



XFV-100

INSTALLATION GUIDE

Vehicle & Asset Trackers

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INTRODUCTION

The XFV-100 family of vehicle and asset trackers provide advanced vehicle telematics in a compact and easy-to-install enclosure. Available in IP54 and IP67 enclosures for protection from dust and water, the XFV-100 series of vehicle and asset trackers can be used in a variety of applications and locations.

Available in 5-wire and 8-wire versions, the XFV-100 series of vehicle and asset trackers provide real-time decision-making capabilities for operators and managers to coach drivers and reduce costs.

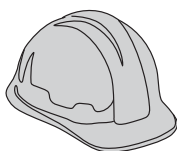
Variant	Description
XFV-101	IP54 enclosure, 5 wires
XFV-102	IP54 enclosure, 8 wires
XFV-103	IP67 enclosure, 5 wires
XFV-104	IP67 enclosure, 8 wires

SAFETY CHECKLIST

WARNING: Device installation should be performed by a qualified individual or installation professional only. Working with a vehicle's power system can be dangerous to both you and your vehicle. Since vehicle designs and power/input sources can vary from vehicle to vehicle, the procedures described here are intended as a guide only.

- **Personal Protection Equipment:** To prevent injury, please wear the following equipment at all times when working on or near the vehicle.

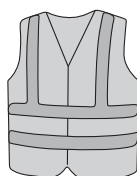
Hardhat



Steel toe shoes



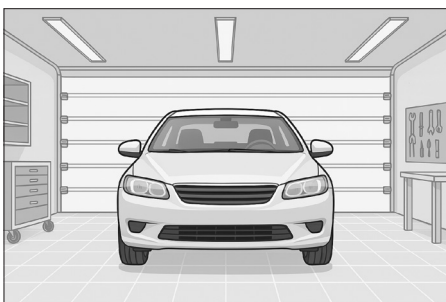
High visibility vest



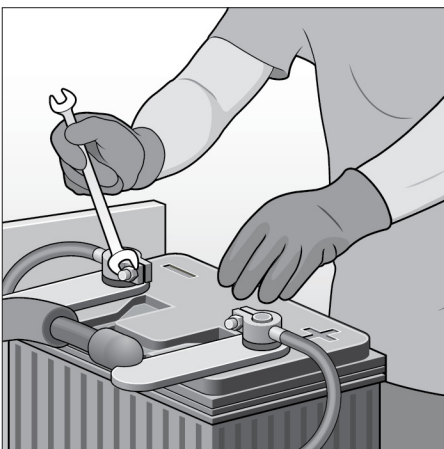
Eye protection



- **Site Requirements:** Place the vehicle on a flat surface in an area that is sheltered from weather (rain, snow, wind, etc.).

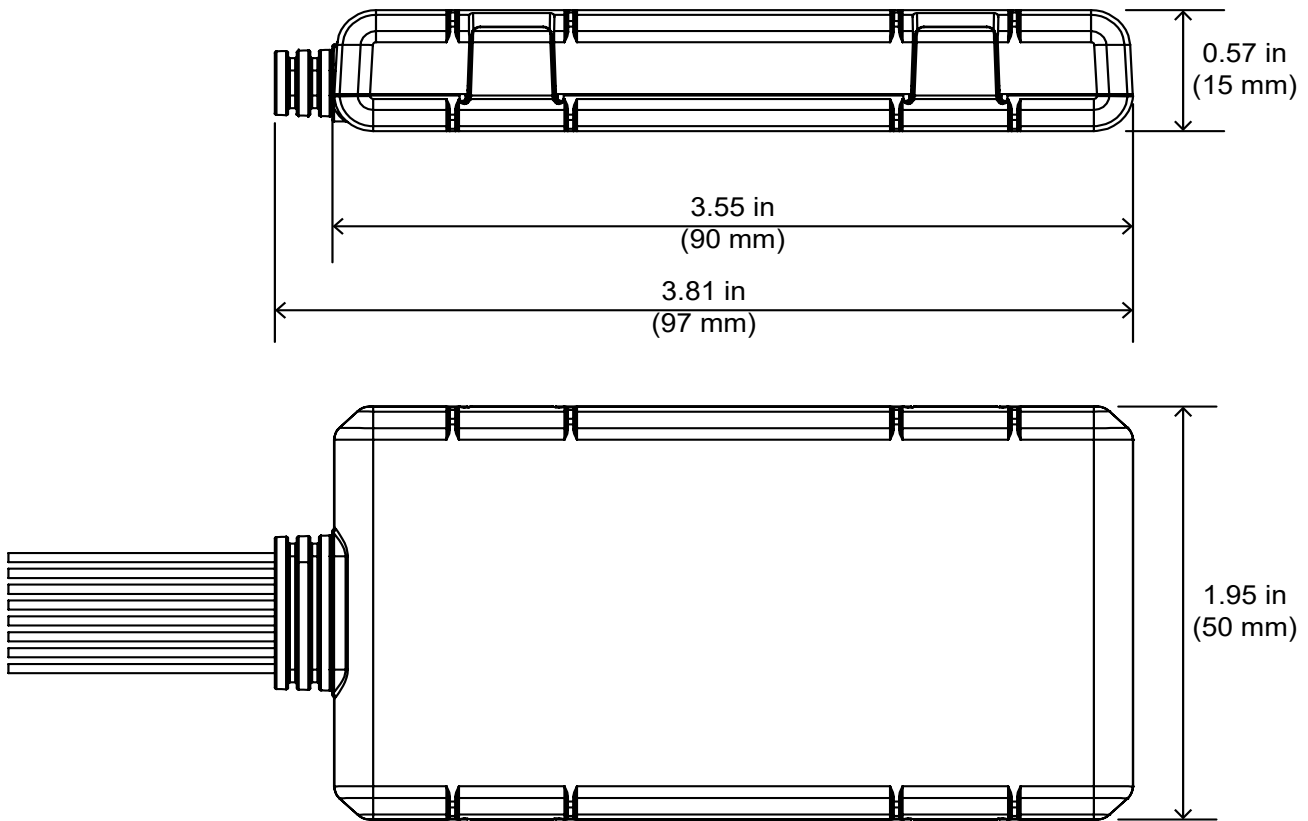


- Disconnect the battery from the vehicle.

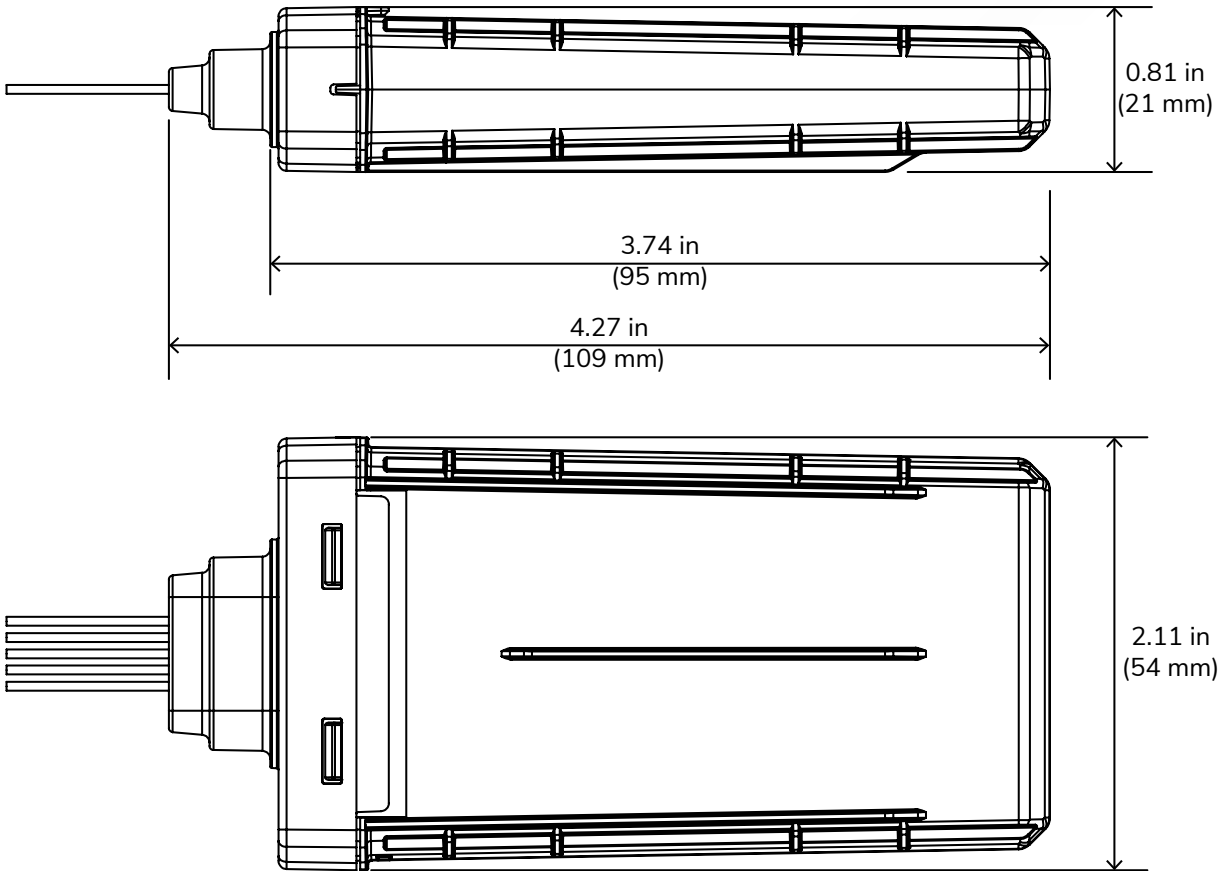


HARDWARE DESCRIPTION

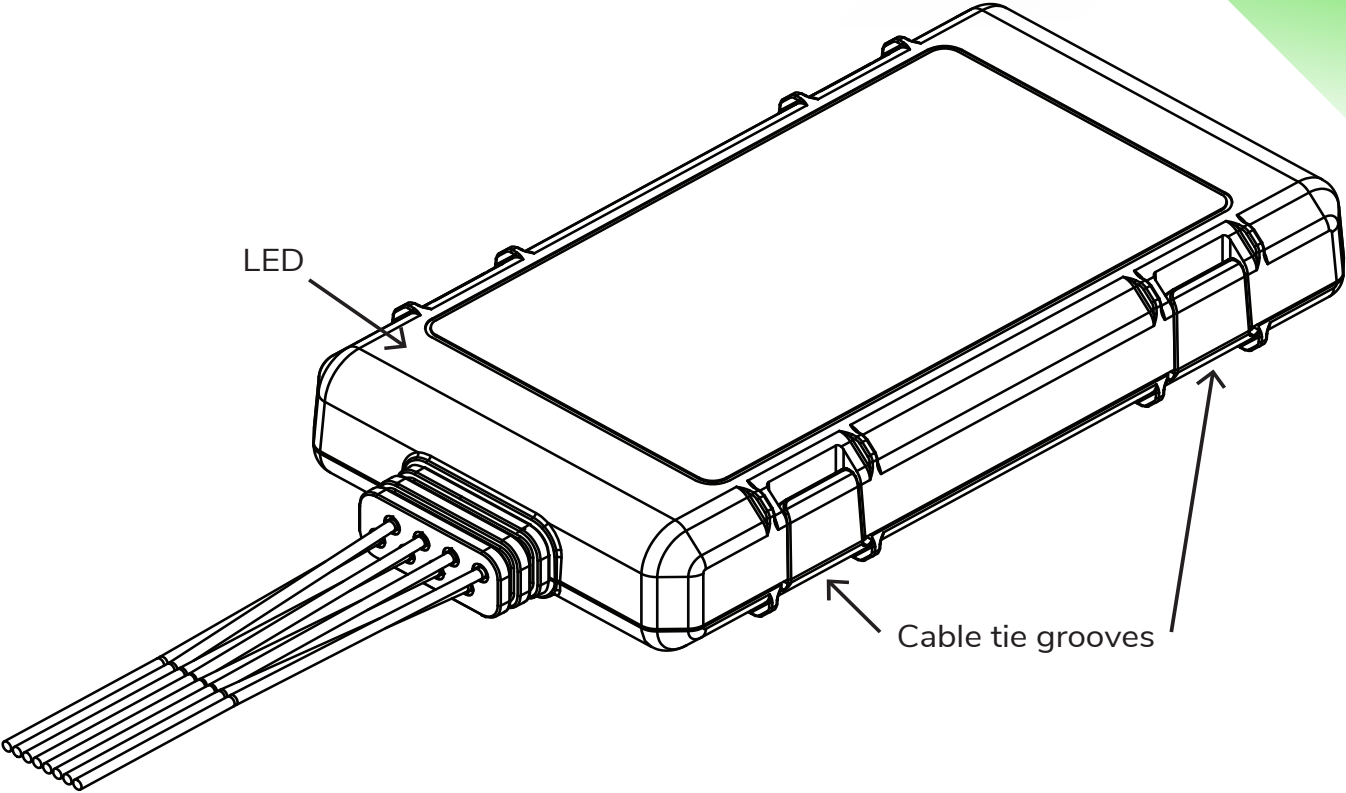
XFV-100 device, IP54 variant dimensions (8 wire version shown)



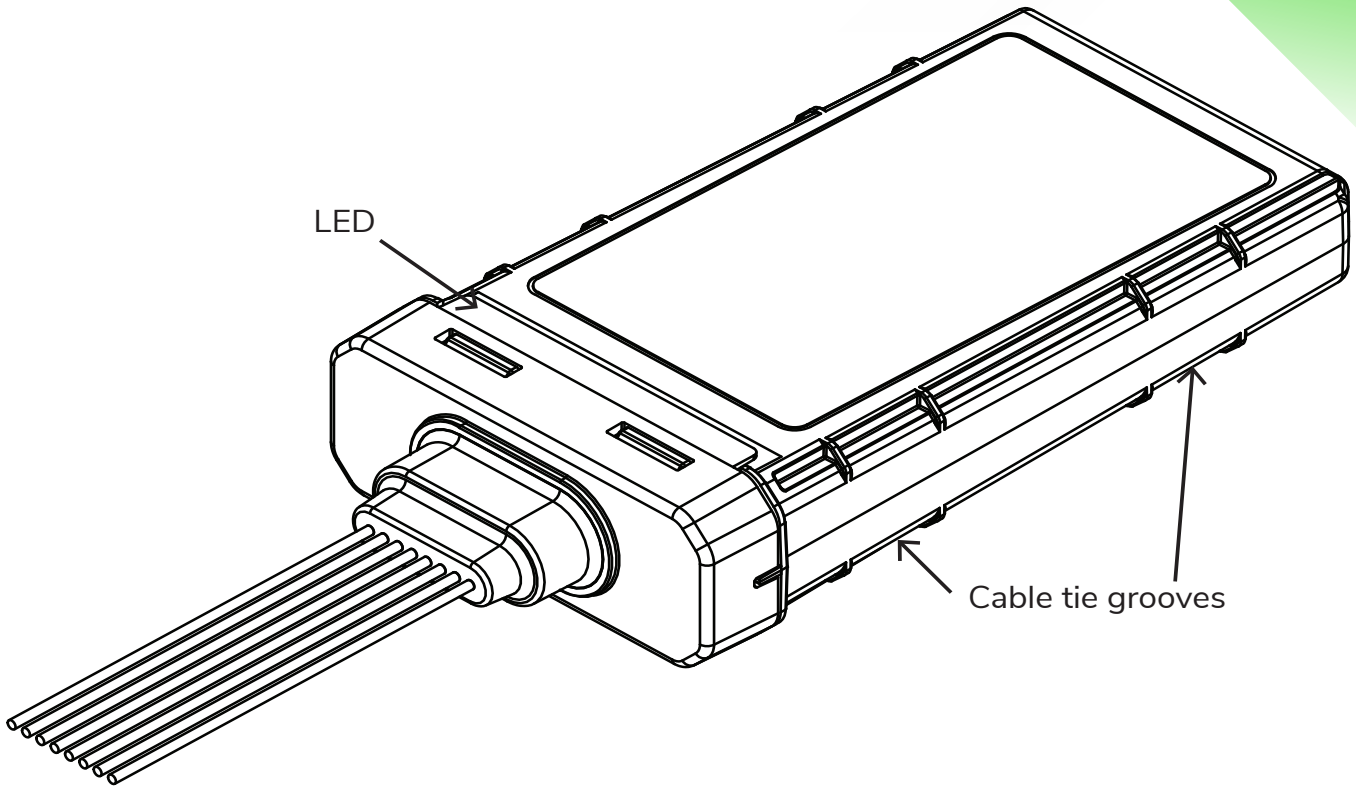
XFV-100 device, IP67 variant dimensions (5 wire version shown)



XFV-100 device, IP54 variant



XFV-100 device, IP67 variant



5-wire model wire connections

Wire Color Description

Red	Power, 9-31 VDC, 12-24 VDC nominal
Black	Ground
Grey/Black	Input 1
Blue/Black	Input 2
Violet/Black	Output 1

8-wire model wire connections

Wire Color Description

Red	Power, 9-31 VDC, 12-24 VDC nominal
Black	Ground
Grey/Black	Input 1
Blue/Black	Input 2
Violet/Black	Output 1
White	Output 2
Brown	1-Wire
Pink	5 Volt Output for 1-wire signal



INSTALLATION REQUIREMENTS

Power Requirements

This device is intended for installations where power supply requirements are met. The device must be connected to the vehicle battery, ensuring a constant power supply even if the engine is not working and the ignition is off.

General Requirements

- XFV-100 devices can be mounted inside the vehicle (XFV-101 and XFV-102) or outside the vehicle (XFV-103 and XFV-104).
- The device must be fastened in a stable location to avoid errors due to motion and vibration.
- Do not install in the engine compartment.
- The device should be protected from exposure to moisture.
- The device should be installed horizontally with its top surface oriented towards the sky (label facing upward).

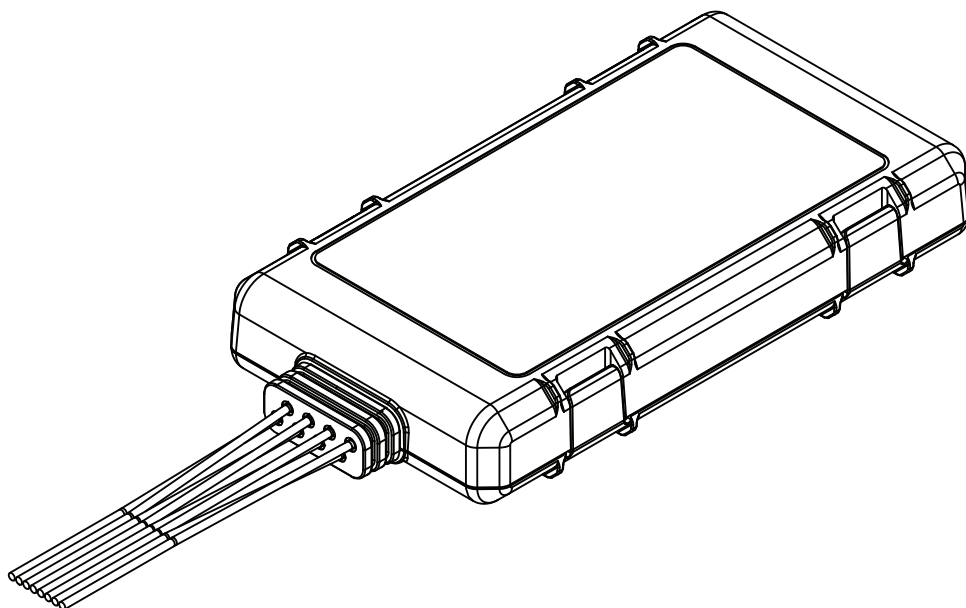
Wiring and Routing

- 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. While the device is water resistant, the wire terminations (butt-splices/soldering) must be sealed with heat-shrink or waterproof tape if the device is mounted in a chassis location.
- Secure the new wiring to the vehicle's wiring bundles where possible.

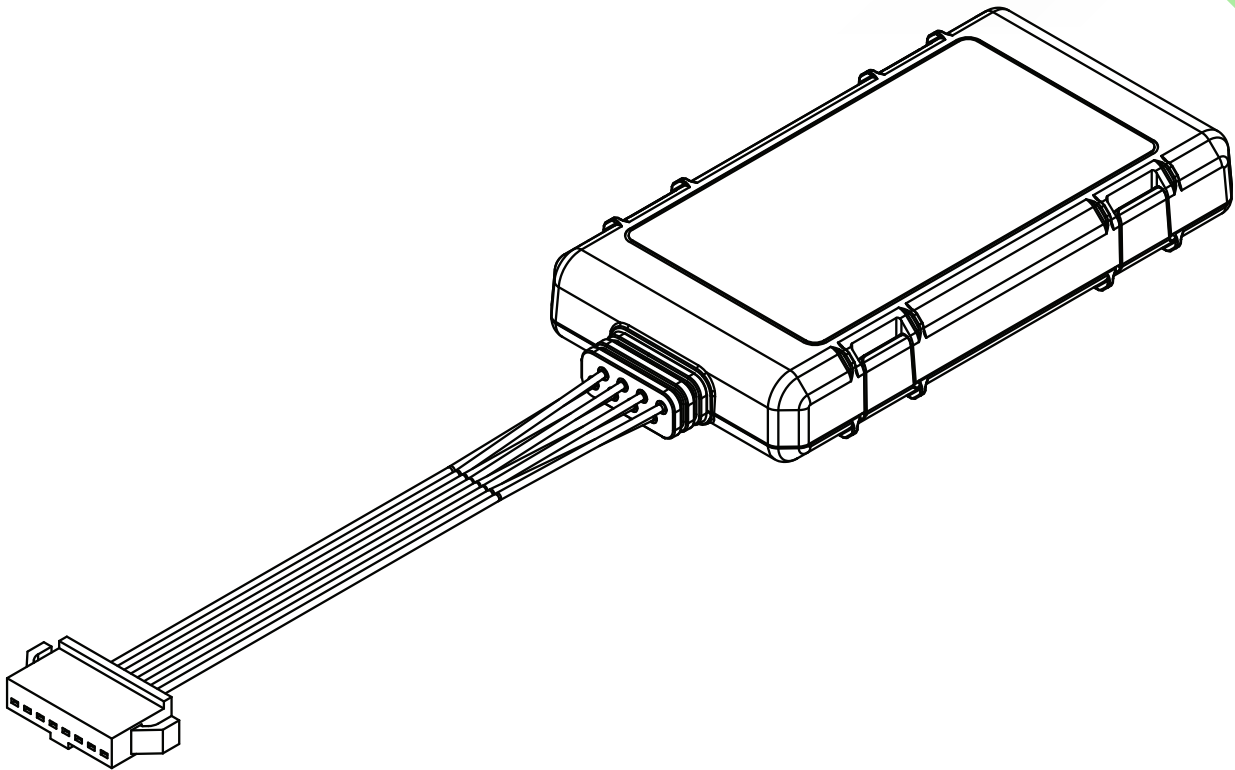
CONNECTION OPTIONS

The XFV-100 family of devices are available with flying leads or a JST connection for simple connection..

Device with flying leads



Device with JST connector





REQUIRED TOOLS

Tools used for installation of mobile electronics are required.

- Thin flat-tip screwdriver
- Cable ties
- Pliers
- Wire strippers
- Multimeter
- Electrical tape



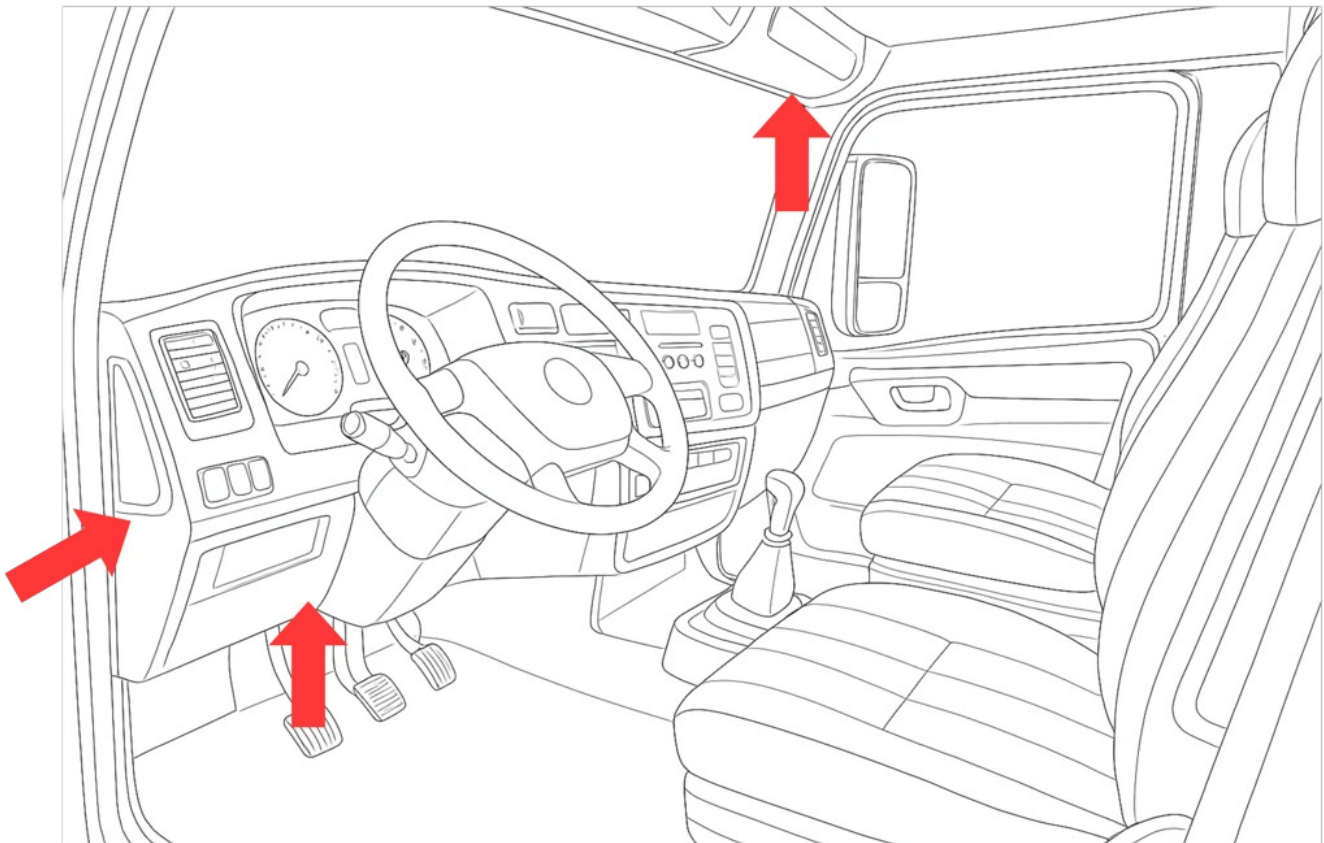
CHOOSE A MOUNTING LOCATION

Find a suitable location for installation. The unit should be installed in a horizontal position relative to the ground.

Choose an installation location that supports the following requirements:

- **Accessible:** The location should be accessible for easy connection or disconnection of peripherals and power sources.
- **Connectivity:** The location must be reachable from all of the power connections and peripherals. There should be enough cable length for each connection to create service loops.
- **Reception:** The device requires access to cellular and global positioning signals to function properly. Make sure the device has clear, unrestricted access to these signals. For optimum reception, do not install the device under metal brackets or near HVAC motors.
- **Operating temperature:** The device should be installed in a location where the operating temperature does not go below -13°F (-25°C) or exceed 140°F (60°C).

Mounting locations



SIM CARD INSTALLATION (SOME MODELS)

If a SIM card is not installed, an activated SIM card must be installed in the device prior to installation.

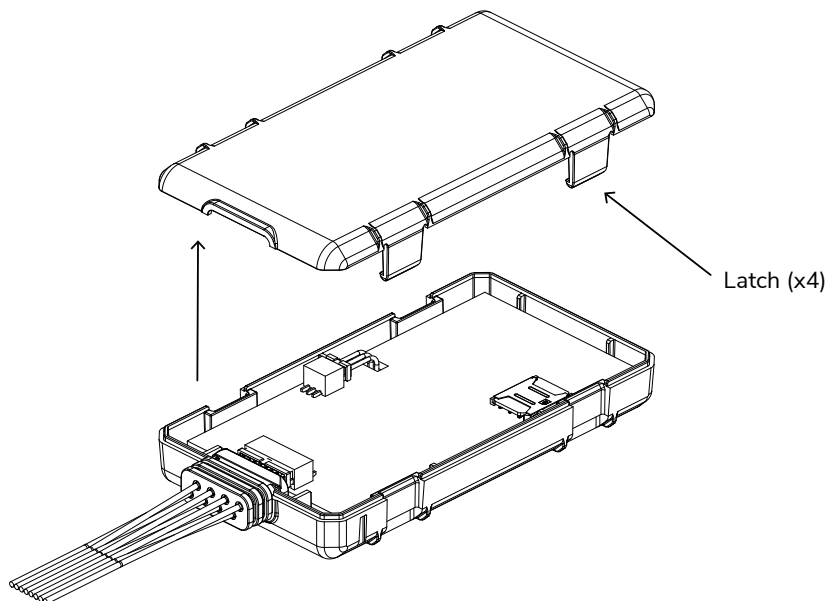
CAUTION: Do not remove or install the SIM card when the device is connected to power.

1. Open the device.

- **IP54 Models**

a. Use a thin flat-tip screwdriver to gently lift the latches on the device and remove the top of the housing.

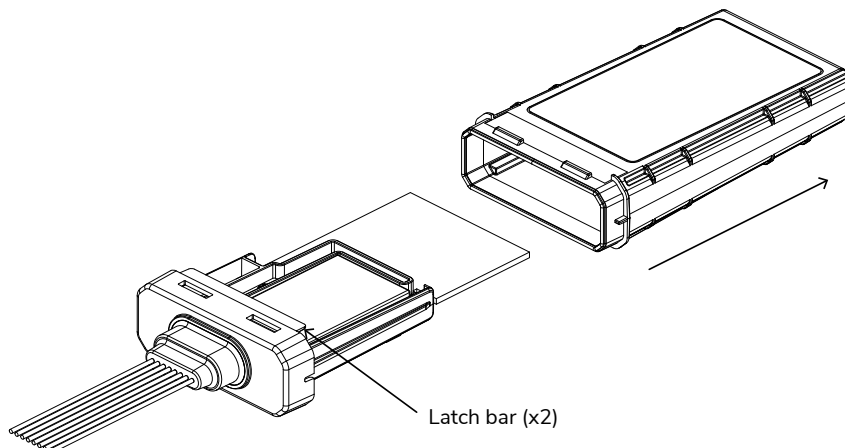
Remove the top



- **IP67 Models**

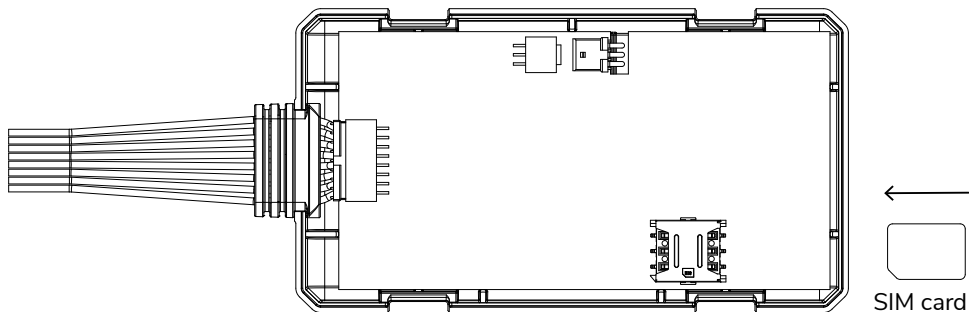
Use a thin flat-tip screwdriver to gently lift the latch bar on the top and bottom of the device and remove the circuit board assembly from the housing.

Open the device

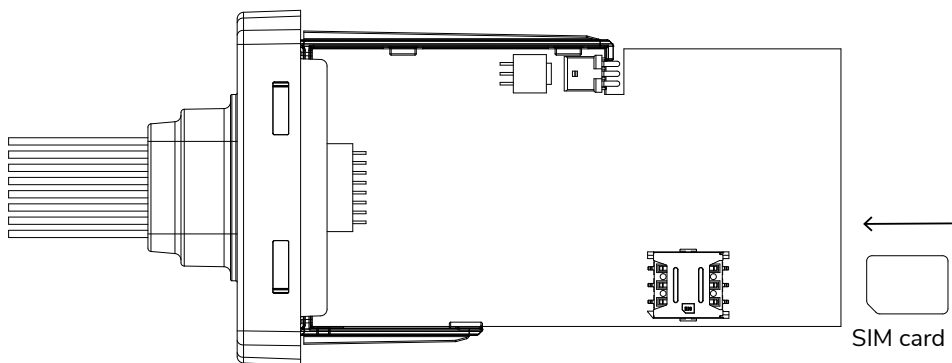


2. Locate the SIM holder and insert a 4FF SIM card as shown in the following diagrams.

Install the SIM card, IP54 model



Install the SIM card, IP67 model

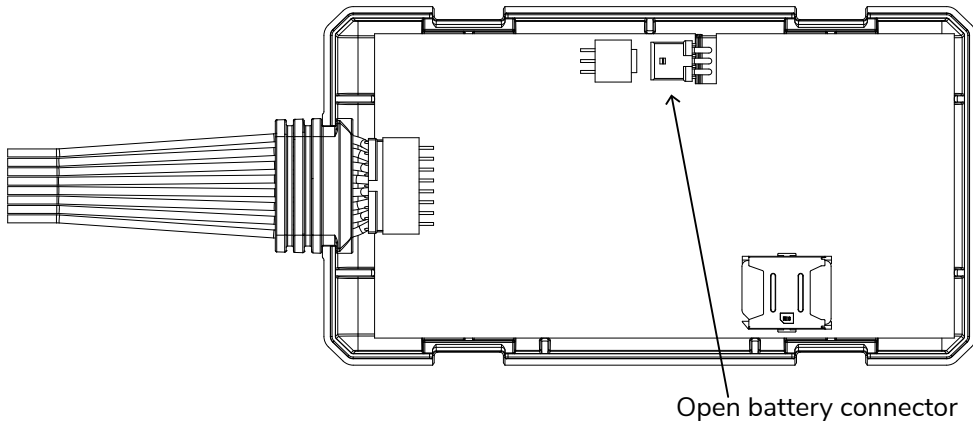


CONNECT THE BATTERY

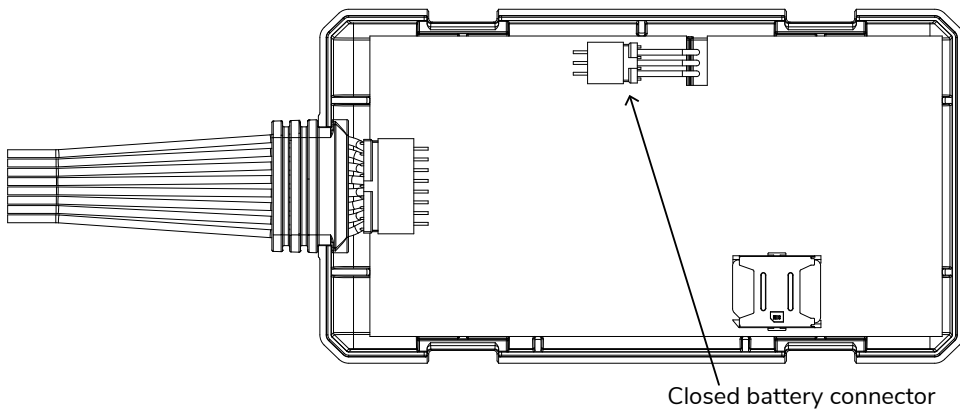
If the internal battery is not connected to the device's circuit board, it must be connected to provide backup power to the device.

1. Connect the battery.

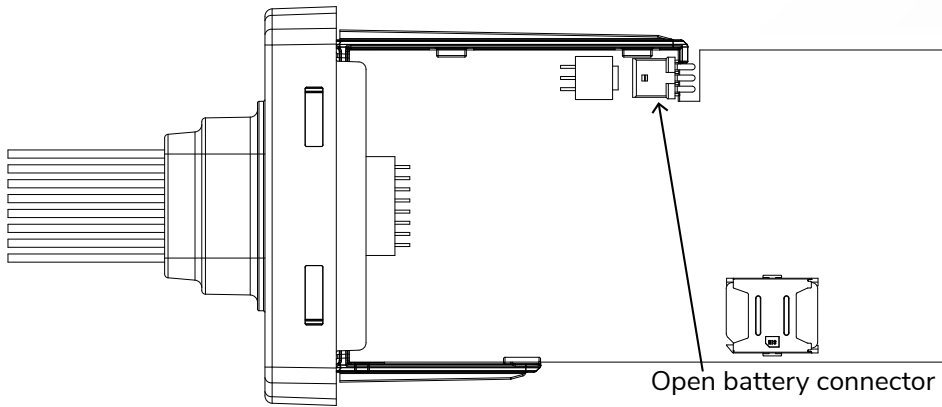
Open battery connector, IP54 model



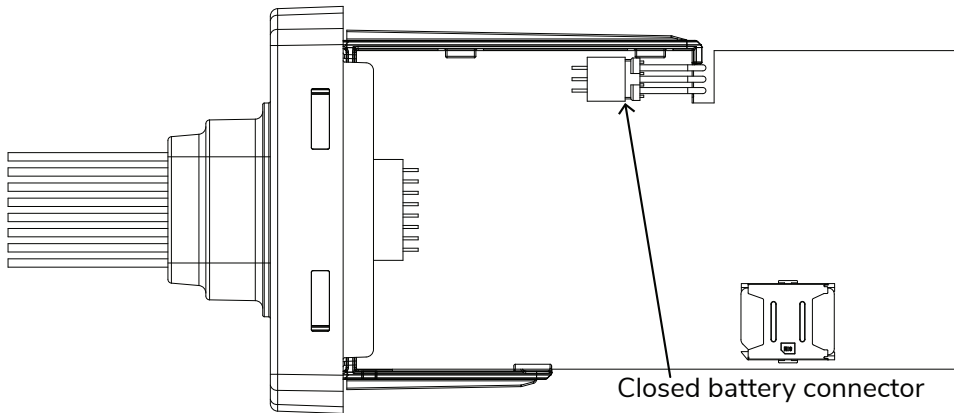
Closed battery connector, IP54 model



Open battery connector, IP67 model

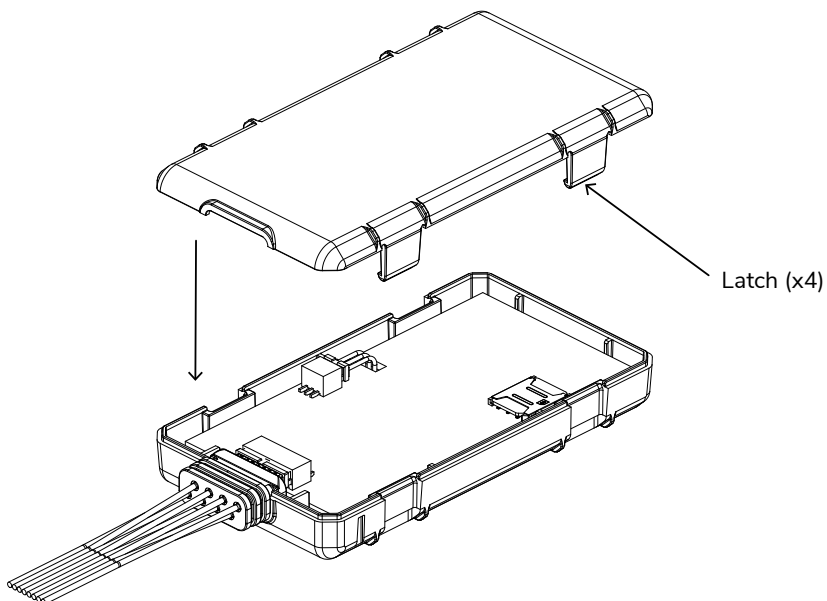


Closed battery connector, IP67 model

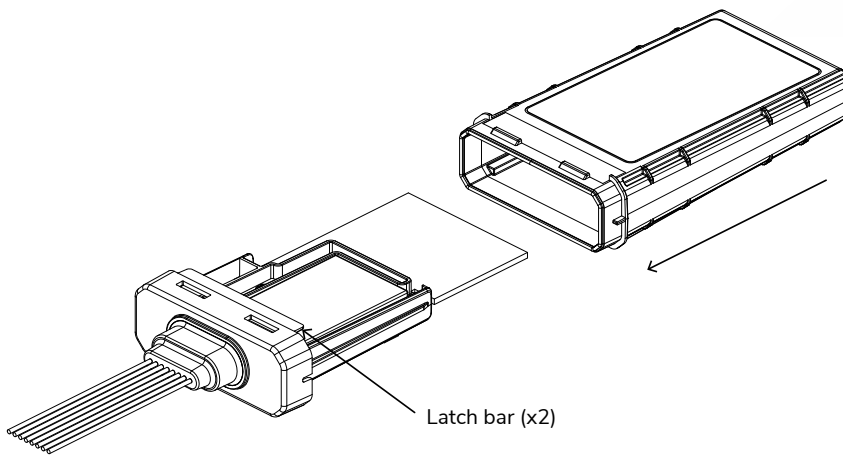


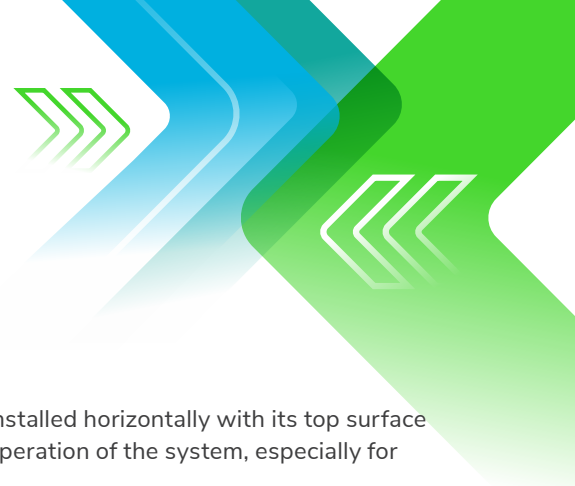
2. Replace the housing and snap it into place.

Attach the top (IP54 model shown)



Attach the cover (IP67 model shown)





SECURE THE DEVICE

Place the device in the desired installation location. The device must be able to be installed horizontally with its top surface oriented towards the sky. Precise orientation is of particular importance to proper operation of the system, especially for accelerometer-based event detection.

The device can be secured with the included cable ties or 3M VHB tape (if installed)

Cable Ties

Wrap the included cable ties around the device and secure the device to the installation location.

3M VHB Tape

Perform the following procedure to use 3M VHB tape.

Note: For optimum installation, the device should be installed in a room with a minimum ambient temperature of 50°F (10°C).

1. Use an abrasive pad and isopropyl alcohol pads to scour and clean the mounting surface.
2. Apply primer if recommended to improve adhesive strength.
3. Make sure all surfaces are completely dry and free of moisture before mounting the device.
4. Remove the 3M VHB tape backing from the device.

Note: Ensure no contaminants from hands or tools are introduced to the tape or mounting surface.

5. Press and hold the device to the mounting surface for 15 seconds.

HARDWARE HOOKUP

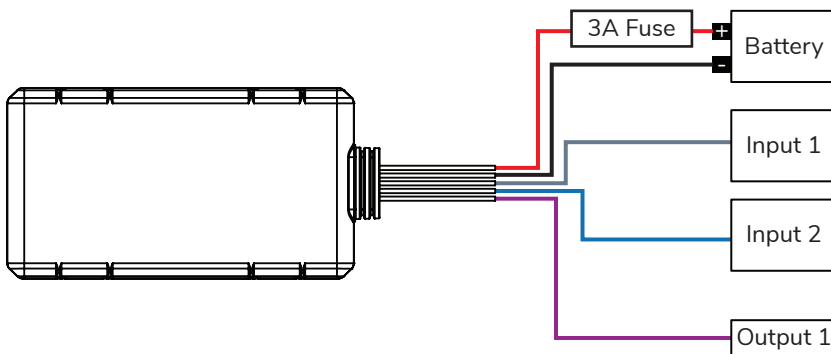
General Instructions

1. If using a wire harness, connect the wire harness to the device.
2. Make connections to the device as required. Refer to the images below for connection details.

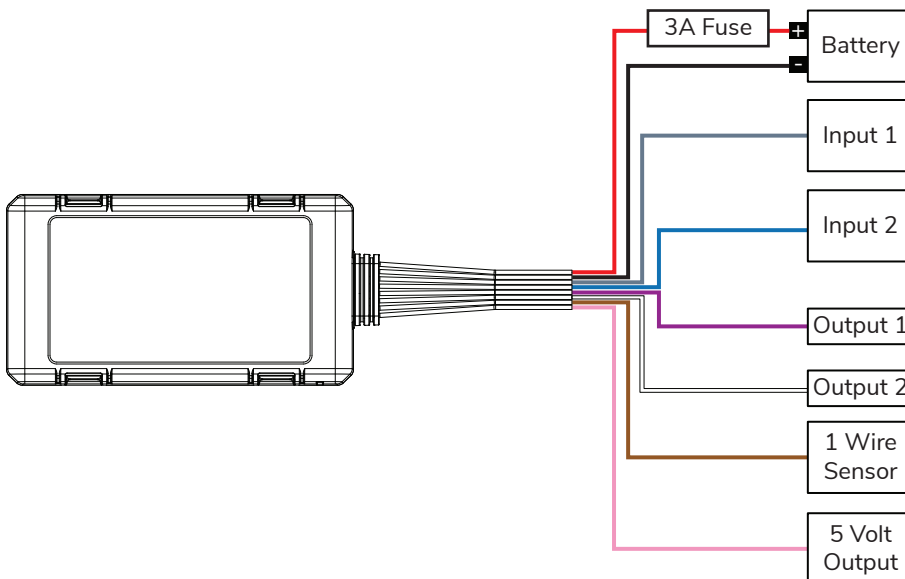
Notes:

- A 1 amp fuse must be present on the power wire to meet all safety requirements.
- If a vehicle's ignition power source is to be used to wake the device to denote vehicle "on" state, connect a sensor input to the vehicle's ignition power circuit and program the device accordingly.

Five-wire devices



8-wire devices





Connect Input(s)

XFV-100 devices have up to two inputs that can be configured for digital or analog operation.

Note: The XFV-101 and XFV-103 have one input while the XFV-102 and XFV-104 can support up to two sensors.

Analog Operation

When set to operate as an analog input, the input operates with the following specifications:

- Acceptable input range: 0 to 31 V, ± 0.25 V
- Analog-to-digital conversion: 14-bit resolution

Digital Operation

- Threshold: 4.7 V
- Frequency monitoring: Up to 3 kHz

Note: Observe the following when making connections.

- Connect the peripheral device's output to an input on the XFV-100 device.
- Connect the peripheral device's ground to the XFV-100's ground.
- Powered peripherals should be powered from the same source as the XFV device.
- Use shielded cable.
- Keep signal wire less than 6 feet (approximately 2 meters).
- If noise is an issue, add filtering capacitors.

Connect Outputs to Other Devices

XFV-100 devices can connect to up to two analog devices. The outputs provide the following:

Note: The XFV-101 and XFV-103 have one output while the XFV-102 and XFV-104 have two outputs.

- Sink current (nominal): 100 mA
- Maximum current: 500 mA
- Maximum voltage: 31 V

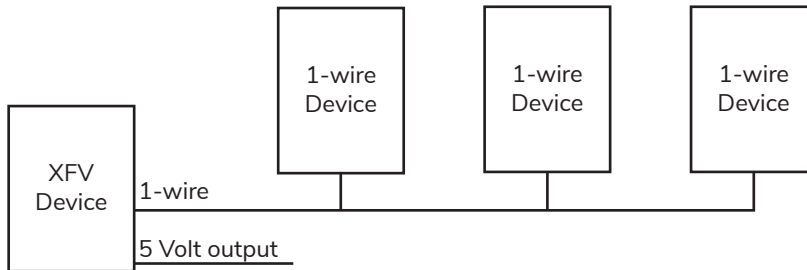
Note: Observe the following when making connections.

- Connect the XFV-100's output(s) to an analog input on the associated device.
- Connect the sensor's ground to the device's ground
- Powered sensors should be powered from the same source as the XFV device.
- Use shielded cable.
- Keep signal wire less than 6 feet (approximately 2 meters).
- If noise is an issue, add filtering capacitors.

Connect to 1-Wire Devices

The XFV-102 and XFV-104 can connect to up to three 1-wire devices such as temperature sensors and button readers. Refer to the following diagram for details.

1-wire connections



Observe the following when making connections.

- Connect the XFV-102 or XFV-104 device's 1-wire line to the 1-wire device's data output line.
- The XFV device and the 1-wire device must share a ground connection.
- A 5 volt supply is available for devices that require power.
- If a peripheral device does not have a pull up resistor, use a 4.7k Ω pull-up resistor between the XFV device's 1-wire connection and Vcc (usually 3.3V or 5V).
- Daisy-chain multiple sensors, avoiding star topology.



VERIFY INSTALLATION

Once installation is complete, verify device operation.

Ignition Power

If configured to detect ignition power, start the vehicle. The device will power up and within a minute will begin to operate.

Find the Device in Xirgo Device Manager

Once installed and power is applied, verify that the device reports in Xirgo Device Manager (XDM).

Device Location

Verify the GNSS location of the device in your fleet management software.



LED BEHAVIOR

The device's LED provides diagnostic information on the device's Global Navigation Satellite System (GNSS) and modem.

GNSS Status

The LED indicates the status of the device's GNSS using short blinks of the LED. The following table describes the operation of the device's LED.

Blink Count	Definition
1	No GNSS signal
2	Poor precision (Horizontal Dilution of Precision (HDOP) less than 1.5)
3	3 satellites locked (HDOP less than 1.5)
12	12 satellites locked (HDOP less than 1.5)

Modem Status

The LED indicates the status of the device's modem using long blinks of the LED. The following table describes the operation of the device's LED.

Blink Count	Definition
1	Modem is turned on. SIM card is valid. GSM is registered. GPRS is registered. Modem is connected to the internet. Modem is connected to the server.
2	Modem is turned on. SIM card is valid. GSM is registered. GPRS is registered. Modem is connected to the internet. Modem is unable to connect to the server.
3	Modem is turned on. SIM card is valid. GSM is registered. GPRS is registered. Modem cannot connect to the internet.
4	Modem is turned on. SIM card is valid. GSM is registered. No GPRS connection.
5	Modem is turned on. SIM card is valid. GSM is not registered.
6	Modem turned on. No further action can be taken.



Blink Count	Definition
7	Device started. No further action can be taken.



CONFIGURATION & SUPPORT

Configuration

The device is configured with Xirgo Device Manager (XDM), Xirgo's device management and configuration portal, where partners/users can adjust operation of each device to meet operational requirements and manage firmware.

Support

This device is designed and built for ease of installation and reliability. However, if you encounter difficulties while installing or using this product, technical support is available at <https://xirgo.com/contact/support/>.



SAFETY ADVICE

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.



REGULATORY INFORMATION

FCC

This equipment with FCC ID: GKM-XFV-100

Variants: XFV-104NA, XFV-103NA, XFV-102NA, XFV-101NA subject to the Federal Communications Commission (FCC) and Industry Canada (IC)rules.

Notice:

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

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,
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications made to this equipment not expressly approved by Xirgo Technologies, LLC may void the FCC authorization to operate this equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

Radio frequency radiation exposure information:

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

Warning: California Proposition 65

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.



IC

IC: 10281A-XFV100

Antenna Statement

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

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the Equivalent Isotropically Radiated Power (E.I.R.P.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la Puissance Isotrope Rayonnée Équivalente (P.I.R.E.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

License exempt

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference,
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage, et
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Hardware and Software Versions

NA Region:

HW Version: KALE-NA-C

SW Version: XFV-100NA-001

EA Region:

HW Version: KALE-EA-C

SW Version: XFV-100EA-001

LA Region:

HW Version: KALE-LA-C

SW Version: XFV-100LA-001



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