*i*³ Modbus Master Tutorial

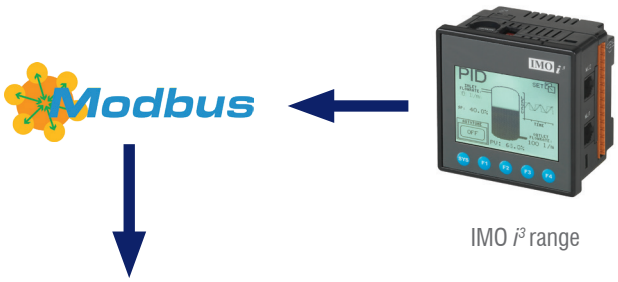
Introduction

In this tutorial we will see how to configure Modbus master communication of an i3 with 4 types of devices – an iView, and iSmart, a XBM plc and a VXT inveter.

Connecting i3 to iSmart

We will demonstrate the i3 as a Modbus master, controlling an iSmart output. The i3 can read and write to and from single and multiple registers and is easily configured.

We will write the set point to a timer and a counter.



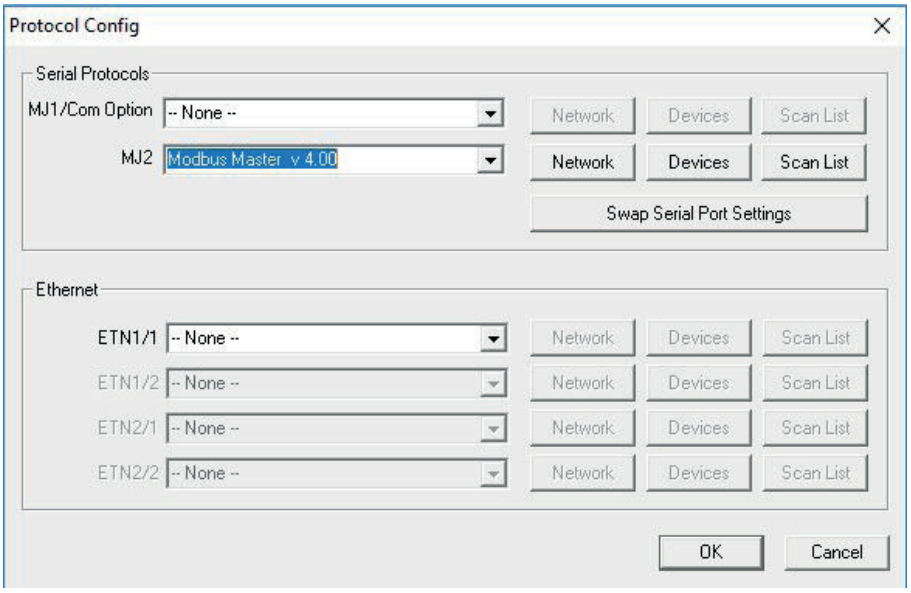
IMO *i*³ range

iSmart

i3 Settings:

Protocol Configuration:

The Modbus master protocol utilises the Modbus function codes 03 to read single and multiple registers, 10 to write to multiple registers and 06 to write to single registers. Most Modbus slave devices only use the function codes 03 to read and 06 to write. Therefore, the i3 can communicate with any Modbus enabled device.



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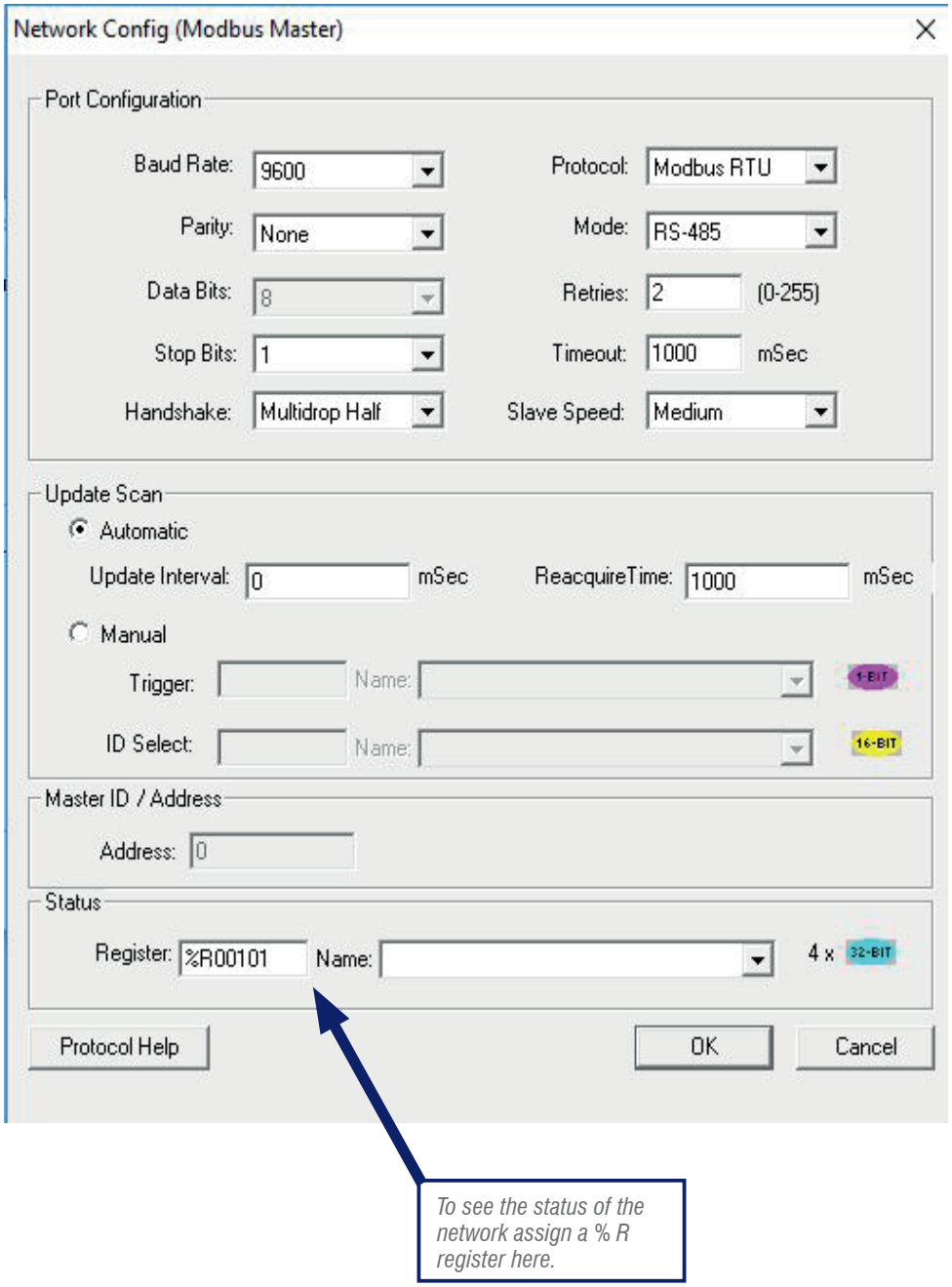
Network Configuration

In the network configuration the communication parameters are set. Set the parameters as shown below. We are going to use the protocol Modbus RTU and communicate on RS485, which is a multi-drop half duplex system.



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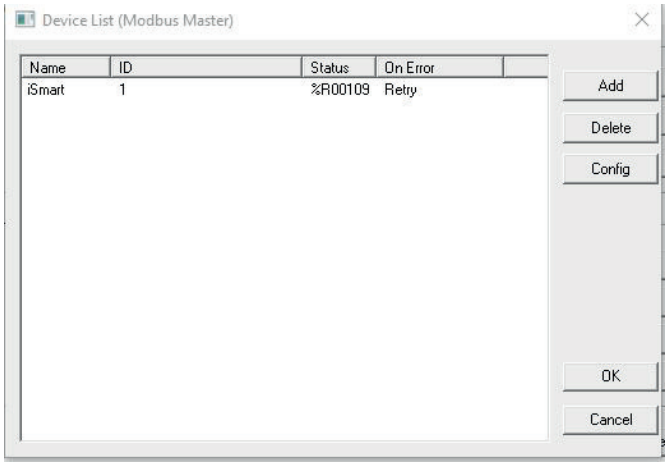
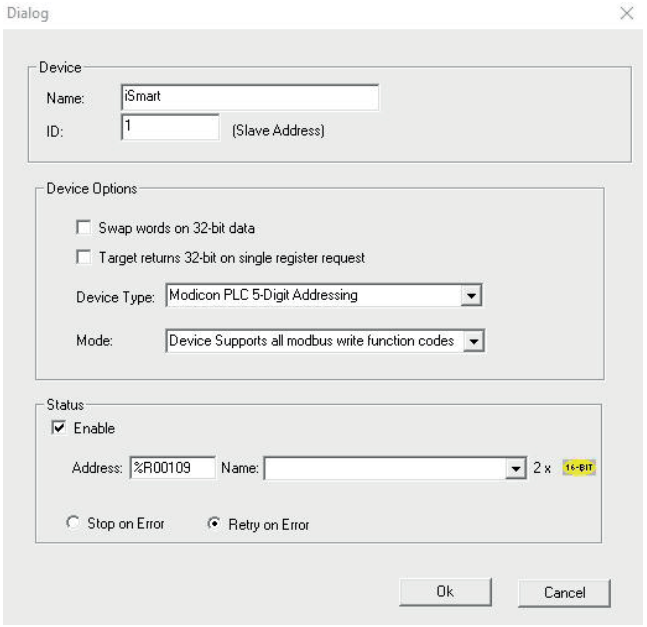
Communication Devices in the Network

Once the Network parameters have been set, the Device need to be added to the network.



Name the device and give the device an ID. This ID should be unique and match the number on the rotary dial on the front on the Smart I/O. Add the three individual devices as shown and click OK. Ensure that the ID has also been set on the front of the Smart I/O before powering up.



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Scan List

Finally, we need to add to the scan list the addresses we are going to read from and write to the Modbus slaves.

Note : For the iSmart Modbus addresses please refer to the smt v3 modbus protocol 1013.pdf for more information.

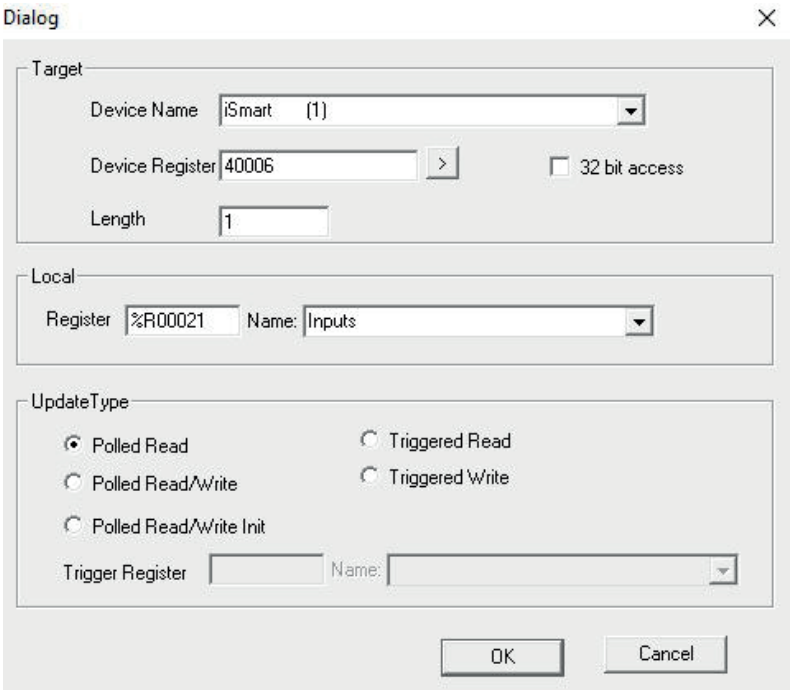
The iSmart addresses used in this example are the following :

I1 : 40006

Q1: 40008

DR1: 44353

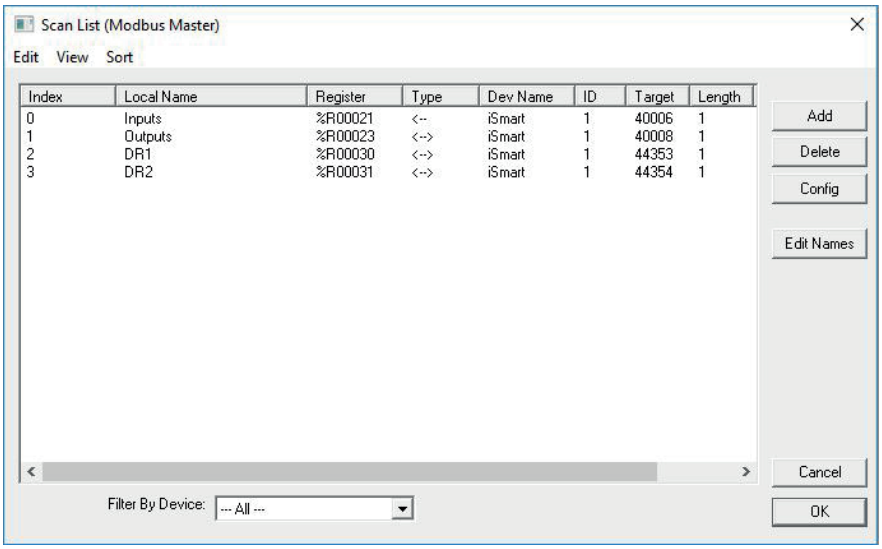
DR2: 44354



Select the Modbus device register address and the length of the data.

The data in the device address will be stored in the i3 locally where specified in a particular register.

The type command and update type are defined here. Whether the data is read or write and polled always or triggered on a bit.



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i^3 Modbus Master Tutorial

Screen Editor Programming

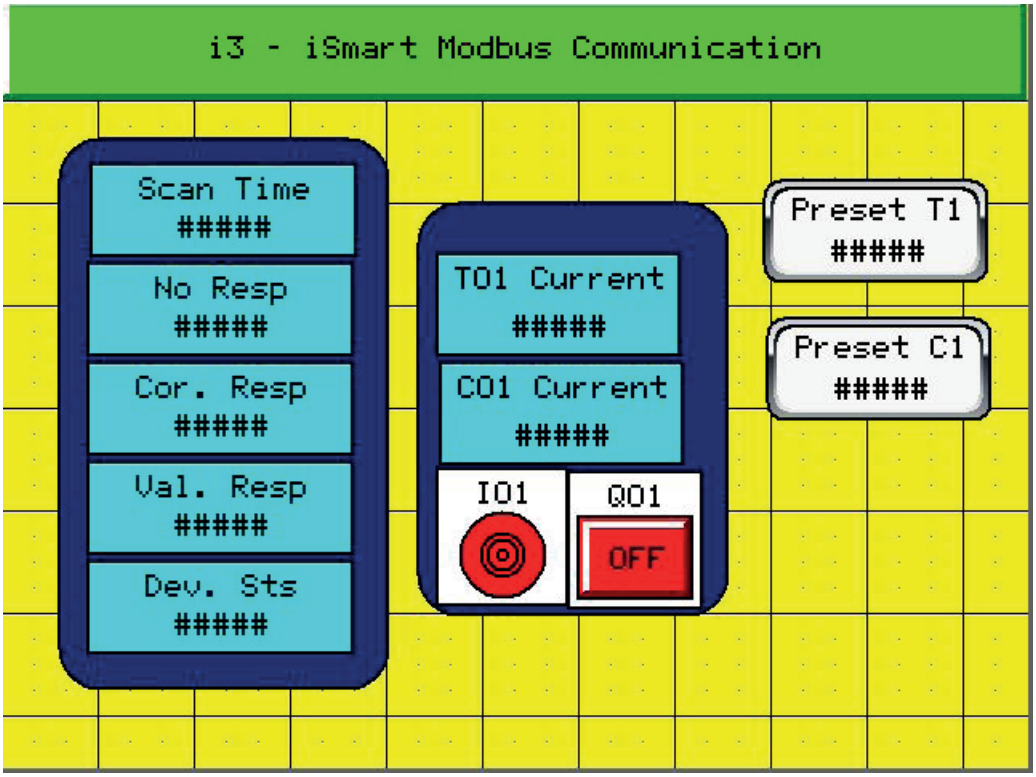
For this program we are going to have 1 screen to :

*Setting timer/counter setpoint.

*Monitor the status of the first iSmart 'Input

*Monitor the communication Status

To enter the screen editor, click on the icon . Please set up the screens as described below



On the Screen, there will be 7 numeric data fields. 5 to monitor the communication status and two others to monitor the current timer/counter value

Two numeric data entry for entering the Timer/Counter set point.

One Lamp to represent the Input 1.

One Toggle Button to turn the Output Q1 ON/OFF.

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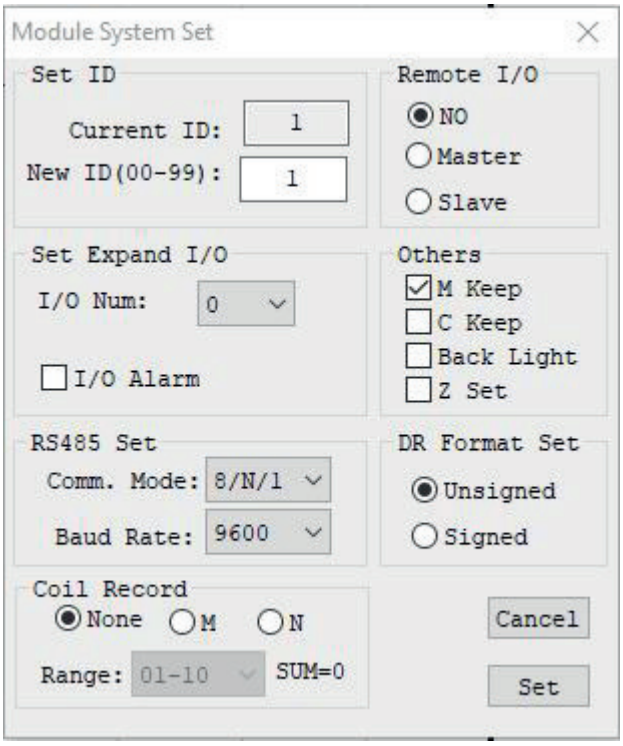
iSmart Comms Settings

The iSmart module system is set as the following :



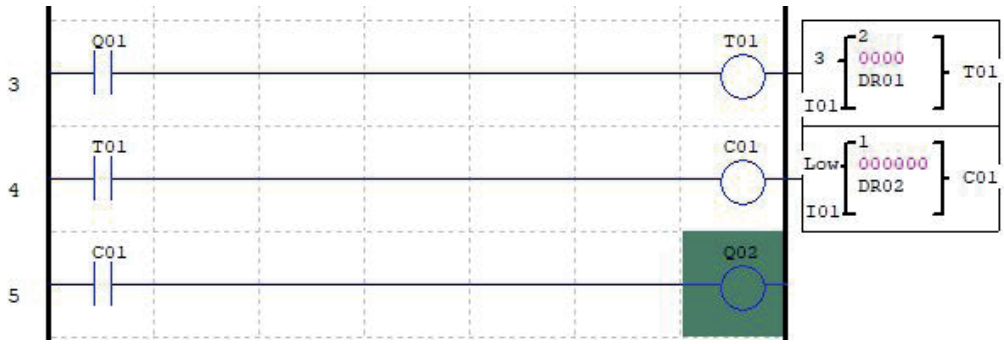
Set ID:

*Each Device in a network is assigned a unique ID address from 1 to 99.

RS485 Set:

*The parameter settings should match the master's parameter.(Baud rate/Data bits/Parity/ Stop bits)

iSmart Ladder Logic Programming



- The output Q1 is controlled from the i3
- The two-pre-set value for the timer/counter are entered from the i3.

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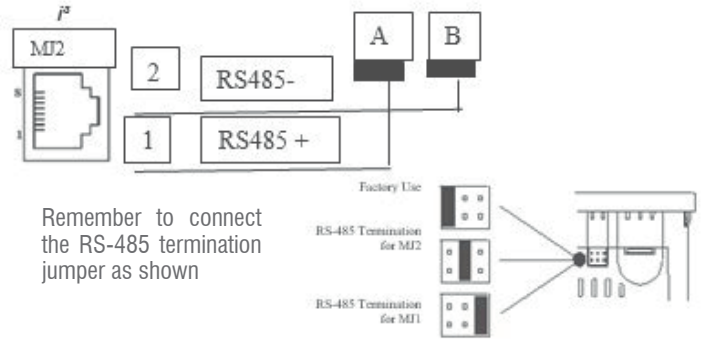
Wiring Diagram

We are using MJ 2 on the i3 for the RS485 communication , 2 wire to connect to the devices. The wiring for this is as follows.



Remember to connect the RS-485 termination jumper as shown

Running the Program

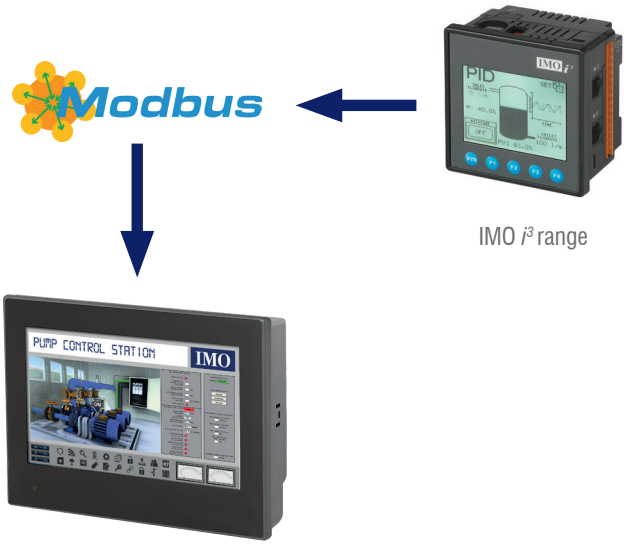
Please refer to the attached program examples:

iSmart : Setpoints_from_i3_master_modbus485.gen

i3 : i3iSmart Modbus.csp

Connecting i3 to an iView

The two controllers can be connected together over the Modbus RTU protocol.



IMO i^3 range

iView

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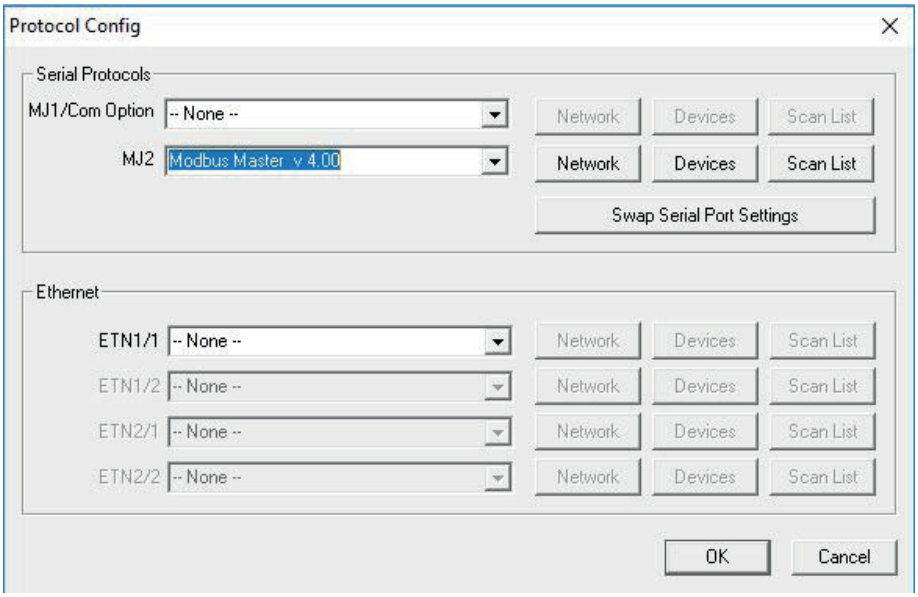
i3 Configurator Software

Protocol Configuration

The Modbus master protocol utilises the Modbus function codes 03 to read single and multiple registers, 10 to write to multiple registers and 06 to write to single registers. Most Modbus slave devices only use the function codes 03 to read and 06 to write. Therefore, the i3 can communicate with any Modbus enabled device.

Open the Program > Protocol Configuration. Select the Modbus Master Protocol in the MJ2 and configure the Network, Devices and Scan list as shown below.



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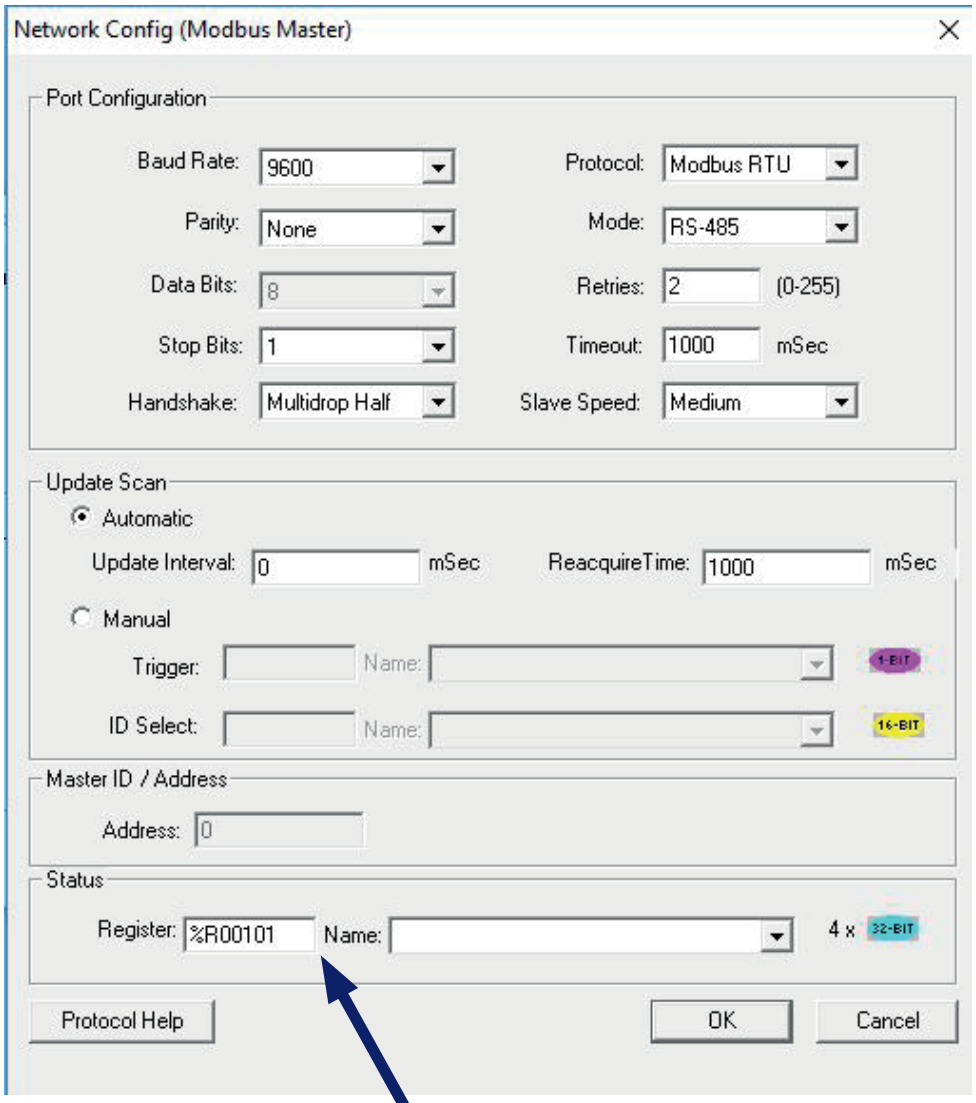
Network Configuration

In the network configuration the communication parameters are set. Set the parameters as shown below. We are going to use the protocol Modbus RTU and communicate on RS485, which is a multi-drop half duplex system.



To see the status of the network assign a % R register here.

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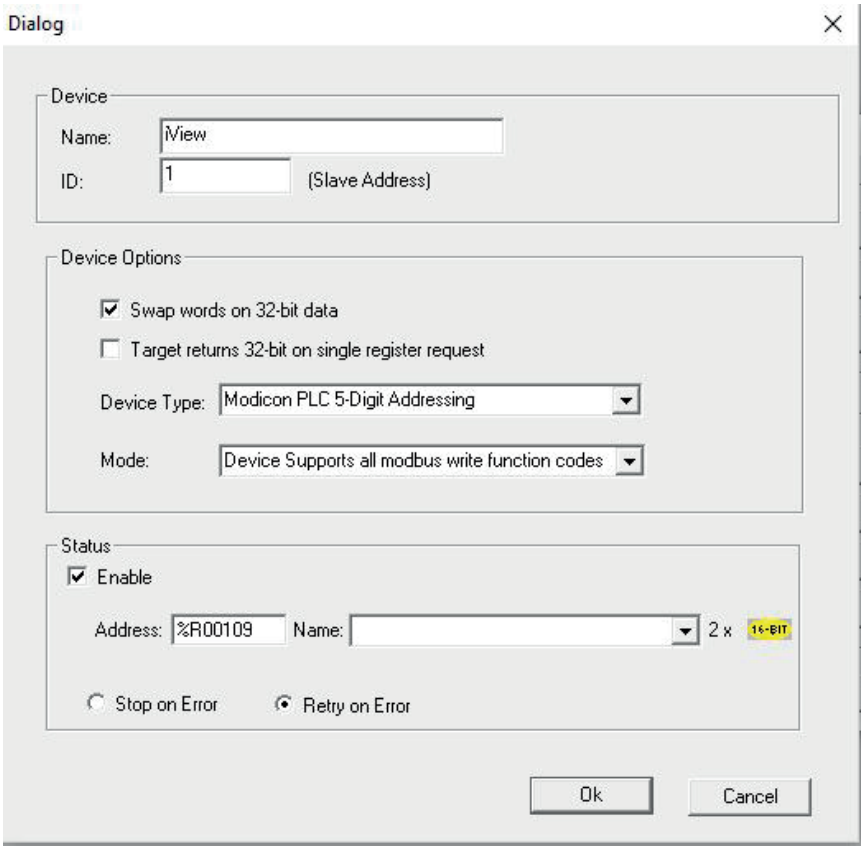
i^3 Modbus Master Tutorial

Devices

Name the device and give it an ID.



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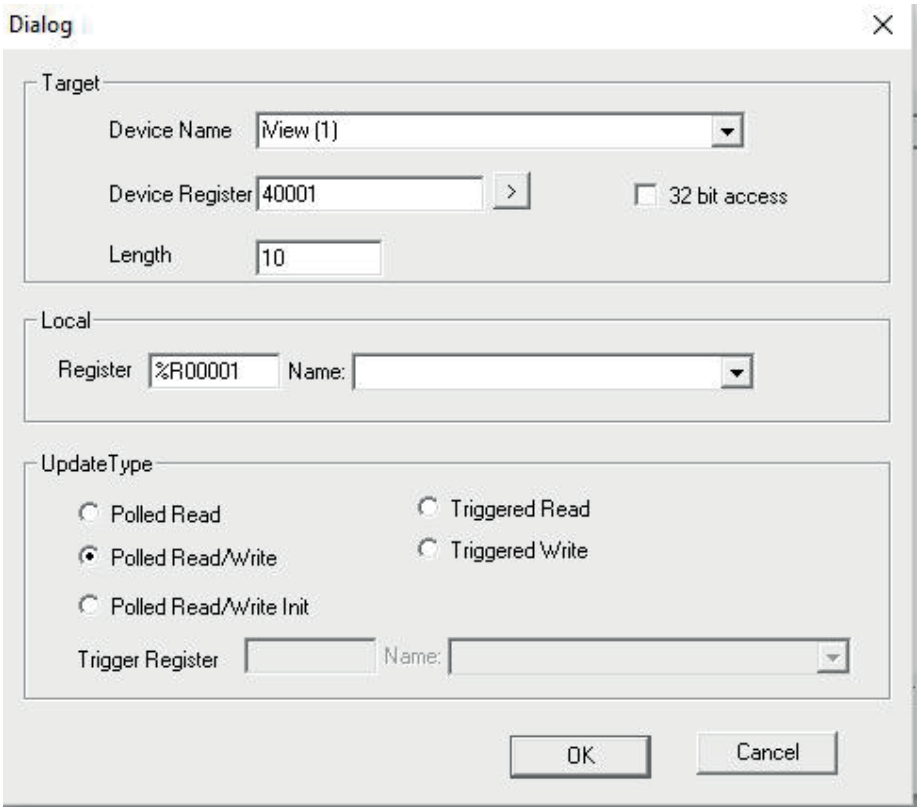
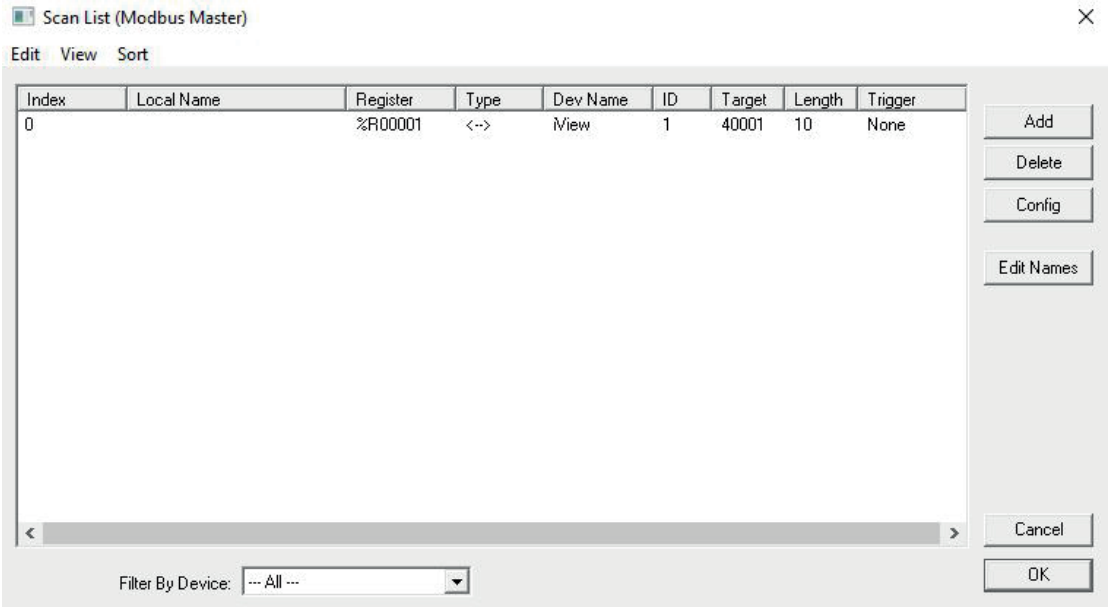
Scan List

Finally, we need to add to the scan list the addresses we are going to read from and write to the Modbus slaves.





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i^3 Modbus Master Tutorial

Select the Modbus device register address and the length of the data.

The data in the device address will be stored in the i3 locally where specified in a particular register.

The type command and update type are defined here. Whether the data is read or write and polled always or triggered on a bit.

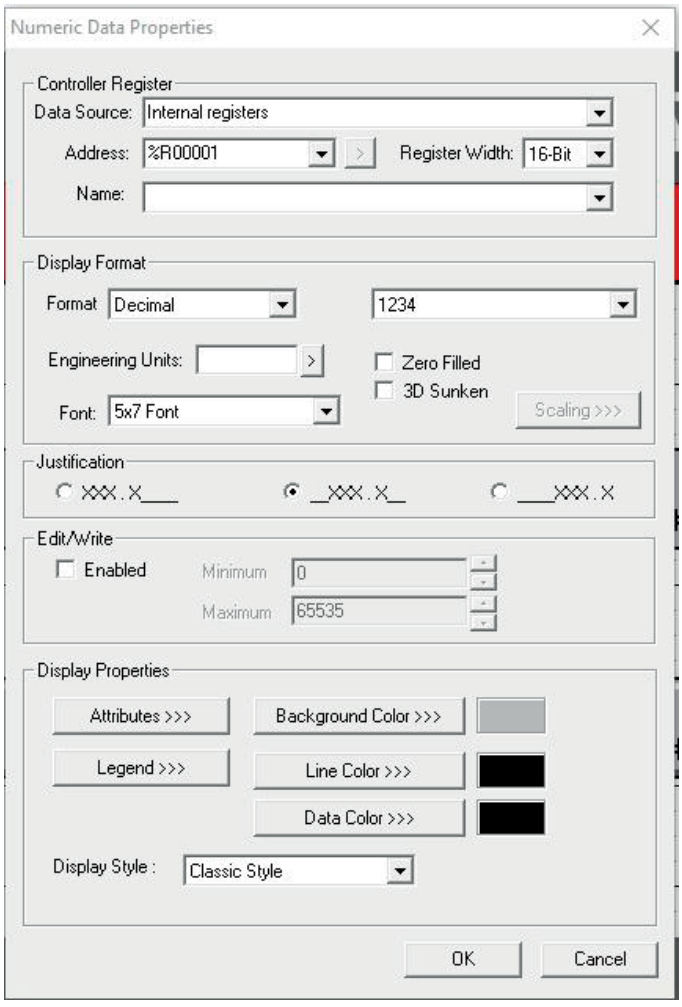
Screen Editor Programming

For this program we are going to have 1 screen and to enter the screen editor, click on the icon . Please set up the screen as described below:

There will be 10 numeric data properties.

- 5 numeric data for monitoring Data/value from the iView.

Note: The option Edit/Write should be unticked.



- 5 numeric data to enter data which it will be received by the iView.

Note: The option Edit/Write should be ticked to enable writing value to the iView.

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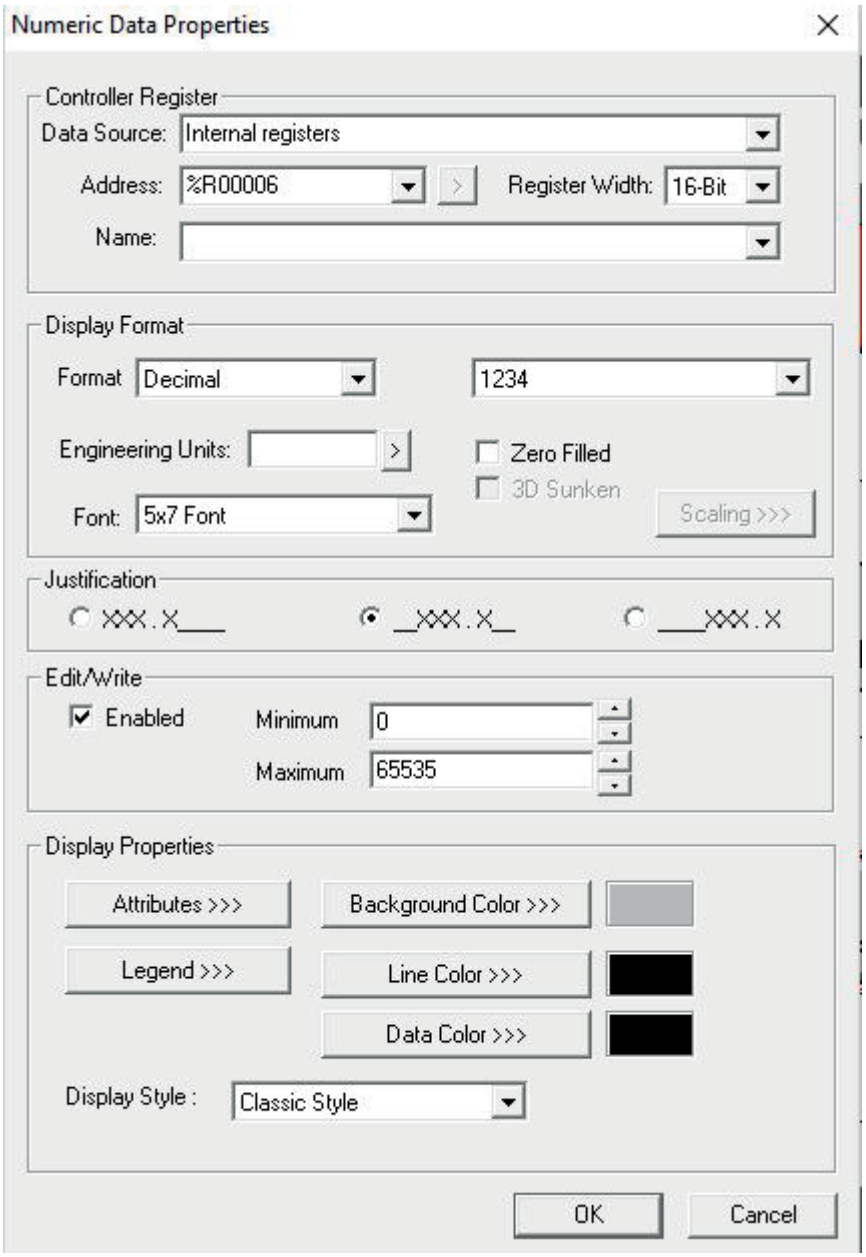

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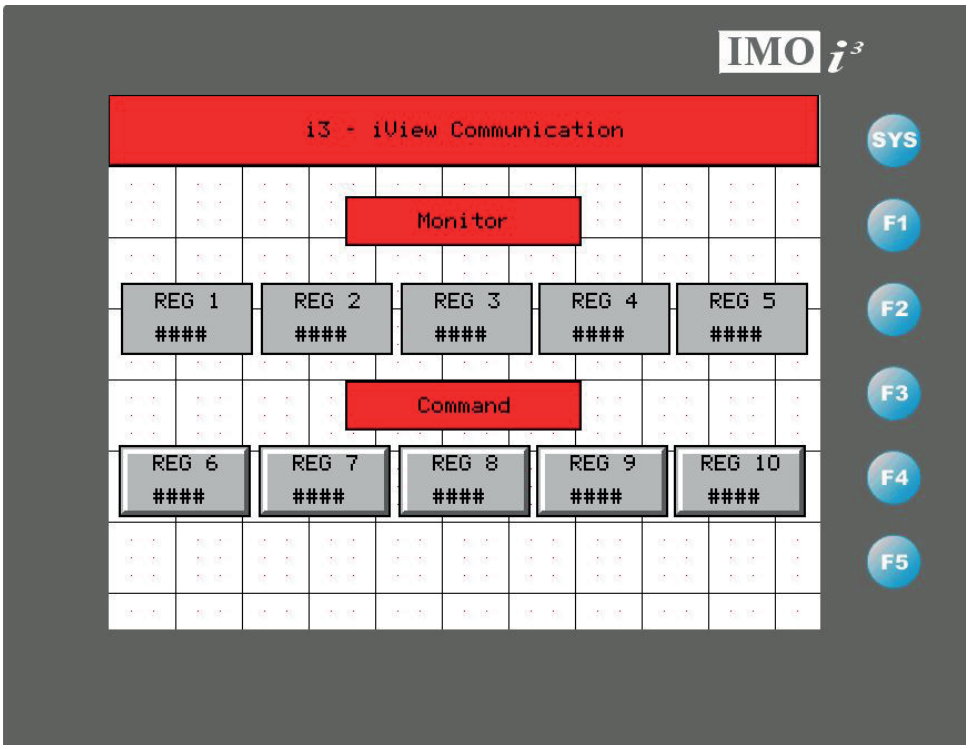
i^3 Modbus Master Tutorial



iView Developer Software:

Open the Project Manager under View > Project Manager

In the Project Manager > Open the Application Program Section (AP_1) > Links. Right Click Links > Add Link.

Configure the link table as below.

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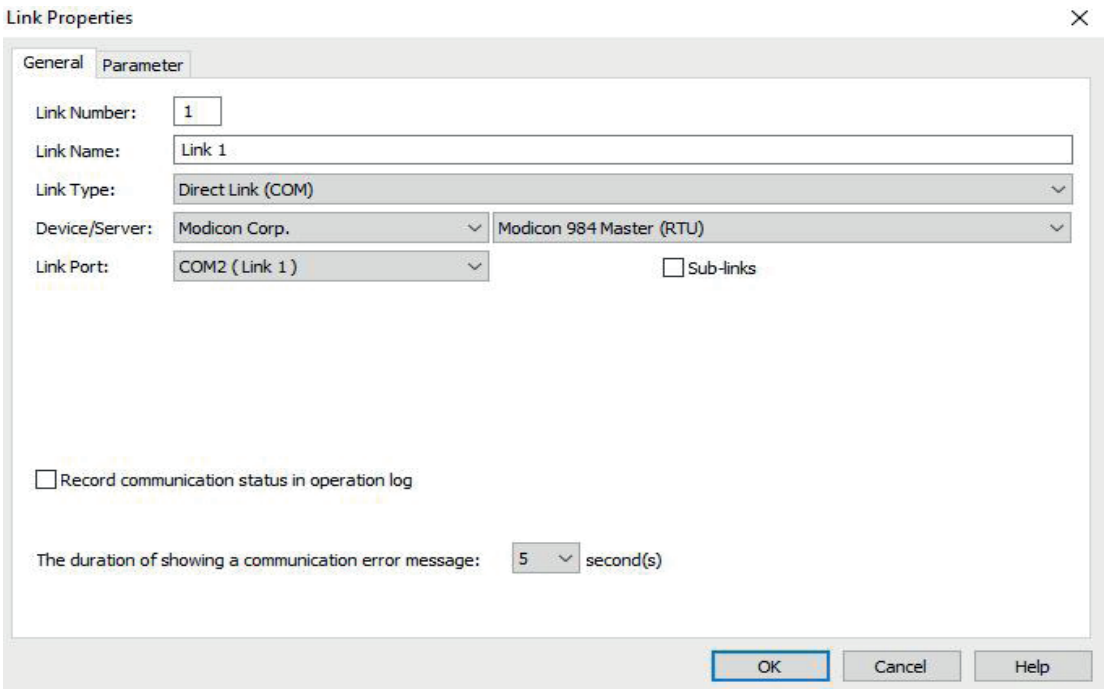
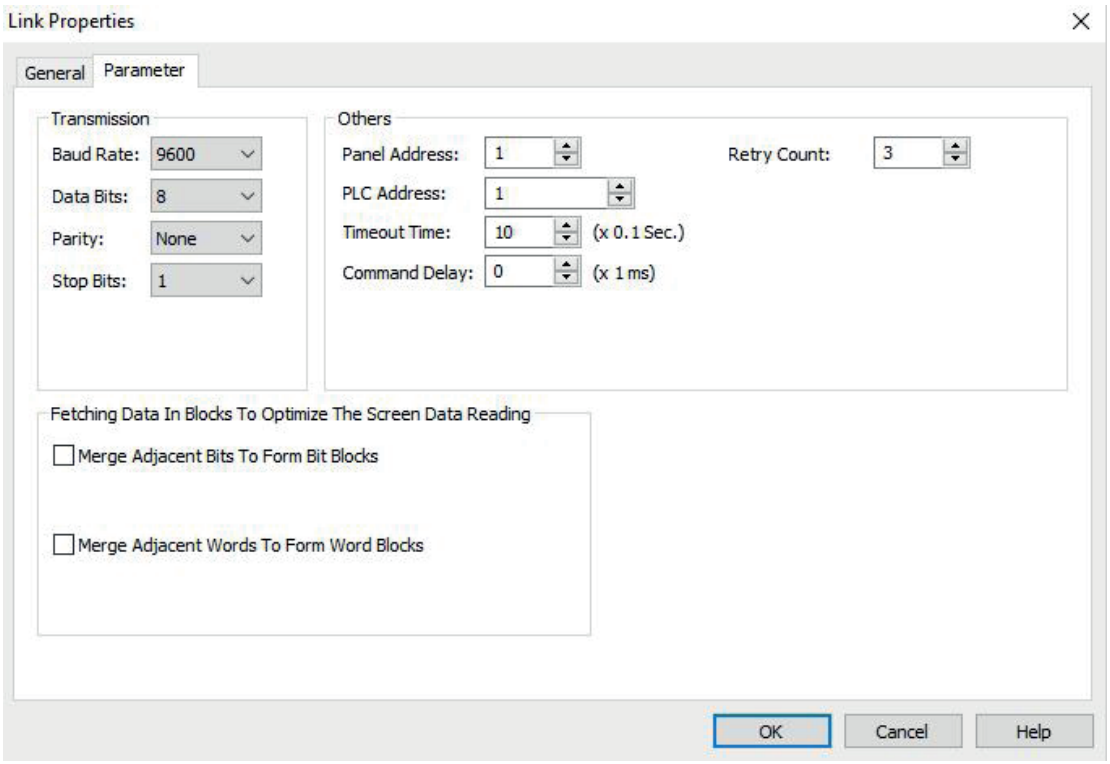
i^3 Modbus Master Tutorial

General:



Parameter:



The parameter settings should match the master's parameter.(Baud rate/Data bits/Parity/Stop bits).

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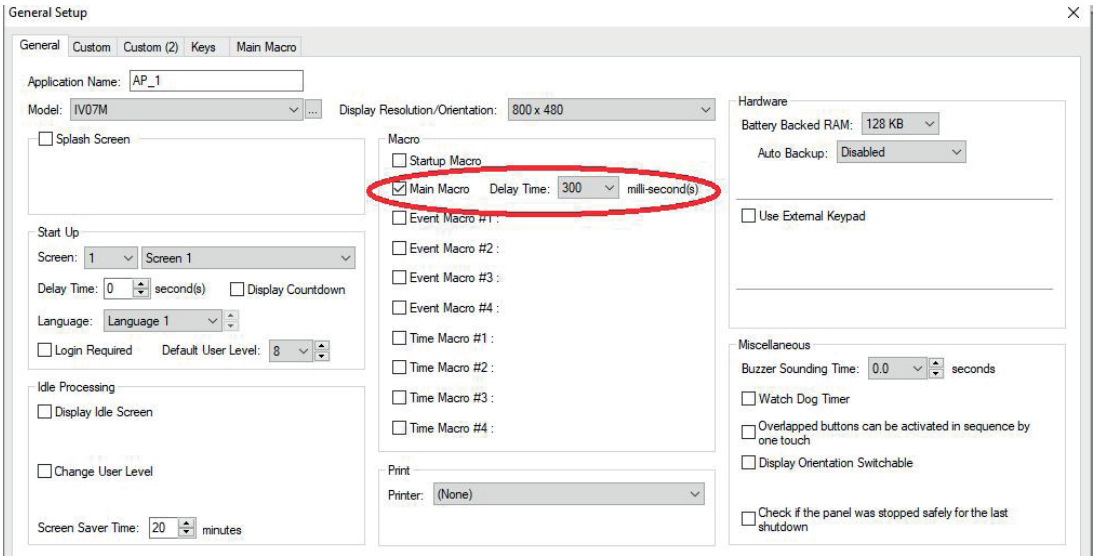
Macro:

Now Expand the following, Setup > General Setup



Open the Main Macro to run a simple script to read and write registers between the i3 and iView.

*1\40001=mov($u0,5) (copy the 5 words starting from $u0 to 40001 of link 1 (i3)).

$u0 to R1 1\40001

$u1 to R2 1\40002

$u2 to R3 1\40003

$u3 to R4 1\40004

$u4 to R5 1\40005

*$u5=mov(1\40006,5) (copy 5 words starting from 40006 of link 1 (i3) from $u5 to $u9).

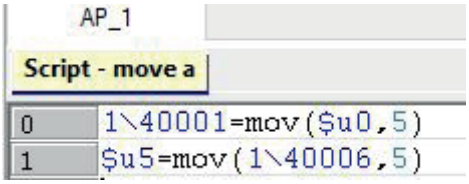
1\40006 to $u5

1\40007 to $u6

1\40008 to $u7

1\40009 to $u8

1\40010 to $u9



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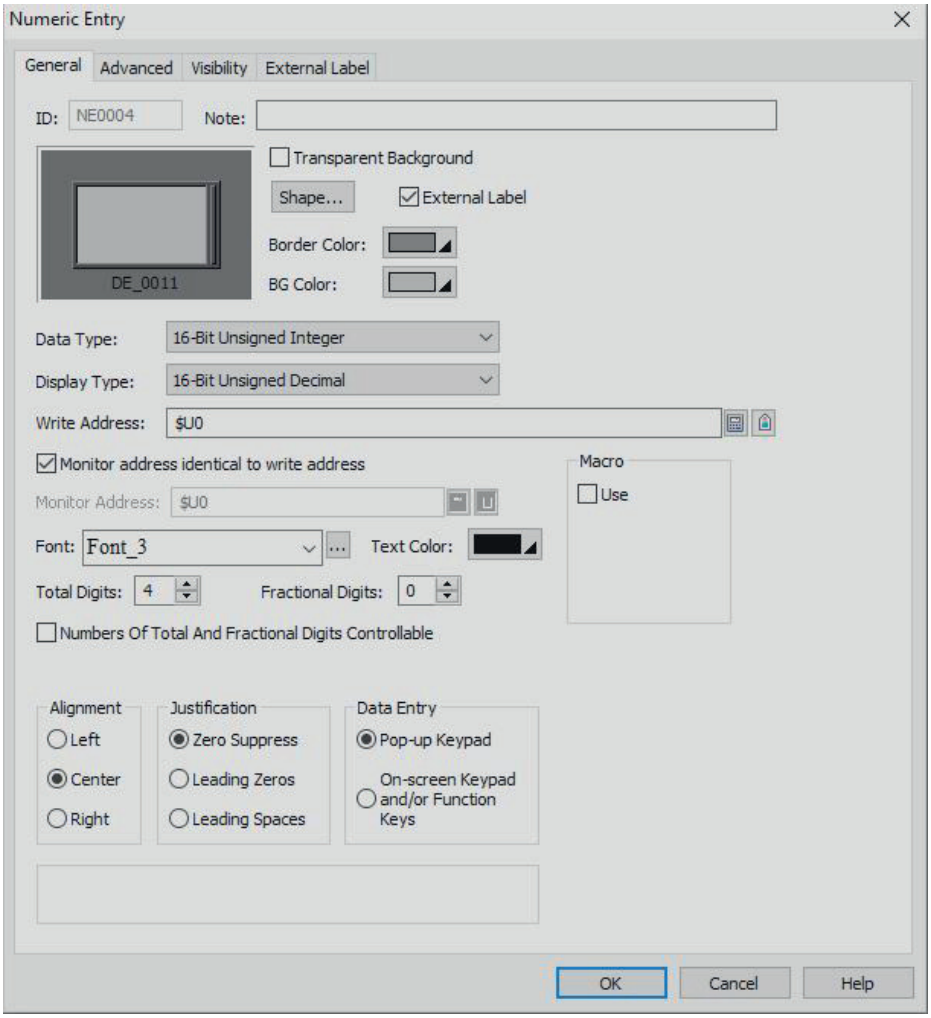
i^3 Modbus Master Tutorial

Screen:

To send command to the i3, 5 numeric entry will be added to the Screen as per picture below.



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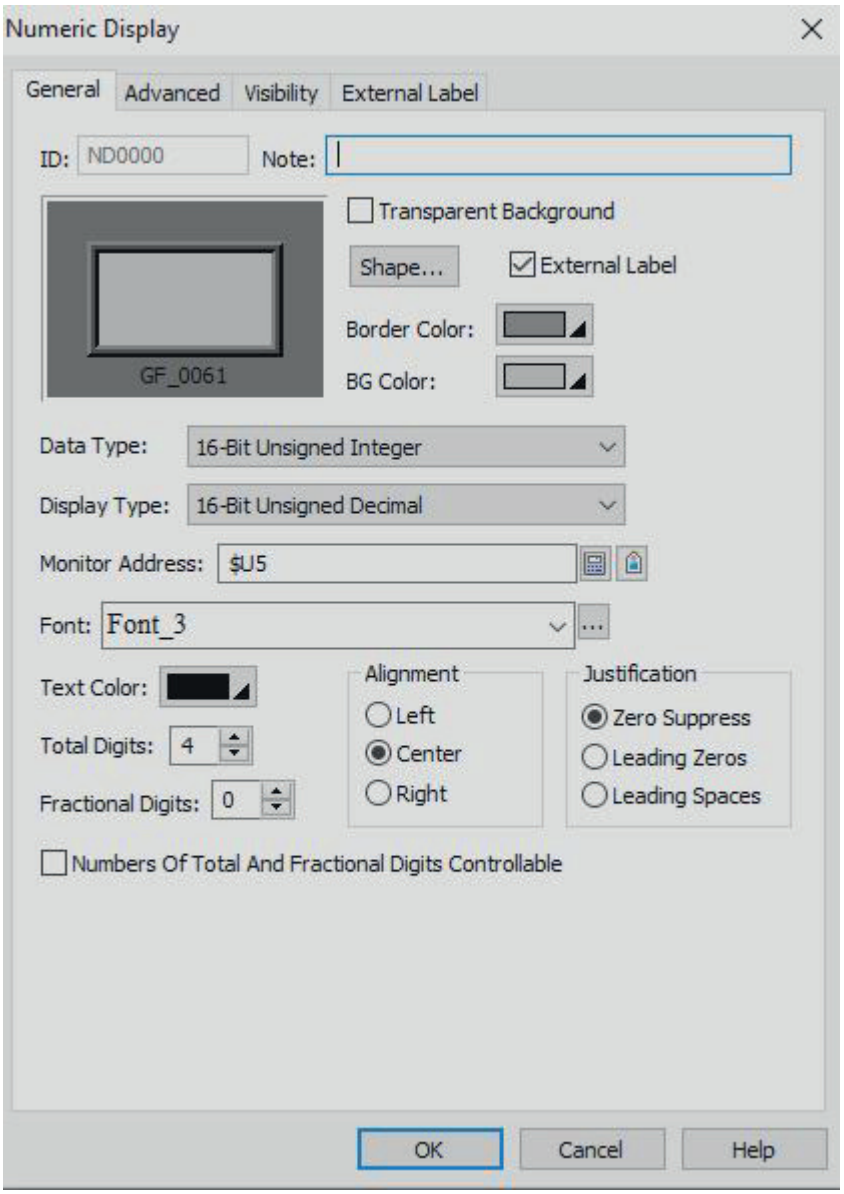
i^3 Modbus Master Tutorial

To read data from the i3, 5 numeric display will be added to the screen to display the data received.



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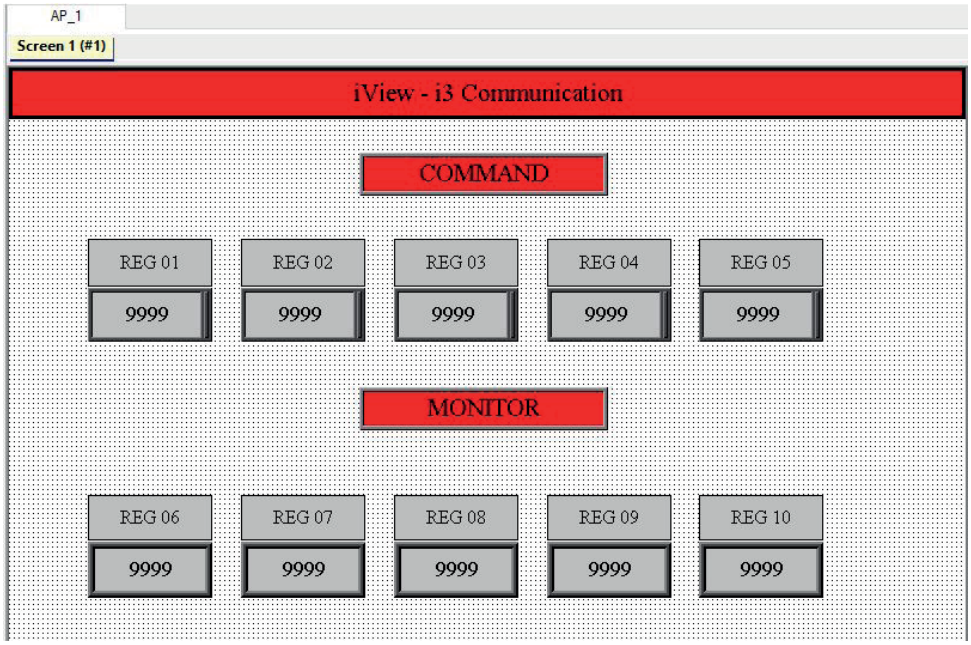

Wiring:

i3 - iView RS 485 Communication

Note : please refer to the iView technical datasheet for more information about the connection.

Attached Program

Please refer to the attached program examples:

iView program: iView_I3_ ModbusMaSTER.pm3

i3 Program : iView i3 Comms.csp

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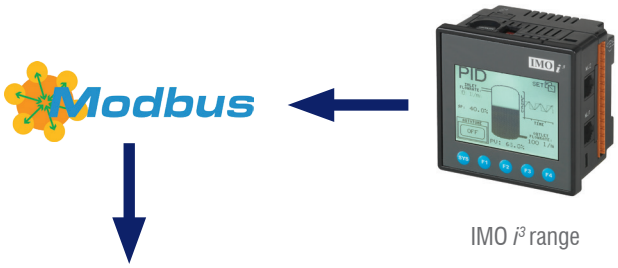
i^3 Modbus Master Tutorial

Connecting i3 to XBM PLC



IMO i^3 range

XBM PLC

i3 Configurator Software:

Protocol Configuration:

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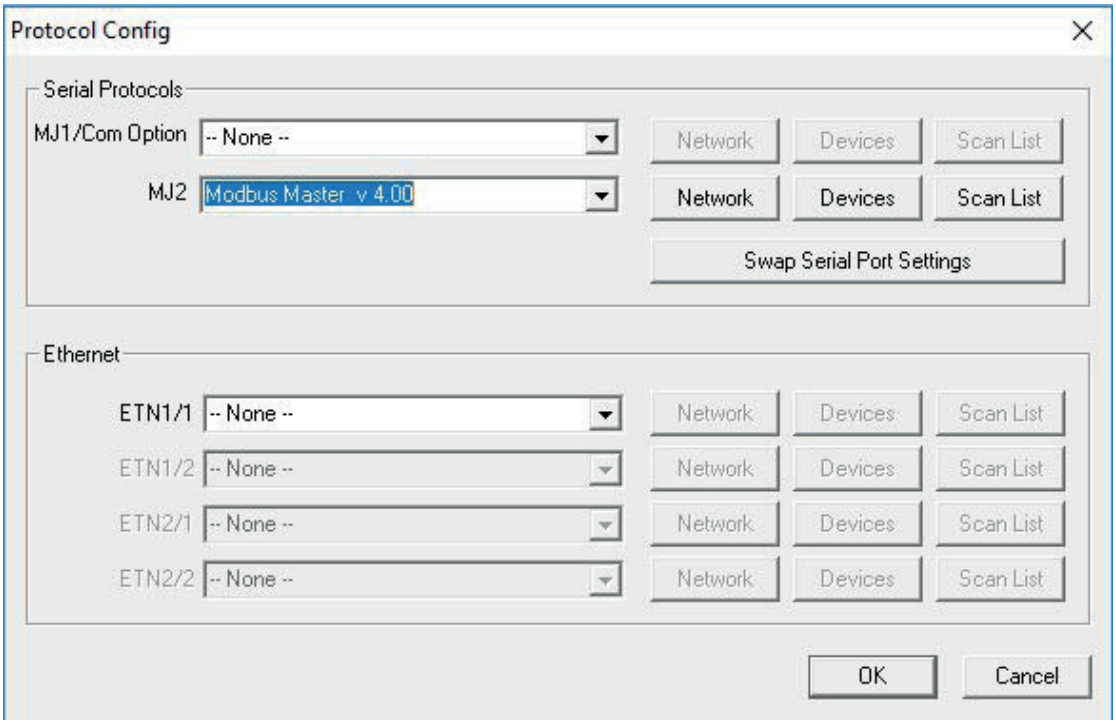
Open the Program > Protocol Configuration. Select the Modbus Master Protocol in the MJ2 and configure the Network, Devices and Scan list as shown below.



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i^3 Modbus Master Tutorial

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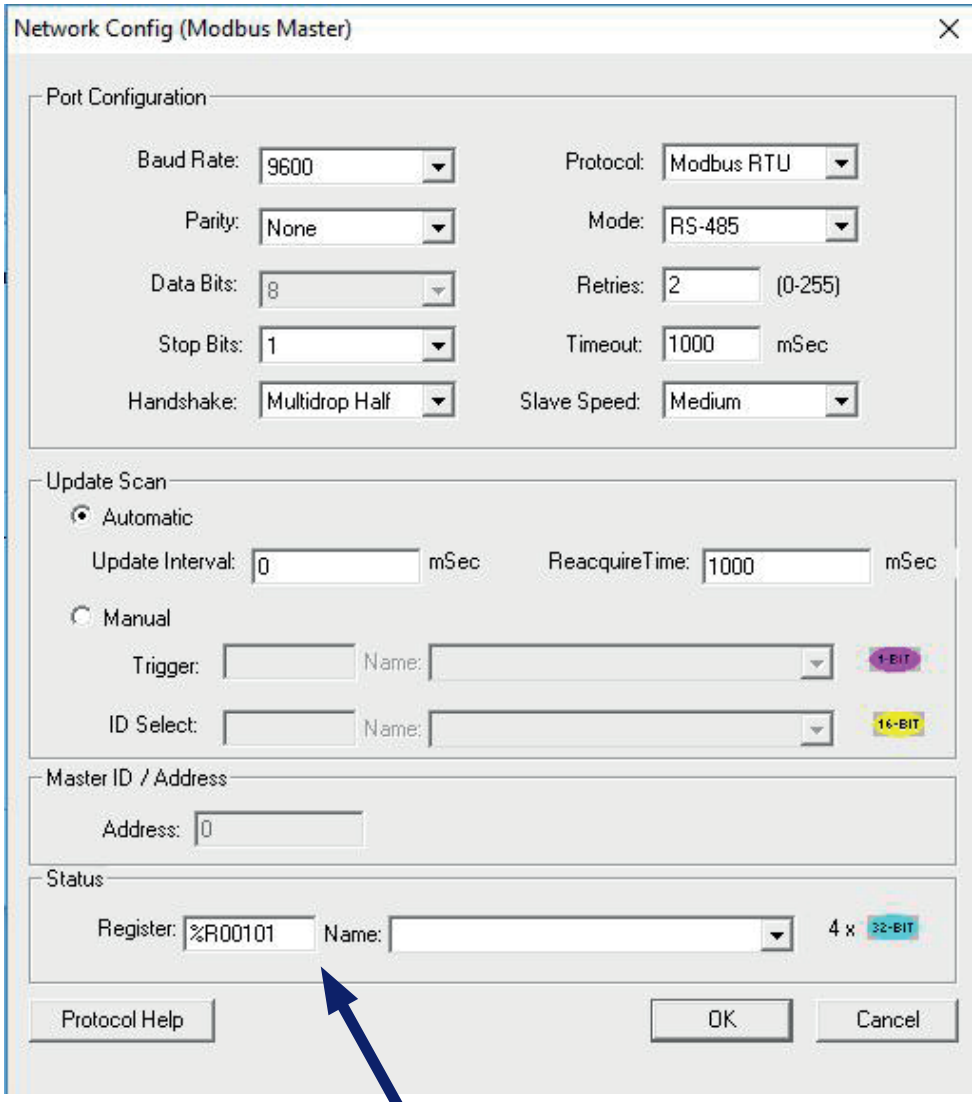

To see the status of the network assign a % R register here.

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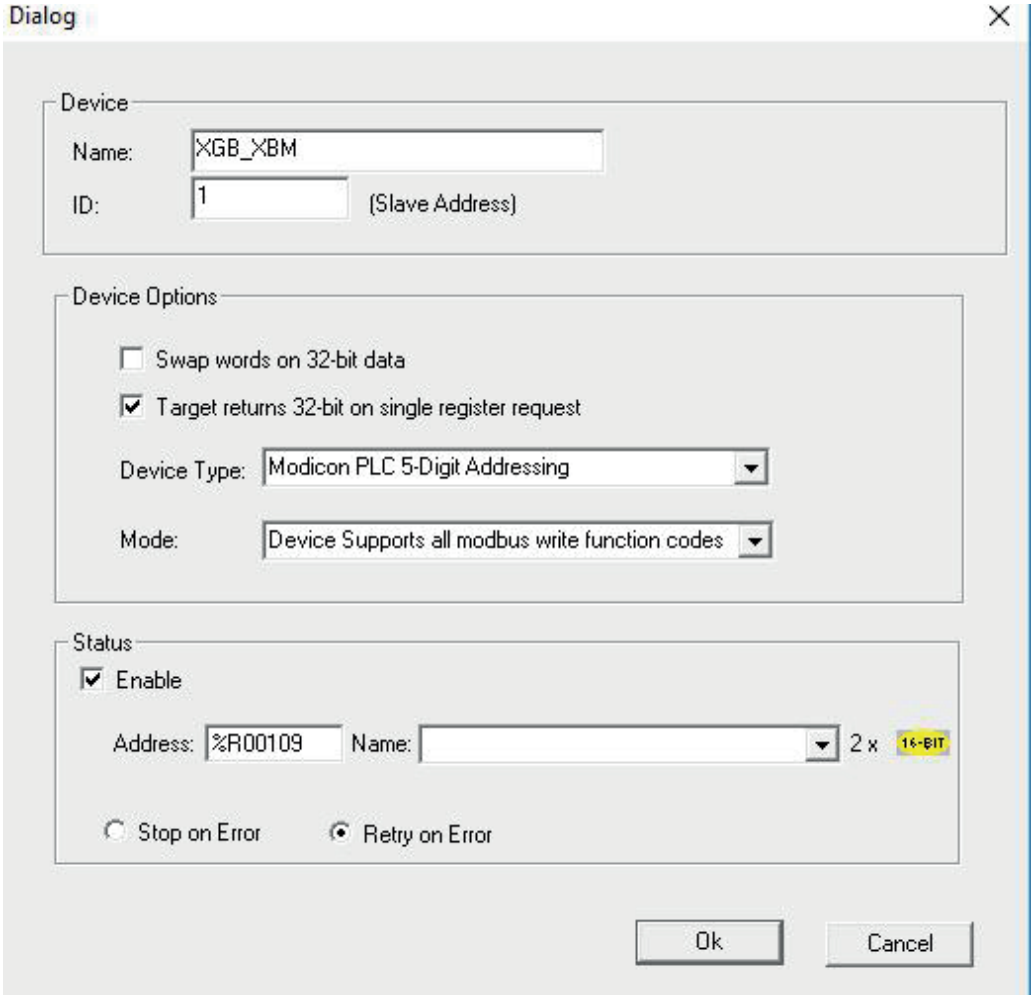
i^3 Modbus Master Tutorial

Devices:

Name the device and give it an ID.



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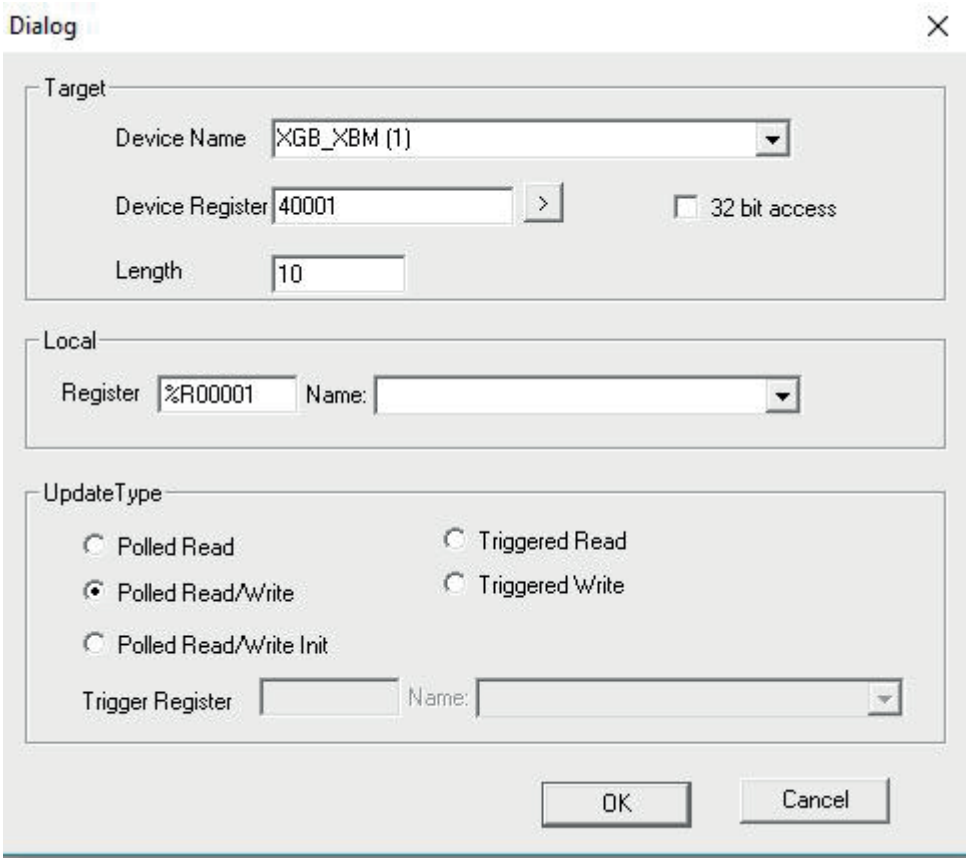
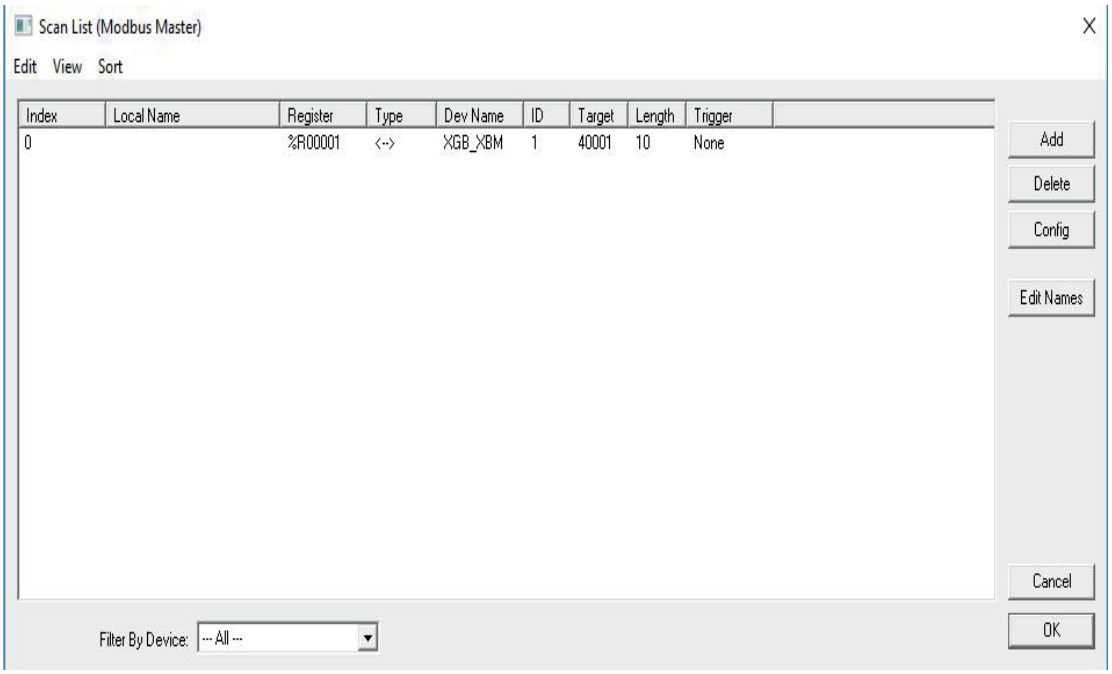
i^3 Modbus Master Tutorial

Scan List:

Finally, we need to add to the scan list the addresses we are going to read from and write to the Modbus slaves.





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i^3 Modbus Master Tutorial

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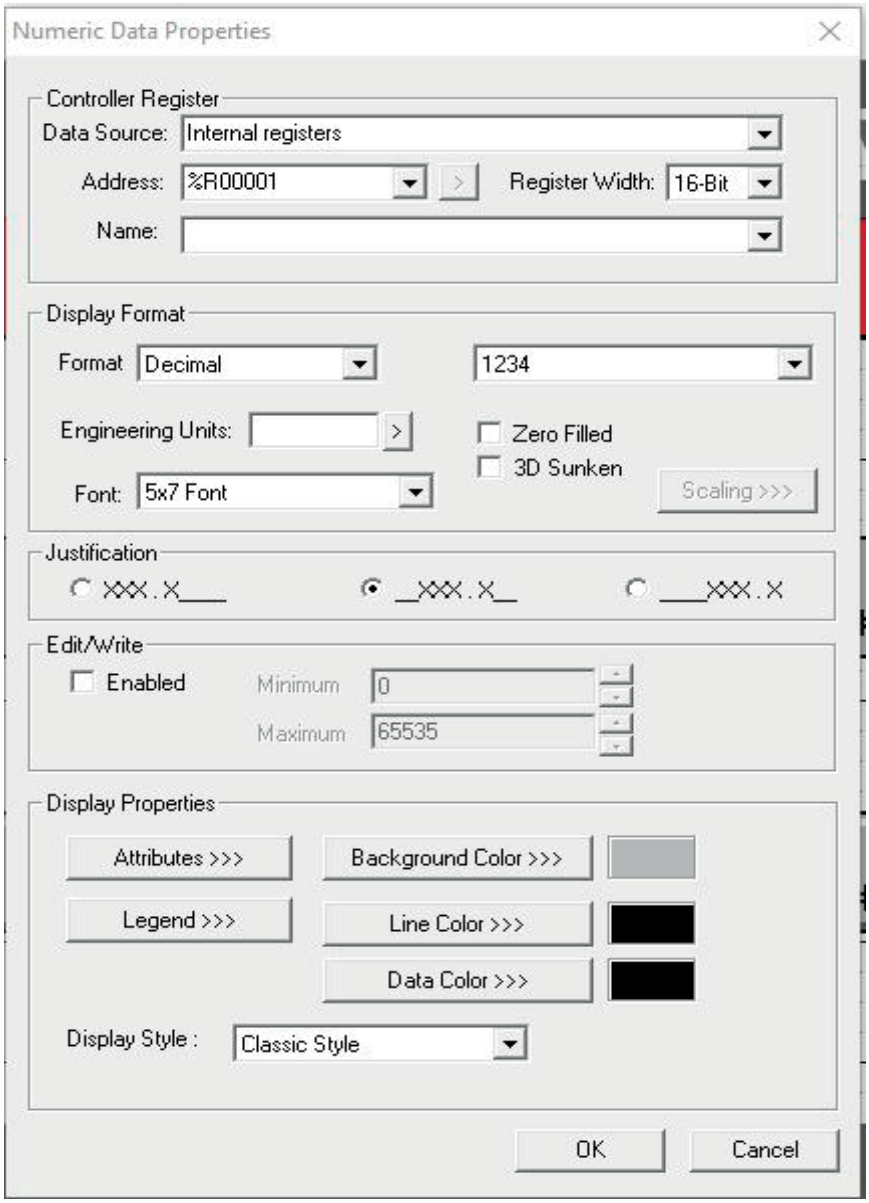
Screen Editor Programming

For this program we are going to have 1 screen and to enter the screen editor, click on the icon . Please set up the screen as described below:

There will be 10 numeric data properties.

- 5 numeric data for monitoring Data/value from the PLC.

Note: The option Edit/Write should be unticked.



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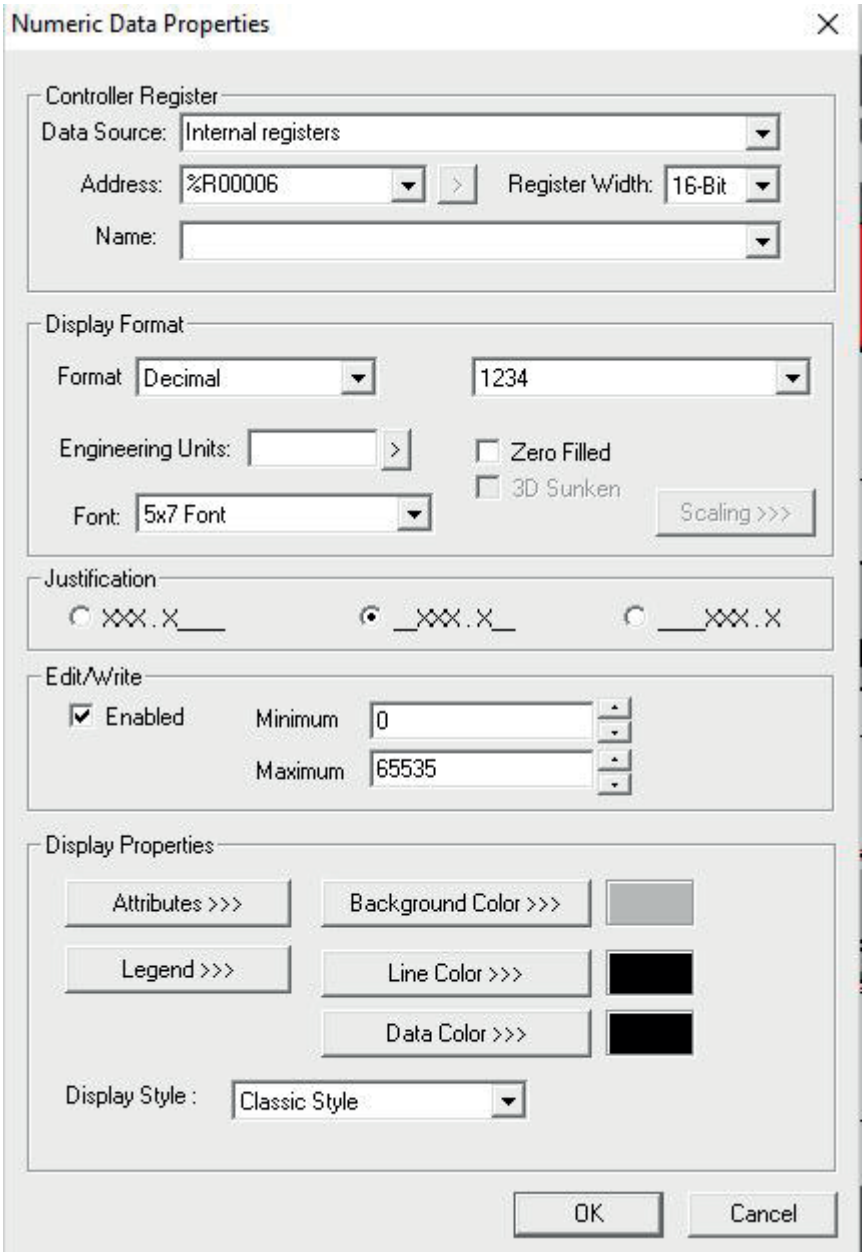
• 5 numeric data to enter data which it will be received by the iView.

Note: The option Edit/Write should be ticked to enable writing value to the PLC.



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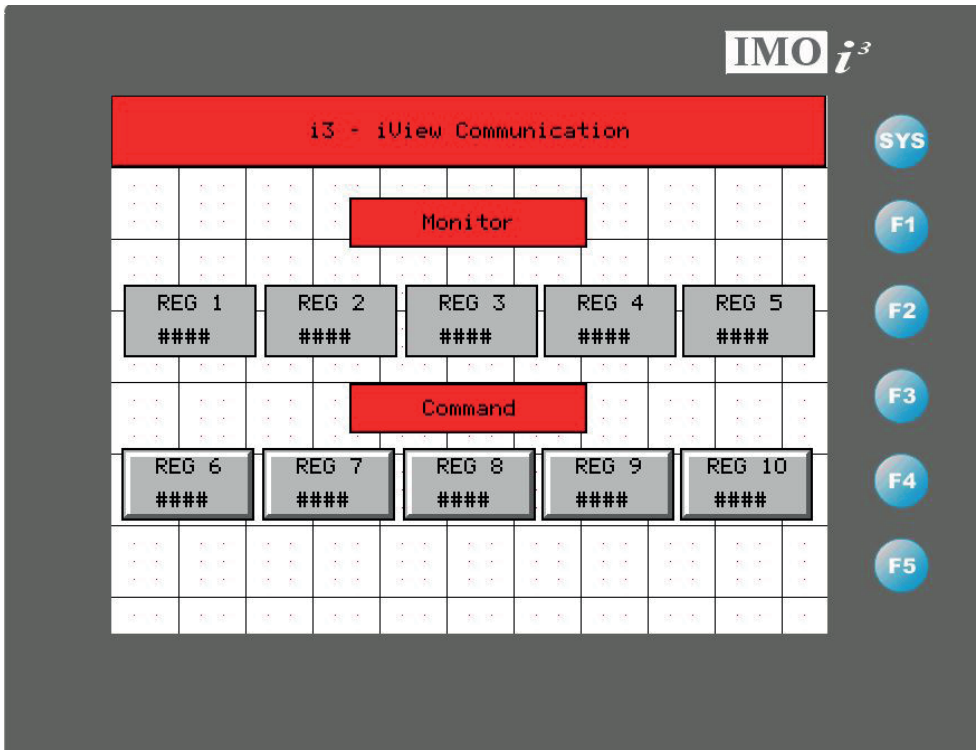
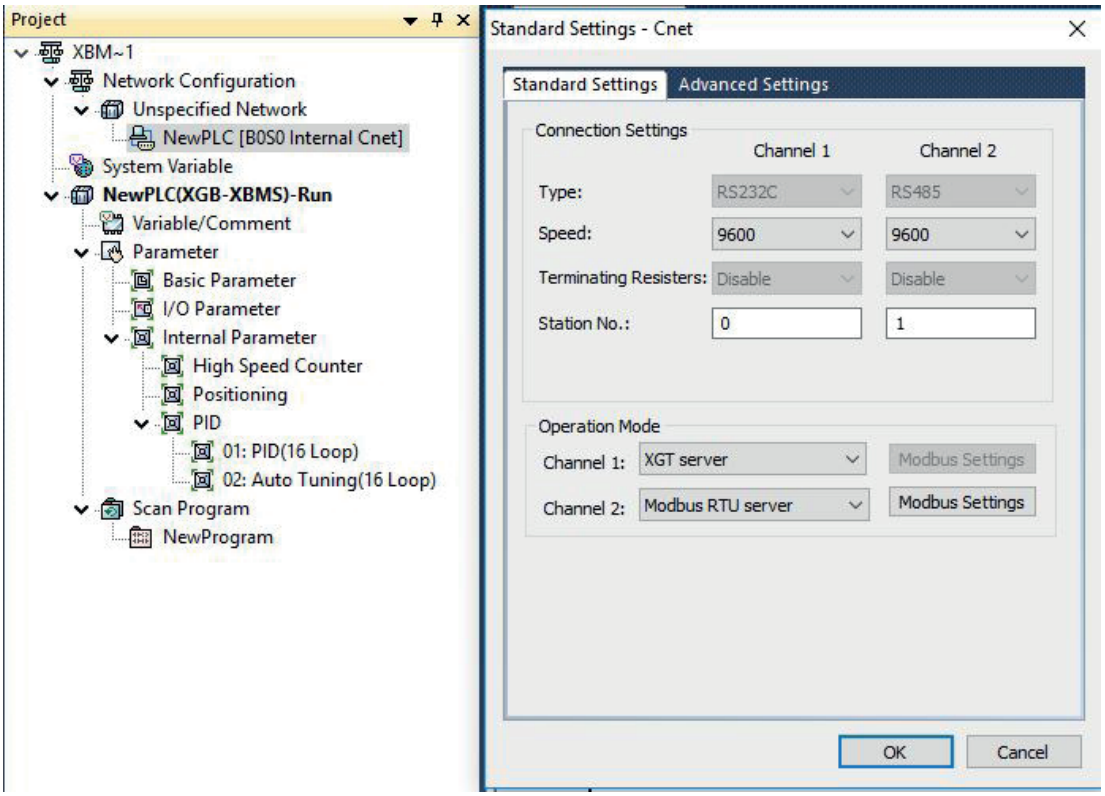
i^3 Modbus Master Tutorial



XGB5000 Software:

Under the project name select Network configuration > Unspecified Network>



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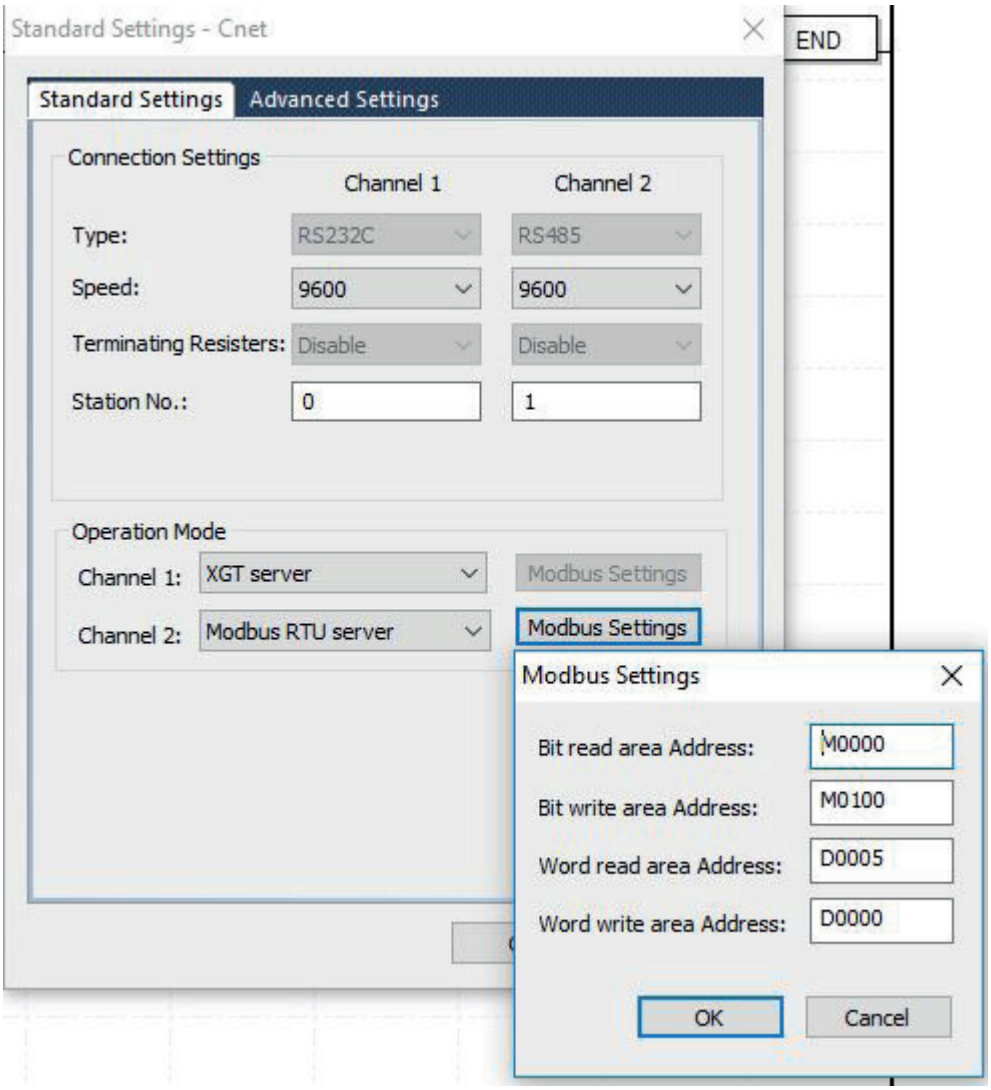
i^3 Modbus Master Tutorial

In this example the PLC is the Slave device , so channel 2 will be set to Modbus RTU server.

The Writing address will be starting from D0000.

The Reading address will be starting from D0005.



Wiring

Table Picture

Attached program :

XGB: XBM_I3.xgwx

I3: i3_xbm_PLC.csp

i3 - XBM RS 485 Communication

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i^3 Modbus Master Tutorial

Connecting i3 to VXT

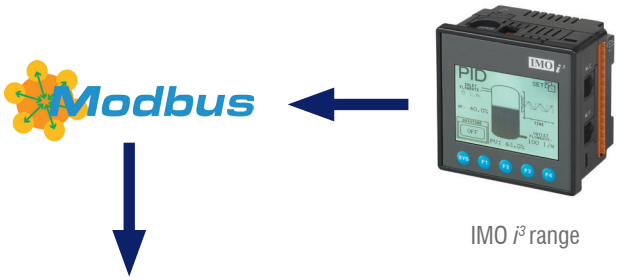
In this tutorial we will demonstrate the i3 as a Modbus master, controlling a network of Modbus devices. The i3 can read and write to and from single and multiple registers and is easily configured.

We will demonstrate the i3 as a Modbus master controlling 1 Modbus slaves an IMO VXT Inverter Drive.

We will read and write the Frequency and start and stop the inverter.

**** Be aware that the i3 Modbus addressing all starts at offset xxxx1 not xxxx0 (Holding Registers - 40001, not 40000, see Figure 1). So, when translating the address from the relevant product manual, you may be required to add 1 to the address to correct this offset.**

For example: The VXT manual will point to register 41797 (plus 1) = 41798. (Please refer to Inverter user manual for more information about the commands.



IMO i^3 range

VXT

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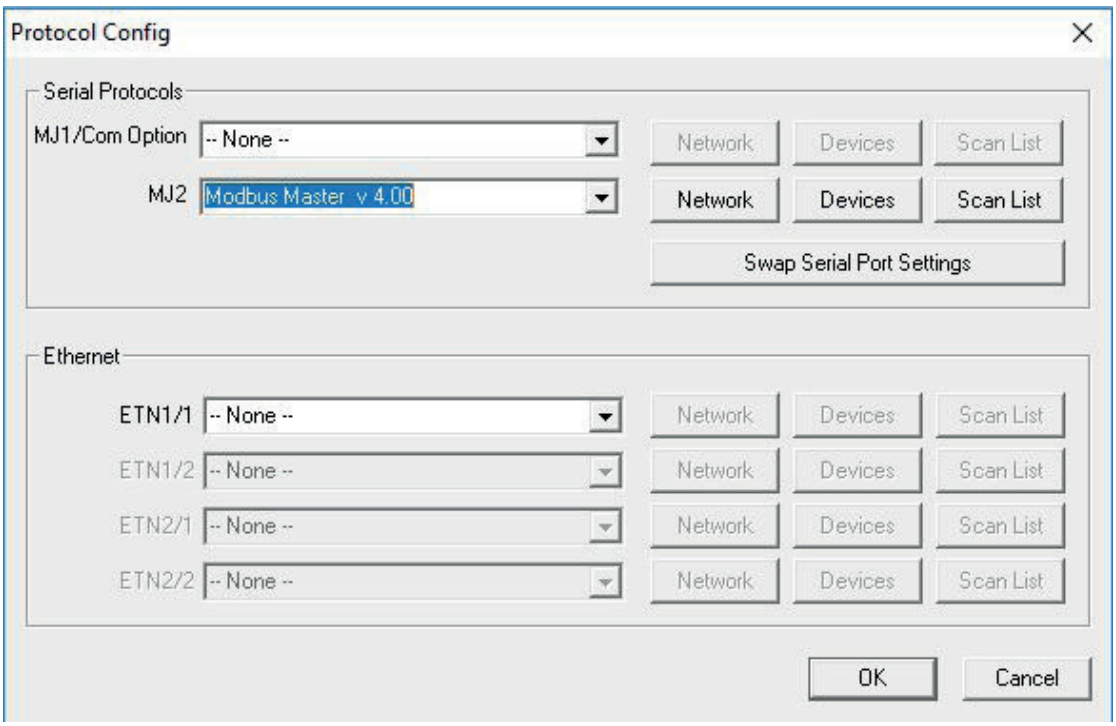
i^3 Modbus Master Tutorial

i3 Configurator Software:

Protocol Configuration:

The Modbus master protocol utilises the Modbus function codes 03 to read single and multiple registers, 10 to write to multiple registers and 06 to write to single registers. Most Modbus slave devices only use the function codes 03 to read and 06 to write. Therefore, the i3 can communicate with any Modbus enabled device.

Open the Program > Protocol Configuration. Select the Modbus Master Protocol in the MJ2 and configure the Network, Devices and Scan list as shown below.



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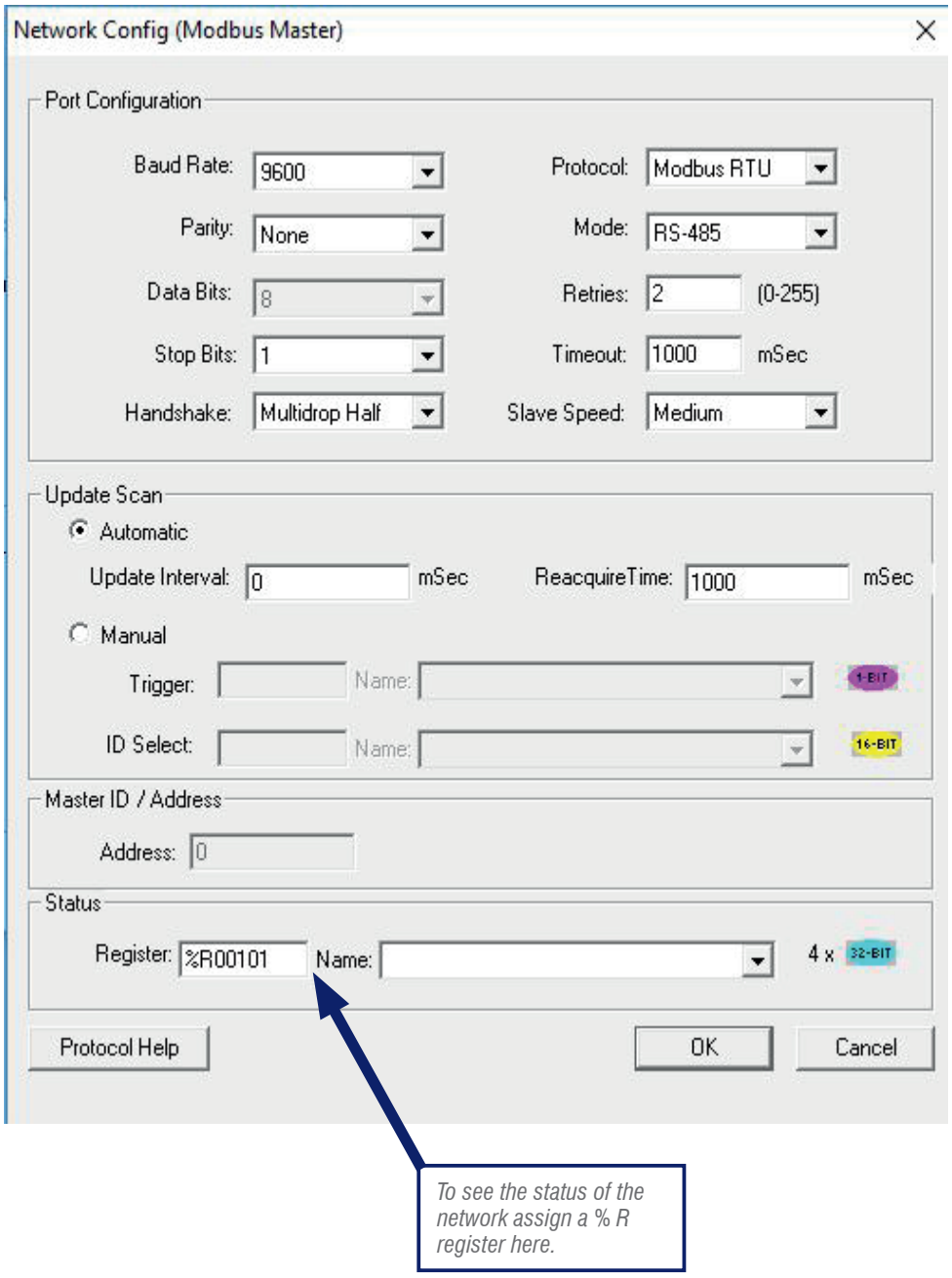
Network Configuration

In the network configuration the communication parameters are set. Set the parameters as shown below. We are going to use the protocol Modbus RTU and communicate on RS485, which is a multi-drop half duplex system.



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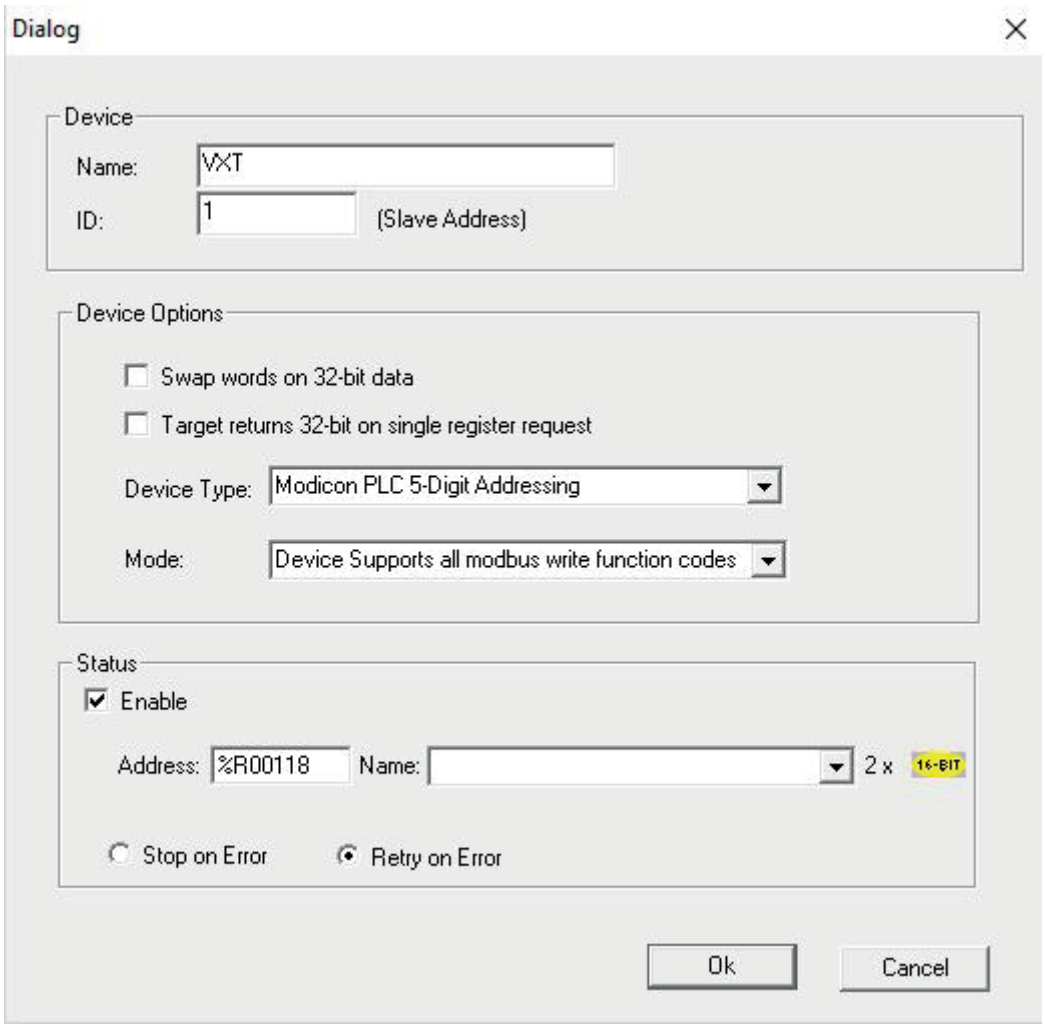
Devices:

Name the device and give it an ID.



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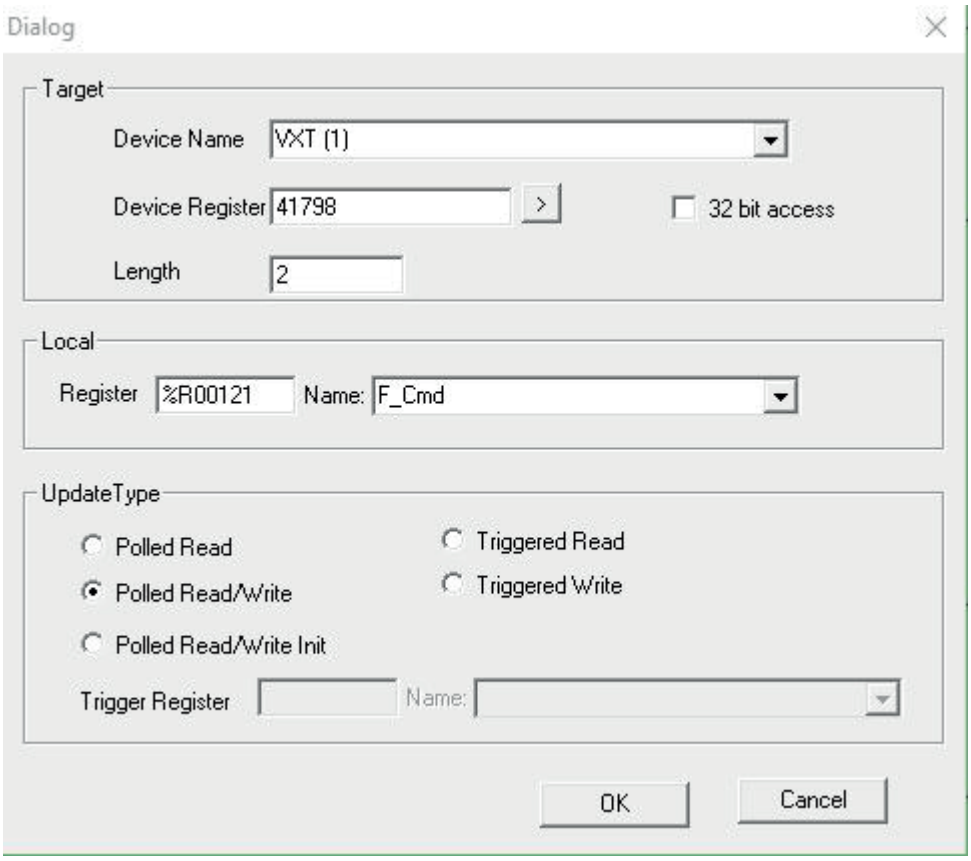
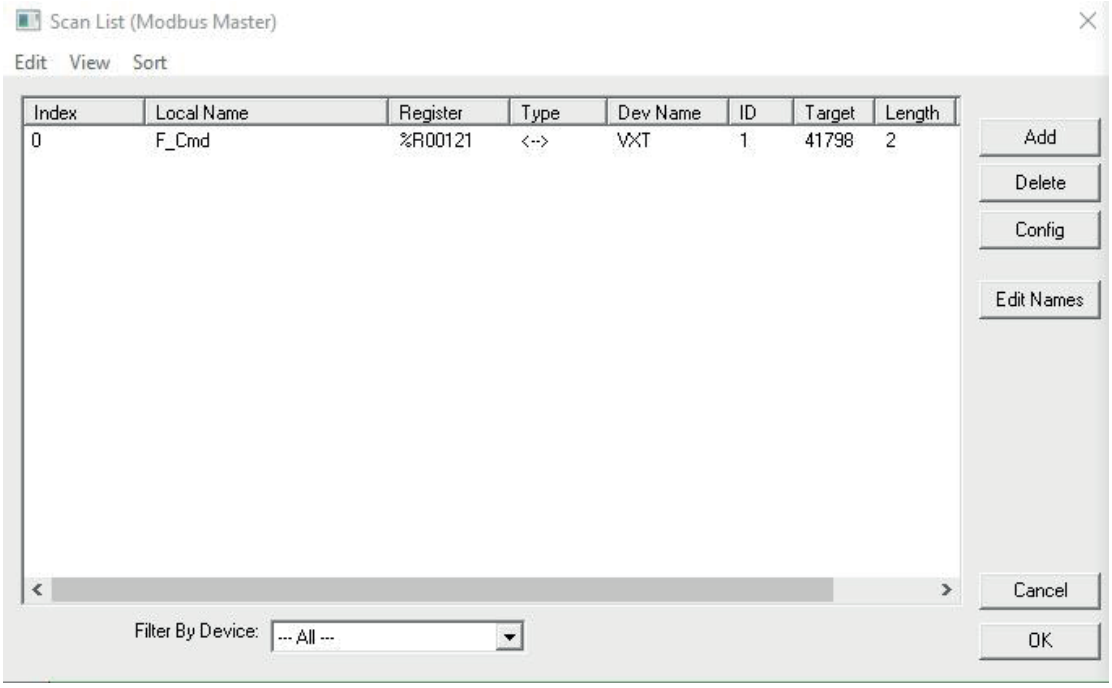
Scan List:

In this example we are going to control direction of the inverter.





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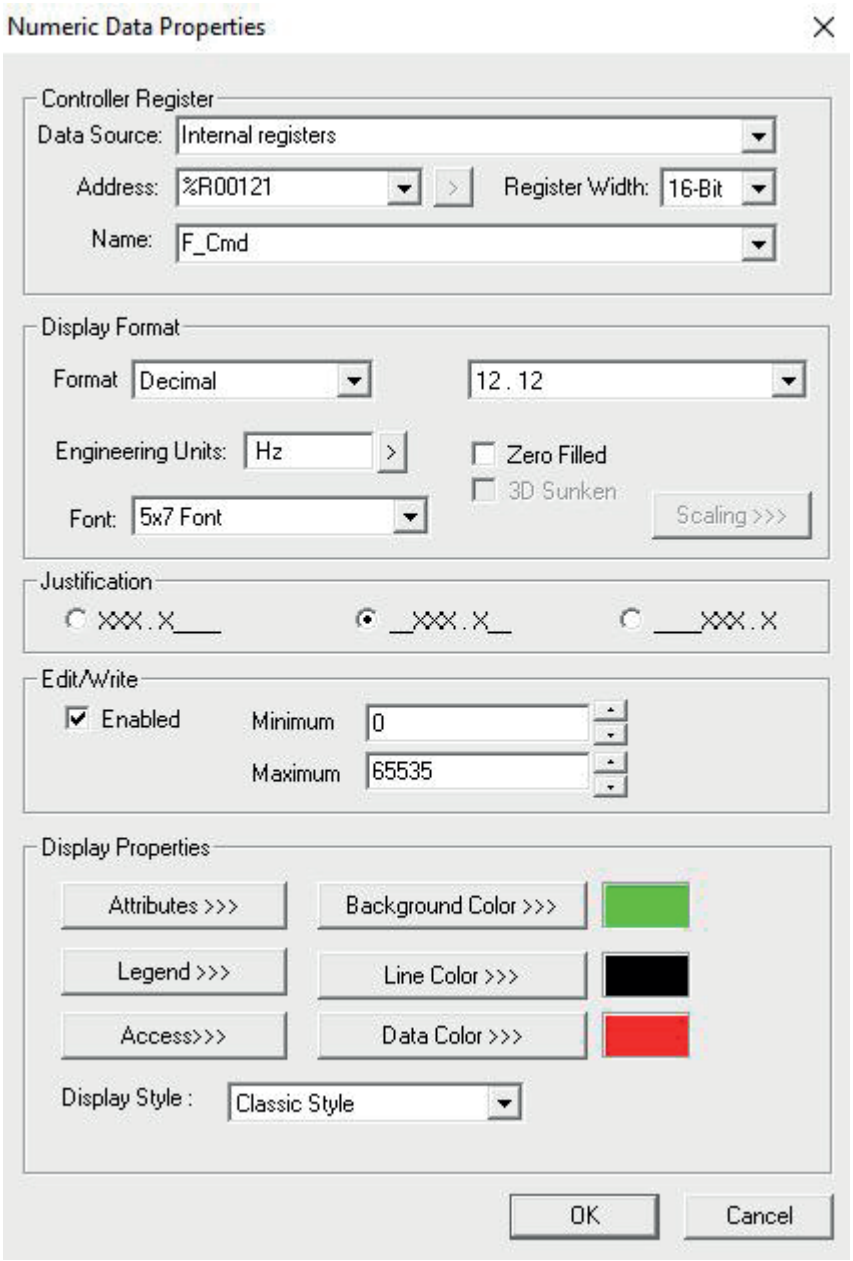
Screen Editor Programming:

In this example we going to configure the following:

- 1 numeric entry for entering the frequency
- 1 Text table data to control the motor direction (Forward/Reverse /Stop).

Setting Frequency :



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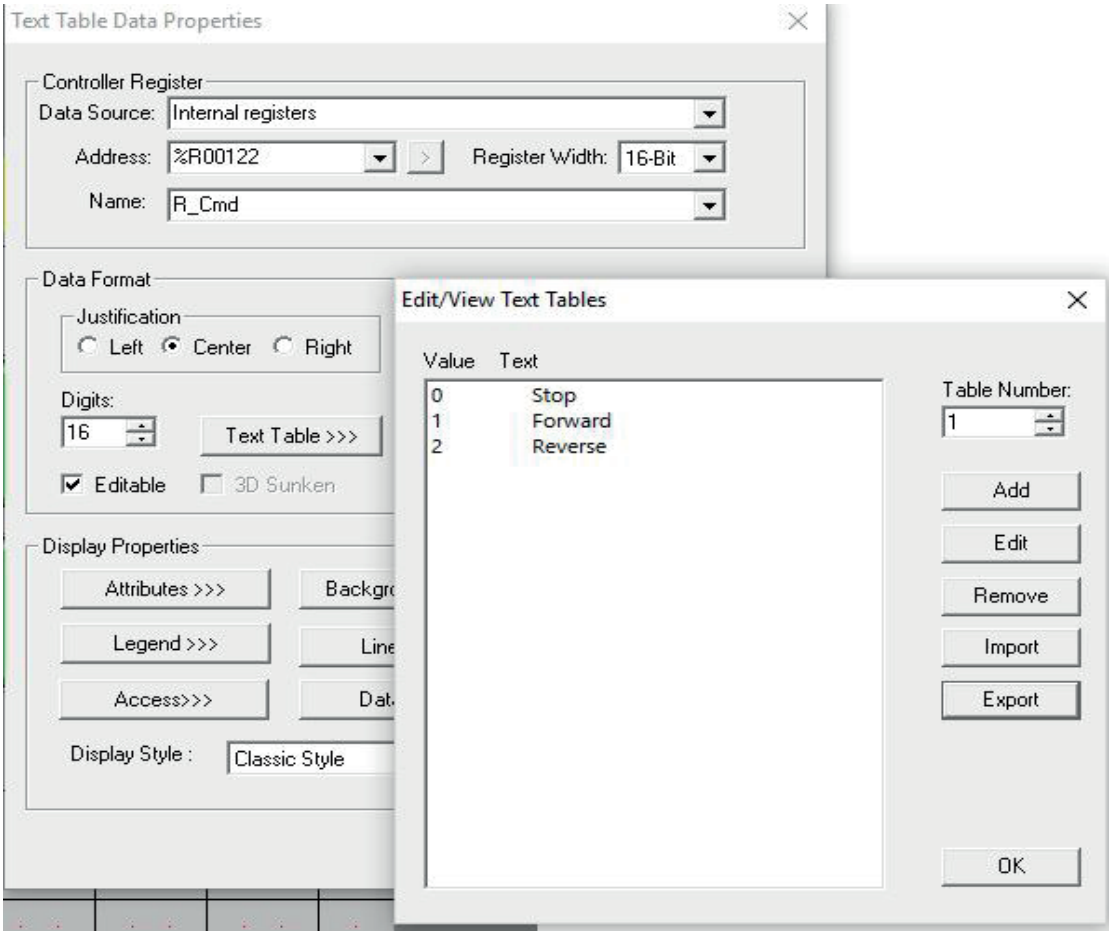
Direction Command:



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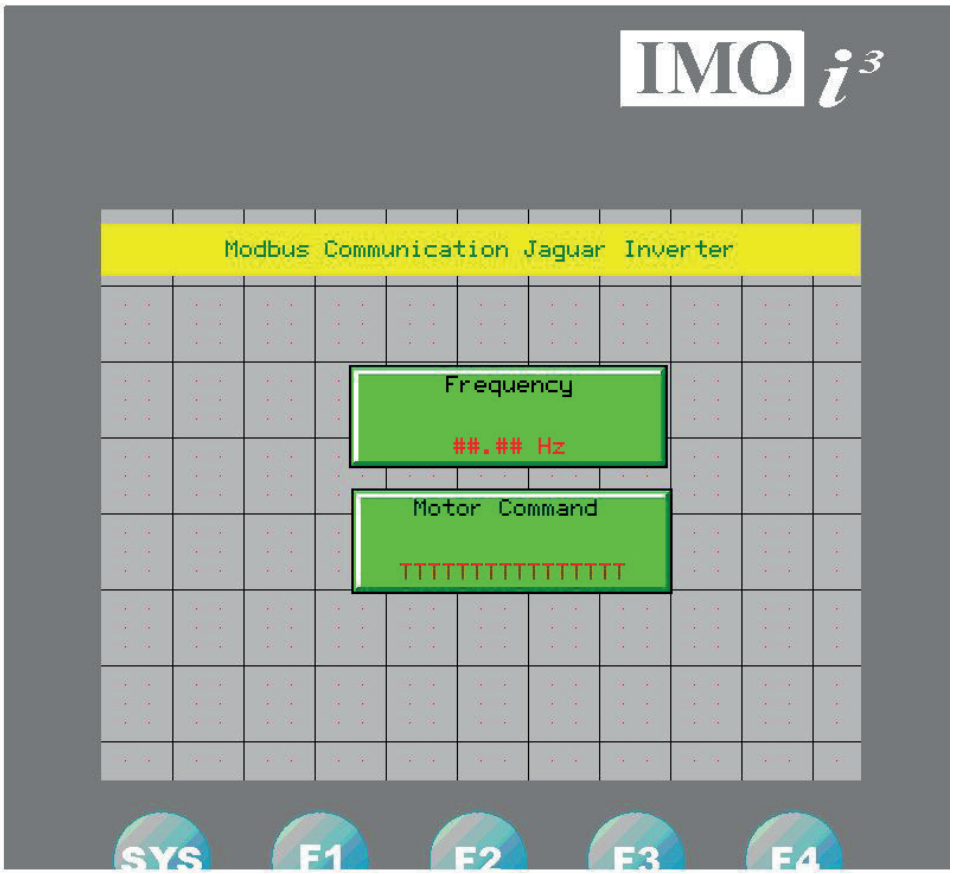
i^3 Modbus Master Tutorial

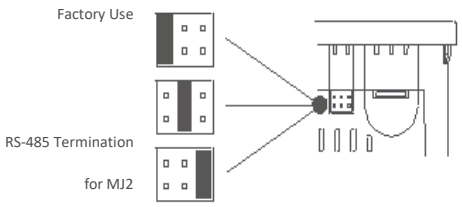


Wiring Diagram

We are using Port 2 on the i3 as a RS485, 2 wire to connect to the device. The wiring for this is as follows.

Pin	MJ2 Pins	
8	TXD	OUT
7	RXD	IN
6	0 V	Gnd
5	+5V (60mA)	+ve
4		
3		
2	TX-/RX-	IN/OUT
1	TX+/RX+	IN/OUT

Remember to connect the RS-485 termination jumper as shown.



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i^3 Modbus Master Tutorial

i3 to VXT Inverter

i3 - VXT RS 485 Communication

Running the Program

Please connect the network as shown. Also, note that drive needs to have the communication parameters set appropriately.

Please use the program: i3_VXT_Inverter.csp by clicking on the paperclip below.

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