IQ4/XNC Mbus Driver Manual

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1 ABOUT THIS MANUAL

This document refers to the IQ4/XNC Mbus Serial Driver v1.0, and the IQ4/XNC Mbus TCP/IP Driver v1.0. It describes the process of installing and configuring an IQ4/XNC with an Mbus (MeterBus) driver. It is assumed that you are familiar with IQ4 configuration, SET, and Mbus.

1.1 Conventions Used in this Manual

The conventions below are designed to make it both quick and easy to find and understand the information.

- Menu commands are in **bold** type.
- Buttons, and options in dialogue boxes that you need to select are in **bold** type.
- The names of text boxes and dialogue boxes are in **bold** type.
- Key combinations that you should press appear in normal type. If joined with a plus sign (+), press and hold the first key while you press the remaining one(s). For example CTRL+P indicates holding down the control key while pressing P.
- Text you should enter is in *Italic* type.

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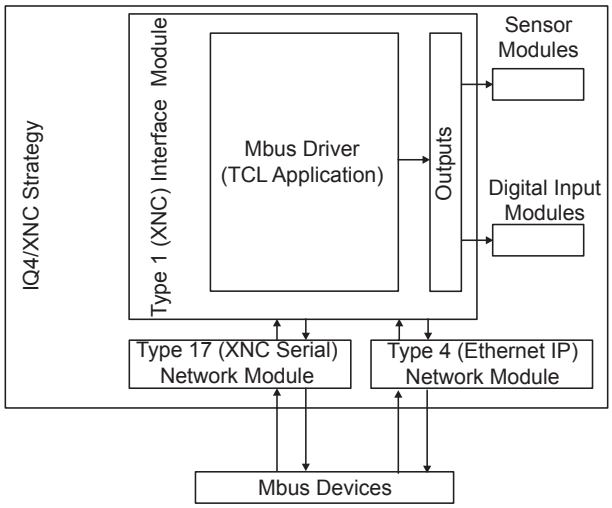
2 ABOUT THE IQ4/XNC MBUS DRIVER

IQ4/XNC Mbus Driver is a TCL application for Trend's IQ4/XNC that enables values from devices on Mbus to be read into the strategy of an IQ4/XNC. The driver is designed specifically for use with Mbus meters.

The driver interrogates the devices using their secondary address, reads the data map from each device and stores the values in the IQ4/XNC's Type 1 (XNC) Interface module outputs. These objects can then be used in the IQ4/XNC's strategy.



The driver reads all the values in the data map from each device and stores them in the outputs. The number outputs available for each device is a common for all devices but can be changed. For example it could be changed to allow more values to be read from each device. This will reduce the maximum number of devices that can be accessed.

Note: The total number of outputs cannot exceed the limit for the driver.

The first output for each device contains the communications status of the device, and the label of this output will contain device's secondary address and the date and time of the last good read.

2.1 Variants

There are four variants of the driver with different numbers of devices, outputs, and different communications options. See the table below.

Communications Option	*Devices*	*Total Outputs*	*BrIQs Required*
TCP/IP	9	120	11110
TCP/IP	55	450	12990
Serial	9	120	9110
Serial	55	450	10990

Each driver variant uses a different number of BrIQs, allows a different number of devices, and has a different number of outputs. When selecting which driver variant to use you should consider the number of BrIQs available in the IQ4/XNC that is to be used, the method of connecting to the Mbus, number of devices that are to be communicated with, and number of outputs to the strategy.

For details of the number of BrIQs available in the IQ4/XNC see the IQ422/.../XNC/...Interface Data Sheet (TA201346).

2.2 Configuration

The driver is configured using SET. The configuration involves specifying the values to be read and the Type 1 (XNC) Interface module's outputs, using codes in the Type 1 (XNC) Interface module's stores. The Type 1 (XNC) Interface module's outputs must also be linked the to required place in the IQ4's strategy, and the strategy configured as required.

The communication settings used for communications over the Mbus are specified in the Type 1 (XNC) Interface module's stores. They determine the necessary information for communications. In the case of the TCP/IP variants they also determine the server being used to connect to the Mbus. If required other servers can be specified enabling the driver to connect to more than one server.

Note: The driver can only connect to one server at a time.

2.3 Connection to Mbus

Connection to the Mbus is made from the IQ4/XNC using either a serial connection or a TCP/IP connection.

For a TCP/IP connection an Mbus server is required. The TCP/IP version of the driver enables more than one server to be used by changing from one server to another. However a delay of 100 seconds is necessary to switch from one server to another

For serial connections if the meter requires a real Mbus connection then a serial to Mbus converter is required. If the meter only requires a serial connection (connects using a serial connection but communicates with Mbus protocol) a converter is not needed. It is only necessary to connect a single meter in this way other meters on the bus communicate with the IQ4/XNC through the meter that is connected. A maximum of 32 meters can be connected in this way and there is maximum distance of 1000 m between the IQ4/XNC and the last meter. When using a serial RS232 connection only one meter can be connected to the IQ4/XNC with a max distance of 20 m - **"Connect the IQ4/XNC to the Mbus Devices" on page 15**.

2.4 Compatibility

For details of the information the driver can access, the Supported Mbus Objects (VIF and DIF), supported meters, and compatible IQ4 controllers see the IQ4/XNC Mbus Driver Data Sheet (TA201376)

3 INSTALL THE IQ4/XNC MBUS DRIVER FILES

The IQ4/XNC Mbus Driver solutions are installed as part of the SET 7.0 or greater installation.

4 CONFIGURATION PROCESS

Before starting you must have: a suitable version of SET (v7.0 or greater), the Mbus driver, an IQ4/XNC, and a converter or server to interface between the IQ4/XNC and the Mbus.

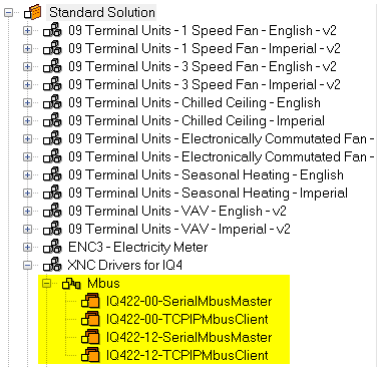
The driver can be loaded into a SET project using a solution from the Strategy Library or by adding an IQ4/XNC to your project and specifying the required driver in the TCL module. Configuring the driver using a solution is the simplest method but requires a standard strategy to have been configured together with the driver. Four solutions are provided within the SET applications library standard solutions for the purpose of getting started or communications testing. Each of these contains sensors, digital inputs, knobs and switches already connected to the outputs and inputs of the TCL module so that data points may be read and written having configured the TCL module stores.

4.1 Configure the Driver Using a Solution

The process below describes how to configure the driver using a solution.

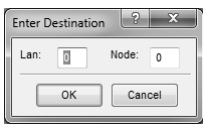
To configure the driver using a solution:

1. Install the Mbus devices which are to be communicated with according to the manufacturer's installation information.
2. Install the IQ4/XNC as described in supplied installation instructions
3. Connect the IQ4/XNC to the Mbus devices - see **"Connect the IQ4/XNC to the Mbus Devices" on page 15**.
4. Choose the required driver - see **"Select the Driver" on page 17**.
5. Run SET and view the **Strategy Library**.
6. In the **Standard Solution** area expand 'XNC Drivers' groups, and open the 'Mbus' sub group. All the solutions for the IQ4/XNC Mbus Driver are displayed.



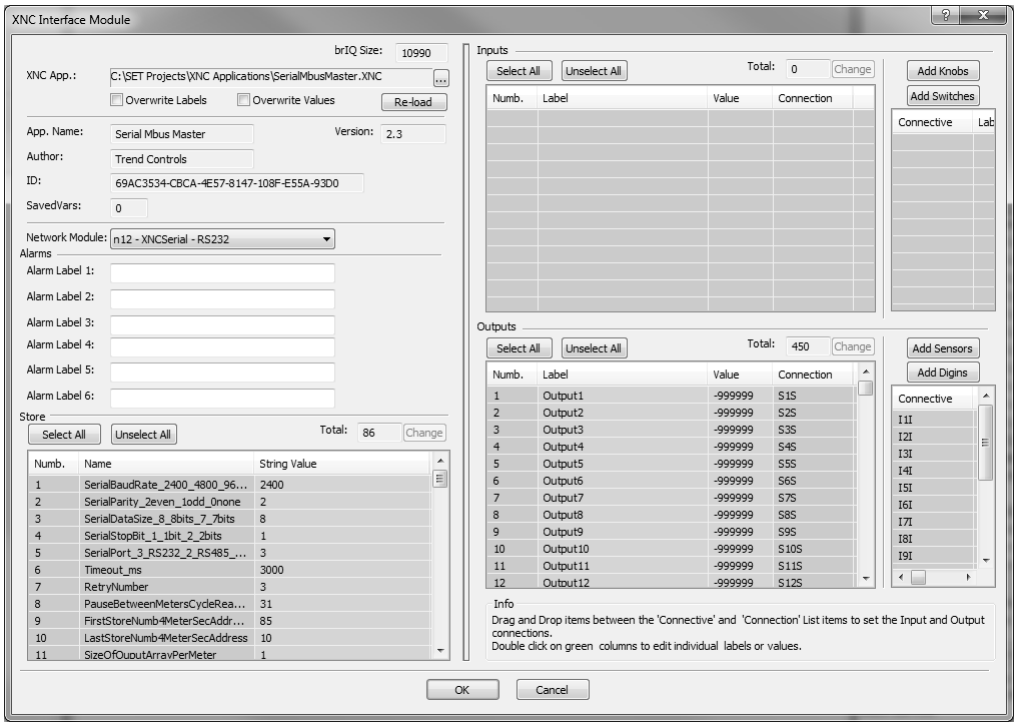
Driver Name	*Solution*
XactTCPIPMbusClient	IQ422-12-TCPIPMbusClient in the 'Mbus' sub group of the 'XNC Drivers for IQ4' group in the Standard Solution area.
TCPIPMbusClient	IQ422-00-TCPIPMbusClient in the 'Mbus' sub group of the 'XNC Drivers for IQ4' group in the Standard Solution area.
XactSerialMbusMaster	IQ422-12-SerialMbusMaster in the 'Mbus' sub group of the 'XNC Drivers for IQ4' group in the Standard Solution area.
SerialMbusMaster	IQ422-00-SerialMbusMaster in the 'Mbus' sub group of the 'XNC Drivers for IQ4' group in the Standard Solution area.

7. Right click the required solution, and click **Copy to Project**. The **Enter Destination** dialogue box is displayed.



8. In the **Lan** box enter the LAN number for the new controller (0 to 119 excluding addresses 2, 3, and 10).
9. In the **Node** box enter the network address of the controller (1 to 119 excluding addresses 2, 3, and 10).
10. Click **OK**. The controller will be added to the project with the strategy defined in the solution.

11. Display a strategy page for the IQ4/XNC, by right-clicking the page, pointing to **Device** and clicking **XNC Interface Module**. The **XNC Interface Module** dialogue box is displayed.



12. Configure the driver's communication settings by double-clicking the string value for each store and entering the required value - see **"Configure the Driver's Communication Settings" on page 19**.
13. Configure the device details by double-clicking the string value for each store and entering the required value. See **"Configure Device Details" on page 21**.
14. Configure the driver's output labels to make identification of the outputs easier by double clicking the output's label in the **Outputs** area, entering the new label and clicking **OK**- see **"Configure Output Labels" on page 23**.
15. Click **OK** to close the **XNC Interface Module** dialogue box.
16. Configure the IQ4/XNC's strategy as required. The solution includes digital input and sensor modules already linked to the XNC interface module's outputs. If required you can delete modules linked to outputs you are not using. For details of configuring the strategy of an IQ4/XNC see the SET Manual (TE200147) and **"Configure the IQ4/XNC Strategy" on page 25**.

    If you are reading the comms status from the device it needs to be linked into the strategy as required so that the required action can be carried out. This is done by linking the connective linked to the TCL output to which the comms status is written to the appropriate part of the alarm handling strategy.

17. Download the strategy - see **"Download the Strategy" on page 26**.

4.2 Configure the Driver by Adding an IQ4/XNC to the Project

When a driver is added using a solution (see **"Configure the Driver Using a Solution" on page 11**) the driver is placed in the project directory. This enables it to be manually added to the controller's TCL Module.

To configure the IQ4/XNC Mbus Driver by adding an IQ4/XNC to the project:

1. Install the Mbus devices which are to be communicated with according to the manufacturer's installation information.
2. Install the IQ4/XNC as described in the supplied installation instructions.
3. Connect the IQ4/XNC to the Mbus devices - see **"Connect the IQ4/XNC to the Mbus Devices" on page 15**.
4. Configure the driver - see **"Configure the IQ4/XNC Mbus Driver" on page 17**.
5. Configure the IQ4/XNC's strategy. For details of configuring the strategy of an IQ4/XNC see the SET Manual (TE200147) and **"Configure the IQ4/XNC Strategy" on page 25**.

5 CONNECT THE IQ4/XNC TO THE MBUS DEVICES

The connection of the IQ4/XNC to the Mbus devices can be made using either a serial connection or a TCP/IP connection. The type of connection used will determine which variant of the driver is used. Only one of the IQ4/XNC's RS232 connectors can be used at a time, and it is not possible to use RS232 and RS485 connectors at the same time. For more details of connection see the appropriate IQ4 installation instructions.

5.1 Connect to the Mbus Devices Using a Serial Connection

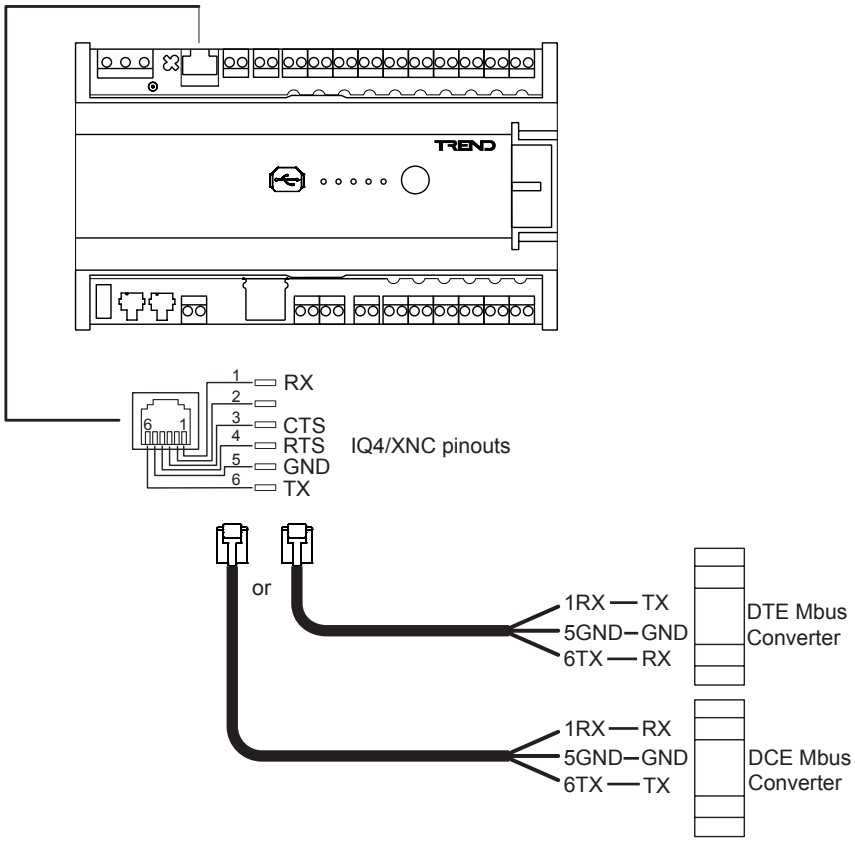
When connecting using a serial connection there are two different options.

- If the meter requires a real Mbus connection (communicates using Mbus electrical specification and protocol) a serial to Mbus converter is required. This connection is usually made using RS232.
- If the meter only requires a serial connection but communicates using the Mbus protocol a converter is not needed. This connection is usually made using an RS485 connection. It is only necessary to connect a single meter in this way other meters on the bus communicate with the IQ4/XNC through the meter that is connected. A maximum of 32 meters can be connected in this way and there is maximum distance of 1000 m between the IQ4/XNC and the last meter.

To connect to the Mbus devices using a serial connection:

1. Install the IQ4/XNC as described in supplied installation instructions
2. Identify whether a converter is required. If one is required install the Mbus converter as described in the manufacturer's documentation and connect it to the Mbus.
3. Connect the IQ4/XNC to the converter or meters via its RS232 or RS485 connectors as shown below.

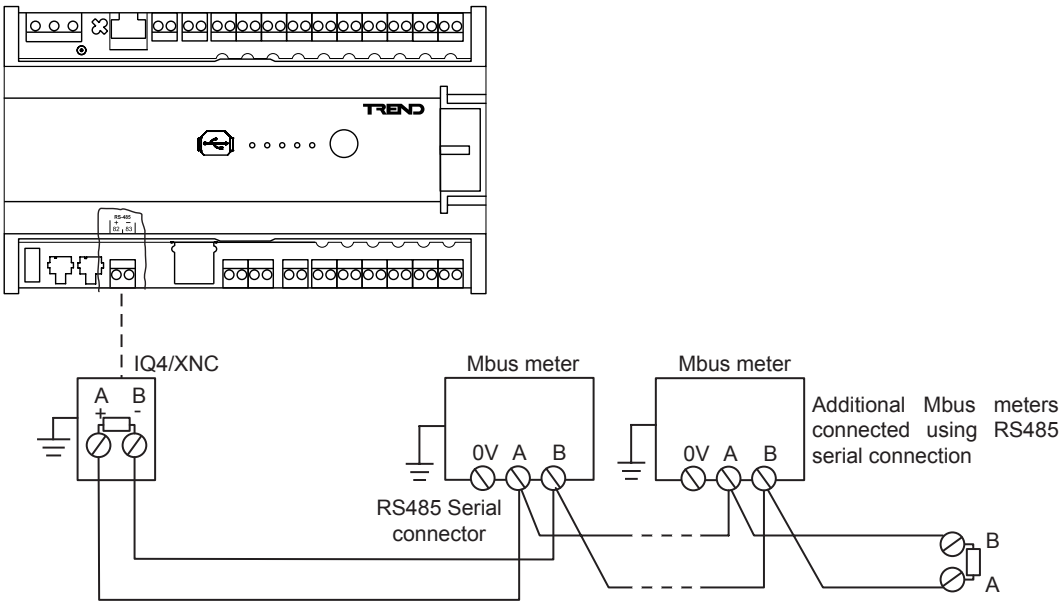
RS232 with RJ11 connector to Mbus converter (For meters that require a real Mbus connection)



The pinouts shown are those for the IQ4/XNC. If connecting to a DTE Mbus converter pin 1 (RX) is connected to the TX terminal on the Mbus converter. Pin 6 (TX) is connected to the RX terminal on the Mbus converter. Pin 5 (GND) is connected to the GND terminal on the Mbus converter.

If connecting to a DCE Mbus converter pin 1 (RX) is connected to the RX terminal on the Mbus converter. Pin 6 (TX) is connected to the TX terminal on the Mbus converter. Pin 5 (GND) is connected to the GND terminal on the Mbus converter.

2 wire RS485 without converter (For meters that connect using an RS485 serial connection but communicate using Mbus protocol)

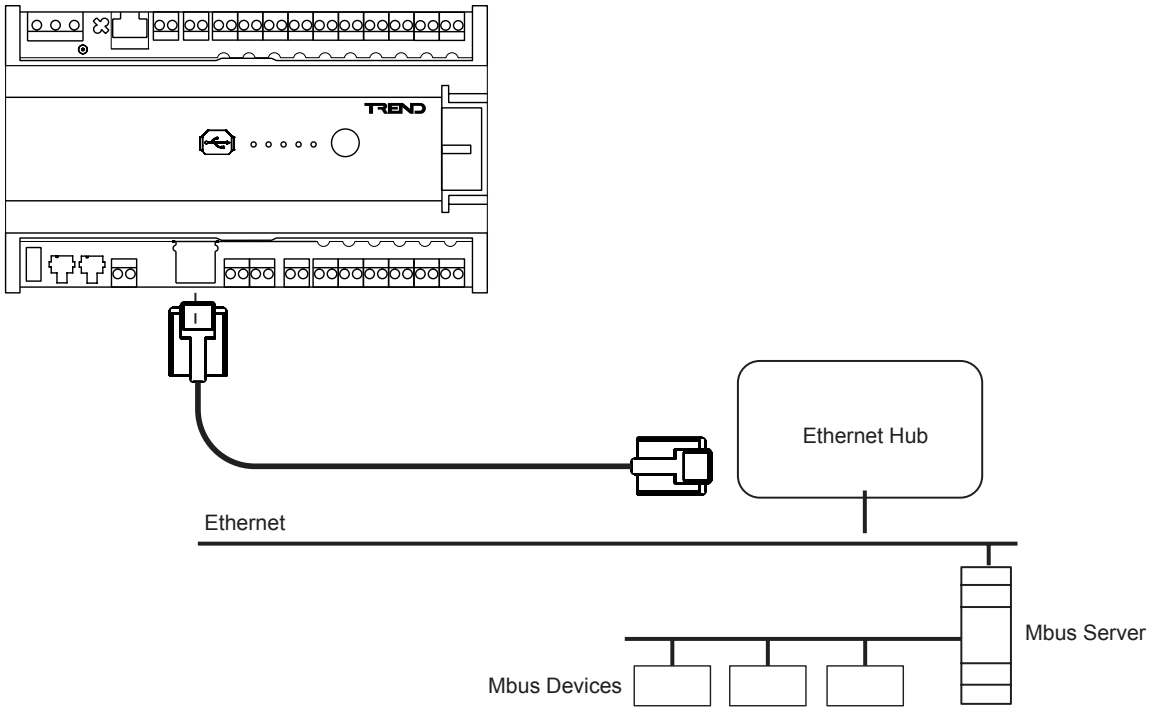


5.2 Connect to the Mbus Devices Using a TCP/IP Connection

When connecting using a TCP/IP connection a Mbus server is required. Connection between the server and the IQ4/XNC is over Ethernet using the IQ4/XNC's Ethernet connector.

To connect to the Mbus devices using a TCP/IP connection:

1. Install the IQ4/XNC as described in supplied installation instructions ensuring that it is able to communicate on the Ethernet network.
2. Install the Mbus server as described in the manufacturer's documentation and connect it to the Mbus and Ethernet network.



Note: There must be an IP connection between the IQ4 and the Mbus server.

6 CONFIGURE THE IQ4/XNC MBUS DRIVER

Configuration of the IQ4/XNC Mbus Driver can be broken down into the following steps:

Select the Driver
Add the Driver to the IQ4/XNC
Configure the Driver's Communication Settings
Configure Device Details
Configure Output Labels

6.1 Select the Driver

The driver is available with two different communications options (TCP/IP, and serial) and in two different sizes (9 devices and 55 devices) making a total of four different variants of the driver. The variants are functionally the same, the only difference is the number devices, outputs available and the communications method. Each driver variant requires a different amount of BrIQs in the IQ4/XNC.

Communications Option	*Devices*	*Total Outputs*	*BrIQs Required*	*Driver Filename*
TCP/IP	9	120	11110	XactTCPIPMbusClient.XNC
TCP/IP	55	450	12990	TCPIPMbusClient.XNC
Serial	9	120	9110	XactSerialMbusMaster.XNC
Serial	55	450	10990	SerialMbusMaster.XNC

When deciding which variant of the driver to use you should consider the following:

Communication option
Number of devices and outputs required
Driver and strategy size

Communication option
Decide which communications option is required (TCP/IP or serial). This depends on the type of converter used to make the connection between the IQ4/XNC and the Mbus.

Number of devices and outputs required
Consider the number of devices required, and the number of values that are to be read from each one and pick a variant of the driver that provides the required level of support.

Driver Filename	*Devices*	*Total Outputs*	*Reserved Outputs*	*Available Outputs/Device*
XactTCPIPMbusClient.XNC	9	120	1 for comms status	12
TCPIPMbusClient.XNC	55	450		7
XactSerialMbusMaster.XNC	9	120		12
SerialMbusMaster.XNC	55	450		7

The driver reads all the values in the data map from each device and stores them in the outputs. If the data map contains more values than there are outputs available for the device the last values in the data map will not be available. The first output for each device contains the communications status of the device, and the label of this output will contain device's secondary address and the date and time of the last good read.

The number outputs available for each device is a common setting for all devices. This value can be changed to allow more values to be read from each device. This will reduce the maximum number of devices that can be accessed. E.g. if using the larger variant of the driver (55 devices and 450 outputs) to read information from 30 devices that return 10 values the number of outputs per device could be set to 11. This would allow the 10 values from each device plus the reserved output and the time and date of the last good read which is a total of 330 outputs.

Note: The total number of outputs cannot exceed the limit for the driver.

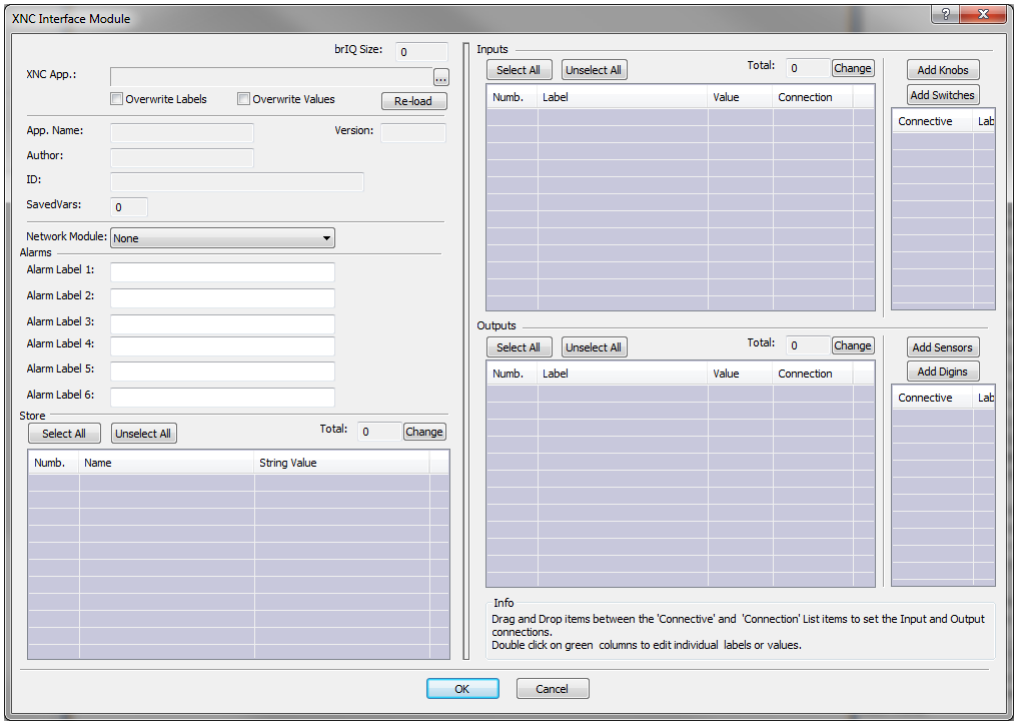
Driver and strategy size
As different variants of the IQ4/XNC have a different number of BrIQs available for use by the driver and strategy you must also consider the number of BrIQs required for the driver, and any strategy that is required. If most of the IQ4/XNC's BrIQs are used by the driver there may not be enough available for the strategy. In this case you should consider using the smaller version of the driver with several IQ4/XNCs, or use an IQ4/XNC with a higher BrIQ count.

6.2 Add the Driver to the IQ4/XNC

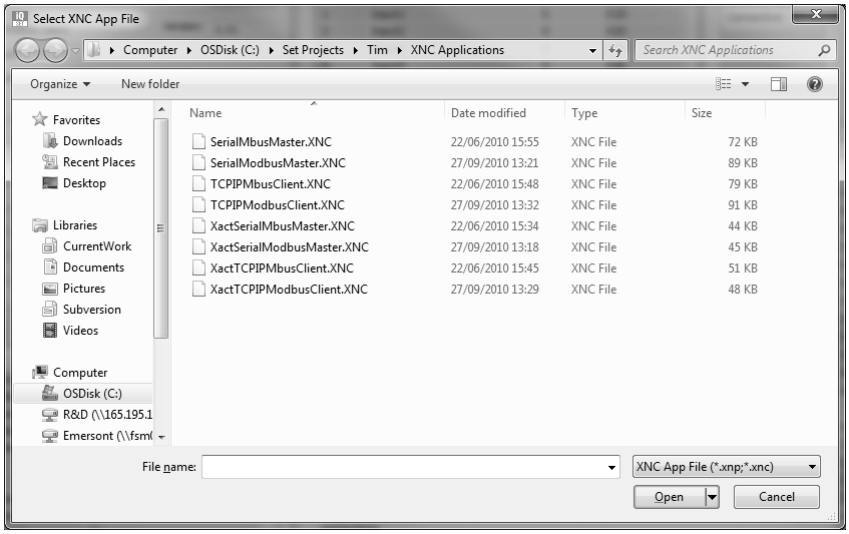
Having selected the required driver as described in the **'Select the Driver'** section of this manual it must be added to the IQ4/XNC.

To add the driver to the IQ4/XNC:

1. Run SET and open the required SET project, or create a new one as described in the SET Manual (TE200147).
2. Add the required IQ4/XNC to the project as described in the 'Add Controllers Manually' section of the SET Manual (TE200147).
3. Display a strategy page for the IQ4/XNC's strategy.
4. Right-click a strategy page, point to **Device** and click **XNC Interface Module**. The **XNC Interface Module** dialogue box is displayed.

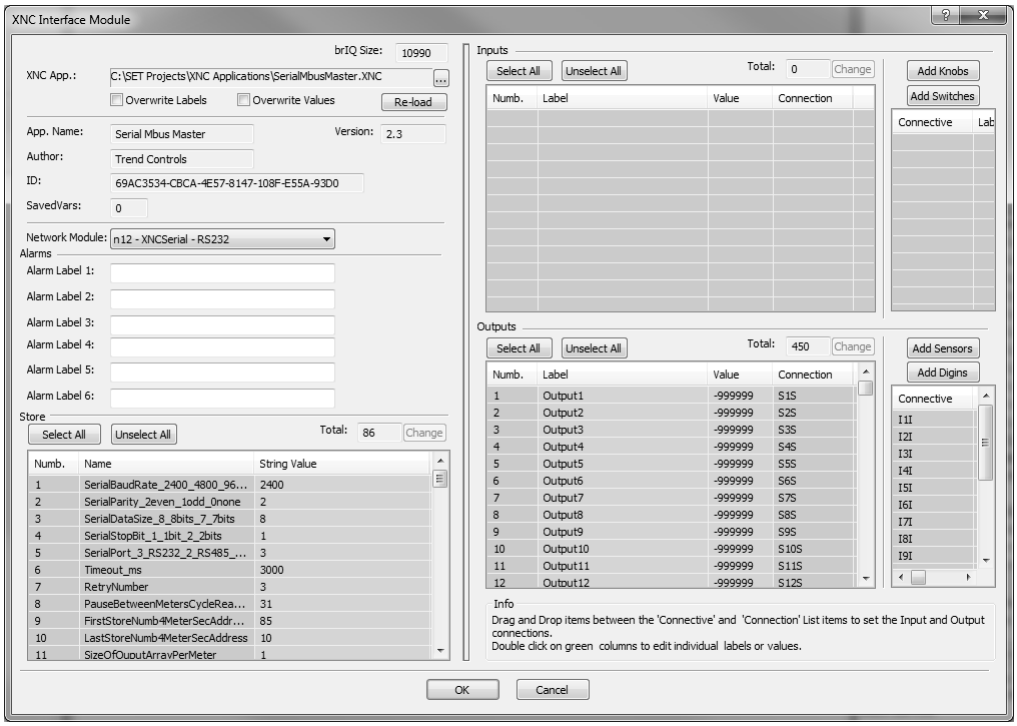


5. Click . The **Select XNC App File** dialogue box is displayed.



6. Navigate to the 'c:\program files\trend control systems\xnc applications' folder by clicking the drive, or folder in the **Look in** box.
7. In the folder list click the file for the required driver.

8. Click **Open**. The TCL application for the driver will be loaded. Details of the application's name, author, and ID are also displayed in the appropriate boxes; all of these are read only.



9. Check that the correct driver variant has been selected by checking the file specified in the **XNC App** box.
10. Click **OK**.

6.3 Configure the Driver's Communication Settings

To configure the driver's communication settings:

1. Run SET, open the SET project, display a strategy page for the IQ4/XNC, right-click a strategy page, point to **Device** and click **XNC Interface Module**. The **XNC Interface Module** dialogue box is displayed.
2. Double-click the string value for each store and enter the required value. The tables below describe how each of the stores should be set up.
3. Click **OK**.

Serial Drivers (XactSerialMbusMaster.XNC and SerialMbusMaster.XNC)

The communications settings for the driver's two serial variants are configured by setting the values of stores 1 to 8.

Store Number	*Setting*	*Description*
1	SerialBaudrate_2400_4800_9600_19200	The baud rate of communications between the IQ4/XNC and the Mbus (range 2400, 4800, 9600 or 19200). Normally 2400.
2	SerialParity_2even_10dd_0none	The parity for communications between the IQ4/XNC and the Mbus (range 0, 1, or 2). 0 = no parity, 1 = odd, and 2 = even. Normally 2.
3	SerialDataSize_8_8bits_7_7bits	The number of data bits for communications between the IQ4/XNC and the Mbus (range 7 or 8). 8 = 8 Bits, 7 = 7 Bits. Normally 8.
4	SerialStopBit_1_1bit_2_2bits	The number of stop bits for communications between the IQ4/XNC and the Mbus (range 1 or 2). 1 =1 stop bit, 2 = 2 stop bits. Normally 1.
5	SerialPort_3_RS232_2_RS485_1_RS422	The port type for communications between the IQ4/XNC and the Mbus (range 1, 2, or 3). 1 = RS485 (4-wire), 2 = RS485 (2-wire), 3 = RS232.

Store Number	*Setting*	*Description*
6	Timeout_ms	The timeout in milliseconds for communications between the IQ4/XNC and the Mbus. If the device fails to respond to XNC requests for a period greater than the Timeout_ms time The RetryNumber the COM status output is set to '1'. If communication is successful, it is set to '0'
7	RetryNumber	The number of retries before a COM error is reported.
8	PauseBetweenMetersCycleReading_ms	Specifies the time in milliseconds between reads of a device. It is the time the TCL waits between looping round the stores specified by FirstStoreNumb4MeterSecAddress and LastStoreNumb4MeterSecAddress It is important if the devices are powered by battery as some manufacturers limit the number of requests that the device can respond to each day in order to preserve battery life.

TCP/IP Driver (XactTCPIPMbusClient.XNC and SerialMbusMaster.XNC)

The communications settings for the driver's TCP/IP variants are configured by setting the values of stores 1, 2, 3, 6, 7, 8 and 31.

Store Number	*Setting*	*Description*
1	DelayToConnectServer	The time required to connect to the server (the default value should be suitable). If the Mbus server does not authorise connection to the IQ4/XNC in the time specified the COM status output specified in the slave address store is set to '1'. If the server does not authorise the connection to the IQ4/XNC the COM status output is set to '0'.
2	DelayToDisconnectServer	Tme required to close the socket (default value should be suitable).
3	PauseBetweenServerConnection_ms	The length of time in milliseconds between server connections.
6	Timeout_ms	The maximum wait time in milliseconds for a response from an Mbus request.
7	RetryNumber	The number of retries before a COM error is reported.
8	PauseBetweenMeterPolling_ms	Specifies the time in milliseconds between reads of a device. It is the time the TCL waits between one data request and the next. It is important if the devices are powered by battery as some manufacturers limit the number of requests that the device can respond to each day in order to preserve battery life
31	ServerAddress#Port#ERR#GAT#MSP	The IP address of the server containing the Mbus device information, the TCP port used for the connection, and the output used to store the communications status. The information must be specified in the format below: ADDR:<IP Address>#<Port Number>#ERR<Output Number>#GAT<converter secondary address>#MSP<Mbus Speed> <IP Address> The server's IP address in the form xxx.xxx.xxx.xxx. <Port Number> The TCP port used for communications. <Output Number> The TCL output the communications status is written to. <converter secondary address> and <Mbus Speed> only available for the TCP/IP variants of the driver, and are only required if the server requires the speed of the Mbus to be specified to enable it to be initialised. <converter secondary address> Specifies the secondary address of the Mbus TCP/IP server <Mbus Speed> specifies the speed of the Mbus (300, 600, 1200, 2400, 4800). E.g. ADDR:192.168.1.1#502#ERR400

6.4 Configure Device Details

The device details are the same for all four variants of the driver. They determine the devices that are to be communicated. They are configured by setting the values of stores 9 to 40 or 9 to 86 depending on the driver selected.

To configure the device details:

1. Run SET, open the SET project, display a strategy page for the IQ4/XNC, right-click a strategy page, point to **Device** and click **XNC Interface Module**. The **XNC Interface Module** dialogue box is displayed.
2. Double-click the string value for each store and enter the required value.
3. Click **OK**.

Store Number	*Setting*	*Description*
9	FirstStoreNumb4MeterSecAddress	The number of the store containing the secondary address of the first device in the range of stores used to specify the address of the devices to be read. The secondary address is normally the serial number. If in doubt refer to the device's documentation. For more details - see **"FirstStoreNumb4MeterSecAddress and LastStoreNumbMeter4SecAddress" on page 23**.
10	LastStoreNumbMeter4SecAddress	The number of the store containing the secondary address of the last device in the range of stores used to specify the address of the devices to be read. The secondary address is normally the serial number. If in doubt refer to the device's documentation. For more details - see **"FirstStoreNumb4MeterSecAddress and LastStoreNumbMeter4SecAddress" on page 23**.
11	SizeOfOutputArrayPerMeter	The number of outputs reserved for each device. For more details - see **"SizeOfOutputArraryPerMeter" on page 23**.
12	LabelAndUnitHandleByDriver_1Yes_0No	Specifies whether the labels and units are obtained from the device, or defined in SET. When set to '1' the units labels are obtained from the device. When set to '0' the units labels are defined in SET.
13 to 18	Not used	
19	VIF0to1_Energy#MWh	If LabelAndUnitHandleByDriver_1Yes_0No=1 the label and units of outputs linked to VIF 0 to 1 energy type values with units of MWh will be set to those specified by this store. The text before # specifies the label, and the text after specifies the units.
20	VIF0to7_Energy#KWh	If LabelAndUnitHandleByDriver_1Yes_0No=1 the label and units of outputs linked to VIF 0 to 7 energy type values with units of KWh will be set to those specified by this store. The text before # specifies the label, and the text after specifies the units.
21	VIF8to15_Energy#KJ	If LabelAndUnitHandleByDriver_1Yes_0No=1 the label and units of outputs linked to VIF 8 to 15 energy type values with units of KJ will be set to those specified by this store. The text before # specifies the label, and the text after specifies the units.
22	VIF16to23_Volume#M3	If LabelAndUnitHandleByDriver_1Yes_0No=1 the label and units of outputs linked to VIF 16 to 23 volume type values with units of M3 will be set to those specified by this store. The text before # specifies the label, and the text after specifies the units.

Store Number	*Setting*	*Description*
23	VIF24to31_Mass#Kg	If LabelAndUnitHandleByDriver_1Yes_0No=1 the label and units of outputs linked to VIF 24 to 31 mass type values with units of Kg will be set to those specified by this store. The text before # specifies the label, and the text after specifies the units.
24	VIF40to47_Power#Kw	If LabelAndUnitHandleByDriver_1Yes_0No=1 the label and units of outputs linked to VIF 40 to 47 power type values with units of Kw will be set to those specified by this store. The text before # specifies the label, and the text after specifies the units.
25	VIF48to55_Power#KJh	If LabelAndUnitHandleByDriver_1Yes_0No=1 the label and units of outputs linked to VIF48 to 55 power type values with units of KJh will be set to those specified by this store. The text before # specifies the label, and the text after specifies the units.
26	VIF56to63_Volume Flow#M3h	If LabelAndUnitHandleByDriver_1Yes_0No=1 the label and units of outputs linked to VIF 56 to 63 volume flow type values with units of M3h will be set to those specified by this store. The text before # specifies the label, and the text after specifies the units.
27	VIV88to91_FlowTemp#DegC	If LabelAndUnitHandleByDriver_1Yes_0No=1 the label and units of outputs linked to VIF 88 to 91 flow temperature type values with units of DegC will be set to those specified by this store. The text before # specifies the label, and the text after specifies the units.
28	VIF92to95_ReturnTemp#DegC	If LabelAndUnitHandleByDriver_1Yes_0No=1 the label and units of outputs linked to VIF 92 to 95 return temperature type values with units of DegC will be set to those specified by this store. The text before # specifies the label, and the text after specifies the units.
29	VIF96to99_Temp Difference#K	If LabelAndUnitHandleByDriver_1Yes_0No=1 the label and units of outputs linked to VIF 96 to 99 temperature difference type values with units of K will be set to those specified by this store. The text before # specifies the label, and the text after specifies the units.
30	VIF110_HeatCostAllocator#HCA	If LabelAndUnitHandleByDriver_1Yes_0No=1 the label and units of outputs linked to VIF 110 heat cost allocator type values with units of HCA will be set to those specified by this store. The text before # specifies the label, and the text after specifies the units.
31 to 40 or 31 to 86 depending on driver.	MeterSecondaryAddress	The secondary addresses of the devices that are to be communicated with. A separate store is used for each device. If the secondary address is less than 8-characters, zeros (0) must be used to make it 8-characters long. E.g. if the secondary address is 12412, enter 00012412 as the store value. The secondary address is normally the serial number. If in doubt refer to the device's documentation. For TCP/IP variants can contain the details of a new connection - see **"MeterSecondaryAddress" on page 23**l.

FirstStoreNumb4MeterSecAddress and LastStoreNumbMeter4SecAddress

These parameters are used to delimit the list of devices to be interrogated. Therefore if you are not using the maximum you should adjust the values appropriately as this will speed up the driver's operation. E.g. if only accessing 10 devices change the 'LastStoreNumb4MeterSecAddress' to '40'. The 'FirstStoreNumb4MeterSecAddress' parameter should normally be left at the default value of '31' unless during commissioning you want to restrict the list of devices to part of the list for fault finding purposes.

SizeOfOutputArraryPerMeter

The 'SizeOfOutputArraryPerMeter' parameter applies to all devices. It specifies the number of outputs reserved for each device. The driver reads all the values in the data map from each device and stores them in the outputs. If the data map contains more values than there are outputs available for the device the last values in the data map will not be available. E.g. if the data map contains 15 values and only 10 outputs are available for each device only the first 9 values in the data map will be placed in the outputs for the device. This is because the first output will contain the communications status, and the next outputs will contain the values from the data map.

The 'SizeOfOutputArraryPerMeter' parameter can be changed to allow more values to be read from each device. However this will reduce the maximum number of devices that can be accessed. Therefore if you are going to use less than the maximum number of devices for the driver but require more outputs per device the number of outputs for each device can be increased. E.g. if using the larger variant of the driver (55 devices and 450 outputs) to read information from 30 devices that return 10 values the number of outputs per device could be set to 11. This would allow the 10 values from each device plus the reserved output for device which is a total of 330 outputs.

Note that the total number of outputs cannot exceed the limit for the driver.

MeterSecondaryAddress

MeterSecondaryAddress parameters normally specify a device that is to be read A separate store is used for each device. If the secondary address is less than 8-characters, zeros (0) must be used to make it 8-characters long. E.g. if the secondary address is 12412, enter 00012412 as the store value. The secondary address is normally the serial number. If in doubt refer to the device's documentation.

For TCP/IP variants of the driver they can also be used to specify a connection to a different server. This allows the driver to connect to several servers in sequence (single communication instance) by using another store to specify a different connection. E.g. If store 31 contained details of the first connection, and store 40 contained details of the second connection. The first connection would be used to retrieve the values specified in stores 32 to 39 and then the second connection would be used to retrieve the values specified in stores 41 and above.

Note that a delay of 100 s is required to change to another server.

The connection must be specified in the format below:

> ADDR:<IP Address>#<Port Number>#ERR<Output Number>#GAT<converter secondary address>#MSP<Mbus Speed>

<IP Address> The server's IP address in the form xxx.xxx.xxx.xxx. <Port Number> The TCP port used for communications. <Output Number> The TCL output the communications status is written to.

<converter secondary address> and <Mbus Speed> are only available for the TCP/IP variants of the driver, and are only required if the server requires the speed of the Mbus to be specified on start up. <converter secondary address> Specifies the secondary address of the Mbus TCP/IP server <Mbus Speed> specifies the speed of the Mbus (300, 600, 1200, 2400, 4800).

6.5 Configure Output Labels

To make identification of the outputs easier when linking them to the strategy it is recommend that the outputs' labels are configured so that they are understandable to the user. They could be set to match the label supplied by the device.

Note that if UnitAndLabelHandleByDriver is set to '1' the labels and units are obtained from the device. In order define your own in SET UnitAndLabelHandleByDriver must be set to '0'.

To configure the output labels:

1. Run SET, open the SET project, display a strategy page for the IQ4/XNC, right-click a strategy page, point to **Device** and click **XNC Interface Module**. The **XNC Interface Module** dialogue box is displayed.
2. In the **Outputs** area double-click on the label of the output that is to be specified.
3. Enter the new label.
4. Click **OK**.

Labels can be copied and pasted by right-clicking on the label and clicking **Copy Label** or **Paste Label**. Labels can be pasted into more than one input, or output by copying the required information to the clipboard, the information for each output must be on a new line, selecting the required output, right-clicking, and clicking **Paste**. Clicking **Select All** will select all the labels.

7 CONFIGURE THE IQ4/XNC STRATEGY

It is necessary to configure the strategy in the IQ4/XNC to process the data from the devices as required. This is done using SET in the normal way to define the strategy as described in SET Manual (TE200147).

Values from the devices are stored in the XNC interface module's outputs. These are available as connectives for linking to modules in the strategy.

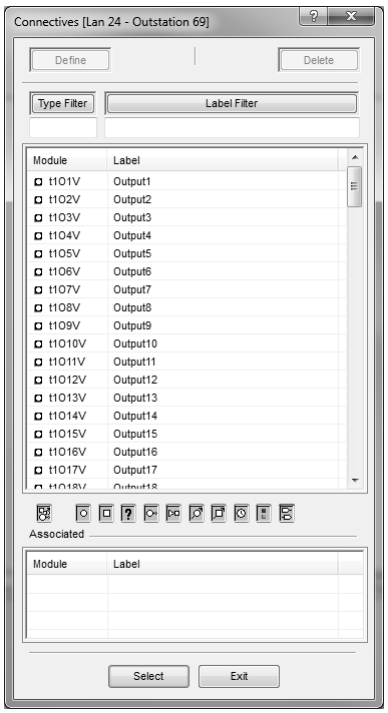
In order to link to the XNC interface module's outputs it is necessary to add a connective to the required output to a strategy page, and then link the strategy to the connective.

7.1 Link to the XNC Interface Module's Outputs

To link to the XNC interface module's outputs:

1. Run SET and display a strategy page for the IQ4/XNC that is to be configured.
2. Add connectives to the required device values to the strategy.

   - Click . The **Connectives** dialogue box is displayed listing all the XNC interface module's outputs, modules currently in the strategy, and any nodes that have been defined as connectives.



   - Click to filter the list of connectives so that only the connectives for the TCL inputs are displayed.
   - Click the input that is to be linked.
   - Click **Select**. The cursor changes to a hand .
   - Move the cursor to the position where the connective is to be placed and click. The connective is placed on the page.
   - Click **Exit**.

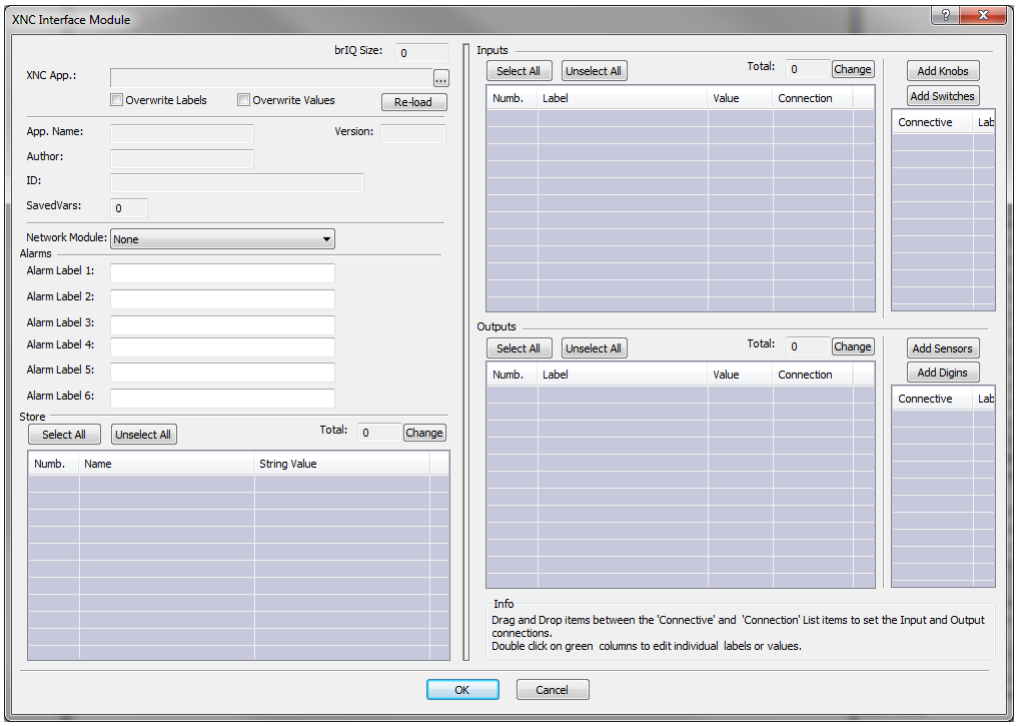
3. Add the required modules to the strategy page as described in the SET Manual (TE200147).
4. Link the modules to the required connectives.

   - Click the output of the module that is to be linked to the meter value.
   - Drag the mouse to the parameter connective linked to the required meter value. If the parameter can be linked the pointer will change to . If the parameter is not a suitable type to be linked the pointer will change to .
   - Release the mouse button.

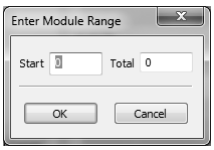
Sensors and digital inputs modules can be easily added to the strategy and automatically connected to the required output from the **XNC Interface Module** dialogue box using the **Add Sensors** and **Add Digins** buttons.

To add sensors or digital input modules:

1. Run SET and open the required SET project, or create a new one as described in the SET Manual (TE200147).
2. Add the required IQ4/XNC to the project as described in the SET Manual (TE200147).
3. Display a strategy page for the IQ4/XNC's strategy.
4. Right-click a strategy page, point to **Device** and click **XNC Interface Module**. The **XNC Interface Module** dialogue box is displayed.



5. Click **Add Sensors** or **Add Digins** as required. The **Enter Module Range** dialogue box is displayed asking for the number of the sensor or digital input modules that are to be added to the strategy.



6. In the **Start** box enter the required module number. For a range of modules, enter the first module number that is to be used; subsequent modules will be used for the other outputs in the range.
7. In the **Total** box enter the total number of modules that are being added.
8. Click **OK**. The specified modules linked to the outputs will be added to the strategy page. If the selected strategy page already contains modules a new strategy page will be created.
9. Connect the sensors to the outputs using connectives by dragging the connectives onto the output in the **XNC Interface Module** dialogue box.

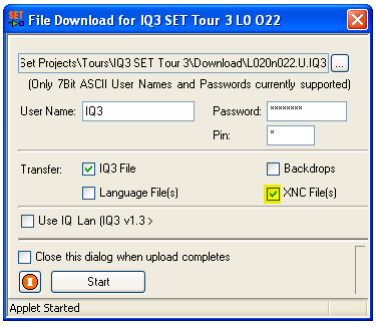
7.2 Link the Strategy to the Comms Status

If you are reading the comms status from the device it needs to be linked into the strategy as required so that the required action can be carried out. This is done by linking the connective linked to the TCL output to which the comms status is written to the appropriate part of the alarm handling strategy

7.3 Download the Strategy

To download the strategy:

1. Download the strategy to the IQ4/XNC as described in the SET Manual (TE200147). Ensure that the XNC File(s) check box is selected.



Note: There is no need to re-load the driver to the XNC in order to apply changes to the strategy. The driver only needs to be done once.

APPENDICES

A1 CONFIGURATION EXAMPLE

In this example there are two meters to be monitored, and each is of a different brand. The secondary address (serial number) of the first meter is 09390964, and the secondary address of the second is 37887191. The first meter returns four values (its data map) and the second meter returns eight values as shown in the table below.

Meter	*Value Type*	*Units*
1	Energy	KWh
1	Volume	M3
1	Volume	M3
1	Volume	M3
2	Energy	KWh
2	Volume	M3
2	Volume Flow	M3h
2	Power	Kw
2	FlowTemp	DegC
2	ReturnTemp	DegC
2	Temp Difference	K
2	Energy	KWh

The first output for a meter is always its COM status. The values are therefore extracted from the second output. An IQ422/12/XNC with a serial connection to the Mbus is to be used to run the driver and associated strategy.

Install the meters

The meters have been installed following the manufacturer's instructions and configured to communicate on the Mbus with the following communications parameters.

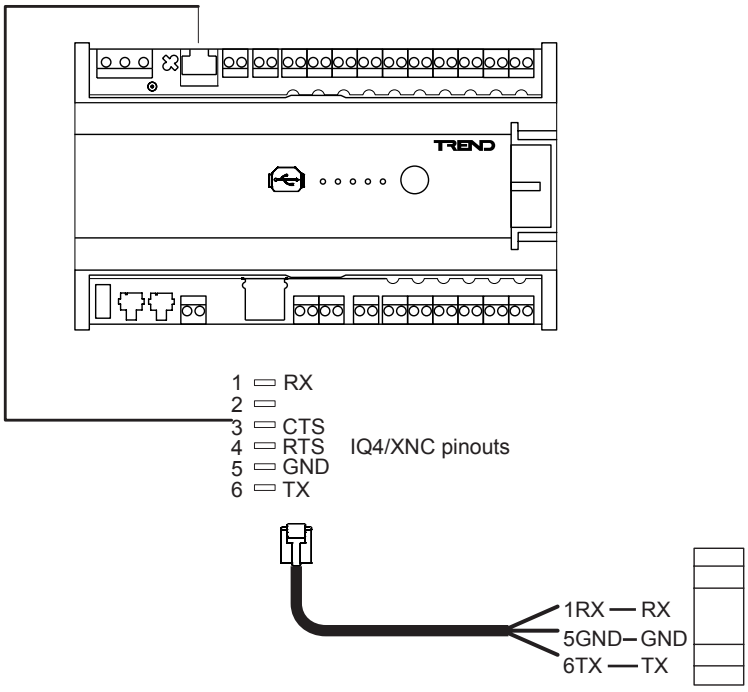
2400 baud
8 bits
even parity
1 stop bit.

Install the IQ422/12/XNC

The IQ422/12/XNC is installed as described in the supplied installation instructions.

Connect the IQ4/XNC to the Mbus devices

The IQ422/12/XNC is connected to the Mbus via a DCE RS232 to Mbus converter using a serial connection as shown.



Select the Driver

The driver selected is the 9 device serial variant of the driver (XactSerialMbusMaster.XNC) because serial communications are being used, and only two meters are to be accessed, and only 12 outputs values are read from the meters. The driver and the required strategy will fit into the IQ4/XNC that is to be used.

Add the Driver to the IQ422/12/XNC

The driver (XactSerialMbusMaster.XNC) is added to the IQ422/12/XNC by specifying it in the **XNC Interface Module** dialogue box in SET.

Configure the Driver's Communication Settings

The driver's communications settings are set up by specifying stores 1 to 8 in the **XNC Interface Module** dialogue box to the parameters below:

Store Number	***Setting***	***Value***	***Description***
1	SerialBaudrate_2400_4800_9600_19200	2400	Set to 2400 as this is the baud rate used by the meters.
2	SerialParity_2even_1odd_0none	2	Set to 2 to specify even parity which is used by the meters.
3	SerialDataSize_8_8bits_7_7bits	8	Set to 8 as this is the number of data bits used by the meters.
4	SerialStopBit_1_1bit_2_2bits	1	Set to 1 as this is the number of stop bits used by the meters.
5	SerialPort_3_RS232_2_RS485_1_RS422	3	Set to 3 as this specifies an RS232 connection which is type of used for communication between the IQ4/XNC and the converter.
6	Timeout_ms	3000	Left as 3000 as this is suitable for most cases.
7	RetryNumber	3	Left as 3 as this is suitable for most cases.
8	PauseBetweenMetersCycleReading_ms	3000	Left as default

Configure Device Details

The device details configured by setting the values of stores 8 to 33.

Store Number	***Setting***	***Value***	***Description***
9	FirstStoreNumb4MeterSecAddress	32	Left as 32 as this is the store containing the secondary address of the first device.
10	LastStoreNumb4MeterSecAddress	33	Set to 33 as this is the store containing the secondary address of the last device. Reducing the number of stores the driver has to look at speeds up operation.
11	SizeOfOutputArrayPerMeter	9	Set to 9 as meter 2 which returns the most values out of the meters being read returns 8 values. Each value requires a store for the value plus 1 store is required for the communications status This makes a total of 9.
11	LabelAndUnitHandleByDriver_1Yes_0No	1	The labels are obtained from the device.
13 to 18	Not used		
19	VIF0to1_Energy#MWh	Energy#MWh	Left as default
20	VIF0to7_Energy#KWh	Energy#KWh	Left as default
21	VIF8to15_Energy#KJ	Energy#KJ	Left as default
22	VIF16to23_Volume#M3	Volume#M3	Left as default
23	VIF24to31_Mass#Kg	Mass#Kg	Left as default
24	VIF40to47_Power#Kw	Power#Kw	Left as default
25	VIF48to55_Power#KJh	Power#KJh	Left as default

Store Number	*Setting*	*Value*	*Description*
26	VIF56to63_Volume Flow#M3h	Volume Flow#M3h	Left as default
27	VIV88to91_FlowTemp#DegC	FlowTemp#DegC	Left as default
28	VIF92to95_ReturnTemp#DegC	ReturnTemp#DegC	Left as default
29	VIF96to99_Temp Difference#K	Temp Difference#K	Left as default
30	VIF110_HeatCostAllocator#HCA	HeatCostAllocator#HCA	Left as default
31	Not used		
32	MeterSecondaryAddress	09390964	The secondary addresses of meter 1.
33	MeterSecondaryAddress	37887191	The secondary addresses of meter 2.

Configure Output Labels

The labels of the outputs are configured as shown to match those in the meters to make identification easier.

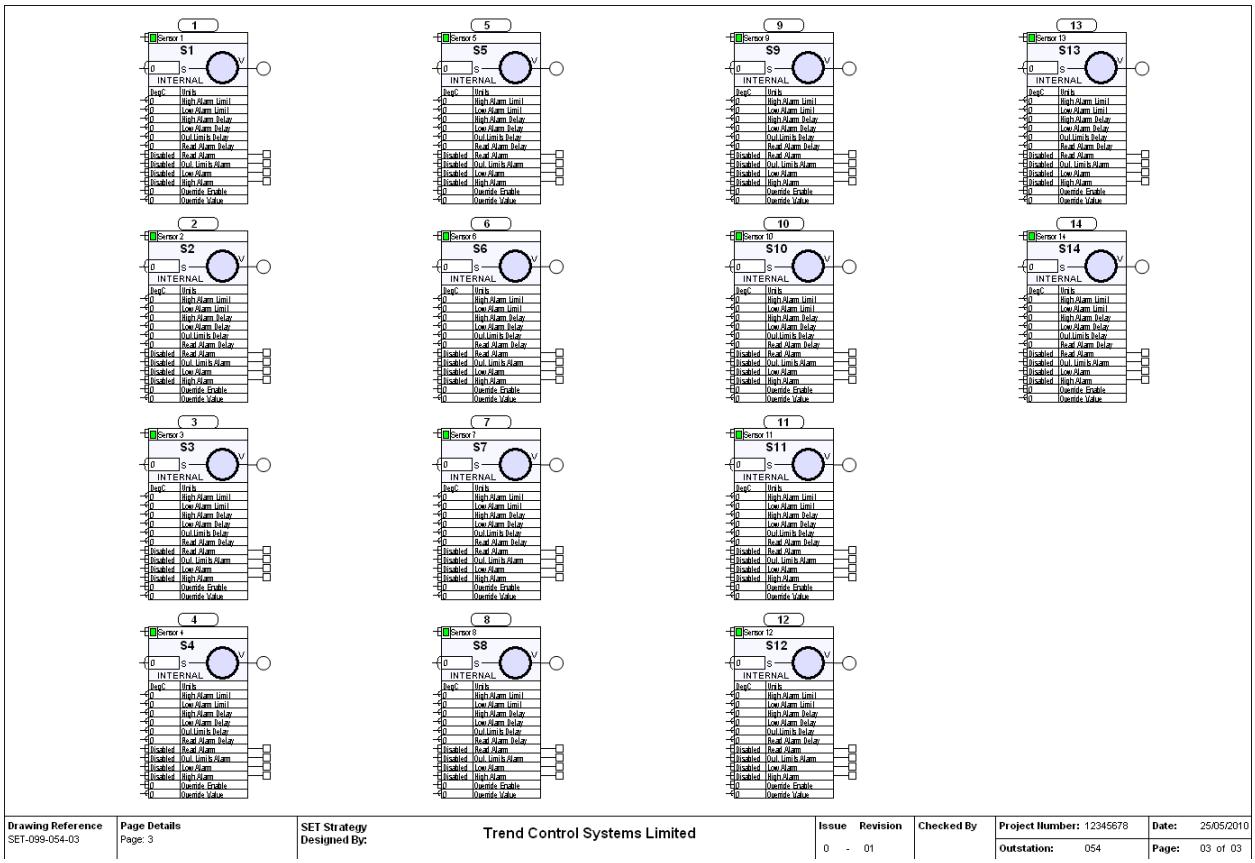
Output	*Label*
1	Meter 1 comms status
2	Energy KWh
3	Volume M3
4	Volume M3
5	Volume M3
10	Meter 2 comms status
11	Energy KWh
12	Volume M3
13	Volume Flow M3h
14	Power Kw
15	FlowTemp DegC
16	ReturnTemp DegC
17	Temp Difference K
18	Energy KWh

Configure Strategy

The strategy is configured with a sensor for each output as shown in the table below. Each sensor is linked to an output via a connective.

Sensor	*Output*	*Label*	*Units*
1	1	Meter 1 comms status	
2	2	Energy KWh	KWh
3	3	Volume M3	M3
4	4	Volume M3	M3
5	5	Volume M3	M3
6	10	Meter 2 comms status	
7	11	Energy KWh	KWh
8	12	Volume M3	M3
9	13	Volume Flow M3h	M3h
10	14	Power Kw	Kw
11	15	FlowTemp DegC	DegC
12	16	ReturnTemp DegC	DegC
13	17	Temp Difference K	K
14	18	Energy KWh	KWh

This is done by clicking **Add Sensors** in the **XNC Interface Module** dialogue box and entering 1 as the start sensor, and 14 as the total number of sensors to add the sensors, then dragging the connective to the sensors to onto the outputs. The sensors are added to the strategy on page 2 as shown below.



*Note: Because the '*LabelAndUnitHandleByDriver_1Yes_0No*' store is set to 1 the labels and units specified in the sensors will be overwritten in the controller by those in the meter they have been specified to make it easier to understand the strategy.*

A2 TROUBLE SHOOTING

This section provides some help on solving common problems that may occur.

Values not as expected

- Check the meter's secondary address is specified correctly
- Check the outputs are linked to the strategy correctly using connectives
- Check the meter value with an Mbus tool from the meter supplier.

Labels and units not as expected

- Check that the 'LabelAndUnitHandleByDriver_1Yes_0No' parameter is set correctly set to '1' to use labels and units form the device or '0' to use labels and units from the strategy.

No values received from device

- Some devices are battery powered and will only respond to a certain number of requests each day once this number is reached the device will not respond to request for data.
- Check if the meter's secondary address is specified correctly.
- Check your RS232 connection to converter is working correctly
- Check your Mbus network is operating correctly using a meter there must be a voltage between the two Mbus wires.
- Check the Mbus speed on the IQ4/XNC and on all meters from the bus is the same.
- Ensure that your meter is an energy one or water meter.
- Current fault on Mbus installation is a short circuit or a cut circuit on the Mbus line.
- Ensure that the converter has enough power to power bus.
- Check the VIF supported by the driver.

To view the message frames:

1. Run SET an display the IQ4/XNC in the **System View**.
2. Display the IQ4/XNC's web pages.
3. Click **Modules**.
4. Click **XNC Interfaces**.
5. Click **t1**. A new web browser is displayed.
6. In the **Alarm Reporting LAN** box enter the LAN of the CNC SET is using to connect to the network.
7. In the **Alarm Reporting OS** box enter the network address of the CNC SET is using to connect to the network.
8. Click ☑.
9. In the **Debug Active** box select 'ON', and click ☑.
10. Go to SET's **System View** and right click the site containing the IQ4/XNC and select **Comms window** from the displayed menu. The **Communications** dialogue box is displayed. This will show any communications between the XNC and the Mbus devices.
11. Analyse the communications to find any faults Knowledge of Mbus protocol is required.
12. When the analysis is complete in the **Debug Active** box select 'OFF', and click ☑.

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