SENSIA
Rockwell Automation + SLB

Lift Control Systems

INSTRUCT LIFT CONTROL SYSTEMS

INSTRUCT ESP Gateway Card

Installation, Operation & Maintenance Manual

MODEL: 103381133

Manual No. LCS-ENG-M0021, (InTouch ref # 7745571), Rev. 05

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Important Safety Information

Terms Used in This Manual

Caution	**Caution, risk of electric shock**
Attention	**Attention, risque d'électrocution**

WARNING	**A warning identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.**
AVERTISSEMENT	**Un avertissement identifie des informations sur des pratiques ou des circonstances pouvant entraîner des blessures corporelles ou la mort, des dommages matériels ou des pertes économiques.**

Caution	Caution statements Indicate actions or procedures which, if not performed correctly, may lead to personal injury or incorrect function of the instrument or connected equipment.
Attention	Indiquez les actions ou les procédures qui, si elles ne sont pas effectuées correctement, peuvent entraîner des blessures ou un mauvais fonctionnement de l'instrument ou de l'équipement connecté.

Note	Indicates additional information about specific conditions or circumstances that may affect instrument operation.
Remarque	Indique des informations supplémentaires sur des conditions ou des circonstances spécifiques pouvant affecter le fonctionnement de l'instrument.

Revision History

Revision	Description of Change	Sensia Issuer	Date
1	Initial release	Lift Control Systems	30-June-2021
2	Add InTouch reference number Change internal document number to LCS-ENG-M0021 SIM Card APN change to sensia02.com.attz Gateway COM3 setting change to 4-wire mode	Lift Control Systems	20-Feb-2023
3	Add steps to update the Modem FW to 5.3.6s-s1 Update the Modem configuration file to config_MTR-LNA7_5_3_6_03_09_23.tar	Lift Control Systems	15-Mar-2023
4	Replaced modem configuration file to config_ config_MTR-LEU7_5_3_6s-s1_02_05_20.tar	Lift Control Systems	July 25, 2023
5	Add modem config for Zedi. (config_MTR-MNG2_5_3_6s-s1_FOR_ZEDI_MAY2024tar.gz) Add firmware versions for Zedi, Avalon, LiftIQ. Changed baud rate for Modbus.	Lift Control Systems	May 22, 2024

Table of Contents

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GENERAL

WARNING!

To avoid the risk of electric shock and fire, the following safety instructions must be observed and the guidelines followed.

The specifications must not be exceeded, and the device must only be applied as described in the following.

Prior to the installation and commissioning of the unit, the installation guide must be examined carefully.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

GENERAL

AVERTISSEMENT!

Pour éviter tout risque de choc électrique et d'incendie, les consignes de sécurité de ce manuel doivent être observées, et les instructions suivies.

Les spécifications ne doivent pas être dépassées, et l'unité ne doit être appliquée que comme décrit dans le texte suivant.

Ce manuel doit être examiné avec soin, avant l'installation et la mise en service de l'unité.

Si l'équipement est utilisé d'une manière non spécifiée par le fabricant, la protection assurée par l'équipement peut être altérée.

INSTALLATION

WARNING!

Installation may only be carried out by electrically skilled and instructed personnel in accordance with national leg-isolation, including the relevant standards.

All technical data on the instrument are to be observed.

Changes to the design and modifications to the equipment are not permitted.

The equipment shall only be operated as intended and only in undamaged and perfect condition.

Sufficient segregation must exist between different cables and wires carrying different types of signal or power and all other circuits.

All wires must be terminated, complete with crimping lugs. Unused cores should be terminated to the earth bus bar.

INSTALLATION

AVERTISSEMENT!

L’installation ne peut être effectuée que par un électricien qualifié, conformément à la législation nationale, y compris les normes pertinentes.

Toutes les données techniques sur l'instrument doivent être observées.

Modifications de l'équipement ne sont pas autorisés.

L'équipement ne doit être utilisé comme prévu par le fabriquant et uniquement si il est en parfait état.

Une séparation suffisante doit exister entre les différents câbles et les fils transportant différents types de signaux ou de puissance et tous les autres circuits.

Tous les fils doivent être terminés, avec pattes de sertissage. Les noyaux non-utilisés doivent être terminés au jeu de barres de la terre.

Section 1: **Product Description**

1.1 OVERVIEW

The INSTRUCT* ESP Gateway Card is a standalone INSTRUCT SCB3 CPU card, which can be used inside INSTRUCT ESP Intelligent Controller to enable advanced real-time services. The Gateway Card, with external cellular modem, can be used to connect wellsite equipment to the real-time infrastructure servers and allows for remote monitoring, control, and surveillance of the reservoir, pump, motor, and surface equipment.

Figure 1-1: INSTRUCT ESP Gateway Card

1.2 END-TO-END DIAGRAM

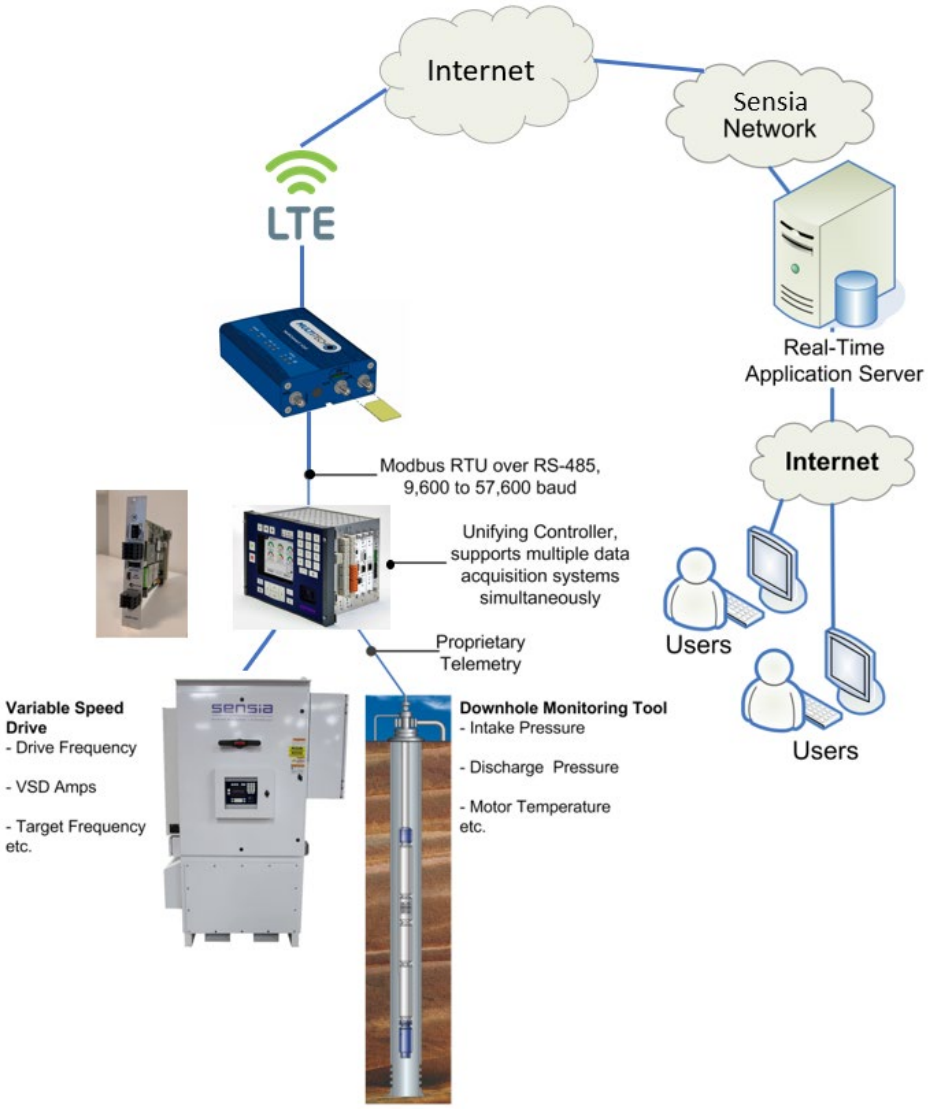


Figure 1-2: End-to-End Diagram

Section 2: **Specifications**

2.1 HARDWARE SPECIFICATIONS

Part Numbers	103381133	
Description	INSTRUCT ESP Gateway card	
Board Size	PCB Size: 100mm x 160mm	
	Eurocard 3U compliant (IEC 60297-3)	
Power Supply	DC (Input)	24VDC +/-10%, 300mA
Maximum Altitude	3,000 meters above sea level	
Temperature	Operating	-40 degC to +70 degC (-40 degF to +158 degF)
	Storage	-40 degC to +75 degC (-40 degF to +167 degF)
Approvals, Certifications, and Declarations	CE, UL, cUL, FCC	
RoHS Compliance	Compliant	

2.2 HARDWARE OVERVIEW

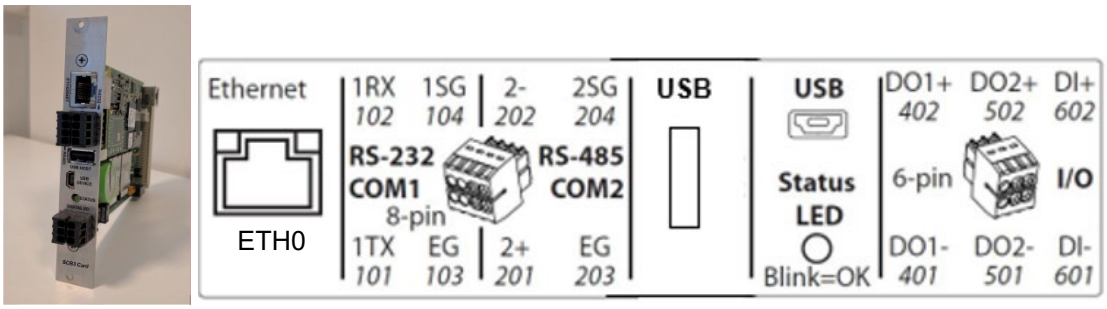


Figure 2-1: Front Connections

Port	Functional Description
Eth0	Used to connect the gateway card to the field network for local acquisition via Modbus TCP/IP protocol, or connect to Cellular Modem
COM1 RS-232 Console	Used by field users to configure, commission, and troubleshoot the gateway card. Settings are 38400, 8, N, 1.
COM2 RS-485 Port	Secondary Modbus acquisition port
USB Receptacle	Enables retrieval of encrypted data logs or Firmware Upgrade
USB Console	Not used
CPU Status LED	Blinks once per second when system is healthy
CPU I/O Interface	Not used. Do not use this port.

Port	Functional Description
COM 3 RS-485 Port (gateway card Backplane Connector)	Default Modbus Acquisition port for communication with INSTRUCT ESP Intelligent Controller

Section 3: **Installation and Operation**

Caution

Potential Severity: Light
Potential Loss: Assets, Personnel
Hazard Category: Electrical

Installation can only be performed by authorized factory or service personnel. Operators only have access to the front panel of the controller. No installation or retrofit can be carried out by the operator.

Using the appropriate procedures, ensure the Drive/Switchboard is stopped and that input power supplies are OFF before proceeding with the procedure.

Using the appropriate procedures, open the cabinet door and use a voltmeter to verify all power is OFF on the Drive/Switchboard prior to proceeding with the remaining procedure.

3.1 MULTITECH CELLULAR MODEM PREPARATION AND CONFIGURATION

3.1.1 MULTITECH CELLULAR MODEM INSTALLATION PREPARATION

The following parts are required for the preparation and installation of the modem. They are included in the INSTRUCT ESP Gateway Cellular Modem Global Kit (PN: 50370539).

Note:

PN 50376574: Gateway Card Cellular Kit (NA Alternate) is an alternative kit equivalent to PN: 50370539 but can only work in North America.

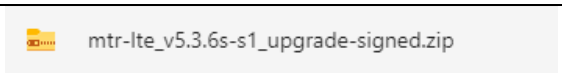
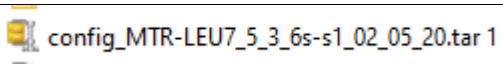
3.1.1.1 Hardware

Item Description	Quantity	Details
Router, Cellular, LTE CAT M1+NB-IOT Sensia PN: 50369243 (For NA kit 50376574, the router PN is 50376572)	1	
Modem Power Cable Sensia PN: 50369242	1	
MultiTech Modem Mounting Bracket Sensia PN: 50369241 (Not included in NA kit 50376574)	1	

Item Description	Quantity	Details
AT&T SIM Card	1	
Power Supply Module Sensia PN: 50369248 (For NA kit 50376574, the Power Supply PN is 50376572)	1	
Cat5E Ethernet Cable, 3 ft Sensia PN: 50369237	1	
Mag-Mount Antenna Sensia PN: 77025191 (For NA kit 50376574, the Antenna PN is: 77027787)	1	

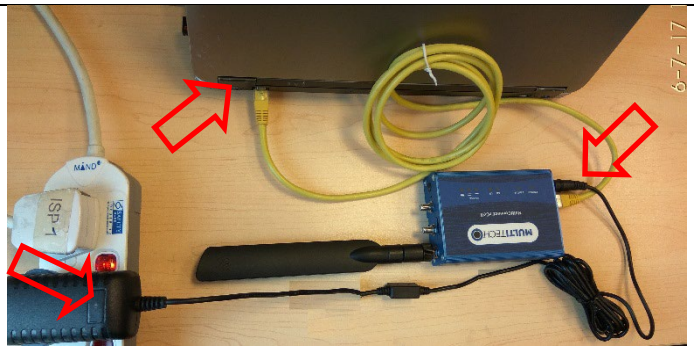
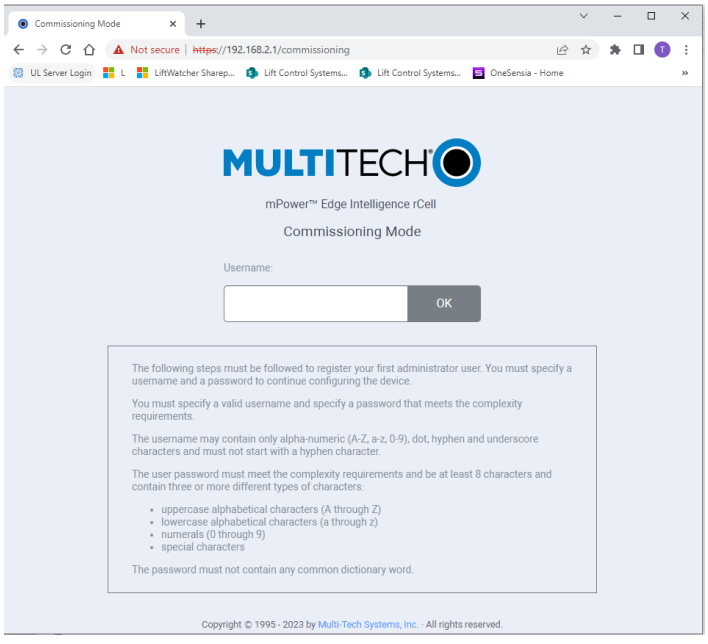
Item Description	Quantity	Details
GLAND, CABLE, NYLON, 3/4 in NPT Sensia PN: 77024442	1	
PSU and Modem Mounting Plate Kit Sensia PN: 50371409 (For NA kit 50376574, Adhesive tape PN: 77027803 is used instead of mounting plate)	1	
CABLE DB9 MALE/FEMALE SERIAL 3 ft RoHS Sensia PN: AC14505 **Note**: This serial cable is not included inside the standard kit. It can be ordered separately.	1	

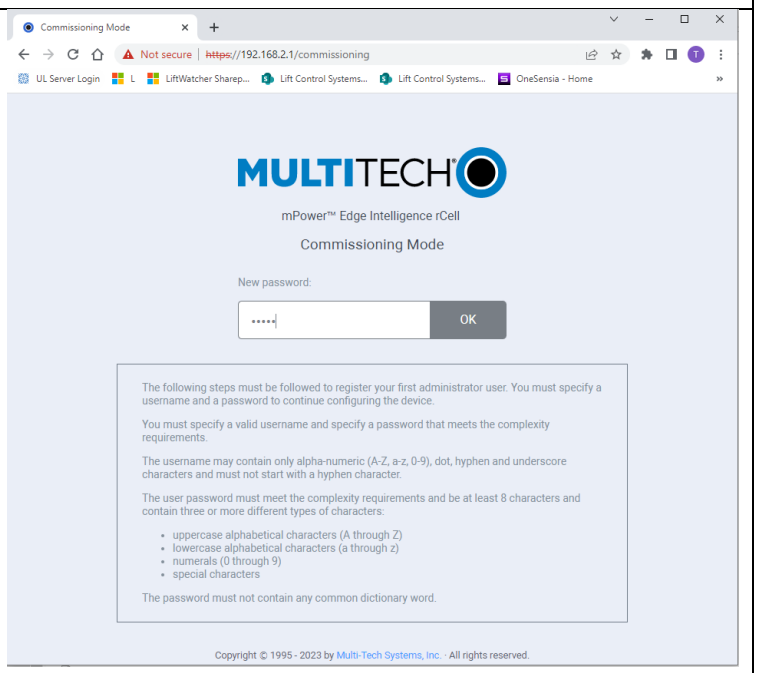
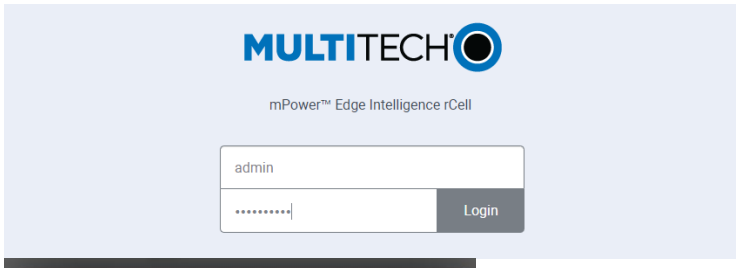
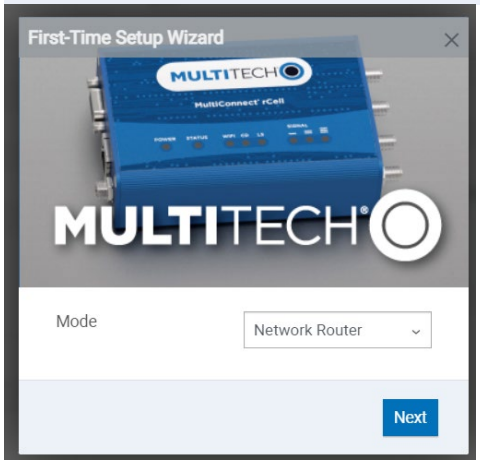
3.1.1.2 Software

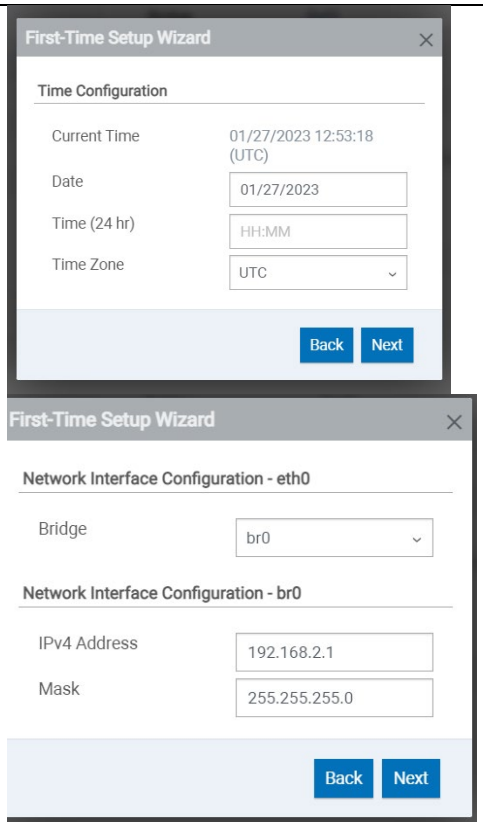
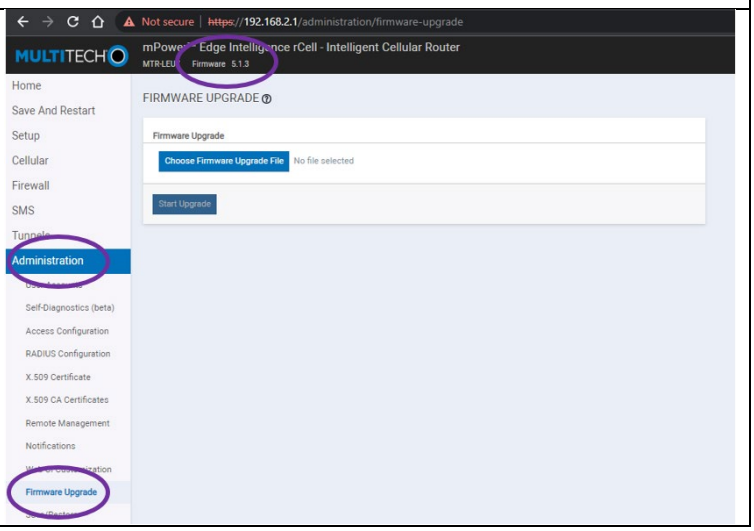
Item Description	Quantity	Details
Downloaded Multitech Modem Firmware version 5.3.6 from Sensia Technical Document Library (Gateway Card configuration_FW_Manual Package) or InTouch 7745571	1	
Downloaded configuration file **config_MTR-LEU7_5_3_6s-s1_02_05_20.tar** if using global version modem MTR-MNG2 Or NA version modem MTR-LNA7 or EU version modem MTR-LEU7 from Sensia Technical Document Library (Gateway Card configuration _FW_Manual Package) or InTouch 7745571	1	

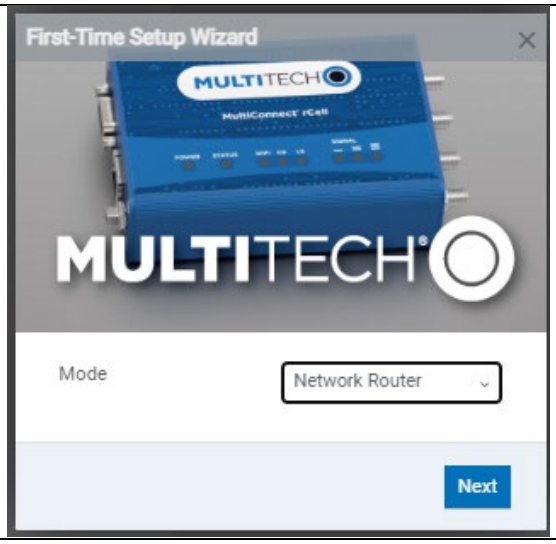
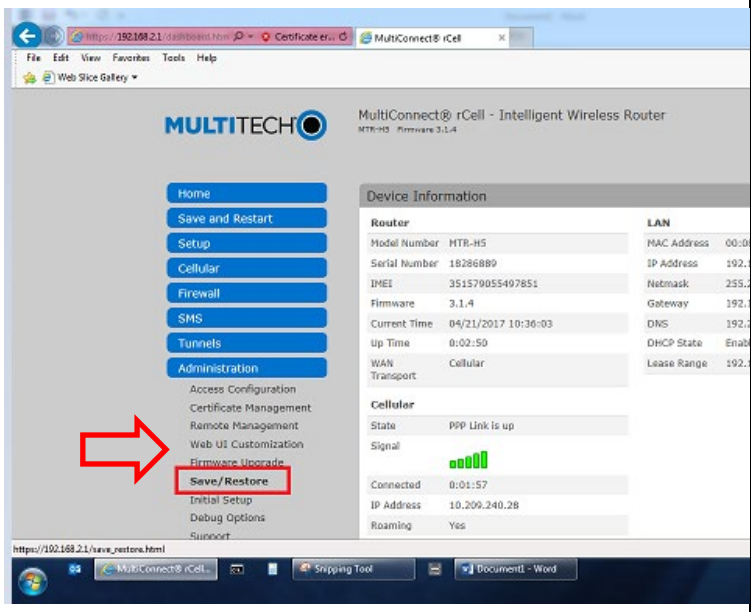
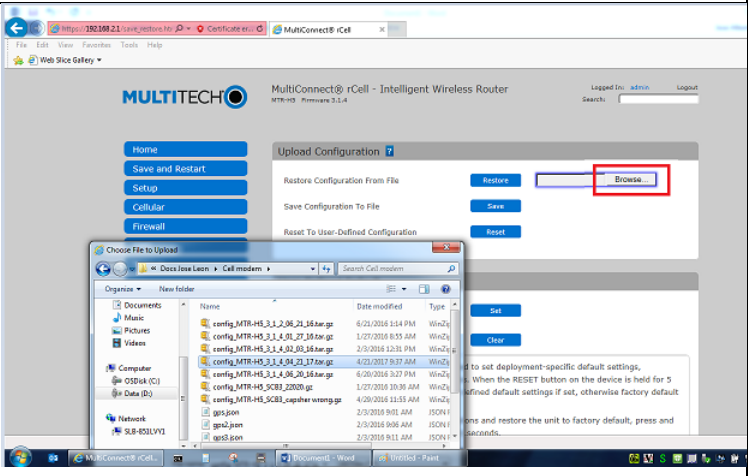
3.1.2 MULTITECH MODEM CONFIGURATION

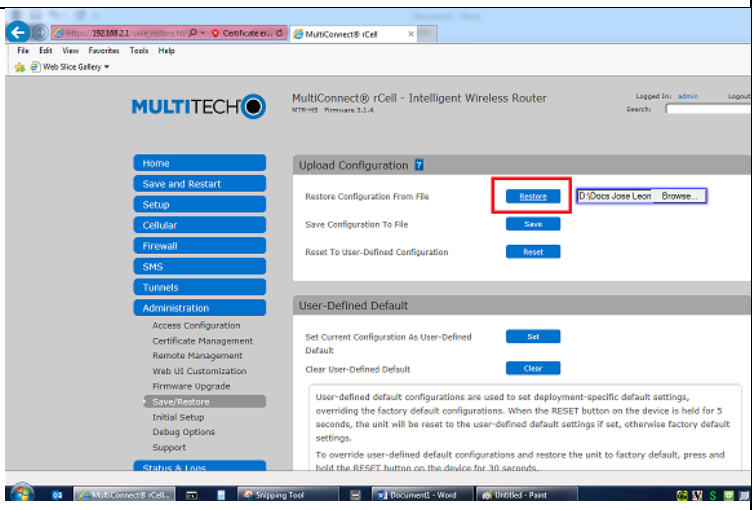
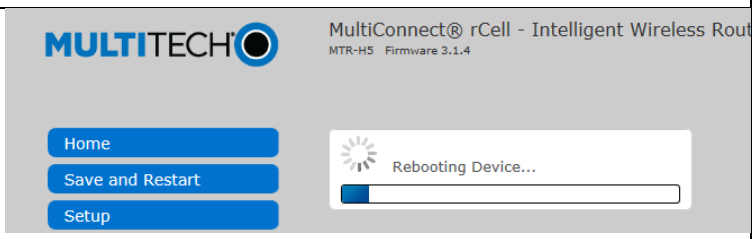
Instructions	Illustrations
1. MultiTech Modem Wiring	

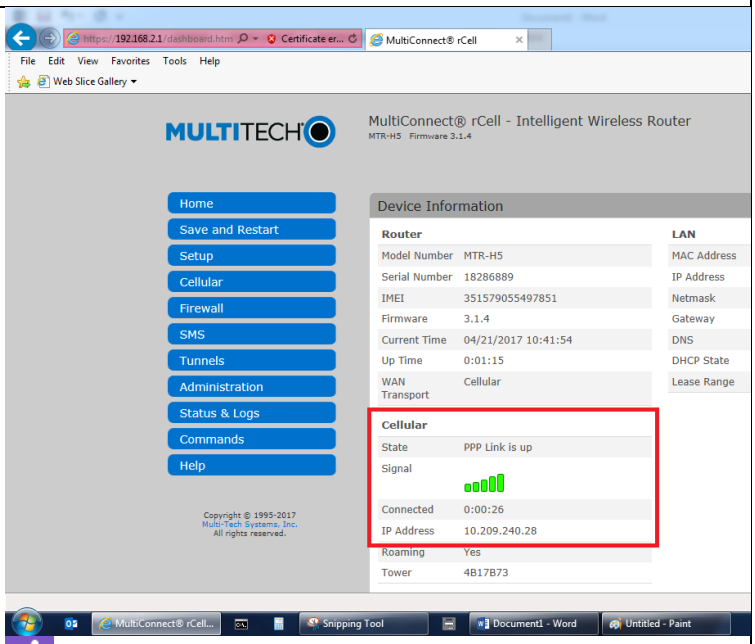
Instructions	Illustrations
1.1. Obtain Power Supply Module (50369248), MultiTech Modem (50369243), MultiTech Power Supply Cable (50369242), Antenna (77025191), and Ethernet Cable (50369237). 1.2. Attach Ethernet cable from MultiTech Modem to PC. 1.3. Attach an AC power plug (not included in the kit because of regional differences) to the Power Supply module input. Use the power cable to connect the Power Supply output to the MultiTech Modem power input. 1.4. Insert AT&T MicroSIM card into MultiTech Modem. 1.5. Power up the modem. Wait for 15 min and ensure Power LED, Status LED, Carrier Detect LED - CD, Link Status LED - LS, Signal Strength bars, and Ethernet port LEDs are blinking or lit. **Note:** For first-time startup of the MultiTech Modem, it might take up to 45 min for the CD light to turn on.	 (Photo for illustration only. Power Supply and Antenna are not using same model included in the kit) 
2. Configuring MultiTech Modem 2.1. Attach Ethernet cable from laptop to MultiTech Modem. 2.2. Open Internet Explorer and type the following IP address in the address bar: 192.168.2.1. Press **Enter**. 2.3. For first-time initialization of the new MultiTech Modem, you need to set the username and password. Please take note of the username and password entered for first-time login. example: Username: admin Password: Admin2023 Step through the wizard and keep all the default settings. Once the configuration file is applied, all these settings will be updated.	

Instructions	Illustrations
	  

Instructions	Illustrations
	
2.4. Update Modem FW to 5.3.6s-s1 Check whether the modem version is at least 5.1.3. - If lower than 5.1.3, isolate the modem and contact LCS Custom Service at: liftcontrolsystems@sensiaglobal.com - If the modem already has 5.3.6s-s1 then no need to proceed. Go to Administration -> Firmware Upgrade Select rcell-mtrv1-upgrade_5.3.6s-s1-signed.bin, then start upgrade.	

Instructions	Illustrations
2.5. After re-flashing, you will see the wizard on the right. Close the wizard by clicking on the X at the top right.	
2.6. Restore the configuration file. Go to the **Administration** option and select **Save/Restore**.	
2.7. Click **Browse** and then select the configuration file available at InTouch 7745571 or the file downloaded from Sensia Technical Document Library (**config_MTR-LEU7_5_3_6s-s1_02_05_20.tar**). 2.8. For Zedi Firmware use (config_MTR-MNG2_5_3_6s-s1_FOR_ZEDI_MAY2024tar.gz) **Note**: After you upload this configuration file, the login credentials will be automatically updated to the settings in the configuration file: **Username**: admin	

Instructions	Illustrations
Password: admin	
2.9.	
2.10. Select **Restore**.	
2.11. The modem will reboot. It will take approximately 10 min for the modem to reboot. **Note**: Normally restoring the configuration file should take 10 minutes at most. If the modem hangs, or get stuck, then power cycle the modem. And re-login If power cycle does not recover the modem, then a reset function is required by pressing and holding down the reset button for 20 seconds. This will reset the modem to default settings. The configuration file needs to be reapplied.	

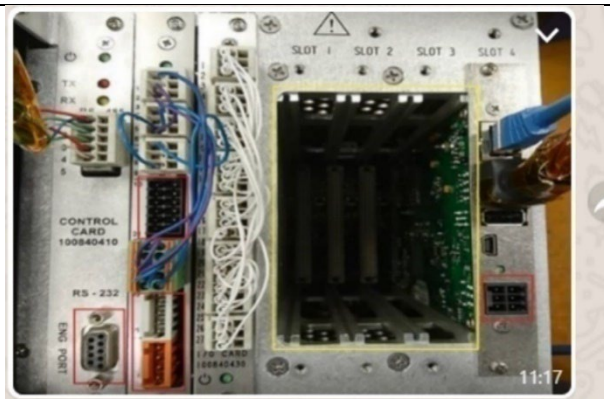
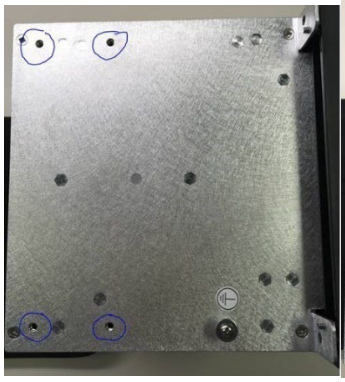
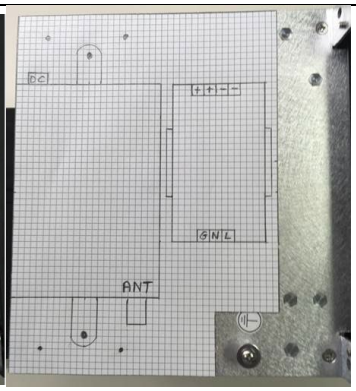
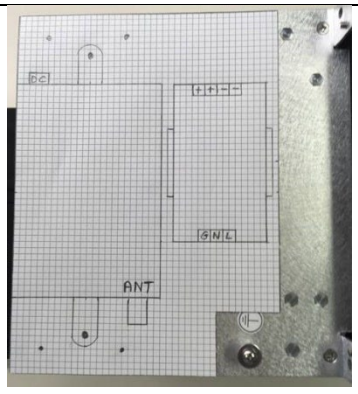
Instructions	Illustrations
2.12. After the MultiTech Modem has completed rebooting, log into the MultiTech website at 192.168.2.1 again. On the login page, enter the following credentials: **Username**: admin **Password**: admin It may take a couple of minutes for the modem to finish the booting process. Please wait up to 10 min for the MultiTech main screen to be updated. Verify that the modem has a good signal, the PPP session is up, and a cellular IP address has been assigned **(10.242.xxx.xxx) or (10.243.xxx.xxx)**	 **Note**: The picture is only for illustration, refer to left Instructions column for the IP address format, it should be **10.242.xxx.xxx or 10.243.xxx.xxx**
2.13. This completes the MultiTech Modem configuration. Power off the modem, dismantle all accessories (ethernet cables, AC/DC adapter), and place aside.	

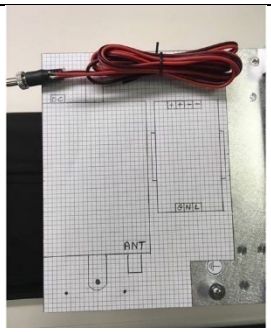
3.2 COMPONENTS INSTALLATION INSIDE VSD

Danger

Potential Severity: Major
Potential Loss: Assets, Personnel
Hazard Category: Electrical

Ensure VSD is powered off during the following procedure.

	Instructions	Illustrations
1.	INSTRUCT ESP Gateway card Installation. Install INSTRUCT ESP Gateway card (PN: 103381133) into the expansion slot of the INSTRUCT ESP Intelligent Controller inside the VSD drive.	
2.	Modem and Power Supply Module Installation (For NA kit 50376574, use adhesive tape included inside the kit to mount the Power Supply Module and Modem on the side of Instruct Controller or inside the VSD Door.	
2.1.	Obtain PSU and Modem Mounting Plate (PN: 50371138) inside the Mounting Kit 50371409. Install the mounting plate to the right side of the INSTRUCT ESP Intelligent Controller by using the provided standoffs and screws.	 
2.2.	Mount the modem and the Power Supply to the plate by using the Modem Mounting bracket (PN: 50369241) and DIN rail provided in the kit.	

	Instructions	Illustrations
3.	Make the cable connection between the Power Supply output to the modem power input by using the modem power cable (PN: 50369242).	
4.	Connect 120VAC inside the VSD to the Power Supply Module AC input. (For INSTRUCT ES7 Intelligent VSDs, it should be connected to CPT2 terminals. For INSTRUCT E20P Intelligent VSDs, connect to the 120VAC terminal block.)	
5.	Drill a ¾ in hole on the VSD door close to the INSTRUCT ESP Intelligent Controller. The hole is for mounting the cable gland (77024442). Do not mount the cable gland yet.	
6.	Place the Mag-Mount Antenna onto the VSD body and pass the coax cable through the drilled hole. Connect the other end of the coax cable to the modem Cell1 port.	
7.	Connect the Ethernet cable between the gateway card Ethernet port to the MultiTech Modem Ethernet port.	

3.3 INSTRUCT ESP GATEWAY CARD CONFIGURATION AND COMMISSIONING

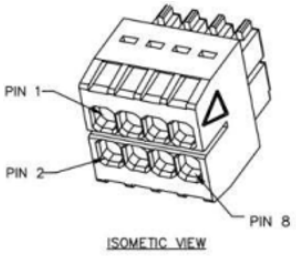
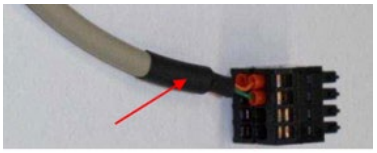
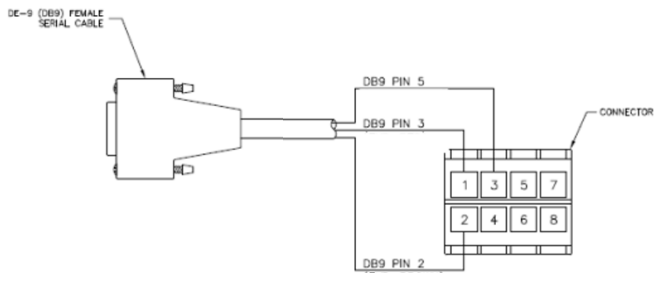
The INSTRUCT ESP Gateway Card (103381133) is factory loaded with FW 2120901 or later. It is ready to be used directly inside the INSTRUCT ESP Intelligent Controller with the modem. Note that the FW must be started with 212xxxx: that is, the specific FW for the gateway card to be used inside the controller. In case the gateway card firmware is not correct, please follow section 4.4 to upgrade the firmware.

The gateway card configuration and commissioning can be done locally by using the TUI through the RS232 COM1 port or remotely by the Proser Team. To do it locally, you need to bring the USB cable out of the VSD through the drilled hole temporarily during the commissioning procedure.

3.3.1 REQUIRED EQUIPMENT & SOFTWARE

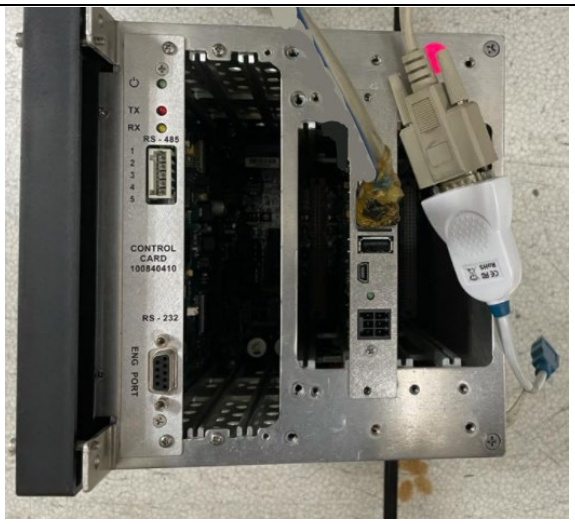
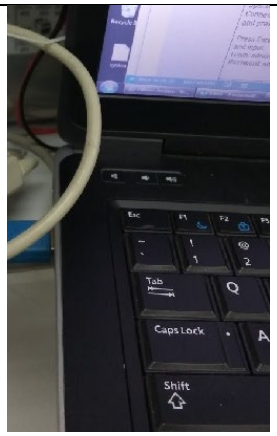
Prepare the following equipment and software before the start of software configuration.

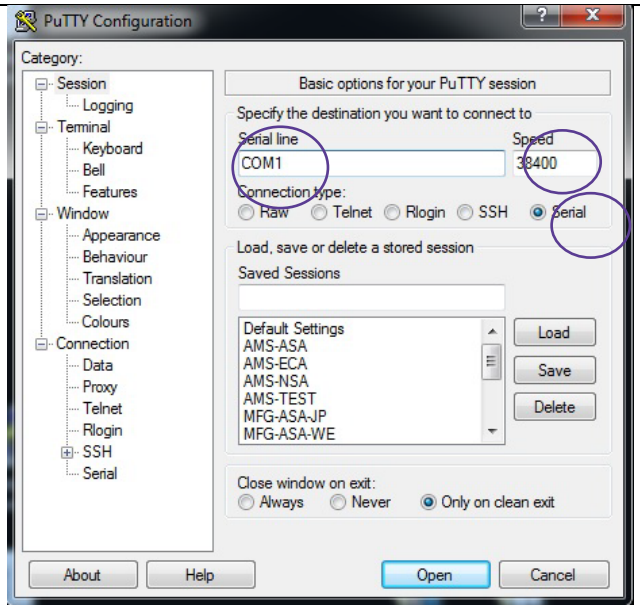
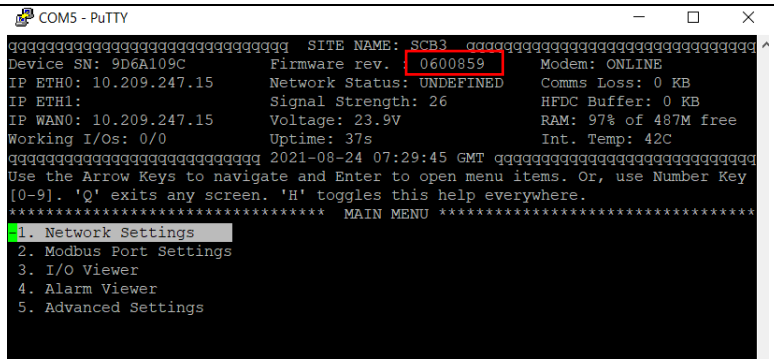
SN	Item Description	Illustrations
1	Windows (32/64) laptop / PC	

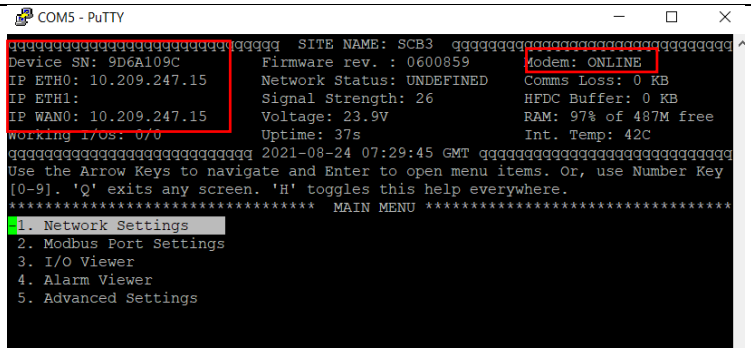
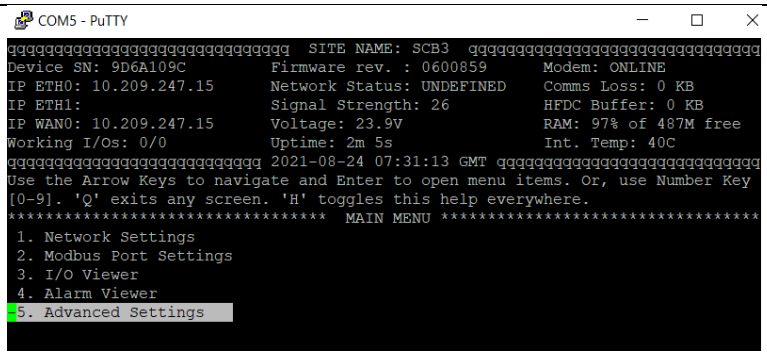
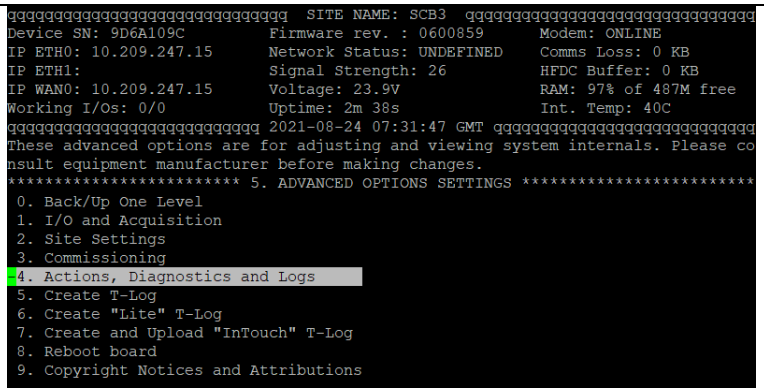
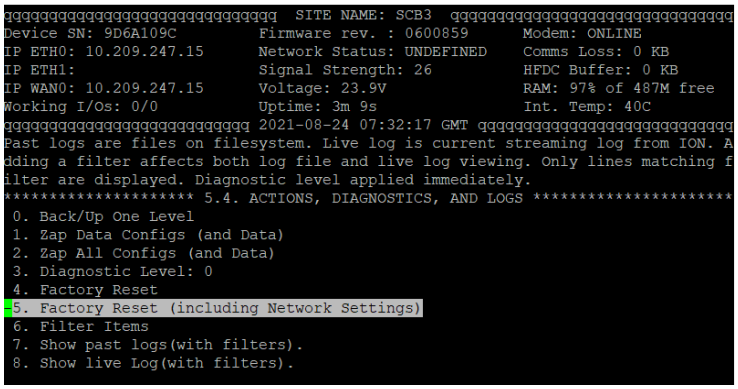
SN	Item Description	Illustrations
		
2	USB to RS232 serial converter (not provided in the kit)	
3	RS232 (DB9 female) to gateway card RS232 COM1 Connector (not provided in the kit)	 DB-9 Cable – AC14505 / Connector – 101078022 Pin 3 – Pin 1 Pin 2 – Pin 2 Pin 5 – Pin 3   
4	Download Terminal User Interface (TUI) – PuTTY Download the 32-bit version of **putty.exe** and save it on the Windows laptop or PC.	Download URL: https://the.earth.li/~sgtatham/putty/latest/w32/putty.exe

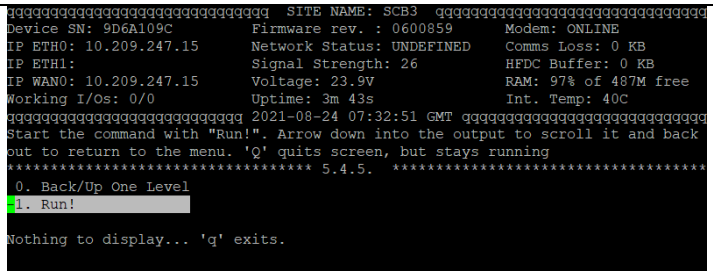
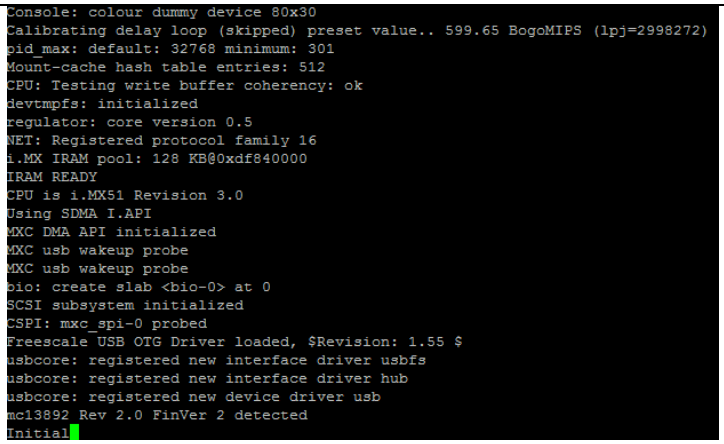
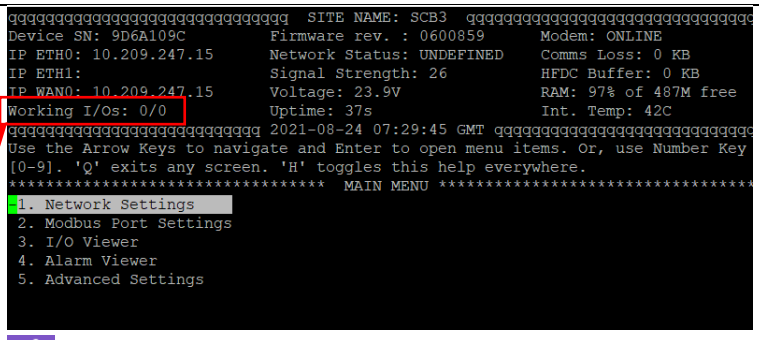
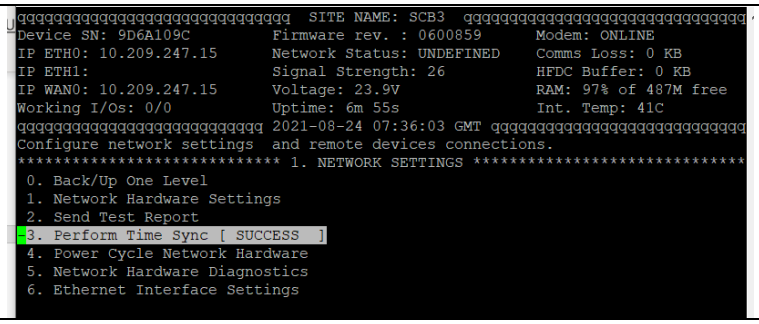
3.3.2 INSTRUCT ESP GATEWAY CARD CONFIGURATION CHECK AND COMMISSIONING

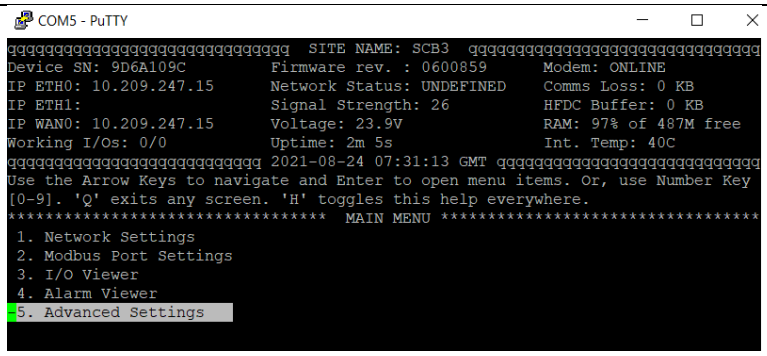
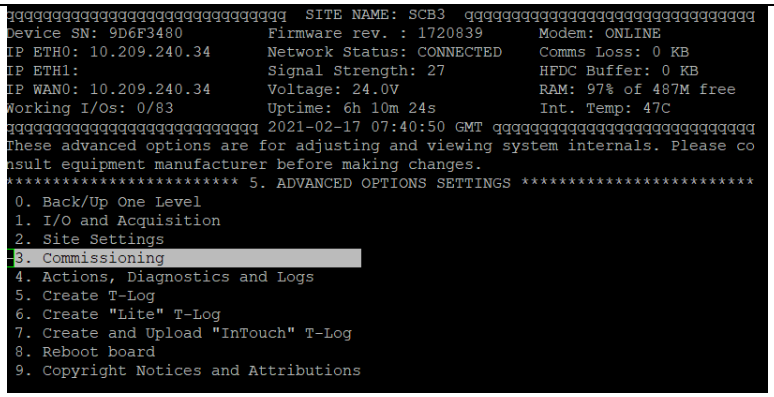
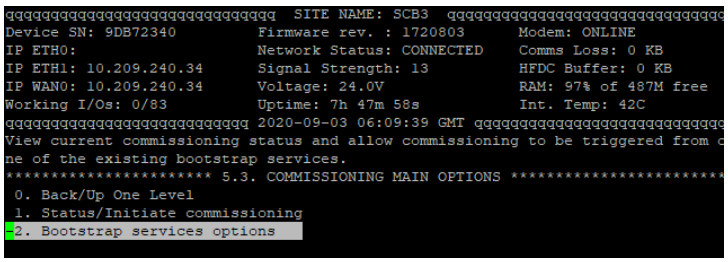
This section outlines the software configuration required for the gateway card to communicate with the MultiTech Cellular Modem.

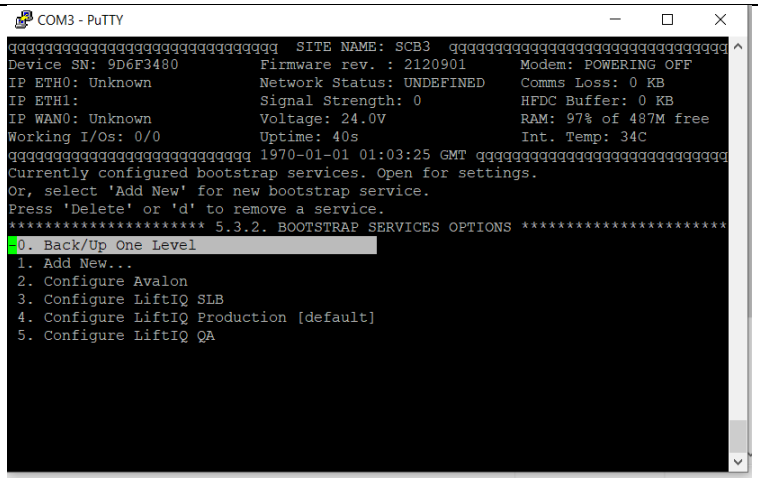
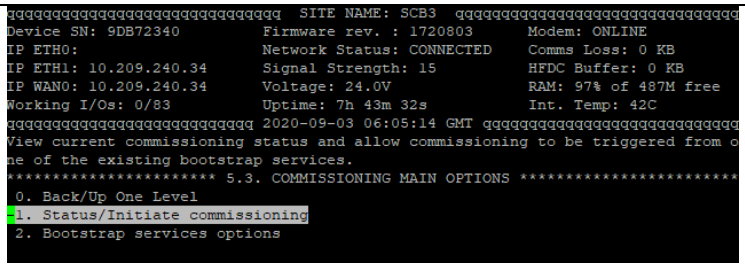
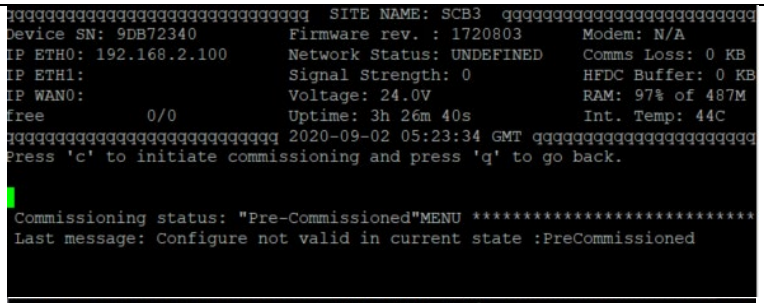
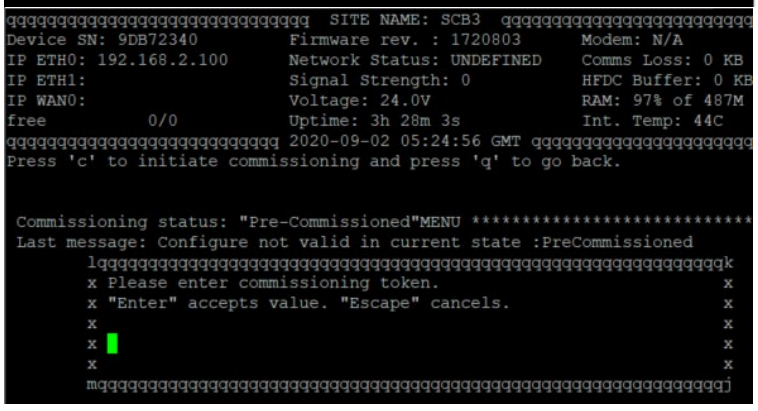
Instructions	Illustrations
1. Connect the USB to RS232 serial converter to the gateway card RS232 Serial Port COM1. Bring the USB end out of the VSD through the hole drilled on the VSD. This connection is only for the commissioning procedure.	
2. Close the VSD door, turn on the power to the VSD, and wait for the controller to boot up.	
3. Connect the above USB plug described in step 1 (outside of the VSD) to a computer.	

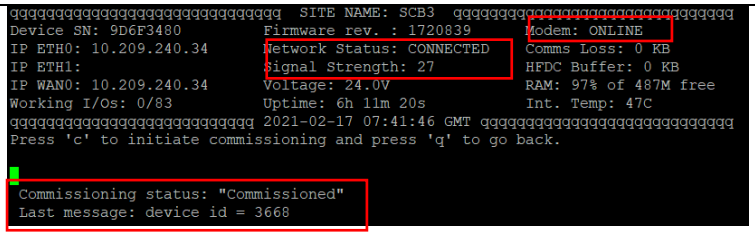
Instructions	Illustrations
4. Open PuTTy. Execute **putty.exe** and configure as below: • Serial Line: COMxx (PC Com port connected to gateway card) • Speed: 38400 • Connection Type: Serial Press **Open**.	
5. Press **Enter** till the Login prompt appears and enter the following credentials: **Login**: admin **Password**: admin	
6. Check that the FW revision is the latest version. Avalon: 0948-AVL-G LiftIQ: 0947-LIQ-G Zedi: 43007 If not, refer to section 4.2.5 for the firmware upload process. The latest firmware available in Sensia Technical Document Library or InTouch 6117586 covers support for the gateway Cellular Modem.	 **Note:** The picture is for illustration only, please refer to the left Instruction column for the exact FW version.

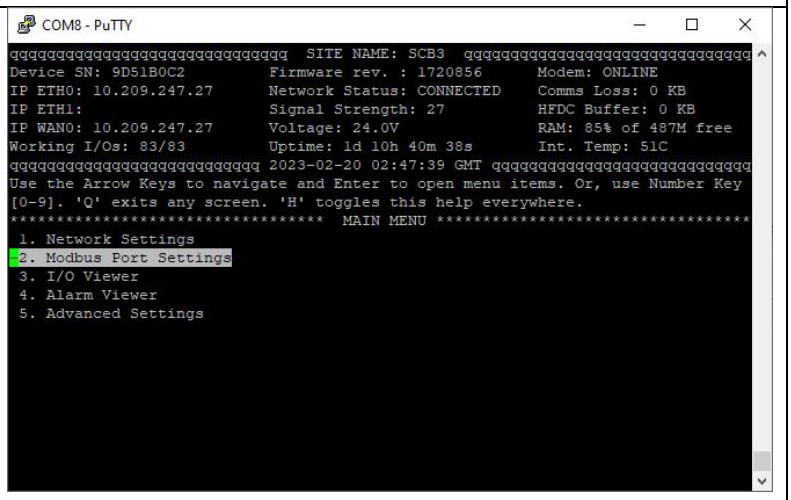
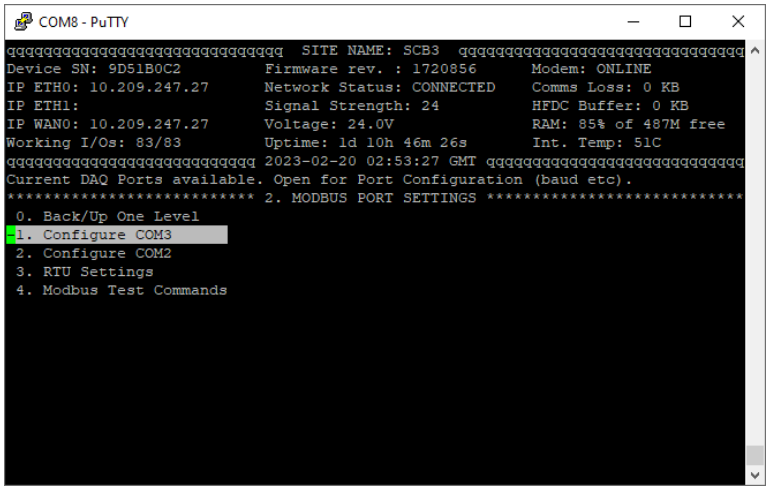
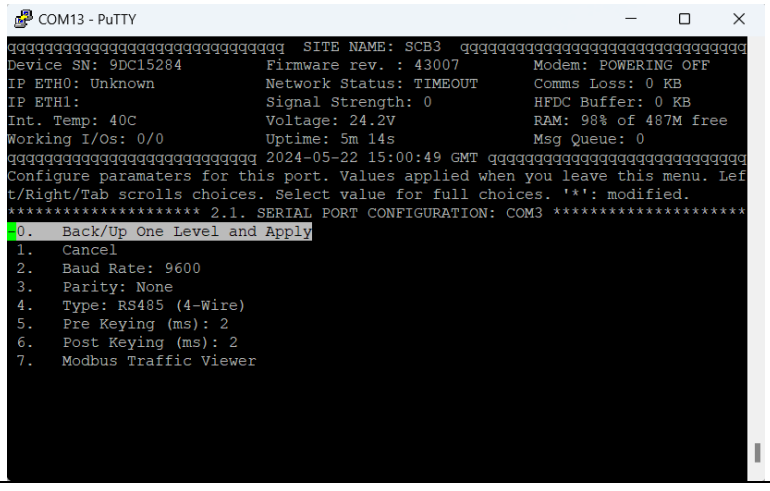
Instructions	Illustrations
7. If it is a new gateway card from the factory, wait 10 to15 minutes. The modem status should become **Online**, and the IP address should be 10.242.xxx.xx or 10.243.xxx.xx. Once the above is verified, skip to the commissioning task in step 11. If it is a used gateway card, proceed to step 8 below.	 **Note:** The picture is for illustration only, please refer to the left Instruction column for the exact IP address format.
8. Perform a factory reset. **Note:** The factory reset will break the old commissioning. It is necessary to contact the Proser team to redo the commissioning after the factory reset. In the main menu, select **5. Advance Settings**.	
8.1. Under **Advanced Options Settings Menu**, select **4. Actions, Diagnostics and Logs**.	
8.2. Under **Actions, Diagnostics, and Logs** menu select **5. Factory Reset (including Network Settings)**. Enter the reason for the reset, e.g., “INSTRUCT ESP Gateway Cellular LiftIQ” and press **Enter**.	
8.3. Select **1. to Run**.	

Instructions	Illustrations
	
8.4. The gateway card will reboot and restart with the factory reset defaults.	
9. After the gateway card reboots, enter the admin screen again following the instruction in Step 3. Ensure the firmware version is correct and the I/Os have been erased to 0/0. Wait 10-15 min for the Modem Status to be **Online** and the IP address to show 10.242.xxx. xx or 10.243.xxx.xx.	 **Note:** The picture is for illustration only, please refer to the left Instruction column for the exact IP address format.
10. Check Time Sync under Network Settings: **3. Perform Time Sync.** **Note:** The time sync takes up to 50 seconds to show Success status.	

Instructions	Illustrations
11. **Commissioning:** **Note:** Before proceeding to the commissioning steps, you should have already obtained a token from the Proser Team. In case you don't have the token, you need to contact the Proser team (proser@sensiaglobal.com) and provide them the IP address in the form of 10.242.xxx.xxx or 10.243.xxx.xx. (The IP address is from your SIM card.) The Proser Team will provide a token number for commissioning. Commissioning is the process that will allow the gateway card to connect to the LiftIQ/Avalon/Zedi real-time server, and push the I/O, alarm, and reporting configuration from the real-time servers to the field hardware, enabling the users to verify that the I/Os are properly functioning. Commissioning can be done on location by using TUI or remotely by the Proser Team. The following steps describe a commissioning done locally by using TUI.	
11.1. Go to the Main Menu, and select **5. Advanced Settings**:	
11.2. Under the Advance Setting menu, select **3. Commissioning**.	
11.3. For LiftIQ: Under the Commissioning menu, check that the **2. Bootstrap services** options is default to **4. Configure LIFTIQ Production [default]**. Then choose **0**. **11.4. For Avalon:** **2. Bootstrap services** options is default to **2. Configure AVALON Production [default]**. Then choose **0**.	

Instructions	Illustrations
11.5. For Zedi: Not applicable Back up one level to go back to the Commissioning menu.	
11.6. Under the Commissioning menu, choose ***1.* Status/Initiate commissioning**.	
11.7. Press **c** to initiate commissioning, and enter the token number obtained from the Proser Team.	 

Instructions	Illustrations
11.8. If commissioning is done successfully, the commissioning status should show: **Commissioned** with the Device ID. The Network Status will be changed to **Connected** and the modem status will show **Online**. Check Signal Strength is between 15-31. Received Strength Signal Indicator (RSSI): 0-6 - Extremely Weak Signal 7-14 - Very Weak Signal 15-23 – Weak Signal 24-31 – Good Signal Straighten the Omni Directional Antenna to get a good signal. The gateway card is successfully commissioned.	

Instructions	Illustrations
12. **Gateway Card COM3 Configuration:** Change the COM3 setting of the Gateway Card and make sure it is same to below: Baud Rate: 9600 Parity: None Type: RS485 (4-Wire) Pre Keying (ms): 2 Post Keying (ms): 2	  

3.4 INSTRUCT ESP INTELLIGENT CONTROLLER CONFIGURATION

Configure the INSTRUCT ESP Intelligent Controller Slot that contains the gateway card to the setting shown below. The following setting matches the gateway card Serial Port Com3 default setting. It ensures good communication between the controller and the card.

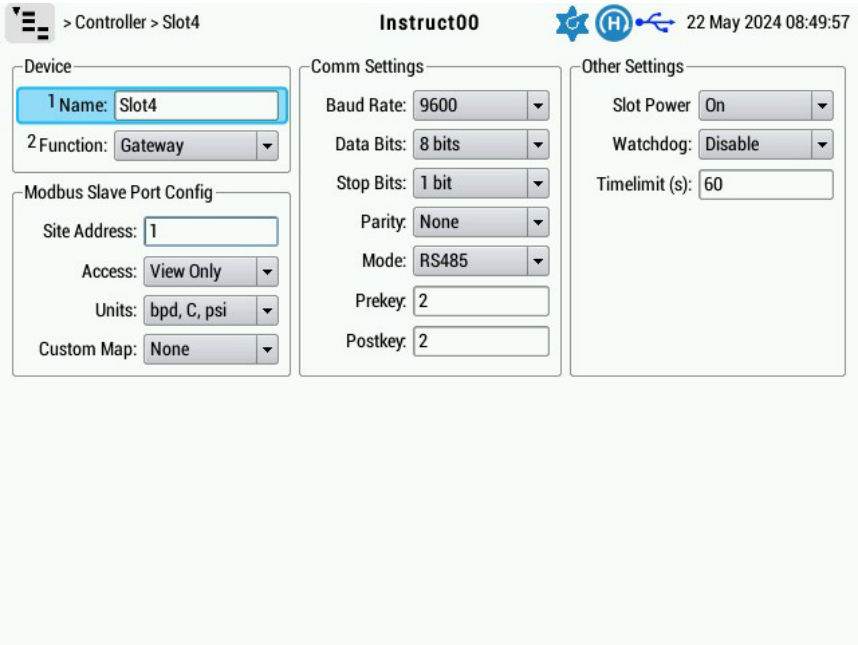


Figure 3-1: Controller slot configuration for INSTRUCT ESP Gateway Card

3.5 READY FOR OPERATION

After all the above steps are done, the controller and gateway card are ready for operation. Turn off the VSD power and wait until the system is fully discharged.

Potential Severity: Light
Potential Loss: Assets, Personnel
Hazard Category: Electrical

Installation can only be performed by authorized factory or service personnel. Operators only have access to the front panel of the controller. No installation or retrofit can be carried out by the operator.

Using the appropriate procedures, ensure the Drive/Switchboard is stopped and that input power supplies are OFF before proceeding with the procedure.

Using the appropriate procedures, open the cabinet door and use a voltmeter to verify all power is OFF on the Drive/Switchboard before attempting the remaining procedure.

Remove the RS232-to-USB Cable and the antenna cable from the drilled hole. Install the cable gland to the drilled hole location on the VSD, put back the antenna cable, and pass the antenna cable through the cable gland. Now the system is ready to operate.

Section 4: **Modbus and TUI Functions**

4.1 SECONDARY MODBUS RS-485 CONNECTION (COM2)

The secondary Modbus RS-485 data acquisition port is COM2. This communication port shares the same connector as COM1, the Engineering port used to communicate with the CPU board inside the INSTRUCT ESP Gateway Card. This RS485 port can be used to connect to other RTU devices, in addition to the host controller.

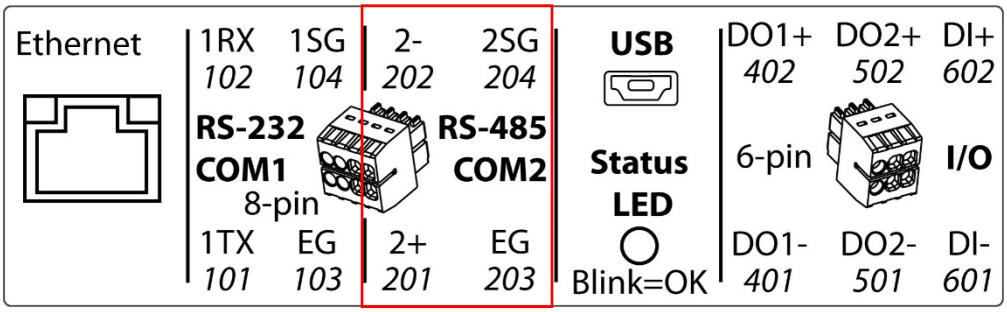


Figure 4-1: COM2 RS485 port

- Pin 201: RS-485 (COM2)
- Pin 202: RS-485 (COM2)
- Pin 203: RS-485 (COM2) Earth Ground (Shield)
- Pin 204: RS-485 (COM2) Signal Ground

Figure 4-2: COM2 Connector

4.2 CONFIRMING RTU COMMUNICATIONS

4.2.1 SERIAL PORT CONFIGURATIONS

The Modbus Port Configuration menu permits the technician to configure and check the serial port connections with the local controllers. COM3 is used for the communication between the controller and the gateway card. COM2 can be used for an additional RS485 RTU device.

1. Open the terminal emulator (text user interface).
2. In the main menu, select option **2. Modbus Port Configuration**.

3. Select the appropriate COM port to be configured (Option 1 or 2).

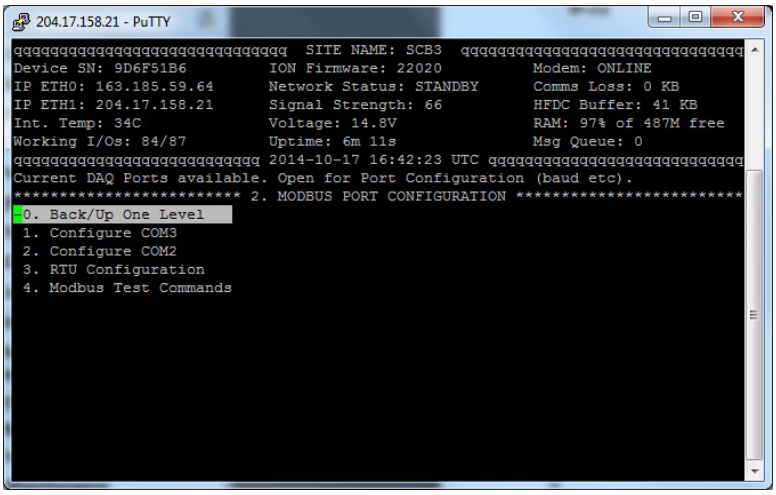


Figure 4-3: Modbus Port Configuration

4. Select each of the configuration parameters one at a time and enter the required values to match the controller.
5. Press **0** to save changes and return to the previous menu.

4.2.2 CONFIGURING RTU SLAVES

The RTU configuration menu allows the technician to configure the gateway card to read from each of the individual RTUs including the controller.

Note:

To communicate properly, these parameters must match those of the controller.

1. Open the terminal emulator (text user interface).
2. In the main menu, select option **2. Modbus Port Configuration**.
3. Select option **3. RTU Configuration**.

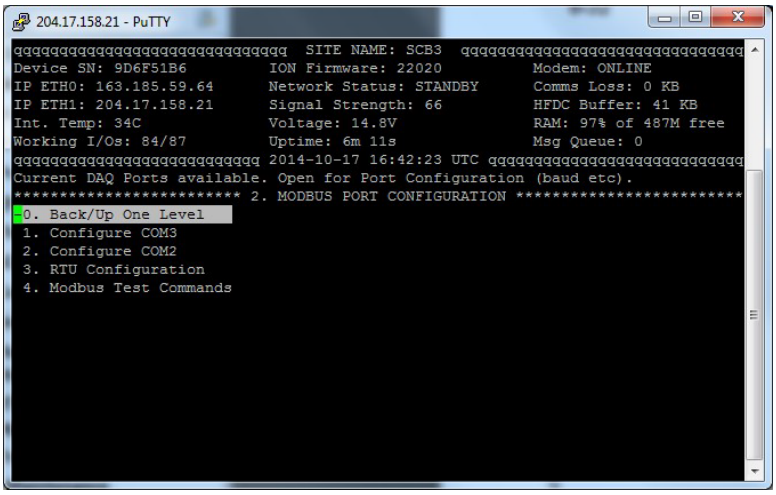


Figure 4-4: Modbus Port Configuration

4. Select an RTU to be configured from among the options provided or add a new RTU.

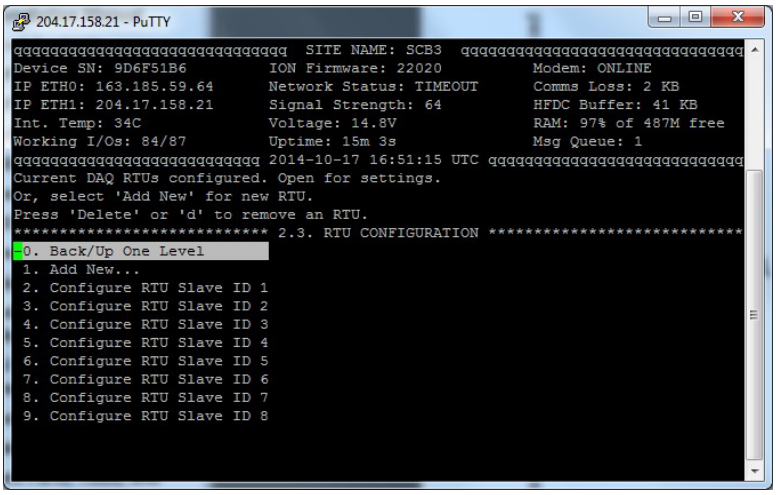


Figure 4-5: RTU Configuration

5. Enter an RTU ID, name, and communication port (COM2 or COM3). Modify other configuration parameters and ensure they match the controller parameters.

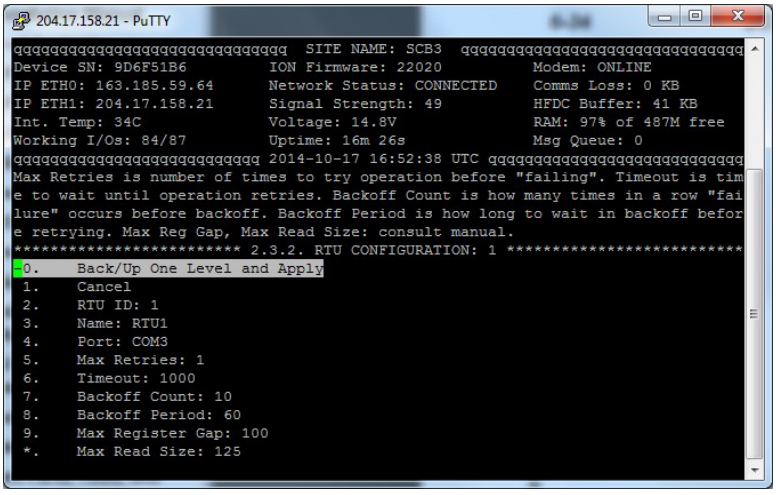


Figure 4-6: RTU Configuration Parameters

4.2.3 MONITORING COMMUNICATIONS

1. Open the terminal emulator (text user interface).
2. In the main menu, select option **4. Advanced Configuration**.
3. Navigate to the **1.I/O and Acquisition** menu.

4. Select the **1. I/O Viewer**. The I/O viewer permits the technician to check the polling in real time on the serial port and see the status of all the RTUs simultaneously.

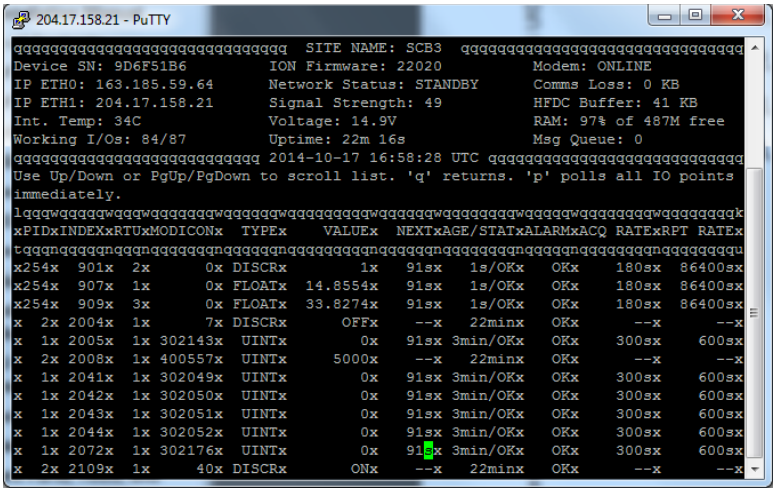


Figure 4-7: I/O Viewer

5. From the I/O and Acquisition menu, select option **3. RTU Viewer**. The RTU Viewer allows the technician to monitor the polling for each RTU in greater detail.

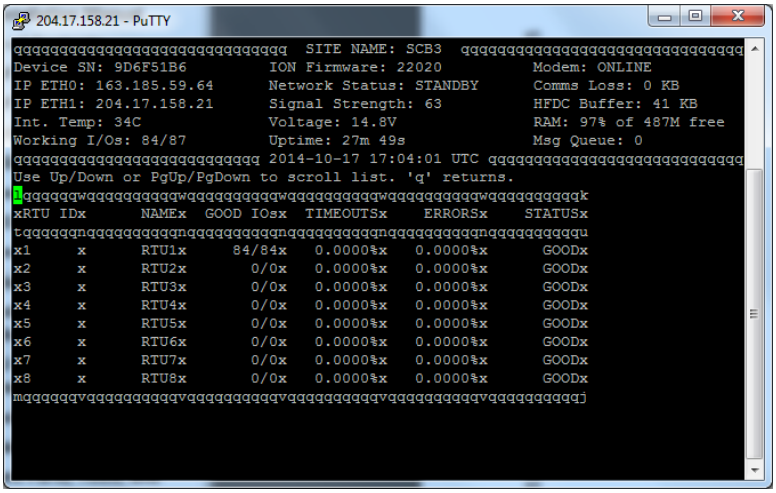


Figure 4-8: RTU Viewer

4.2.4 CONFIGURING TEST COMMANDS

Test commands permit the technician to ensure proper communication between the controller and the gateway card.

1. Open the terminal emulator (text user interface).
2. In the main menu, select option **2. Modbus Port Configuration**.

3. Select option **4. Modbus Test Commands**.

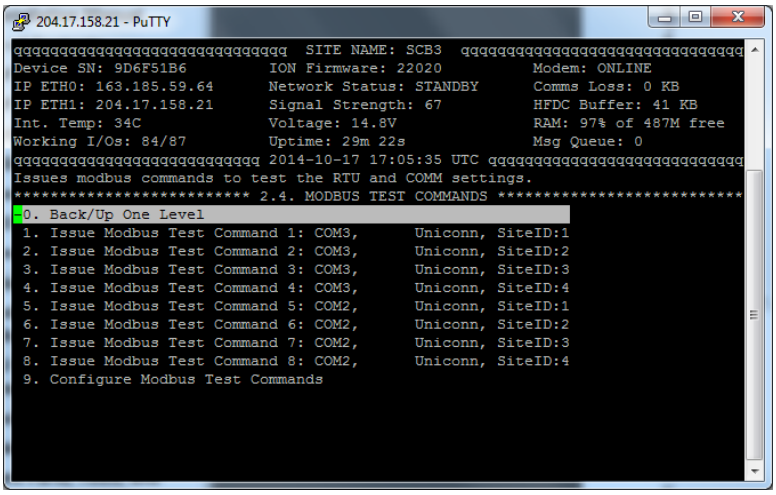


Figure 4-9: Modbus Test Commands

4. Select option **9. Configure Modbus Test Commands**.

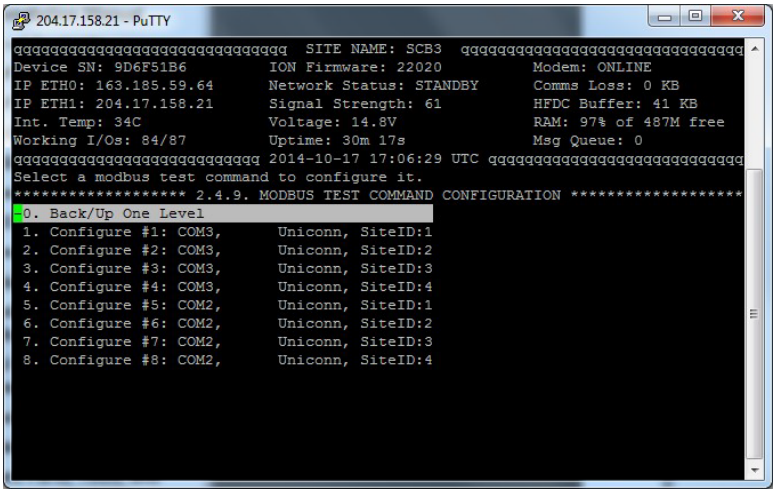


Figure 4-10: Configure Modbus Test Commands

5. Select a test command and configure the parameters as required.

4.2.5 ISSUING TEST COMMANDS AND CONFIRMATION ON TRAFFIC VIEWER

Issuing test commands permits the technician to check the response of the controller and ensure communications. The Traffic Viewer gives the technician an opportunity to see the transmitted and received code associated with each of the configured controllers.

1. Open the terminal emulator (text user interface).
2. In the main menu, select option **2. Modbus Port Configuration**.
3. Select option **2.4 Modbus Test Commands**.
4. Select a command based on the controller you would like to test. If the command was sent successfully, it will display "Success." Otherwise, it will display "Failed."
5. After issuing the command, press **0** to go to menu **2. Modbus Port Configuration**.
6. Select option **1** (Configure COM3) or **2** (Configure COM2).

7. Select option **7. Modbus Traffic Viewer**. The transmitted and received code will be printed to the screen.

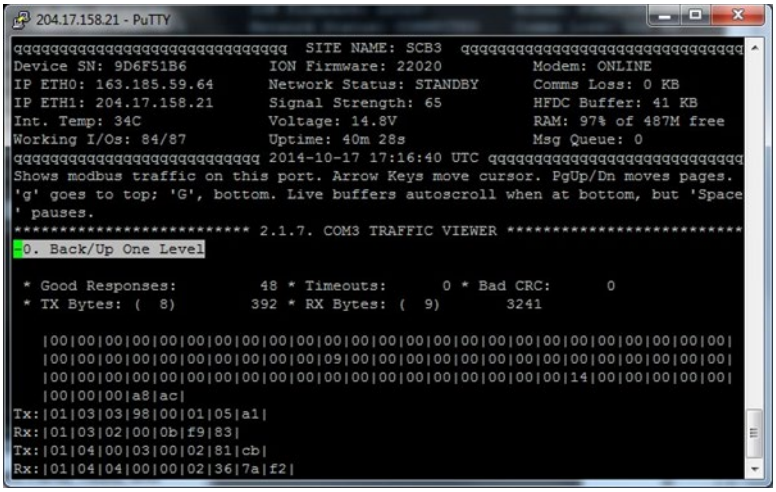


Figure 4-11: Modbus Traffic Viewer

8. Verify data received.

- If no data are received, it would indicate a problem with the connection or the controller. Check the physical connection to the controller.
- If garbage data (random data without a pattern) are received, it indicates that there may be a problem with the configuration parameters. Ensure that the parameters set in the COM2 or COM3 configuration, as well as those in the RTU configuration, match those of the controller.

4.3 ADVANCED SETTINGS

The **Advanced Settings** can be found under the main Menu:

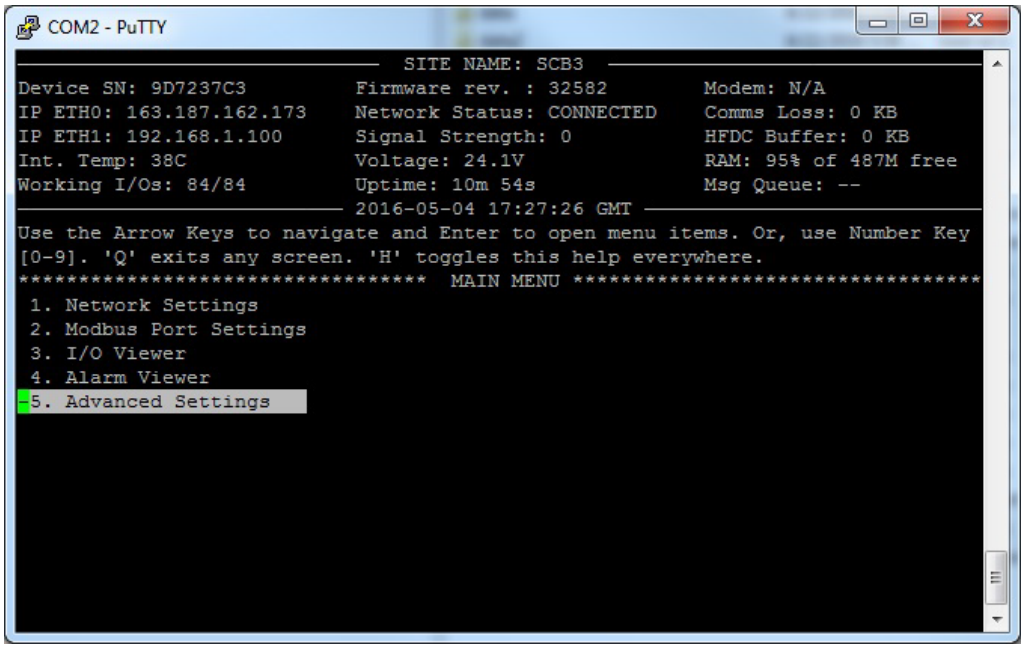


Figure 4-12: Main Screen

It gives access to the following functions:

4.3.1 SITE SETTINGS

Site Settings allows you to modify the name (SCB3 by default).

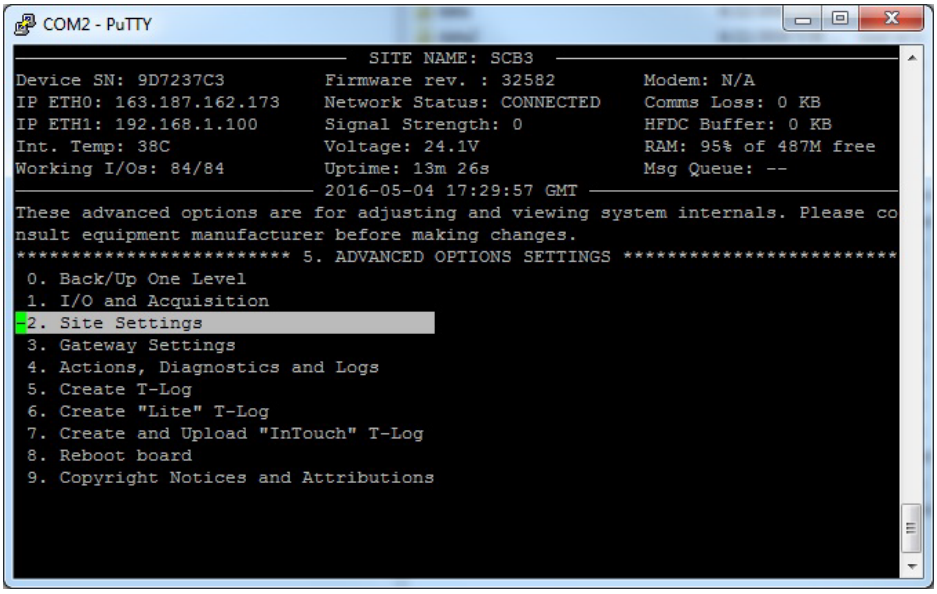


Figure 4-13: Site Setting

4.3.2 ACTIONS, DIAGNOSTICS AND LOGS

The **Actions, Diagnostics and Logs** option allows you to perform a factory reset that will restore the original configuration of the running firmware version.

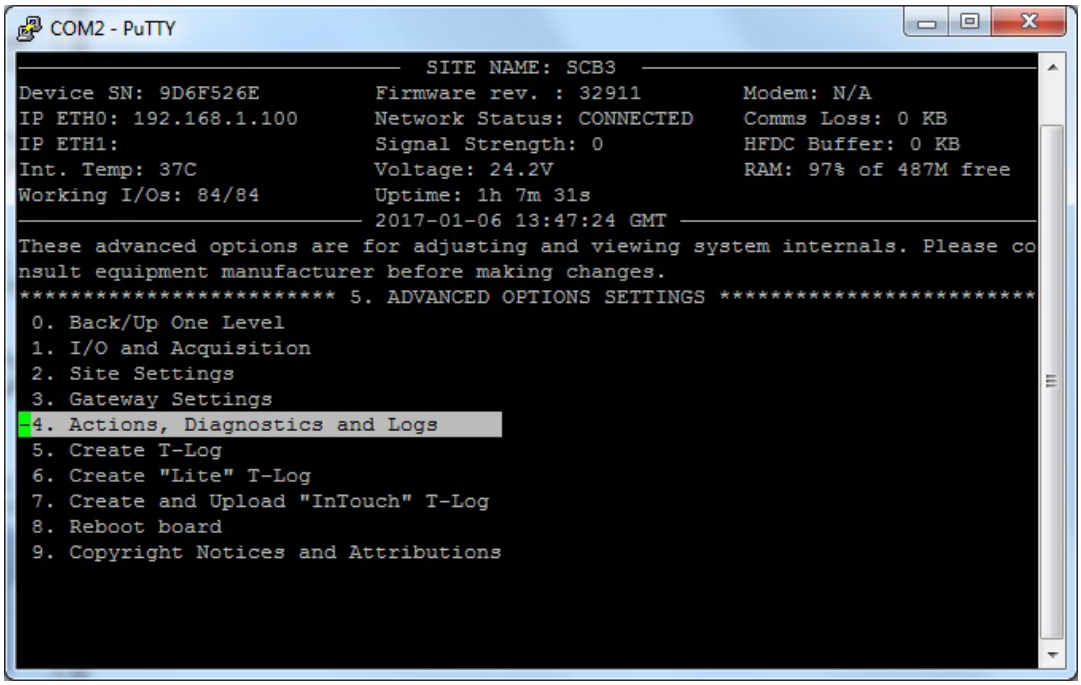


Figure 4-14: Actions, Diagnostics and Logs

To perform a factory reset, select **4. Factory Reset (including Network Settings)**.

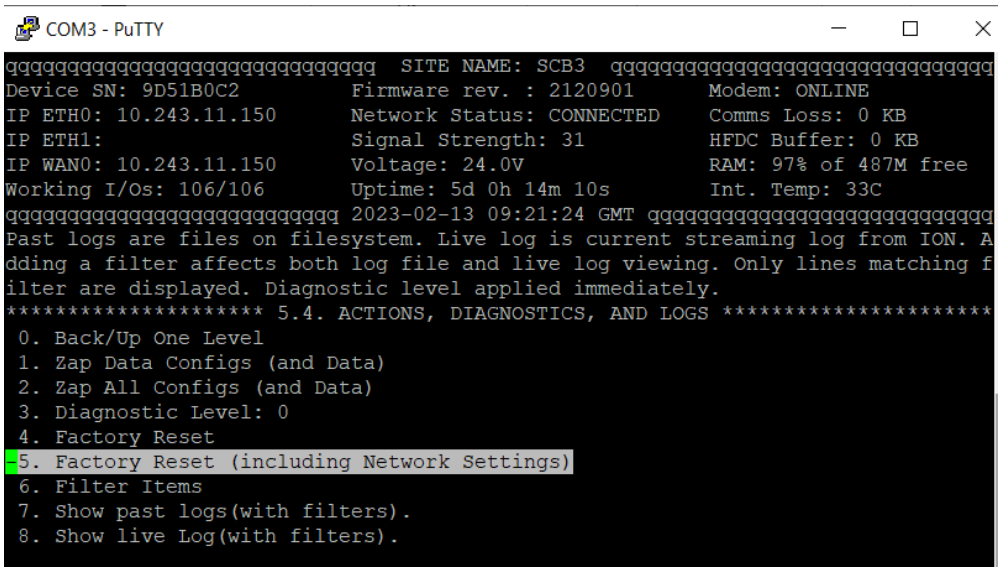


Figure 4-15: Factory Reset

When this option is selected, you must type the reason for the factory reset. Then press **Ente**r and the factory reset will take place. The gateway card will automatically reset, and the original configuration will be loaded upon reboot.

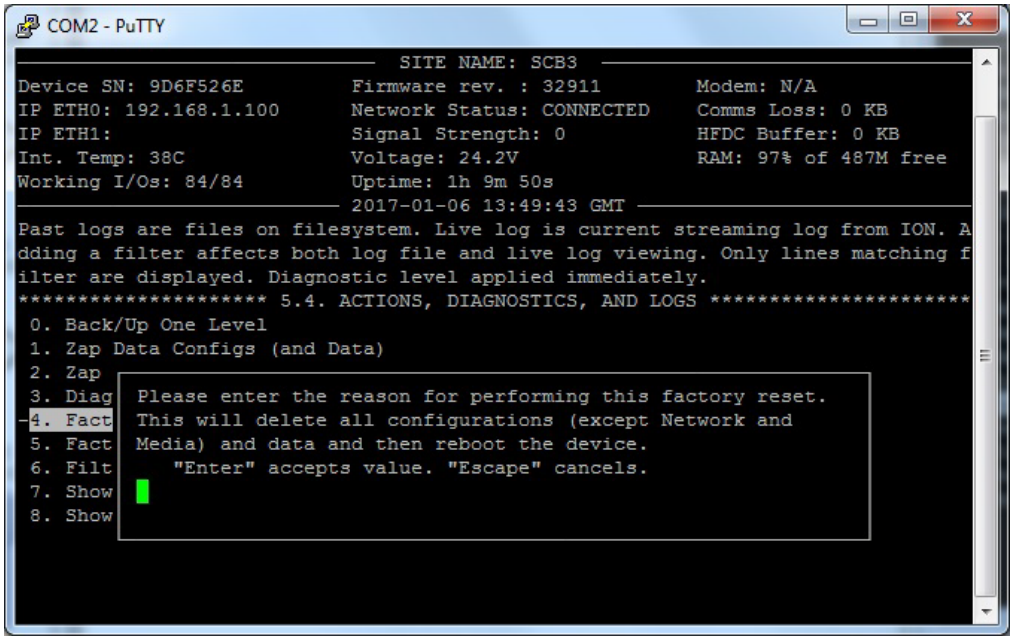


Figure 4-16: Factory Reset

4.3.3 REBOOT BOARD

The **Reboot board** option performs a card reset.

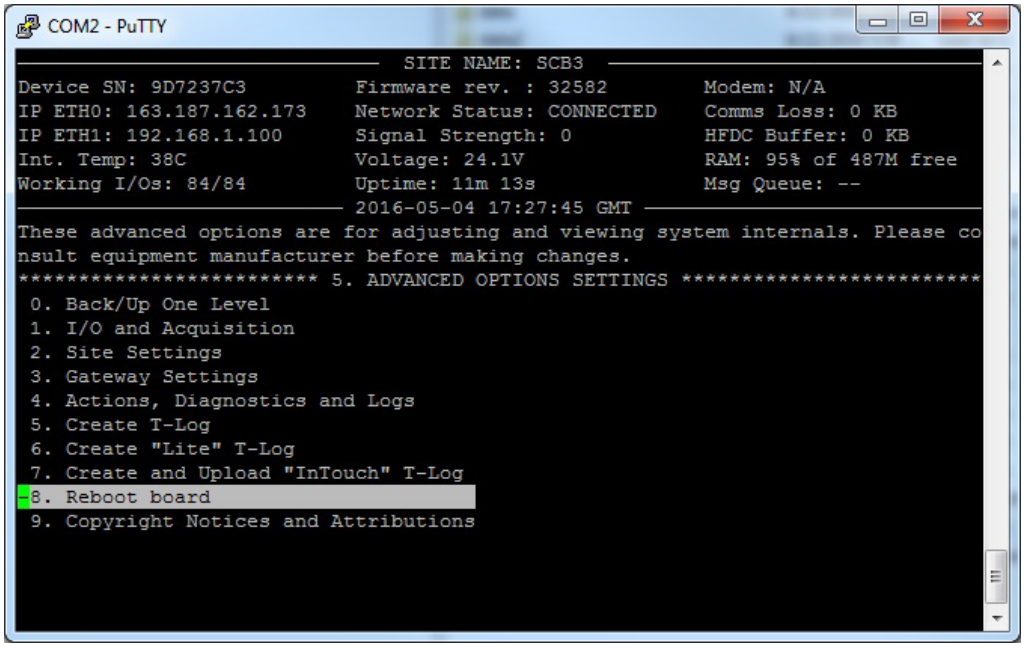


Figure 4-17: Reboot Board

4.4 UPGRADING THE INSTRUCT ESP GATEWAY CARD FIRMWARE

The following steps outline the process to manually upgrade the gateway card firmware. While the firmware may be remotely upgraded over the network, there may be occasions where the installer may perform a local upgrade.

1. Download the latest gateway card firmware (InTouch ID 6117586).
2. Move/copy the firmware to the USB flash drive formatted with the FAT32 file system (default).

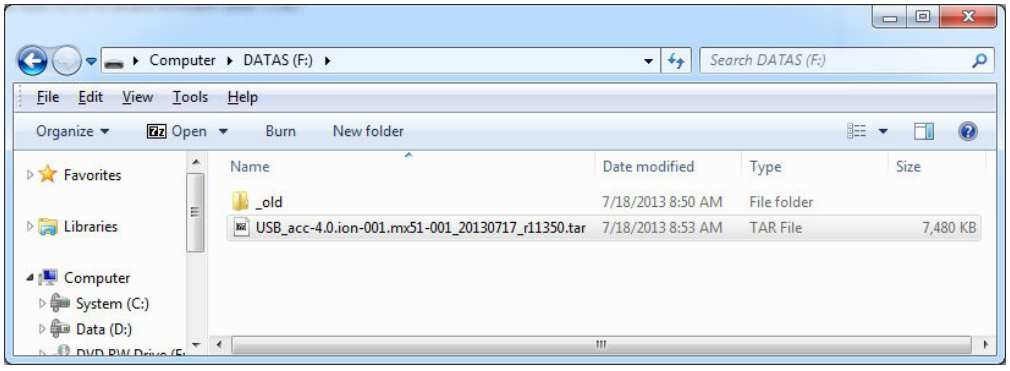


Figure 4-18: Copy Firmware

Note:

Make sure there is only one copy of the firmware (***.tar** file) on the USB flash drive.

3. Connect to the gateway card Engineering port (COM2), using the serial cable.

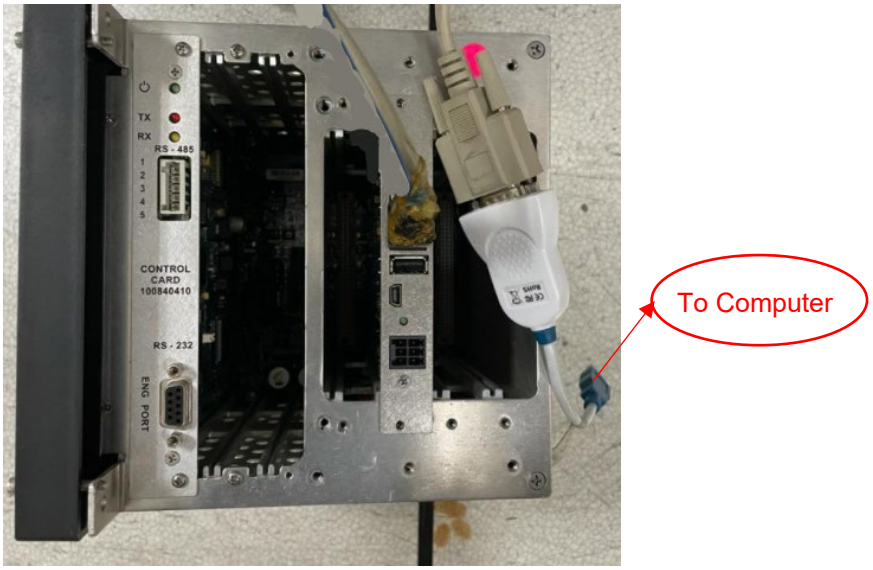


Figure 4-19: COM2 Connection

4. Open a terminal program (PuTTY is recommended) and connect to the gateway card, using serial port COMx with the COM port settings below:

   - Baud Rate: 38,400
   - Data Bits: 8
   - Stop Bits: 1
   - Parity: None

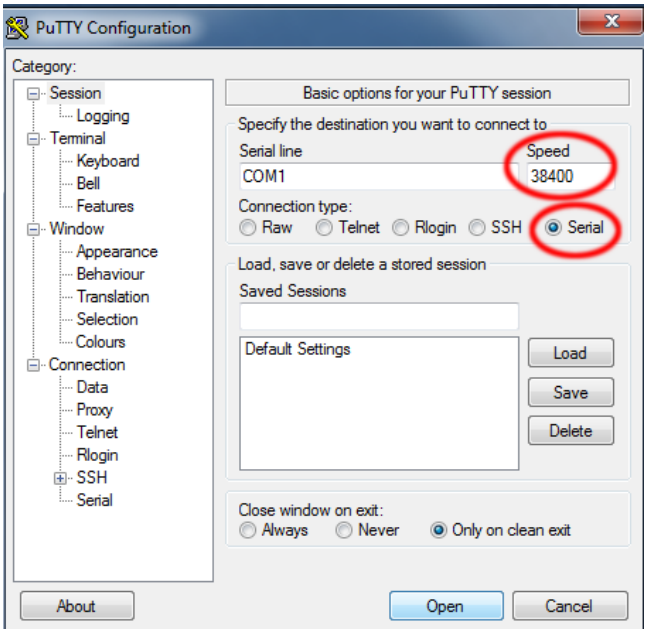


Figure 4-20: COM Port Setting

5. Power up the INSTRUCT ESP Intelligent Controller and wait for the system to fully boot up. Log in to the administrator interface using “admin” for both username and password.

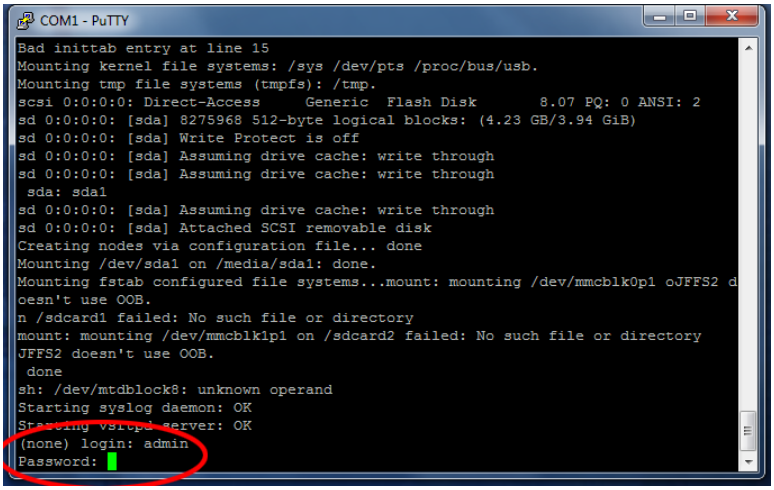


Figure 4-21: Log In

6. Check the existing firmware version.

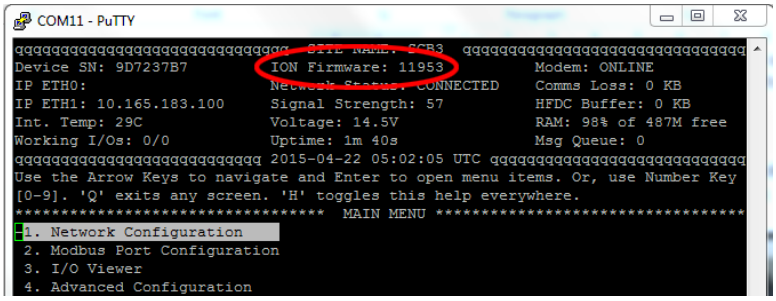


Figure 4-22: Check FW Version

7. Insert the USB flash drive into the USB port in the gateway card. Make sure the green LED light next to gateway card Engineering port and the USB flash drive shines with a steady light and is not blinking.

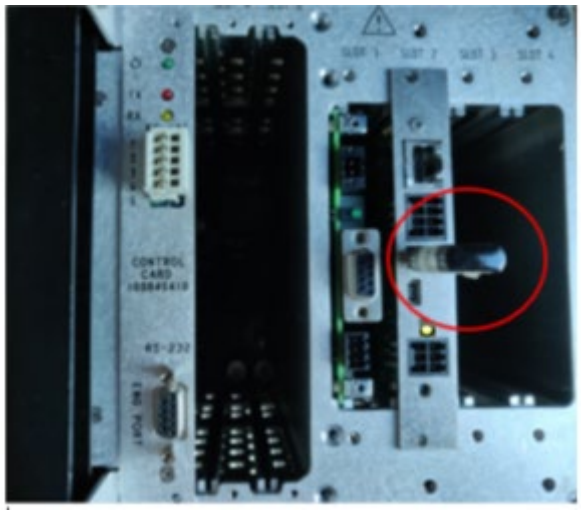


Figure 4-23: Plug in USB Flash Drive

Caution

Potential Severity: Light
Potential Loss: Assets
Hazard Category: Electrical, Machinery equipment hand tools

Do not type anything on the administrator interface during the upgrading process, or the autoboot process will stop. Wait until the login prompt returns.

8. Go to the administrator interface (i.e., PuTTY) and wait for the gateway card to reboot.

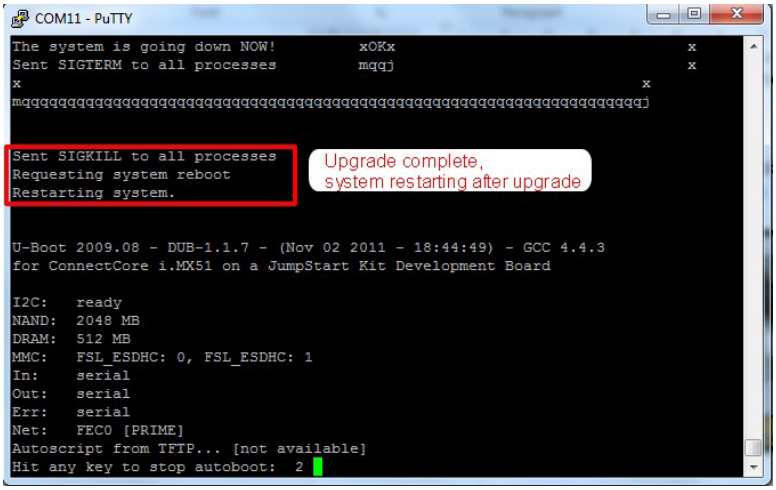


Figure 4-24: Upgrade Complete

9. Log in to the administrator interface using “admin” for both username and password.
10. Check the listed firmware version in the dashboard (top center). Make sure that the version number matches the gateway card firmware version 212xxxxxx. Refer to InTouch 6117586 for the latest firmware version.

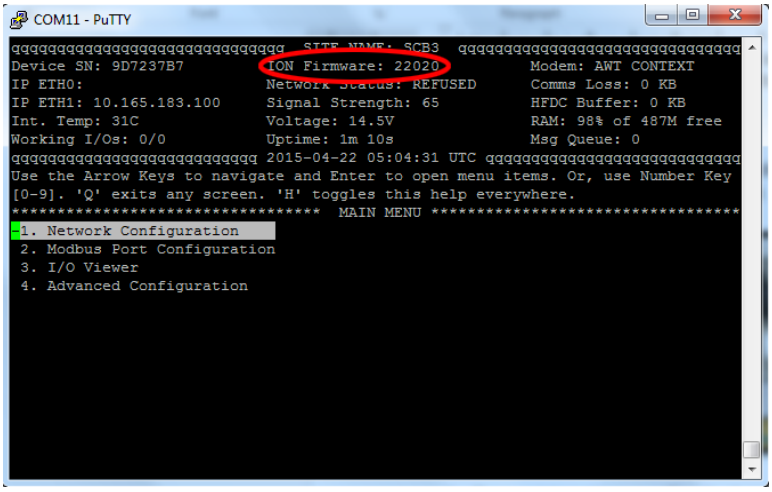


Figure 4-25: Check firmware version

Note:

The USB flash drive can be connected to the PC again and inspected for the presence of a “SUCESS” file.

USB flash drive

1) When the USB flash drive is plugged into the computer,.**ran** should appear at the end of the firmware file name. Example: **USB_acc-4_0_ion-001_mx51-001_20141013_r22020.tar.ran**.
2) If the firmware upgrade is successful, a new file called **UPGRADE_SUCCESS** and a new folder called **test_reports** are created. The **test_reports** folder stores the report generated during the production testing and is pulled out from the gateway card during the upgrading.
3) If the firmware upgrade fails, a new file called **UPGRADE_FAIL** and a new folder called **test_reports** are created.
4) If the USB flash drive will be used to upgrade the firmware for another gateway card, then:
   - Delete the **UPGRADE_SUCCESS** or **UPGRADE_FAIL** file and the **test_reports** folder on the USB flash drive.
   - Remove the **.ran** text from the firmware file name, for example: **USB_acc-4_0_ion-001_mx51-001_20141013_r22020.tar**.
5) Verify USB flash drive files before starting the firmware upgrade process for another gateway card.

Section 5: **Maintenance**

5.1 DEVICE MAINTENANCE

5.1.1 DEVICE CLEANING

Use only a damp cloth to clean the instrument to avoid static electricity.

5.1.2 DEVICE REPAIR

CAUTION!	There are no user-serviceable parts within this product. Any attempt to repair the device may invalidate the warranty.
ATTENTION!	*Il n'y a à l'intérieur aucun élément susceptible d'être changé ou modifié par l'utilisateur.* *Toute tentative de réparation de l'appareil peut invalider la garantie.*

5.2 DEVICE TROUBLESHOOTING

Please observe all safety warnings and precautions at the front of this handbook.

The following steps are intended to assist the installer in troubleshooting common hardware problems. Follow the steps in sequence until the problem is corrected. For advanced troubleshooting assistance please contact LiftControlSystems@sensiaglobal.com.

5.2.1 CAPTURING TROUBLESHOOTING LOGS (T-LOGS)

In the event of a site issue that requires external support from InTouch or Engineering, you may generate a Troubleshooting Log, or *T-Log*. The following steps outline the process needed to generate and retrieve a T-Log.

1. Insert a FAT32 formatted removable USB flash drive into the gateway card.
2. Connect to the gateway card Engineering port (COM2), open a terminal program (PuTTY is recommended) and log into the administrator interface using “admin” for username and password.

   Serial port settings are as follows:

   - Baud Rate: 38,400
   - Data Bits: 8
   - Stop Bits: 1
   - Parity: None

3. Select option **4. Advanced Configuration**.

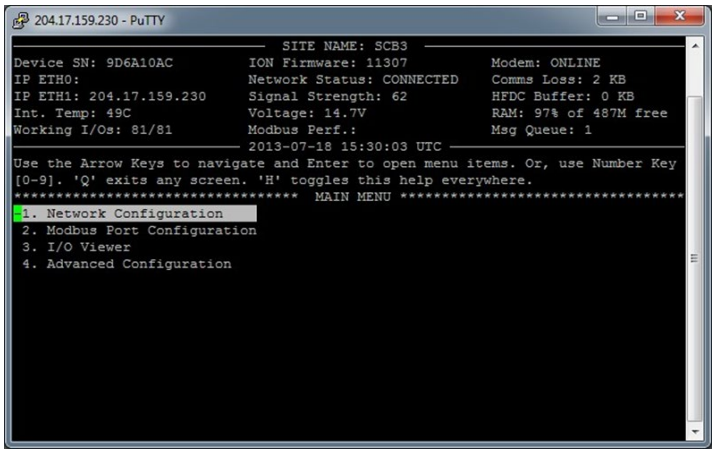


Figure 5-1: TUI Main Menu

4. Select option **4, Create Full T-Log**.

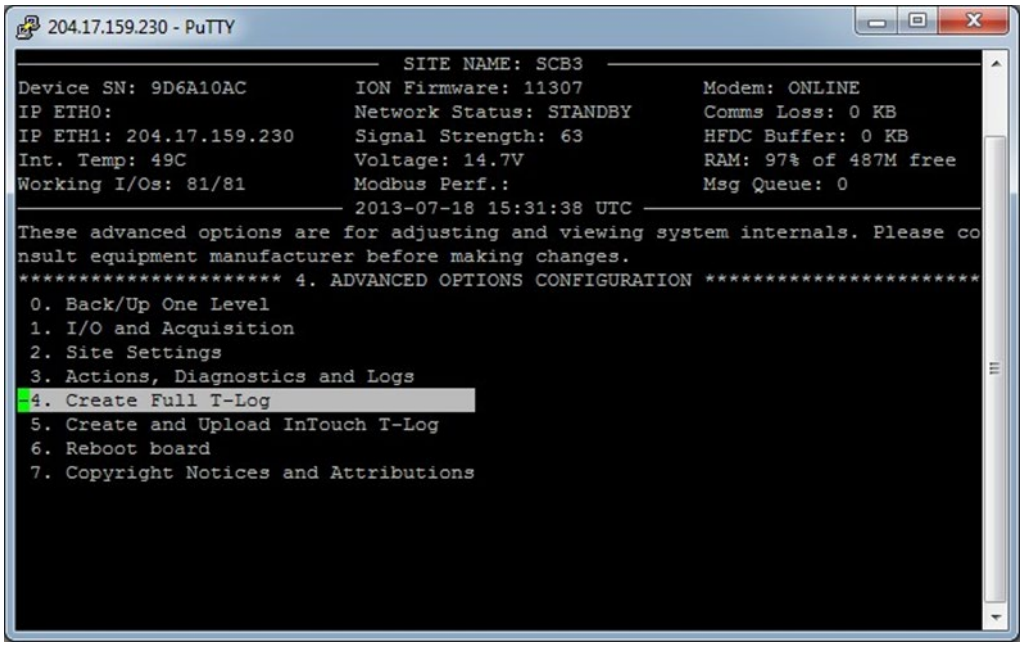


Figure 5-2: Create Full T-Log

5. Enter the reason for creating the T-Log.

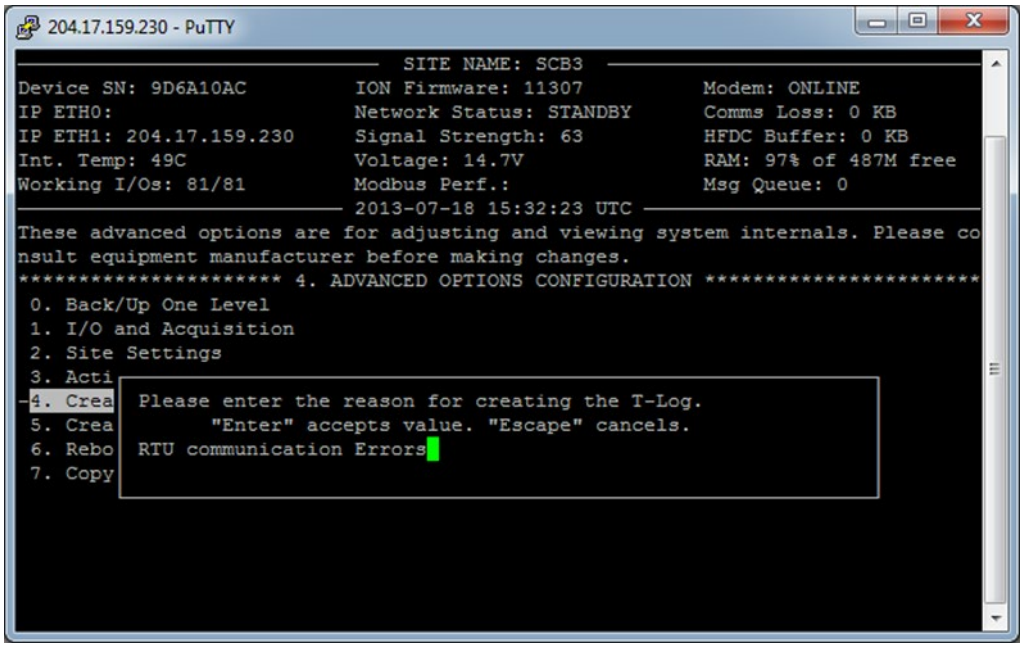


Figure 5-3: Entering a T-Log Reason

6. Select **1. Run!**.

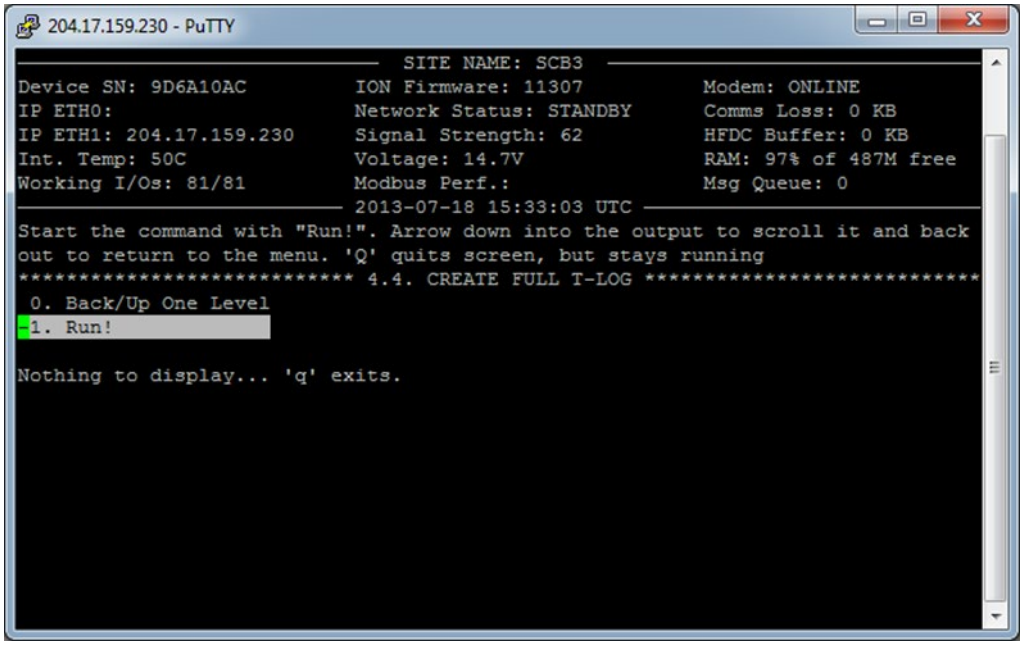


Figure 5-4: Running the T-Log

7. Wait until the unit provides confirmation that the T-Log action has been completed. This can take several minutes if there is a significant amount of log data to be collected.

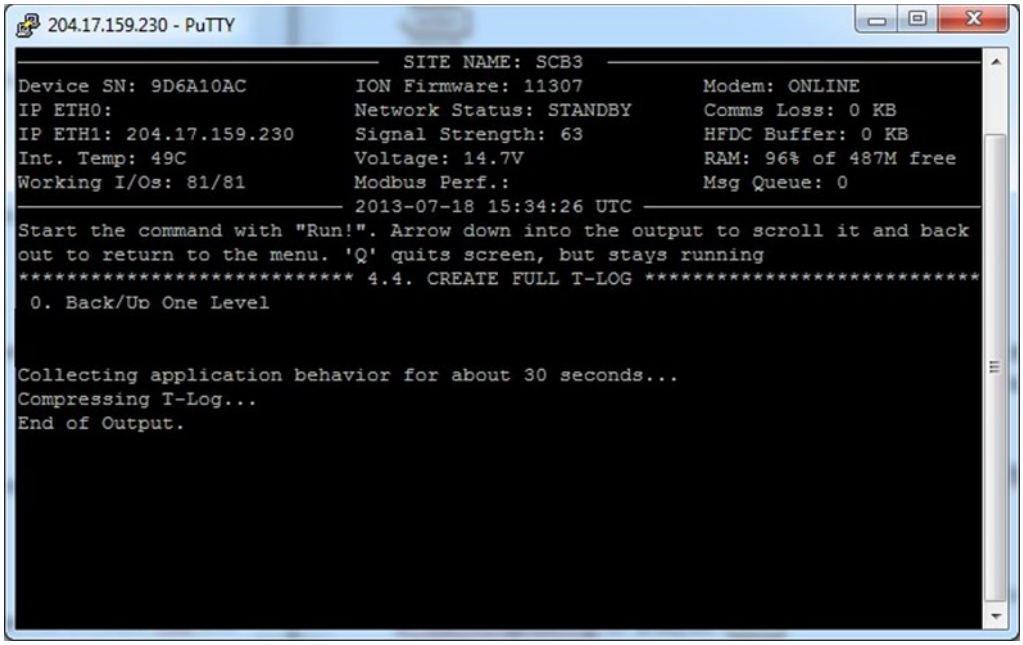


Figure 5-5: T-Log Complete

8. Once the T-Log process is complete, wait 20s and then remove the USB drive from the gateway card.
9. Connect the removable USB flash drive to a PC to retrieve the T-Log file and submit it to InTouch / Engineering for analysis.

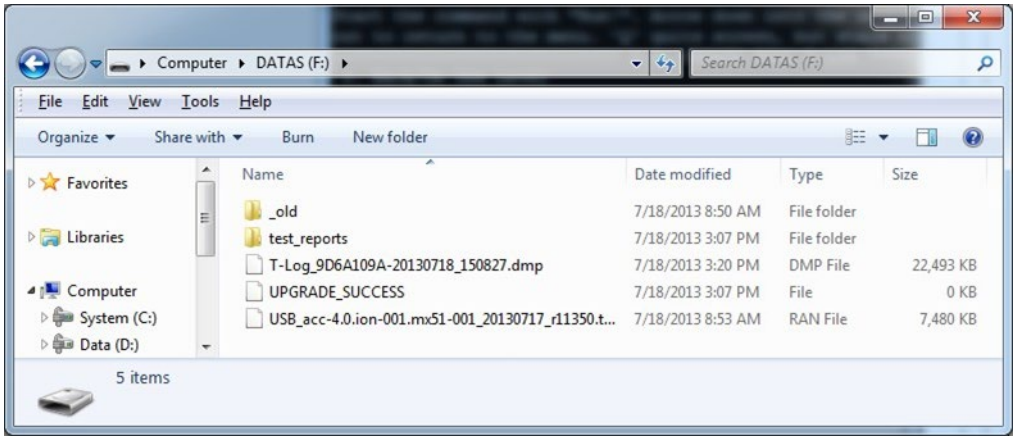


Figure 5-6: T-Log File Stored on Removable USB Flash Drive

5.2.2 SERIAL COMMUNICATION TROUBLESHOOTING

Tip

Most communication problems between the gateway card and the connected RTU devices (such as the INSTRUCT ESP Intelligent Controller) are due to incorrect/incomplete wiring or incorrect communication settings.

1. The gateway card and/or LiftIQ shows **No RTU** or **RTU Backoff** (no communication between the card and the connected RTUs).
   a. The gateway card is set to use the wrong COM port for Modbus communication.

To set the communication between the host controller and card, the COM3 with correct RS485 mode should be used. If RTUs other than host controller are connected, COM2 should be used.

b. The RS-485 wiring is incorrect.

   Make sure the (+) wires are connected to other (+) wires, and vice versa for (-). Recheck the wiring diagrams as per section.

c. Several devices have the same Modbus address.

   Each device on the Modbus network must have a unique Modbus address. Valid addresses are 1–247 inclusive.

d. The INSTRUCT ESP Intelligent Controller is incorrectly configured.

   Ensure the controller Port settings for the gateway card are set to the following:

   - Function: SCB
   - Access: FULL

   For other RTUs, using the cable not specifically designed for the communication application (RS-485) may result in intermittent communications, poor communication performance, or may prevent communication all together. Do not use a power cable or an untwisted cable for RS-485 applications.

e. Incorrect cable type for application

f. Electrical noise/interference

   Ensure communication cables are not routed along high-capacity power cables. Confirm the cable shield is correctly bonded to earth-ground at one end only.

g. Poor connections

   Check that each communication wire is securely fastened to its connection point. If this is an existing installation, check for signs of corrosion or mechanical cable damage caused by vibration.

h. Corroded terminals

   Corrosion can affect connectors. Check for signs of corrosion/rust and on connection points.

i. Protocol mismatch

   Confirm that all slave devices are configured for Modbus RTU protocol.

j. Baud rates (4800, 9600, 19200, 38400, 57600) on all devices do not match.

k. The data bits (8) on all devices do not match.

   Confirm that all devices are using the same number of data bits specified by the gateway card COM Port configuration.

l. The stop bits (1, 2) on all devices do not match.

   Confirm that all devices are using the same number of stop bits specified by the gateway card COM Port configuration.

m. The parity (Even, Odd, None) on all devices does not match. Confirm that all devices are using the same parity setting as specified by the gateway card COM Port configuration.

2. The gateway card is receiving valid Modbus responses with strange or unexpected numbers. The number format of the connected device is not set, the connected device responds with unsigned integer numbers, or the number format does not match the format the gateway card is expecting.

   Confirm that the device is set to output unsigned integer numbers unless otherwise specified by the GDN List template. This is a common issue on the Schlumberger Phoenix ISP panel, typically caused by connecting to the panel with PumpView software. PumpView will reset the ISP data type to an IEEE floating point.

3. The well cannot be started via the LiftIQ interface. The RTU is set for READ ONLY access. Confirm that the problematic device has FULL or READ/WRITE access through the Modbus serial port connected to the gateway card.
4. Setpoints and values cannot be changed via the LiftIQ interface. The RTU is set for READ ONLY access. Confirm that the problematic device has FULL or READ/WRITE access through the Modbus serial port connected to the gateway card.

For further information on Modbus serial communication troubleshooting, please refer to InTouch Content ID 4201401.

5.3 SERVICE

5.3.1 RECOMMENDED SPARES

When requesting assistance or spare parts, please provide the instrument model and serial numbers to ensure that the correct options are supplied.

5.3.2 REPACKING FOR SHIPMENT

When shipping the device to Sensia for service or repair, we recommend the box-in-box technique. Place the instrument in all its original packaging, and then place this box inside a strong outer box, with about 60 to 100 mm internal cushioning material, closed and sealed by H-taping with pressure sensitive tape.

If the original packaging is not available, pack the module in electrostatic discharge (ESD) shielding packaging, and then place it into static-free (low charging) packaging materials to avoid additional damage to your device.

Appendix A: **Parts, Spares, Tools, and Supplies**

A.1 Ordering Part Numbers

Part Number	Description
103381133	INSTRUCT ESP Gateway card
50370539	INSTRUCT ESP Gateway Cellular Modem Kit (Global)

Appendix B: **Terminal Emulators**

A terminal emulator is required to interact with the gateway card firmware and perform the initial configuration and setup of the card. The Text User Interface was specifically designed to be flexible and agnostic to the terminal emulation program used, so users may experiment with terminal emulators until they find one they prefer. Some programs are more stable and feature-filled than others. Below are some recommended terminal application options.

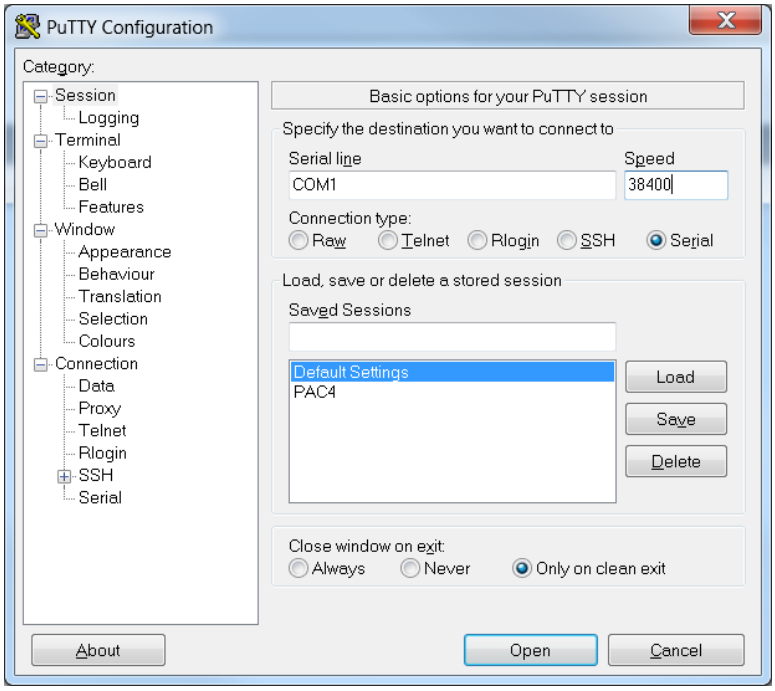
PuTTY

PuTTY is a free application available for Windows and Unix platforms. It may be downloaded from: http://www.chiark.greenend.org.uk/~sgtatham/PuTTY/. While it is not the most attractive or user-friendly application, it is the most stable and robust option for interacting with the gateway card.

Setting up Serial Communications

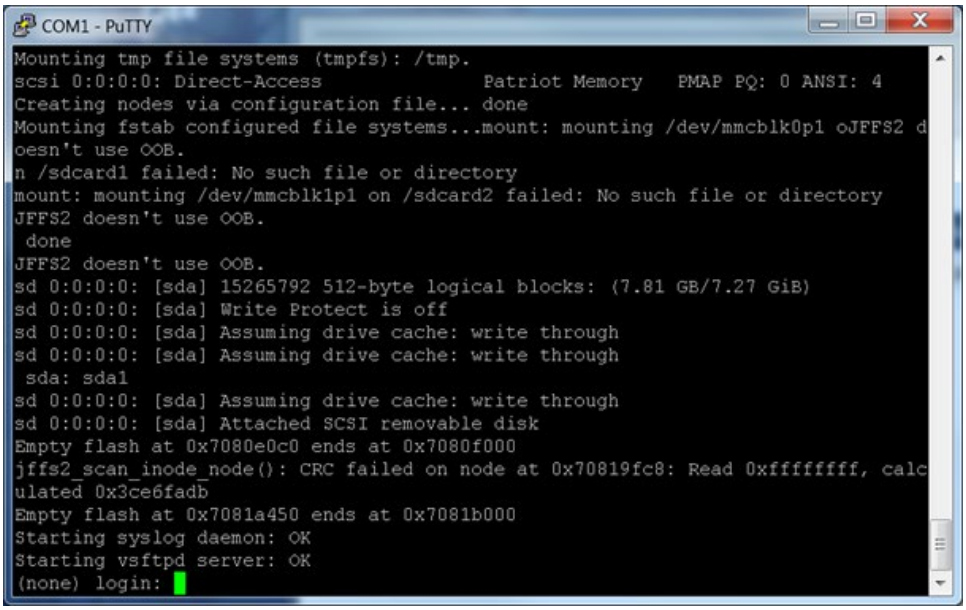
To set up PuTTY serial communications for Windows 7 through 10 systems, follow these steps:

1. Download a terminal program. Refer to the PuTTY documentation for details on setup and operation: http://www.chiark.greenend.org.uk/~sgtatham/PuTTY/download.html.
2. Open the program.
3. Set up PuTTY configuration for Serial connection type.



PuTTY Configuration

4. Click **Open** to log into the terminal.



TUI Login

Appendix C: **References**

Manual, INSTRUCT ESP Intelligent Controller (InTouch ID 6128576): Refer to *INSTRUCT ESP Intelligent Controller User Manual* for controller related installation and troubleshooting.

Appendix D: **INSTRUCT ESP Gateway Card Support Resources**

PRODUCT DOCUMENTATION

This manual is the main product documentation for the INSTRUCT ESP Gateway card.

GUIDES AND RELEASE NOTES

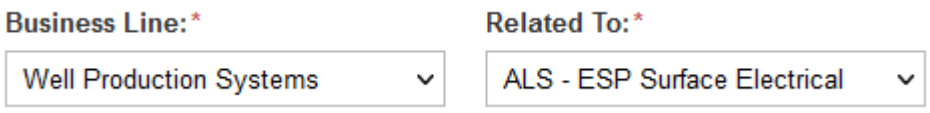
General guides, best practices, technical alerts, firmware, and software release notes are available at InTouch 7745571 reference page.

TECHNICAL SUPPORT

You can reach us via the Lift Control Systems Custom Service email:

liftcontrolsystems@sensiaglobal.com

- For Schlumberger customers, an InTouch ticket should be raised to Well Production System – ALS-ESP Surface Electrical helpdesk.



HOW TO REACH US

You can find more information about Sensia and about the INSTRUCT ESP Gateway Card information here:

Sensia Home Page:	https://www.sensiaglobal.com/
Sensia Lift Control Solutions Page:	https://www.sensiaglobal.com/Sensia-Lift-Control-Systems
Contact Us:	https://www.sensiaglobal.com/Contact