Installation Instructions for
ION-9100 Remote Tank Level Display
Version 1.1 – 03/21/2016

Prior to beginning installation, please scan the QR code to the left, or download and print the most current instructions from our site here: http://www.ionitnetworks.com/pdf/ion-9100-install-guide.pdf.

Please **read through the entire set of instructions** and verify that you have all of the items needed for installation.

Items Included with your Remote Display

(1) ION-9100 Remote Tank Level Display Module
(2) ION-9422 Display Module USB Wall-plug Power Adapter

(2) Display Module
Power Adapter

(1) Display Module

What You'll Need to Setup Your Remote Display
☐ A magnet for activating the sensor
☐ The type and size of your tank (in gallons)

Note: The ION-9100 is designed to work in combination with IONIT's ultrasonic remote tank level monitor, sold separately (ION-9071).

SETTING UP YOUR DISPLAY
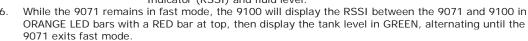
To begin using your new Remote Tank Display, you must associate or "pair" your display with your IONIT fluid level sensor (ION-9071) located on your oil tank. Follow Step 1 below to associate your display to your oil level sensor. By default, your display is setup for the most common oil tank type and size, a Granby type 275 gallon standard vertical oil tank. If you have a different type/size tank please follow Step 2 below. Also, your display is setup by default to operate as a display only. There are several other operating modes for advanced functionality. Please see Step 3 for configuring the operating modes of your 9100.

STEP 1: Associate ("pair") Your 9071 Fluid Level Sensor to Your 9100 Remote Tank Display

1. Plug the 9100 into its wall-plug USB power adapter and into an outlet near your 9071 level sensor
2. The 9100 will power on and every other LED will be flashing RED (meaning, not associated with a 9071)
3. Place the 9071 into fast mode by swiping a magnet over the black dot on the 9071. The 9071 will remain in fast mode for about 4 minutes.
4. Once the 9071 is in fast mode, after about 10 seconds the 9100 will lock onto the 9071's signal be paired with it, then the 9100 will display the fluid level from the 9071.
5. With the 9071 in fast mode, unplug the 9100 and its power supply and move it to a convenient location in your home where you want to view your tank level remotely. Plug in the power supply to a live un-switched electrical outlet, and then plug the 9100 in to it. The 9100 will display the Received Signal Strength Indicator (RSSI) and fluid level.
6. While the 9071 remains in fast mode, the 9100 will display the RSSI between the 9071 and 9100 in ORANGE LED bars with a RED bar at top, then display the tank level in GREEN, alternating until the 9071 exits fast mode.
7. Once the 9071 has exited fast mode, the 9100 will display the tank level. Since the 9071 transmits the tank level once per hour, the 9100 will display the fluid level in the tank as reported by the 9071 during its last transmission.
8. On each subsequent hourly 9071 transmission, the 9100 will display the RSSI for about 1 second, and then display the tank level.

ION-9071 Fluid Level Sensor

Full Strength RSSI

STEP2: Select the Your Correct Tank Type and Size

Your 9100 is setup by default for a Granby 275 gallon vertical tank. To select a different tank:

1. Hold the magnet to the upper LEFT side of the 9100 display module lined up with the "i" in IONIT's logo (shown by the red arrow), until the display flashes
2. Remove the magnet
3. Swipe magnet at the same spot each time to increment the ORANGE LED bar from the first bar position at the bottom (position 1) to the top bar (position 10), per the Tank Type/Size table below.
4. Once the correct tank is selected, place and hold the magnet on the left side of the 9100 again until the display returns to normal. Your selected tank is locked in to your 9100 now.

Note: The unit will revert to normal operation using the previously selected tank size if there is no activity for 10 seconds

ORANGE LED Bar Position	Tank Type/Size
10	84" Horizontal cylinder
9	78" Horizontal cylinder
8	72" Horizontal cylinder
7	54" Horizontal cylinder
6	48" Horizontal cylinder
5	Roth style 1500L (400 gal)
4	Roth style 620L (165 gal) or 1000L (275 gal)
3	Granby style 190 gallon (720L) or Convault style 2000 gallon
2	Granby style 275 gallon horizontal tank
1 (DEFAULT)	**Granby style 275 gallon standard vertical tank** Use this setting for 330 gallon vertical tank, dual 275 or dual 330 gallon tanks, 138 gallon and Roth style 400L tanks.

ORANGE LED Bar
at position 1
Granby 275

ORANGE LED Bar at position 4
Roth Style 620L

STEP3: Configure the Remote Display's MODE of Operation (ADVANCED FEATURE)

If you wish to change the operating mode of your 9100 from the default Display Only Mode, please follow these instructions. Your 9100 Remote Display can operate in 3 distinct operating modes and 1 test mode:

Mode	Mode Description
Display Only Mode (DEFAULT)	**When in this mode, the 9100 will display the last reported tank level and the RSSI between the 9071 and 9100.**
Repeater Mode	Displays the RSSI when a transmission is received, then displays its mode until next received transmission. *Acts as a signal Repeater when used in combination with IONIT Networks 9401 Hub for cloud-based remote monitoring. When in Repeater mode, the 9100 listens for signals transmitted from any IONIT device (e.g. 9071 fluid level sensor) and repeats the signal. Used when there is low RSSI between 9401 Hub and IONIT devices. Place the 9100 between IONIT devices and IONIT Hubs to have signals span greater distances.*
Display and Repeater Mode	Combines both functionalities as described above. When it repeats a signal, all LEDs
LED Test Mode	Counts in binary from 0-1023 using yellow LEDs. If any segments are green, red or blank, then a failure exists.

To change the Mode of Operation:

1. Plug the 9100 wall-plug power adapter into a live power outlet
2. With the 9100 display module unplugged from power, hold the magnet against the upper RIGHT side of the 9100 and then plug it into its power adapter
3. Keep holding the magnet in place until the LED display starts flashing
4. Remove magnet
5. Swipe magnet each time to increment through each mode (0 bars to 9 bars)
6. Once the correct mode is selected, hold the magnet against the upper RIGHT side again until the 9100 resets

Note: The unit will revert to normal operation using the previously selected mode if there is no activity for 10 seconds

ORANGE LED Bar Position	Operating Modes
10	Reset and restore factory configuration
9	Reset and restore factory configuration
8	Reset and restore factory configuration
7	LED Test Mode
6	Not in use – reserved for future feature – chirp transmitter
5	Not in use – reserved for future feature – signal level meter
4	Not in use – reserved for future feature – Drive-by Tank Level™
3	Display and Repeater Mode
2	Repeater Mode
1 (DEFAULT)	**Display Only Mode**

ORANGE LED Bar
at position 1
Display Only Mode

ORANGE LED Bar at position 4
Not In Use

How To Read My Remote Display

Reading Tank Level

Number and Type of LED Segments	Fuel level based on your tank's capacity in gallons
10 GREEN Solid LEDs	Full Tank - 95% to 100% full
9 GREEN Solid LEDs	85% to 95% full
8 GREEN Solid LEDs	75% to 85% full
7 GREEN Solid LEDs	65% to 75% full
6 GREEN Solid LEDs	55% to 65% full
5 GREEN Solid LEDs	45% to 55% full
4 GREEN Solid LEDs	35% to 45% full
3 GREEN Solid LEDs	25% to 35% full
2 GREEN Solid LEDs	20% to 25% full
2 YELLOW Solid LEDs	TANK LEVEL WARNING – 15% to 20% full
1 YELLOW and 1 RED Solid LED	TANK LEVEL WARNING – 10% to 15% full
1 RED Solid LED	TANK LEVEL WARNING – 5% to 10% full
1 RED Flashing LED	LOW TANK ALERT – less than 5% full

Reading Diagnostics

Type of LED Segments	Fuel level based on your tank's capacity in gallons
Flashing alternate RED LEDs	9100 Remote Tank Display is not associated ("paired") with your 9071 fluid level sensor
Flashing GREEN LEDs	9100 is paired to a 9071 fluid level sensor, but the 9071 sensor is in Hibernate mode
Solid YELLOW LEDs instead of GREEN LEDs for tank level	Replace Battery in your 9071 fluid level sensor. Indicates battery is below 2.4 Volts. When tank level display is in TANK LEVEL WARNING range (see above table), this low battery indicator will not be visible as it will overlap with the TANK LEVEL WARNING display.
Solid RED LED above Tank Level LEDs	Indicates the 9100 has not received a transmission from its paired 9071 in over 6 hours
Animating YELLOW LEDs with RED LED on top	Received Signal Strength Indicator (RSSI) display (see table below)
Flash All LEDs RED	Indicates 9100 just received a transmission from the paired 9071, or is repeating a transmission.

Reading Received Signal Strength Indicator (RSSI)

Number and Type of LED Segments	Fuel level based on your tank's capacity in gallons
9 YELLOW + 1 RED top LED	over 95% signal strength
8 YELLOW + 1 RED top LED	over 85% signal strength
7 YELLOW + 1 RED top LED	over 75% signal strength
6 YELLOW + 1 RED top LED	over 65% signal strength
5 YELLOW + 1 RED top LED	over 55% signal strength
4 YELLOW + 1 RED top LED	over 45% signal strength
3 YELLOW + 1 RED top LED	over 35% signal strength
2 YELLOW + 1 RED top LED	over 25% signal strength
1 YELLOW + 1 RED top LED	over 15% signal strength
1 RED LED	LOW SIGNAL – under 15% signal strength

IMPORTANT INFORMATION

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.

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:

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

Do not change or modify the device. Any modifications will void your authority to operate the equipment.