



User Manual:

GSM / GPRS Modem Configuration

GSM / GPRS



GSM / GPRS Modem Configuration

User Guide

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GSM Modem

GSM is a network used for connecting two devices and exchanging data. It can be used by an OCS with an internal modem HE-GSM04A to communicate to other devices connecting to an Internet/GSM/PSTN network.

To install a GSM modem option card in an XLe / XLt OCS, open the back cover of the OCS and connect the Modem **HE-GSM04A** and then connect the antenna to the modem.

INSTALLATION PROCEDURE

1. Disconnect all power from the XLE OCS (Operator Control Station) unit including I/O power.
2. Remove the four screws on the back of the XLe unit and remove the back cover. The back cover will be replaced with the extended back cover that ships with the communication add-on. Screws are re-used (Figure 1).
3. Plug the communication board onto the 24-pin connector. Make sure all the pins are properly aligned (Figure 2).
4. Place the extended back cover onto the unit. It can be helpful to tip it at an angle so the connector on the COM board passes through the opening on the back cover.
5. Place the screw back into the hole and turn the screw slowly counter clockwise until it clicks into the threads. This prevents the screw from being cross-threaded. Now, turn the screw clock-wise until the cover is firmly secured. Repeat this process for all four (4) screws.

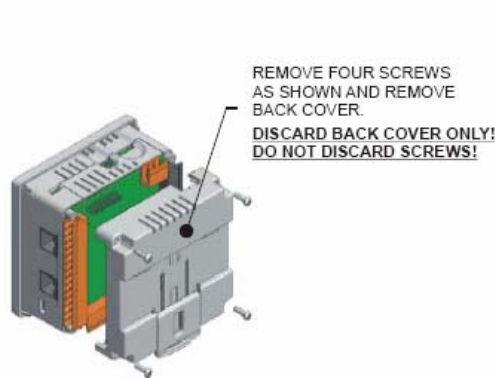


Figure 1 - Removing Back Cover of the XLE

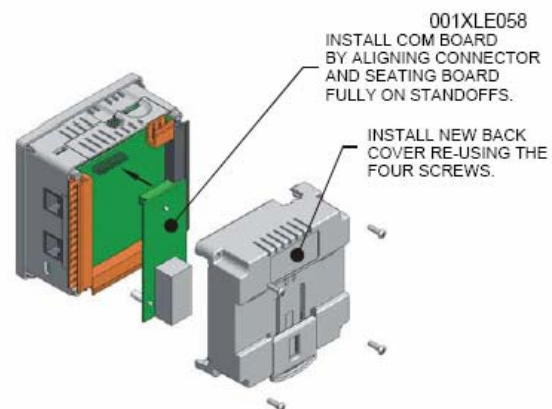


Figure 2 - Installing the COM Board in the XLE

With the GSM modem option card, the Data Exchange and Connectivity with Cscape can be established in the following two ways:

- GSM connectivity
- GPRS connectivity

Cscape configuration is explained in the following sections.

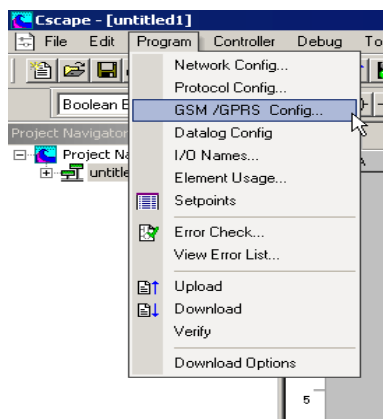
1 GSM Functionality

- GSM data call can be used for:
 - Peer to peer communication between two devices for exchanging register data.
 - Connect to Cscape for downloading / uploading and debugging the application
 - Send / receive configured SMS messages.
- GSM data call connects at 9600bps only.
- GSM data call requires 'data call enabled SIM'

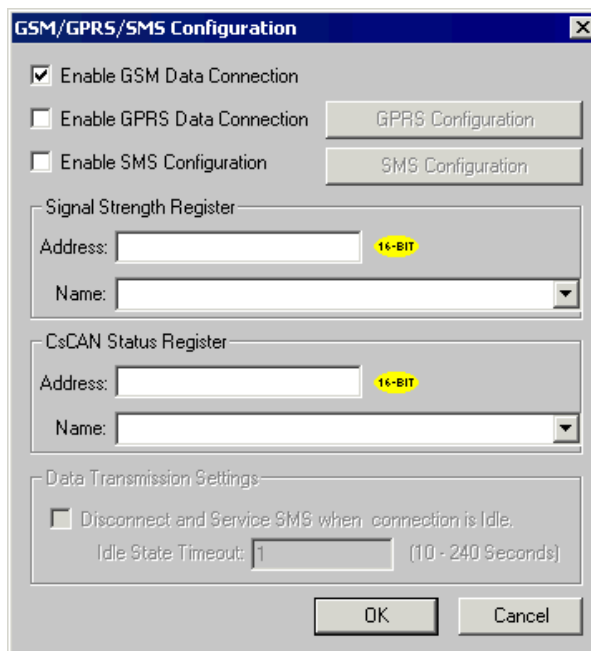
1.1 GSM Configuration

1.1.1 Peer to peer communication

- Horner OCS firmware is designed to initialize a GSM modem to establish a GSM data call.
- In order to establish GSM data call connectivity using Horner OCS follow these steps.
- Select **Program and GSM /GPRS Config** from the Main Menu. Open the GSM/GPRS/SMS Configuration dialog by selecting Program and GSM / GPRS/SMS Configuration.



- Select the Enable GSM Data Connection checkbox in the GSM/GPRS/SMS Configuration window.

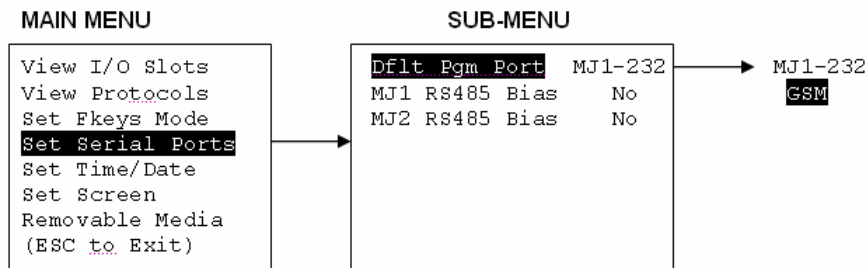


- If an SMS transmission needs to be carried out when the GSM connection is active then additional Data Transmission Settings need to be entered for servicing SMS. If SMS needs to be serviced when a GSM connection is active, select Enable SMS Configuration. This will enable Data Transmission Settings. Select the checkbox and set the idle time after which SMS should be serviced. If the checkbox is not selected, SMS will not be serviced.

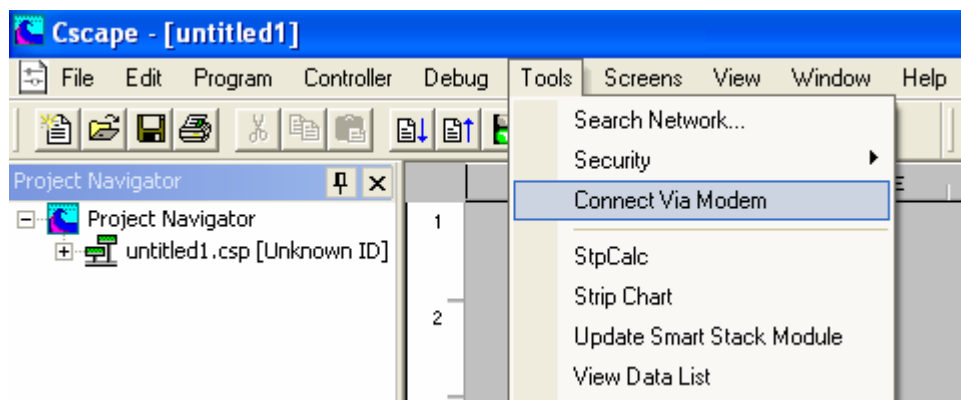
- Additional ladder programming **must be** written to answer or to make GSM data call using communication operation ladder blocks. Use of Communication blocks for [GSM / GPRS connectivity](#) is detailed in section 4.

1.1.2 Connectivity with Cscope

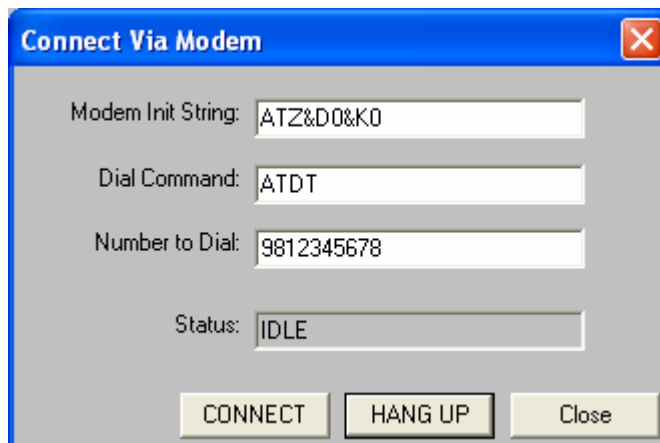
- On the device, Change the default programming port to GSMGPRS from the system menu, serial port option, i.e. OCS 'system menu -> Set Serial Ports -> Dflt Pgm Port ->GSM' for MJ1.



- Open the **Connect Via modem** dialog by selecting **Tools and Connect Via Modem** from the Main Menu



- Connect a typical modem to a personal computer, internal or external to the PC.
- In the Connect Via Modem dialog, enter the initialization string for the modem. The default initialization string is ATZ&D0&K0. This sets the modem to default configuration DTR On and Disable Flow Control. Enter the dial command. The default command is ATDT instructing the modem to dial in touch tone mode. Enter the GSM number of the SIM connected to the device.



Note: The status of the connection will be updated in the CsCAN Status Register specified in the GSM/GPRS/SMS Configuration window. Various status values are detailed in section 4.3.

1.1.3 Send / Receive SMS

SMS configuration for sending/receiving SMS is detailed in section 5.2.

2 GPRS (General Packet Radio Service) Functionality

A **GPRS** network can be used to establish communication between OCS and any other communicating devices having unique IP address and port configuration.

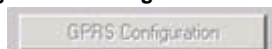
- GPRS can be used to establish connectivity with:
 - remote servers for exchanging register data
 - Cscape for downloading / uploading and debugging the application using redirector software
 - GSM network for sending / receiving configured SMS messages
 - peer to peer communications
- Static SIM with VPN functionality is required.
- GPRS service must be enabled in SIM.
- Auto dial blocks of modem are required on both server and client.

2.1 GPRS Configuration

Horner OCS firmware is designed to initialize the GSM modem to establish GPRS connectivity. This configuration needs to be done for connectivity with remote server as well as for connectivity with Cscape.

- Open the GSM/GPRS/SMS Configuration by selecting Program, GSM/GPRS/SMS Configuration from the Main Menu.
- Select the Enable GPRS Data Connection check box.
- Configure a register address to store Signal strength (Optional)
- Configure Status register for CsCAN communication (Optional)

- Click on the **GPRS Configuration settings** button to configure GPRS according to the information obtained by the Network Service Provider.

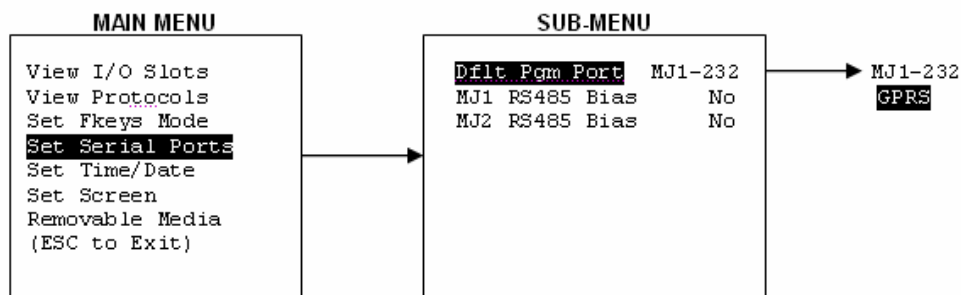


GPRS Configuration	
GPRS Access Point Configuration	The GPRS Access Point Configuration is <u>mandatory</u> and the fields are to be filled according to the information obtained by your Network Service Provider.
GPRS Packet Assembler/Disassembler Configuration	<p>Client mode: In this mode the OCS behaves as client and connects to a specific server (Server IP/Port address to be specified in modem ladder block input).</p> <p>Server mode: In this mode the OCS behaves as server and accepts connection requests from specified client. Client IP addresses are to be specified in modem ladder block input.</p> <ul style="list-style-type: none"> For added security, the IP address for Cscape connectivity can also be specified. Enter the IP address for CsCAN connectivity directly in CsCAN Source IP Addr field or select the Get Source IP Address from Register checkbox and specify a %R register Address (32bit). <p>Note: If the CsCAN Source IP Addr is 0.0.0.0, then the connection from any address will be accepted.</p> <p>Note: Server mode of operation is supported only in cases of SIM with a static IP address.</p> <ul style="list-style-type: none"> CsCAN Source Port: When the modem is configured in server mode, the incoming connection request from any client will accepted only via this port address. Block Size: GPRS packet size in number of bytes. Timeout Period: Transmission of GPRS packet to destination address will take place either on reaching Packet Size (block size) or occurrence of timeout. Forward Character: Transmission of GPRS packet will take place on reception of character configured in this window. This value is to be entered in Hex value of ASCII character. For example, If '0D' is configured, the GPRS packet is transmitted when Line Feed character is received. Send Forward character: If this checkbox enabled, forward character will be sent together with GPRS packet.

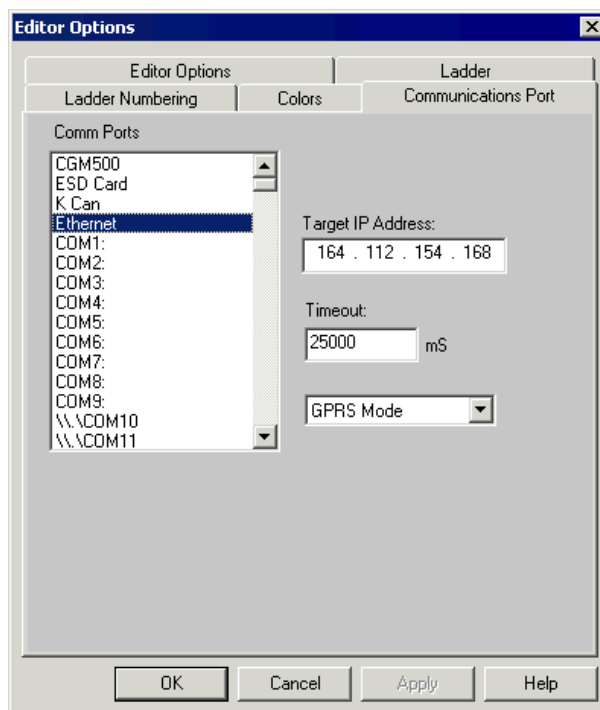
Additional ladder programming must be written to establish connection with remote server/client over GPRS service using 'communication operation' ladder blocks.

2.2 Connectivity with Cscape

- GPRS configuration must be downloaded into the OCS.
- Configure Sever/Client IP address in the OCS Main Menu -> Dflt Pgm Port -> GPRS
- This is valid for port MJ1 *only*.



- Select the default programming port as GPRS in the System Menu
- The connectivity with Cscape over GPRS can be established only when the modem is configured in server mode.
- Open the Communications Port tab by selecting Tools and Editor Options from the Main Menu.
-

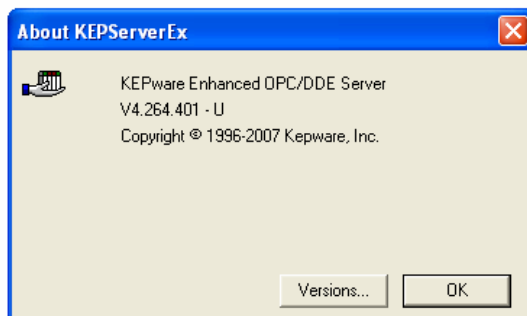


- Select Ethernet as the communications port (COMM Ports).
- Specify modem IP address and timeout.
- The communication timeout for Cscape should be increased to take care of the GPRS latency (typically 30 to 40 seconds).
- The status of the connection will be updated in CsCAN Status Register specified in the GSM/GPRS/SMS Configuration window. Various **status values** are described in the Section 4.3 Modem Status Register Value Definitions table. The same table can be used for the CsCAN Status Register. When the modem status value is 6, communications can be established.

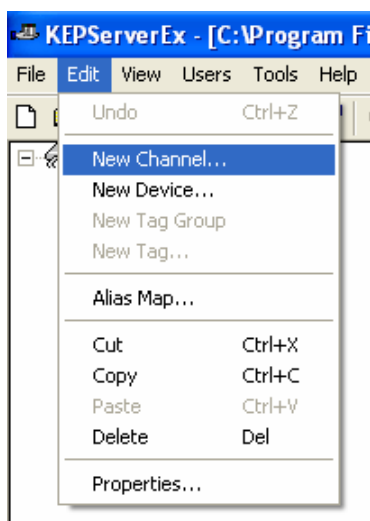
2.3 Configuring KEPServerEX for Data Exchange

KEPServerEX is the latest generation of Kepware's OPC server technology. The KEPServerEX gets the device and system data. It then translates it into a standard communication protocol (OPC or DDE) that all clients can receive and understand.

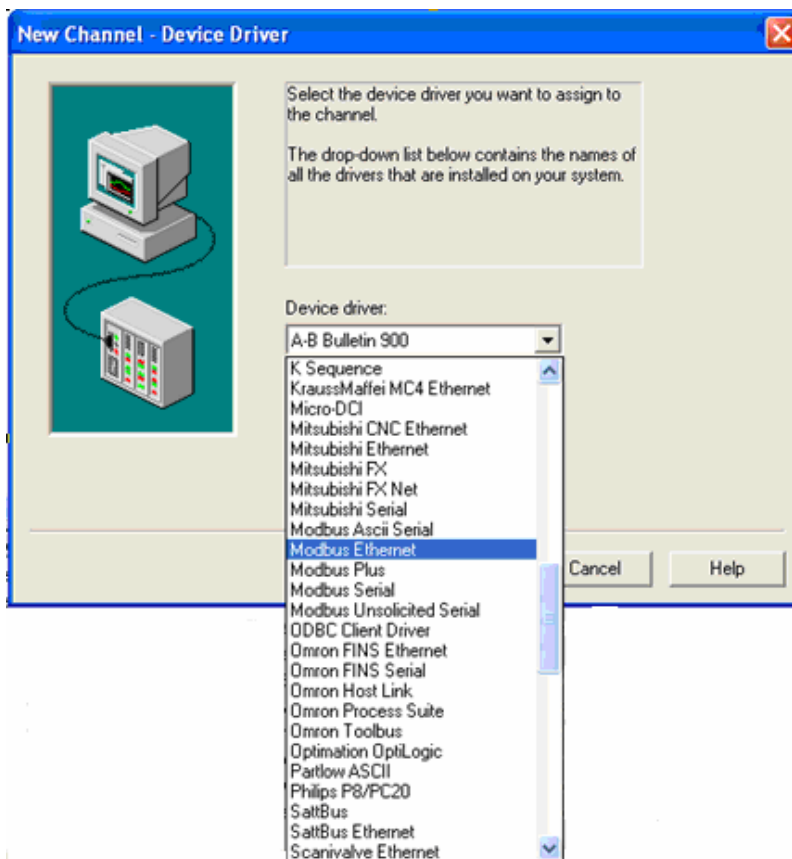
The following dialog gives details about the version of KEPServerEX with which the GPRS connectivity has been tested.



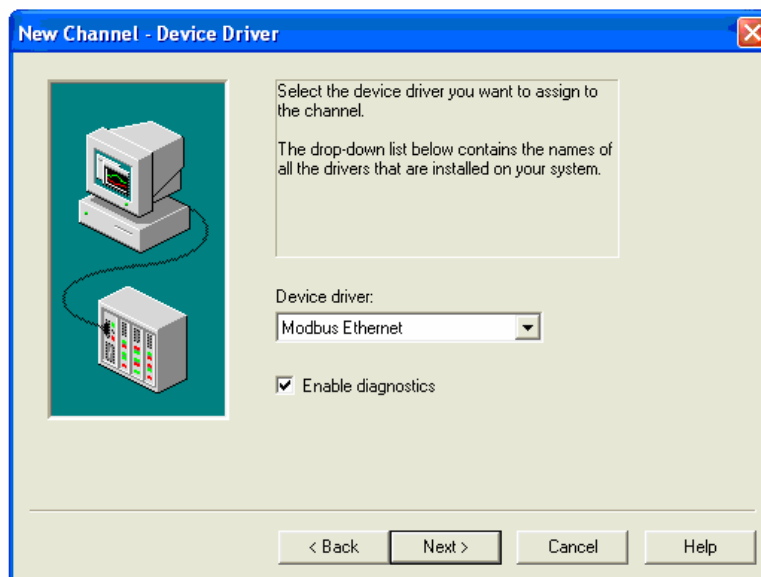
To configure KEPServerEX, a new channel is to be configured followed by a new device and tags for data mapping. Create a new channel by selecting New Channel from the Edit drop down on the KEPServerEX main menu:



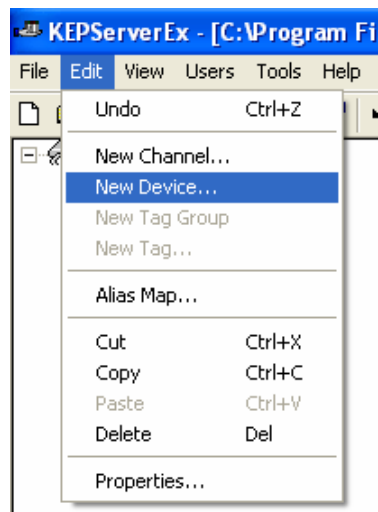
- After selecting name, choose the **Modbus Ethernet** option from the Device driver drop down.
-
-



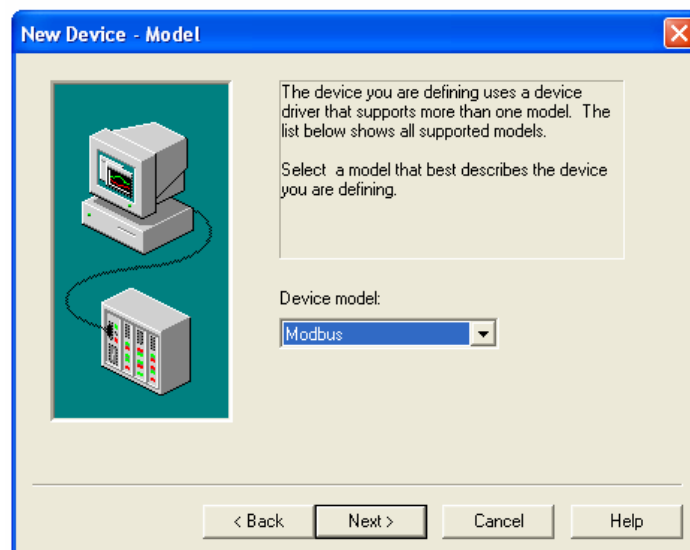
- Select the **Enable Diagnostics** check box and continue with other default settings.



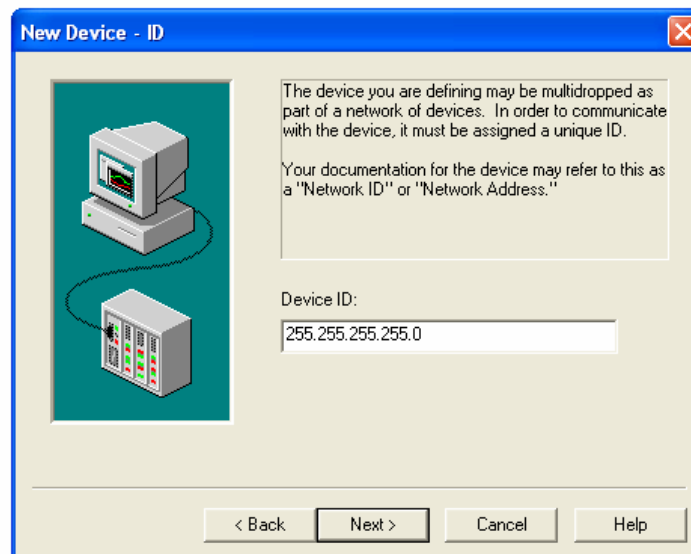
- Add a new device by selecting **New Device** from the **Edit** submenu in KEPServerEX.



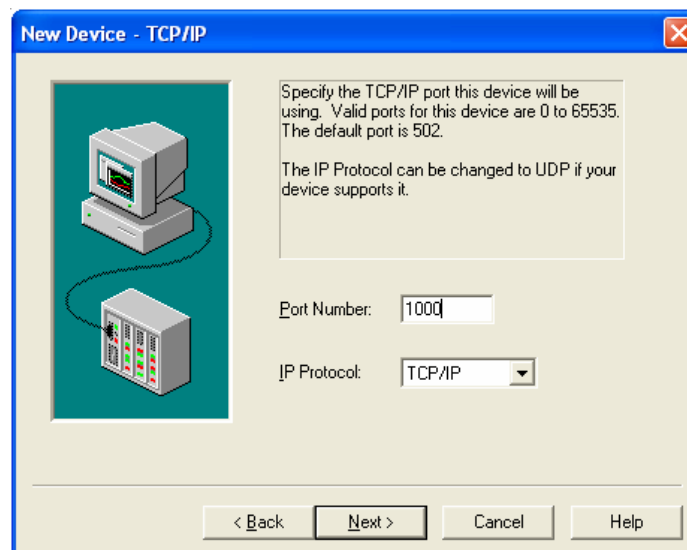
- After naming, choose **Modbus** from the Device Model menu.



In the New Device – ID dialog, set the **Device ID** (IP address of the sim card used). The last digit of the **Device ID** is a modbus slave ID, and it should match the settings from CSCAPE (=2 as mentioned in the sample program).

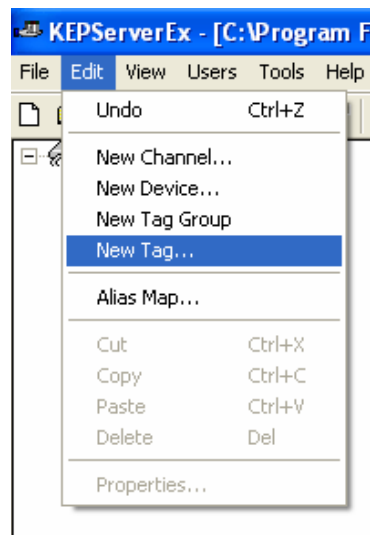


Clicking **Next>** opens the New Device – TCP/IP dialog box.

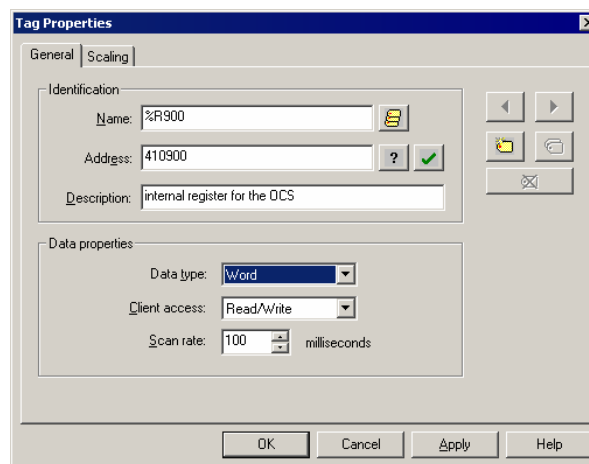


- Enter the correct port number (the same as in cscape configurator), and TCP/IP protocol and continue with other default settings.

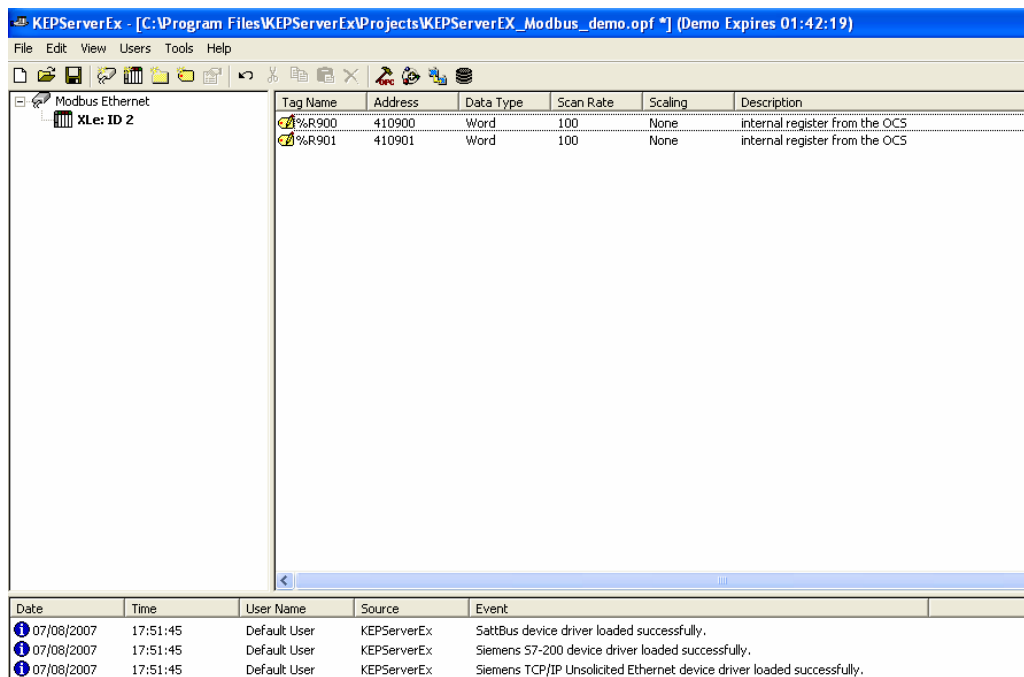
To be able to read and change internal registers, tags have to be created. Select **New Tag** from the **Edit** drop down on the KEPServerEx main menu.



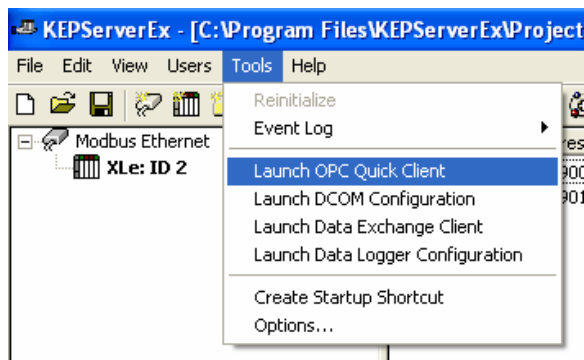
- The following Tag Properties dialog box show entries for register %R900. Likewise other tags can be created.



After creating a new tag this screen will show all the tags created with Tag Name, Address, Data Type, Scan Rate, Scaling and Description...



- To run OPC client, select **Launch OPC Quick Client** from Tools on the KEPServerEx main menu.



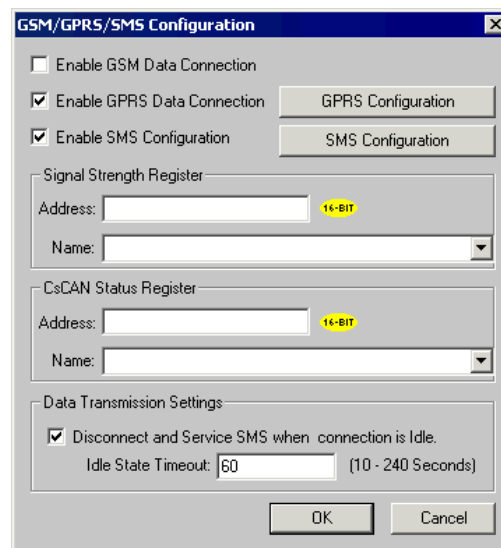
When a connection is made, the status register specified in the modem block will change to a 1. Test the data exchange.

2.4 Send / Receive SMS

SMS configuration for sending/receiving SMS is detailed in section 5.2.

3 Data Transmission Settings

If SMS needs to be serviced when a GSM/GPRS connection is active then additional Data Transmission Settings are needed. Select the **Enable SMS Configuration** checkbox with GSM or GPRS.



The screenshot shows a dialog box titled "GSM/GPRS/SMS Configuration". It contains several settings:

- ☐ Enable GSM Data Connection
- ☒ Enable GPRS Data Connection, with a "GPRS Configuration" button to its right.
- ☒ Enable SMS Configuration, with an "SMS Configuration" button to its right.
- Signal Strength Register**
 - Address: [text box] 16-BIT
 - Name: [dropdown menu]
- CsCAN Status Register**
 - Address: [text box] 16-BIT
 - Name: [dropdown menu]
- Data Transmission Settings**
 - ☒ Disconnect and Service SMS when connection is Idle.
 - Idle State Timeout: [60] (10 - 240 Seconds)

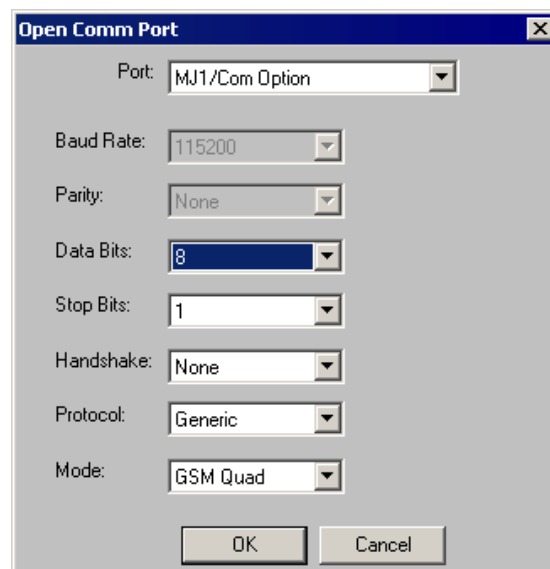
At the bottom are "OK" and "Cancel" buttons.

Select the checkbox, **Disconnect and Service SMS when connection is Idle**, to enable the **Idle State Timeout**. Enter the time duration from 10 to 240 seconds.

4 Data Transfer using Communication Blocks

For exchanging data over GSM / GPRS, communications block are required to be configured as follows:

4.1 Open Port



When using the internal GSM modem, Mode should be specified GSM Quad. The **Protocol** can be selected as CsCAN, Generic or Modbus. For Modbus, Slave or Master block should be used.

4.2 Modem Control Block

Note: To use modem control block, the com port is to be opened first.

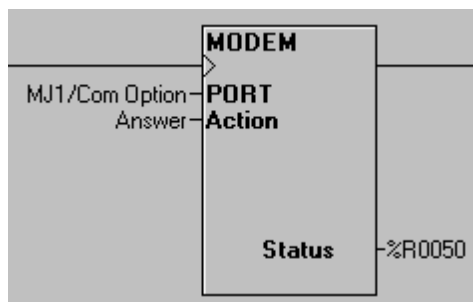
• Auto Dial modem Option

- GSM data call
 - Modem Control block with 'Auto Dial' option is used for calling remote device (server)
 - Remote device data number must be entered in 'Number' text box.
 - Select type of dialing i.e. Pulse or Tone
 -
- Configure the status register to show the status of the connection. The status values are detailed in section 4.3.
- GPRS connectivity
 - Modem Control block with 'Auto Dial' option is used to connect to remote server/client using the GPRS service.
 - Remote server IP and Port address must be entered in 'Number' text box in the format IP Address/Port. If the device it self acting as Sever then only the remote client IP address needs to be entered.
 - Select type of protocol UDP or TCP over IP.
- Configure the status register to show the status of the connection. The status values are detailed in section 4.3.
 - If the modem ladder block input is enabled then the modem tries establishing connection with a remote server in client mode or waits for a connection request from the client in server mode.



• Auto Answer modem Option

- GSM data call
 - Modem Control block with 'Auto Answer' option is used for receiving connection requests from a remote server or device.
 - Number of rings after which connection request is accepted is entered in the text box provided.
- Configure the status register to show the status of the connection. The status values are detailed in section 4.3.



- **Initialize modem Option**

- Modem Control block with 'Initialize Modem' option is used for execution of modem specific AT commands.
- Modem specific AT command to be executed is to be entered in 'Init String' text box provided in control.
- If AT command execution is successful then Modem Control block output is enabled, if not, the output is disabled.
- The status register is updated depending upon the response from the modem.
- The response from the modem is stored in consecutive register locations starting from 'status register+1' address.

Example:

- Modem control block with 'Initialize Modem' option is used for balance of minutes remaining from your service provider.
- The service provider balance request string is entered in the 'Init String' box together with CUSD AT command.
- The response from the service provider is stored in consecutive register locations starting from 'Status Address + 1'.

Note: The command to be sent for balance inquiry is: +CUSD = 1,"**111#",15 where "**111#" is the string to request balance remaining in SIM and **may vary** depending on the service provider.

Comm Modem Control

Port: MJ1/Com Option

Status Address: %R0050 Name: Modem_Status

Operation: Initialize Modem

☐ Pulse (UDP) ☒ Tone (TCP)

Init String: +CUSD=1,"**111#",15

OK Cancel

4.3 Modem Status Register value definitions

Modem Status	Register Value	Modem Output Power
Modem is inactive	65535 (0xFFFF)	Disabled
Modem command started and waiting for response	65534 (0xFFFE)	Disabled
Modem is not responding (Command Timeout)	65533 (0xFFFD)	Disabled
Modem Command succeeded	0 (0x0)	Enabled (Only in case of Initialization modem command else Disabled)
Modem is connected to destination server	1(0x1)	Enabled
Modem is Ringing (i.e. incoming call)	2 (0x2)	Disabled
Modem detected no/lost carrier	3(0x3)	Disabled
Modem command syntax error	4(0x4)	Disabled
SMS functionality is Active	5(0x5)	Disabled
Modem in Listen (Server) Mode	6 (0x6)	Disabled

Note:

- Status of '6' indicates Mode is waiting for connection request from specified client and it is applicable in case of GPRS server mode.
- When the modem returns status 'Connected', then TX, RX or another communications ladder block can be used to exchange data with a destination server according to protocol.
- Disabling the Modem Control ladder block input will disconnect GPRS service. The Status Register value changes to 65534 (0xFFFE i.e. indicates waiting for modem response for disconnect command) and then to 65535 (0xFFFF).
- SMS functionality works based upon 'Data Transmission Settings' in the SMS configuration window while the GSM/GPRS connection is active.
- Connecting to a GPRS network and establishing connection with remote server may require 3 to 4 minutes.
- Breaking connection with a remote server may take 10 to 20 seconds.
- If a continuous error response is seen in the status register or 0xFFFE response while connecting the modem as the default programming port then please check the following:
 - a. GPRS configuration parameters (in case of GPRS connection)
 - b. GSM Signal strength
 - c. Proper insertion of SIM card in modem
 - d. Is the SIM enabled for a given service (i.e. GPRS or GSM data call).
 - e. Antenna connected properly/antenna connection
 - f. VPN connectivity
- If the default programming port is switched to the default serial port option from GSM/GPRS then the port should be released after 20 to 30 seconds after complete GPRS connection drop.

5 SMS Communications

5.1 Overview

SMS (Short Message Service) is a type of communications process that enables the transmission of short text messages and data transfers to and from mobile devices such as cell phones. Messages are usually limited from 140 to 160 characters in length and are stored and forwarded at SMS centers. This allows messages and data transfers to be retrieved immediately or at a later time via an SMS center.

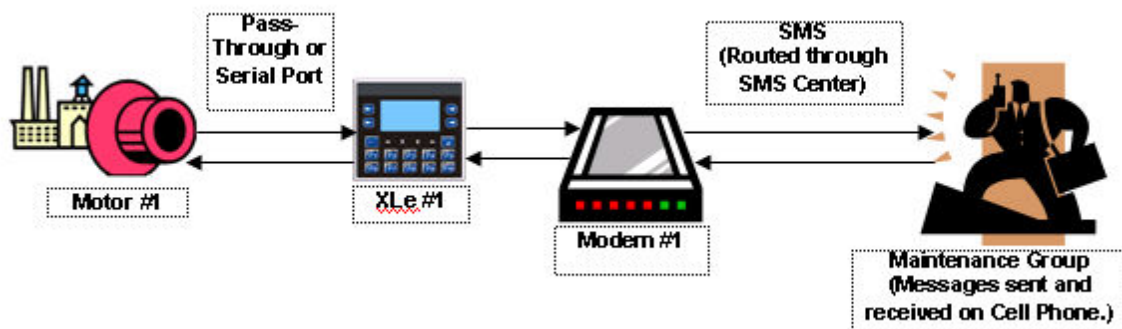
Advantages of using SMS

SMS communications provide an affordable and convenient means to send and receive data using mobile devices such as cell phones. Businesses and industry often require 24-hour coverage of their operations and have personnel who are on-call after normal work hours to handle work-related issues and emergencies. There are employees who are responsible for the proper functioning of equipment and processes at remote sites. Managers need to be notified of significant events.

Using SMS Communications with Horner Controllers

The SMS feature in selected Horner controllers provides the capability of sending and receiving text messages and register data values using mobile devices such as a cell phone. Depending upon the configuration, approved group members can read and write values into the controller's data registers. This kind of communication is referred to as a **data transfer**.

Data Transfer Example



- o Motor #1 stops. Data is sent to a register in the OCS controller (XLe / XLt).
- o The OCS reads the data register value indicating Motor #1 has stopped. A message is sent to the cell phone of a Maintenance Group member via SMS Communications. Transmissions are routed through an SMS center.
- o The Maintenance Group member receives the following message on a cell phone:
- o **Motor #1 speed is 0**
- o The Maintenance Group member sends the following message back to the OCS using a cell phone via SMS communications:
- o **Motor #1 Start Speed is 1800**
- o The OCS reads the register containing the data value sent from the Maintenance Group member and responds as programmed.
- o The OCS sends a signal to start Motor #1
- o Motor #1 re-starts, and normal operation is restored.

SMS Security Measures

As part of the SMS configuration, a list of approved phone numbers and authorized messages that will be used for SMS communications must be provided. Because the SMS feature allows users to read and write to controller registers it is important to follow good standard security practices to safeguard systems. Whether users are allowed to write to registers or not, ensure that security is in place to protect against unauthorized inputs to registers.

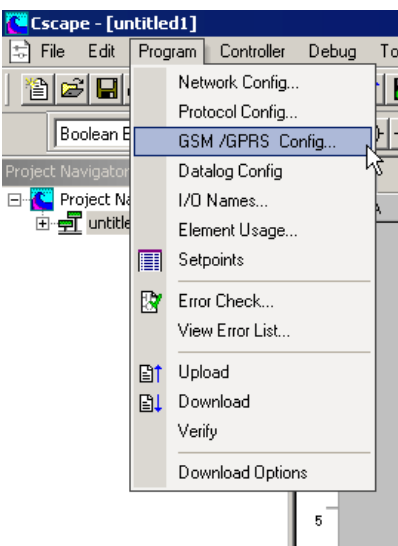
5.2 SMS Configuration

Cscape software is used to configure the necessary attributes in selected Horner controllers such as the XLe or XLt to send and receive short text messages and data transfers using SMS communications. After the SMS configuration is completed and downloaded into the controller, approved group members can send and receive a variety of information such as register values and emergency alerts using cell phones and other mobile devices.

Refer to **SMS Communications** for more information on SMS and its capabilities.

Select the desired controller. This feature is available on OCS types XLe, XLt, NX and QX and requires Cscape 8.1 or higher for SMS configuration. See **How to Select a Controller Model** if needed.

Click **Program** and then select the **GSM /GPRS Config** tab on the Cscape main menu.



 A screenshot of the 'GSM/GPRS/SMS Configuration' dialog box. It has three checkboxes: 'Enable GSM Data Connection' (unchecked), 'Enable GPRS Data Connection' (unchecked), and 'Enable SMS Configuration' (checked). To the right of the checked checkbox is an 'SMS Configuration' button. Below these are three sections: 'Signal Strength Register' with 'Address' and 'Name' fields (Address has a '16-BIT' label), 'CsCAN Status Register' with 'Address' and 'Name' fields (Address has a '16-BIT' label), and 'Data Transmission Settings' with a checkbox 'Disconnect and Service SMS when connection is Idle.' and an 'Idle State Timeout' field set to '1' (with '(10 - 240 Seconds)' in parentheses). At the bottom are 'OK' and 'Cancel' buttons.

- Select the **Enable SMS Configuration** checkbox and then click **SMS Configuration** to begin SMS configuration.

5.2.1 GSM Modem Settings – SMS Configuration

- In this example, the screen is already configured. The **SMS Configuration** screen has several sections that require configuration.

Status Register Settings	
Address	Enter the starting register location to indicate the status of the SMS communication. This is a block of four registers that are consecutive in memory. For example, if you are using R31– R34, you need to enter the starting register address as %R0031.
Name	Enter (or select) an I/O Name.

The Status Register contains a status bit indicating the condition of the SMS communication. The following table contains the meaning of each status bit...

Status Bits	
SMS Status Bits	
Bit 13	Receive response failed
Bit 14	Initialization Failed
Bit 15	Transmit Failed
Bit 16	Communication Failed
Bit 17 - Bit 24	Receive level value
Bit 25 – Bit 32	Bit Error Rate value
Bit 33 - Bit 48	Invalid message count
Bit 49 - Bit 56	Send/Receive retry count
Bit 57 – Bit 64	Re-initialization count

Status Bits for Siemens Modems & Internal Modem	
Bit 1	CPIN Command Failed
Bit 2	CSCA service center number command Failed
Bit 3	CREG Command Failed
Bit 4	CMGF Command Failed
Bit 5	CNMI Command Failed
Bit 6	CSQ Command Failed
Bit 7	COPS Command Failed
Bit 8	CPEE command Failed.
Bit 9	ATE command Failed
Status Bits for User Specific Initialization	
Bit 1 – Bit 12	If command(s) fails in the user script, a corresponding bit is set indicating failure. For example: Bit 1 is set when the first command in the script fails. Bit 2 is set when the 2nd command in the script fails.

SMS Message Buffer Register Settings

The Message Buffer Register holds the latest SMS message string sent or received by the controller. An individual SMS message can have up to 160 characters.

Message Buffer Register Settings	
Address	Enter the starting register location where the latest SMS message string is stored. This is a block of 80 registers that are consecutive in memory. For example, if you are using R101– R180, you need to enter the starting register address as %R0101.
Name	Enter (or select) an I/O Name.

SMS Configuration Parameters

Configuration Parameters	
Center Number	If required, select the box and type in Center number (up to 16 digits). The Center Number uses numbers 0 – 9 and these special characters: , () – +
SIM Pin Code	If required, select the box and type Pin number (up to 4 digits). SIM Pin Code can have only digits 0 – 9.
Command Interval	This is the interval of time (in seconds) that the OCS poll for messages (valid range: 1 - 100).

Additional SMS Settings

Be sure to click each button and perform the configuration procedures associated with each button.

Modem Initialization Settings

Configure this screen to select the type of Modem Initialization that is going to be used.

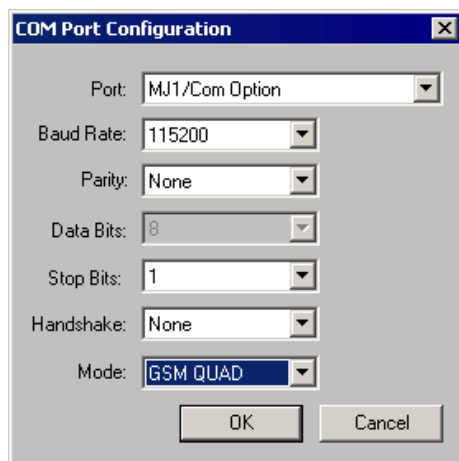
Configuration of **Initialization Status Register Settings** and **User Specific Modem Initialization Script** in the above screen is required when **User Initialization Script** is selected.

Modem Initialization Settings	
Modem Initialization Type	<p>The following options are available:</p> <p>No Initialization (Modem Preconfigured): No initialization of GSM modem will be done. Select this option if the attached GSM modem is pre-configured and does not require initialization.</p> <p>Internal Modem Initialization: Select this option if you have an XLe or XLt with internal modem.</p> <p>Siemens TC Modem Initialization: In case of external GSM modem, select this option.</p> <p>User Initialization Script: To use your own initialization script, select User Initialization Script. When User Initialization Script is selected, it is necessary to configure initialization status register and provide initialization script.</p> <p>The type of Modem Initialization used affects various settings that are available on the COM Port screen.</p>
Address	Enter the starting register address location used to store the additional modem initialization script's latest command executed. This is a block of 10 registers that are consecutive in memory. For example, if you are using R301 to R310, you need to enter the starting register address as %R301.
Name	Enter (or select) the I/O Name.
User Specific Modem Initialization Script	Enter your script in this box.

5.2.2 COM Port Settings

Note: Before configuring this screen, you need to configure the Modem Initialization Settings screen. The type of Modem Initialization used affects various settings that are available on the COM Port screen such as the Port, Baud Rate, and Mode.

After configuring the Modem Initialization Settings, configure the port to be used for communications.



COM Port Configuration

Port: MJ1/Com Option

Baud Rate: 115200

Parity: None

Data Bits: 8

Stop Bits: 1

Handshake: None

Mode: GSM QUAD

OK Cancel

The following selections must match the default settings of the modem you are using.

COM Port Configuration Settings	
Port	Select the desired port. The number of ports varies depending on the controller used. For an XLE or XLt internal modem MJ1 should be selected,
Mode	Select the connection mode. The drop-down list changes according to the port selection. For an XLe or XLt internal modem, this selection should be GSM QUAD. For an external GSM Modem, RS 232 should be selected.
Comm Settings	Select Baud Rate, Parity, Data Bits, Stop Bits and Handshake settings as per the default settings of the modem being used.

5.2.3 SMS Target Directory Settings

Before creating Send or Receive messages, a directory of phone numbers should be created. Configure the following screen to build a directory.

[illegible]

- Click **Add Contact** to add a member. See the following screen (**New Contact Information**).
- Click **Modify Contact** if a member is already added in the directory. To modify the member listing, either double-click the row or highlight the row and click **Modify Contact**. The **Modify Contact Information** screen appears and is configured as the **New Contact Information** screen shown below.
- Click **Delete Contact** to *remove* a listing after highlighting the row.

5.2.4 New Contact Information

New Contact Information [X]

Group Name: Maintenance

Phone Number: +919986733135

Phone Number Name:

Comments:
Fixed Maintenance Phone number..

OK Cancel

New Contact Information	
Group Name	Enter or select a Group Name. 1. It can contain characters A-Z, a-z, 0-9, and the _ underscore character. 2. The first character must be A-Z, a-z, or the _ underscore character. 3. Do not use spaces or special characters. 4. Do <i>not</i> use two consecutive underscore characters.
Phone Number	Enter a phone number <u>or</u> enter a register where the phone number is stored. <ul style="list-style-type: none"> If you want to change the phone number at runtime, you should enter a register address. The register address points to the location where you can dynamically change the phone number without having to perform the SMS configuration procedures again. Phone numbers can not have characters other than Numbers 0 through 9 and these special characters: , () - +. Phone numbers must <i>not</i> be more than 16 characters in length.
Phone Number Name	If you specify a register address in the Phone Number field, you can give the phone number an I/O name.
Comments	Add details for clarification.

- Click **Modify Contact** and **Delete Contact** buttons as needed.
- Click **OK** to see the contacts on the directory.

The following screen shows examples of contacts added to the directory.

The screenshot shows a window titled "SMS Target Directory" with a close button (X) in the top right corner. Below the title bar, it says "Configured Contact Information List:". There is a table with four columns: "Group Name", "Phone Number", "Phone Number Name", and "Comments". The table contains two rows of data:

Group Name	Phone Number	Phone Number Name	Comments
MAINTENANCE	+919986733135		Fixed Maintenance Phone number...
MAINTENANCE	%R0340	Operator	Modifiable Maintenance Phone No.

Below the table is a horizontal scrollbar. To the right of the table are three buttons: "Add Contact", "Modify Contact", and "Delete Contact". At the bottom right of the window are two buttons: "OK" and "Cancel".

With the directory created, you may begin creating send and receive messages.

5.2.5 Incoming Messages Settings (RECEIVE): (Messages sent from Groups to the controller)

Before creating send or receive messages, a directory needs to be created. After the directory is created, configure the following screen.

[illegible]

- Click **Add New Message** to add a new message.
- Click **Modify Message** to edit a message that is already on the list. Either double-click the row or highlight the row and click **Modify Message**.
- Click **Delete Message** to remove a message after highlighting the row.


In this example, the screen is already configured for a RECEIVE message.

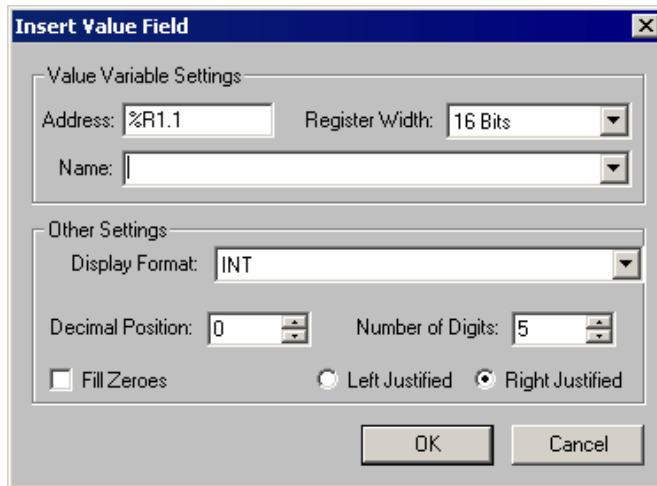
The screenshot shows a Windows-style dialog box titled "SMS Message Configuration". It has a standard close button (X) in the top right corner. The dialog is divided into three main sections:

1. **Notify Variable Settings**: This section contains two input fields. The first is labeled "Address:" and contains the text "%R1.1"; next to it is a small pink button with the text "F-BIT". The second field is labeled "Name:" and is currently empty.

2. **Message Attributes**: This section includes a dropdown menu labeled "Allowed Group:" which is set to "MAINTENANCE". To the right of this dropdown is a checked checkbox followed by the text "Ack Message".

3. **SMS Message Configuration**: This section features a label "Current Data Field Length:". Below it is a large grid composed of many small green squares. The top-left portion of the grid displays the text "Shutdown for Preventive Maintenance" in a black, monospaced font. At the bottom left of the dialog, there are three buttons: "OVR", "F2 = Insert Field", and "F3 = Insert Char". At the very bottom center are the "OK" and "Cancel" buttons.

SMS Message Configuration	
Trigger Variable Settings	Enter a <i>bit</i> reference in the Address field that will be set to high by the system when a valid SMS message associated with the trigger is received from the specified Group member. I/O name can be entered or selected in the Name field.
Message Attributes	 <p>Enter or select the group that can send an SMS message to the controller. Select the Ack Message check box if you want to send an acknowledgement to the user that the controller has received the message.</p>
SMS Message Configuration	<p>Messages can contain text and register data values that approved group members can read and write into the controller's data registers at runtime. See Rules for Send and Receive Messages.</p> <ul style="list-style-type: none"> The text of the message is entered starting in the upper most left block of the text input field (shown in green). In order to display register data values, click F2 = Edit Field button and configure the Insert Value Field screen shown below:



Insert Value Field	
Value Variable Settings	Enter a register reference where data embedded in the received message will be stored. Select Register Width .
Other Settings	<p>Select or enter the data type in the Display Format field. In the Decimal Position field, click the position of the decimal point. Click the number of digits in the Number of Digits. Example: xxxxx shows that there is no decimal and the total number of digits is 5.</p> <p>If there had been a decimal point in the example, the decimal would have counted as one digit and would be included as part of the total number of digits.</p> <p>Click the Fill Zeroes box and the Left Justified or Right Justified box if desired.</p>

Click **OK**, and you will be returned to the SMS Configuration screen. If satisfied with the message, click OK.

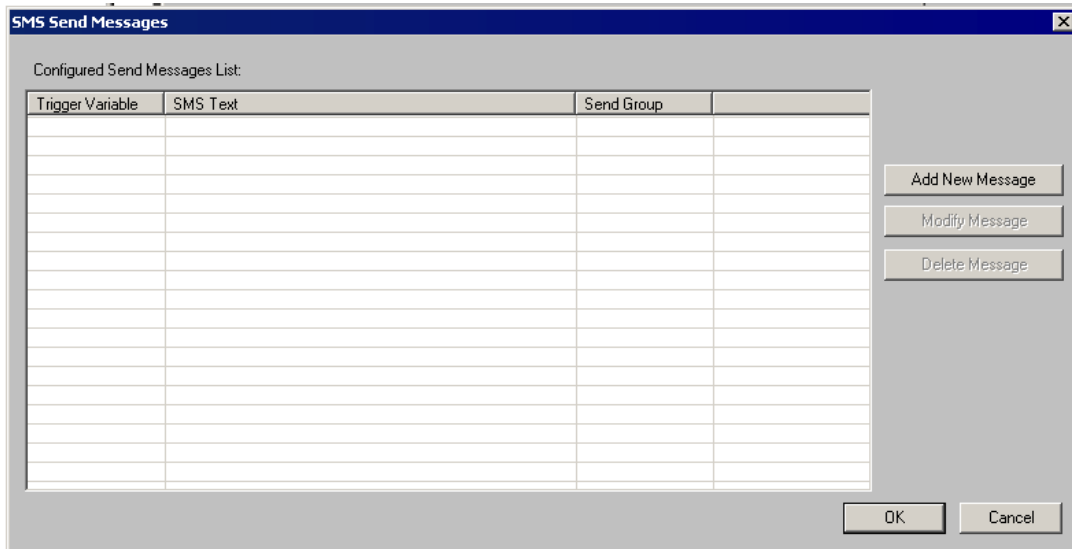
[illegible]

5.2.6 Outgoing Messages Settings (SEND):(Messages sent from the controller to Groups)

Note: Before creating send or receive messages, a directory needs to be created. After the directory is created, configure the following screen:

[illegible]

- Click **Add New Message** to add a new message.
- Click **Modify Message** to edit a message that is already on the list. Either double-click the row or highlight the row and click **Modify Message**.
- Click **Delete Message** to remove a message after highlighting the row.

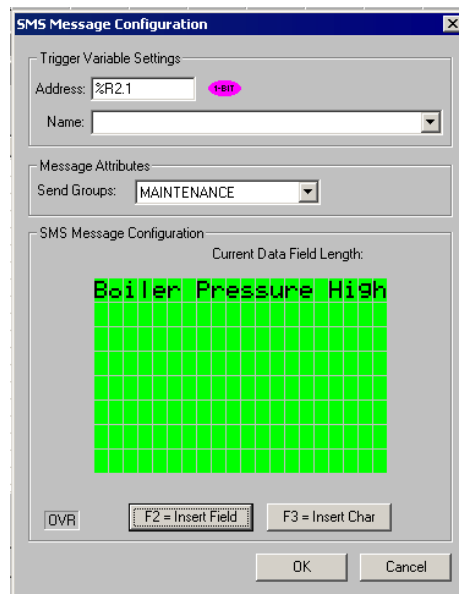


The **SMS Send Messages** dialog box features a table titled "Configured Send Messages List" with four columns: "Trigger Variable", "SMS Text", "Send Group", and an empty column. The table contains 15 empty rows. To the right of the table are three buttons: "Add New Message", "Modify Message", and "Delete Message". At the bottom right are "OK" and "Cancel" buttons.

Trigger Variable	SMS Text	Send Group	

When **Add New Message** or **Modify Message** is clicked, the following screen appears. In this example, the screen is already configured for a SEND message.

5.2.7 SMS Message Configuration



The **SMS Message Configuration** dialog box is divided into three sections. The "Trigger Variable Settings" section has an "Address" field with the value "%R2.1" and a "Name" dropdown menu. The "Message Attributes" section has a "Send Groups" dropdown menu with the value "MAINTENANCE". The "SMS Message Configuration" section has a "Current Data Field Length:" label and a green grid displaying the text "Boiler Pressure High". At the bottom are buttons for "OVR", "F2 = Insert Field", "F3 = Insert Char", "OK", and "Cancel".

SMS Message Configuration	
Trigger Variable Settings	An event is needed to trigger an SMS communication from the controller to the member(s) of a Group. Enter a bit reference in the Address field that (when set to HIGH) causes the SMS message associated with the trigger to be sent to the specified Group member(s). An I/O name can be entered or selected in the Name field.
Message Attributes	Enter or select the group that the SMS message is sent to.
SMS Message Configuration	<p>Messages can contain text and register data values that approved group members can read and write into the controller's data registers at runtime. See Rules for Send and Receive Messages.</p> <ul style="list-style-type: none"> The text of the message is entered starting in the upper most left block of the text input field (shown in green). In order to edit/add register data values, click F2 = Edit Field button and configure the Insert Value Field screen shown below:

5.2.8 Insert Value Field

Insert Value Field	
Value Variable Settings	Enter a register reference where the data embedded in the message to send will be stored. An I/O name can be entered or selected in the Name field. Select Register Width .
Other Settings	<p>Select or enter the data type in the Display Format field. In the Decimal Position field, click the position of the decimal point. Click the number of digits in the Number of Digits. Example: xx.xx shows that the decimal is in the 3rd position and the total number of digits (including the decimal) is 5.</p> <p>Click the Fill Zeroes box and the Left Justified or Right Justified box if desired.</p>

Click **OK**, and you are returned to the SMS Configuration screen. If satisfied with the message, Click OK.

5.2.9 SMS Send Message

[illegible]

5.2.10 Rules for SMS Send and Receive Messages

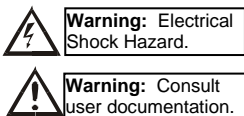
1. Up to 160 characters can be used in each SMS Message.
2. Up to 20 data register value fields can be included in each message.
3. When the SMS Configuration dialog is closed, if a send message or receive message is found to have been associated with a non-existing contact information group, then the user will be notified about the error and provided with an opportunity to fix the same.

6 GPRS / GSM Modem Specifications

HE-GSM04 SPECIFICATIONS			
Antenna Interface	Female SMA.		
Frequency bands	EGSM 900, DCS 1800, and PCS 1900, GSM 850 capability.		
GSM/GPRS features supported	Provides for all GSM/GPRS authentication, encryption, and frequency hopping algorithms. GPRS Coding Schemes CS1-CS4 supported. Multi-Slot Class 10 (4RX/2TX, Max 5 Slots).		
Regulatory Agency approvals	GCF Type Approval PTCRB Type Approval FCC Certification (Part 24) RTTE CE (European Community Certification) IC (Industry Canada) Approval		
GSM/GPRS Functionality	Mobile-originated and mobile-terminated SMS messages: up to 140 bytes or up to 160 GSM 7-bit ASCII characters. Reception of Cell Broadcast Message SMS Receipt acknowledgement Circuit Switched Data (Transparent & Non-transparent up to 9.6 Kbps) Voice (EFR, FR, HR) Supports Unstructured Supplementary Service Data (USSD) Multi-Slot Class 10 Supported (4Rx/2Tx), (5 Slot Max) PBCCH/PCCCH Supported.		
SIM	3 V Mini-Subscriber Identity Module (SIM) compatible		
Size (L x W)	82.3 mm x 34.6 mm x 3.1 mm		
Weight	Less than 80 grams		
Operating & Storage temperature	0°C to +60°C (Operating) -10°C to +85°C (Storage)		
Relative humidity	5 - 95%		
Air pressure (altitude)	70 kPa to 106 kPa (-400 m to 3000 m)		
Transmit Power	Frequency	Power Class	Transmit Power
	1900 MHz 1800 MHz	GSM Power Class 1	1-W conducted power maximum (30 dBm +/- 2 dB), measured at the antenna port
	850 MHz 900 MHz	GSM Power Class 4	2-W conducted power maximum (33 dBm +/- 2 dB), measured at the antenna port
Receive Power	Frequency	Sensitivity	Mode
	1900 MHz 1800 MHz	-106 dBm (typical)	GPRS Coding Scheme 1 (CS1)
	850 MHz 900 MHz	-106 dBm (typical)	GPRS Coding Scheme 1 (CS1)

7 Installation / Safety

When found on the product, the following symbols specify:



WARNING: To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.

WARNING: To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the voltage measurement inputs. Be sure to locate fuses as close to the source as possible.

WARNING: Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.

WARNING: In the event of repeated failure, do not replace the fuse again as a repeated failure indicates a defective condition that will not clear by replacing the fuse.

WARNING: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

☐ All applicable codes and standards need to be followed in the installation of this product.

☐ Adhere to the following safety precautions whenever any type of connection is made to the module:

- ✓ ▪Connect the safety (earth) ground on the power connector first before making any other connections.
- ✓ ▪When connecting to electric circuits or pulse-initiating equipment, open their related breakers.
- ✓ ▪Do not make connections to live power lines.
- ✓ ▪Make connections to the module first; then connect to the circuit to be monitored.
- ✓ ▪Route power wires in a safe manner in accordance with good practice and local codes.
- ✓ ▪Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
- ✓ ▪Ensure hands, shoes, and floor are dry before making any connection to a power line.
- ✓ ▪Make sure the unit is turned OFF before making connection to terminals.
- ✓ ▪Make sure all circuits are de-energized before making connections.
- ✓ ▪Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.

8 Technical Support

TECHNICAL SUPPORT

For assistance, contact Technical Support at the following locations:

EUROPE
Email: tech.support@horerirl.ie
Fax: +353 (0)21 4321 826
Tel : +353 (0)21 4321 266
Website : <http://www.horner-apq.com>

USA
Email: techspt@heapg.com
Fax: +1 317 916 4274
Tel: +1 317 916 4297
Website : <http://www.heapg.com>

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