IQ2 DP-DC-MHS SETUP AND CONFIGURATION GUIDE

ENABLING IIoT

TABLE OF CONTENTS

Change Log:

Date	Author	Change	Version Number
April 2022	Matt Crites	Initial publication	1
June 2022	Matt Crites	Software Upgrade	2

Section 1.0: General Overview

1.1:APP AND DEVICE OVERVIEW

The endpoints, known as iQ2 DP-DC-MHS are configured by field technicians using a freely available mobile app for Android. The Android device i.e. cell phone, tablet, etc. utilizes built in Bluetooth technology to connect and communicate with the cellular endpoint.

The iQ2 DP-DC-MHS is a low power, battery operated cellular device that activation ready. After completed a very simple set up in the field, the GP-DC01 cellular endpoint will monitor dry contacts such as opening/closing of doors, high floats, etc from a relay. When a set (high) or clear (low) is detected, the endpoint will make a connection to the cellular network, alerting that an alarm has been reached. The GP-DC01 will monitor for changes on a regular timed interval, set by the user in the technician's app. The endpoint will only send data based on change i.e. high or low detection. The endpoint will also provide signal and battery voltage levels to iQ2 on a daily basis.

LEC's award winning software platform, iQ2, will collect those readings as well as alert subscribed users when an alarm has been reached using SMS and/or email.
This guide will walk a field technician through the steps necessary to successfully connect, communicate, and set up iQ2 DP-DC-MHS cellular endpoint.

1.2: SUPPORT INFORMATION

Setup Support

For support related materials, please use the link below:

https://lecinc.freshdesk.com/support/home

Section 2.0: Connection to iQ2 DP-DC-MHS

Before the iQ2 DP-DC-MHS can connect to the app, the Bluetooth mechanism must be engaged. To activate the Bluetooth connection, a magnet will be utilized to enable Bluetooth communication between GP-DC01 cellular endpoint and the configuration app.

2.1: ACTIVATING TECHNICIAN COMMUNICATION

Place a magnet momentarily near the location shown below to initiate the technician communication mode. Once the technician communication mode is successfully activated, a green LED next to the external antenna port on the cap of the endpoint will illuminate.
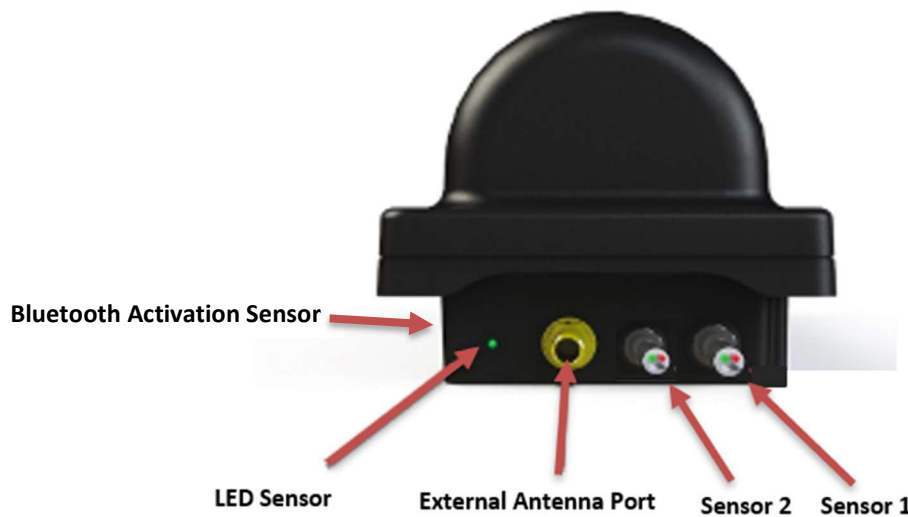
Upon activation of the technician communication mode, the field tech will have approximately 60 seconds to connect the GP-DC01 to the app before the endpoint will return to normal operating mode at which time a magnet will need to be reapplied to continue with configuration and setup.

With the green LED illuminated, open the Technician's Configuration app on the Android mobile device.

2.2: MAIN MENU

Once the app opens, the field tech will have access to the app's main menu screen. Most of the options will be grayed out until a successful connection is made between the app and GP-DC01

cellular endpoint. Once an active connection is achieved, the below options will become active. The main menu options are as follows:
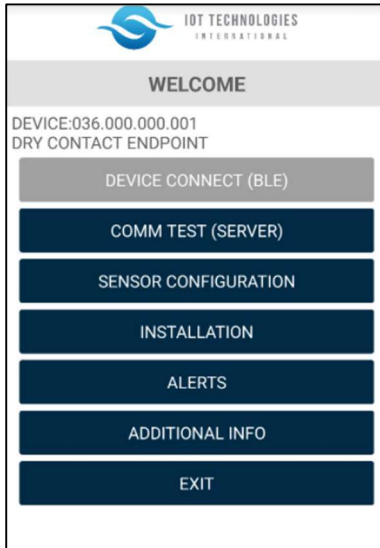

- **Device Connect**: Initiate Bluetooth connectivity
- **Comm Test**: Tests communications with the cellular network
- **Sensor Configuration**: Setting endpoint for high float, power status, etc.
- **Installation**: Enter installation parameters
- **Alerts**: Displays Alerts status
- **Additional Info**: Provides known cellular network data i.e. cellular signal, etc and device related information i.e. battery level, detected pressure, etc.
- **Exit**: Exit the Configuration App

2.3: INITIATE CONNECTION FROM APPLICATION

Press the "Device Connect (BLE)" button at the top of the main menu to initiate a scan for any technician communication mode enabled cellular endpoint.
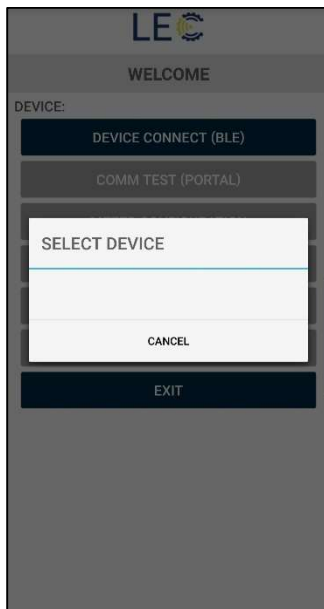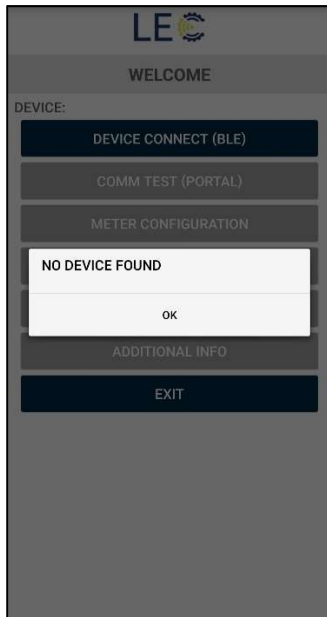

The iQ Pulse DP-DC-MHS's unique identification number will display on the screen. Press the ID number on the screen to begin the connection or press **cancel** to return to the main menu.
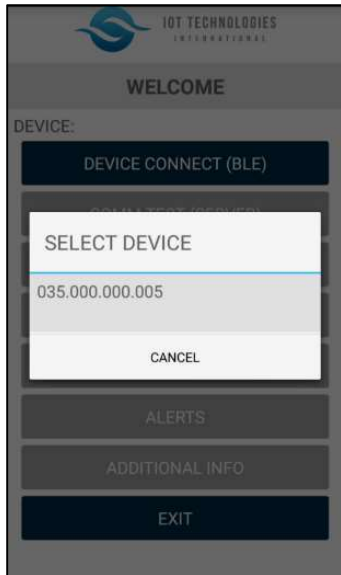
Once the ID number is pressed, the display will indicate a connection is in progress.
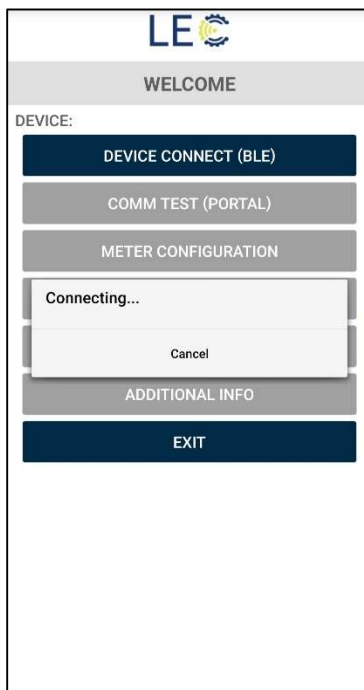
If the app displays the message **NO DEVICE FOUND**, check to ensure the green LED on the top of the cellular endpoints cap is still illuminated. If it is not, the DP-DC-MHS has likely returned to normal operating mode and will require reinitializing technician communication mode. See section 2.1.

Upon successful connection, the iQ Pulse DP-DC-MHS's green LED will begin to flicker to indicate the Bluetooth communication was completed. The iQ Pulse DP-DC-MHS's unique ID number will be displayed on the app screen above the main menu and the once grayed out menu options should now be active and selectable.
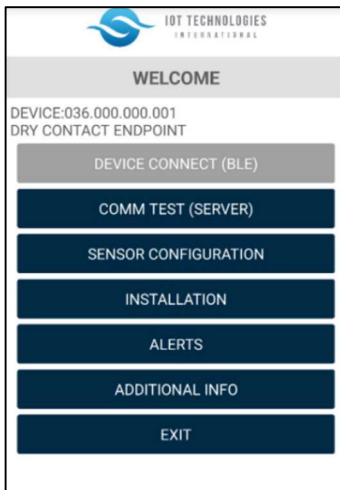

The green LED indicator will remain illuminated as long as there is an active Bluetooth connection. Please note that the iQ Pulse DP-DC-MHS could timeout if the android mobile device goes inactive for an extended period of time which will then require reinitializing a Bluetooth connection.

To ensure proper return to normal operating mode, the field technician should deactivate the connection by clicking **Exit** on the main menu screen. Failing to do so could cause the iQ Pulse DP-DC-MHS cellular endpoint to not operate normally and could also negatively impact the battery life.

Section 3.0: Comm Test (Portal)

The Comm Test is used during initial installation of the iQ Pulse DP-DC-MHS cellular endpoint to perform a communication test with the cellular network. This step is necessary to determine if an external antenna maybe required or if the internal antenna is sufficient for communications. To begin, press the "Comm Test (Portal)" button on the main menu of the android app.
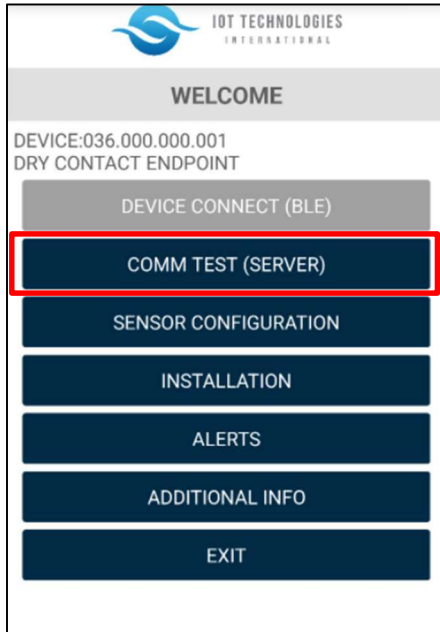
Once the process has begun, it could take upwards of 5 minutes before completing, depending on network coverage. Upon successful completion, the screen will indicate the test has completed and provide the measured signal strength (RSRP) and signal quality (RSRQ). The metrics of each can be found below:
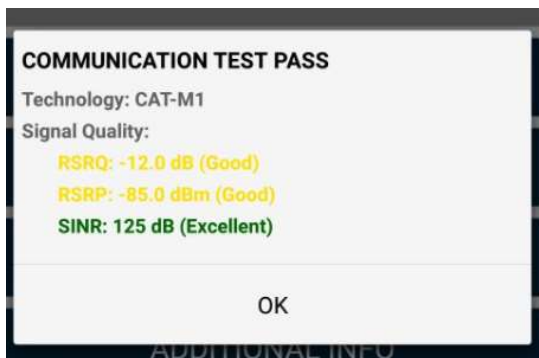
RSRP:
Excellent (Green)   >= -80 dBm
Good (Yellow) -80 dBm to -90 dBm
Medium (Orange) -90 dBm to -100 dBm
Cell Edge (Red) <= -100 dBm

RSRQ:
Excellent (Green)   >= -10
Good (Yellow) -10 dB to -15 dB
Medium (Orange) -15 dB to -20 dB
Cell Edge (Red) <= -20 dB

Press "OK" to return to the Main Menu.

NOTE: There could be times where the Comm Test may fail. This could be due to poor network coverage that may require the use of an external antenna, which will be covered in the next section or a low battery. It may be necessary to run a Comm Test more than once if the previous test fails.
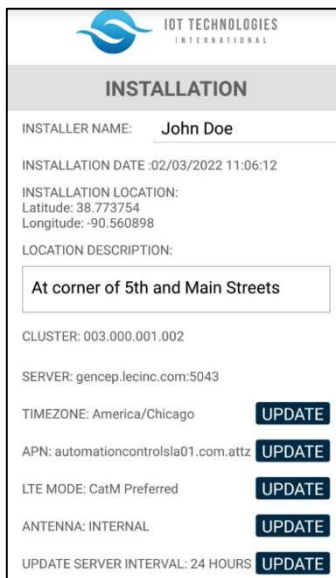
Section 4.0: Installation

This section will outline the steps necessary to install and activate the iQ Pulse GP-CEP.

<u>SECTION 4.1: INSTALLATION INFORMATION</u>

The Installation menu provides the following information:

- **INSTALLER NAME:** Enter Technicians Name, if desired
- **INSTALLATION LOCATION** (Lat/Long)
- **LOCATION DESCRIPTION:** Enter Site Description, if desired
- **CLUSTER**
- **SERVER NAME**
- **TIME ZONE** (Press Update to modify)
- **APN** (Press Update to modify)
- **LTE MODE**
- **ANTENNA TYPE** (Press Update to modify)
- **UPDATE SERVER INTERVALE** (Press Update to modify)
- **METER READING**

NOTE: Installer name and location can only be entered/altered when a device is deactivated from the iQ2 Web Portal.

The next sections will describe each of the above in greater detail.

<u>SECTION 4.2: CLUSTER</u>

The device cluster is related to activation and will be described in the next section, 4.2 Activation of the iQ2 DP-DC-MHS Cellular endpoint.

<u>SECTION 4.3: SERVER/TIME ZONE</u>

The device server is not noneditable. This relates to the database where the readings and alarms will be sent. The Server should read "**gencep.lecinc.com:5043**". If the field reads anything other than that, please contact LEC support.

The time zone field is editable and a required field to ensure time stamps are recorded corrected. To change the time zone, click **UPDATE.** A list of time zones will populate into a menu. Scroll through the menu to select the appropriate time zone for your area or search the time zone in the search area. Simply click on the correct time zone to change.
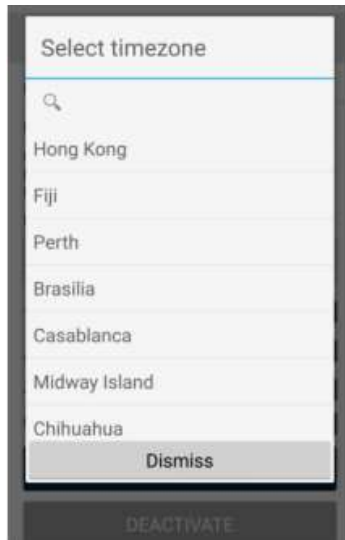
Press "Dismiss" to return to the Installation Information screen without changing the current time zone.

SECTION 4.4: APN

The APN field is network specific and is required to communicate with the cellular network. The device will come prepopulated with the correct SIM card, however If comm tests consistently fail, the APN for the SIM card may be incorrect. Contact LEC Support for further assistance on adding the appropriate APN.

SECTION 4.5: LTE MODE

LTE Mode is the method by which the GP-DC01 communicates with the cellular network. It is advised to not change this mode unless instructed by LEC Support.
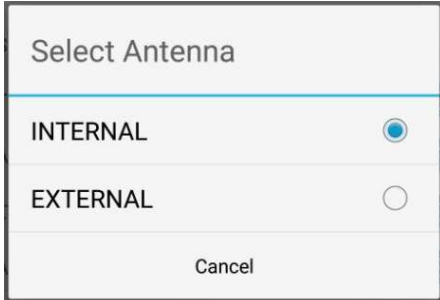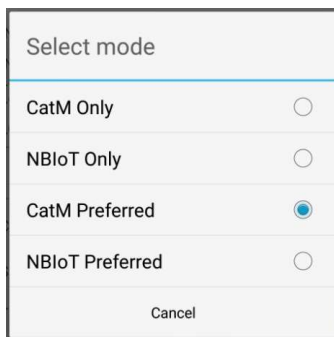

SECTION 4.6: ANTENNA TYPE

Each iQ Pulse Smart Meter comes with an internal antenna for connection to the network. Depending on where it is installed and network coverage, it may be necessary during installation

or at any point thereafter, to change the antenna type from using an internal antenna to an external.

Should an external antenna be required, unscrew the EMI cap from the SMA connector on top of the iQ2 DP-DC-MHS's case and attach the external antenna. Mount the antenna as directed by LEC Support.

Antenna Mode is an editable field. To edit, click **UPDATE**. Choose the desired antenna type or press Cancel to return to the **INSTALLATION** main menu without making any changes.
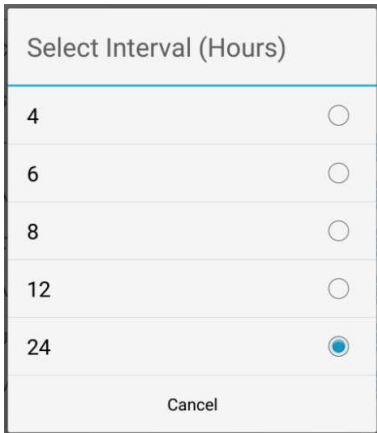
Select Antenna	
INTERNAL	⦿
EXTERNAL	○
Cancel	

SECTION 4.7: UPDATE SERVER INTERVAL

The Update Server Interval option is the frequency the GP-DC01 cellular endpoint delivers the collected pressure readings to iQ2 web portal. The default time frame is set to 24 hrs. This is a editable field however, changing the frequency interval could result in a shorter battery lifespan. To change, click **UPDATE**. Click the desired interval to return to the INSTALLATION main menu.

Select Interval (Hours)	
4	○
6	○
8	○
12	○
24	⦿
Cancel	

SECTION 4.8: METER READING

The Meter Reading field is how often the GP-DC01 cellular endpoint samples a new reading from the enabled dry contacts. By default, these sensors are sampled every 15 min. This is an editable field. To change how often a sample is taken, click **UPDATE**. Click the desired interval to return to the INSTALLATION main menu.

The frequency of regular sampling rates cannot be set more frequently than 15 min intervals due to memory constraints. This does not affect the reported battery voltage nor the LTE signal level/signal Quality readings. This information will continue to update during the regular interval cycle outlined in section 4.7 of this guide.

SECTION 4.9: ACTIVATION OF IQ2 DP-DC-MHS CELLULAR ENDPOINT

Before the GP-DC01 cellular endpoint can monitor for high/low signal changes, it needs to be activated to the iQ2 web portal. Press the **ACTIVATE** button near the bottom of the app screen to register the cellular endpoint the iQ2Web portal. Activation could take upwards of 5 minutes to complete, depending on cellular coverage.

Enter the correct Cluster ID of 003.000.001.002. When done, click **OK**.

The GP-DC01 endpoint will begin activating. If the activation was successful, a dialog box will appear on the screen indicating so. If unsuccessful, re-attempt to activate. If still unsuccessful, please contact LEC support.

The GP-DC01 endpoint is now activated and monitoring for alarms. It could take upwards of 10 min before the GP-DC01 cellular endpoint will display as "Online" in iQ2. To set up alarms and tags

into iQ2, please refer to the below link for videos and documentation.

https://lecinc.freshdesk.com/support/home

To Deactivate an iQ2 DP-DC-MHS, press the "Deactivate" button on the android app. Deactivation will cause the cellular endpoint to cease sending data.

SECTION 4.10: DEVICE RESET

There may be times where a reboot of an endpoint is necessary to clear any communications issues. The only way to reboot an endpoint is through the technician's app.

To perform a reboot, scroll to the bottom of the Installation page. Click the "Device Reset" button. To reboot an endpoint, a password will be required. Enter the following into the password field: **#Lecinc1#**
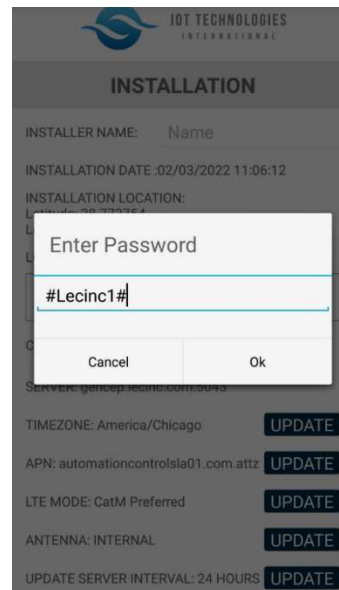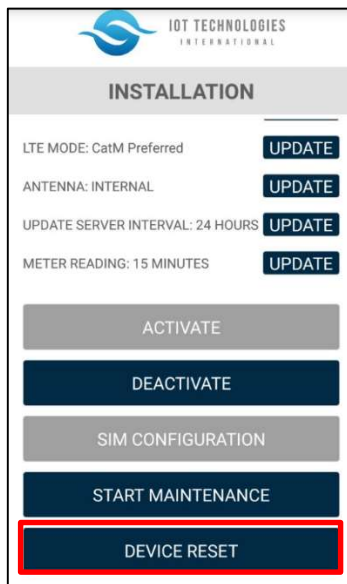
The endpoint will now reboot and connection to the app will be lost. To get reconnected to the app, Bluetooth communication will need to be reactivated.
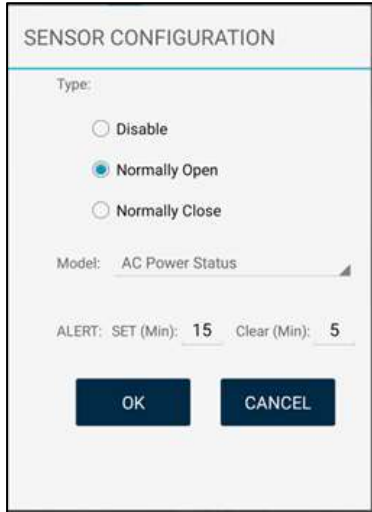
Section 5.0: Sensor Configuration

The iQ2 DP-DC-MHS Endpoint has two dry contacts. Sensor 2 is to the right of the antenna port and Sensor 1 is to the right of Sensor 2. Either sensor can be connected to dry contact such as a float switch or detection of AC power status. The endpoint leads are labeled as follows:
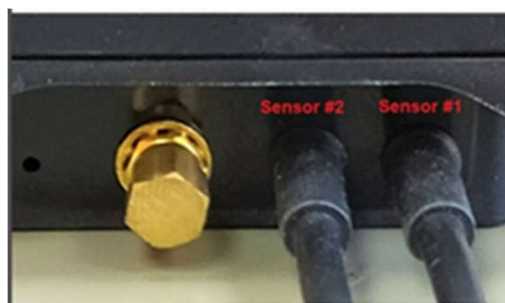
Each sensor can be configured as being normally open, normally closed, or disabled. To configure, you must set the following:

- **Type (Choose One):**
  - Disabled
  - Normally Open
  - Normally Closed
- **Model (Choose One):**
  - Float Switch
  - AC Power Status
- **Alert:**
  - SET (Min): how long a sensor must be in a set or high state before setting it as an alarm
 - Clear (Min): How long a sensor must be in a clear state before clearing the alarm status

NOTE: The SET threshold is the time the endpoint must be in an alarm state before sending the alert. For example, if the SET is 5 min, the alert will need to be active for at least 5 min before that alarm is transmitted to iQ2. The CLEAR timer is set for the length of time the alert has been cleared before sending the clear message to iQ2.

Section 6.0: Alerts

SECTION 6.1: ALERTS

The Alerts screen will display the status of each of the dry contact alarms as well as battery alerts. The GP-DC01 cellular endpoint has two different displayed states. Those states are Disabled or OK. When disabled is displayed, this means that the endpoint is not being monitoring that sensor. When OK is displayed, it means that the endpoint is monitoring that sensor connection.

In addition, there are also two different alarm states indicated by color. When displayed in green, the threshold is within normal levels as indicated by the users entered value. When displayed in red, the threshold has exceeded the user defined value.
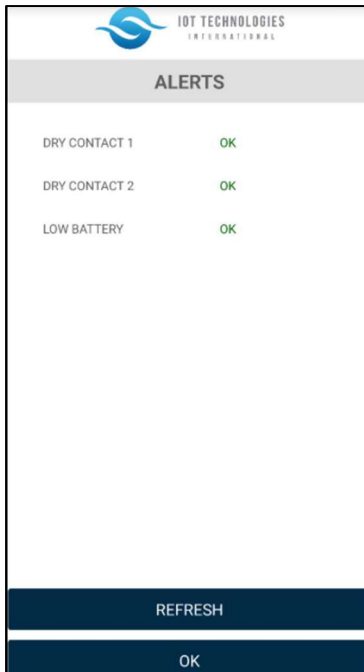
SECTION 6.2: ALARM SAMPLING

The endpoint takes a reading every 5 min to detect if there is a voltage present or not on any enabled sensor cable. For example, if the sensor is set for normally open and at the scheduled interval testing time it detects the presence of a voltage, a timer starts based on the Set time threshold set on the Sensor Configuration screen. If the set timer is configured for 5 min, then the sensor must be in a high state for at least 5 min before the GP-DC01 endpoint will make a connection to the cellular network and transmit the alarm. If anytime during that 5 min interval a low state is detected, the alarm is canceled, and the endpoint returns to its normal testing cycle.
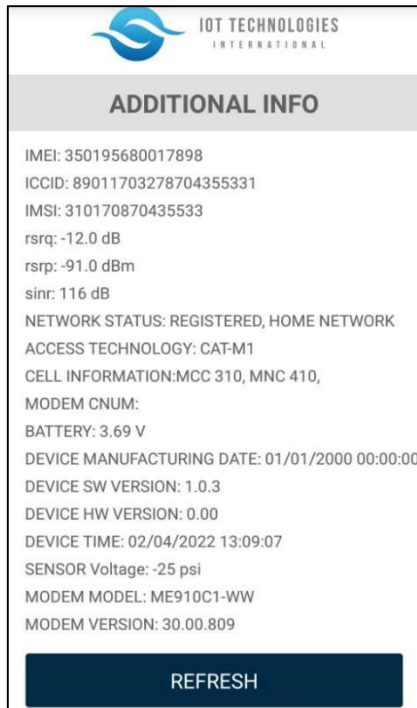
Once the alarm is detected by iQ2, a three min holdoff timer starts. This timer is to ensure the alarm doesn't cancel after receiving an alarm clear message from the endpoint if a state change is detected. After the three-minute timer expires and if there has not been an alarm clear message received, iQ2 will send the alarm notification to all those who are subscribed to receive them via their chosen medium.

Once the alarm has been detected and sent, the GP-DC01 endpoint will continue to monitor for state changes every 60 seconds. A clear message will be sent after a state change is detected and has remained in that "clear" state for the interval set in the Sensor Configuration screen. For example, if the clear timer is set for 3 min then, once the state change is detected, that state must remain for at least 3 min before the clear message will be sent to iQ2.

Section 6.0: Additional Information

The additional information function provides specific information relating to iQ2 GP-DC01. From this menu, information such as RSSI, SIM ID, and battery status, etc. This information may be needed for troubleshooting purposes or to evaluate cellular communications:


- **DEVICE ID**: Unique Identification number
- **IMEI**: Cellular Modem ID
- **ICCID**: SIM Card ID
- **IMSI**: Operator information
- **RSRQ**: LTE Signal Quality
- **RSRP**: LTE Signal Strength
- **SINR:** Single to Noise Ratio
- **NETWORK STATUS**: Registered statue, Roaming or Home network
- **ACCESS TECHNOLGY**: Type of access (e.g. 4G)
- **CELL INFORMATION**: MCC, MNC (PLMN)
- **BATTERY**: Battery status
- **DEVICE MANUFACTURING DATE**: Date device was manufactured
- **DEVICE SW VERSION**: Software version number
- **DEVICE HW VERSION**: GP-CEP hardware version number
- **DEVICE TIME**: Detected time and date of endpoint
- **SENSOR VOLTAGE**: Detected state of each sensor (set or clear)
- **MODEM MODEL**: Cellular module installed
- **MODEM VERSION**: The current FW loaded onto the cellular module

Starting with FW version 1.0.3, the GP-DC endpoint allows for firmware upgrades via Bluetooth. Using a .hex firmware file, firmware can be updated using the technician's application. Firmware upgrading should only be done with the guidance of LEC support. Please contact support for the latest firmware file.

To begin the upgrade process, on the Additional Information screen, click Software Upgrade.
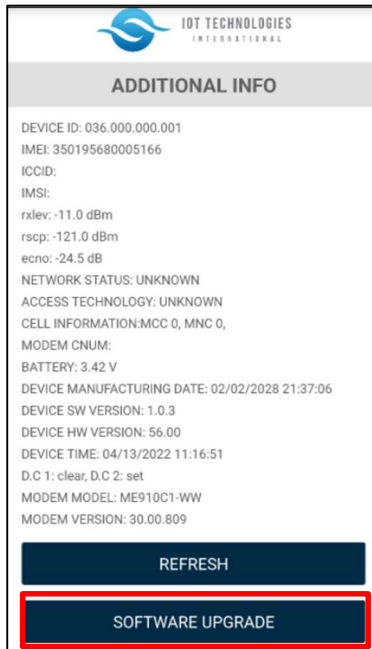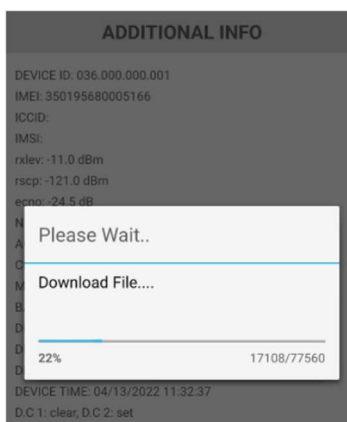
Navigate to where the firmware file is located on your mobile device. For example, the Downloads folder. Ensure the file name has "DDC" in the title.
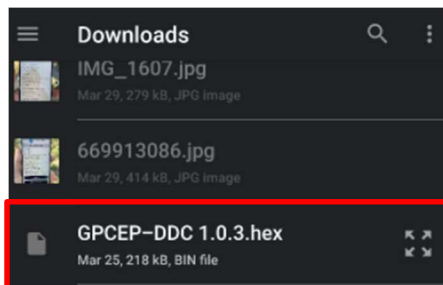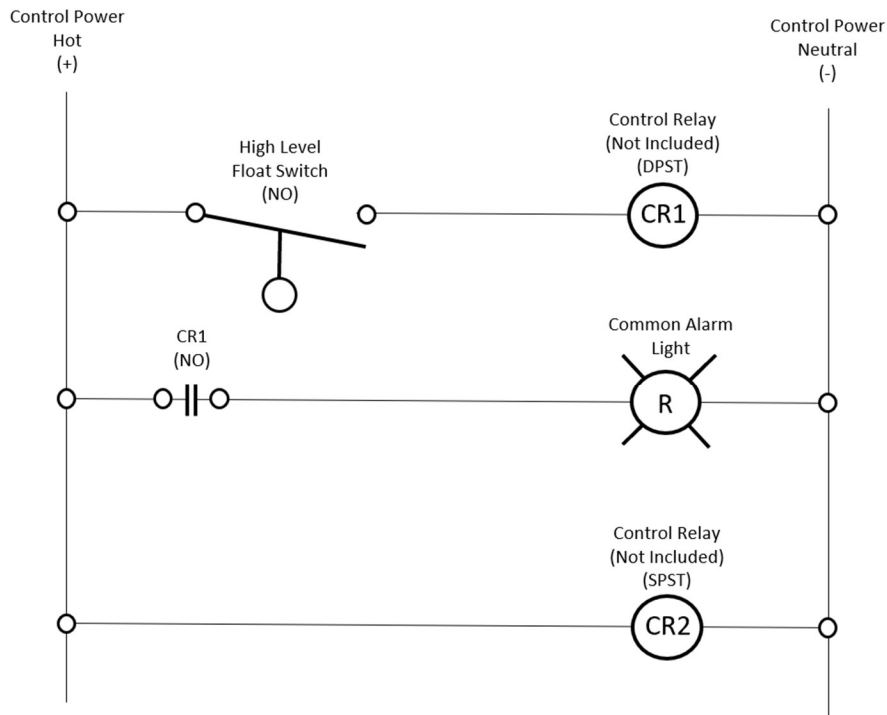

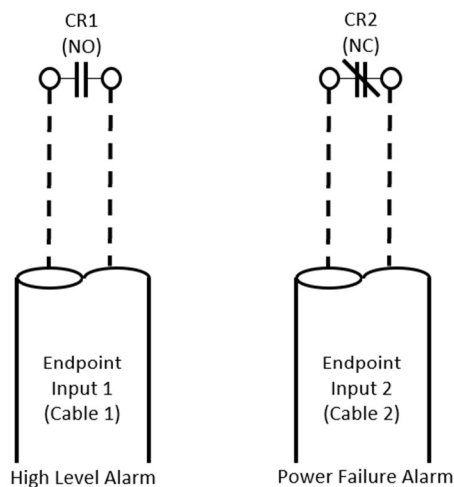Click the file to start the upgrade process.

When the firmware upgrade is complete, the endpoint will reboot. You will need to close the technician's app and reinitiate the Bluetooth to regain access to the endpoint.

Section 8: Field Wiring

SECTION 8.1: PUMP CONTROL WIRING


SECTION 8.2: ENDPOINT WIRING

Tools required:
1. Control Relays as dictated by control power and voltage
2. Terminating screwdriver
3. Wire strippers
4. Drill and fasteners for mounting endpoint using the provided brackets

Appendix A: Troubleshooting

This section will walk through some common issues that can be found when setting up and/or using the iQ Pulse GP-CEP endpoint.

PROBLEM: Can't connect endpoint to technician's app
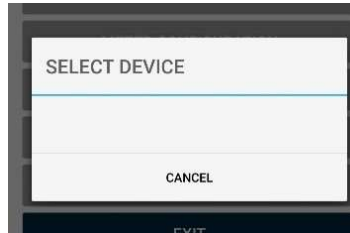
SOLUTIONS:

- The Bluetooth connection may not be active. Check the top of the endpoint to ensure the green LED is on. If not, please refer to section 2.1 Activating Technician Communication for more information.

- If the Bluetooth connection still will not connect, the battery may be dead, or Bluetooth sensor may be malfunctioning. Contact Support for RMA
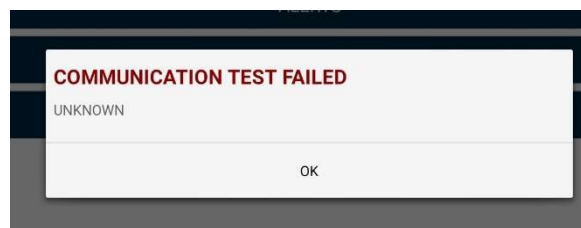
PROBLEM: Device Not Connected: App navigation works but cannot make any changes.
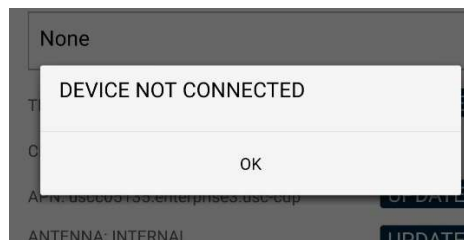
SOLUTION:

- The app is no longer connected to the endpoint. Reactivate the Bluetooth communication to regain connection. Refer to section 2.1: Activating Technician Communication for more information.

PROBLEM: Communication Test Failed: Running a Comm Test displays "unknown" message

SOLUTIONS:

- Endpoint may be in a poor coverage area. Move endpoint to a known good coverage area.

- Connect an external antenna, if available. Refer to section 4.6 Antenna Selection for more information.

- SIM card may not be active. Run a SIM configuration to ensure the SIM card is active with the cellular network. Refer to section 4.8: SIM Configuration for more information.

- SIM card may not being read by the endpoint. Check the Additional Info tab of the technician's app. Refer to the ICCID field. If CCID is present, the SIM is being read however, if the field says, "sim not inserted", the SIM card is not being recognized. Contact Support for RMA.

ADDITIONAL INFO

CEP ID: 025.000.000.102
IMEI: 353535099408815
ICCID: sim not inserted
IMSI:
rxlev: -110.0 dBm
rscp: -120.0 dBm
ecno: -24.0 dB
rsrp:
NETWORK STATUS: UNKNOWN
ACCESS TECHNOLOGY: UNKNOWN
CELL INFORMATION:MCC 0, MNC 0,
MODEM CNUM:

**PROBLEM**: Activation Error: Activating an endpoint to the iQ Pulse portal is unsuccessful.

ACTIVATION ERROR

OK
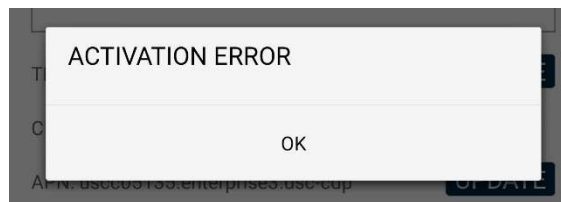
SOLUTIONS:

- Low or no Signal detected:
  - o Move endpoint to another location that has known good cellular coverage
  - o Add a known good external antenna, if using the internal. Refer to section 4.6 Antenna Selection for more information.
  - o Run SIM Configuration, if not already done. Refer to section 4.8: SIM Configuration for more information.

Low/No Signal detected
Technology: UNKNOWN
Signal Quality:
    rxlev: -110.0 dBm
    rscp: -120.0 dBm
    ecno: -24.0 dBm

OK
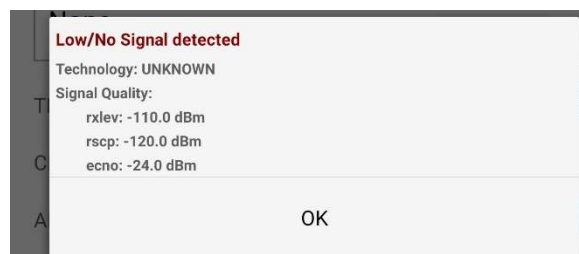
- Device unable to send data; check network:
  - o Move endpoint to another location that has known good cellular coverage
  - o Add a known good external antenna, if using the internal. Refer to section 4.6 Antenna Selection for more information.

- o Run SIM Configuration, if not already done. Refer to section 4.8: SIM Configuration for more information.
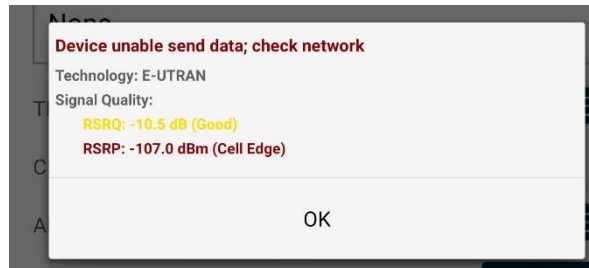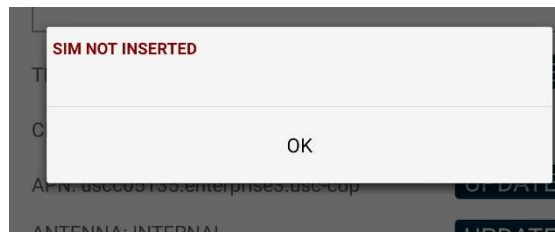

- Sim not inserted
  - o Reboot the endpoint. Refer to section 4.9: Device Reset for more information
  - o SIM is not being recognized. Contact Support for RMA

If none of the above fixes the problem, please refer to section 1.2 Support Information of this document to contact support for additional assistance.