SIM card

SIM card must be inserted into the device before starting installation. The device must be turned off when inserting SIM card. Before inserting the SIM card, make sure you have all network services activated, the card's PIN code must be disabled.

To disable: go to the SIM card's security settings on your phone. If the SIM is protected by a PIN, a check mark will appear next to "Lock SIM Card." Tap Lock Sim Card and enter the SIM pin code. If you don't know the PIN, you may be able to get it from your mobile provider. If the PIN is accepted, the check mark will disappear from the "Lock SIM Card" box. This means the PIN is now removed.

If the vehicle is travelling to countries, roaming service must be activated for the SIM card. We recommend recording LX40 identifying information and SIM card number for organizational purposes.

Tools/equipment necessary:

1. Pliers
2. Wire strippers
3. Multimeter
4. Electrical isolation tape

Installation of LX40

Steps to install central unit:

1. Open the housing by gently lifting the plastic holders on each side and remove the circuit board from it. Use a thin screwdriver to lift up the plastic holders in order not to break them.
2. Locate the SIM holder and following the printed picture on the circuit board, insert the SIM card.
3. Place the circuit board back in to the housing and close it.
4. Use cable ties/tie wraps to fix device in a stable position (units housing has four holes, for straps to go through and fasten them to the body of the vehicle).
5. Connect power supply.
6. Connect ignition wire to a digital input (usually IN5).
7. Attach cable harness to LX40.
8. Connect other devices as appropriate for the installation.

Installation instructions

Electrical Connection Guidelines

- 1A fuse on power wire is mandatory to meet all safety requirements
- We strongly recommend to install fuses in line with LX40 outputs when connecting external devices. Fuses should be not larger than 1A rating.

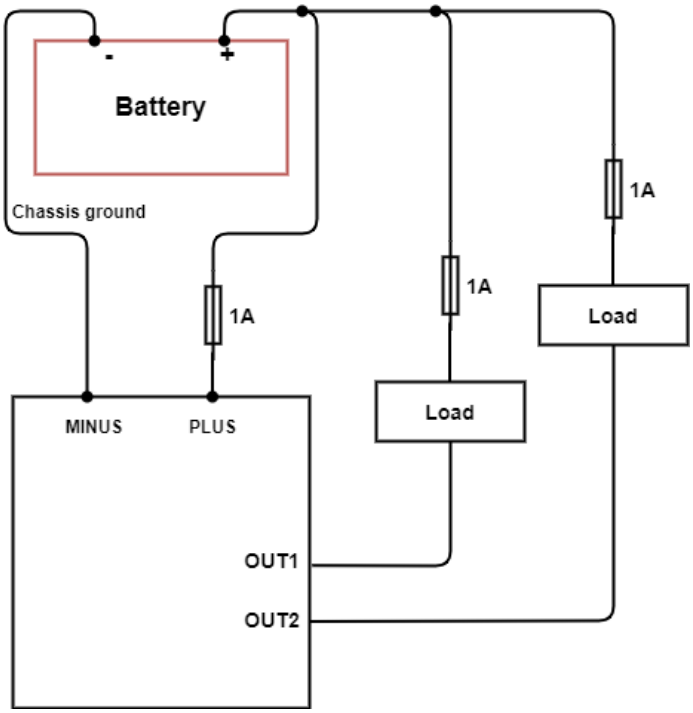


Figure 3. Principal connection scheme

Pinout

Colors are for included cable harness and pinout.



Figure 4. LX41 pinout and cable colors.

Pinout

Colors are for included cable harness and pinout.

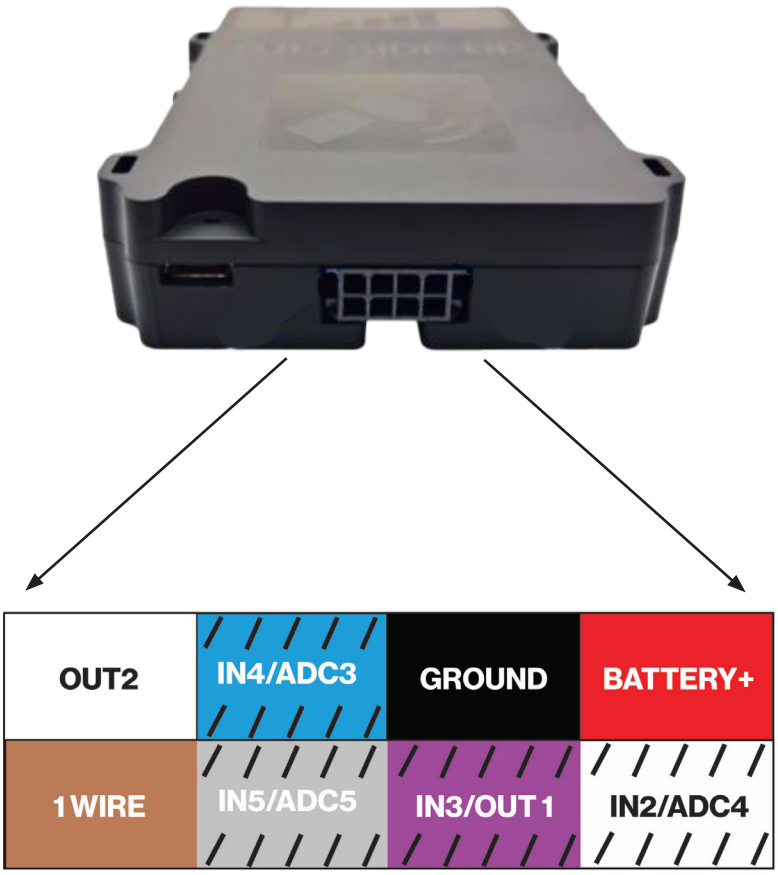


Figure 5. LX42 pinout and cable colors.

Pinout

Colors are for included cable harness and pinout.

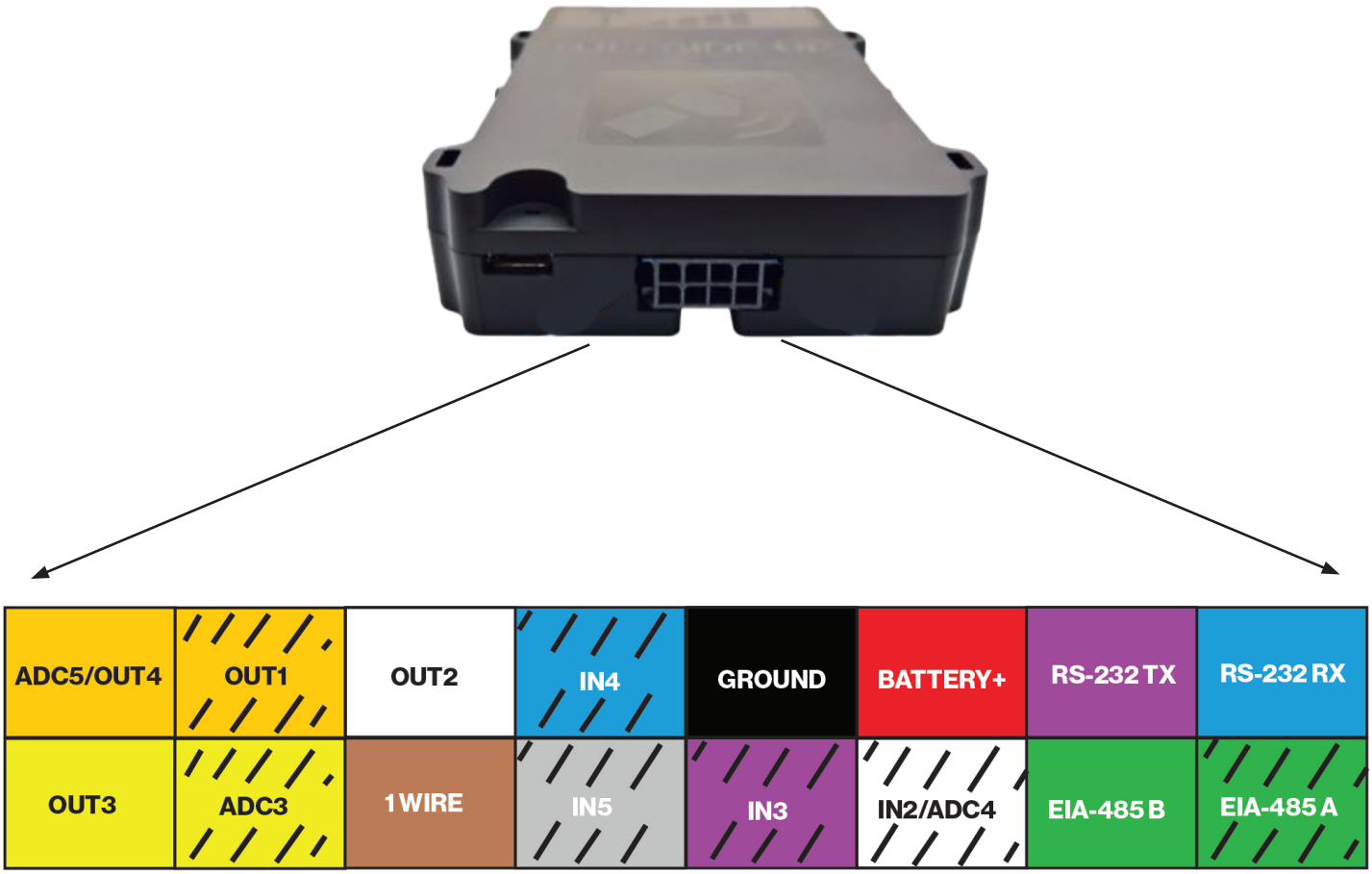


Figure 6. LX43 pinout and cable colors.

Pinout

Colors are for included cable harness and pinout.

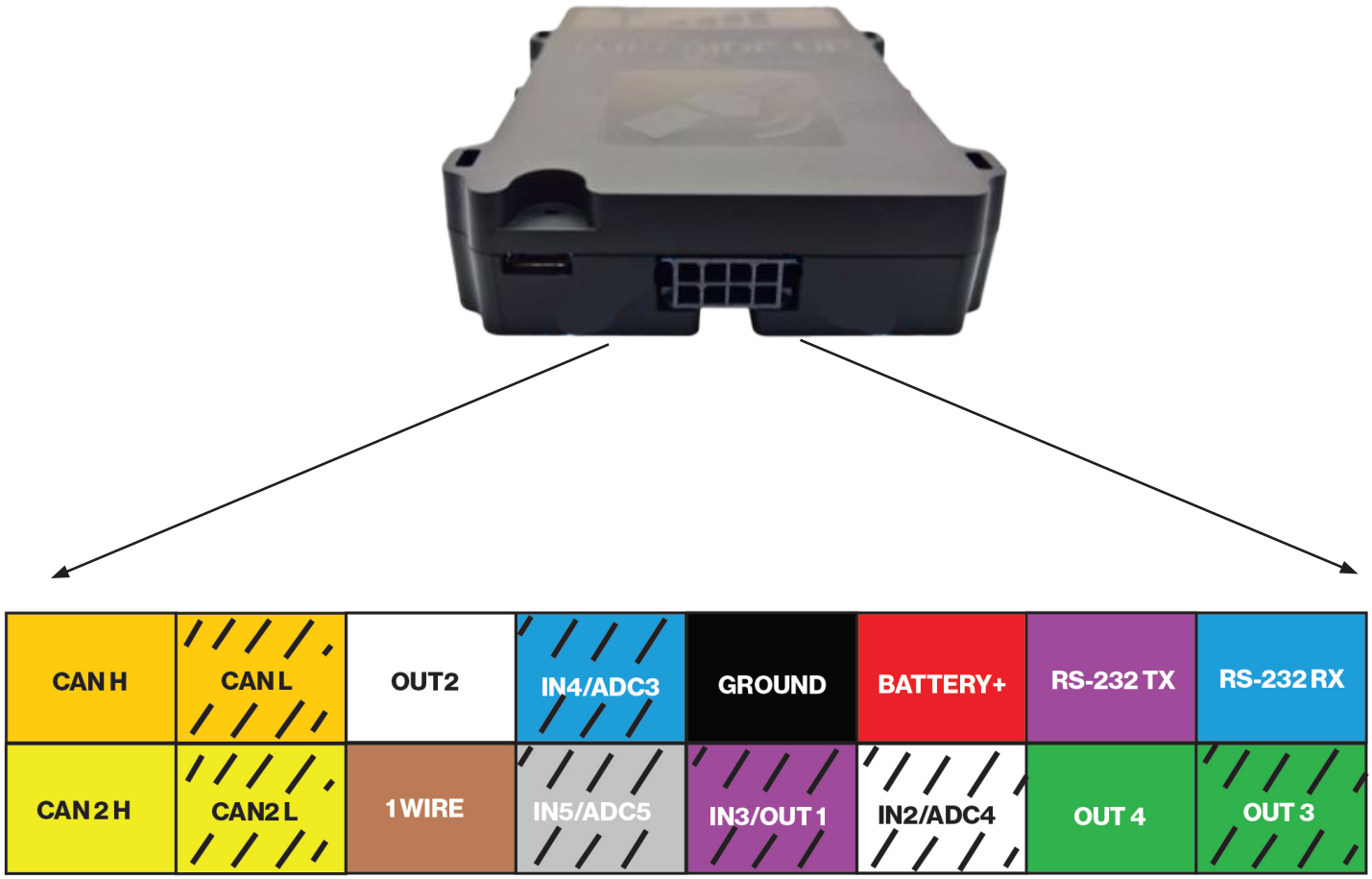


Figure 7. LX44 pinout and cable colors.

Pinout

Colors are for included cable harness and pinout.

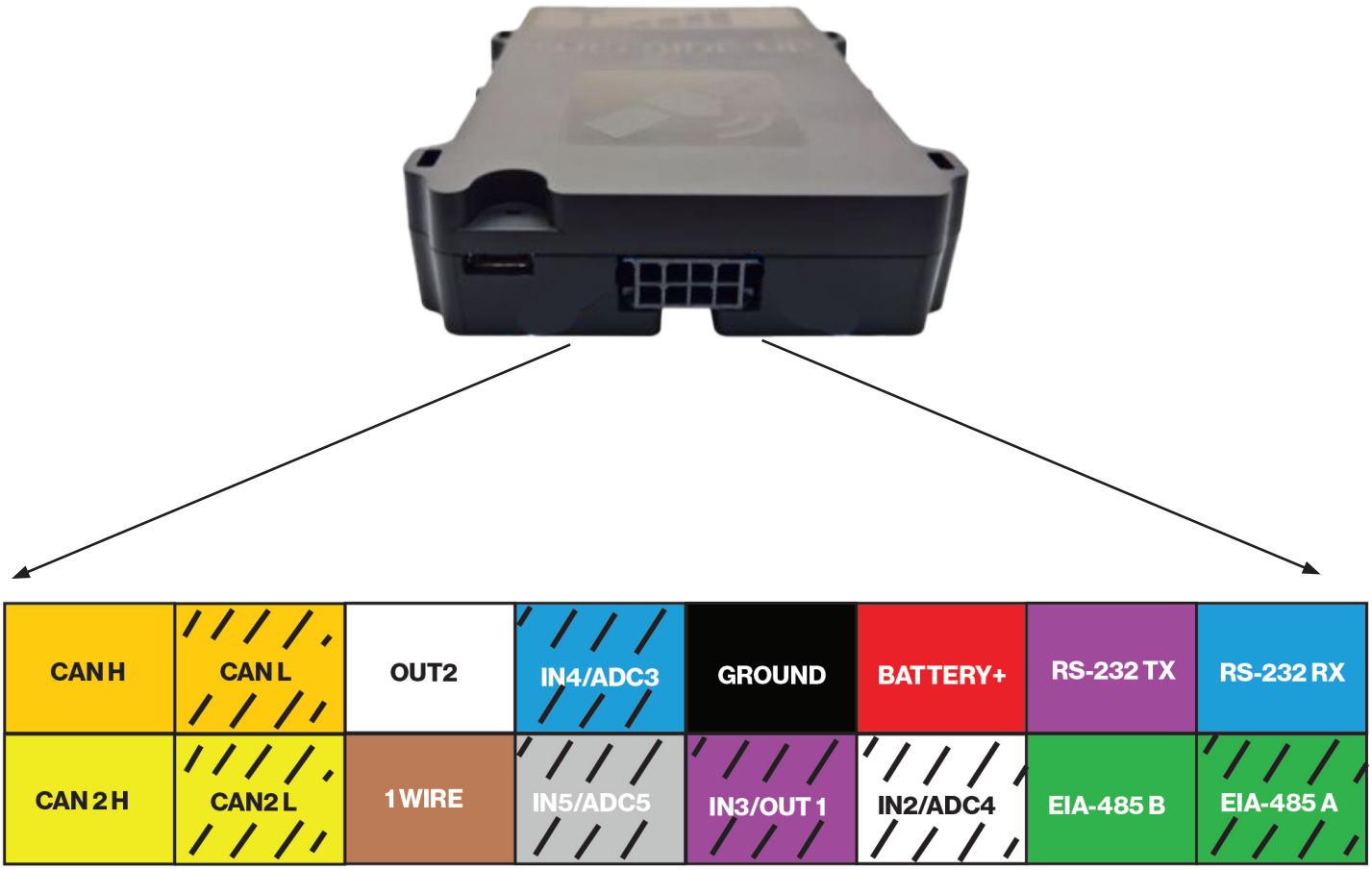


Figure 8. LX45 pinout and cable colors.

Diagnostic LED

LX40 has a diagnostic status LED to indicate its internal operation status for cellular connectivity, GNSS, and CAN connectivity (for devices with CAN ports). By default this LED is not active, but will begin indicating status when IN5 is connected to Battery+. Alternatively, the diagnostic LED can be set to continuous operation via configuration.

When enabled, the LED blink sequence will repeat continuously, cycling through cellular status, GNSS status, CAN status, and then repeating. Device function represented by LED blinks is based on the blink length:

Cellular status: Longest blink, 500 ms on / 500 ms off (1 Hz):

Table 5. Cellular modem status flashing meaning

Flashes count	Meaning
1	Modem connected to server, Modem connected to Internet, Modem GPRS registered, Modem GSM registered, Modem SIM card ok, Modem turned on
2	Modem connected to Internet, Modem GPRS registered, Modem GSM registered, Modem SIM card ok, Modem turned on
3	Modem GPRS registered, Modem GSM registered, Modem SIM card ok, Modem turned on
4	Modem GSM registered, Modem SIM card ok, Modem turned on
5	Modem SIM card ok, Modem turned on
6	Modem turned on
7	Device started

Diagnostic LED

GNSS status: Medium blink, 100 ms on / 100 ms off (5 Hz):

Flashes count	Meaning
1	No GNSS signal
2	Poor precision. HDOP>1.5
3	3 satellites locked. HDOP<1.5
...	...
12	12 satellites locked. HDOP<1.5

CAN status for devices with CAN ports: Fastest blink, 70 ms on / 70 ms off (~ 7 Hz):

Flashes count	Meaning	Description
1	Reading CAN1 line	Power
2	Reading CAN2 line	GND
3	Reading CAN1 & CAN2 lines	CAN H

Configuration and Support

Configuration

LX40 is to be configured via XDM, our device management and configuration portal, where partners/users can adjust operation of their devices to fulfill specific requirements.

Support

LX40 is built to be a reliable, stable and easy-to-install device. Please read and follow provided installation and operating instructions carefully. However, if you encounter difficulties while installing or using this product, technical support is available and may be reached by https://sensatainsights.com/contact/support/.

Safety Advice and Regulatory
Regulatory Information

Caution

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.

Caution

Any changes or modifications (including the antennas) to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

California Proposition 65 Warning

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

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