Honeywell
THE POWER OF CONNECTED
CLOUDLINK 4G M1 MODEM

CloudLink 4G M1 Modem User Guide

FD-609 | Revision A | November 2018

CONTENTS

CONTENTS

1 Overview

This chapter introduces the CloudLink 4G M1 Modem and also provides the device features.

CloudLink 4G M1 Modem is a cellular radio that can be used as a component in Electronic Volume Correctors and in wireless platforms. This can function as a standalone transparent modem. MasterLink application software can be used to configure the Modem.

1.1 Modem Features

- Serial communication through RS-232 & RS-485
- Bluetooth Low Energy V5.0
- Belongs to the category of LTE CAT M1
- Configured to IPv4
- Operates in Client and Server Modes
- Cellular Statistics
- Firmware Upgrade Over-The-Air (FOTA)
- North American Cellular Network Approvals
- Pulse-Counting Input
- Built-In magnetic switch
- External power supply (30V max)
- Dual battery operation
- Transparent Modem
- Dedicated configuration port

2.1 Mechanical Assembly

This chapter describes the mechanical assembly of the different components of a CloudLink 4G M1 Modem.

2.1.1 Device Dimensions

The figures below illustrate the dimensions of a CloudLink 4G M1 Modem device.
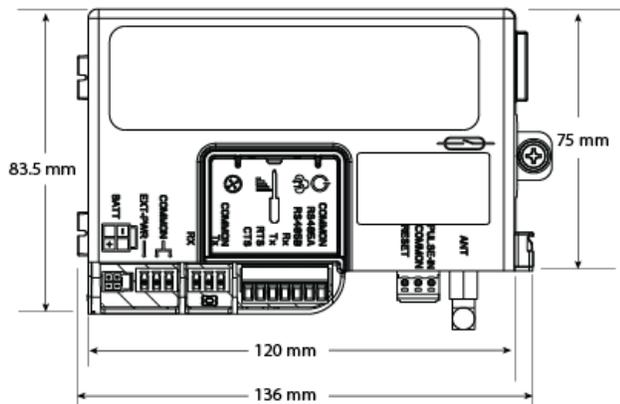
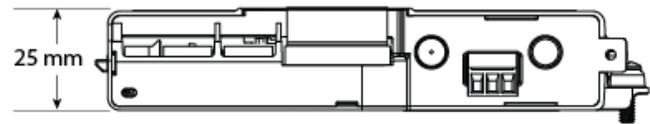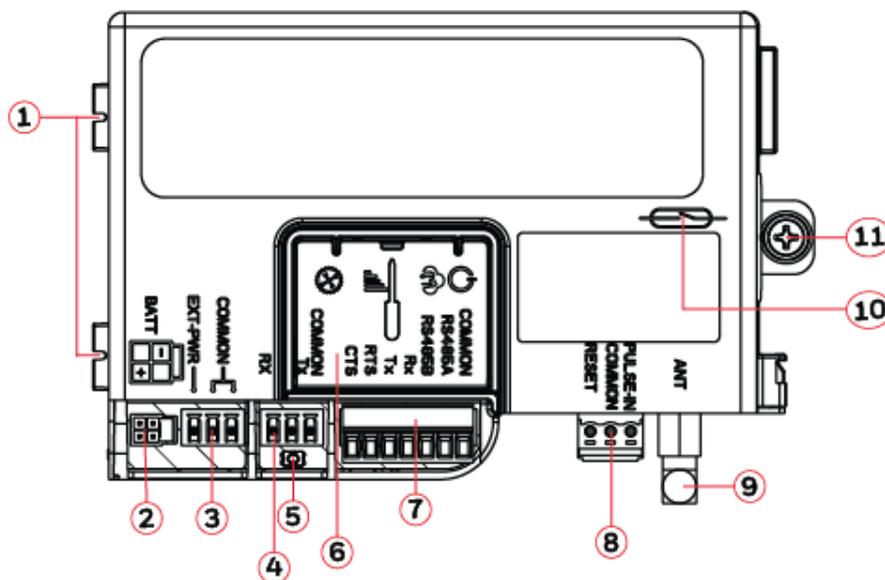**Figure 2-1**: Device Dimensions (top view)   **Figure 2-2**: Device Dimensions (front view)

2.1.2 Device in detail

1) Mounting tabs	2) Battery Connector	3) External Power Input
4) Dedicated Configuration Port	5) Default Switch	6) SIM Cover
7) Serial Port (RS232/RS485)	8) Pulse Input Port with Reset	9) Antenna
10) Magnetic Reed Switch	11) Captive Screw	

2.1.3 Product Label DIV 1 & DIV 2

THIS PRODUCT CONTAINS RF TRANSCEIVERS: NINA-B112, ME910C1-NV
CONTAINS FCC ID: RI7ME910C1NV, CONTAINS IC: 5131A-ME910C1NV
CONTAINS FCC ID: XPYNINAB1, CONTAINS IC:8595A-NINAB1
LTE CAT-M1 BANDS :13
Tamb : -40°C to +65°C

INTRINSICALLY SAFE
À SÉCURITÉ INTRINSÈQUE
CLASS I ZONE 0, AEX ia IIB T4 Ga
Ex ia IIB T4 Ga IECEx CSA 18.0003X
CLASS I DIV 1 GROUPS C & D T4
INTRINSICALLY SAFE WHEN INSTALLED AS PER DRAWING 40-6176
CLASS I DIV 2, GROUPS A, B, C & D, T4
NON-INCENDIVE WHEN INSTALLED AS PER DRAWING 40-6177
EXTERNAL POWER(ONLY DIV2):4.8-30Vdc@0.8A PEAK0.23A AVG

CSA18CA70174210

Honeywell
MODEL:Cloud Link 4G M1 Modem
ORDER CODE: 22-2903-3-KIT
HONEYWELL/MERCURY INSTRUMENTS
512 VIRGINIA DRIVE,
FORT WASHINGTON, PA 19034, USA
www.honeywellprocess.com

WARNING: FOR BATTERY POWERED APPLICATIONS, USE ONLY
HONEYWELL BATTERY PACK 40-6154.
AVERTISSEMENT : POUR LES APPLICATIONS UTILISANT DES BATTERIES,
N'UTILISER QUE LA BATTERIE HONEYWELL 40-6154 POUR REMPLACEMENT.

22-3007-2 (CL4GM-R110, CLASS 1, DIV1)

THIS PRODUCT CONTAINS RF TRANSCEIVERS: NINA-B112, ME910C1-NV
CONTAINS FCC ID: RI7ME910C1NV, CONTAINS IC: 5131A-ME910C1NV
CONTAINS FCC ID: XPYNINAB1, CONTAINS IC:8595A-NINAB1
LTE CAT-M1 BANDS : 13
ANTENNA IMPEDANCE : 50Ω
Tamb : -40°C to +70°C
CLASS I DIV 2, GROUPS A, B, C & D,T4
NON-INCENDIVE WHEN INSTALLED AS PER DRAWING 40-6177
EXTERNAL POWER REQUIREMENTS: 4.8-30Vdc @ 0.8A PEAK 0.23A AVG

Honeywell
MODEL: Cloud Link 4G M1 Modem
ORDER CODE: 22-2903-4-KIT
HONEYWELL /MERCURY INSTRUMENTS
512 VIRGINIA DRIVE,
FORT WASHINGTON, PA 19034, USA
www.honeywellprocess.com
SEE USER'S GUIDE FOR COMPLETE DETAILS.

22-3007-3 (CL4GM-R110, CLASS 1, DIV2)

2.2 Specifications

2.2.1 Power Options

CloudLink 4G M1 Modem supports the following power supply options.

2.2.2 Zone 0/DIV 1 use

1. Lithium Battery Pack (Honeywell Part Number: 40-6154).
2. External Power on BATT Connector through an approved associated safety barrier which meets the entity parameters as per the installation drawings.

> **Note:** Under no circumstances shall the CloudLink device be connected to the battery pack and external power supply simultaneously.

> **Caution:** Do not power CloudLink on External power connector for DIV1/Zone 0 location. Refer Installation drawings for more detailed power options.

2.2.3 DIV 2 use

1. Lithium Battery Pack (Honeywell Part Number: 40-6154).
2. For remote power installations connect 4.8 - 30VDC to the CloudLink at External Power Connector.

> **Note:** Under no circumstances shall the CloudLink device be connected to the battery pack and external power supply simultaneously.

> **Caution:** Refer Installation drawings for more detailed power options.

2.2.4 Certifications

Product should adhere to the below standards:

- CSA C22.2 No 61010-1-12 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use Part 1: General Requirements-Third Edition
- UL 61010-1-12
- CSA C22.2 No 60079-0:2015
- CSA C22.2 No 60079-11:2014
- UL 60079-0:2013
- UL 60079-11:2014
- CSA C22.2 No 213 - 2015/ ISA 12.12.01-2015
- IEC 60079-0 6th Edition
- IEC 60079-11 6th Edition
- CSA C/US Class I, Division 1, Group C & D; T4
- CSA C/US Class I, Division 2, Group A, B, C & D; T4
- IECEx Zone 0 Ex ia IIB T4 Ga
- Class I Zone 0 AEx ia IIB T4 Ga
- IEC 61000-6-2
- IEC 61000-6-4
- CAN/CSA-C22.2 No. 0-M91 General Requirements – Canadian Electrical Code, Part II
- CAN/CSA-C22.2 No. 60079-11:14 Explosive Atmospheres-Part 11: Equipment protection by intrinsic safety "i"
- CAN/CSA-C22.2 No. 60079-0:15 Explosive Atmospheres-Part 0: Equipment – General Requirements
- C22.2 No. 142-M1987 Process Control Equipment
- CSA Std. C22.2 No. 213-2015 Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations

- ANSI/UL 60079-11:13 Electrical apparatus for Explosive Gas Atmospheres-Part 11: Intrinsic Safety "i"
- ANSI/UL 60079-0:13 Electrical Apparatus for Explosive Gas Atmospheres-Part 0: General Requirements
- ANSI/ISA-12.12.01-2015 Non-Incendive Electrical Equipment for use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
- ANSI/ISA-61010-1 3rd Edition Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use Part 1: General Requirements-Third Edition
- FCC Part 15 Sub-part B
- IC Canada (ICES-003 Issue 6)
- Verizon certified
- Bluetooth 5.0 (Declaration ID: XXXXXXX)
- Supporting 3GPP Release 13 LTE Cat M1 Band 13
- ROHS compliant

2.2.5 Environmental

Operating Temp: -40 °C to +65 °C in Div1

-40 °C to +70 °C in Div2

2.3 Safety Measures

2.3.1 Safety and Hazardous Information

CloudLink 4G M1 Modem complies with the general safety standards and regulations. However, failure to operate as per the safety instructions available in this document may lead to hazards.

Compliance with FCC and IC Rules and Regulations

- During normal operating conditions, a separation distance between the antenna and any person of min. 20cm should be assured where the integration is limited to fixed or mobile categorized host devices .
- For mobile and fixed operation configurations the antenna gain, including cable loss, must not exceed the limits 6.94 dBi with band 13.

2.3.2 Safety Security Control Measures

Conditions of Certification / Safe use for Zone 0/Division1 version of CloudLink 4G M1 Modem:

- CloudLink 4G M1 Modem shall only be powered with battery pack 40-6154 or through an approved associated safety apparatus which meets the entity parameters. The battery pack shall not be replaced in hazardous atmospheres.
- Under no circumstances shall the device be connected to the battery pack and external power supply simultaneously.
- The battery pack shall not be recharged, or altered in any way under any circumstances.
- CloudLink and the 40-6154 battery pack used with the device shall be housed in a rigid enclosure that provides protection from mechanical impact.
- The dedicated configuration port shall be used in non-hazardous areas only

- Under certain extreme circumstances, the non-metallic parts of the CloudLink enclosure may generate an ignition-capable level of electrostatic charge. Therefore the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. This is particularly important if the equipment is installed in a Division 1 or Zone 0 location. In addition, the equipment shall only be cleaned with a damp cloth.
- The SIM card connection shall only be used with SIM cards. The SIM card may be connected or disconnected in the hazardous area.
- Both RS232 interface signals and RS485 interface signals of CloudLink Serial Port (P19) shall not be connected simultaneously to serial device.

Conditions of Certification / Safe use for Division 2 version of CloudLink 4G M1 Modem:

- The CloudLink 4G M1 Modem shall be powered by a 4.8-30V DC supply on the EXT-PWR port, and only lithium battery pack 40-6154 on the battery connection port. The battery pack shall not be replaced in hazardous atmospheres.
- Under no circumstances shall the device be connected to the battery pack and external power supply simultaneously.
- The battery pack shall not be recharged, or altered in any way under any circumstances.
- The CloudLink 4G M1 Modem & the battery pack 40-6154 shall be installed in a rigid enclosure that provides protection from mechanical impact. The enclosure shall be acceptable to the local authority having jurisdiction.
- The SIM card connection shall only be used with SIM cards. The SIM card may be connected or disconnected only in a non-hazardous area or when the decide has been de-energized.
- All connections into the CloudLink shall be sourced from Class 2 circuits.
- The dedicated configuration port shall be used in non-hazardous areas only.

2.3.3 Cyber Security Control Measures

The user is recommended to deploy CloudLink and Remote MDM server application under secured VPN network
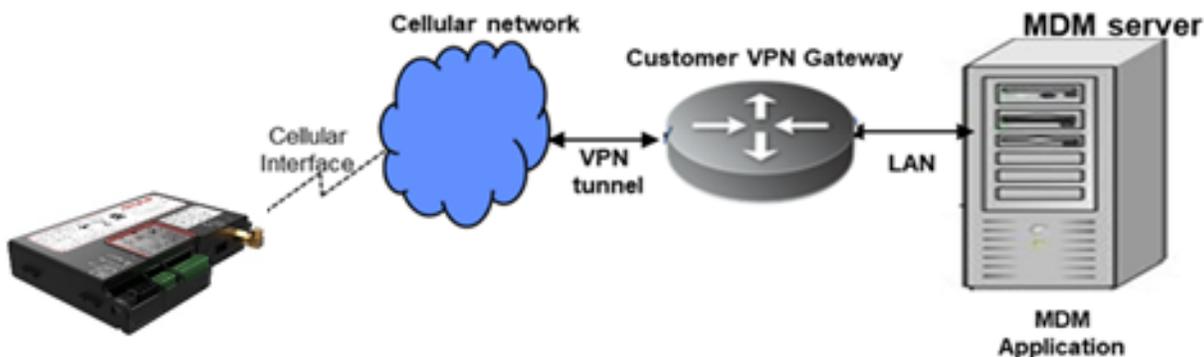
Conditions to adhere Cyber Security measures:

- Restrict physical access to the device and other devices in the network
- Secure the connection between the Cellular carrier network and end gateway by VPN tunnel
- Secure the LAN connecting Customer/User VPN gateway and the MDM server running the MDM application

- Use a firewall for the business network to process control/monitor network interface to restrict access from the business network.
- Use a firewall within local area network connecting VPN Gateway to server hosting MDM application
- Close all unused TCP and UDP communication ports on server hosting MDM application
- Set the minimum level of privilege for all accounts, and enforce a strong password policy.
- Do not allow the use of unauthorized removable media
- Prevent the use of unauthorized laptops on the process control network
- Ensure that your virus protection and Microsoft security hot fixes are up to date on all systems.

Device Security measures

The CloudLink can be accessed through the following interfaces

- Serial
- BLE
- Cellular

Sign-In –

° A valid user name and password is required for accessing the Cloud Link 4G M1 Modem.
° For Secure sign-on, user name and password are hashed and hash pairs embedded in protocol are used for authentication.
° The device supports different privilege levels like Read / Write and Read Only.

White-List –

° The CloudLink supports white Listing for Cellular communication.
° User can configure up to 10 host IP addresses in case of call outs from remote hosts to the device.

BLE Communication –

° For BLE communication the CloudLink supports two types of paring methods viz; <u>Just Works</u> and <u>Passkey entry</u>.
° With Just Works pairing, a malicious program or user can change the CloudLink configuration data by sniffing the BLE signals and using Replay / Man in the middle attack. The device operation can be changed and it will affect the data available to billing system on time. Access to the metering device might be hindered. Hence, the customer is advised to use passkey entry mechanism for BLE communication.

To further enhance device security,

A feature to disable device application firmware upgrade using item code i3107 is made available

A feature to block (through item code i3162) BLE (Bluetooth Low Energy) based applications from communicating to any device connected to CloudLink over RS485/RS232 is provided.

> **Note:** Restrict physical access to the device and secure the connection between the carrier network and end gateway by VPN tunnel. Secure the LAN connecting Customer/User VPN gateway and the MDM server running the MDM application

3 Installation

3.1 Retrofit details

The CloudLink 4G M1 Modem device can be retrofitted easily by following the below steps:

<u>STEPS :</u>

- Unscrew the CloudLink 4G (CLR100) Modem
- Slide the CloudLink 4G M1 (CLR110) Modem into the same slot
- Position the mounting tabs properly and torque the screw
- Connect the cables (Refer 22-3012 and 22-3013 for Meter and Remote Mounts respectively)

CLOUDLINK RETROFIT with EC350 (Remote Mount)
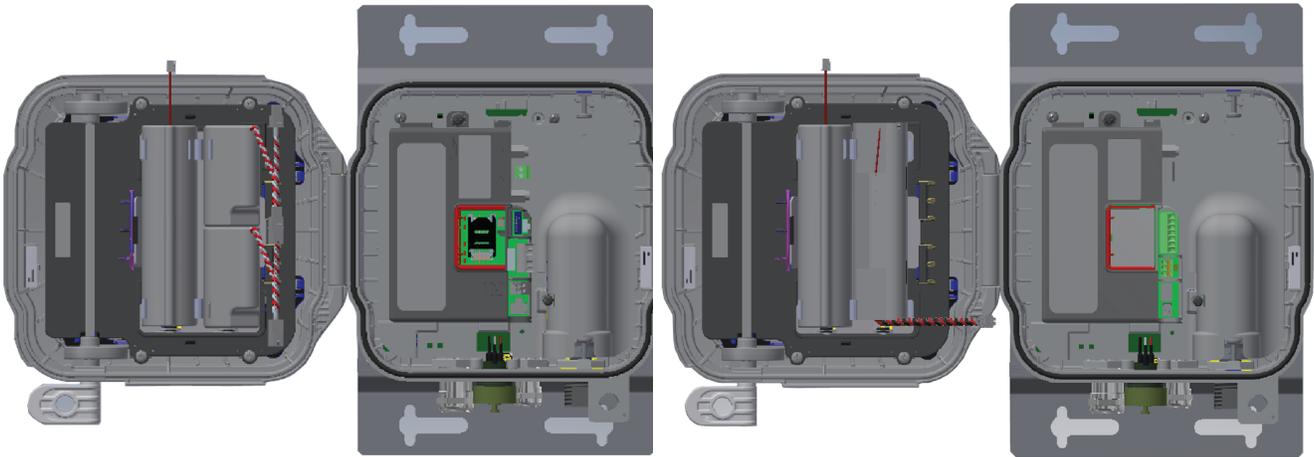
Device fitted with CLR100   Device fitted with CLR110

CLOUDLINK RETROFIT with EC350 (Meter Mount)

Device fitted with CLR100   Device fitted with CLR110

4 Electrical Assembly
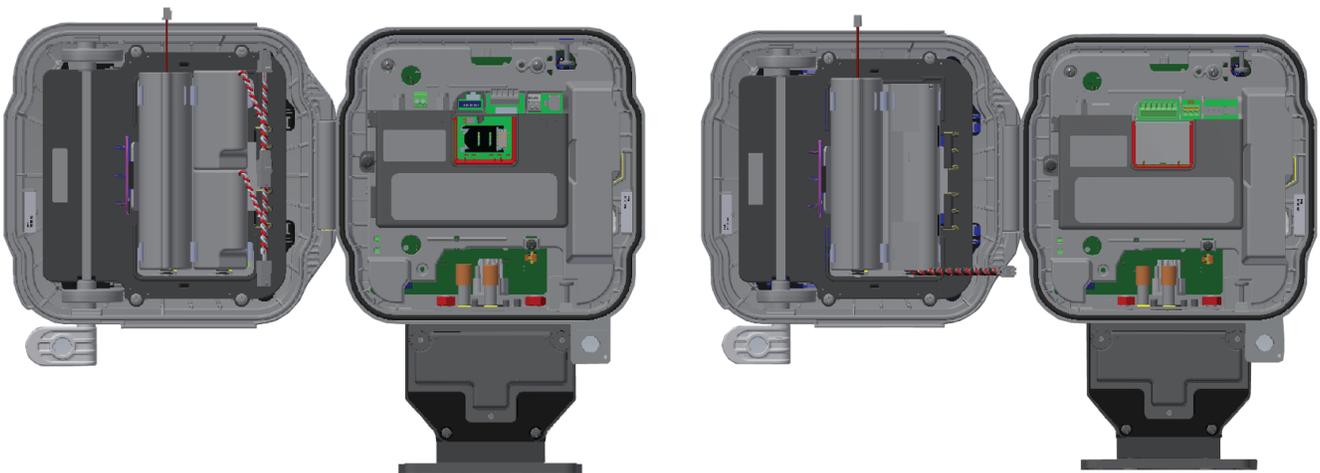
This chapter describes assembly of the different electrical components of a CloudLink 4G M1 Modem

4.1 SIM Card

This connector on CloudLink holds the cellular radio Standard SIM card and supports both 1.8V (Class C) and 3.0V (Class B) version SIM cards.

To install the SIM card:
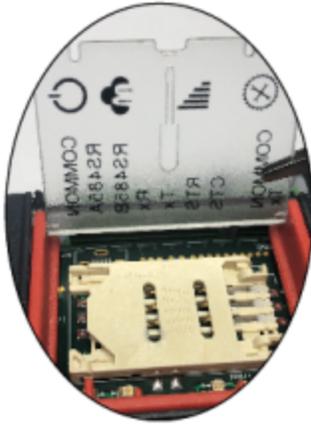
1) Lift the SIM cover to insert the SIM
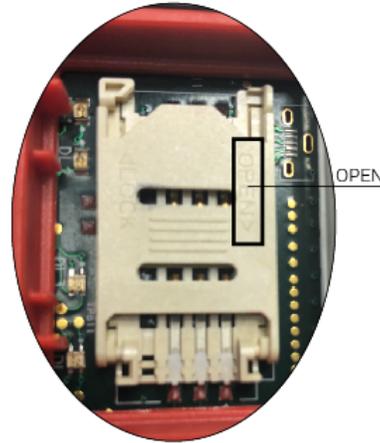
2) Slide the SIM slot in the direction of 'Open'
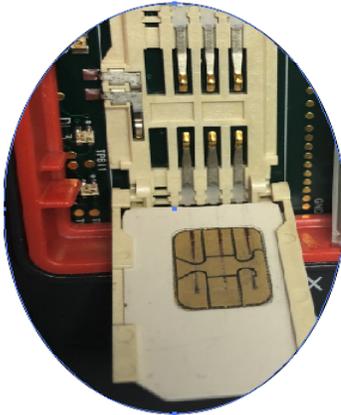
3) Insert the SIM in the slot with proper orientation of the notched corner

4) And, lock the slot in the direction of 'Lock' then, close the SIM cover

Recommended SIM card Specs:
- MPN: SIMS46-6-30-2-2-F-LF
- MFR: Major League Electronics
- HPN: 51508243-203
- Description: 8 Position Hinged SIM Card Connector

Access Point Name

Access Point Name (APN) is the name of a gateway between a CloudLink device and host system. The cellular device requesting a data connection must be configured with an APN to communicate with the carrier. Based on the APN used, the mobile carrier assigns an IP address to the device.

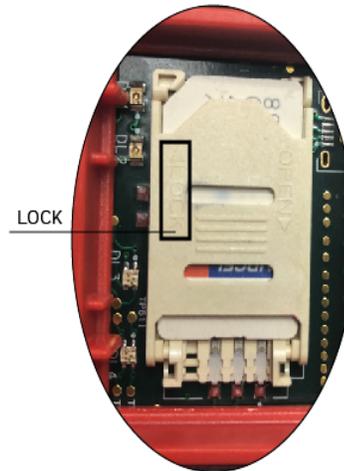Device IP address assigned from the carrier are categorized into two types i.e. dynamic and static IP address. Type of IP address assigned to the device depends on the APN configured to the device. For static IP address, a special SIM card must be procured from the carrier with agreed data-plan.

Carriers support two types of network topology – public and private network.

If the data collection system and cellular devices are to be deployed in private network, user need to procure static SIM cards and manually configure the device with private APN provided by the Cellular service provider

If the data collection system and cellular devices are to be deployed in public internet, the cellular network shall automatically provide the public APN to the device during device connection to the cellular network.

If the CloudLink is making an Internet connection, the cellular service provider will need to provide an Internet APN (access point name). In order to connect to the Internet, the provider has its own computer equipment called a "gateway" server. The server will usually have an APN in the form of a domain name, such as "myserviceprovider.com" or a generic name such as "proxy".

Contact your service provider for this information.

> **Note:** By default a static APN (VZWINTERNET) is given by the carrier but, in case the APN has to be changed then 'Enable' the i3064 and change the APN Value through MasterLink Desktop Application.

> **Note:** User has to use static SIM cards. Service provider gives static IP for these SIM cards. Check with service provider for the APN to be used based on the region.

4.2 Antenna

The FXUB63 flexible ultra wideband antenna is designed to cover all working frequencies in the 698- 3000 MHz spectrum.

The antenna has a flexible body with excellent efficiencies on all bands, ground independent, with cable and connector for easy installation.

Antenna transmits and receives data and can be placed inside EVC enclosure or similar enclosures. In cases where signal strength is a concern, external antenna options are also supported.
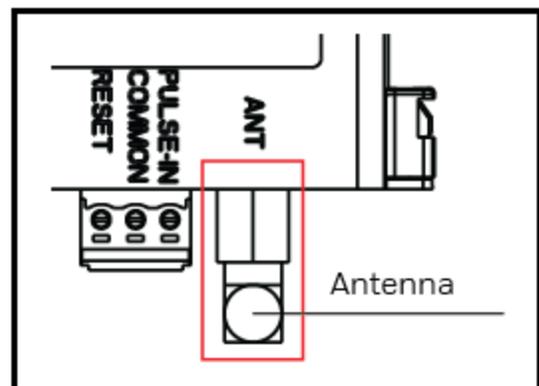

Figure 4–1: Antenna

> **Note:** For External antenna the RF cable used can be 20 cm long.

> **Attention:** Antennas must be placed away from metallic parts like Batteries, Pressure Transducers, Grounding plates.

Connector Specs:

- MPN: 73251-1150
- MFR: Molex
- Description: RF Connectors/Coaxial Connectors SMA EDGE MOUNT JACK

Recommended Antenna:

- HPN: 51508225-100
- Description: RF Connector/Antenna Interfacing Connector, LTE Antenna (Band 13 MHz)

Signal Strength Range

Technology	Range Description	Ranges (dBm)	
		Start	End
4G	Good Range	-75	– 1
	Fair Range	-85	– 75
	Poor Range	-113	– 85

CloudLink supports band 13 for Verizon networks.

Item	Value
Frequency range	LTE Band 13 (746MHz – 787MHz)
Frequency Band	LTE Band 13
Impedance	50 ohm
Input power	> 24 dBm Average power
VSWR absolute max	<= 10:1 (limit to avoid permanent damage)
VSWR recommended	<= 2:1 (limit to fulfill all regulatory requirements)

4.3 Power Supply

Source	Voltage Range	Type
Battery	6.0V to 7.5V	(Li-SOCl2) D-Cell + HLC, connected in series (For pulse power)
External Supply	4.8V to 30V	1. External Power supply 2. Alkaline Battery pack with external super capacitor.

- Humidity: Max 95% rH, non-condensing
- Peak current during transmission 0.8A @ 4.8V
- Operating voltage 4.8V to 30V

4.3.1 Power Port – Battery

Data	Value
Voltage	6.0V to 7.5V
Part Number	40-6154

Battery
Connector

CloudLink 4G M1 Modem battery connector connects the device to a single Lithium D-Cell with a voltage rating of 3.6V.

Below are the battery specifications recommended to be used for CloudLink.
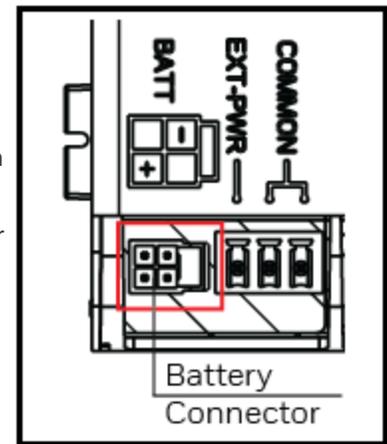
Recommended Battery terminal Connector Specs:

- MPN: 105310-1304
- MFR: Molex
- HPN: 51508370-204
- Description: Headers & Wire Housings NanoFit Hdr Vrt 4Ckt DR KNK Pns Blk 30Au

Note: Under no circumstances shall the CloudLink device be connected to the battery pack and external power supply simultaneously.

4.3.2 Power Port – External Supply

CloudLink 4G M1 Modem North America supports external power supply.

Pin Description:

- **COMMON**: Negative (-) terminal/Return of the external supply
- **EXT-PWR**: Positive (+) terminal of the external supply
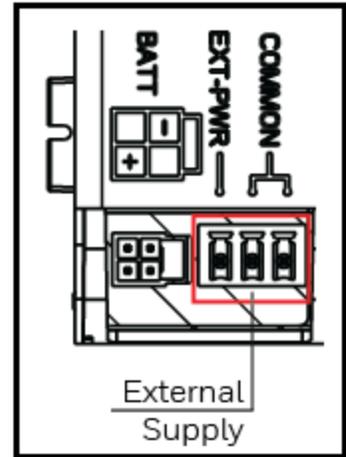
Recommended Battery terminal Connector Specs:

- MPN: 39501-1003
- MFR: Molex
- Description: Pluggable Terminal Block EURO 3.5MM 3 CIRCUIT VERT PCB HEADER

Data	Value
Operating Voltage	4.8V to 30V
Average Current	0.23A
Peak Current	0.8A

4.4 Serial Communication – RS232/485

CloudLink as a transparent cellular modem supports traditional RS232/RS485 interface (only one at a time).

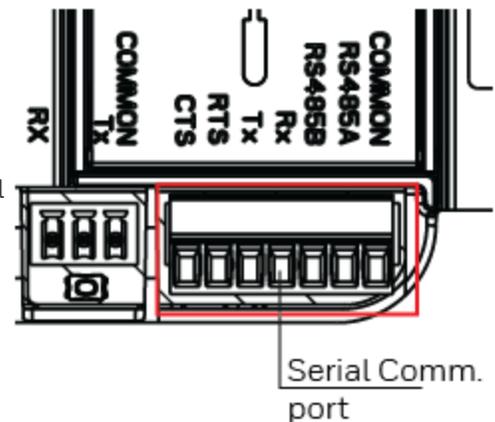| Pin#	Name	Description	I/O	Voltage Levels
1	Common	Common		Common
2	RS232 Tx	RS232 Mode: Transmit Line	O	+/- 3.7V (Min) +/-4V (Typ)
3	RS232 Rx	RS232 Mode: Receive Line	I	+/- 10V (max)
4	RS485 A	RS485 Mode: Non-inverting Driver Output and Non-inverting Receiver Input	I/O	Diff Driver Output: 2.7V (typ)
5	RS485 B	RS485 Mode: Inverting Driver Output and Inverting Receiver Input	I/O	Diff Driver Output: 2.7V (typ)
6	RS232 RTS	RS232 Mode: Request To Send (RTS)	O	+/- 3.7V (Min)
		RS485 Mode: NC (No Connection)		
7	RS232 CTS	RS232 Mode: Clear To Send (CTS)	I	+/- 10V (max)
		RS485 Mode: NC (No Connection)		

Recommended Serial Comm Connector Specs:

- MPN: 1843651
- MFR: Phoenix Contact
- Description: TERM BLOCK HDR 7POS VERT 3.5MM

Note: While switching between RS232 or RS485, you must change firmware configuration using the appropriate item code 3065 & 3075 for selecting the serial port type and baud rate respectively. The RS485 cable supports a baud rate range from 9600 to 57600 bps. Maximum baud rate for RS232 interface is 115200 bps.

Warning: Older RS232 standards have a voltage level of +/- 18V. Using this voltage level can damage the CloudLink device.

Note: RUID must be configured before using BLE communication. Configuration must be done using serial communication.

4.5 Pulse Counter

CloudLink supports 1-channel pulse-counting input up to 10 pulses per second with a minimum pulse width of 25 mS. It is to provide additional redundancy on the UMB pulse input front end. A pulse input from the UMB is wired to this additional pulse input. The EVC will read the pulse counter information recorded in the modem using AT commands and compare it with its own pulse accumulation register and raise alarm if any mismatch in accumulation. Pull-up resistor in the modem can drive ~30uA of wetting current. The pulse counter in the modem is not MID/MC certified, cannot be used for billing.

CloudLink pulse count becomes zero when device resets.
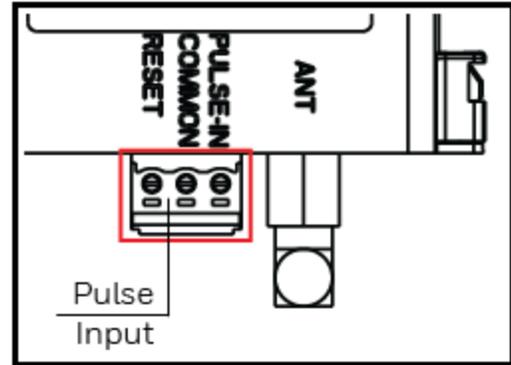
Connector Details:

- MPN: (39512-1003)
- MFR: Molex
- Description: Pluggable Terminal Blocks 3.81MM EURO HEADER R O HEADER RA BLK 3CKT

Pulse Counting:

- To initiate pulse counting, **Enable** Item 3136 value. Once i3136 value is **Disable**d, the pulse count value automatically resets to zero.
- To resume the pulse counting from a specific count, **Disable** the value of i3136. **Write** the count in i3113 then, **Enable** the Pulse Count feature in i3136. This will start the pulse count from the given number.

4.6 Magnetic REED Switch

Magnetic Reed Switch in CloudLink 4G M1 Modem is to show LED pattern based on device state

.
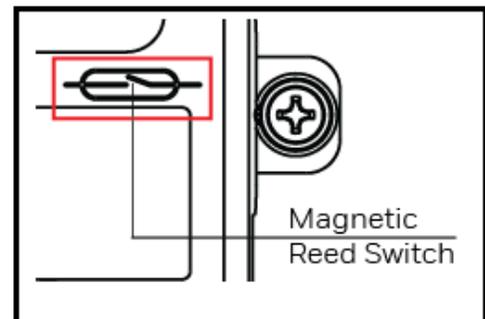
4.7 BLE (Bluetooth Low Energy)

CloudLink supports Bluetooth Low Energy (BLE) for local communications up to 30m (100ft) (Line of Sight). The maximum transmit power from BLE is +8dBm and receiver sensitivity of -98dBm. The antenna of BLE is inside the Modem, no provision for external antenna is given for BLE.

In order to connect a CloudLink with MasterLink Software Application iOS app, you need to perform a bluetooth pairing first, the Modem supports two types of pairing methods:

- Just Works (no EVC dependency) and Cloudlink in Standalone mode
- Passkey entry (only with EC350)

4.8 LED Indicators

LED 1   LED 2   LED 3   LED 4

LED Diagnostics					
LED	**COLOR CODES**	**SYMBOL**	**DESCRIPTION**	**STATE**	**DETAIL DESCRIPTION**
1	Green	DL1	POWER INDICATION & NETWORK CONNECTIVITY STATUS	OFF	Sleep or power off
				BLINK	Trying to connect (cellular)
				ON	Connected to network (cellular)
2	Green	DL2	DATA CONNECTION	OFF	No data flow to cellular host
				BLINK	Data flow between host and device over cellular interface, no fixed blink rate
3	Tricolor* (Red, Yellow and Green)	DL3	NETWORK CONNECTIVITY & SIGNAL STRENGTH	OFF	Not connected to network
				BLINK*	Connected to network * Denotes RED – Poor RSSI YELLOW – Fair RSSI GREEN – Good RSSI
				SOLID YELLOW	Trying to connect to network
4	Tricolor (Red, Yellow and Green)	DL4	DIAGNOSTICS	SOLID GREEN	When ML signed in over BLE/Serial. No diagnostic codes shown when MasterLink signs in.
				RED/ YELLOW	Red and yellow denote the error codes with Red being the first digit and Yellow as the second digit. Green will be a delimiter between the error codes. Example: Low Battery Voltage – Error Code 13 1 Red blink followed by 3 Yellow blinks with Delimiter Green.

> **Note:** Refer to section for more details on Device modes.

Note: After power cycle, User needs to wait until the modem is booted up i.e., LED3 & LED4 stops blinking. After which he can continue with the operations of the modem.

LED Error Codes:

Error code Description	Bit Number	Corresponding Decimal Value	Displayed error code on LEDs
Self test failure	0	1	11
Radio module failure	1	2	12
Low battery voltage	2	4	13
SIM card error	3	8	21
Data connection failure	4	16	22
BLE fault	5	32	23

Example: 1

Instance : SIM Card Error

Modem displays Error Code 21 : 2 Red followed by 1 Yellow with Green as Delimiter

Item 3160 value will display **'0000000008'** in MasterLink Desktop Application
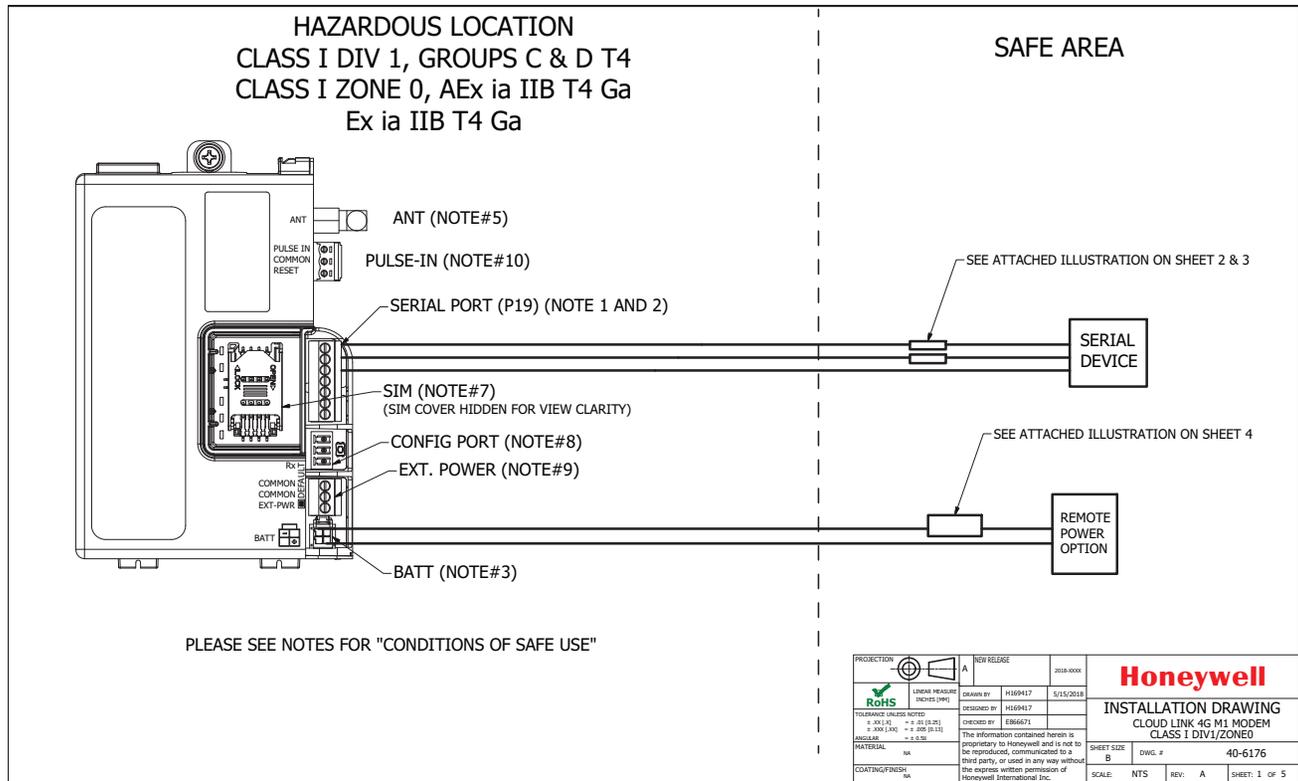
Example: 2

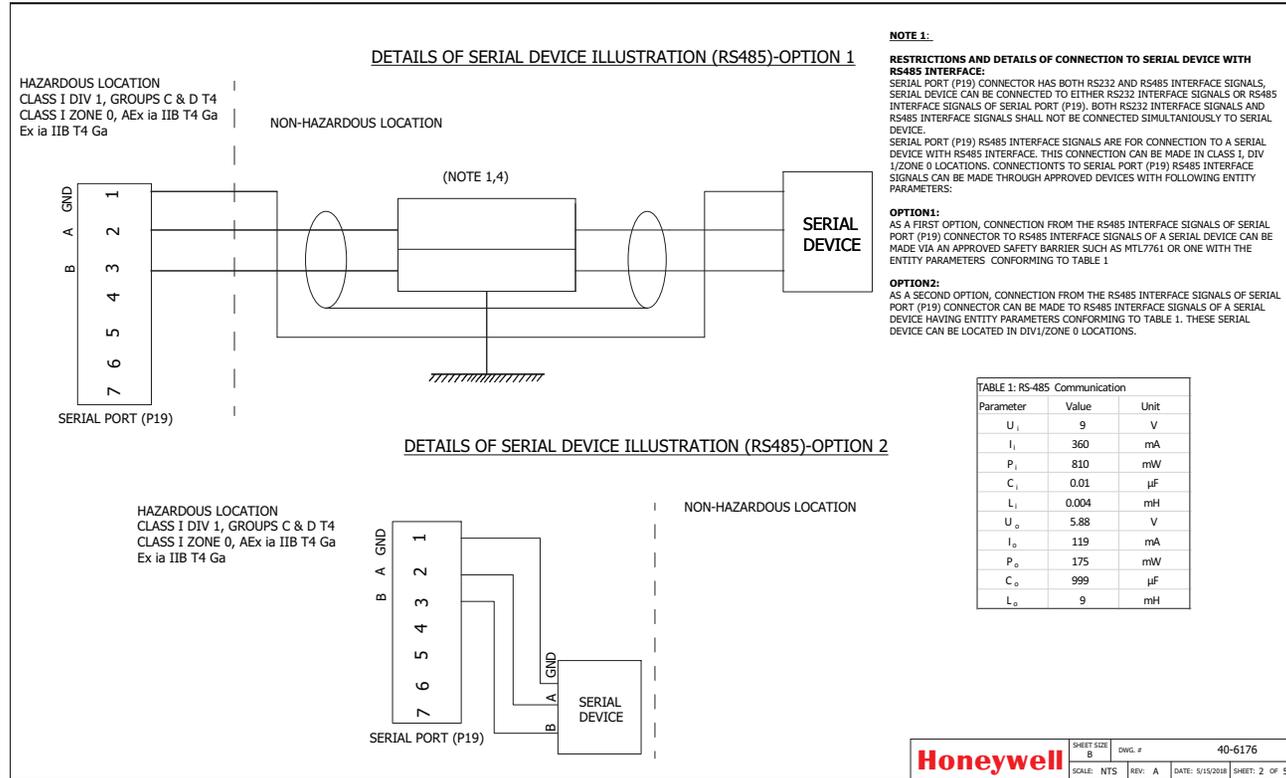Instance : Self test failure & Radio module failure

Modem displays Error Code 11 and 21 : 1 Red followed by 1 Yellow with Green as Delimiter and 2 Red followed by 1 Yellow
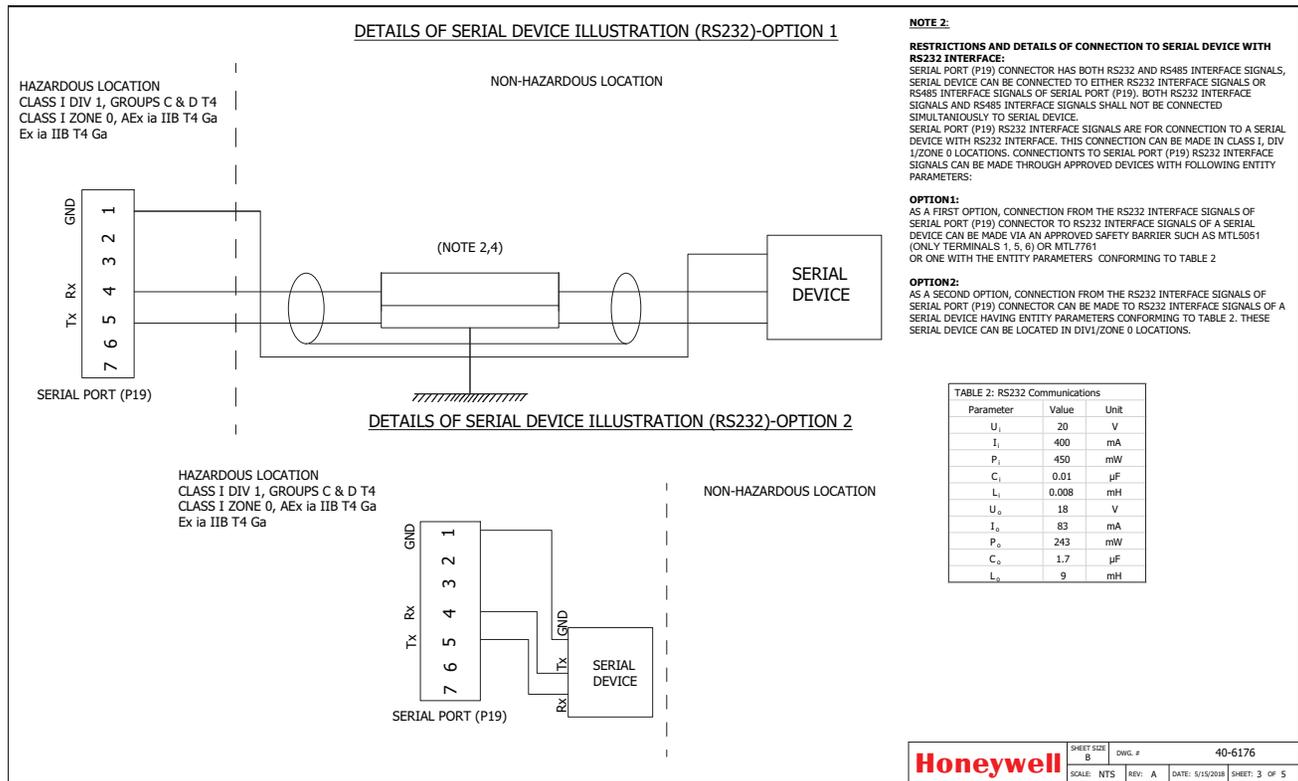
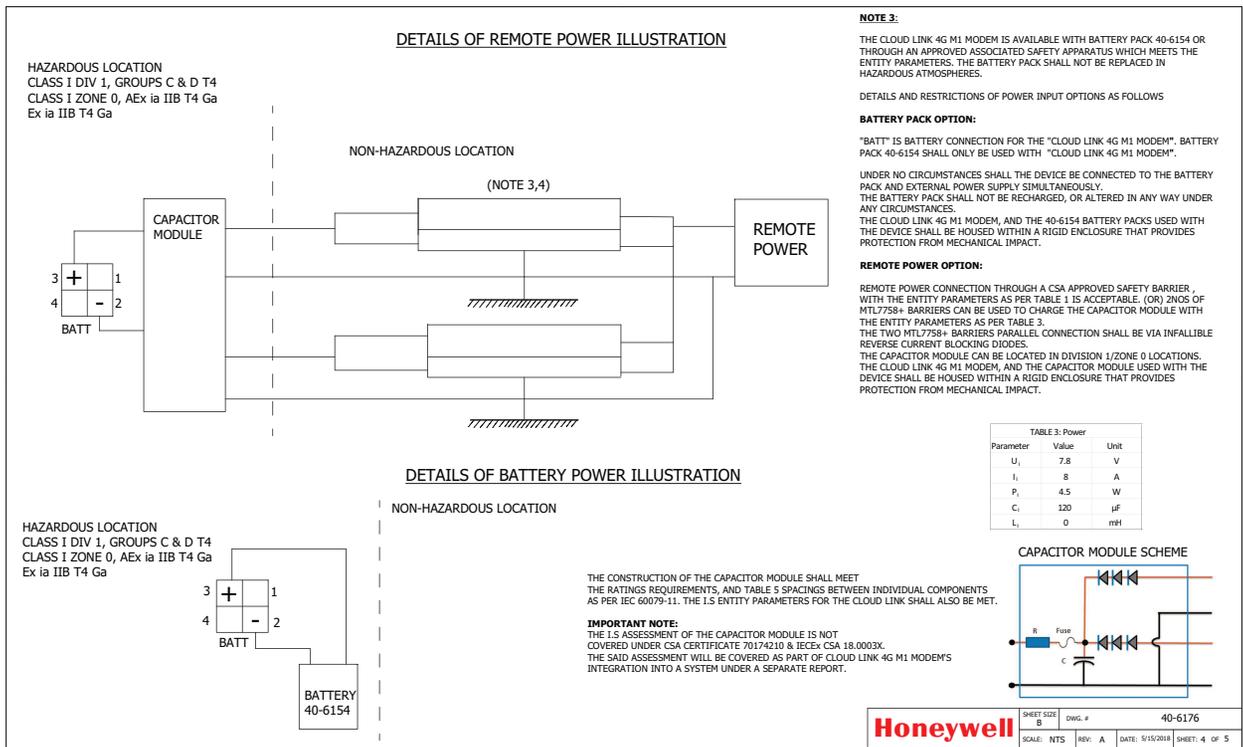Item 3160 value will display (2+1) **'0000000003'** in MasterLink Desktop Application

5 Installation Drawings

5.1 Div 1

DETAILS OF SERIAL DEVICE ILLUSTRATION (RS485)-OPTION 1

HAZARDOUS LOCATION
CLASS I DIV 1, GROUPS C & D T4
CLASS I ZONE 0, AEx ia IIB T4 Ga
Ex ia IIB T4 Ga

NON-HAZARDOUS LOCATION

(NOTE 1,4)

SERIAL
DEVICE

SERIAL PORT (P19)

NOTE 1:

RESTRICTIONS AND DETAILS OF CONNECTION TO SERIAL DEVICE WITH RS485 INTERFACE:

SERIAL PORT (P19) CONNECTOR HAS BOTH RS232 AND RS485 INTERFACE SIGNALS, SERIAL DEVICE CAN BE CONNECTED TO EITHER RS232 INTERFACE SIGNALS OR RS485 INTERFACE SIGNALS OF SERIAL PORT (P19). BOTH RS232 INTERFACE SIGNALS AND RS485 INTERFACE SIGNALS SHALL NOT BE CONNECTED SIMULTANIOUSLY TO SERIAL DEVICE.

SERIAL PORT (P19) RS485 INTERFACE SIGNALS ARE FOR CONNECTION TO A SERIAL DEVICE WITH RS485 INTERFACE. THIS CONNECTION CAN BE MADE IN CLASS I, DIV 1/ZONE 0 LOCATIONS. CONNECTIONTS TO SERIAL PORT (P19) RS485 INTERFACE SIGNALS CAN BE MADE THROUGH APPROVED DEVICES WITH FOLLOWING ENTITY PARAMETERS:

OPTION1:
AS A FIRST OPTION, CONNECTION FROM THE RS485 INTERFACE SIGNALS OF SERIAL PORT (P19) CONNECTOR TO RS485 INTERFACE SIGNALS OF A SERIAL DEVICE CAN BE MADE VIA AN APPROVED SAFETY BARRIER SUCH AS MTL7761 OR ONE WITH THE ENTITY PARAMETERS CONFORMING TO TABLE 1

OPTION2:
AS A SECOND OPTION, CONNECTION FROM THE RS485 INTERFACE SIGNALS OF SERIAL PORT (P19) CONNECTOR CAN BE MADE TO RS485 INTERFACE SIGNALS OF A SERIAL DEVICE HAVING ENTITY PARAMETERS CONFORMING TO TABLE 1. THESE SERIAL DEVICE CAN BE LOCATED IN DIV1/ZONE 0 LOCATIONS.

DETAILS OF SERIAL DEVICE ILLUSTRATION (RS485)-OPTION 2

HAZARDOUS LOCATION
CLASS I DIV 1, GROUPS C & D T4
CLASS I ZONE 0, AEx ia IIB T4 Ga
Ex ia IIB T4 Ga

NON-HAZARDOUS LOCATION

SERIAL
DEVICE

SERIAL PORT (P19)

TABLE 1: RS-485 Communication		
Parameter	Value	Unit
U_i	9	V
I_i	360	mA
P_i	810	mW
C_i	0.01	µF
L_i	0.004	mH
U_o	5.88	V
I_o	119	mA
P_o	175	mW
C_o	999	µF
L_o	9	mH

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DETAILS OF SERIAL DEVICE ILLUSTRATION (RS232)-OPTION 1

NON-HAZARDOUS LOCATION

HAZARDOUS LOCATION
CLASS I DIV 1, GROUPS C & D T4
CLASS I ZONE 0, AEx ia IIB T4 Ga
Ex ia IIB T4 Ga

GND

Rx
Tx

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

(NOTE 2,4)

SERIAL DEVICE

SERIAL PORT (P19)

DETAILS OF SERIAL DEVICE ILLUSTRATION (RS232)-OPTION 2

HAZARDOUS LOCATION
CLASS I DIV 1, GROUPS C & D T4
CLASS I ZONE 0, AEx ia IIB T4 Ga
Ex ia IIB T4 Ga

NON-HAZARDOUS LOCATION

GND

Rx
Tx

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

GND
Tx
Rx

SERIAL DEVICE

SERIAL PORT (P19)

NOTE 2:

RESTRICTIONS AND DETAILS OF CONNECTION TO SERIAL DEVICE WITH RS232 INTERFACE:
SERIAL PORT (P19) CONNECTOR HAS BOTH RS232 AND RS485 INTERFACE SIGNALS, SERIAL DEVICE CAN BE CONNECTED TO EITHER RS232 INTERFACE SIGNALS OR RS485 INTERFACE SIGNALS OF SERIAL PORT (P19). BOTH RS232 INTERFACE SIGNALS AND RS485 INTERFACE SIGNALS SHALL NOT BE CONNECTED SIMULTANIOUSLY TO SERIAL DEVICE.
SERIAL PORT (P19) RS232 INTERFACE SIGNALS ARE FOR CONNECTION TO A SERIAL DEVICE WITH RS232 INTERFACE. THIS CONNECTION CAN BE MADE IN CLASS I, DIV 1/ZONE 0 LOCATIONS. CONNECTIONTS TO SERIAL PORT (P19) RS232 INTERFACE SIGNALS CAN BE MADE THROUGH APPROVED DEVICES WITH FOLLOWING ENTITY PARAMETERS:

OPTION1:
AS A FIRST OPTION, CONNECTION FROM THE RS232 INTERFACE SIGNALS OF SERIAL PORT (P19) CONNECTOR TO RS232 INTERFACE SIGNALS OF A SERIAL DEVICE CAN BE MADE VIA AN APPROVED SAFETY BARRIER SUCH AS MTL5051 (ONLY TERMINALS 1, 5, 6) OR MTL7761
OR ONE WITH THE ENTITY PARAMETERS CONFORMING TO TABLE 2

OPTION2:
AS A SECOND OPTION, CONNECTION FROM THE RS232 INTERFACE SIGNALS OF SERIAL PORT (P19) CONNECTOR CAN BE MADE TO RS232 INTERFACE SIGNALS OF A SERIAL DEVICE HAVING ENTITY PARAMETERS CONFORMING TO TABLE 2. THESE SERIAL DEVICE CAN BE LOCATED IN DIV1/ZONE 0 LOCATIONS.

TABLE 2: RS232 Communications		
Parameter	Value	Unit
U_i	20	V
I_i	400	mA
P_i	450	mW
C_i	0.01	μF
L_i	0.008	mH
U_o	18	V
I_o	83	mA
P_o	243	mW
C_o	1.7	μF
L_o	9	mH

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SHEET SIZE B	DWG. #	40-6176
SCALE: NTS	REV: A	DATE: 5/15/2018	SHEET: 3 OF 5

DETAILS OF REMOTE POWER ILLUSTRATION

NOTE 3:

THE CLOUD LINK 4G M1 MODEM IS AVAILABLE WITH BATTERY PACK 40-6154 OR THROUGH AN APPROVED ASSOCIATED SAFETY APPARATUS WHICH MEETS THE ENTITY PARAMETERS. THE BATTERY PACK SHALL NOT BE REPLACED IN HAZARDOUS ATMOSPHERES.

DETAILS AND RESTRICTIONS OF POWER INPUT OPTIONS AS FOLLOWS

BATTERY PACK OPTION:

"BATT" IS BATTERY CONNECTION FOR THE "CLOUD LINK 4G M1 MODEM". BATTERY PACK 40-6154 SHALL ONLY BE USED WITH "CLOUD LINK 4G M1 MODEM".

UNDER NO CIRCUMSTANCES SHALL THE DEVICE BE CONNECTED TO THE BATTERY PACK AND EXTERNAL POWER SUPPLY SIMULTANEOUSLY.
THE BATTERY PACK SHALL NOT BE RECHARGED, OR ALTERED IN ANY WAY UNDER ANY CIRCUMSTANCES.
THE CLOUD LINK 4G M1 MODEM, AND THE 40-6154 BATTERY PACKS USED WITH THE DEVICE SHALL BE HOUSED WITHIN A RIGID ENCLOSURE THAT PROVIDES PROTECTION FROM MECHANICAL IMPACT.

REMOTE POWER OPTION:

REMOTE POWER CONNECTION THROUGH A CSA APPROVED SAFETY BARRIER , WITH THE ENTITY PARAMETERS AS PER TABLE 1 IS ACCEPTABLE. (OR) 2NOS OF MTL7758+ BARRIERS CAN BE USED TO CHARGE THE CAPACITOR MODULE WITH THE ENTITY PARAMETERS AS PER TABLE 3.
THE TWO MTL7758+ BARRIERS PARALLEL CONNECTION SHALL BE VIA INFALLIBLE REVERSE CURRENT BLOCKING DIODES.
THE CAPACITOR MODULE CAN BE LOCATED IN DIVISION 1/ZONE 0 LOCATIONS.
THE CLOUD LINK 4G M1 MODEM, AND THE CAPACITOR MODULE USED WITH THE DEVICE SHALL BE HOUSED WITHIN A RIGID ENCLOSURE THAT PROVIDES PROTECTION FROM MECHANICAL IMPACT.

HAZARDOUS LOCATION
CLASS I DIV 1, GROUPS C & D T4
CLASS I ZONE 0, AEx ia IIB T4 Ga
Ex ia IIB T4 Ga

NON-HAZARDOUS LOCATION

(NOTE 3,4)

CAPACITOR MODULE

REMOTE POWER

3 + 1
4 − 2
BATT

TABLE 3: Power

Parameter	Value	Unit
U_i	7.8	V
I_i	8	A
P_i	4.5	W
C_i	120	μF
L_i	0	mH

DETAILS OF BATTERY POWER ILLUSTRATION

NON-HAZARDOUS LOCATION

HAZARDOUS LOCATION
CLASS I DIV 1, GROUPS C & D T4
CLASS I ZONE 0, AEx ia IIB T4 Ga
Ex ia IIB T4 Ga

3 + 1
4 − 2
BATT

BATTERY
40-6154

THE CONSTRUCTION OF THE CAPACITOR MODULE SHALL MEET
THE RATINGS REQUIREMENTS, AND TABLE 5 SPACINGS BETWEEN INDIVIDUAL COMPONENTS
AS PER IEC 60079-11. THE I.S ENTITY PARAMETERS FOR THE CLOUD LINK SHALL ALSO BE MET.

IMPORTANT NOTE:
THE I.S ASSESSMENT OF THE CAPACITOR MODULE IS NOT COVERED UNDER CSA CERTIFICATE 70174210 & IECEx CSA 18.0003X.
THE SAID ASSESSMENT WILL BE COVERED AS PART OF CLOUD LINK 4G M1 MODEM'S INTEGRATION INTO A SYSTEM UNDER A SEPARATE REPORT.

CAPACITOR MODULE SCHEME

R Fuse
C

SHEET SIZE B	DWG. #		40-6176
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NOTES:
4) FOR CANADIAN INSTALLATIONS, INSTALL IN ACCORDANCE WITH CANADIAN ELECTRICAL CODE PART 1.
FOR US INSTALLATIONS INSTALL IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, ANSI/NFPA 70, ARTICLE 504.
WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY AND SUITABILITY FOR CLASS I, DIV1
AVERTISSEMENT: LA SUBSTITUTION COMPROMETTRE LA SECURITE INTRINSEQUE, ET L'APTITUDE A LA CLASS I, DIV 1

CONDITIONS FOR SAFE USE IN ZONE 0/DIVISION1:
THE CLOUD LINK 4G M1 MODEM IS AVAILABLE WITH BATTERY PACK 40-6154 OR THROUGH AN APPROVED ASSOCIATED SAFETY APPARATUS WHICH MEETS THE ENTITY PARAMETERS.
THE BATTERY PACK SHALL NOT BE REPLACED IN HAZARDOUS ATMOSPHERES.
UNDER NO CIRCUMSTANCES SHALL THE DEVICE BE CONNECTED TO THE BATTERY PACK AND EXTERNAL POWER SUPPLY SIMULTANEOUSLY.
THE BATTERY PACK SHALL NOT BE RECHARGED, OR ALTERED IN ANY WAY UNDER ANY CIRCUMSTANCES.
THE CLOUD LINK 4G M1 MODEM, AND THE 40-6154 BATTERY PACKS USED WITH THE DEVICE SHALL BE HOUSED WITHIN A RIGID ENCLOSURE THAT PROVIDES PROTECTION FROM MECHANICAL IMPACT.

UNDER CERTAIN EXTREME CIRCUMSTANCES, THE NON-METALLIC PARTS OF THE CLOUD LINK 4G MODEM ENCLOSURE MAY GENERATE AN IGNITION-CAPABLE LEVEL OF ELECTROSTATIC CHARGE.
THEREFORE THE EQUIPMENT SHALL NOT BE INSTALLED IN A LOCATION WHERE THE EXTERNAL CONDITIONS ARE CONDUCIVE TO THE BUILD-UP OF ELECTROSTATIC CHARGE ON SUCH SURFACES.
THIS IS PARTICULARLY IMPORTANT IF THE EQUIPMENT IS INSTALLED IN A ZONE 0 LOCATION. IN ADDITION, THE EQUIPMENT SHALL ONLY BE CLEANED WITH A DAMP CLOTH.

THE SIM CARD CONNECTION SHALL ONLY BE USED WITH SIM CARDS. THE SIM CARD MAY BE CONNECTED OR DISCONNECTED IN THE HAZARDOUS AREA.

BOTH RS232 INTERFACE SIGNALS AND RS485 INTERFACE SIGNALS OF CLOUD LINK 4G M1 MODEM'S SERIAL PORT (P19) SHALL NOT BE CONNECTED SIMULTANEOUSLY TO SERIAL DEVICE

THE EQUIPMENT SHALL BE INSTALLED IN HAZARDOUS AREAS AS PER DRAWING 40-6176.

5) "ANT" IS FOR CONNECTING CELLULAR ANTENNA TO "CLOUD LINK 4G M1 MODEM". THIS IS A TRANSMIT AND RECEIVE ANTENNA.
ANTENNA OUTPUT IS DC BLOCKED, SO LIVE CONNECTIONS OR DISCONNECTIONS IN THE HAZARDOUS AREA ARE LIMITED TO A PASSIVE ANTENNA TYPE ONLY
THIS ANTENNA MAY BE PLACED IN HAZARDOUS LOCATION.

6) "S1" IS A DEFAULT SWITCH AND ENERGY IS SUPPLIED BY THE "CLOUD LINK 4G M1 MODEM".

7) "SIM" IS FOR CONNECTING SIM CARD (SUBSCRIBER IDENTITY MODULE) ONLY IN THE "CLOUD LINK 4G M1 MODEM". SIM CARD MAY BE
REPLACED IN A HAZARDOUS AREA.

8) CONFIG PORT SHALL BE USED IN NON-HAZARDOUS LOCATION FREE FROM HAZARDOUS GASES

9) EXTERNAL POWER CONNECTOR (P21) SHALL NOT BE USED IN DIV1/ZONE 0 LOCATIONS.

10) "PULSE-IN" IS A SWITCH INPUT FOR THE "CLOUD LINK 4G M1 MODEM" AND ENERGY IS SUPPLIED BY THE "CLOUD LINK 4G M1 MODEM".
INPUTS TO "PULSE-IN" MUST BE
FIRST OPTION IS CONNECT ANY PASSIVE RESISTIVE NON-ENERGY STORING DEVICES SUCH AS REED SWITCHES
SECOND OPTION IS TO CONNECT ANY OTHER PASSIVE DEVICE HAVING ENTITY PARAMETERS CONFIRMING TO TABLE 4 IS ACCEPTABLE.

TABLE 4: PULSE INPUT		
Parameter	Value	Unit
U_i	7.8	V
I_i	100	mA
P_i	195	mW
C_i	0.01	μF
L_i	0	mH
U_o	7.8	V
I_o	11	mA
P_o	20	mW
C_o	130	μF
L_o	10	mH

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SHEET SIZE: B	DWG. #	40-6176
SCALE: NTS	REV: A	DATE: 5/15/2018	SHEET: 5 OF 5

5.2 Div 2

CONDITIONS OF SAFE USE:

1) FOR CANADIAN INSTALLATIONS, INSTALL IN ACCORDANCE WITH CANADIAN ELECTRICAL CODE PART 1.
   FOR US INSTALLATIONS INSTALL IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, ANSI/NFPA 70, ARTICLE 504.

   WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIV2

2) "ANT" IS FOR CONNECTING CELLULAR ANTENNA TO "CLOUD LINK 4G M1 MODEM". THIS IS A TRANSMIT AND RECEIVE ANTENNA.
   ANTENNA OUTPUT IS DC BLOCKED, SO LIVE CONNECTIONS OR DISCONNECTIONS IN THE HAZARDOUS AREA ARE LIMITED TO A PASSIVE ANTENNA TYPE ONLY.
   THIS ANTENNA MAY BE PLACED IN HAZARDOUS OR NON-HAZARDOUS LOCATIONS.

3) "PULSE-IN" IS FOR CONNECTION TO RESET AND PULSE INPUT LINES OF "CLOUD LINK 4G M1 MODEM".
   NON INCENDIVE WIRING IF SIMPLE SWITCH IS USED OR TRANSISTOR SWITCH WITH NO ADDITIONAL
   CAPACITANCE OR INDUCTANCE OR PASSIVE RESISTIVE NON-ENERGY STORING DEVICE.
   ALSO NON INCENDIVE IF CONNECTED TO THE PULSE OUTPUTS OF MERCURY INSTRUMENTS
   MODELS: MINI, MINI-AT, MINI-MAX, ERX, PULSE ACCUMULATOR, TCI AND EC 350.

4) "S1" IS A DEFAULT SWITCH AND ENERGY IS SUPPLIED BY THE "CLOUD LINK 4G M1 MODEM".

5) SERIAL PORT (P19) CONNECTOR HAS BOTH RS232 AND RS485 INTERFACE SIGNALS, SERIAL DEVICE CAN BE CONNECTED TO EITHER RS232 INTERFACE SIGNALS
   OR RS485 INTERFACE SIGNALS OF SERIAL PORT (P19). BOTH RS232 INTERFACE SIGNALS AND RS485 INTERFACE SIGNALS
   SHALL NOT BE CONNECTED SIMULTANIOUSLY TO SERIAL DEVICE.

6) THE SIM CARD CONNECTION SHALL ONLY BE USED WITH SIM CARDS. THE SIM CARD MAY BE CONNECTED
   OR DISCONNECTED ONLY IN A NON-HAZARDOUS AREA OR WHEN THE DEVICE HAS BEEN DE-ENERGIZED.

7) CONNECTION TO "CONFIG PORT" IS NOT PERMITTED IF AREA IS KNOWN TO BE HAZARDOUS.

8) FOR REMOTE POWER INSTALLATIONS CONNECT 4.8 - 30VDC TO THE "CLOUD LINK 4G M1 MODEM" AT EXT-PWR CONNECTOR.

9) UNDER NO CIRCUMSTANCES SHALL THE DEVICE BE CONNECTED TO THE BATTERY PACK AND EXTERNAL POWER SUPPLY SIMULTANEOUSLY.

10) THE "CLOUD LINK 4G M1 MODEM" IS AVAILABLE WITH BATTERY PACK 40-6154 WHICH IS COMPRISED OF TWO SERIES CONNECTED
    LITHIUM D CELLS, IN PARALLEL WITH TWO SUPER-CAPACITORS, ALONG WITH A FUSE AND AN INFALLIBLE RESISTOR.

11) THE BATTERY PACK SHALL NOT BE RECHARGED, OR ALTERED IN ANY WAY UNDER ANY CIRCUMSTANCES.

12) CLOUD LINK 4G M1 MODEM AND THE BATTERY PACK "40-6154" SHALL BE INSTALLED IN A RIGID ENCLOSURE
    THAT PROVIDES PROTECTION FROM MECHANICAL IMPACT. THE ENCLOSURE SHALL BE ACCEPTABLE TO THE LOCAL AUTHORITY HAVING JURISDICTION.

13) ALL CONNECTION INTO THE "CLOUD LINK 4G M1 MODEM" SHALL BE SOURCED FROM CLASS 2 CIRCUITS.

HAZARDOUS LOCATION
CLASS I DIV 2, GROUPS A, B, C & D T4

Tamb: -40°C to +70°C

ANT (NOTE 2)

PULSE-IN (NOTE 3)

SIM (NOTE 6)
(SIM COVER HIDDEN FOR VIEW CLARITY)

SERIAL PORT (P19) (NOTE 5)

CONFIG PORT (NOTE 7)

DEFAULT SWITCH (S1) (NOTE 4)

EXT-PWR (NOTE 8)

BATT (NOTE 10)

PROJECTION		NEW RELEASE			Honeywell	
RoHS	LINEAR MEASURE INCHES [MM]	A		2018-XXXX		
		DRAWN BY	H169417	5/29/2018	INSTALLATION DRAWING	
TOLERANCE UNLESS NOTED		DESIGNED BY	H169417		CLOUD LINK 4G M1 MODEM	
± .XX [.X] = ± .01 [0.25] ± .XXX [.XX] = ± .005 [0.13]		CHECKED BY	E866671		CLASS I, DIV 2	
ANGULAR = ± 0.5⊠		The information contained herein is proprietary to Honeywell and is not to be reproduced, communicated to a third party, or used in any way without the express written permission of Honeywell International Inc.			SHEET SIZE B	DWG. # 40-6177
MATERIAL NA						
COATING/FINISH NA					SCALE: NTS	REV: A	SHEET: 1 OF 1

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6 FOTA Firmware Upgrade Over–The–Air

6.1 Steps to upgrade Firmware
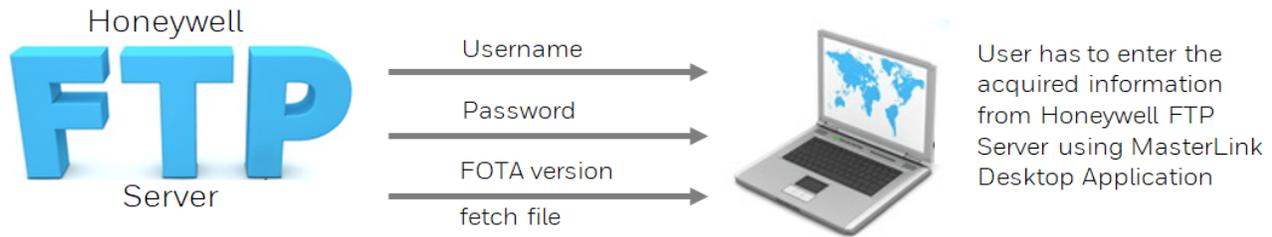
Procedure:

To initiate FOTA the below Item values are to be configured

Item Number	Item Description
3167	FTP Server IP address
3168	FTP Username
3169	FTP Password
3170	FOTA version fetch file

Using the same MasterLink tool, FOTA upgrade process can be done in two ways,

Case Scenario 1: (Default 30 day period)

- Enable i3180 Value
- Initiate a call from the device (EC350)
- FOTA process will commence (at default time – 30 days)
- Wait for 20-25 minutes for radio firmware upgrade to complete

Case Scenario 2: (Immediate)

- Enable i3180 Value (to initiate FOTA)
- Enable i3179 Value (Quick or immediate FOTA)
- Initiate a call from the device (EC350)
- Wait for 20-25 minutes for radio firmware upgrade to complete

Note: Current Firmware version can be checked by i3062 and the status of the FOTA by i3181 respectively.

7 Configuration Software

Honeywell MasterLink software application can be used to configure and deploy a CloudLink 4G M1 Modem device. When you connect a CloudLink 4G M1 Modem device to MasterLink, you can configure it as a:

- EC350/ERX350 device,
- Cloud Link modem, or
- EC350/ERX350 + Cloud Link Modem as an Integrated device.

To learn more about MasterLink, EC350/ERX350, or Cloud Link Modem, refer to their respective user guides available on the Honeywell Process Website.

Product Name	Documentation Link
Honeywell MasterLink Software	MasterLink User Guide
Honeywell EC350	EC350 User's Guide
Honeywell ERX350	ERX350 User's Guide
Cloud Link 4G Modem	Cloud Link 4G Modem User Guide

7.1 Configuring CloudLink 4G M1 Modem

This chapter describes the configuration of a CloudLink 4G M1 Modem device using the MasterLink Mobile application.

Refer the link below for more details:

MasterLink Mobile Application

MasterLink Mobile application is a configuration and diagnostic software designed for Electronic Volume Corrector EC350 and CloudLink 4G M1 Modem. The primary purpose is to configure, calibrate and download data from EC350 and CloudLink through MasterLink Mobile application. MasterLink Mobile application is supported on Windows environment and is also available to download from AppStore and Google play store.

7.1.1 Operating Modes

The CloudLink 4G M1 Modem has 2 operating modes:

1. **Standalone mode**: where the modem functions as an independent device.

2. **Integrated mode**: where the modem is connected and used with an EVC device.

7.1.2 Getting started with MasterLink iOS application

MasterLink Mobile application is available in iOS from AppStore. For more information on installing and getting started with the MasterLink Mobile application – iOS refer to MasterLink Mobile application help from the Honeywell Process Website

(https://www.honeywellprocess.com).

7.1.2.1 Login and Registration

After you have installed the MasterLink iOS Mobile application, you need a valid license key. Your company's site administrator can generate a license file and a user name that is sent to you in an e-mail. From the e-mail, you can open the license file in MasterLink Mobile application. You can then use your user name and password to register.
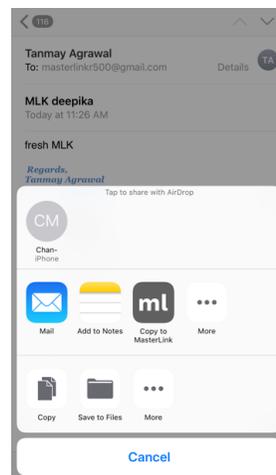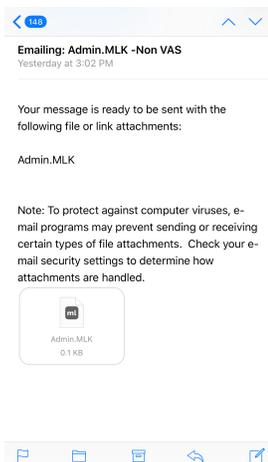
1. Tap and hold/or long-press the attachment

2. Select 'Copy To' MasterLink app and open the license file
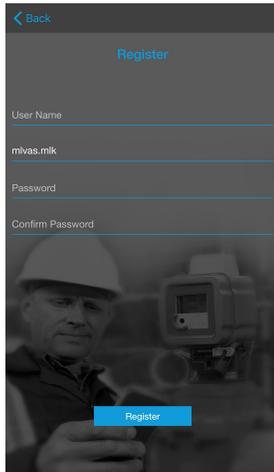
3. Register with your credentials
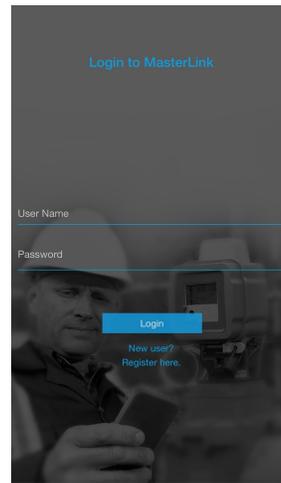
4. Login with your credentials.

7.1.2.2 Adding a New Site
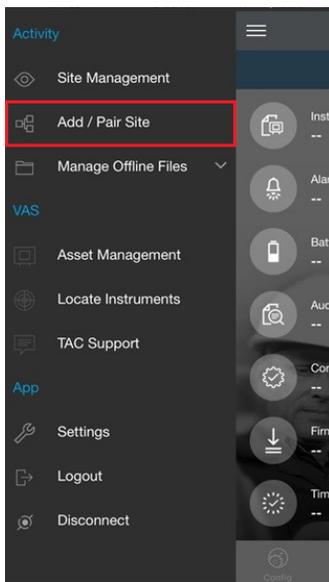
1. Select **Add / Pair Site**
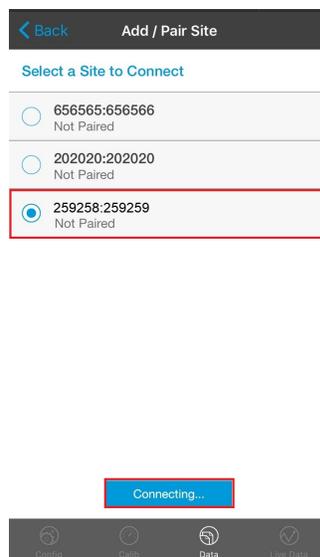
2. 'Connect' to a device
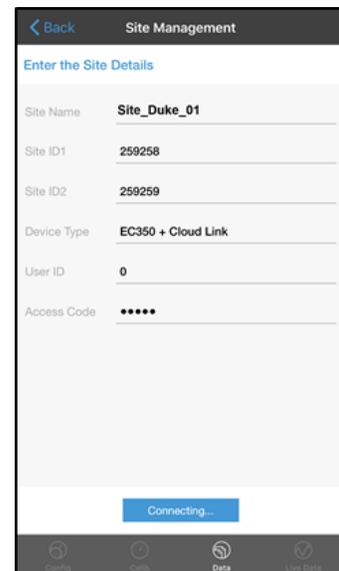
3. Enter the Site / device details
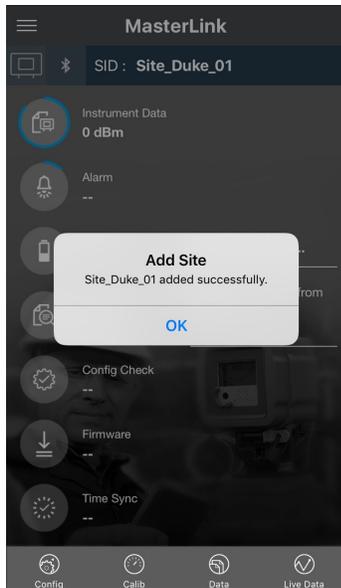
4. Site added successfully   **5.** Dashboard appears

> **Attention:** Site ID 1 or Site ID 2 must be a non-zero value. If either of them has a value equal to zero, then you must reconfigure it to a non-zero value using MasterLink desktop application connected using serial interface.

7.1.2.3 Connecting to an existing site
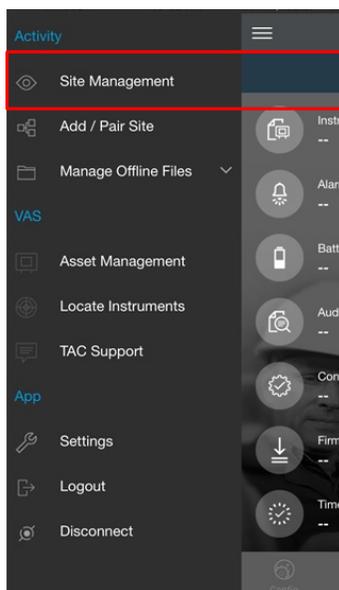
1. Select **Site Management**   **2.** 'Connect' to a device
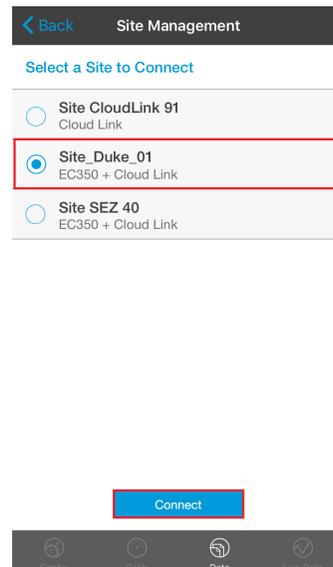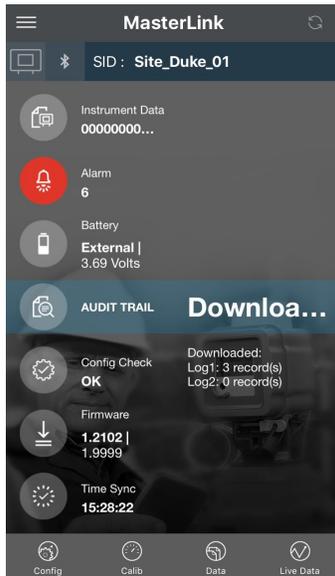
3. Dashboard downloading

MasterLink Software Application automatically connects to an existing site if the instrument is authorized to connect automatically. If there are multiple sites in the vicinity, then you will be prompted to select a site.
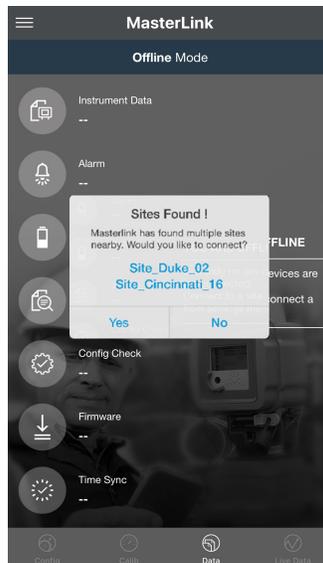
Warning: Deleting an existing site does not remove the device pair settings on the mobile device.

7.1.3 Bluetooth Pairing with MasterLink iOS application

Every CloudLink 4G M1 Modem device has a unique IMEI and RUID numbers. It is recommended to keep a note of these numbers as they can be used for identifying the device. RUIDs are used to identify a device using MasterLink desktop application or using PowerSpring.

7.1.3.1 Pairing with Just Works (without passkey)
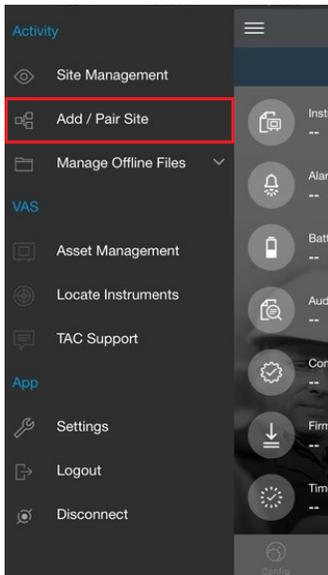
1. Select **Add / Pair Site**
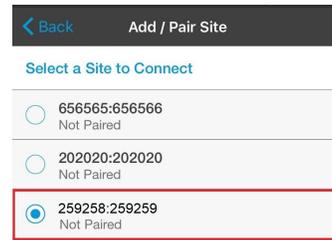
2. 'Connect' a device from the list
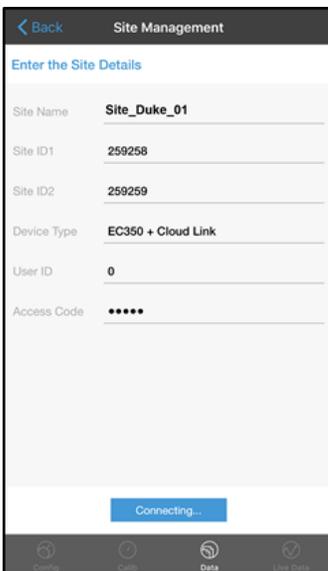
3. Enter the Site / device details
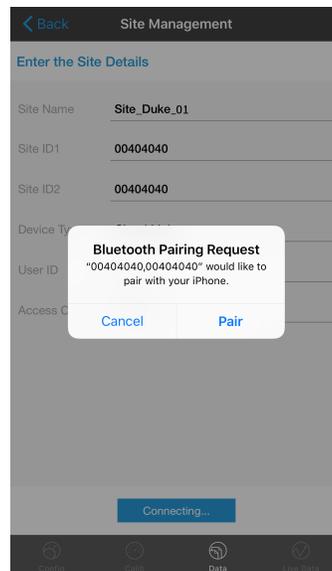
4. Tap **Pair** to complete the pairing process

7.1.3.2 Pairing with Passkey Entry

Passkey entry bluetooth pairing works only when the CloudLink 4G M1 Modem is used in integrated mode. Here's a high level overview of how passkey entry bluetooth pairing works.
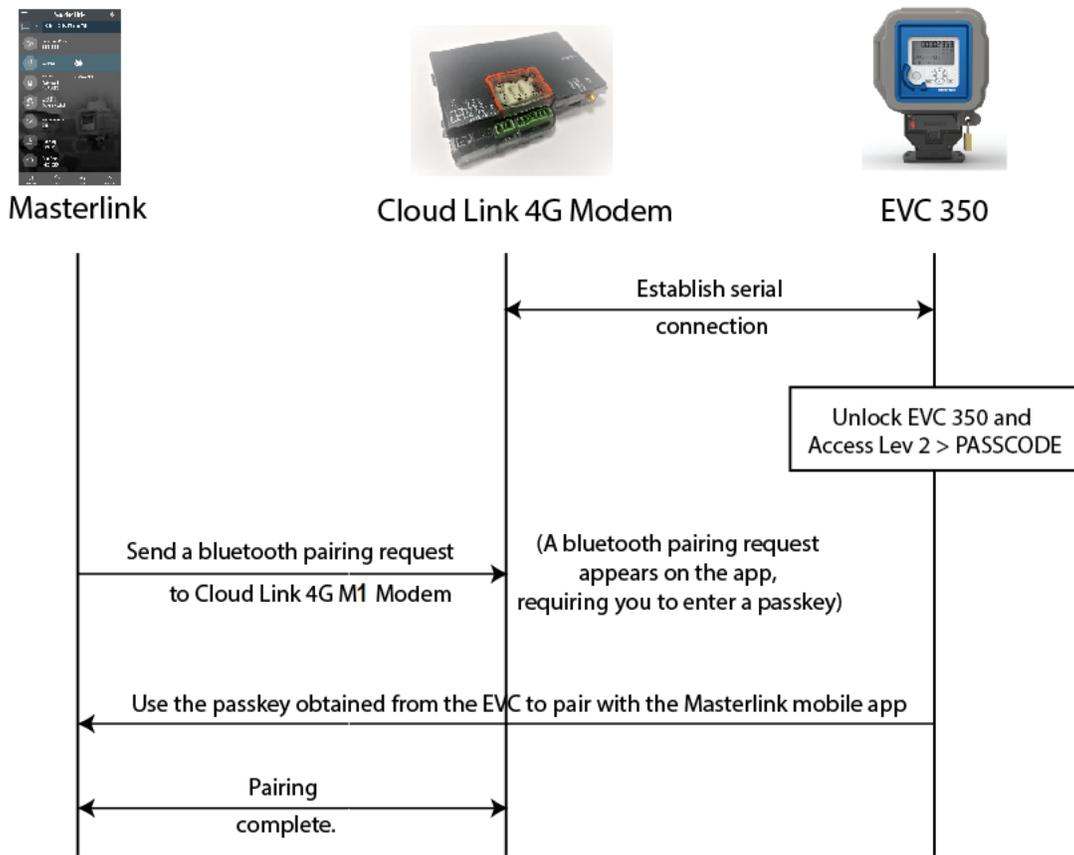
To pair using passkey:
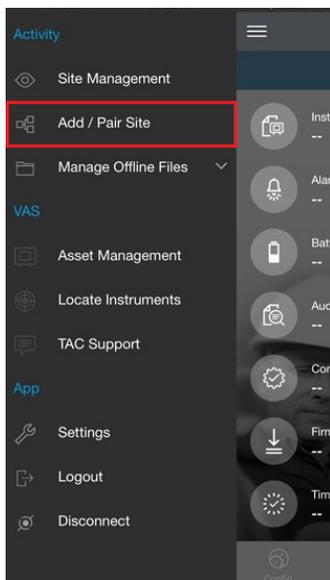
1. Select **Add / Pair Site**
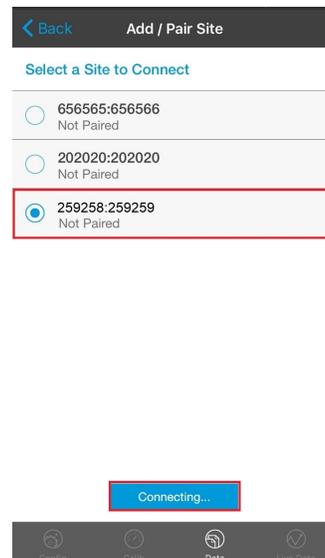
2. 'Connect' a device from the list
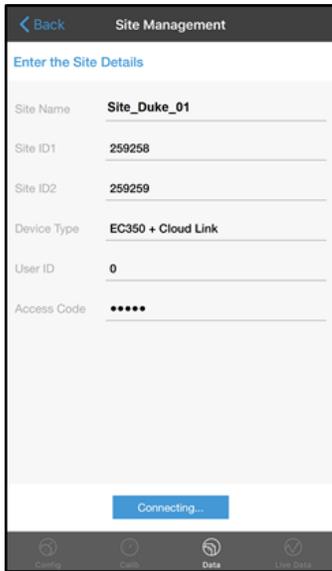
3. Enter the Site / device details
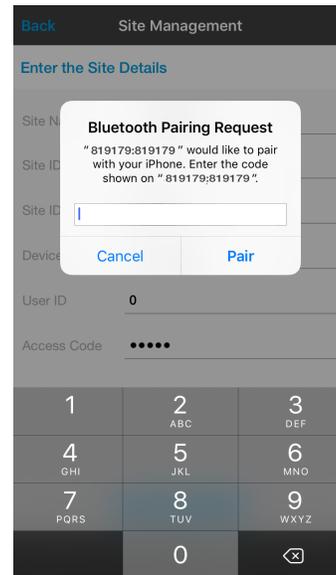
4. Enter the passkey obtained from the EVC and then tap **Pair.**

Note: The passkey must be entered within 40 seconds. This is valid for 40 seconds after which it expires. If it expires, you need to obtain a new passkey, and start all over.

7.1.4 Device Configuration Over Bluetooth

7.1.4.1 Configuration by Group
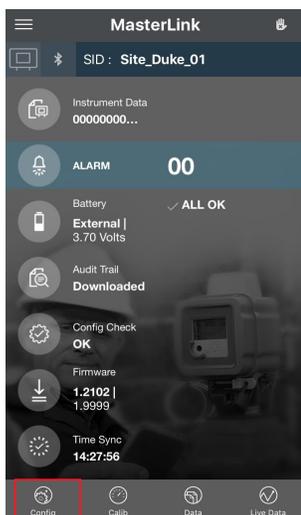
1. Tap **Config**
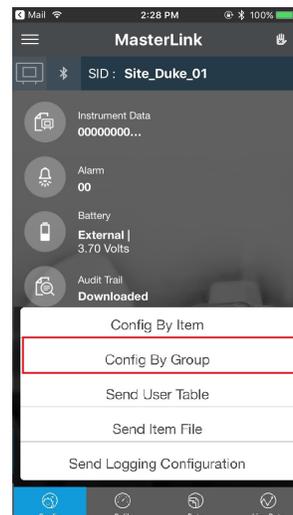
2. Tap **Config by Group**
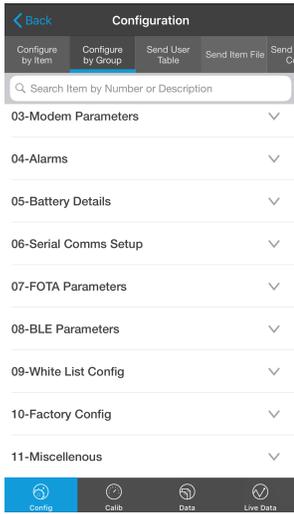
3. Select an item group
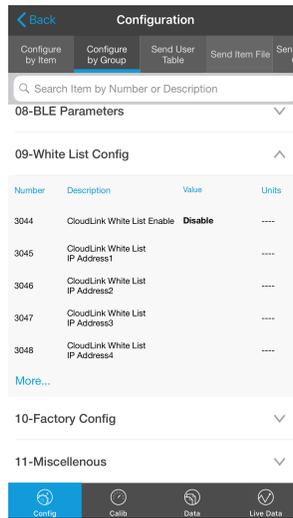
4. Configure the item values

7.1.4.2 Configuration by Item
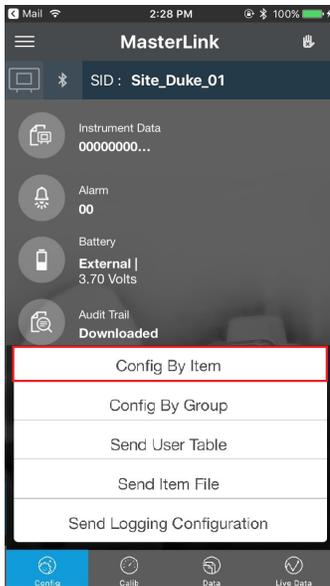
1. Tap **Config > Config by Item**
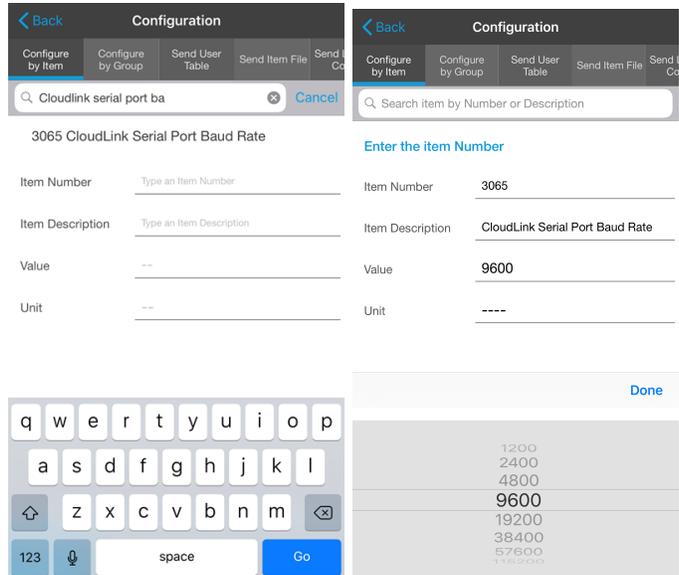
2. Configure item parameters
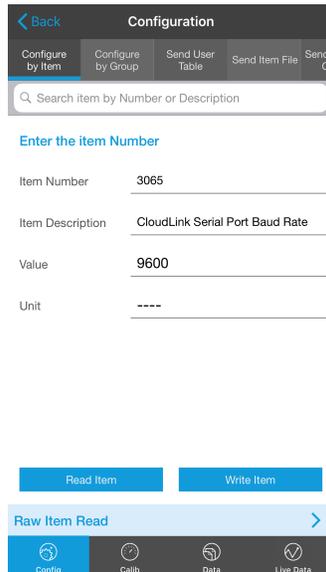
3. Select **Write Item** to modify the 'Value'

Initial Connection:

At Power up, with a valid, active CAT M1 SIM card and a sufficient signal strength, the Modem tries to connect to network within 15-20 seconds. Failing which it adheres to the below retry options.

Retry Options:

- If Call-in is driven from EC350, after three retries it halts the trials to connect to network.
- In case of 3142 Continuous Server mode, continuous retries will happen until the network gets connected.

7.1.5 Firmware Upgrade
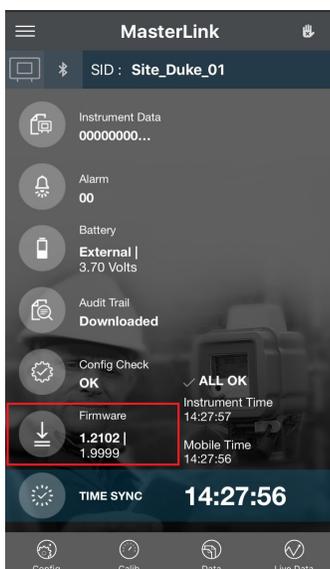
1. Tap **Firmware**

2. Select Firmware and tap Download
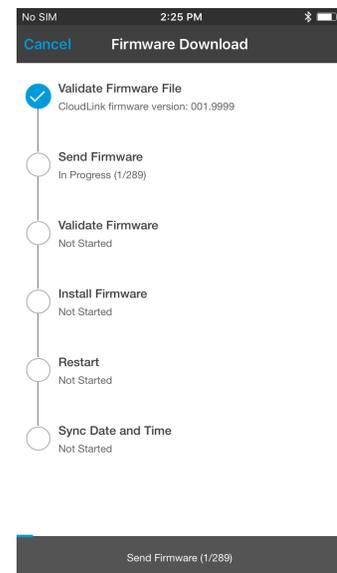
3. Firmware Validation
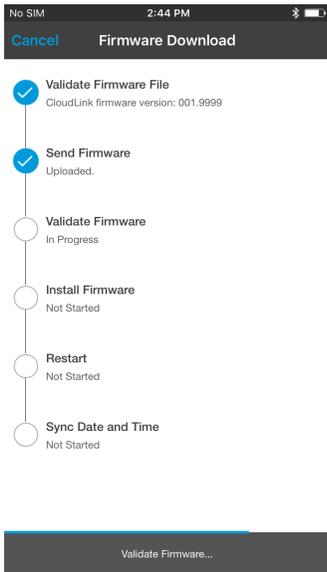
4. Send firmware to device
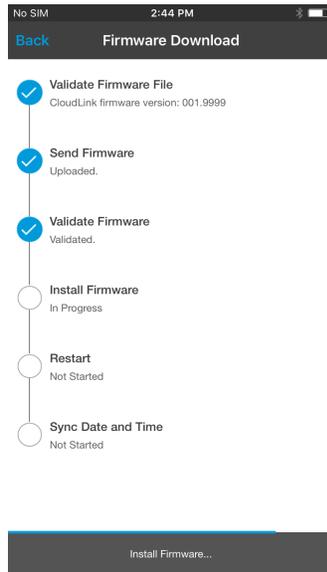
5. Validation
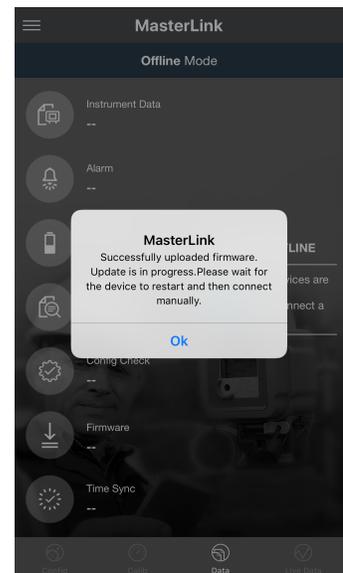
6. Firmware update completed

> **Note:** After Firmware upgrade is successful, configuration is retained with the previously configured values.

When connected in Integrated mode (Cloud Link+EC350) please note the following conditions:

ML signs-off from CloudLink if any huge transaction with EC350 (EVC): LED 4 will be in OFF state

1) When EVC firmware upgrade is initiated through ML application, CL signs off due to session time out and LED 4 will be in 'OFF' state

2) When firmware upgrade is cancelled manually or due to other reasons, CL will sign in back and LED 4 will be displaying Solid Green

3) When firmware upgrade is resuming till the end, until successful upgradation CL remains in sign off mode. After which, device (EC350) restarts and USER should connect manually again to the same sites

Application FW

After every Call-in, CloudLink switches to Server mode for a duration of **keepalive** time. User can reach out to CloudLink and start OTA FW upgrade during this time.

During Callout Window, User can reach out to CloudLink and start OTA FW upgrade during this time.

7.1.6 Server Mode

To configure server mode settings:
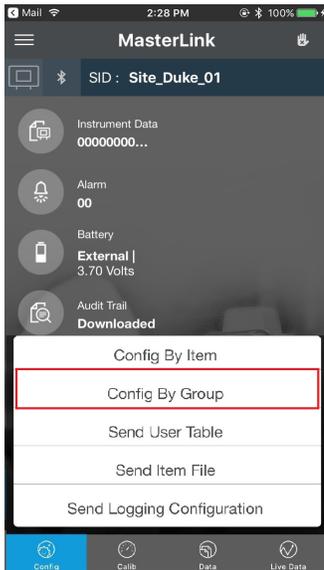
1. Select **Config > Config by Group**
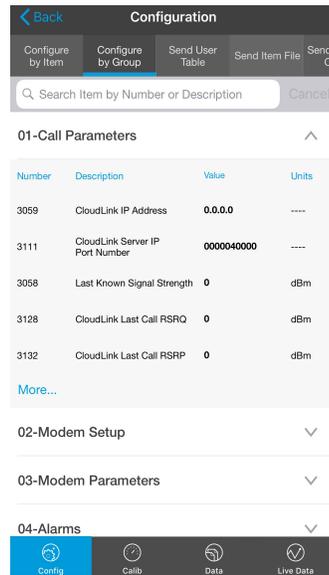
2. Select **Server Mode Settings** and the configure the server settings.

7.1.7 Pulse Counting

CloudLink 4G M1 Modem has a feature to count the pulses. This adds the advantage of getting redundant counts along with the counts from the actual sensor measured by the external EVC. To use this functionality, you need to enable and configure this feature.

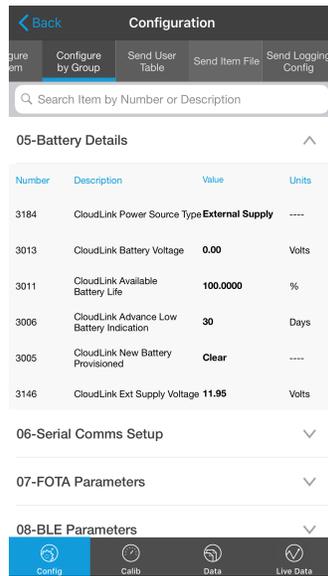To enable Pulse counts:
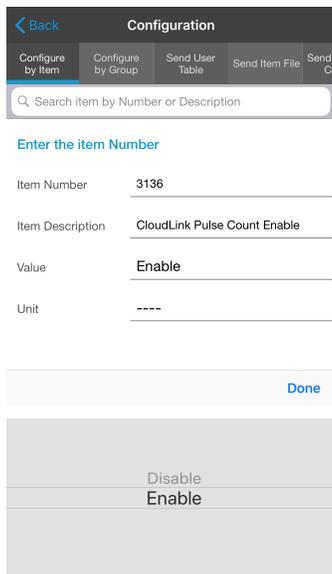
1. Enable Modem Pulse Count Enable
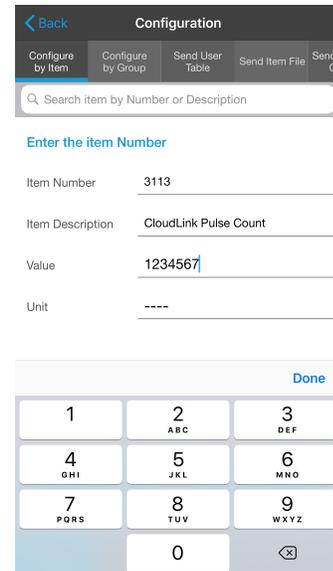
2. Configure Modem Pulse Count

7.1.8 Changing the Battery

After changing battery, perform a *Reset Battery* operation by modifying the *Modem Reset Battery* configuration item **3005**. This will reset/clear all the battery related counters for new battery. It is always

assumed that only a new/fresh battery will be replaced as doing the "reset battery" operation will reload the battery capacity to full battery capacity.

Battery related parameters:

> **Attention:** Always ensure that you perform a *Reset Battery* after changing the battery. This is to ensure that you have an accurate measurement of battery life.

7.1.9 Default

To perform a factory reset:

1. Push button S1 located near Config Port P29.
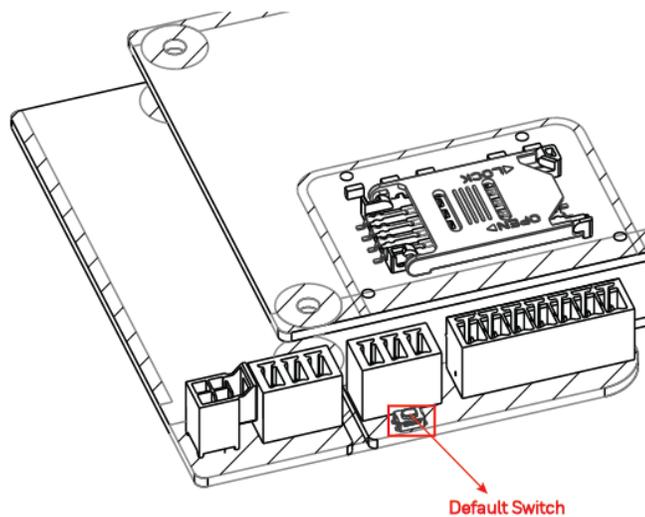
Default Switch

2. Hold the switch and connect the Power Supply.
3. Continue to hold the switch for another 10 seconds.
4. Release the switch.

Long pressing the Reset to Default switch button and then powering up the CloudLink will not erase the custom configurations which were done at factory before shipment. It will start functioning on power up using the customer configured parameters which got configured at factory before shipment.

Hard Reset: Pluggin out the External or Battery connector will reset the Modem manually.

Soft Reset: Through MasterLink Desktop Application, i3137 Value when selected as **Modem Reset** from the drop-down list then, Modem can be reset.
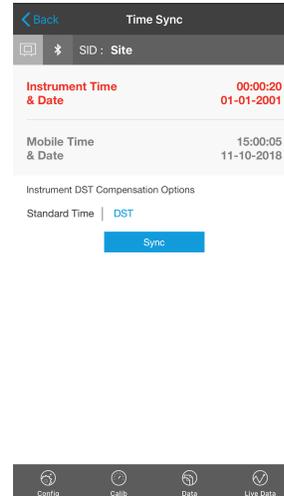
> **Note:** Site IDs must be restored using serial interface. These Site IDs must be non-zero value.
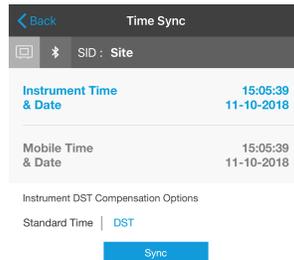
7.1.10 Time Sync

The Time Sync screen lets you sync your mobile time and date with the device time and date.
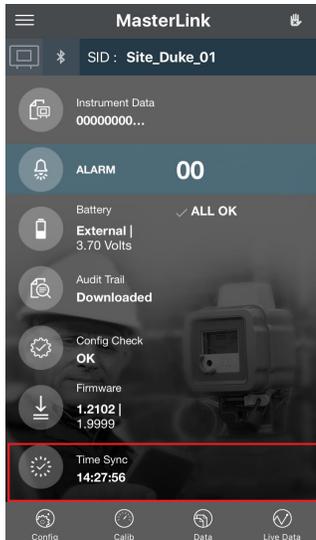
1. Tap on **Time Sync**

2. Tap on **Sync**

The instrument time syncs with the date and time of your mobile device.

7.1.11 Secure Sign On

CloudLink 4G M1 Modem can be accessed through the following interfaces:

- Serial
- BLE

- Cellular
- IrDA (via EC350)

A valid user name and password are required for accessing the CloudLink 4G Modem. For Secure signon, user name and password are hashed and hash pairs embedded in protocol are used for authentication. The device supports different privilege levels like Read / Write, Read Only.

The CloudLink supports white Listing for Cellular communication. The user can configure up to 10 host IP addresses for device to allow specific hosts in case of call outs.

For BLE communication the CloudLink supports two types of pairing methods:

- Just Works
- Passkey entry

With Just Works pairing, a malicious program or user can change the CloudLink configuration data, by sniffing the BLE signals and using Replay / Man in the middle attack. The device operation can be changed and it will affect the data being available to billing system on time. Access to the metering device might be hindered. The customer is advised to use passkey entry mechanism for BLE communication.
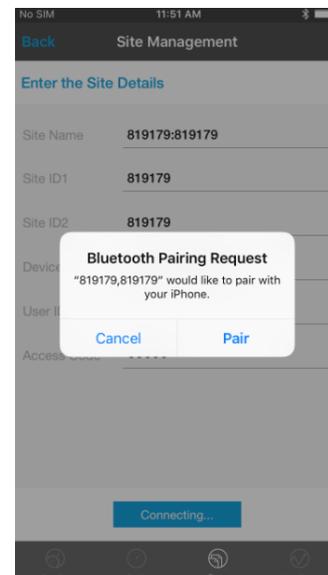
To further enhance device security:

- a feature to disable over-the-air (OTA) firmware (application) upgrade through cellular data using item code #3107 is available.
- a feature to disable BLE (Bluetooth Low Energy) pass-through is available.

This provision is implemented for blocking the BLE based applications from communicating to any device connected to CloudLink over RS232/RS485. This feature can be used using item code #3162.

7.1.11.1 Secure Sign On Over Bluetooth
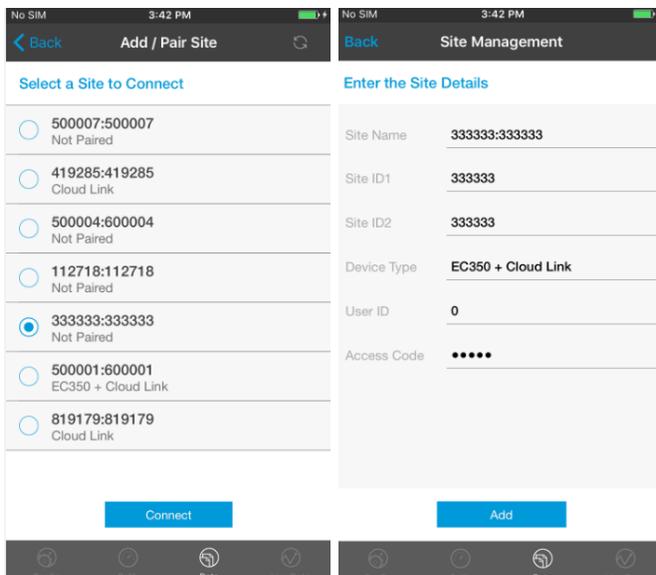
1. Connect to an existing site or add a new site   **2.** Pair the device with your mobile handset

> **Note:** When the Modem is power cycled, connecting the modem through serial interface will blink the LEDs 3 & 4 for three times initially. Though CL is connected, LED 4 will be in OFF state.

7.1.11.2 White List

You may need to white list an IP address if you want to connect remotely to CloudLink from a remote machine. White list feature is applicable only when the CloudLink 4G M1 Modem is in server mode to allow a configured client IP addresses to connect to device.

This feature can be enabled by:

1. Selecting *Enable* option for White List Enable.
2. Allowing client IP addresses in white-listing configuration group.
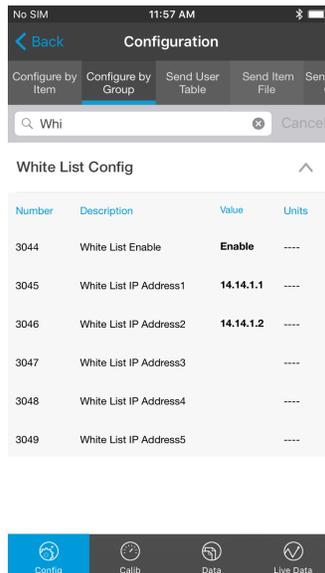
7.1.12 Device diagnostics

CloudLink can generate Alarm, Event, Diagnostic and Cellular reports. Details descriptions are provided in the below sections:
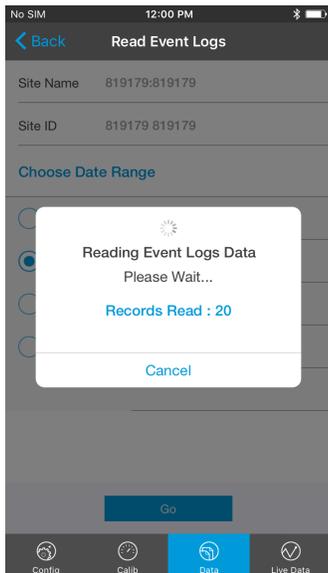
7.1.12.1 Event Logs

CloudLink 4G M1 Modem supports event logging. The Event Log records activity is directly linked to and maintained within the instrument. Event Log activities include, Access Code Changes, Item Code Changes, and Event Log Downloads.
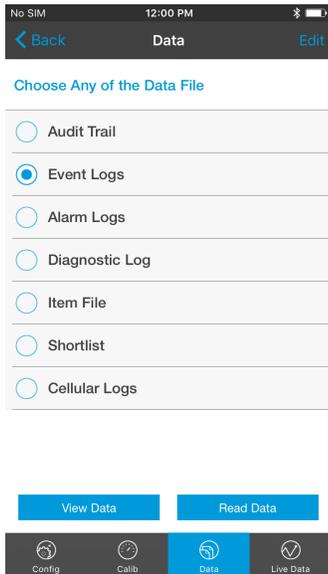
1. Tap **Data**, and select **Event Logs**
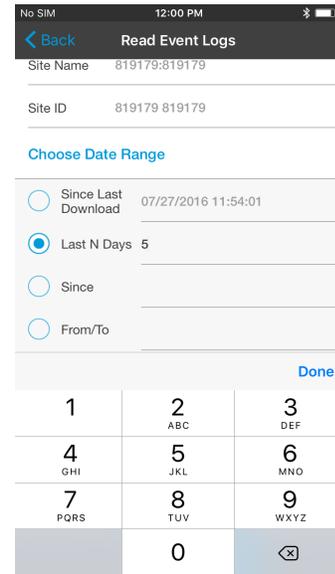
2. Select the **Date Range**

3. Wait for the logs to be retrieved

4. View or export event logs

Note: For defined CL internal events like, CloudLink Last Call Network Status User ID is observed as 255.

List of events:

SL.NO	Events	ITEM Code
1	Configuration parameters changed	3115
2	OTA firmare upgrade event	3116
3	Password Change	3117

SL.NO	Events	ITEM Code
4	Host Contact IP Address changed	3110
5	Host Contact Port Number Changed	3111
6	Log in fail event	3119

7.1.12.2 Diagnostic Logs

CloudLink 4G M1 Modem supports diagnostic logging.
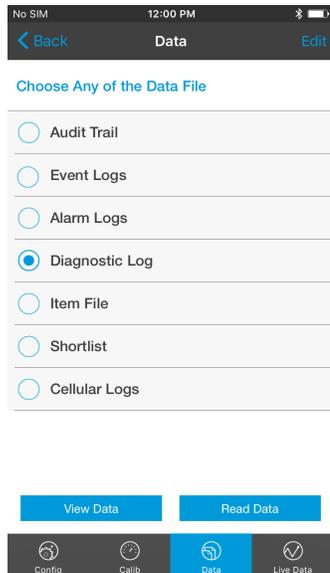
1. Tap **Data**, and select **Diagnostic Log**
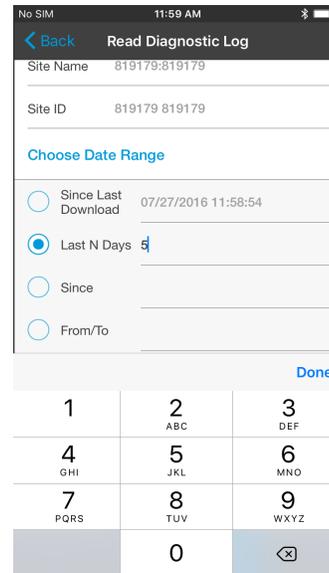
2. Select the **Date Range**
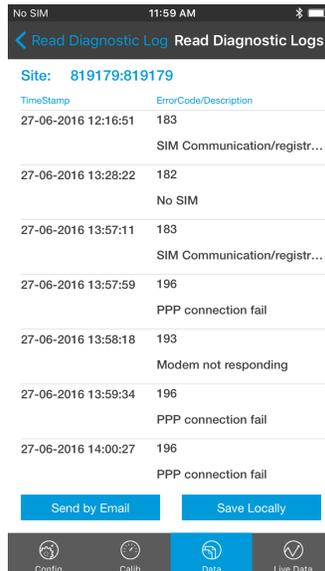
3. View or export diagnostic logs

7.1.12.3 Alarm Logs

The Read Alarm Log function reads alarm activity data from a field instrument and transfers it to the alarm file. An Alarm Log record is defined as any alarm activity, which includes new alarms as well as alarms that have been cleared.
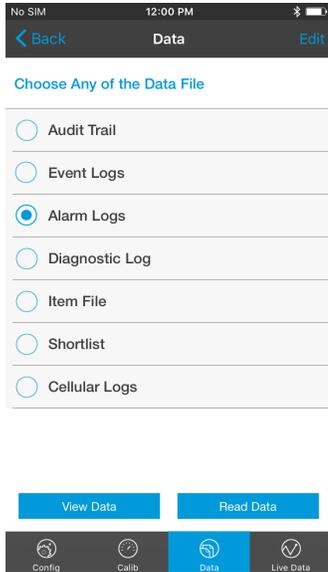
1. Tap **Data**, and select **Alarm Logs**
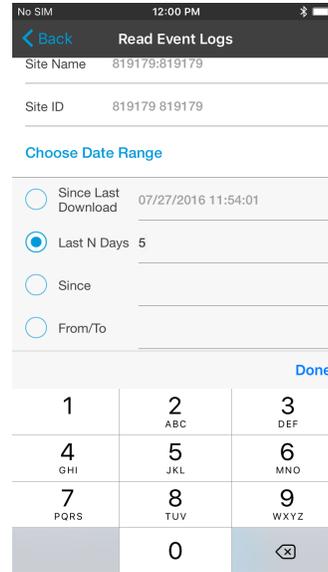
2. Select the **Date Range**
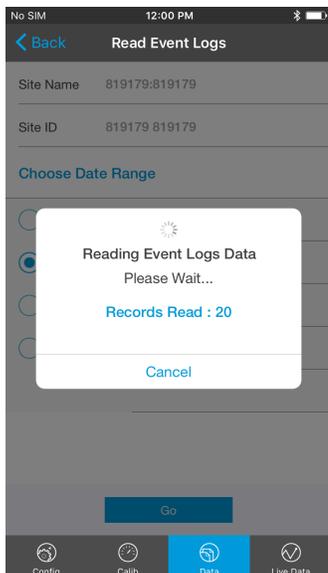
3. Wait for the logs to be retrieved

4. View or export Alarm logs

7.1.12.4 Cellular Logs

CloudLink 4G M1 Modem supports Cellular logging. By default, the device shows the most recent Cellular logs.

S.NO	Cellular Statistics	ITEM Code
1	Access Technology	3124
2	RSSI	3058
3	RSRP	3132
4	RSCP	3127
5	RSRQ	3128
6	Location ID / TAC	3126
7	Cell ID	3125
8	Physical Cell ID	3131
9	MCC	3129
10	MNC	3130
11	Last Call Duration	3134
12	Last Call Status	3135

8 Troubleshooting

LOG	REPRESENTATION
LED Error	A
Diagnostic Log	B
Event Log	C
Cellular Log	D
Alarm Log	E
ML Error Code	F

MASTERLINK ERROR CODES	ISSUE/ERROR	LOG	TROUBLE SHOOTING RECOMMENDATIONS
223	Self Test Failure – Radio module	B	1. Check Power supply 2. Allow supercap to charge at least 1 hour and then try rebooting device
224	Self Test Failure – Flash 1	B	Power Cycle the unit, if the problem persists even after reboot replace the device
225	Self Test Failure – Flash 2	B	Power Cycle the unit, if the problem persists even after reboot replace the device
11, 226	Self Test Failure – SRAM	A, B	Power Cycle the unit, if the problem persists even after reboot replace the device
227	Self Test Failure – BLE	B	Could be a BLE chip failure, reboot and try again
164	Watchdog reset	A, B	In case of exceptions or hardware failures like noise or spurious interruptions, watchdog resets the device. LED 3 & LED 4 will blink twice at the time of reboot, if the problem persists replace the hardware
12, 195	Radio Power On Failure	A, B	Radio start up failed, not responding to AT commands from MCU. Power cycle the device in case of multiple occurrences, replace the hardware
12, 193	Radio communication failure	A, B	Radio start up failed or radio not responding 1. Check Power supply 2. Allow supercap to charge at least 1 hour and then try rebooting device in case of multiple occurrence, replace hardware
–	Radio registration failed	C, D	Radio start up failed or radio not responding or network signal issue or SIM issue Check Power supply, change SIM, check antenna connections, check if network is available using other CL or cellular device

MASTERLINK ERROR CODES	ISSUE/ERROR	LOG	TROUBLE SHOOTING RECOMMENDATIONS
13	Low battery voltage Alarm	A, E	Low battery alarm is raised whenever we detect the battery going below a certain threshold and we have waited sufficient time (4 hours) to let the supercap inside the battery to get charged. For these 4 hours, the device will not wake up as we need to give time for super-cap to get charged from battery
21, 182	SIM card Error	A, B	SIM issue. 1) Reinstall SIM card and make sure SIM card touches the SIM card pads 2) If problem reappears, change the SIM card
-	Call failure – Host unreachable	C, D	CloudLink could not connect to host. Check host if its up and running, Check SIM, antenna, RSSI. Issue can also be due to incorrect IP and APN
-	Call abruptly disconnected due to network issue	C, D	CloudLink gets disconnected to host due to network issues. Check SIM, antenna connections, whether RSSI is in a good range or not
-	No or Poor Cellular Signal	C, D	No or poor network signal. Check SIM and antenna
-	Cellular Session timed out event	C	No data activity between CloudLink and Cellular network , hence cellular connection is terminated
22	Data connection failure	A, C	CL could not connect to host. Check MDM if its set up, network signal and IP
23, 187	BLE UART communication fail	A, B	Could not communicate with BLE module Power cycle. Check connecting to BLE again, if the problem persists, then the issue is with BLE chip
-	BLE pairing failure	C	User could not connect to CloudLink over BLE. Move closer to the device and retry pairing. Check passcode if passkey enabled
-	BLE connect and disconnect event	C	Event logged when CloudLink is connected/disconnected to user through BLE
-	BLE session time out	C	No data activity between CloudLink BLE and user BLE , hence connection terminated
177	Configuration checksum fail	B	Configuration Flash Checksum Error. If this Diagnostic Log is recurrent then Config memory is treated as corrupted in case of multiple occurrences, perform Factory defaults and if it still persists replace hardware
-	Configuration parameters change event	C	Event logged when configuration parameters get changed and logged into Flash

MASTERLINK ERROR CODES	ISSUE/ERROR	LOG	TROUBLE SHOOTING RECOMMENDATIONS
-	Power supply change Event	C	Event logged when Power supply type gets changed For example, 0 Dual Battery Pack or 1 External Supply
-	Magnetic swipe trigger event	C	Event logged when magnetic swipe detected
-	Factory reset event	C	Event logged when factory reset detected at power up through default switch
-	Advance low battery capacity indication	C	Event logged when advance low battery detected based on user configuration in i3006
-	Network registration Fail	C	Radio could not register with network. Check SIM and antenna
-	Event when remote host connects to CL	C	Host connected during callin
-	Remote host connected/disconnected	C	Host connected/disconnected during callout window or continuous server mode
-	Callin start time	C	
-	Callin stop time	C	
-	Callout Start/stop time	C	
-	Firmware upgrade in progress	C	Firmware upgrade in progress
-	FOTA in progress	C	Radio Firmware Over the air upgrade in progress
-	FOTA completed	C	Radio Firmware Over the air upgrade completed
-	Firmware upgrade start event	C	
-	Firmware upgrade successful event	C	
-	Firmware upgrade failed event	C	
-	OTA Firmware upgrade image size too high	F	Size supported is < 1MB. Check Firmware size
-	OTA firmware upgrade sequence mismatch	F	Firmware packet sequence mismatch. Start again to resume Firmware upgrade
-	OTA firmware upgrade application image checksum error	F	
167	ADC inputs error	B	Issue with internal ADC

MASTERLINK ERROR CODES	ISSUE/ERROR	LOG	TROUBLE SHOOTING RECOMMENDATIONS
168	Temperature measurement error	B	Error in measurement of internal temperature of device
171	External Data Flash Segment erase fail	B	Flash failure. Power Cycle the unit if the problem persists even after reboot replace the device
173	Data Flash write failure	B	Flash failure. Power Cycle the unit if the problem persists even after reboot replace the device
174	OTA Flash write failure	B	Flash failure. Power Cycle the unit if the problem persists even after reboot replace the device
175	Data Flash Read failure	B	Flash failure. Power Cycle the unit if the problem persists even after reboot replace the device
176	OTA Flash Read failure	B	Flash failure. Power Cycle the unit if the problem persists even after reboot replace the device
194	Radio module echo off failure	B	Flash failure. Power Cycle the unit if the problem persists even after reboot replace the device
196	Data Attach Failure	B, C	CL could not connect to host. Check MDM if its set up, check network signal and IP
-	ITEM code not supported	F	Check whether supported item is read/written
-	ML packet Format error	F	ML packet received is out of format
-	ML pkt Checksum not correct	F	MI packet got corrupted
-	Internal Flash Error	B, F	Internal flash data corrupted if the problem persists, need to replace the device
-	Firmware upgrade fail due to low battery	F	
-	BLE Abrupt Connection Failure	C	
-	User table checksum error	B	Internal user table got corrupted
-	No Diagnostic records found	F	
-	No Event records found	F	
-	No Cellular records found	F	
-	No Alarms records found	F	