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Rockwell Automation + Schlumberger

Lift Control Systems

INSTRUCT LIFT CONTROL SYSTEMS

INSTRUCT ESP Modbus TCP/IP Communications Card

Installation, Operation & Maintenance Manual

MODEL: 100419643

Manual No. LCS-ENG-M0011 (InTouch ref # 6470145), Rev. 01

INTELLIGENT ACTION

Publisher Notes

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REVISION HISTORY

REVISION:	DESCRIPTION OF CHANGE:	ISSUER:	DATE:
1	Initial release under Sensia	Lift Control Systems	11-Jun-2022

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.

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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 is 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 Modbus TCP/IP Communications Card manages Modbus TCP/IP communication between the TCP/IP network and the acquisition unit. It communicates using the Modbus TCP/IP protocol, allowing access to Modbus SCADA systems via existing TCP/IP networks.

1.2 FEATURES AND BENEFITS

- Compatible with Sensia's INSTRUCT ESP Intelligent Controller, legacy controllers (such as UniConn and others) and Schlumberger's acquisition systems (for example, ARConn)
- Compatible with standard Modbus TCP/IP protocol
- Enables to access system parameters for third-party Modbus SCADA systems

1.3 APPLICATIONS

- Connection to a local TCP/IP network
- Communication with third-party SCADA systems using TCP/IP protocol

1.4 LIMITATIONS

- Only compatible with TCP/IP protocol, not compatible with Ethernet/IP protocol or other IP protocols
- Additional hardware (Modbus protocol converter) required to communicate with other IP protocols

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INSTRUCT is a mark of Sensia*.

Section 2: **QHSE**

2.1 OVERVIEW

Note:

It is the operator's responsibility to ensure that all personnel working with or near the equipment are aware of the risks involved. Failure to heed precautions provided in this manual can result in serious or possibly even fatal injury to personnel, and/or damage to the products or to the related equipment and systems.

Caution

Potential Severity: Light

Potential Loss: Assets

Hazard Category: Electrical

Using this product in a manner not specified by the manufacturer could result in protection impairment.

Note:

Only qualified personnel are eligible to install equipment described in this manual, paying special attention to warning notes located throughout the manual.

Danger

Potential Severity:	Major
Potential Loss:	Environmental
Hazard Category:	Electrical, Machinery equipment hand tools, Toxic corrosive hazardous substances

All field users should use their local electrical standards, technical guidelines, and laws unless Sensia's standards are more stringent in which case they should be used.

Note:

Qualified personnel are people entrusted by their employer with installation, assembly, commissioning, and operation of the equipment within the intent and constraints of the operating instructions in this manual and the warning information on the equipment itself. Qualified personnel must have the following minimum training and qualifications:

- Special training in electrical equipment, in accordance with the standards of safety engineering
- Hydrostatic pressure testing mandatory training as required
- CPR training
- First aid training
- Personal protective equipment (PPE) training
- Fire safety training

Note:

For reasons of clarity, these operating instructions do not contain all details of all types of equipment and cannot take into account for every conceivable installation, operation, or maintenance circumstance. Consult technical support (Appendix D: Support Resources) if further information is required or if problems occur that are not adequately detailed in the operating instructions. The contents of this instruction manual shall not become part of, or modify any prior or existing agreement, commitment, or legal relationship.

2.2 DANGER TO PERSONNEL

Potential Severity:	Catastrophic
Potential Loss:	Assets, Environmental, Personnel
Hazard Category:	Electrical, Explosives

This product is not suitable for operation in hazardous locations or areas with an explosive atmosphere.

Potential Severity:	Serious
Potential Loss:	Personnel
Hazard Category:	Electrical

Lethal voltages are present when equipment is running. Do not open panels or remove protective coverings until equipment is powered down.

The following precautions should be followed by qualified personnel when working on or around a unit.

- Never work alone on equipment that has power applied to it. Be sure someone is nearby to give assistance in case of an accident.
- Ensure lock-out, tag-out (LOTO) procedures are used whenever possible.
- Beware of defective equipment. If equipment components or connections look loose, corroded, or damaged in any way, do not operate. Contact technical support (Appendix D:Support Resources) for further action.
- Ensure that power to the system is OFF when connecting or disconnecting equipment.
- The power terminals and control terminals may carry a voltage even when the connected equipment is not active.
- Non-observance of warning notices can result in death, severe personal injury, or considerable property damage.

2.3 DANGER TO ENVIRONMENT

Potential Severity:	Light

Potential Loss: Assets, Environmental

Hazard Category: Machinery equipment hand tools

Failure to observe the following precautions may result in damage to the environment.

The following information pertains to the safe disposal of the equipment manufactured by Sensia in accordance with environmental standards. Operators are required to follow safe disposal methods.

2.3.1 CIRCUIT BOARDS

Circuit boards require additional disposal care. Circuit boards require disposal, and in some cases, recycling by an approved waste vendor. Refer to local law and the law of the manufacturing country for details.

Note:

Check with local environmental law and Sensia HSE advisor for specific procedures for disposal of above-mentioned component.

The circuit boards used in this equipment may contain lead solder and solder paste. The boards should be disposed of according to local regulations.

Section 3: **Specifications**

Table 3-1: INSTRUCT ESP Modbus TCP/IP Communications Card Specifications

Dimensions	Card	PCB Size: 3.937 in (100 mm) x 6.299 in (160mm) Eurocard 3U compliant (IEC 60297-3)
	Faceplate	5.100 in (129.5 mm) x 0.780 in (19.8 mm)
Shipping Weight		0.28 lb (0.13 kg)
Power Supply		24 volts DC ±10%, 27 mA, 0.65 W
Temperature	Operating	-40 degF (-40 degC) to 185 degF (+85 degC)
	Storage	-40 degF (-40 degC) to 185 degF (+85 degC)
Protocol	TCP/IP	Transmission Control Protocol (TCP) in accordance to standard RFC 793. Internet Protocol (IP) in accordance to standard RFC 791.
Interface	Ethernet	Ethernet: Version 2.0 / IEEE 802.3
Engineering Port	RS232	RS232 (DCE) Conforms to EIA RS-232 standard
CE Certification		CE compliant [1]

[1] *Must be installed in CE compliant controller or acquisition unit.*

Section 4: **Theory of Operation**

The INSTRUCT ESP Modbus TCP/IP Communications Card is designed to connect to Ethernet-based TCP/IP networks using standard Internet Protocol (IP) addressing. The end device must be capable of decoding Modbus. The IP address can be manually configured or left as default for one-to-one connections. The Ethernet communication interface is isolated for enhanced noise immunity.

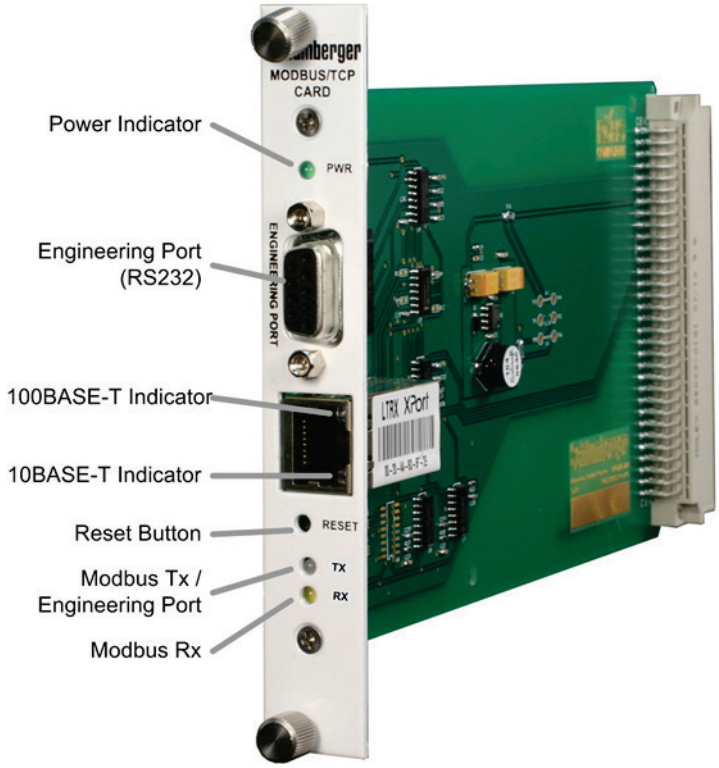


Figure 4-1: INSTRUCT ESP Modbus TCP/IP Communications Card

Table 4-1: Faceplate I/O and Indicators

Item	Description	
Engineering Port	This is used primarily to configure the Ethernet interface module with an IP address. Additional module configuration and diagnostics can also be performed.	
100BASE-T Indicator	The Ethernet interface has detected a 100 Mb/s (Megabits per second) link	
	Ethernet Status LED	**Status**
	Off	System is Off
	Solid Amber	Half duplex link detected
	Blinking Amber	Half duplex link with data activity
	Solid Green	Full duplex link detected
	Blinking Green	Full duplex with data activity

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td rowspan="6">10BASE-T Indicator</td><td colspan="2">The Ethernet interface has detected a 10 MB/s (Mega Bits per second) link</td></tr>
<tr><td>Ethernet Status LED</td><td>Status</td></tr>
<tr><td>Off</td><td>System is Off</td></tr>
<tr><td>Solid Amber</td><td>Half duplex link detected</td></tr>
<tr><td>Blinking Amber</td><td>Half duplex link with data activity</td></tr>
<tr><td>Solid Green</td><td>Full duplex link detected</td></tr>
<tr><td>Blinking Green</td><td>Full duplex with data activity</td></tr>
<tr><td>Reset Button</td><td colspan="2">Reset the Ethernet module or place it into configuration mode</td></tr>
<tr><td rowspan="5">Modbus Tx / Engineering Port</td><td colspan="2">Modbus Tx indicator. This indicates the Modbus data transmitted before the data has been 'wrapped' into the TCP/IP packet</td></tr>
<tr><td>Serial Communication Status LEDs</td><td>Status</td></tr>
<tr><td>Blinking Green</td><td>Indicates Modbus data is entering the Ethernet module.</td></tr>
<tr><td>Blinking Red</td><td>Indicates data activity on the Engineering port. This should only be active during configuration.</td></tr>
<tr><td>Blinking Red / Green</td><td>Indicates Engineering port and Modbus data activity occurring at the same time.
User potentially trying to program card without disabling the back port communication of the controller.</td></tr>
<tr><td rowspan="2">Modbus Rx</td><td>Serial Communication Status LEDs</td><td>Status</td></tr>
<tr><td>Blinking Yellow</td><td>Modbus Rx indicator. Indicates data received on the Modbus side.</td></tr>
</table>

The Modbus protocol is encapsulated within the TCP/IP protocol. The INSTRUCT ESP Modbus TCP/IP Communications Card functions by taking a standard Modbus data packet from the backplane, wraps the packet inside a TCP/IP packet, and sends the packet onto the network cloud. The TCP/IP packet contains a destination address which routes it through the network to the receiving Modbus TCP/IP device. See Figure 4-2: Modbus TCP/IP Data Path.

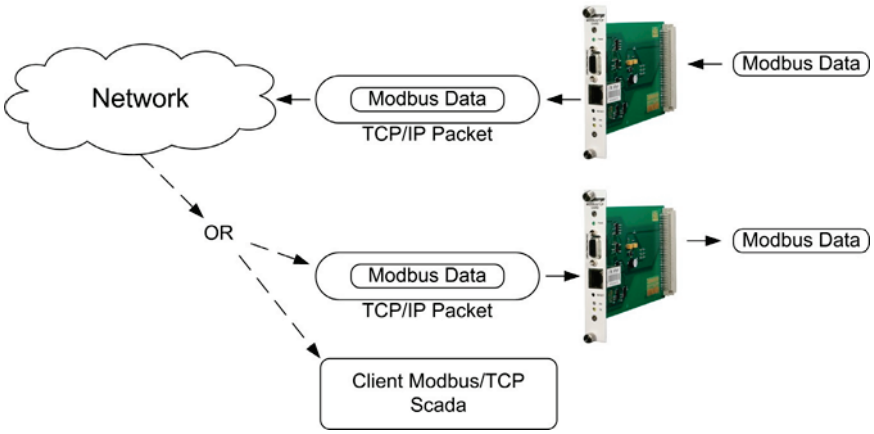


Figure 4-2: Modbus TCP/IP Data Path

Note

The Ethernet module is connected to the backplane for Modbus data and connected to the Engineering port for configuration. These ports cannot be used simultaneously. The Modbus data interface on the host system must be disabled prior to using the Engineering port.

Section 5: **Installation**

5.1 INSTALL THE MODBUS TCP/IP CARD

Potential Severity: Light

Potential Loss: Assets

Hazard Category: Electrical

The card is not hot-swappable. Power to the card must be turned off prior to insertion of the card into an expansion card slot. Failure to do so could result in equipment damage to either the card or the controller.

1. Turn off the power to the controller or acquisition system.
2. Remove the cover plate or existing card from the expansion slot, if applicable.
3. Insert the card in the slot and make sure the faceplate labels appear right side up. Rails inside the expansion card chassis ensure that the card connector will line up and mate with the socket.

Potential Severity: Light

Potential Loss: Assets

Hazard Category: Machinery equipment hand tools

The card should never be forcefully pushed in. If an alignment issue does not allow the card to properly mate, the card should be retracted and slowly pushed into the socket.

4. Tighten the thumbscrews to ensure a good connection to the socket. Alternate tightening of the thumbscrews to ensure a flush fit.
5. To complete the front plate connection, consider these guidelines:
   - The 8P8C modular connector (“RJ45”) connection on the front plate can be connected to a network hub, switch, or router using a standard Ethernet cable.
   - For connection to the Engineering port, a standard male to female RS-232 serial cable is required.

To remove the card from the system:

1. Turn off the power to the controller or acquisition system.
2. Unscrew the thumbscrews.
3. Slowly pull on both thumbscrews simultaneously until the card is freed from the socket connection.

5.2 WIRING CONNECTION

The card has two connections on the front plate:

- RJ45 connection (standard Ethernet connection): Used to connect to TCP/IP networks. The end device must be capable of decoding Modbus.
- Engineering port (standard RS-232): Used to configure the Ethernet interface IP address

Note:

These connections cannot be used simultaneously. The Modbus data interface on the host system must be disabled prior to using the Engineering port.

Section 6: **Configuration**

6.1 OVERVIEW

The INSTRUCT ESP Modbus TCP/IP Communications Card has been pre-configured at the factory for default Modbus and TCP/IP parameters. While the Modbus default parameters will work with most controller configurations, the TCP/IP settings will need to be specifically configured for installation on a live TCP/IP network. See section 6.2 IP Address for details.

6.2 IP ADDRESS

The INSTRUCT ESP Modbus TCP/IP Communications Card is factory pre-configured for the IP address of:

- 192.168.0.1

A personal computer (PC) with a terminal program (such as HyperTerminal) is required to configure the card.

> **Note**
>
> Ensure the communications interface to the host device (on the backplane) has this connection disabled prior to starting configuration. In a controller or acquisition, this can be done by disabling the card slot that contains the Modbus TCP/IP card.

6.2.1 CONNECTING TO SERIAL CONSOLE APPLICATION

Configuring the controller to use the Modbus TCP/IP card with specific operation parameters such as baud rate, data bits, and parity may be done in one of two ways — either directly on the controller or by way of the StarView* Wellsite display software. Prior to configuring the controller, it is necessary to check and/or set the Modbus TCP/IP card settings.

1. Once the Modbus TCP/IP card is inserted into the controller and the controller is powered on, connect a serial cable between a PC and the Modbus TCP/IP card RS-232 Engineering port.
2. Start a serial console application such as PuTTY or HyperTerminal using the following settings:
   - Baud: 9600
   - Format: 8, N, 1, No Parity
   - Flow Control: None

StarView is a mark of Sensia*.

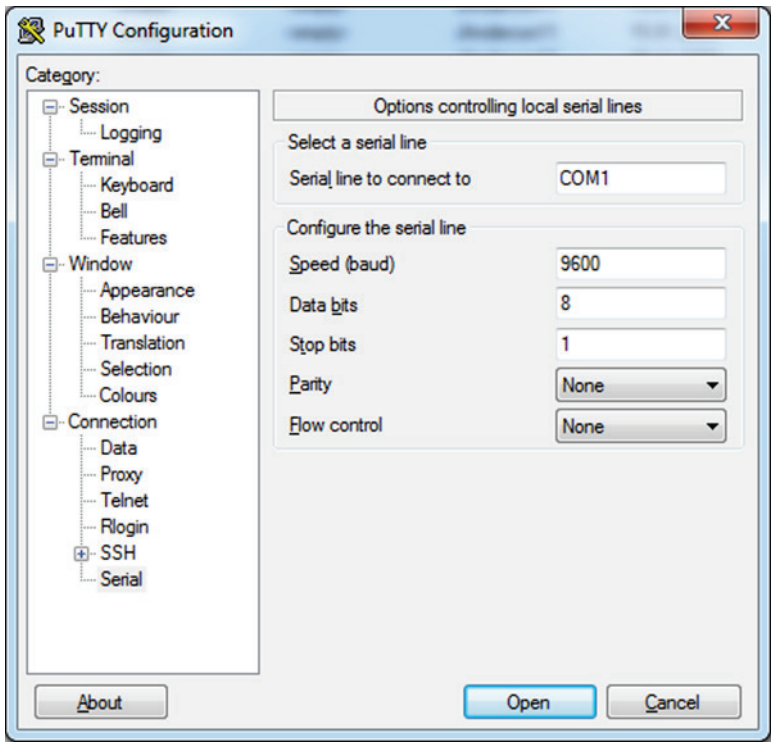


Figure 6-1: PuTTY Settings for Modbus TCP/IP Engineering Port Communication

3. Hold the **x** key on the PC keyboard and hit the reset button on the Modbus TCP/IP card.
4. While continuing to hold the **x** key, release the reset button. The Modbus TCP/IP card should now boot into configuration mode. Press **Enter** to go into Setup Mode.
5. Make note of the Serial and Mode Settings.

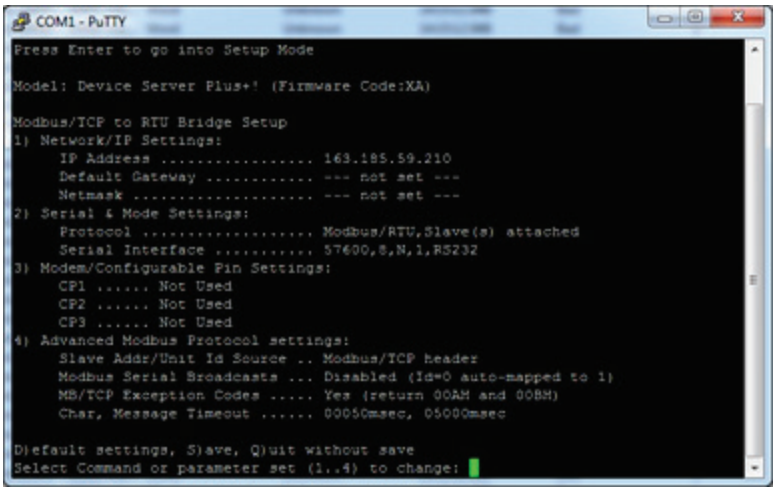


Figure 6-2: Modbus TCP/IP Setup Mode — Accessed via Serial Connection with Engineering Port

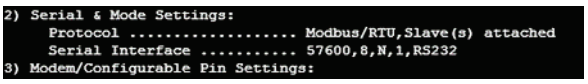


Figure 6-3: Modbus TCP/IP Card Serial & Mode Settings

6.2.2 CONNECTING TO CARD

1. Connect the PC to the Engineering port of the Modbus TCP/IP card.
2. Prepare the terminal program for an interface of:
   - 9600 baud
   - 8 bits, No parity, One stop bit (8,N,1)
   - Flow control = none
3. Reset the TCP/IP card by inserting a pin into the RESET hole on the faceplate.
4. Immediately after the RESET, press and hold the **x** key until the TCP/IP card displays the message shown in Figure 6-4.

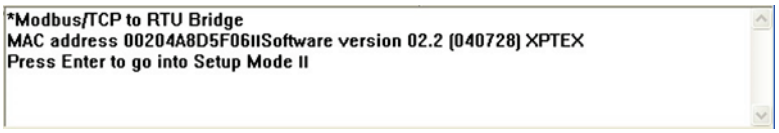


Figure 6-4: TCP/IP Card Terminal Prompt

5. Press the **Enter** key to continue and the menu will appear as shown in Figure 6-5.

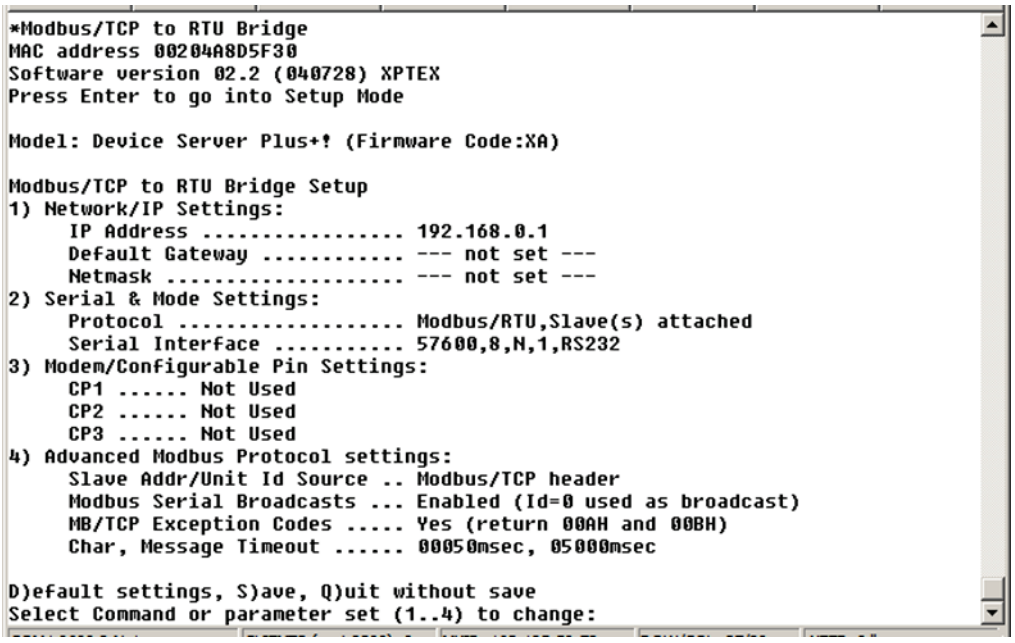


Figure 6-5: TCP/IP Card Terminal Menu

6.2.3 CHANGING IP ADDRESS

To change the IP Address, IP Gateway, and Netmask, follow the steps below. The IP Address, IP Gateway, and Netmask static values are dictated by the network to which the connection is made. Please check with IT in order to obtain appropriate values.

1. Input 1 to change the IP Address, IP Gateway, and Netmask.
2. Input the first number *A* of the address A.B.C.D. The number must be between 0 and 255. Press **Enter.**
3. Input the second number *B* of the address A.B.C.D. The number must be between 0 and 255. Press **Enter**.
4. Input the third number *C* of the address A.B.C.D. The number must be between 0 and 255. Press **Enter**.

5. Input the fourth number *D* of the address A.B.C.D. The number must be between 0 and 255. Press **Enter**.
6. If a Gateway Address is required, input Y and follow steps 2 through 5 to input the Gateway Address.
7. If a Netmask is required, input Y and follow steps 2 through 5 to input the Gateway Address.
8. If configuration via Telnet is desired, input Y to change the Telnet password. Enter the new password when prompted.

6.2.4 VERIFYING CARD SETTING

Once the IP information is configured, ensure that the appropriate **Protocol** and **Serial Interface** settings are selected. See option 2, **Serial and Mode Settings**.

The **Protocol** should be set to **Modbus/RTU,Slave(s) attached** and the **Serial Interface** settings will be dictated by the backplane of the controller into which the card is inserted.

Option 3, **Modem/Configurable Pin Settings,** and option 4, **Advanced Modbus Protocol settings,** should be changed only when required by installation conditions.

Tip

Ensure parameters are saved prior to disconnecting. Input S to save or Q to discard edits and quit without saving.

6.2.5 CONFIGURING TCP/IP ADDRESS

6.2.5.1 Configure TCP/IP Address for Local Area Network

To configure the Modbus TCP/IP card for connection to a local area network (LAN), the following are required:

- a valid TCP/IP address
- a valid Gateway address
- a valid Netmask
- an RJ45 Ethernet network cable

6.2.5.2 Configure TCP/IP Address for Direct Computer Connection

To configure the Modbus TCP/IP card for a direct connection to a computer, the following are required:

- a valid TCP/IP address. Typically 192.168.0.*X* where *X* can be any number between 2 and 255
- a valid Gateway address. Typically 192.168.0.1
- a valid Netmask. Typically 255.255.255.0
- an RJ45 Ethernet crossover network cable

Note:

Some computers are capable of auto-switching and thus a RJ45 Ethernet crossover cable may not be required.

6.3 INSTRUCT ESP INTELLIGENT CONTROLLER

Configuring the INSTRUCT ESP Intelligent Controller to use the Modbus TCP/IP card with specific operation parameters such as baud rate, data bits, and parity may be done in one of two ways — either directly on the controller or by way of the StarView Wellsite display software.

6.3.1 CONFIGURING THE CONTROLLER DIRECTLY

Note

Prior to configuring the INSTRUCT Controller it is necessary to check and/or set the Modbus TCP/IP card settings, using a terminal program.

1. Insert the card into the controller and power on the controller.
2. Connect a serial cable between the PC and the card RS-232 Engineering port.
3. Start a serial console application, using the following settings:
   - Baud: 9600
   - Format: 8, N, 1, No Parity
   - Flow Control: None
4. Hold the **x** key on the PC keyboard and hit the reset button on the Modbus TCP/IP card.
5. While holding the **x** key, release the reset button. The card should boot into configuration mode. Press **Enter** to go into Setup Mode.
6. Make note of the Serial and Mode Settings.

1. Press the **Home** button on the keypad.
2. Press the **Menu** button on the keypad to bring up the top-level menu.
3. Select the **Controller** menu item using either the numeric keypad or the **Up / Down / Left / Right** navigation keys on the keypad.
4. Select the appropriate **Slot** menu item using either the numeric keypad or the **Up / Down / Left / Right** navigation keys on the keypad.

   The expansion slot closest to the front of the unit (display) is Slot 1 and the expansion slot at the back of the unit is Slot 4.
5. Rename the slot as needed by the application. For example, it may be useful to name the port “SCADA 1” or “LiftIQ SCB.” To rename a slot, select the **Device>Name** option using the **Up / Down / Left / Right** navigation keys on the keypad and press the **Enter** (✓) button.
6. Change the function to Modbus Slave by selecting the **Device>Function>Modbus>Modbus TCP/IP** option. Press the **Enter** (✓) button to confirm the selection.
7. Change the Modbus Slave ID by selecting the **Port Config>Site Address** option, using the numeric keypad to enter the desired value. Press the **Enter** (✓) button to confirm the selection.
8. Change the Read/Write Access Level by selecting a **Port Config>Access>Full/View Only** option. Press the **Enter** ✓ button to confirm the selection.
9. Change the Units configuration by selecting a **Port Config>Units>** option. Press the **Enter** (✓) button to confirm the selection.

10. Change the Baud Rate to 57,600 baud by selecting the **Comm Settings>Baud Rate>57600** option. Press the **Enter** (✓) button to confirm the selection.
11. Change the Data Bits to 8 by selecting the **Comm Settings>Data Bits>8** option. Press the **Enter** (✓) button to confirm the selection.
12. Change the Stop Bits to 1 by selecting the **Comm Settings>Stop Bits>1** option. Press the **Enter** (✓) button to confirm the selection.
13. Change the Parity by selecting a **Comm Settings>Parity>** option. Press the **Enter** (✓) button to confirm the selection.

    Available options are None, Even, and Odd. None is the default.
14. Change the Mode to RS-232 by selecting **Comm Settings>Mode>RS232**. Press the **Enter** (✓) button to confirm the selection.

    Available options are RS485 and RS232.

> **Note**
>
> It is important to note that RS232 must always be selected for the Modbus TCP/IP Card.

15. Change the Prekey value by entering a value of 2 into **Comm Settings>Prekey>** using the numeric keypad to enter the desired value. Press the **Enter** (✓) button to confirm the selection.
16. Change the Postkey value by entering a value of 2 into **Comm Settings>Postkey>** using the numeric keypad to enter the desired value. Press the **Enter** (✓) button to confirm the selection.

6.3.2 CONFIGURING THE CONTROLLER USING STARVIEW

1. Make sure that the Modbus TCP/IP card is installed in the controller.
2. Connect StarView to the controller unit to activate a live communication.
3. Navigate to the **CONFIGURATION>Controller>Cards** screen (Figure 6-6: Port Configuration Screen).

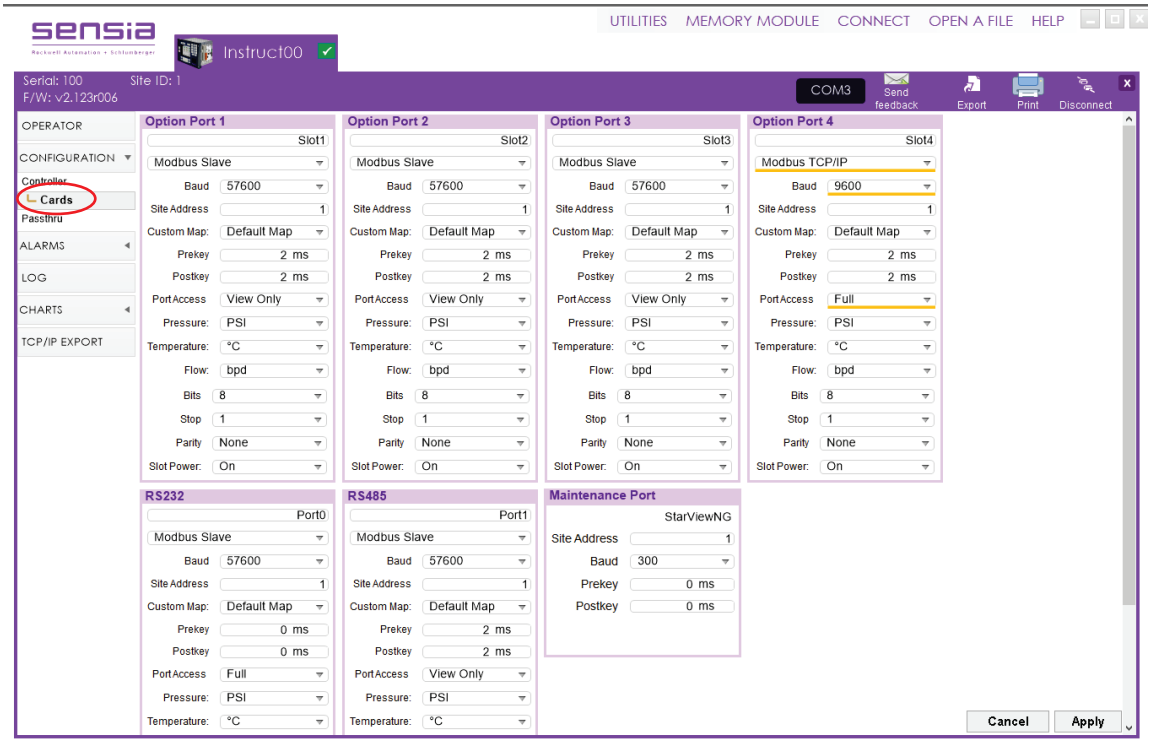


Figure 6-6: Port Configuration Screen

4. Choose port name, site address, baud rate, prekey, postkey, word length,and the number of stops, bits, and parity as per client settings. The option port that is occupied by the Modbus TCP/IP Card should be set to MODBUS TCP/IP. Refer to Figure 6-7: Port Configured for TCP/IP.

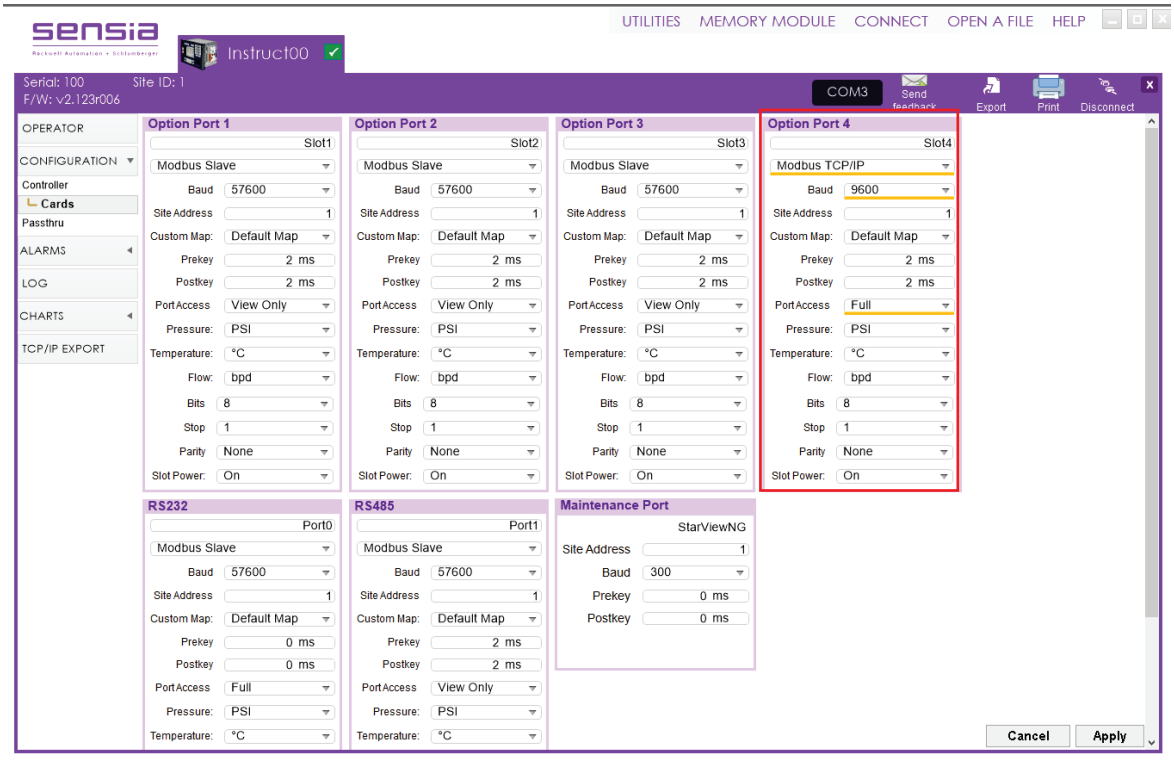


Figure 6-7: Port Configured for TCP/IP, Modbus TCP/IP Card Installed in Option Port 4.

5. Prepare the cable to connect to the client system. The Ethernet terminal is available on the faceplate of the Modbus TCP/IP card.

6. Provide the Modbus map of the controller to the client, so that the master system can be programmed.

6.4 UNICONN (LEGACY)

Note

The UniConn Controller is obsolete. The product center no longer supports it.

Configuring the UniConn to use the Modbus TCP/IP card may be done either directly on the controller or by way of the Legacy StarView Wellsite display software.

6.4.1 CONFIGURING THE CONTROLLER DIRECTLY

The UniConn uses the Modbus RTU (Remote Telemetry Unit) protocol for connection to Supervisory Control And Data Acquisition (SCADA) systems. To connect the UniConn to a SCADA system using Modbus TCP/IP over Ethernet, a Modbus TCP/IP card must be inserted into one of the UniConn expansion ports.

The port that the Modbus TCP/IP card is installed in must be configured for the specific application in the **Setup** Menu.

Figure 6-8: Configure the UniConn for a TCP/IP shows the UniConn menu structure for the settings of a UniConn expansion card installed in port 4.

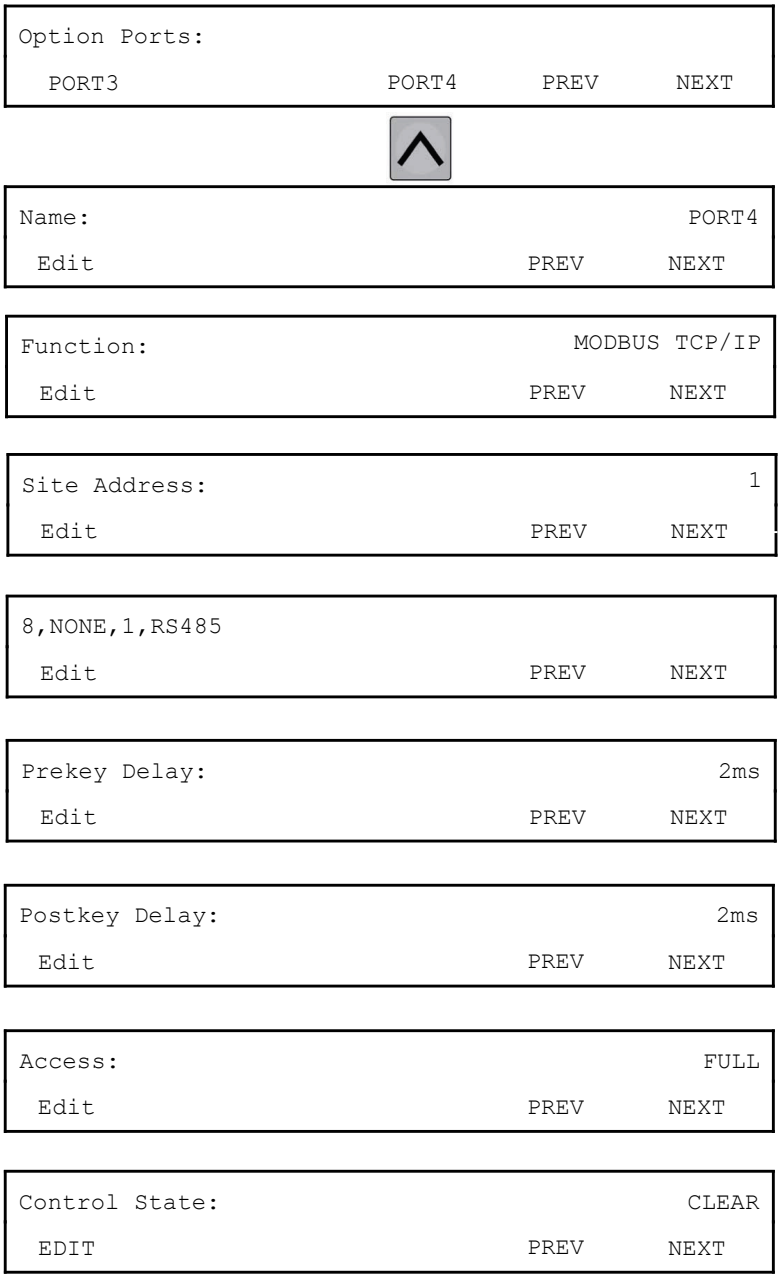


Figure 6-8: Configure the UniConn for a TCP/IP Card

Specific settings and variables for SCADA systems vary for each application. Refer to the SCADA master or host device documentation or vendor for the correct SCADA network configuration settings. Refer to Table 6-1: Configurable Parameters for TCP/IP SCADA Applications for a list of configurable parameters for SCADA applications.

Table 6-1: Configurable Parameters for TCP/IP SCADA Applications

Parameter Description	Parameter Value
Function	MODBUS TCP/IP
Site Address	1-247 (unique Modbus Slave ID number)

Parameter Description	Parameter Value
Baud Rate	300 / 1200 / 2400 / 4800 / 9600 / 19200 / 38400 / **57600** (default) Recommended Setting: 57600 baud **Note** Changes to the baud rate will also require configuring the TCP/IP card using the Engineering port.
Data Bits/Parity/Stop Bits/Interface	7/**8**, **1**/2, **RS–232** / RS–485 Required Setting: **RS232, 8–N-1**
Prekey Delay	0-60,000 ms (recommended values: **2**-120 ms) Recommended Setting: 2ms
Postkey Delay	0-60,000 ms (recommended values: **2**-120 ms) Recommended Setting: 2ms

6.4.2 CONFIGURING THE CONTROLLER USING LEGACY STARVIEW SOFTWARE

1. Make sure that Modbus TCP/IP card is installed into UniConn.
2. Using Legacy StarView and UniConn front Maintenance port (57600 Baud), connect to UniConn (choose **File>New** command).
3. Wait until the database is uploaded and then choose **Database>Controller**. See item “a” in Figure 6-9.

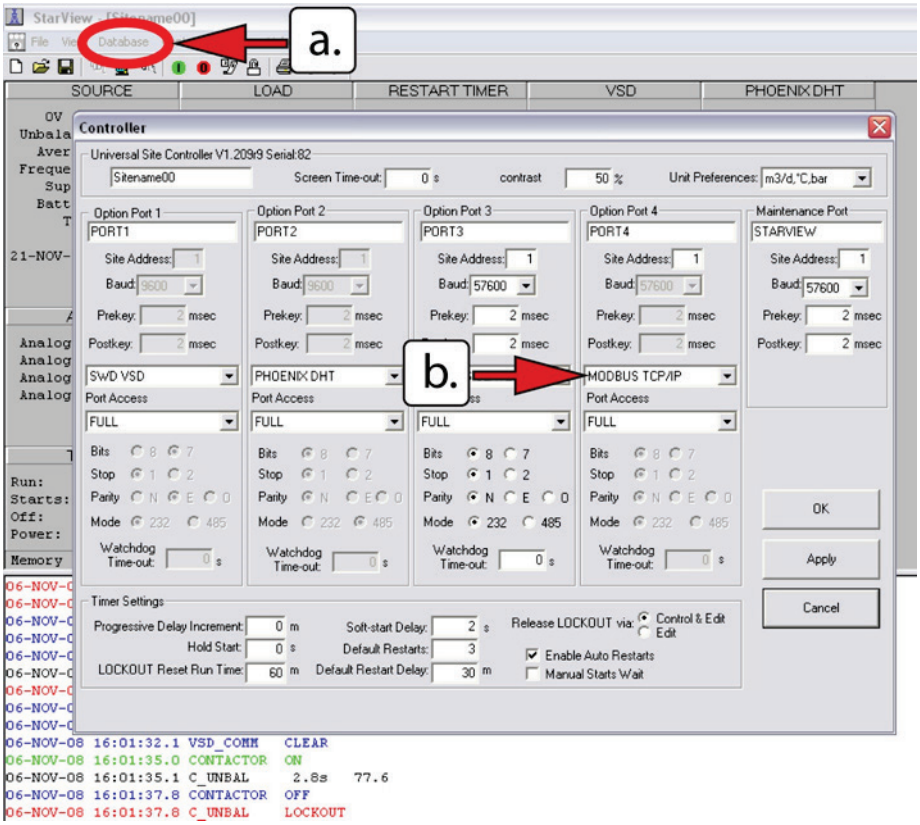


Figure 6-9: Legacy StarView Controller Window

4. Set the UniConn slot that is occupied by the Modbus TCP/IP card to MODBUS TCP/IP. See item “b” in Figure 6-9.
5. Choose port name, site address, baud rate, prekey, postkey, word length, number of stops, bits, and parity as per client settings. Ensure the mode is set as RS-232 as this setting is related to the internal TCP/IP card UniConn connection.
6. Prepare the cable to connect to the client system. The Ethernet terminal is available on the faceplate of the Modbus TCP/IP card.
7. Provide the Modbus map of the UniConn to the client, so that master system can be programmed.

6.5 ARCONN

Note

The ArConn Controller is obsolete. The product center no longer supports it.

The configuration for ArConn is done through Legacy StarView Software.

1. Make sure that Modbus TCP/IP card is installed into the acquisition unit.
2. Start Legacy StarView Software.
3. Click **File >Communications...** to open the Communication Port Settings window.

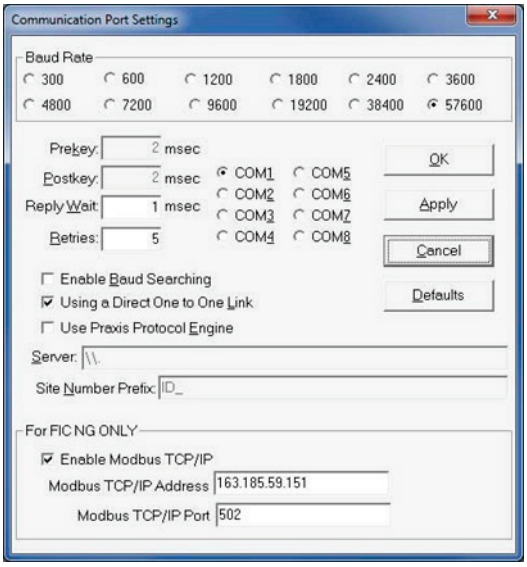


Figure 6-10: Legacy StarView Modbus TCP/IP Settings

4. Select the Enable Modbus TCP/IP checkbox.
5. Enter the site specific Modbus TCP/IP address which was previously configured in the Modbus TCP/IP card.
6. Leave the Modbus TCP/IP port at the default value 502. This port is Modbus standard and is not configurable in the Modbus TCP/IP card.
7. For a local area network connection, connect a *straight-through* RJ-45 twisted pair network cable between the Modbus TCP/IP card and the network router, switch, or hub. When implementing a one-to-one connection between the PC and the card, use a *crossover* RJ-45 twisted pair network cable.
8. Turn on the acquisition unit and wait until the communication links begin to blink, signaling activity.
9. Verify that the IP address of the card is able to be pinged.
10. Click **File->New** to open the Live View (site) window.

Section 7: **Commissioning**

The following is only a summary of the commissioning process. For detailed commissioning procedures refer to the appropriate application manual for the controller or acquisition system.

1. Install the card in the controller or acquisition system.
2. Connect to the card's Engineering port and configure the IP address.
3. Connect to the controller or acquisition system port for the card using the system interface or StarView.
4. If required, configure the controller or acquisition system. Refer to the appropriate controller or acquisition system manual.
5. Connect the card to the third-party SCADA system.
6. Configure the third-party (master) SCADA system using the appropriate controller or acquisition system Modbus map.
7. Verify communication with the third-party (master) SCADA system.

Section 8: **Troubleshooting**

8.1 TROUBLESHOOTING CHART

Table 8-1: Modbus TCP/IP Card Troubleshooting Chart

Symptom	Cause	Solution
Card not communicating properly	Incorrect port configuration	Make sure TCP/IP, Gateway, and/or Netmask are valid.
	Incorrect port configured	A system can have multiple cards. Make sure the port and installed card are properly configured for the connected SCADA system.
	Incorrect wiring	Make sure RJ45 Ethernet cable is used.
SCADA system not communicating properly	SCADA system application problem	Verify that controller/acquisition system and card have been successfully connected to a similar SCADA system and send the Modbus map to SCADA team.
	Incorrect Modbus slave (site) address	Make sure the card port and SCADA system are set to the same slave (site) address.
	Incorrect Modbus map	Make sure the correct Modbus map is used by the SCADA system. For example, UniConn and INSTRUCT have different Modbus maps.
SCADA system not sending remote commands	Cannot stop, clear, and start system remotely	Make sure the controller/acquisition system port setting is set to FULL Access. Make sure the correct Modbus map is used. Make sure the proper coils are used. Refer to the Modbus map. Make sure the SCADA system is using the proper logic sequence.
SCADA system cannot interface with controller/acquisition system	SCADA system does not support Modbus RTU protocol.	Additional hardware is required to connect to non-Modbus systems.
	SCADA system does not support RS-232 or RS-485.	Additional hardware is required to connect to convert the RS-232 or RS-485 connections.

8.2 STARVIEW COMMUNICATIONS TROUBLESHOOTING

Symptom	**Cause and Solution**
StarView does not connect to the controller.	Site address mismatch. Baud rate mismatch PC Com port incorrect. Controller lost power Serial cable faulty

Section 9: **Maintenance**

9.1 STORAGE AND HANDLING

Ensuring the following actions will prevent damage to cards during transportation.

- The box containing the tools and cards after each job must be kept in temperature-controlled environment or storage area, per card specifications.
- Make sure that cards are sent to the wellsite in the original (or equivalent) packaging.
- Make sure cards are not packed with rags. Particles and the thread from the fabric can pull out card component when removed from packaging.
- Cards should be individually packaged.
- The cards should be packed to prevent movement and/or shipped in vibration packaging.

9.2 FACTORY CONTACT INFORMATION

For factory maintenance, servicing, or warranty work, refer to Appendix D:Support Resources.

For technical support, refer to Appendix D:Support Resources or your local sales representative.

Section 10: **Appendixes**

To supplement this INSTRUCT ESP Modbus TCP/IP Communication Card Installation, Operation & Maintenance Manual, the following appendixes are provided:

Appendix A: **Spare Parts**

Part Number	Description
100419643	INSTRUCT ESP Modbus TCP/IP Communications Card
AC21228	Dust cover for Engineering port
100267826	RS232 Serial Cable
100078327	Thumb Screw

Appendix B: **Modbus Tables**

INSTRUCT ESP Intelligent Controller Modbus Map (InTouch ID 6145281)

UniConn Modbus Map (InTouch ID 4104120)

ArConn Modbus Map (InTouch ID 5751501)

Appendix C: **References**

Installation Manual, INSTRUCT ESP Modbus TCP/IP Communications Card (InTouch ID 6470145)

User Manual, INSTRUCT ESP Intelligent Controller (InTouch ID 6128576)

User Manual, UniConn Controller (InTouch ID 3953183)

User Manual, ArConn Phoenix (InTouch ID 5747165)

User Manual, ArConn WellWatcher (InTouch ID 4566510)

User Manual, ArConn WellWatcher NG (InTouch ID 5947245)

Appendix D: **Support Resources**

D.1 PRODUCT DOCUMENTATION

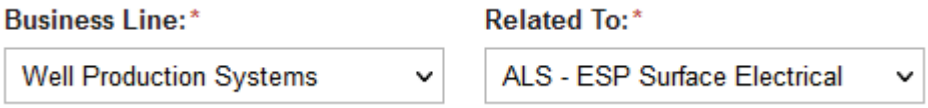
This manual is the main product documentation for the INSTRUCT ESP Modbus TCP/IP Communications Card.

D.2 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.



D.3 HOW TO REACH US

You can find more information about Sensia and about the INSTRUCT ESP Intelligent Controller information here:

Sensia Home Page:	https://www.sensiaglobal.com/
Sensia Lift Control Solutions Page:	https://www.sensiaglobal.com/Sensia-Lift-Control-Systems
• ESP Controller Page:	https://www.sensiaglobal.com/Sensia-Lift-Control-Systems/Lift-Control-Devices/ESP-controllers
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