

RELi<sup>3</sup>ON<sup>®</sup>

insight  
SERIES<sup>®</sup>

# INSTALLATION GUIDE

12V, 24V & 48V MODELS



# THANK YOU FOR CHOOSING RELiON

Please read through this guide before installation. This Quick Installation Guide contains important information regarding the proper installation of InSight Series® lithium batteries and accessories. This QIG applies to all RELiON's InSight Series lithium batteries and their accessories. Should you have any questions concerning installation or use, please contact us at [reliombattery.com](http://reliombattery.com)



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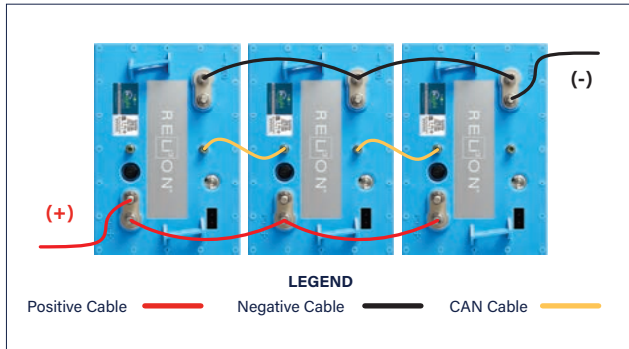
# BATTERY INSTALLATION INSTRUCTIONS



## 1. USE PARALLEL CONNECTIONS

InSight batteries are only to be connected in parallel to meet your energy requirements. **They cannot be connected in series.** See wiring diagram.

	12V	24V	48V
Parallel Connections	10	10	10
Series Connections	None	None	None



## 2. INSTALL THE BATTERIES CLOSE TOGETHER

If you are replacing your existing batteries with fewer than the original batteries, install the new InSight batteries close to each other in the battery compartment.

### **3. USE RELION INSIGHT BATTERY SPACERS**

We recommend using our Battery Spacers to fill the empty battery spots so you can use the existing battery hold-downs that come in your vehicle. These can be purchased on our website at [relionbattery.com](http://relionbattery.com). If you do not use our Battery Spacers, please ensure your InSight batteries are securely held down.

### **4. CABLE SIZE**

Be sure to use cables of equal lengths to connect your InSight batteries.

### **5. TORQUE**

79.7 – 88.5 in-lbs. 6.6 - 7.4 ft-lbs. 9 – 10 N-m.

### **6. UTILIZE CAN CABLES**

CAN cables (1 ft) are provided with your InSight battery. Starting with the first battery connect the CAN cable from the Output (positive battery side) to the Input of the 2nd battery (negative battery side) and so on. The CAN port on the negative side of the 1st battery and on the positive side of the last battery will remain unused. Longer CAN cables (2 and 4 ft) are available upon request. The CAN cables have 90° connectors. CAN cables with 180° connectors are available upon request.

### **7. POWER THE BATTERY ON**

Once connected, press and hold the POWER button on one of the batteries until you see the first LED flash green. It will continue to flash green every 5 seconds. You will notice that once you wake up one battery the remaining batteries will automatically wake up. Once the batteries are awake, you can tap the POWER button to see the state-of-charge (SOC) of each battery. Refer to Table 3 to determine the SOC. If the batteries are not at an equal SOC, they will balance upon being fully charged. Refer to Table 2 for how to turn off the battery.

## 8. CHARGING

It is best to use/select a Lithium charge profile.

## 9. COMPATIBLE ACCESSORIES AVAILABLE

The backlit InSight Fuel Gauge is a plug-and-play accessory that provides real-time State of Charge for your InSight batteries.

The InSight Remote Button gives you the convenience to power your InSight batteries on and off without having to access the battery compartment. These can be purchased online through [delcity.net](http://delcity.net).

## BATTERY INTERFACE

The battery cover has two tri-colored LEDs (green, yellow, and red) that are used to communicate the status of the battery, the SOC of the battery, as well as protection modes and errors. LED1 is on the left side and LED2 is on the right side of the LED display when facing the battery from the positive post side.



## TABLE 1: LEDS - BATTERY MODES

MODE	LED 1	LED 2
OFF	OFF	OFF
ON	Flashing Green (5 sec)	OFF
Charging	OFF	Flashing Green (2 sec)

## TABLE 2: POWER BUTTON FUNCTIONS

ACTION	OPERATION	REMARKS
Power ON	<i>Press and hold</i> button for 5s until: <ul style="list-style-type: none"><li>• LED1 Flashes Green</li><li>• Then release button</li></ul>	Battery will turn ON
Display SOC	With battery ON <i>Tap</i> button once	LED displays for 6 sec. See SOC STATUS Table 3
Power OFF	<i>Tap, release, then press and hold</i> button for 6s until: <ul style="list-style-type: none"><li>• LED1 Solid Red</li><li>• LED2 Solid Red</li><li>• Then release button</li></ul>	Battery will turn OFF



## TABLE 3: LEDS - (INITIATE WITH SINGLE TAP OF THE POWER BUTTON)

SOC	LED 1	LED 2
95% - 100%	Solid Green	Solid Green
75% - 95%	Solid Green	Flashing Green
50% - 75%	Solid Green	Solid Yellow
30% - 50%	Solid Green	Flashing Yellow
10% - 30%	Solid Green	Solid Red
0 - 10%	Solid Green	Flashing Red

For more detail, please refer to **RELiON's InSight Series Manual**, available by scanning:



# FUEL GAUGE INSTALLATION

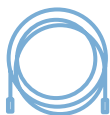
## WHAT'S NEEDED



**1x** RELiON  
Fuel Gauge



**1x** Mounting  
Bracket

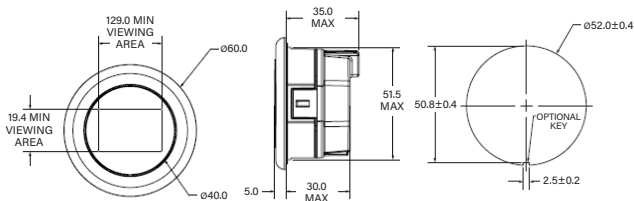


**1x** Fuel Gauge  
Cable Assembly  
(3 meter standard, 6 and  
10 meter available)



1. Power down the device in which the fuel gauge will be installed. Power down the first InSight battery in the string by tapping the power button once and then depressing the button until both LEDs on the battery show solid red (approx 6 seconds). Release button. The rest of the batteries in the string will also power off automatically.
2. Begin by locating the Fuel Gauge Cable Assembly. Attach the red ring terminal to the positive battery post and then the black ring terminal to the negative battery post on the first InSight battery in the bank.
3. Insert the CANBUS plug attached to the cable assembly wiring harness in the provided CANBUS SPLITTER.
4. Route the other end of the cable through the mounting bracket to the fuel gauge display destination on the vehicle dashboard and insert the four-pin cable plug into the back of the gauge. Important note - be sure to route the cable through the mounting bracket on the back side of the dashboard. **Use zip ties to secure harness to vehicle to reduce strain on plugs!**
5. Insert the fuel gauge through the dashboard and seat in the mounting bracket. Rotate the mounting bracket until the fuel gauge is held firmly in place on the dashboard. Installation is now complete. The fuel gauge will display current state of charge and other messages communicated by the battery bank.

## FUEL GAUGE MEASUREMENTS



# FUEL GAUGE MESSAGES AND WARNINGS

The fuel gauge will display several messages throughout its operation cycle.

1. Upon startup the gauge will display the number of batteries detected. Make sure the number of batteries detected match the number of batteries in the bank.
2. During normal operation the fuel gauge will display the state of charge of the battery bank digitally as a percentage from 0-100%.
3. While the battery bank is above 20% state of charge the upper line of text will display the SOC while the second line displays the number of batteries and the remaining amp hours of the battery bank.
4. While the battery bank is below 20% state of charge the upper line of text will display the SOC while the second line will show "LOBATT" message.
5. While the battery bank is at or below 10% state of charge the upper line of text will display the SOC while the second line of text will flash "LOBATT" every 2 seconds.
6. If the setup is not done correctly and the gauge does not read any batteries it will display the message "no comms".

## FUEL GAUGE SPECIFICATIONS

Operating Current	29 milliamps
Operating Temperature	14°F to 185°F (-10°C to 85°C)
Storage Temperatures	-40°F to 185°F (-40°C to 85°C)
Ingress Protection Rating	IP67

# REMOTE BUTTON INSTALLATION

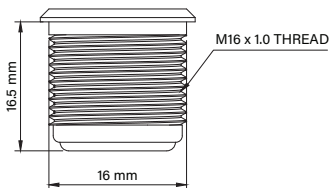
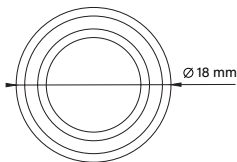


1. Begin by locating the Remote Button Cable Assembly. Route the connecting end through the button mounting destination hole, ending in the battery compartment. Use zip ties to secure the cable assembly to the vehicle to reduce strain on connections.
2. Attach the red ring terminal to the positive battery post and then the black ring terminal to the negative battery post on the first InSight battery in the bank.
3. Insert the CANBUS plug attached to the remote button cable assembly in provided CANBUS splitter on the first InSight battery in the bank.
4. Insert the CANBUS splitter in the CANBUS IN port on the first battery in the string.
5. Installation is complete. Test the function of the remote button by depressing the remote button until the InSight Batteries in the string power on (approx five seconds). LED 1 on all batteries will flash green.

*Note: Splitter is optional.*

*See diagrams for more information on your battery setup.*

## REMOTE BUTTON MEASUREMENTS

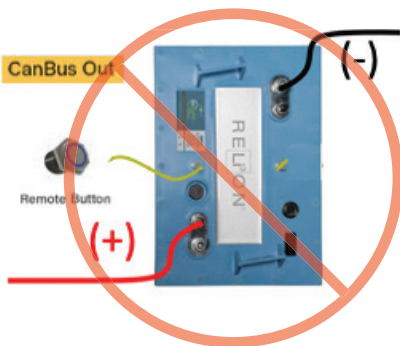
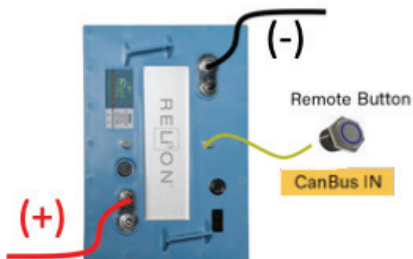


# INSTALLATION DIAGRAMS

## DIAGRAM #1:

### Remote Button Only + 1 battery

- Connect to IN comm port only
- Button works on a single battery

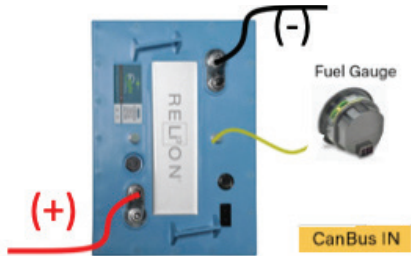


**DO NOT connect Remote Button OUT port.**

## DIAGRAM #2:

### Fuel Gauge Only + 1 battery

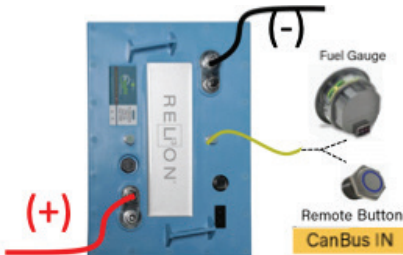
- Connect to IN or OUT comm port
- Gauge works on a single battery



## DIAGRAM #3:

### Remote Button + Fuel Gauge + 1 battery (with splitter)

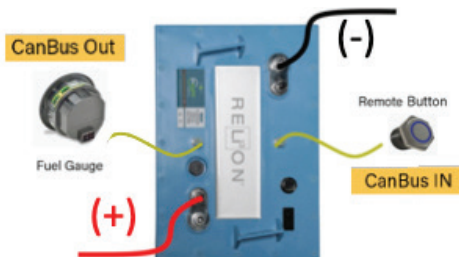
- Button/Gauge/splitter = connect all to IN port only
- Gauge and Button work on a single battery



#### DIAGRAM #4:

##### Remote Button + Fuel Gauge + 1 battery (no splitter)

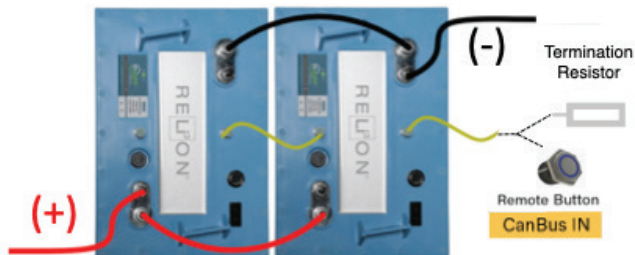
- Remote Button = connect to IN port
- Fuel Gauge = connect to OUT port
- Gauge and Button work on a single battery



#### DIAGRAM #5:

##### Remote Button only + 2 or more batteries (with splitter)

- Remote Button/Resistor/Splitter = to IN port on Battery #1
- Termination resistor required

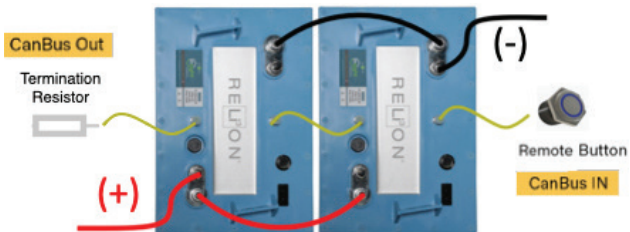




### DIAGRAM #6:

#### Remote Button only + 2 or more batteries (no splitter)

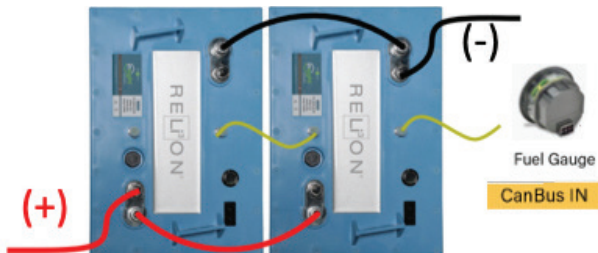
- Button = to IN port on Battery #1
- Resistor = to OUT port on last battery in string
- Termination resistor required



### DIAGRAM #7:

#### Fuel Gauge only + 2 or more batteries

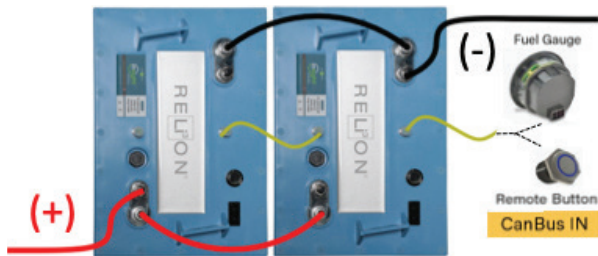
- IN port on Battery #1 or OUT port on last battery in string
- Gauge displays battery pack SOC



### DIAGRAM #8:

#### Remote Button + Fuel Gauge + 2 or more batteries (with splitter)

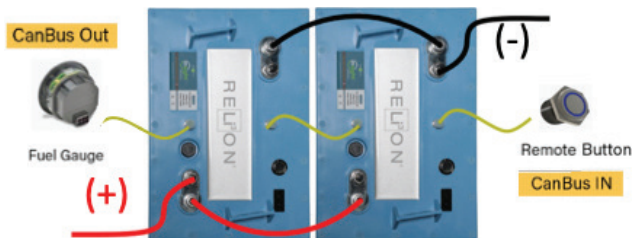
- Button/Gauge/Splitter = to IN port on Battery #1
- Button and Gauge control entire battery pack



### DIAGRAM #9:

#### Remote Button + Fuel Gauge + 2 or more batteries (no splitter)

- Button = connect only to IN port on Battery #1
- Gauge = to OUT port on last battery in string
- Button and Gauge control entire battery pack



Note: For CANbus connection network purposes, the Fuel Gauge is terminated, and the Remote Button is unterminated.

# PRECAUTIONS

Lithium Iron Phosphate (LiFePO<sub>4</sub>) batteries are an inherently safe chemistry. Please reference RELiON's Lithium Iron Phosphate Safety Document (available on our website at [reliombattery.com](http://reliombattery.com)) for more details. However, as with any electronics, safety measures should always be taken. Please adhere to these instructions for safe handling and operation:

- Wear safety glasses when installing batteries
- Use a wrench with a rubber coated handle
- Do not place any objects on top of batteries
- Make sure all cable connections are properly tightened
- Refer to RELiON's LiFePO<sub>4</sub> SDS for additional information

# TECHNICAL SUPPORT

If you have technical questions about your RELiON Battery, Fuel Gauge or Remote Button, please contact RELiON Battery directly at **[reliombattery.com](http://reliombattery.com)** or contact RELiON Technical Support at (855) 931-2466



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