STELLAR-VIEW

MANUAL

INSTALLATION | OPERATION | MAINTENANCE

FIRESTELLAR

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Revision History

SR.	VERSION	DATE	CHANGELOG	AUTHOR
1	v1.0	20/11/2019	Initial Release	KP
2	v1.1	25/11/2019	Updated Annexure A Table	KP

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Overview

Description

Stellar-View is an Electronic LED Tank Level Indicator useful for measuring Volume of Liquid in a Tank. Sleek futuristic construction and design aptly fits on all types of mobile vehicle applications as well as static installations. Unique combination of configurable Led-Bar and Segment displays provide Level Indication along with Battery Voltage Indication

Features

- High-Intensity LEDs for distant signaling
- Displays Level in % and Liters
- Indicates Battery Voltage
- Alarm support to prevent Pump Dry-run
- Withstands extreme weather cycles
- High Impact and Vibration resistance
- Supports all shapes and sizes of Tanks
- Adjustable LED brightness

Specifications

- Operating Voltage   :   8 – 32VDC
- Dimensions   :   95 x 175 x 60 mm
- Mounting Type   :   Flanged
- Electrical Protection :   Reverse Polarity, Over Voltage
- Sensor Rating   :   4 – 20mA, Max 4m Tank Height
- Alarm Output   :   Active High, Max Load 2A, External Fuse recommended
- Cut-Off Output   :   Active High, Max Load 2A, External Fuse recommended

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Display & Button Details

Buttons

The device consists of 2 buttons marked as `'A'` and `'B'`
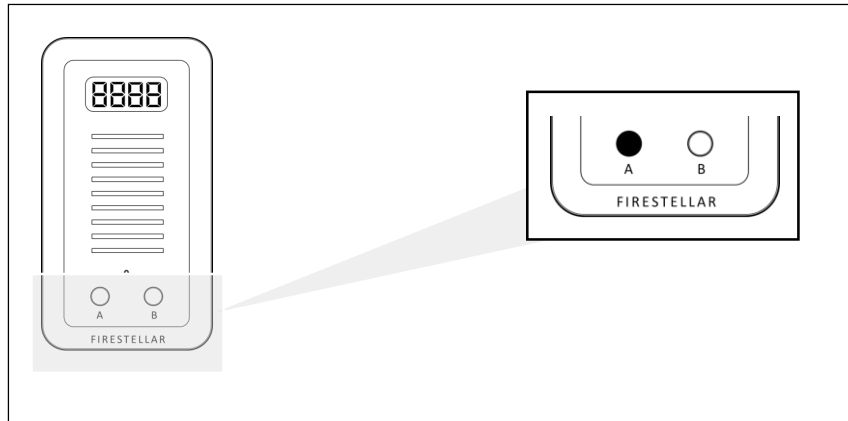
Buttons `'A'` and `'B'` can be pressed for short or long duration to execute different functions. Below are the 3 pressing patterns.

1. Momentary Push   :   Simple click of the button for short duration
2. Short-Momentary   :   Press and Hold button for approximately 2 seconds
3. Long   :   Press and Hold button for approximately 5 seconds
4. Extra Long   :   Press and Hold button for approximately 10 seconds

Device will work depending on the operating mode and duration of Button press
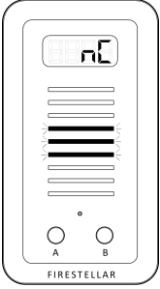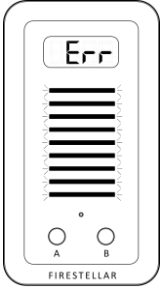
- In Normal mode,

    `'A'` is used to Toggle the Segment display modes. Refer Segment Display section for details

    `'B'` is used for Alarm acknowledgement. Alarm can be configured to provide Low Level, High Level or both alerts. Pressing *'B'* shall silence the Alarm.

- For Calibration Mode, please refer to Calibration section
- For User Settings Mode, please refer to User-Settings section

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LED Bars – Patterns & Significance

Different pattern of LED Bars signify internal status of the device. Solid-On LEDs indicate normal functioning and is a direct representation of Liquid Volume in the Tank.

0% to 9%	10% to 19%	20% to 29%	30% to 39%	40% to 49%

50% to 59%	60% to 69%	70% to 79%	80% to 89%	90 to 100%
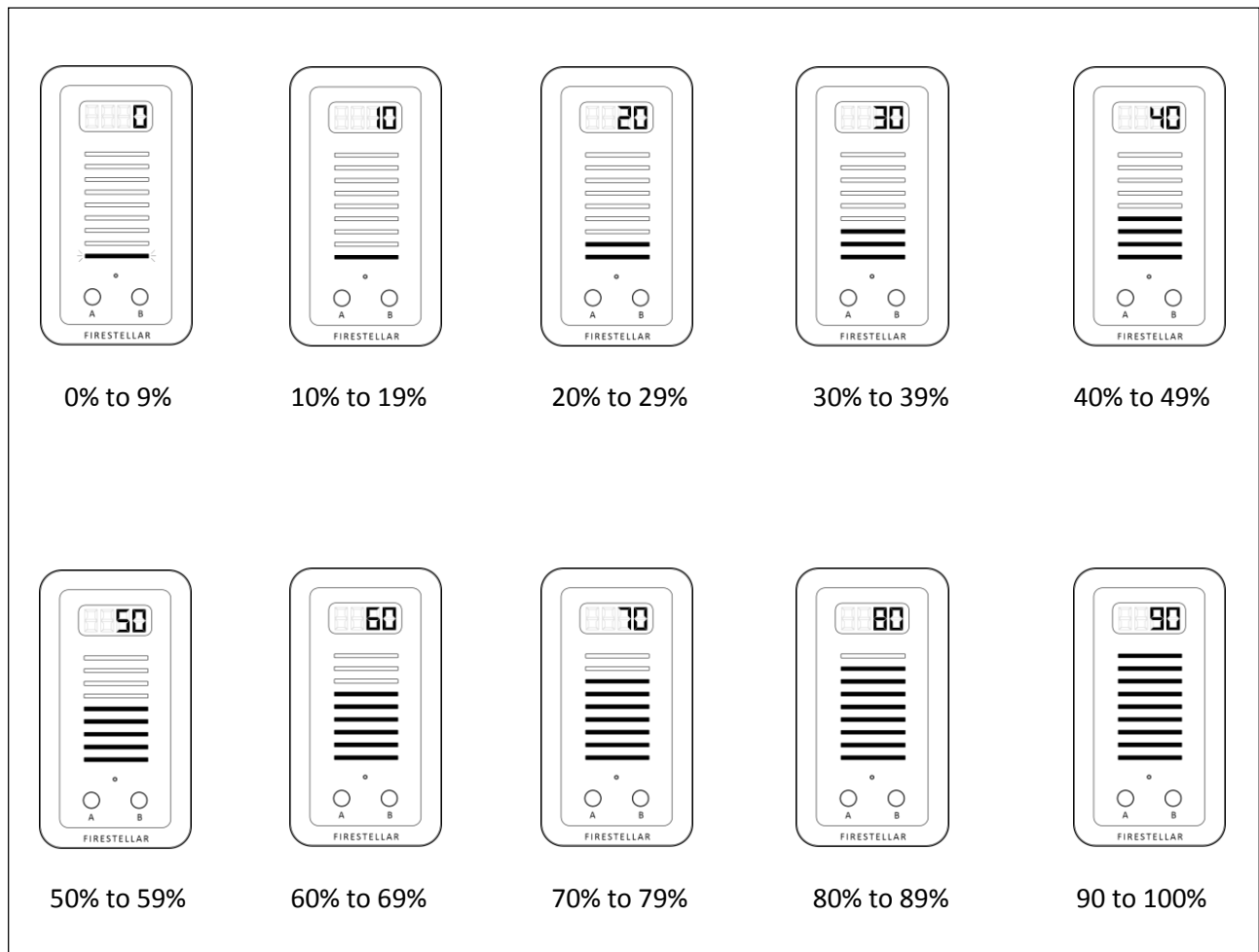
Blinking LEDs indicate User Intervention is required

	Segment Display : " *CAL*" LED-Bar : Top (Green) & Bottom (Red) Blinking This pattern indicates the Unit is not calibrated. <u>Refer to Calibration section</u> for more information on how to calibrate the Device
	Segment Display : " *nC*" LED-Bar : Center 3 LEDs (Yellow) Blinking This pattern indicates the Device cannot detect the Sensor. Possible solutions are: - Check whether the Sensor cap and its Connector are properly fastened - Inspect for any wire cut or damage in Sensor Harness - Make sure the Harness Connector is properly connected to Device Connector - Make sure the Ball Valve connected to Sensor is Open **NOTE**: Device will not Enter in Calibration Menu if the Sensor is not connected
	Segment Display : " *Err*" LED-Bar : All LEDs Blinking This pattern indicates the device has encountered internal Error. The issue can be at either of 3 points, viz. inside the device, Sensor harness or Sensor itself To troubleshoot, connect alternate sensor or harness, if available, to find out the exact cause of error. If the analysis verifies the Device has problem, contact us for further assistance

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Segment Display – Information Options

Segment Display can toggle between different modes to indicate Volume of Liquid in Liters, Volume of Liquid in Percentage or Battery Voltage. The display mode can be switched by pressing the `'A'` key

Assuming setup as in Figure below,
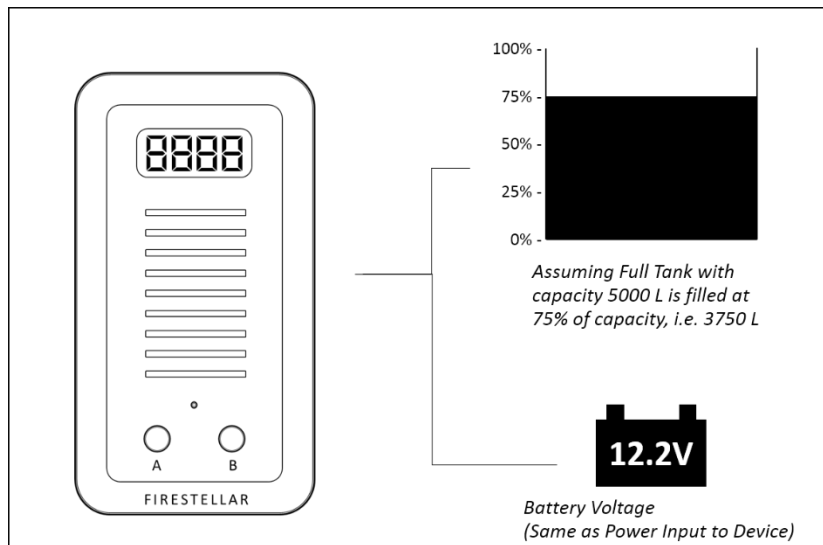
Pressing Button `'A'` toggles between different display modes

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Calibration

Entering Calibration Mode

Power On the device normally and wait for the Self-Test to complete. Press & Hold `'A'` button for 5 seconds till `'----'` appears on the Display. Release `'A'` button and check whether `'C101'` appears on the Display with Top-most Green LED from LED-Bar blinking. This signifies that the device has entered Calibration Mode

Performing Calibration

Tank is calibrated for Low and High level using Codes 101 and 102
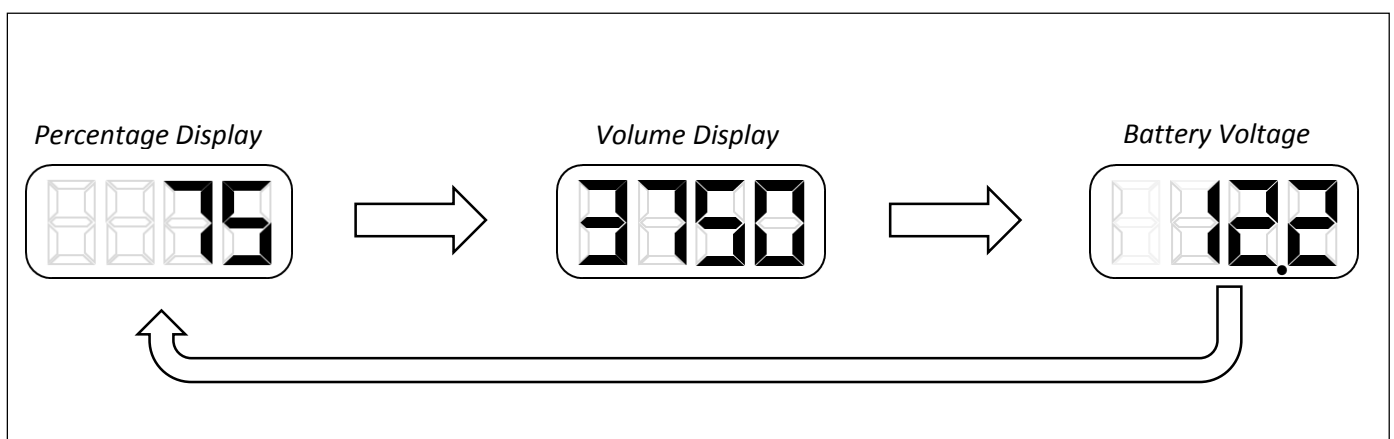
1.   Full Tank Calibration (Code `C101`)
     a.   Completely fill the Tank
     b.   Press `'B'` on the device
     c.   Number 3 will show up on the Segment display
     d.   Press `'B'` again till the Display counter reduces and shows `' set'`. This multiple press extra precaution is to avoid accidental calibration value over-write

Navigate to Code `C102` by pressing `'A'`

2.   Empty Tank Calibration (Code `C102`)
     o   Drain the liquid and Empty the Tank completely
     o   Press `'B'` on the device
     o   Number 3 will show up on the Segment display
     o   Press `'B'` again till the Display counter reduces and shows `' set'`. This multiple press extra precaution is to avoid accidental calibration value over-write

Note: Empty Tank can also be calibrated before Full Tank. The order of Empty and Full tank is not mandatory but nevertheless, both values shall be necessarily set for successful calibration of the Tank

Exiting Calibration Mode

After calibration is complete, either power cycle the device to resume normal operation or press & hold both `'A'` and `'B'` simultaneously for 5 seconds

Reset Calibration

While in the Calibration mode (either `C101` or `C102` is visible on the Segment display), Press and Hold `'A'` for approximately 10 seconds to reset calibration. Power cycle the device or press & hold both `'A'` and `'B'` simultaneously for Long push duration (5 sec) to return to Normal Mode. The Top-most and Bottom-most Blinking LEDs along with Segment display showing `" CAL"` verifies that the Calibration Reset was successful

Note: Both, Tank Empty and Tank Full values need to be set after calibration reset

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User Settings

Entering User-Settings Mode

Power On the device normally and wait for the Self-Test to complete. Press & Hold `'A'` & `'B'` button simultaneously for 5 seconds till `'----'` appears on the Display. Release both `'A'` & `'B'` buttons and check whether `'C201'` appears on the Display. This signifies that the device has entered User-Settings Mode

Navigating User-Settings Mode

Button `'A'` is used as Next Key for navigation to next Code.

Button `'B'` is used to Change values. Short-Momentary `'B'` press saves the current digit and switches to next one. Once desirable values are set, press `'A'` to exit the Code

If an out of range value is input, internal buzzer double beeps and the value is set within bounds

Exiting User-Settings Mode

After completing all settings, either power cycle the device to resume normal operation or press & hold both `'A'` and `'B'` simultaneously for Long push duration (5 sec) and wait for device to resume Normal mode

Reset All Settings (Factory Reset)

While in the User-Setting Mode, Press and Hold `'A'` for approximately 10 seconds to reset all settings. Refer to Code Table for default values

Set Volume of Tank (Code `C201`)

User can set the Volume using Buttons `'A'` and `'B'` in the range of 0 to 9999 L. If the user does not want Volume viewing or if the Tank Volume is greater than 9999 L, the Volume value can be set to value 0. This will disable Volume view in Normal Mode. The Segment display will now toggle between Percent and Battery Voltage on `'A'` button Press.

Default Display Setting (Code `C202`)

Based on the application where the device is installed, user may select default Segment Display view. This setting allows user to select and save which parameter of Percentage, Volume or Battery View should be displayed after Power-On on the display

Alarm Configuration (Code `C203, C204, C205, C206 and C207`)

The device has an option to Activate or Deactivate Alarm signal. Alarm configuration has distinct settings for Low and High Level Alarm. Refer to Appendix Table A and for more details

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Brightness Setting (Code *C212*)

This setting allow user to select LED Brightness intensity of LED-Bar from Level 1 to Level 3. Level 3 is the brightest.

Force/Manual Calibration (Code *C213* and *C214*)

This is a very useful feature for Calibrating Multiple tanks with same specifications but on different vehicles

Codes C213 and C214 from User Settings Menu are used for manually entering sensor values

Calibrate One Tank on a vehicle, say Vehicle1, using the procedure as mentioned above.

Navigate to C213 and C214 on Vehicle1 and note the corresponding 4-digit values. These are the sensor values which can be directly fed on other Vehicles for manually feeding the calibration

Navigate to C213 on other vehicle, say Vehicle2 and enter the value as noted in procedure above. Repeat the same for C214. The calibration on Vehicle2 is now complete

Note: Follow this only if the Tank Size, Capacity and Sensor installation location are identical. Despite of this procedure, there may be a slight difference in Level Indication due to Sensor differences

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Installation

Main Unit Installation
Cut a slot of 149mm x 83mm as shown in the outline. Use 4 sets of M4 Nut-Bolt for fastening

Fig. Device Installation

70mm
83mm
149m
135m
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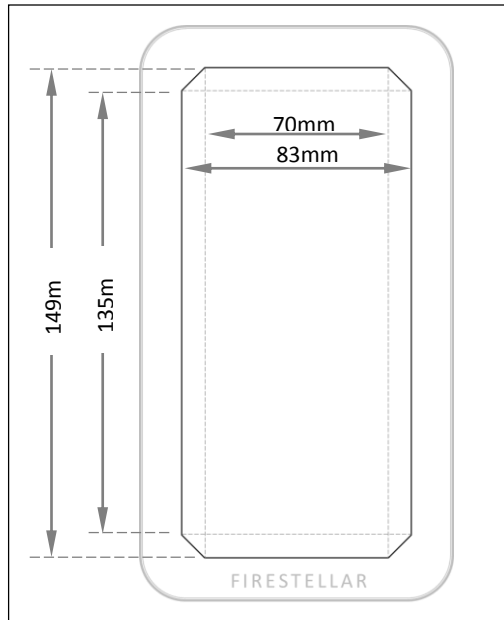
Sensor Installation
1. Weld a ¼" NPT SS coupling 2" above from the bottom of the tank. This elevation of 2" avoids contact of Sensor diaphragm with settled sludge/mud and impurities at the bottom of the Tank.
2. The Sensor should be mounted sideways i.e. parallel to ground surface and perpendicular to side wall of the Tank.
3. It is recommended to attach a ball valve in series between coupling and Sensor, for easy removal of Sensor for maintenance
4. It is recommended to consider this coupler early during Tank Design. This provides flexibility to connect pressure sensors in later stages of fabrication. Shall there be no requirement of Sensors, the hole can be easily plugged and closed later.
5. Use Teflon tape to tighten Sensor to its coupling to avoid water leakage.

Note: Tank shall be Vented/Open-To-Air for Accurate Sensor Function
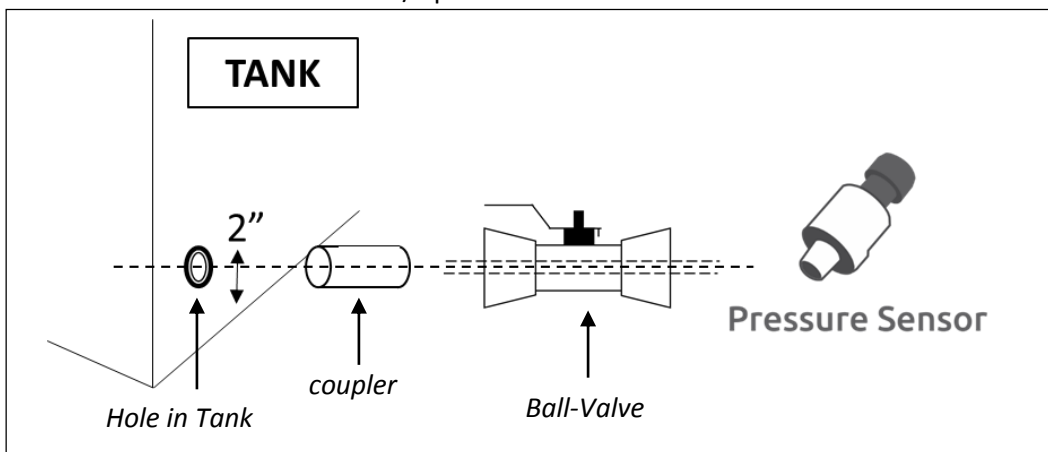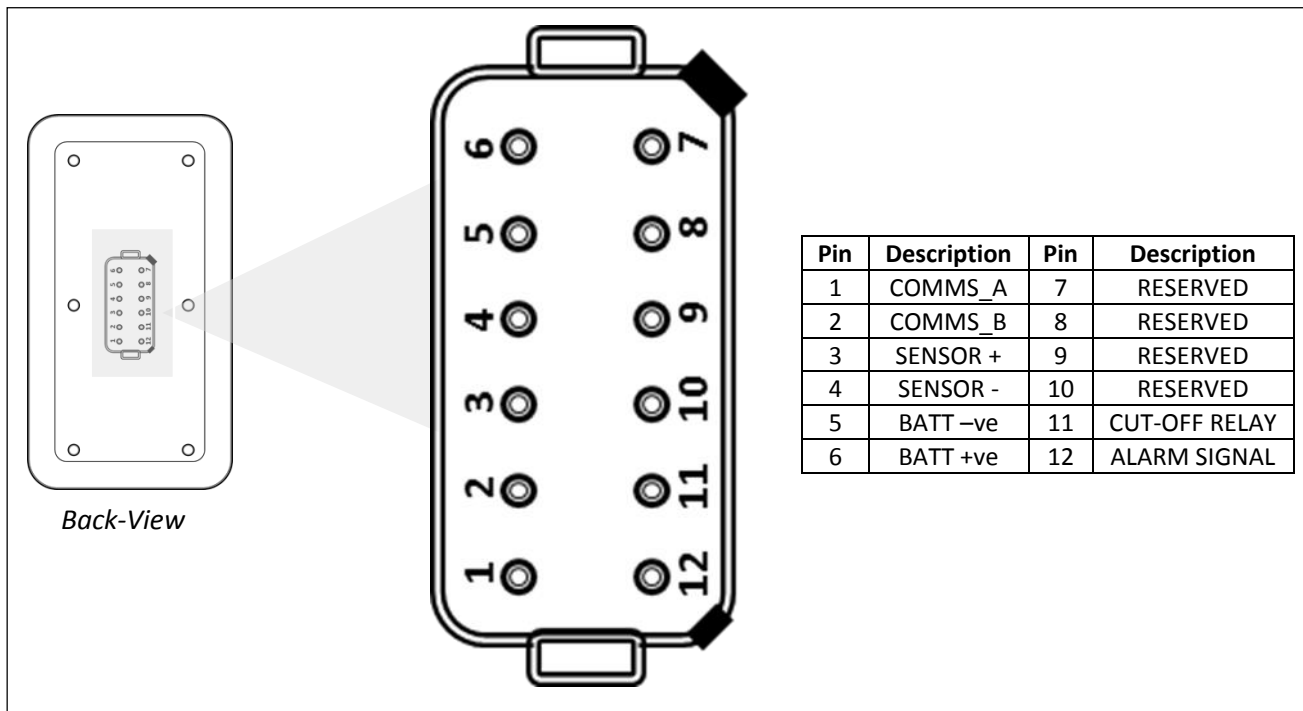
TANK
2"
Pressure Sensor
Hole in Tank
coupler
Ball-Valve

Fig. Sensor Installation

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Wiring

Connector Layout

Pin	Description	Pin	Description
1	COMMS_A	7	RESERVED
2	COMMS_B	8	RESERVED
3	SENSOR +	9	RESERVED
4	SENSOR -	10	RESERVED
5	BATT –ve	11	CUT-OFF RELAY
6	BATT +ve	12	ALARM SIGNAL

Back-View

Power Connection with Fuse Ratings

It is recommended to use 2-core shielded cable for Power from Battery to Device. For proper operation of device, "BATT –ve" of Device should be connected to negative terminal of battery directly and not through chassis body. Use a 10A Fuse between Device and Battery power line. All joints and wire connections shall be waterproof

Sensor Connections

The device is supplied with end-to-end sensor harness. Connect one end of the harness to device connector and other on the sensor cap. Make sure the connectors are secured properly. There will be a 'click' feel on the sensor connector lock at proper connection.

Connecting Alarm Buzzer & Settings

Alarm output can be used to create an alert for Liquid in the Tank falling below or above a specific level. Codes `C203, C204, C205, C206 and C207` are used for configuration of Alarm. Most commonly Alarm signal is connected to a Light for visual indication, Buzzer for audio indication or both. Recommended to use IP65 or higher rated Alarm device

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Using Cut-Off Signal for Auto-Valve Cut-off

Cut-off signal is an auxiliary output which can be activated by Codes `C208, C209, C210 and C211`. This is a static signal which can be used as a low/high level interlock for another device

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Menu Codes and Interpretation

Refer to Appendix Table A for Code summary and explanation

Example 1: Setting Tank Volume as 6000L, Low Level Alert at 10% with Beeping Alarm, No High Level Alarm

Suggested Settings:

1. Set *C201* to '6000'
2. Set *C204* to '1' (Enable. Refer Appendix A for more details)
3. Set *C205* to '10'
4. Set *C206* to '0' (Disable)

Example 2: Tank capacity – 12,000L, Low Level Alarm at 5% with Beeping Alarm, High Level Alarm at 95%, Cut-Off Interlock at 10%

Suggested Settings:

1. Set *C201* to '0'. As device cannot show volume greater than 9999 L
2. Set *C204* to '1' (Enable. Refer Appendix A for more details)
3. Set *C205* to '5'
4. Set *C206* to '1' (Disable)
5. Set *C207* to '95'
6. Set *C208* to '1'
7. Set *C209* to '10'

Example 3: Show Battery Voltage at Power-On as default display instead of percentage value

Suggested Settings:

1. Set *C202* to '3'. LED-Bars will show Tank Volume but Display will show Battery Voltage value

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Maintenance

Sensor Maintenance

Sensors are tested thoroughly in the factory before dispatching the device. However, the liquid in contact, say water, may not be from a clean source and may contain impurities. In such cases, there is a chance of dirt residue getting stuck on sensor. Most commonly, this gets auto-cleaned when liquid is filled again, but in certain cases, the sensor may be needed to removed and cleaned. Do not clean the sensor with pressurized air or water. Use running water for cleaning. Do not insert any sharp objects inside the sensor. It will damage the diaphragm

Device Body

The device is made of solid materials like ABS and Polycarbonate. Water along with cloth occasionally can be used to clean the device. Avoid use of thinner and any other sharp materials for device cleaning

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Trouble-Shooting

Power Fail

Check Fuse. Check whether the voltage at the device input is in range as per specifications

Self-Test verification

The device runs a self-test each time it is turned ON. This helps to verify each segment and LED in the Led-Bar for its operability

Error

The device will display 'err' if the input sensor value is out of bounds. Check the Sensor cable for any shorting. Disconnect the sensor. If error persists, contact us for further troubleshooting

Oscillating Display

This can happen if the Tank is not vented properly. Use Vents or create an open-to-air path from Tank to atmosphere. This also helps to avoid Tank deformation that happens over a period of time

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Appendix

A. Code Summary Table

SR.	CODE	FUNCTION	RANGE
1	C201	Set tank Volume. Set to '0' if Volume > 9999 L	0 – 9999 (Default - 0)
2	C202	Set default Segment Display Reading	0. Percentage (Default) 1. Volume 2. Battery voltage
3	C203	Select Alarm Type	0. Off 1. Beeping (Default) 2. Continuous ON
4	C204	Activate Low Level Alarm	0. Disable 1. Enable (Default)
5	C205	Set Low Level Alarm %	5 - 45 (Default - 10)
6	C206	Activate High Level Alarm	0. Disable (Default) 1. Enable
7	C207	Set High Level Alarm %	55 -95 (Default 90)
8	C208	Activate Low-Level Cut-Off Relay	0. Disable (Default) 1. Enable
9	C209	Set Low-Level Cut-Off %	5 - 45 (Default - 10)
10	C210	Activate High-Level Cut-Off Relay	0. Disable (Default) 1. Enable
11	C211	Set High-Level Cut-Off %	55 -95 (Default 90)
12	C212	Select Brightness Level for LED-Bar	0. Reserved for future use 1. Low Brightness 2. Moderate Brightness 3. High Brightness (Default)
13	C213	Force-feed/Manual Bottom Sensor Value	0 - 9999
14	C214	Force-feed/Manual Top Sensor Value	0 - 9999

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