MICRO-DESIGN, INC.

F200
Operator’s Manual.

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Introduction

The F200 is a wireless sensing node utilized in a wide range of vertical industry applications. Utilizing the extremely efficient Cat 1 cellular network or Mesh Network 5.0, the F200 transmits asset / truck data directly to the LevelCon secure cloud. Users receive reported tank levels, asset locations, asset health, and current assignments directly from any phone, tablet, or PC. Within the LevelCon Cloud portal, users easily configure email, voice or text alerts for low / high levels and/or fill events, geo fencing etc.

Key Monitor Features

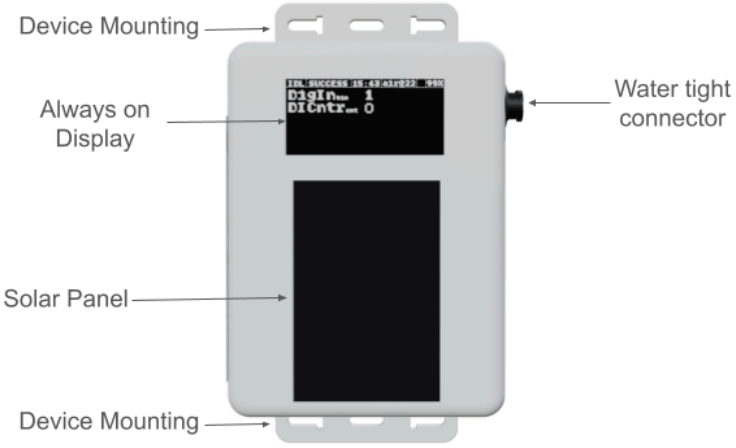
	1 Analog Input & 1 Digital Grounding Input- Alarm Capable.
	Multi-sensor RS485 deployment /UART Modbus, I2C
	Compatible with Cat1 LTE Carriers
	Mesh Network Support 5.0
	GPS enabled for mobile asset tracking
	Integrated temperature and barometric pressure sensor
	24/7 access to data on LevelCon Cloud
	4x AA battery with optional solar power assistance 6V to 24V DC power supply (Optional)

Technical Specifications

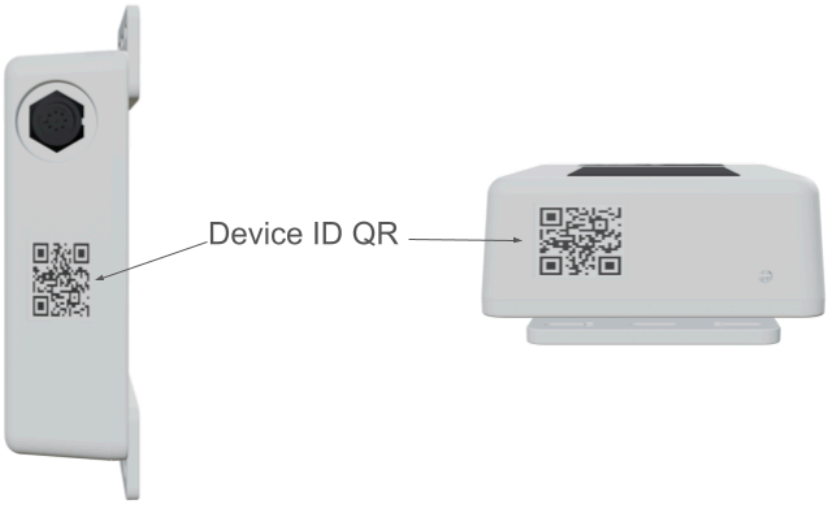
Dimensions	Height	120 mm
	Width	89 mm
	Depth	36 mm
Input / Outputs	1 Analog input, configurable for 0-5V. Multiple RS485 sensor daisy chaining capable	
	1 Digital grounding input, alarm capable or 1 digital output Please mention the use case for digitals while ordering	
Power Requirements	4 AA size Batteries, Energizer Lithium recommended and solar power harnessing	
	Optional external power via 6 ~ 24 Vdc	
Battery Life	Up to 5+ years of Battery life with solar augmentations	
Wireless Connectivity	Cellular	CAT 1 LTE
	Mesh Network	5.0 and above compatible
Data Security	AES 128 bit encryption	
Data Packet	JSON formatted data packet	
Software updates	Over the air (OTA) firmware updates are provided as new features are introduced.	
Temperature range	Operating -40C->65C, Storage -50C->80C	
Certification	Environment	ClassI I Division 1 Group D Certification for hazardous area deployment (pending) IP66 rated enclosure

* Data charges billed monthly
** Module addon sold separately

Understanding the exteriors of F200



Note : Puncturing the breather vent hole will void device warranty


Device ID QR

Unit Installation

Basic Hardware

- Philips Head screwdriver
- Zip ties

Installation procedure.

1. Unbox the F200.
2. Inspect the associated sensor if provided within the shipment.
3. Lower the sensor in the tank and secure the sensor with the supplied 2’ NPT bushing.
4. Route the remaining sensor cable using the supplied zip ties and secure it to the tank.
5. Insert the male sensor (chogori) connector at the end of the sensor cable to the matching female connector on the F200.
6. Lock the connector into place by twisting the bezel clockwise.
7. Attach the F200 to the tank via 4x high power neodymium magnetic feet.
8. Connect to the device using the LevelCon Wireless app and initiate force report form the same

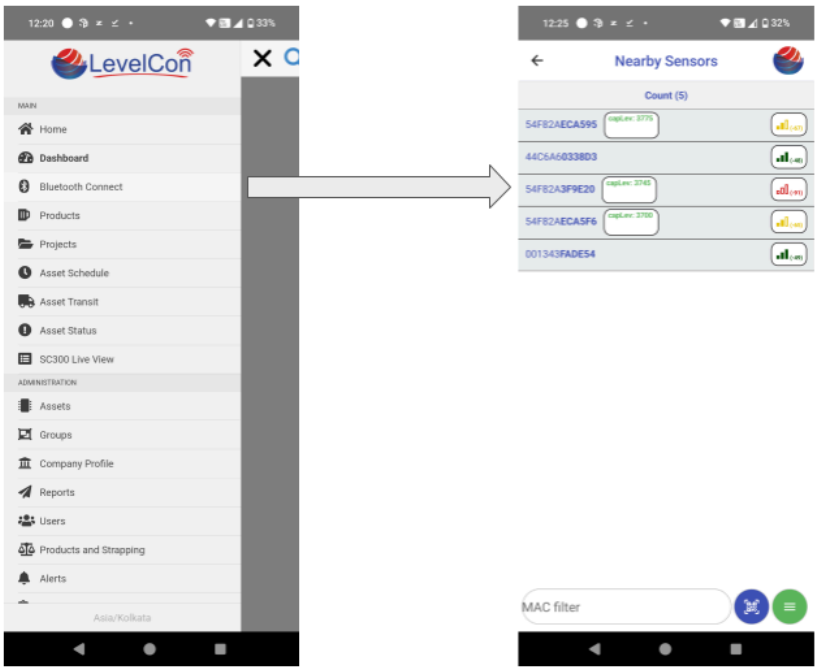
First report generation.

F200 and above are Mesh network enabled devices. They come pre configured from the factory and you can generate your first report by connecting to the device via Wireless.

If the device configuration needs to be altered you can do so using any Mesh Network enabled phone or tablet by downloading the LevelCon app from the respective app stores. Please follow the steps below to perform various configurations.

1. Fire up the LevelCon app from your mesh enabled phone or tablet.

2. From the Left hand menu, click on Wireless Connect and you will be navigated to the Nearby Sensors Page.



3. Select the appropriate device address that you wish to connect to from the nearby sensors list. On successful connection you'll be greeted with the status page of the. By default LevelCon devices come pre configured from the factory. We will now move to the log tab to view the device log messages

4. Next we will Force a report by clicking on the green balloon button at the bottom right of the screen and select the Report button (1) and wait for a report success string. After the report is complete click on the blue send button (2) to share the logs with support.

5. If you see the report success string, you have successfully generated your first report.

Basic configuration options

For F200 devices you might be required to provide basic configurations such as alarm times, timezone details device on and off schedules. These can be done from the basic tab of Mesh Network configuration tab

Remember to hit Save before you close the window for the changes to load to the memory.

Time Zone

This option lets you select the appropriate time zone from the drop down menu. This helps in maintaining time locally on the device and is used as a reference for setting time alarms.

Daylight Sav

This option lets you enable or disable daylight saving time settings. Please select the appropriate time zone for this feature to work properly.

Report Rate(s)

This option configures the device to report after a specified number of seconds. The allowable input range for this input is 86400.

Wake Alarm

These alarms enable the end user to set up specific timings during the course of the day at which the unit should report its parameters. You can set up to 9 alarms using the basics menu. The time period needs to be set up in the 24 hour format. As an example, if you want the device to report at **3:45 PM** please enter **1545** in the text space available next to Wake Alarm. If the report rate is set, Wake Alarm is disabled.

Off Hrs Start / Off Hrs End

This option allows you to set the time from when the device goes to sleep. As an example if you want the device to go to sleep at 8:00 PM and start reporting at 6:00 AM, please enter 2000 in Off Hrs Start and enter 600 in Off Hrs End.

Advanced configuration options

F200 provides advanced configuration options such as apn, adc wait, gps enable etc. under the advanced tab of Mesh Network configurations page. The following options available under Advanced tab are explained below.

Caution : Making uninformed changes in the “Advanced” tab might cause unrecoverable errors in the device configuration and void any warranty. Users take utmost care while modifying these parameters. Contact Levelcon in case you need assistance

Remember to hit Save before you close the window for the changes to load to the memory.

Mode

TBT

Sensor Type

The device is capable of communicating with 0-5 V and 4-20 mA type analog sensors. If you are using an analog sensor with the device, please select the appropriate sensor type. By default, the device is configured for 0-5 V type sensors.

ADC Wait(s)

This parameter enables you to set the number of seconds the device queues up the sensor for a reading before it collects the sensor level data from the sensor. The Default value is 3 seconds. This should only be increased if using a non-contact sensor such as a radar gauge, sonic sensor or laser sensor.

Digital Wake

This feature is associated with digital input such as a high level float gauge for overfill protection or other types of normally open/normally closed contacts. If enabled, the input device will close its circuit and engage the no/nc on the digital input of the F200 forcing the monitor to turn on and report. The Digital Wake value is set in seconds and correlates to the number of seconds that NO/NC waits after triggered to force the F200 to report, i.e. if set to 3 seconds, when the DI is triggered for more than 3 seconds, the unit will force a report. The default value of this parameter is Off.

LCD Mode

The F200 turns on the LCD only when a user forces a report. In other scenarios, the LCD is off while the monitor performs normal tasks in the background, i.e. regular scheduled reporting. If Force LCD is enabled, the LCD will turn on every time the device conducts any action. The default value of this parameter is off.

Warning : Enabling the option, Force LCD ON, will cause the device to use much more power and may drain the batteries much sooner than expected. Use this option carefully. If you have questions about this option, please contact LevelCon.

GPS Timeout(s)

This option enables device location reporting via GPS. This option should only be used for units that are deployed outdoors. Set the number of seconds the unit should wait before it obtains a GPS fix. The preferred value for this parameter is 100 seconds. A zero value means the unit will not attempt to obtain a GPS fix. By default the value of this parameter is zero.

Warning : Location reporting via GPS is a battery intensive operation and should only be enabled if the unit is outdoors. When installed, the F200's solar panel must be oriented towards the sky to enable faster GPS fix and solar charging.

Pulse Counter

This parameter enables pulse counting on the digital input to the F200. This feature is normally associated with a monitor connected to a Flow meter.

Digital Output

This is a normally open, normally closed feature.
Off(Float)
On(low)

Warning : Modifying the apn setting may lead to permanent network disconnection causing the device to stop reporting over Cellular connectivity. This parameter should only be modified with the assistance of a LevelCon representative.

TCP Server

This parameter is used to modify the endpoint at which data is to be sent to and set to the LevelCon Cloud by default. This parameter should not be modified without the assistance of a LevelCon representative. The default value for this parameter is f100.levelcon.com

Port

This parameter refers to the port on which the device communicates. This parameter should not be modified without the assistance of a LevelCon representative. The default value for this parameter is 8686.

Servicing the Batteries

Follow the procedure below to service the batteries.

Warning : Do not use power tools to perform this service!!!

Alert : Use Energizer L91 AA cells only

Alert : Please move to a non hazardous location for any troubleshooting or battery replacement tasks!

1. Remove the 4 phillips head screws marked by the 4 arrows. And place the base next to the monitor to hold the 4 screws removed from the base.

2. With the base off, you can easily access the 4x Energizer Ultimate Lithium batteries
    a. Carefully remove the batteries one at a time and replace them with fresh batteries.

Alert : DO NOT remove/replace the blue capacitive cell. Please pay careful attention to the polarity of batteries! Negative (-) always contacts the spring.

b. Please note that the board is held in place by the standoffs on the base plate. Thus there are no screws to hold the bard to the lid.

If you remove the board or the board comes out of the lid, be sure not to rip or tear the ribbon cable connected to the outside sensor connector.

3. Once the batteries are replaced, make sure the gasket is in place properly and is not pinched at any location.
4. Now place the base back on the lid ensuring the gasket remains in place in the lid. Then reinstall the 4 screws to the base.
    a. Inspect the connection between the base and the lid to ensure there are no gaps around the edge of the monitor. If you see gaps, please tighten the screws until the gap is gone.

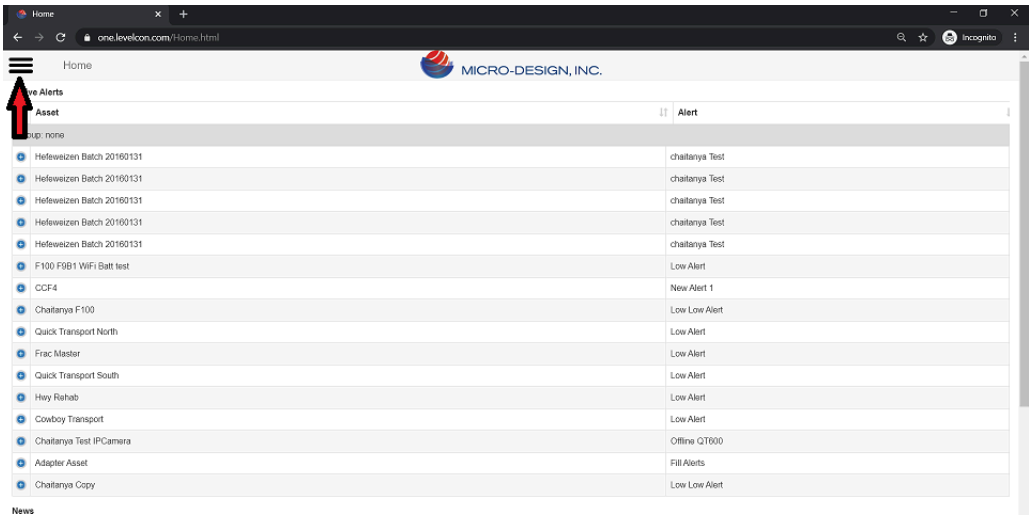
Warning : Please take utmost care that the board does not come in contact with any metal or liquid during this process. The board may be rendered undeployable and will void any warranty. If you have any questions please contact Levelcon

Web interface.

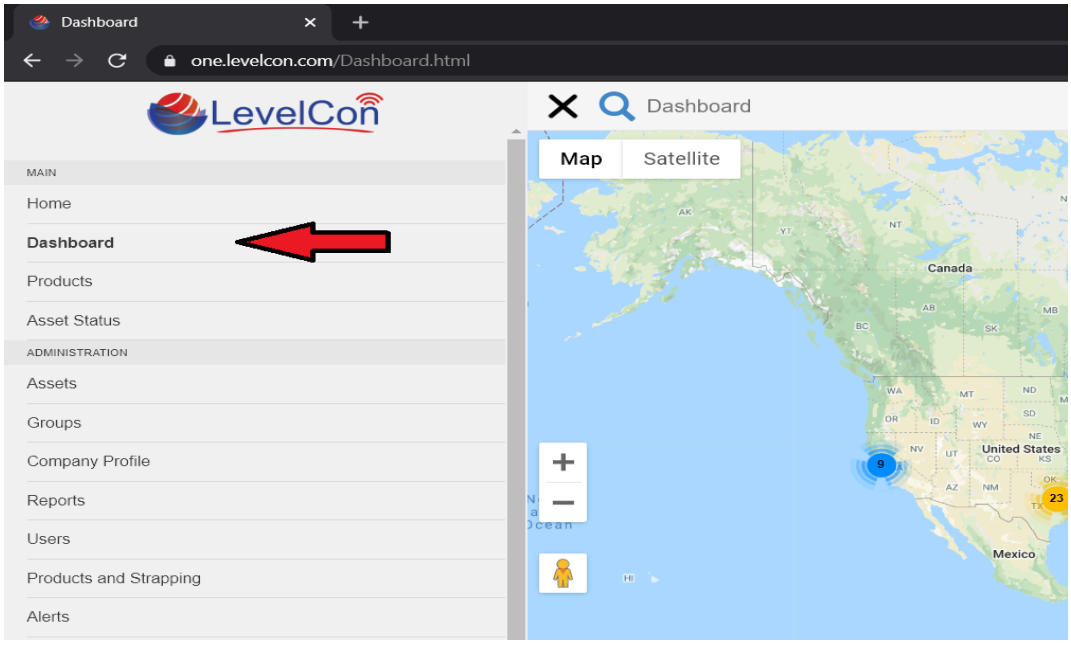
The data from the F200 is immediately displayed on the LevelCon secure cloud portal. You can access this data at https://one.levelcon.com.Follow the steps mentioned below to access your data. You can also view our online tutorial videos at:
https://drive.google.com/drive/u/0/folders/0B7H0S78DpOhhdmE0cW1ZZzluYlk
** If you do not have a username and password, please see your company's account manager or request an account at support@levelcon.com

1. Navigate to https://one.levelcon.com and input your username and password.

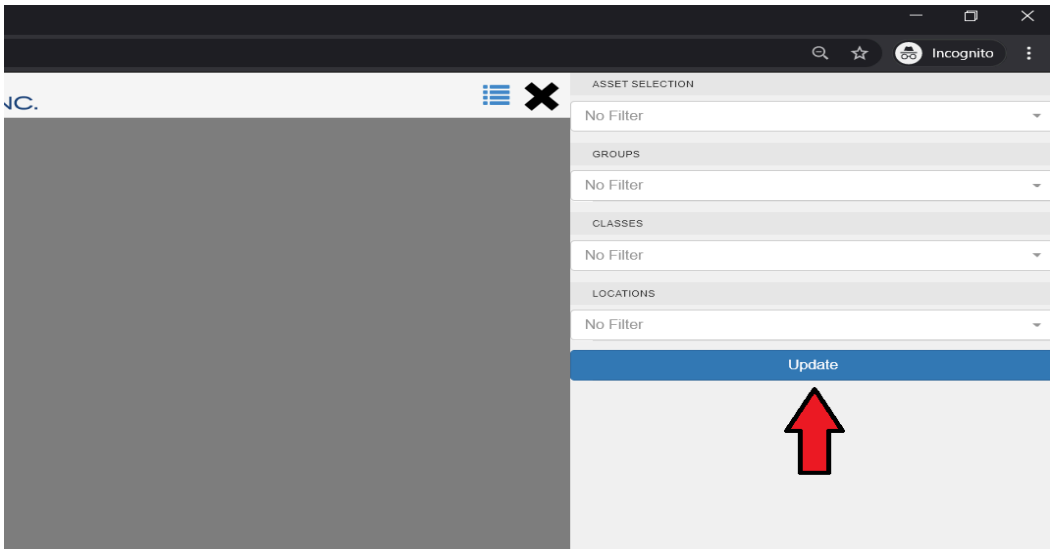
2. After a successful login, you will be directed to the Home Pate. Here you see any alerts associated with your assets. Click on the navigation menu to access the options associated with your security level.



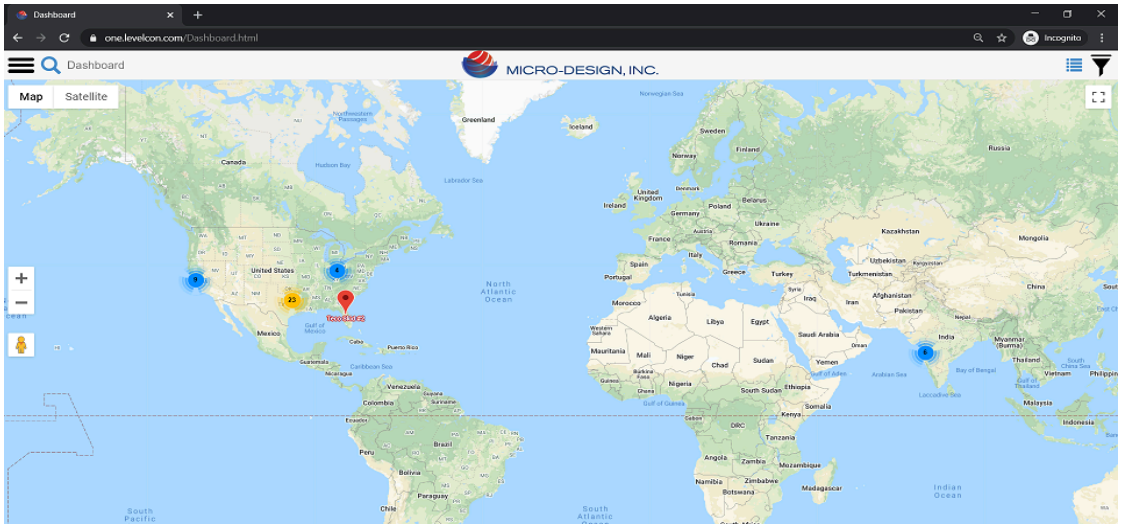
3. Click on the **Dashboard** option to go to the dashboard from the main menu.



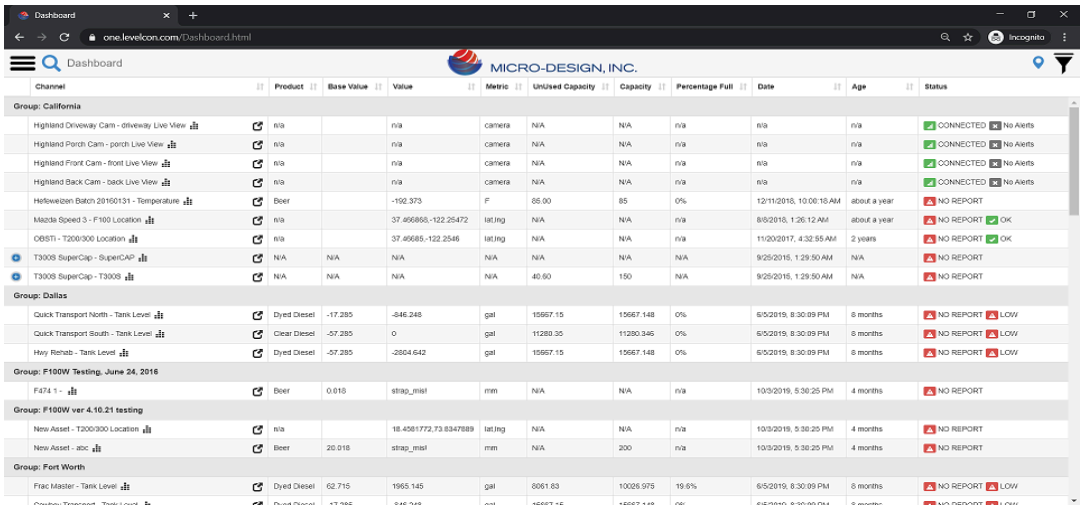
4. If you are logging in for the first time click on update to see all your assets.



5. Once your view has been updated, you should be able to see all your assets on the single map view of the dashboard.



6. To view the assets on the gridview, click on the grid icon on the top right of the window. You can switch back to the map view by clicking on the map icon on the same dashboard view.



Basic Troubleshooting and Error codes.

F200 Modbus RS485 Slave Register Map

F200 SERIES Slave REGISTER MAP		
Sr No	**Register Address**	**Pins**
1	1	DIG_DO1
2	10001	DIG_DI1
3	30001	Analog
4	30002	ADC_Voltage_Sensor
5	40011 & 40012	DI_Count
6	40013 & 40014	LIS3DH_Motion Sensor
7	40051 & 40052	Run Time
8	40053 & 40054	UTC Time
9	Between 40201 & 40600	BLE Sensor Values

IRMesh Settings

F200 Settings

- Load latest Firmware
- After loading, perform default settings
    - Verify that IR mesh is enabled
- After Defaults are set, move to the AGR Tab
    - Set AGR Time to 0
    - Pair with WP01 or Mesh Network sensor
    - Force a report from the monitor
- Sensor Alarm and Strapping
    - Click on the green circle
    - Move to Sensor Alarm and Strapping
    - Alarm settings for Float Trigger
        - Type = Low
        - IDX = Mac of WP01
        - Chan = 0
        - Trig = 0
        - Hyst = 0
        - Alm Idx= Local DO

- Alm Tmr = 1
- Alm Chan =0

F200 Sensor High level Trigger Digital output

- ADC=0
- Alarms and strapping
- Set alarm
    - Type- High
    - IDX- BLE sensor Mac
    - Chan= 0
    - Trig= raw trigger value
    - Hyst= .5
    - Alrm IDX= Local Do
    - Alrm Tmr= 1
    - Alm Chan= 0

WP01 Float Settings

- Load latest Firmware
- After loading, perform default settings
    - Verify that IR mesh is enabled
- Go into the Config
    - ADC wait = 0
    - Digital wake = off
    - Digital Advance Configuration
        - Enable DIpullup

WP01 Float Trigger

To set WP01 as a float to trigger an output to a local DO for F200

At the WP01:

- Update Firmware
- Load defaults
- Ensure IR Mesh is “Enabled”
- Set ADC to “0”

At the F200:

- Update firmware
- Load defaults
- Pair WP01 with F200 via AGR in IR Mesh Mode

- Go to Sensor Alarm and Strapping
- Set new Alarm
    - Type = Lo
    - IDX= WP01 Mac
    - Chan= 0
    - Trig= 0
    - Hyst= 0.5
    - Alm Idx= WP01 Mac
    - Alm Tmr=blank
    - Alm Chan= blank

Float Engaged (up position) will trigger this response from the F200

- LRMesh Stat:
- WP01MAC: Seconds*
- PC:3445H
- SenAlm0 LO Trig
- Mesh Network WP01MAC(0)=0.00
- Mesh Network Streamer Sending
- BG9X Wait Start
- BG9X Init LTE
- Using eMTC BAND 13,IPV6,vzwinternet
- LCD-> Cell Search, 300 sec Signal:0 Reg:2
- LCD-> Cell Search, 298 sec Signal:0 Reg:1
- LCD-> Cell Search, 296 sec Signal:0 Reg:1
- LCD-> Cell Search, 293 sec Signal:21 Reg:1
- LCD-> VzW eMTC 13 Connecting...
- New Time: 2023/12/13,09:56:38 UTC -5.00
- LCD-> APN IP: 2600:1009:B174:AB8E: 0:12:53D0:A901
- LCD-> Send SENMCM
- Mesh Network Streamer Sent

Float disengaged (down position) will trigger this response from the F200

- LRMesh Stat:
- WP01 Mac ID:seconds*
- Mesh Network WP01 Mac(0)= 1.00
- SenAlm0 LO Clear