MYNAH

KNOWLEDGE BASE / TECHNICAL NOTES

DeltaV Integration with Stahl IS1 Using Modbus TCP Virtual IO Module

By

PRODUCT FAMILY: DELTAV VIRTUAL IO MODULE

This technical note describes the recommended settings for integrating the Stahl IS1 Remote IO System with a Modbus TCP Virtual IO Module. Documentation is provided in the introduction for configuring the Stahl IS1 with a Modbus TCP interface in addition to the Modbus TCP Virtual IO Module manual.

Introduction

Documentation:

Integrating Stahl IS1 with Modbus TCP Interface (/files/10_Coupling_description_Ethernet_Modbus_TCP.pdf)
Modbus TCP Virtual IO Module Manual (http://www.mynah.com/vimnet_webhelp/Default_Left.htm#CSHID=modbus_tcp%2Ftheory_of_operation.htm|StartTopic=Content%2Fmodbus_tcp%2Ftheory_of_operation.htm|SkinName=Mynah-MiMiC)

Hardware Requirements

Stahl IS1 Modbus TCP Remote I/O System
Emerson SK-KJ1710 Ethernet to Fiber Media Converter
24V 3A DC Power Supply
2 100Base-T Ethernet Network Switch (min. 4 ports)
MYNAH Technologies VIM-4201 with driver firmware IOD-4101 (latest revision recommended)
2 PCs with sufficient hardware resources (one as DeltaV workstation, one as VIMNet/FDT Frame workstation)

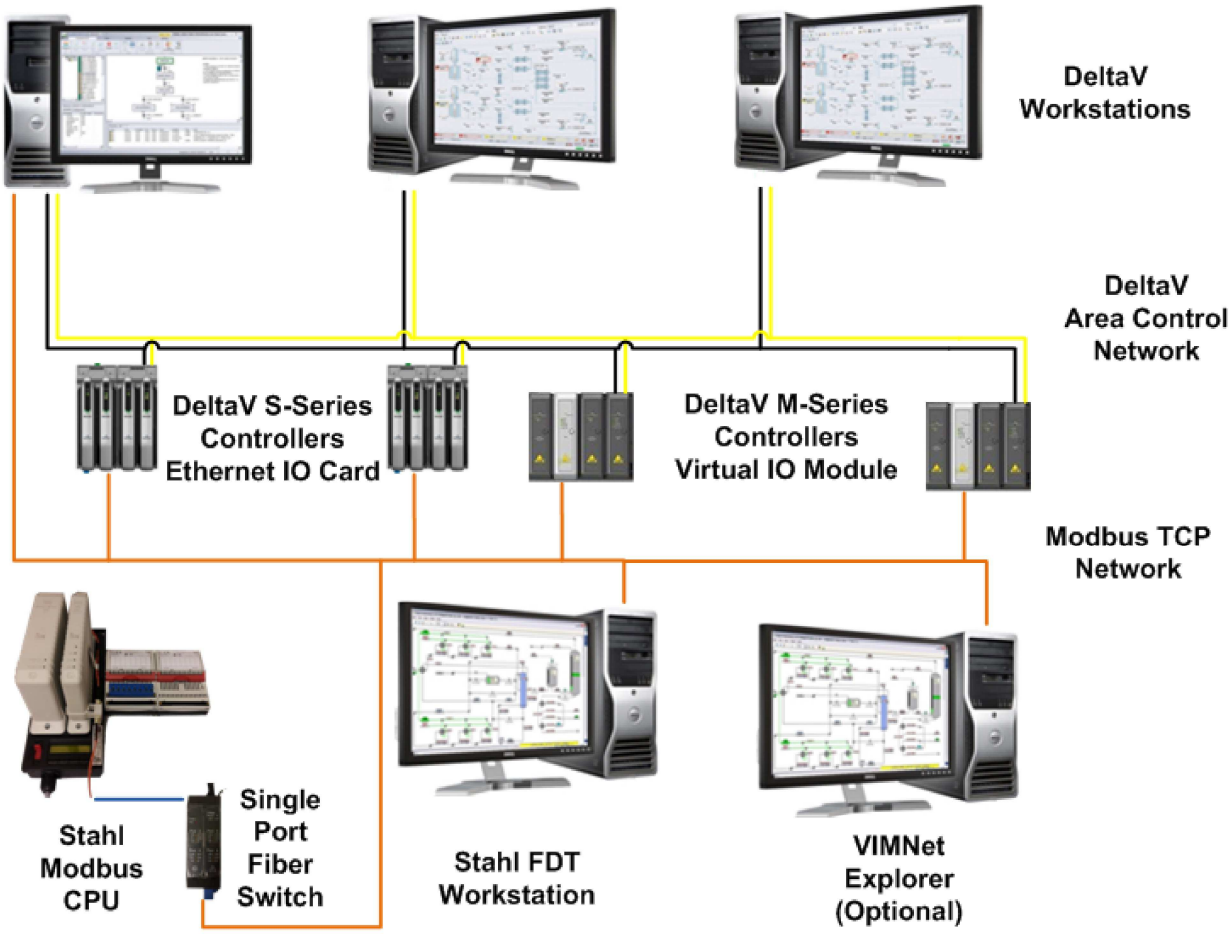
Software Requirements

Stahl IS1_DTM_V3.0.1.446 (free download, but requires license from Stahl after 30 days)
PACTware 3.6 FDT Frame (freeware, requires Microsoft .NET framework 1.1 and Microsoft .NET Framework 1.1 SP1)
VIMNet Explorer (freeware, requires MYNAH My Account (http://www.mynah.com/knowledge-base/my-account-mynahcom-features-and-directions) to download - contact MYNAH Technologies for support)
DeltaV System Software (Release 6.3 or later) installed on a hardware-appropriate Windows workstation configured as a ProfessionalPlus for DeltaV (requires license)
- DeltaV Explorer
- DeltaV Diagnostics
- DeltaV Control Studio

Guide Assumptions

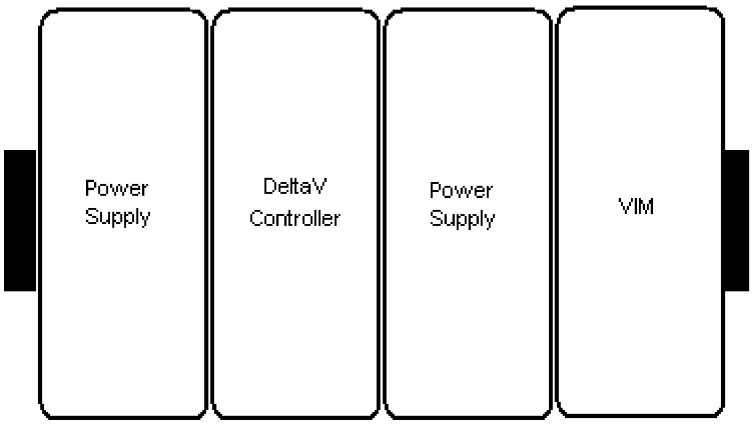
The user has an installed Stahl IS1 Modbus TCP Remote I/O System with appropriate I/O Modules connected to the system
The user does not currently have an FDT Frame installed and will need to make use of the software described in this document (if you already have an FDT frame installed and the IS1 Remote I/O System configuration has already been uploaded to the IS1 CPU Module, proceed to section 4.1 from the end of section 3 and continue from there - you will still need to install the Stahl IS1 DTM to configure the IS1 CPU Module).
All of the software downloads mentioned in this document are Freeware unless stated otherwise.

1 - Connecting the IS1 System to the PC (DeltaV Machine)



Connect the DeltaV PC and the Primary port on the bottom the DeltaV Controller (the port furthest from the back of the module) to the DeltaV network switch (this switch should be on the DeltaV Network). Then, connect the VIMNet/FDT Frame PC, the Ethernet port on the bottom of the VIM, and one of the Ethernet ports on the Ethernet-to-Fiber media converter to the Modbus TCP network switch (this swich should be on the Modbus TCP Network). Next, using the auxiliary Fiber port attached to the right side of the IS1 CPU (9441), connect the IS1 CPU to the Ethernet-to-Fiber media converter. After all of the above connections have been completed, connect the Ethernet-to-Fiber media converter to the DC power supply (4 = +, 5 =

Not Used, 6 = GND). Turn on the DC power supply. Connect the individual modules to the controller carrier as illustrated in the Modbus TCP Manual, for our configuration we used the layout below:



2 - Installing and Starting the Software

Install the DeltaV software suite on the DeltaV PC, then install the remaining required software on the VIMNet/FDT Frame PC in the order listed under "Software Requirements" (Note that PACTware 3.6 requires .NET Framework 1.1 and .NET Framework SP1. If you do not have these installed, run "dotnetfx.exe" and "NDP1.1sp1-KB867460-X86.exe" prior to installing PACTware 3.6). After all of the software is installed, launch PACTware 3.6 on the VIMNet/FDT Frame PC (PACTware will search for DTMs on first launch and should detect the Stahl DTM that was installed earlier in this step).

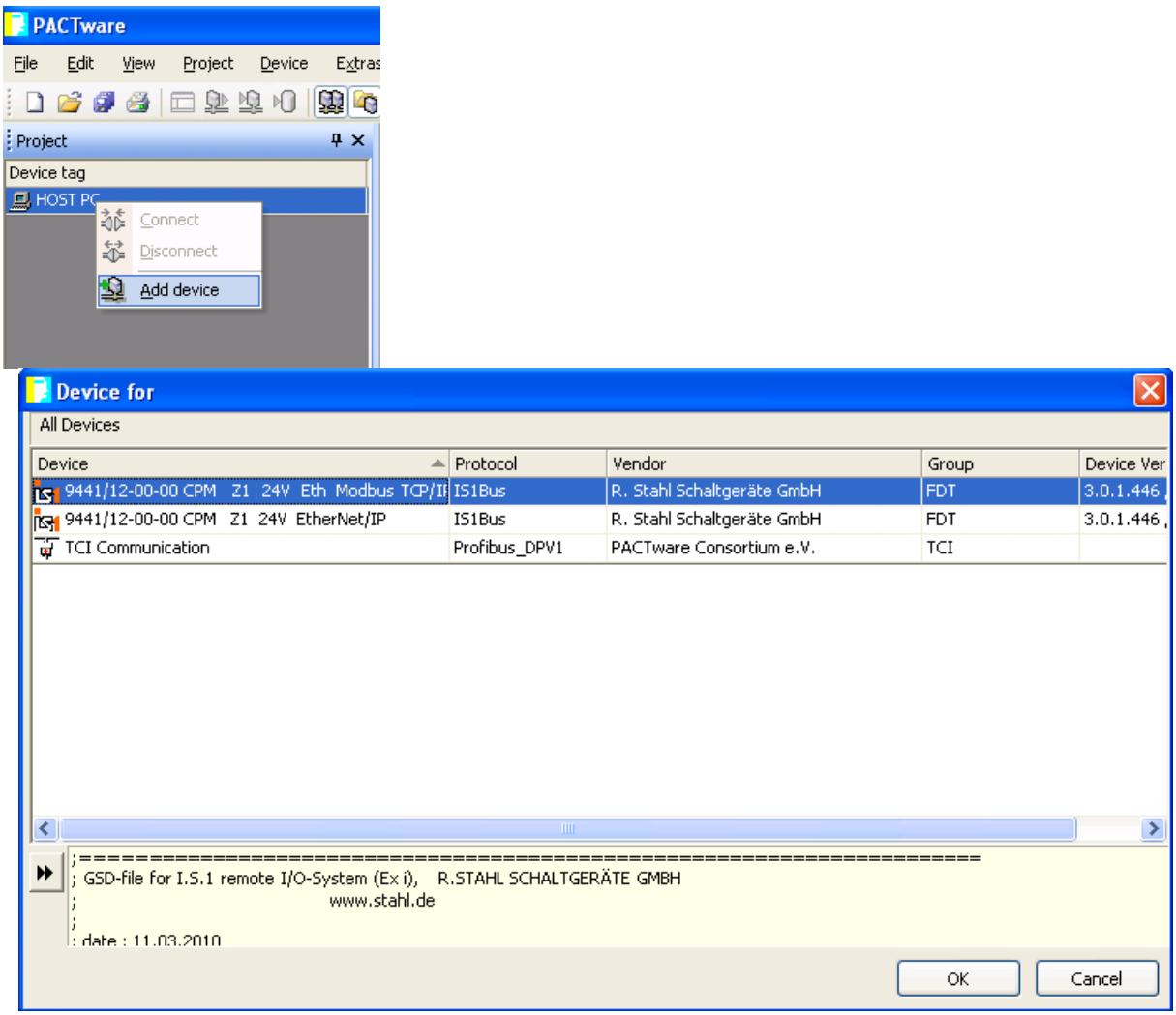
3 - Configuring the IS1 System Using the Power Module/CPU Base Terminal

On the base for the IS1 Power Module/CPU, there is a small LCD screen at the bottom. Upon booting the IS1 System, this screen will display system information pertaining to the IS1 CPU, including the IP Address of the IS1 CPU Module (the IS1 CPU's default IP Address is 0.0.0.0). To configure the IS1 CPU's IP Address, press the "Enter" key twice (located on the right side of the keypad) to enter the Information/Service Menu. Use the left/right arrow keys to scroll through the options until the following display appears:

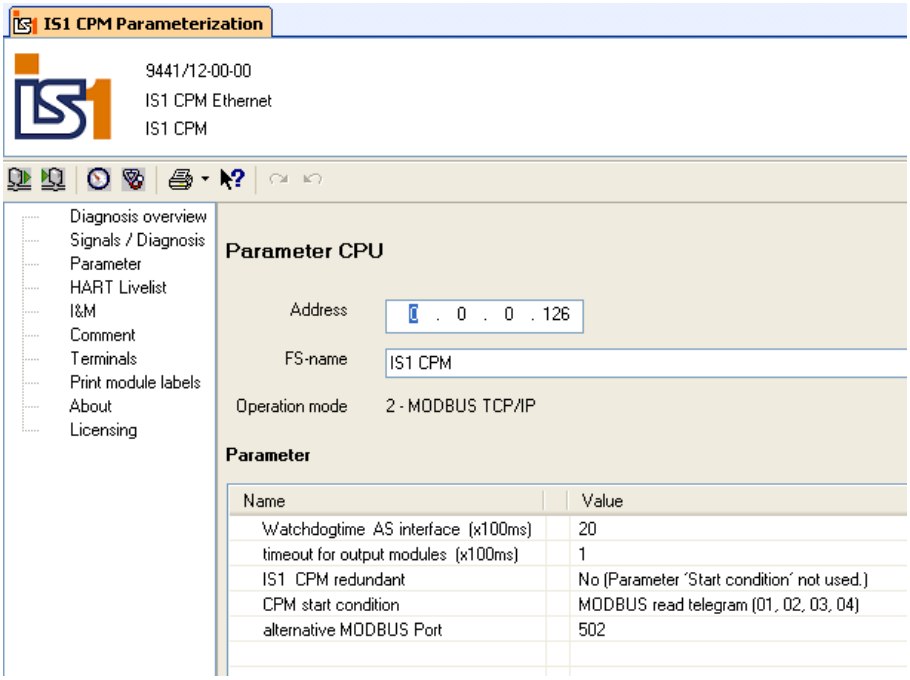
Press the “Enter” key twice to set the IP Address. Use the arrow keys to modify the number in each space, and then press the “Enter” key to confirm. After confirming the last number of the IP Address, select “yes” to apply the changes. Press the “ESC” key three times to return to the System Menu. Scroll through the options in the same manner as above to confirm that the IP Address was set correctly.

4 - Configuring the IS1 System Using PACTware 3.6

Right-click on “HOST PC” under the Project tab and select “Add device” to display a list of options. Select the Device labeled “9441/12-00-00 CPM Z1 24V Eth Modbus TCP/IP” and click OK.

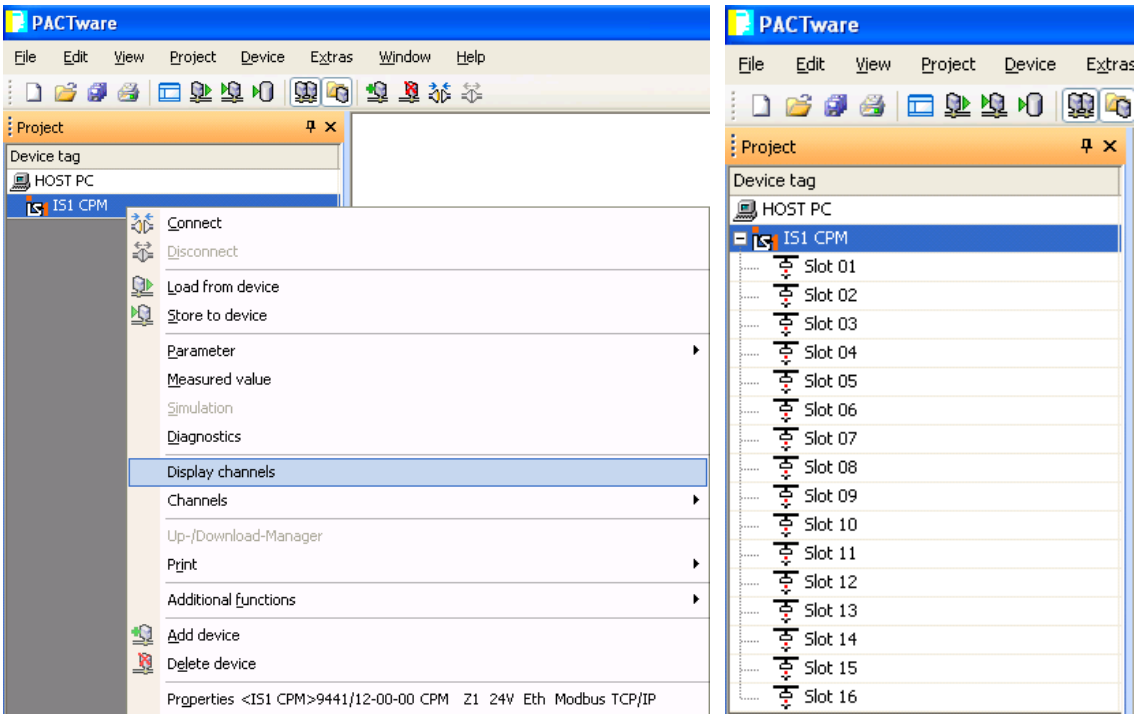


Double click on the newly added “IS1 CPM” under “HOST PC” to display the Parameterization window for the IS1 CPU.

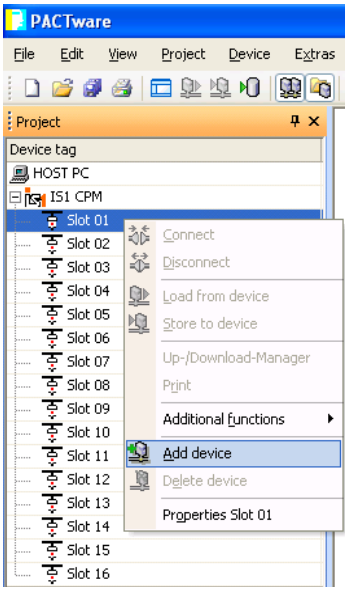


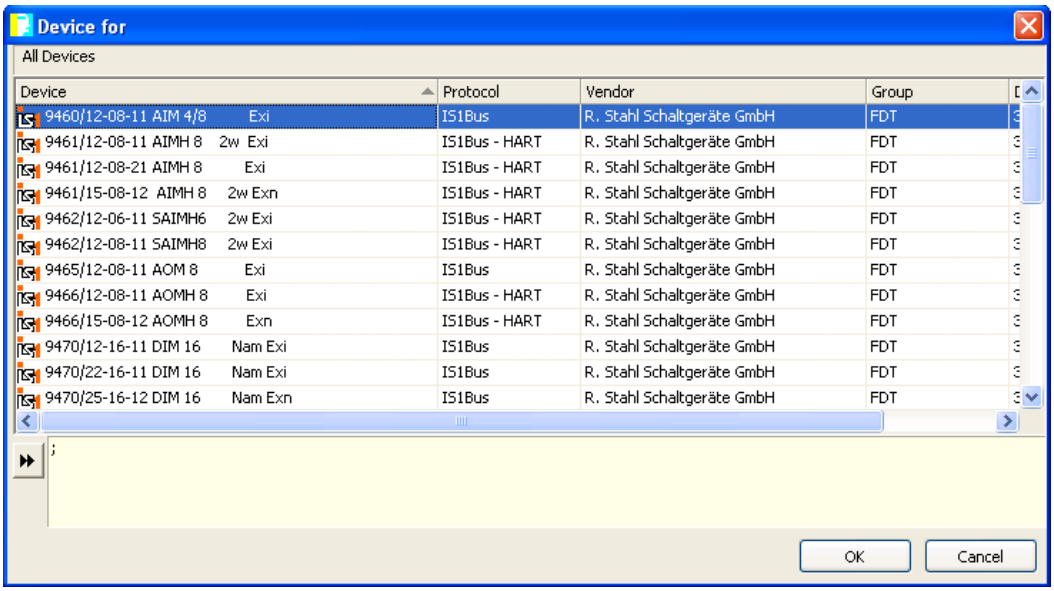
Modify the “Address” field under “Parameter CPU” to match the IP Address displayed on the LCD screen of the IS1 Power Module/CPU Base (Press the “ESC” key on the IS1 Power Module/CPU Base until you reach the System Menu, then use the left/right arrow keys to scroll through the system information until you see the current CPU 0-0: Address - this is the IP Address you will need to use in the “Address” field in PACTware). After entering the IP Address, click Apply. The IP Address is now registered in the IS1 CPM parameters.

Under the Project tab, right-click on “IS1 CPM” and select “Display Channels.” This will show all of the available slots on the IS1 bus rail(s) and will allow you to manage the I/O Modules connected to the bus rail.

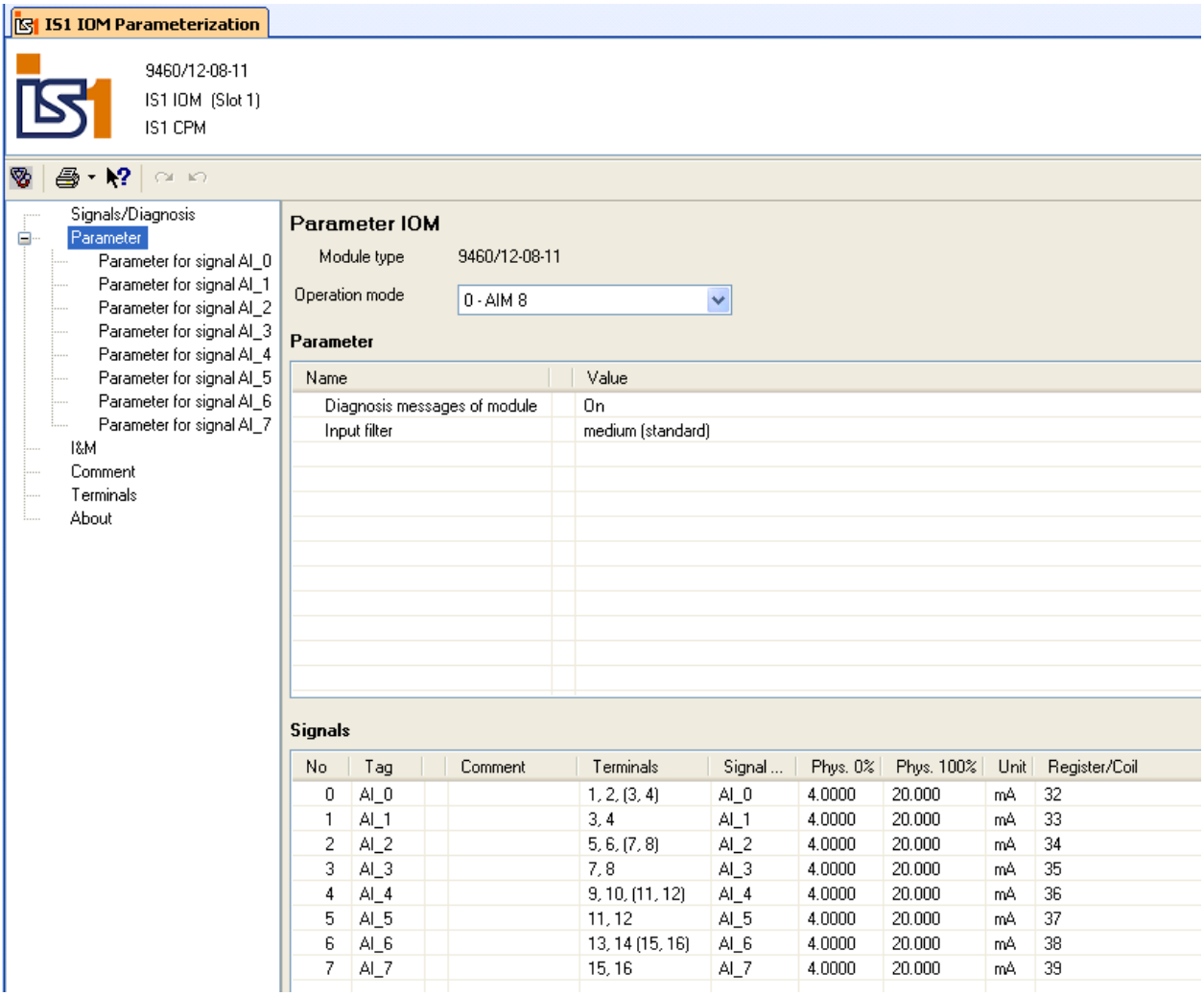


Under “IS1 CPM”, right-click on “Slot 01” and select “Add device” to display a list of options. Select the Device that matches the part number of the I/O Module mounted on the first slot of the IS1 bus rail, then click OK (in this example, the Device “9460/12-08-11 AIM 4/8 EXi” was selected).



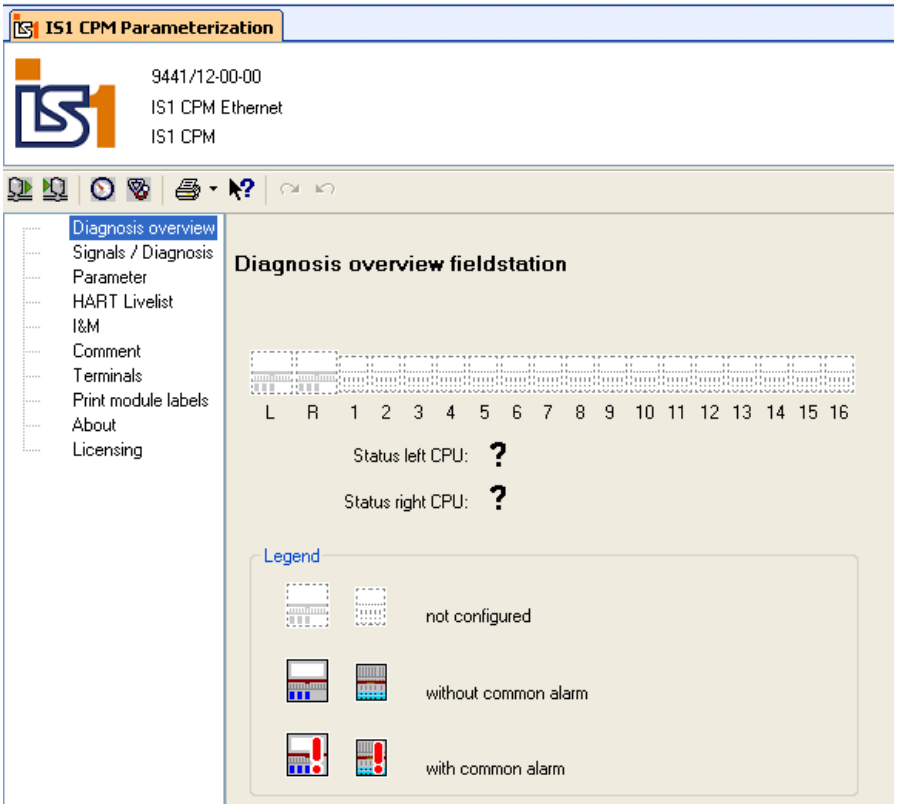


Double-click on “IS1 IOM” under “Slot 01” to view the Parameterization window on the right side of the application. In this window, you can view information about the I/O Module, current diagnostics, and data present in each of the I/O Module’s registers. You can rename an I/O Module by highlighting the name of the I/O Module in the Project tab and clicking the text once.

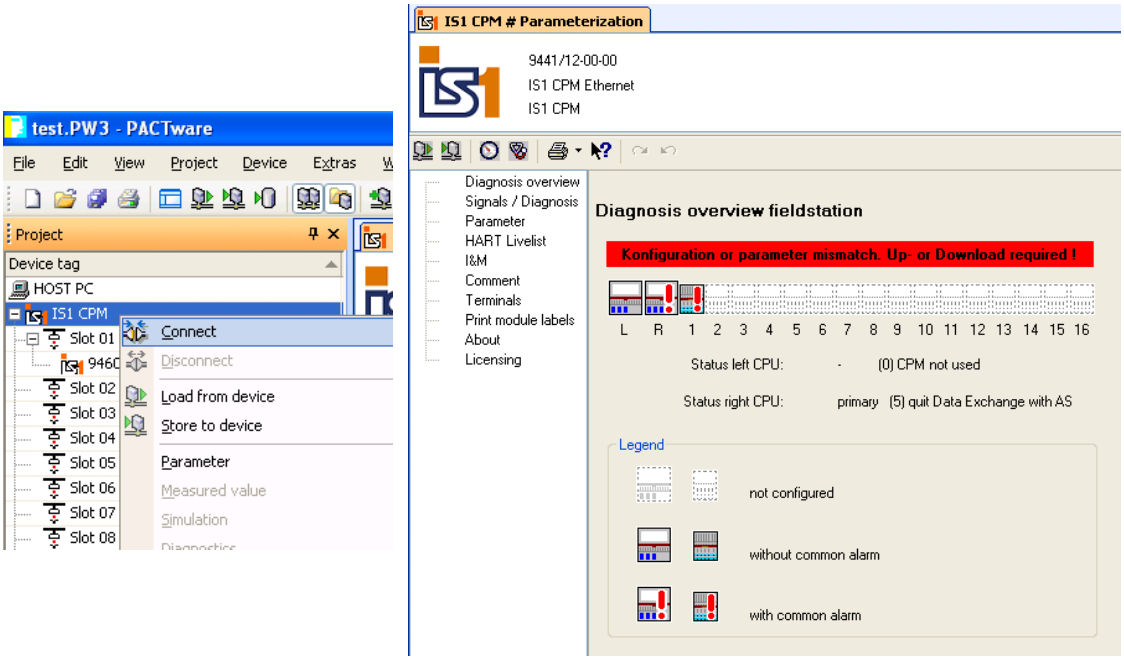


Repeat the above steps for adding additional I/O Modules to the Slots listed under “IS1 CPM” to match your current physical IS1 System bus configuration.

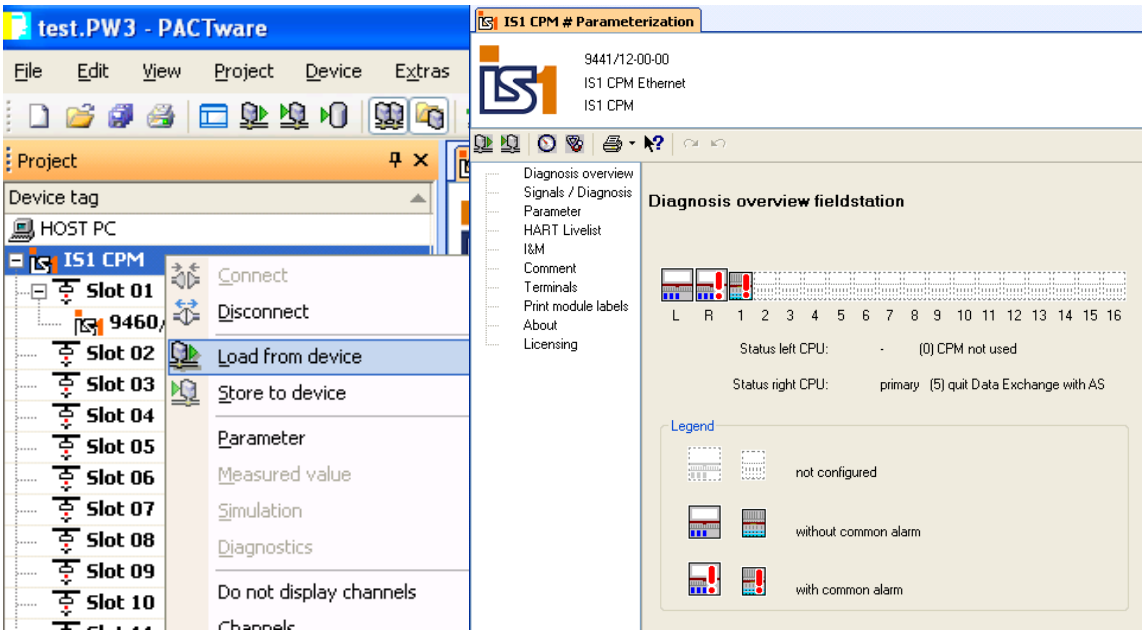
Once the digital IS1 configuration matches your physical IS1 System configuration, double click on “IS1 CPM” under “HOST PC” and select “Diagnosis overview” at the top of the left menu tab in the parameterization window. There should be no indication of connected modules, as a connection to the physical IS1 System has not yet been established.



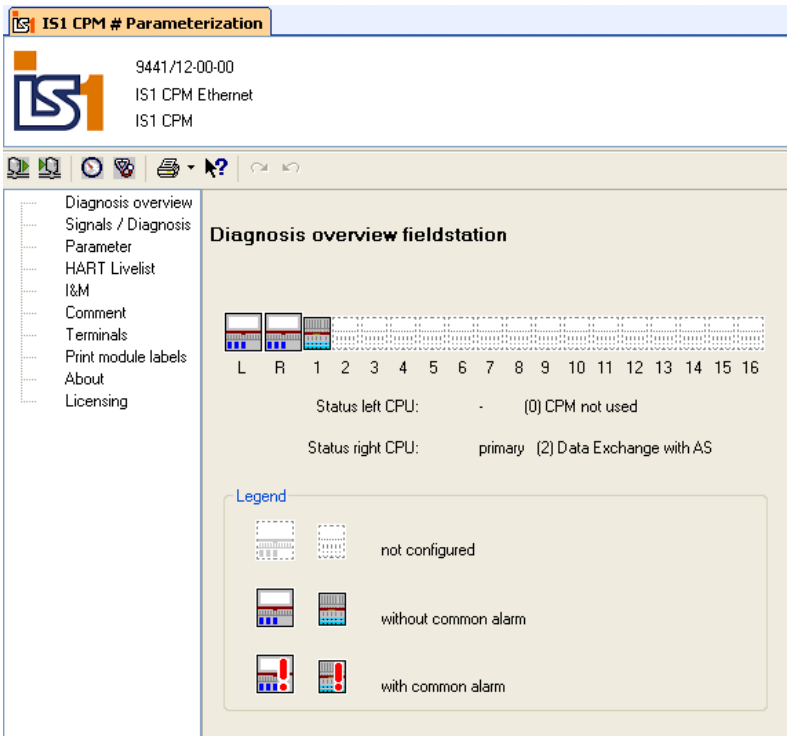
To establish a connection to the physical IS1 System, right-click on “IS1 CPM” under “HOST PC” and select “Connect” (the text of the “IS1 CPM” label should turn bold to indicate that it is connected). Once the connection is created, an error message will be displayed in the Diagnosis Overview window:



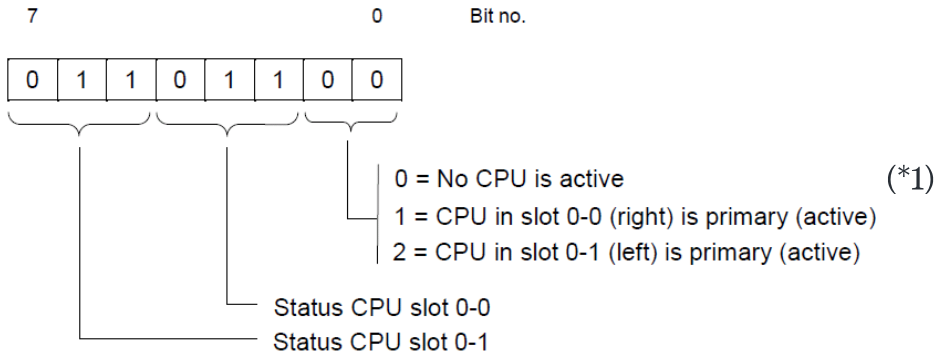
This error message is displayed because the software needs information to be loaded from the physical IS1 System. First, right-click on the IS1 I/O Module under “Slot 01” and select “Connect”. Do this for every other IS1 I/O Module listed under the Project tab as well. Second, right-click on “IS1 CPM” under “HOST PC” and select “Store to device”. This will download the current digital configuration to the physical IS1 CPU Module. Finally, right-click on “IS1 CPM” under “HOST PC” and select “Load from device”. This will load information from the physical IS1 System into the PACTware IS1 System and refresh the configuration diagnostics display for the IS1 CPU Module. The previous error message should now be cleared, as well as any common alarms on the I/O Modules in Slots 01-16 (Note that any time you make a change to the configuration of the physical IS1 System, you must first modify the digital representation of the system in PACTware to match your current physical configuration, then repeat the process of storing/loading data to/from the IS1 CPU Module).



Right-click on “IS1 CPM” under “HOST PC” and select “Disconnect” (this should disconnect the IS1 CPM in addition to any devices listed under the Slots of the IS1 CPM). After the disconnect is complete, reconnect the IS1 CPM and all devices listed under its slots in the same manner as before. The Diagnosis Overview window should indicate that the common alarms of the IS1 CPU and I/O Modules are no longer active (You may not need to reconnect in order to clear the common alarm indication - if the diagnosis window does not indicate a common alarm with any of the IS1 Modules, continue with the instructions).



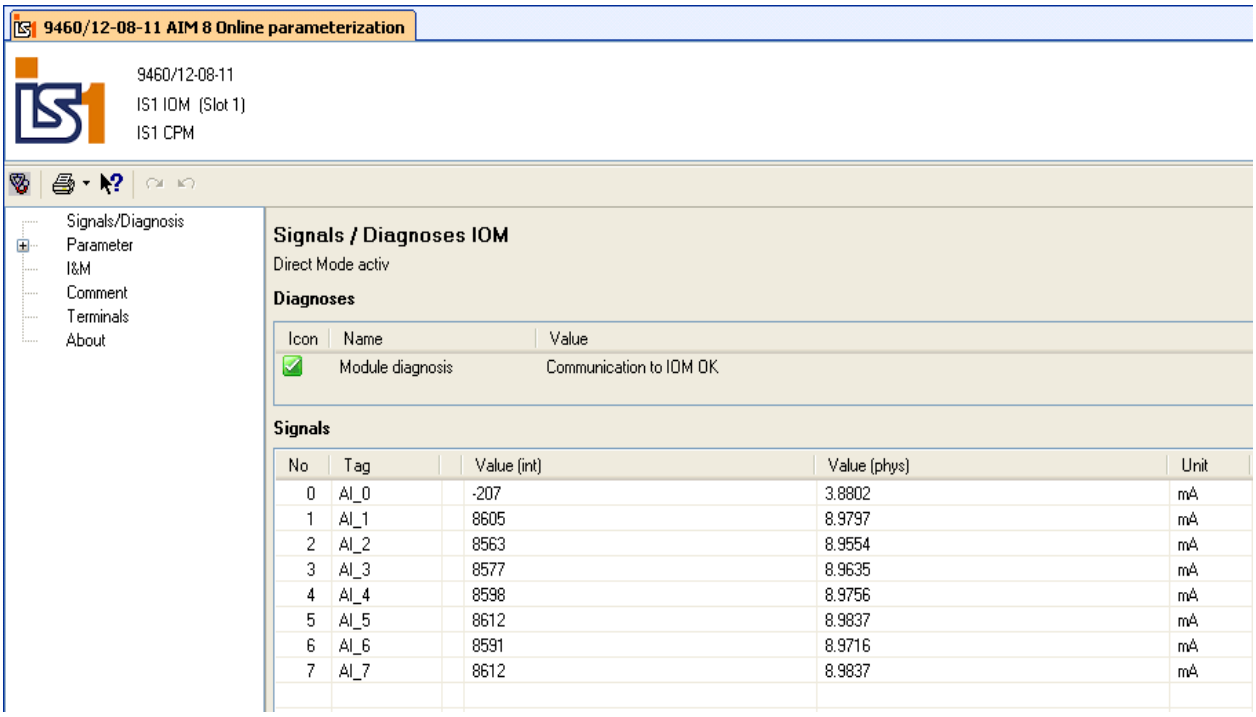
Beneath the diagram of the IS1 System configuration, there is a status indicator for each CPU slot (if using only one IS1 CPU Module, that module defaults to the right CPU slot). Below is a table listing each of the IS1 CPU Module status codes and their respective descriptions (the Input register number for the CPU Status Register is 31):



Status Code	Description
000 (0)	Reserved (No CPU Connected)
001 (1)	Hardware Error CPU
010 (2)	Data exchange with AS (configuration + parameters from IS1 DTM)
011 (3)	No data exchange (after power on without config- and parameter data)
100 (4)	Configuration- or parameter failure
101 (5)	Data exchange with AS quit (as well after PowerOn, if config- and parameter data are valid)
110 (6)	Reserved

(*1)

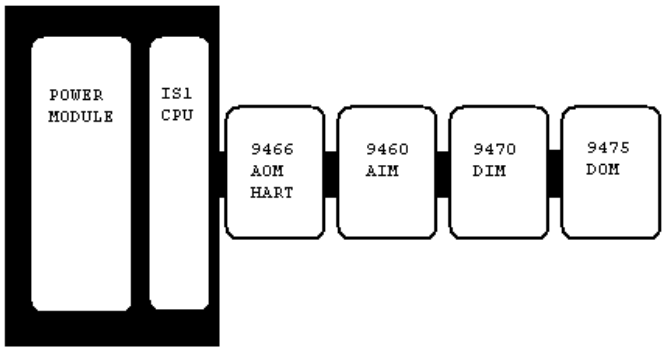
A properly function I/O Module that is sending and receiving data will have a Diagnostics Overview window that looks like this (to access this window, double-click on the specific IS1 IOM in the Project tab, then select “Signals/Diagnosis” in the Parameterization window):



4.1 - Modbus Addressing Scheme

The I/O Modules in an IS1 System each contain a varying amount of registers, which store the data accessed by the Modbus TCP protocol. The relative addressing scheme for these registers is quite simple; however, the exact register address will depend of the type of I/O Module being addressed.

The IS1 Remote I/O System assigns register numbers to each of the registers in the I/O Modules connected to the bus rail. Within the Automation System (AS), these register numbers start at 32 for the first register of the first I/O Module connected to the bus rail, then increment by one for each register adjacent to that starting register that shares its I/O type (including adjacent registers in separate I/O units). This numbering sequence will continue to the end of the entire bus rail configuration (even if extenders such as the 9494/L1-V7 are used).



In this example, the register numbers for the AOM HART start at 32, since it is the first output module on the bus rail. However, since the AIM is an input module, its register numbers start at 32 as well, because the input modules store data in Input Registers, whereas the output modules store data in Holding Registers. Since the DIM is next in line, its register numbers would start at 40, since the AIM has 8 registers (32-39). The DOM register numbers also start at 40, as the AOM also has 8 registers (32-29).

The register numbers in the AS correspond to the Modbus addresses associated with these registers. The address for each register depends of the type of I/O Module containing the register and the behavior of that I/O Module. Below is a table of the addressing scheme for common I/O Modules for use with the Stahl IS1 Modbus TCP Remote I/O System:

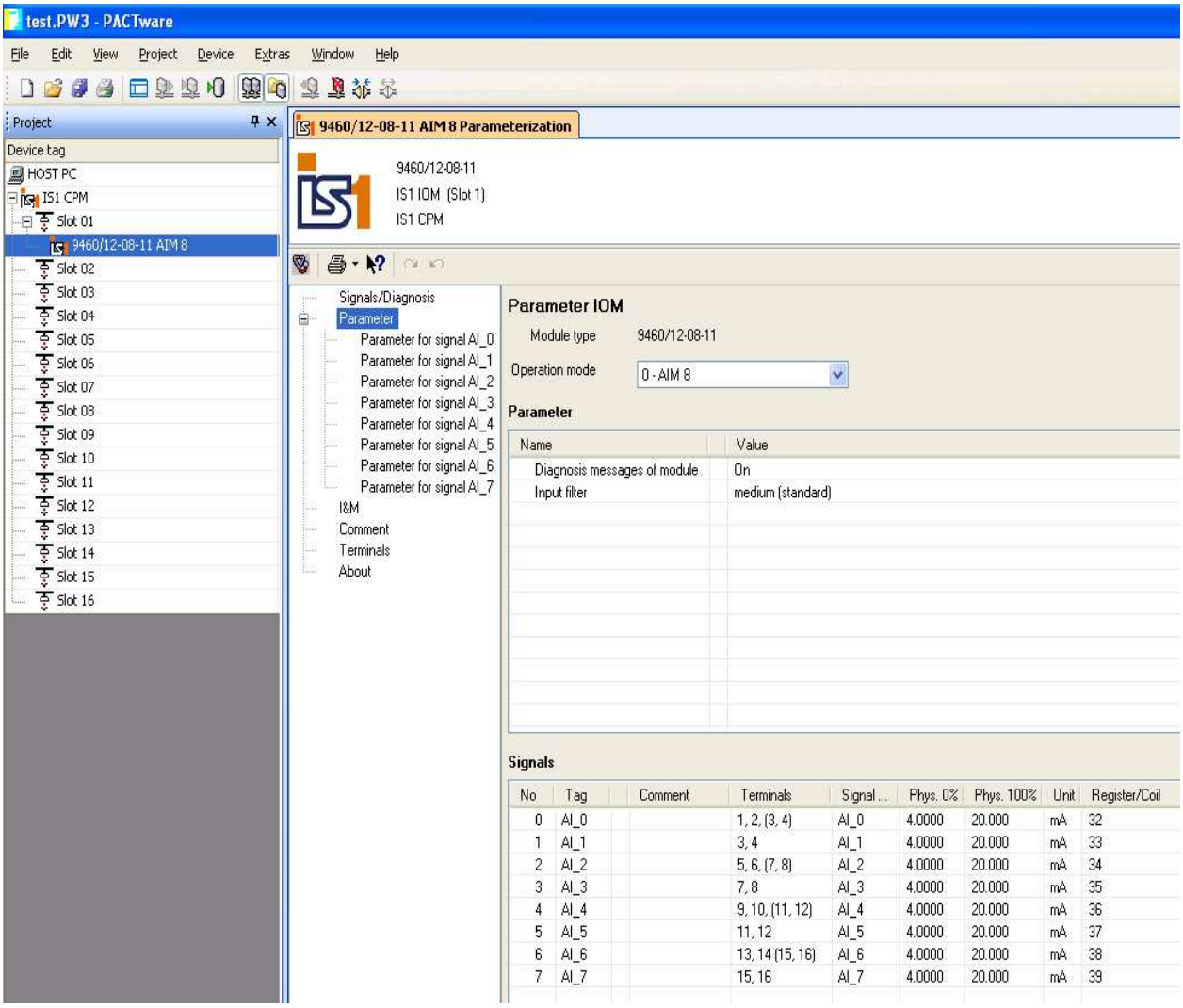
I/O Module	Data Registers Used (Coils, Status, Input, Holding)	Register Address
Analog/Digital Input	Input	30xxx
Analog/Digital Output	Holding	40xxx

(For the above table, xxx refers to the register number of a pin group in an I/O Module on the interface, expressed to three digits, e.g. 034 or 119. For addresses on the AS, add 1 to the address value.)

In the previous example, these would be register address ranges for the individual I/O Modules:

AOM HART 8	40032-40039
AIM 8	30032-30039
DIM 16	30040-30041
DOM 8	40040

However, when viewing the registers on an interface that counts from 0 (such as a Modbus Analyzer), the register number displayed on the interface is 1 less than the actual register number in the AS. Consider this I/O Module's status window below (see bottom-right corner of the window for register numbers):



This AI Module is connected to Slot 1 on the physical IS1 device, which means that its register values start at 32 and go up to 39. However, when the data from these registers is viewed on an interface that counts from 0, the register data will correspond to a register number 1 less than the actual register the data came from. The register values from this AI Module, when viewed on such an interface, would range from 31 to 38. Note that DeltaV Explorer and PACTware both count from 1, so the register values will start at 32 in those programs.

4.2 - Status/Control Register Addresses

The table below shows the register numbers for the status and control registers for the IS1 CPU and its connected I/O Modules. The register addresses follow the same scheme as the I/O units (i.e. - 30xxx for input, 40xxx for output).

Input signals (DI / AI):

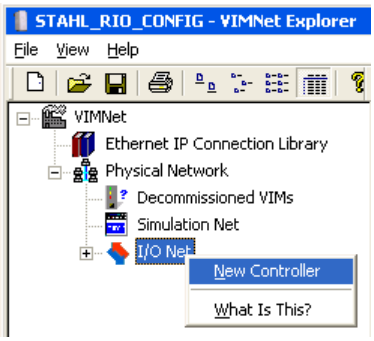
	MODBUS address on interface *2)		MODBUS address in AS and IS1 DTM		Content	Allowed MODBUS functions
	Register Address	Bit (Coil) Address	Register Address	Bit (Coil) Address *1)		
Input data	0x000c (12)	0x00c0 (192)	0x000d (13)	0x00c1 (193)	Signal statuses 1 register per module 1 bit per signal	read: 02 (input coil) or 04 (input register) optional: 03 (holding register) with Register offset +1000
	0x001b (27)	0x01b0 (432)	0x001c (28)	0x01b1 (433)		
	0x001c (28)	0x01c0 (448)	0x001d (29)	0x01c1 (449)	Module alarms slot 0 to 15	
	0x001d (29)	0x01d0 (464)	0x001e (30)	0x01d1 (465)	Module alarms slot 16	
	0x001e (30)	0x01e0 (480)	0x001f (31)	0x01e1 (481)	Status register CPU	
	0x001f...0x019e (**31**...414)	0x01f0...0x19ef (**496**...6639)	0x0020...0x019f (**32**...415)	0x01f1...0x19f0 (**497**...6640)	**Data block input signals**	

(*1)

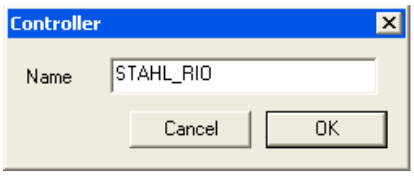
Output signals (DO / AO):

	MODBUS Address on interface *2)		MODBUS Address in AS and IS1 DTM		Content	Allowed MODBUS functions
	Register Address	Bit (Coil) Address	Register Address	Bit (Coil) Address *1)		
Output data	0x001e (30)	0x01e0 (480)	0x001f (31)	0x01e1 (481)	Control register CPU	read: 01 (output coil) 03 (holding register) write: 05, 15 (coil) 06, 16 (register)
	0x001f...0x019e (**31**...414)	0x01f0...0x19ef (**496**...6639)	0x0020...0x019f (**32**...415)	0x01f1...0x19f0 (**497**...6640)	**Data block output signals**	

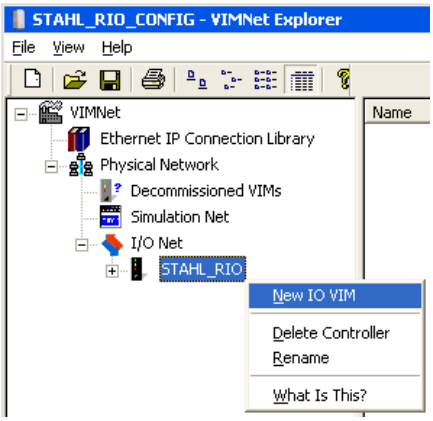
5 - Configuration in VIMNet Explorer



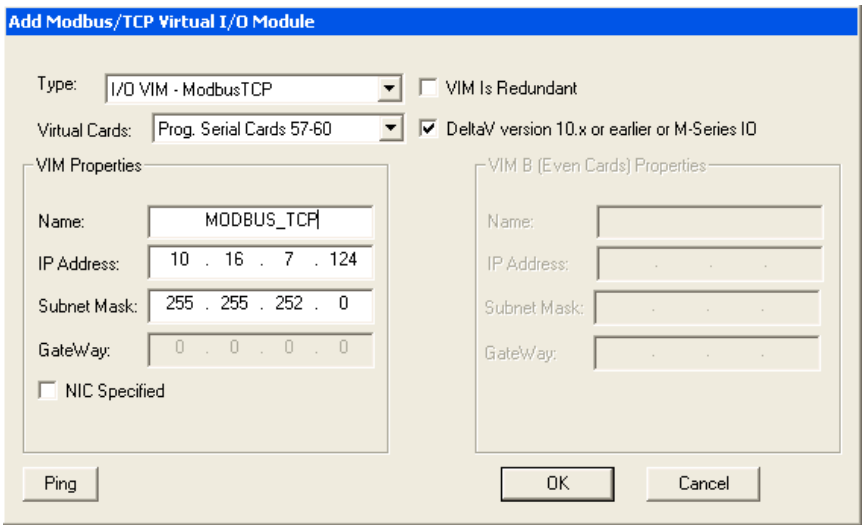
Open VIMNet Explorer. Expand “VIMNet” and “Physical Network” until “I/O Net” is displayed, as in the image above. Right-click on “I/O Net” and select “New Controller”.



A prompt will appear asking for a controller name. The name of the controller used in this example is shown above.

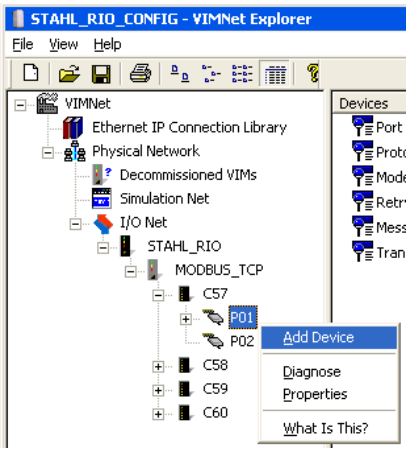


Expand “I/O Net” until the new controller (labeled “STAHL_RIO” in this example) is displayed, as in the image above. Right-click on the controller and select “New IO VIM”.

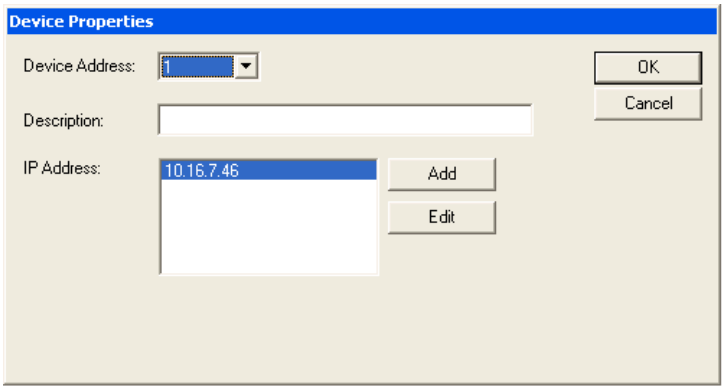


A prompt will appear requesting specific configuration information about the new I/O VIM. For configuring the VIM to work with the Stahl IS1 Remote I/O System, enter the following data into the prompt fields, and then click OK:

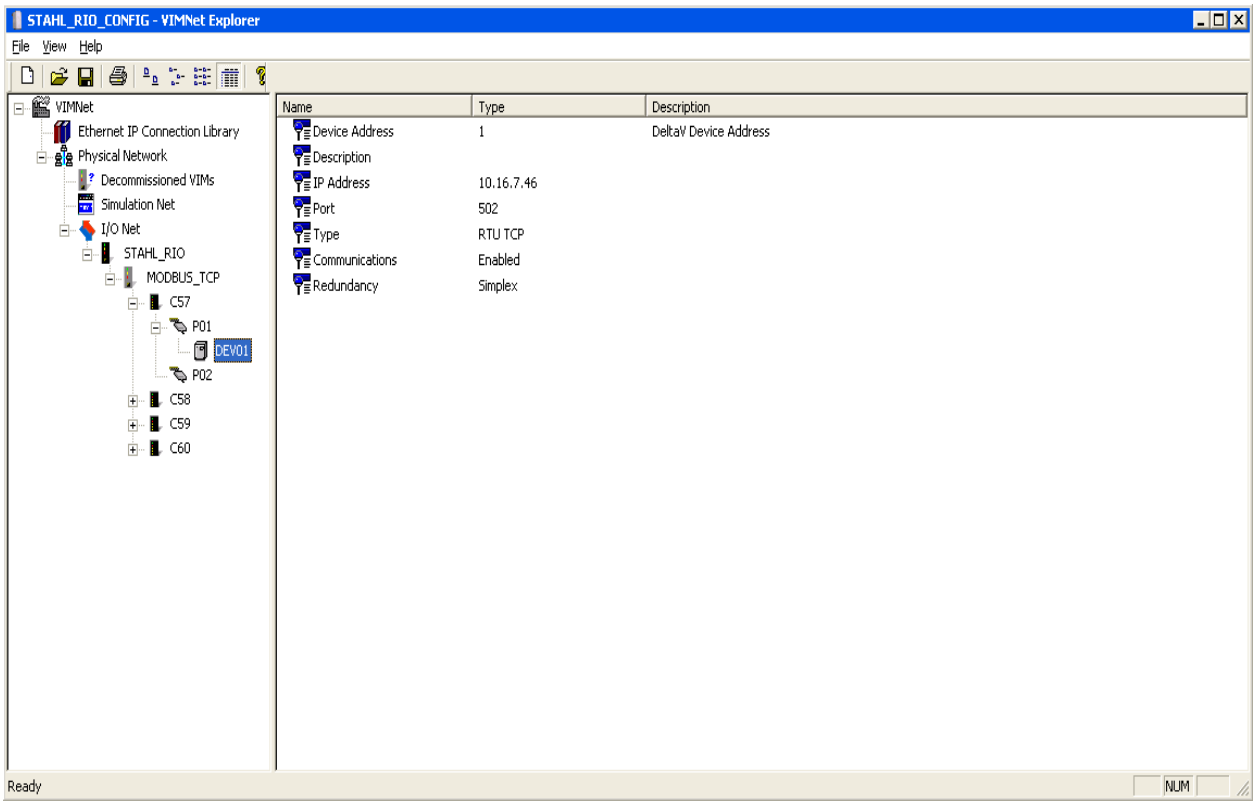
Type:	I/O VIM - Modbus TCP
Virtual Cards:	Prog. Serial Cards 57-60
DeltaV version 10.x or earlier or M-Series IO:	(Dependent on release number of DeltaV installation and controller type)
Name:	(User Dependent)
IP Address:	(The IP Address of the VIM on the Modbud TCP Network)
Subnet Mask:	(The Modbus TCP Network Subnet Mask)
NIC Specified:	Not Checked



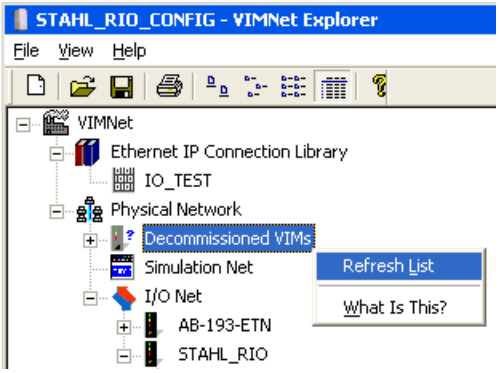
Expand the controller and the newly created I/O VIM, then expand “C57” to show the two ports attached to Card 57. Right-click on “P01” and select “Add Device”.



Set the “Device Address” to 1 and the IP Address to the IP Address of the IS1 CPU Module (if you need to determine the IP Address of the IS1 CPU Module, use the arrow keys on the CPU base to scroll through the system information until the IP Address is displayed). If the IP Address is not displayed, click “Add” to create an IP Address - the value for this IP Address should match the one on the Stahl IS1 System. After the IP Address is set, click OK.

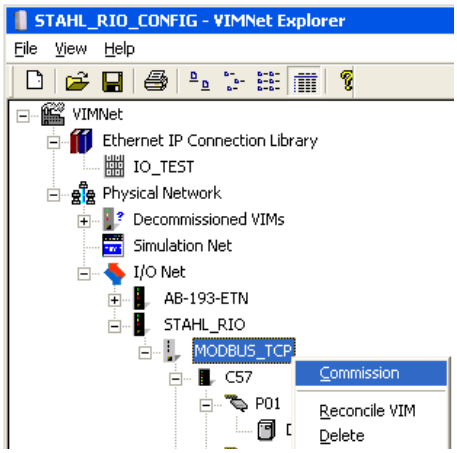


A new device named “DEV01” should appear under “P01” of “C57”. This device is the IS1 Modbus TCP Remote I/O System. From here, datasets will be created under this device - these datasets will store all of the information in the registers of the I/O Modules connected to the IS1 Remote I/O System bus rail.

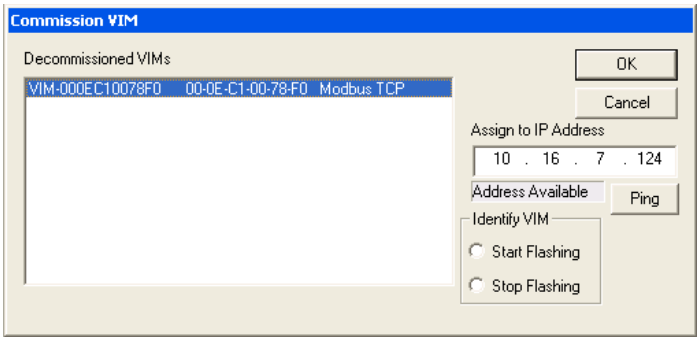


Right-click on “Decommissioned VIMs” under “Physical Network” and select “Refresh List.”

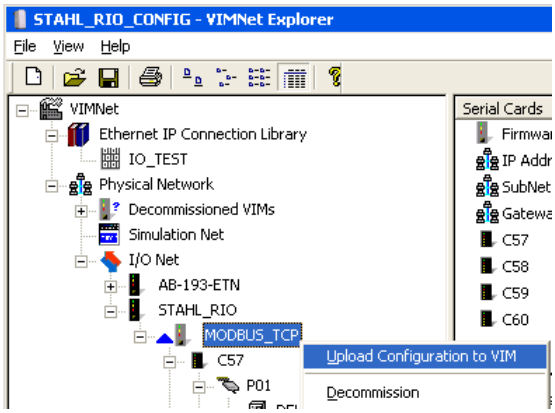
A list of all available decommissioned VIMs on the network will be displayed in the main window. Confirm that the VIM connected to the controller carrier containing the DeltaV MD/MD+ controller is present on the list of decommissioned VIMs.



Right-click on the VIM placeholder under the controller created earlier and select “Commission”.



Select the VIM connected to the back rail containing the DeltaV controller and click “OK” (Note that the IP Address in the prompt should match the IP Address of the VIM configured earlier. If it does not, you may need to reconfigure the VIM).

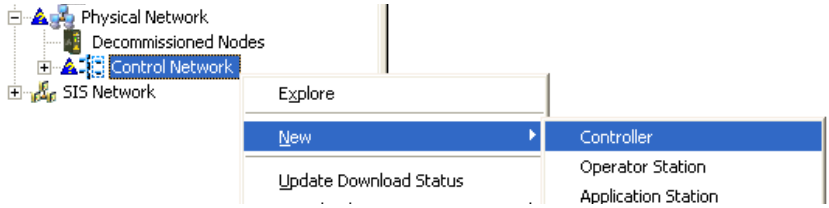


After the VIM has been successfully commissioned to the placeholder, there should be a blue arrow next to the VIM placeholder. This indicates that the configuration in VIMNet Explorer needs to be uploaded to the VIM hardware. Right-click on the VIM placeholder and select “Upload Configuration to VIM”. When prompted to save the changes to your VIMNet Explorer configuration, select “Yes”. A warning dialog will appear asking for confirmation to upload the configuration to the VIM -

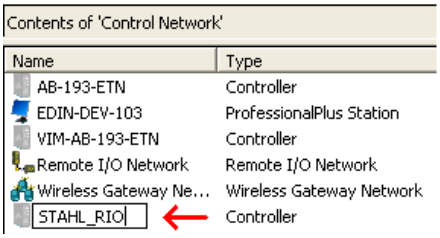
select “Yes” to proceed. After the upload is complete, a dialog will appear indicating a successful upload and the blue arrow that was next to the VIM placeholder should now be gone.

6 - Configuration in DeltaV Explorer

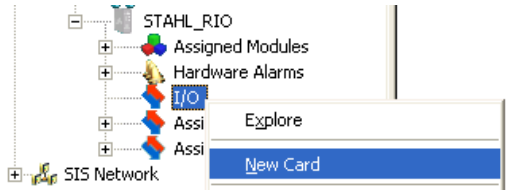
Open DeltaV Explorer. Expand the option labeled “System Configuration”, and then expand the option labeled “Physical Network”.



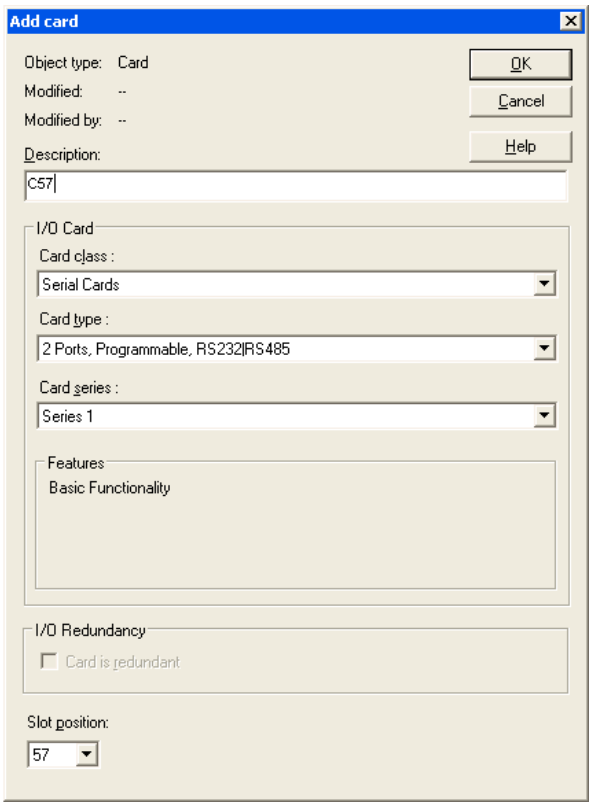
Right click on “Control Network” under “Physical Network” and select “New > Controller”.



The new controller will appear at the bottom of the list of items in the main window of DeltaV Explorer, as indicated by the red arrow in the image above.



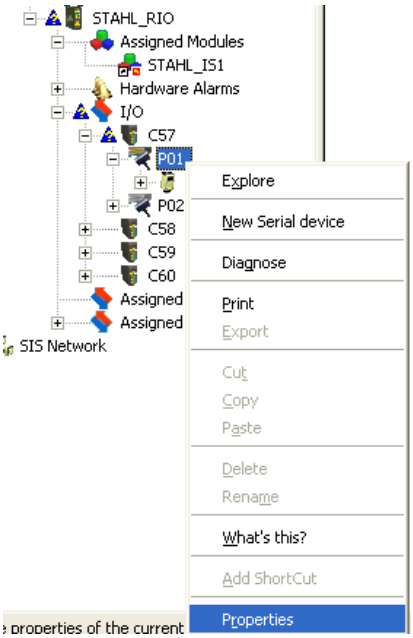
Expand the new controller in the explorer tree. Right-click “I/O” and select “New Card”.



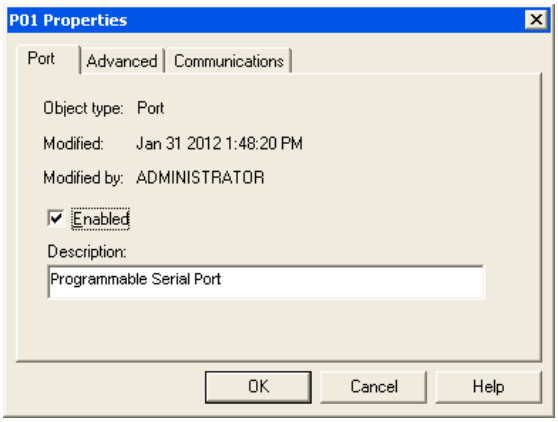
Configure the new I/O card to match the parameters in the image above. The MODBUS TCP protocol requires the DeltaV controller to be configured with programmable serial cards, regardless of the I/O modules in the Stahl IS1 Remote I/O System. Repeat the process of adding and configuring new cards for cards 58-60, changing the “Description” and “Slot Position” parameters accordingly for each unique card number. The “Card class”, “Card type”, and “Card series” parameters should remain the same for each new card.

Name	Type	Description	Needs Downl...	Modified By	Last Modified
C57	Prog. Serial Card, 2 Ports, RS232/RS...	C57	No	ADMINIS...	Jan 31 2012 9:10:50...
C58	Prog. Serial Card, 2 Ports, RS232/RS...	C58	No	ADMINIS...	Jan 31 2012 9:12:09...
C59	Prog. Serial Card, 2 Ports, RS232/RS...	C59	No	ADMINIS...	Jan 31 2012 9:12:37...
C60	Prog. Serial Card, 2 Ports, RS232/RS...	C60	No	ADMINIS...	Jan 31 2012 9:12:51...

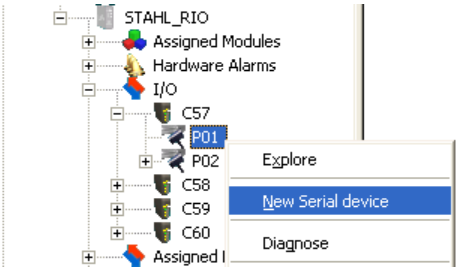
Once all of the cards have been added, the main window should display a list of the cards as in the image above.



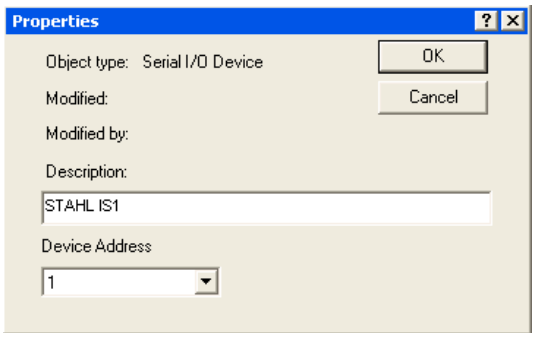
Expand "C57", then right-click on “P01” and select “Properties”.



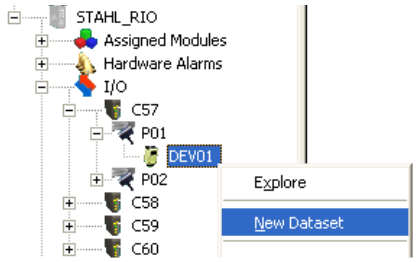
Check the “Enabled” box, and then click “OK”.



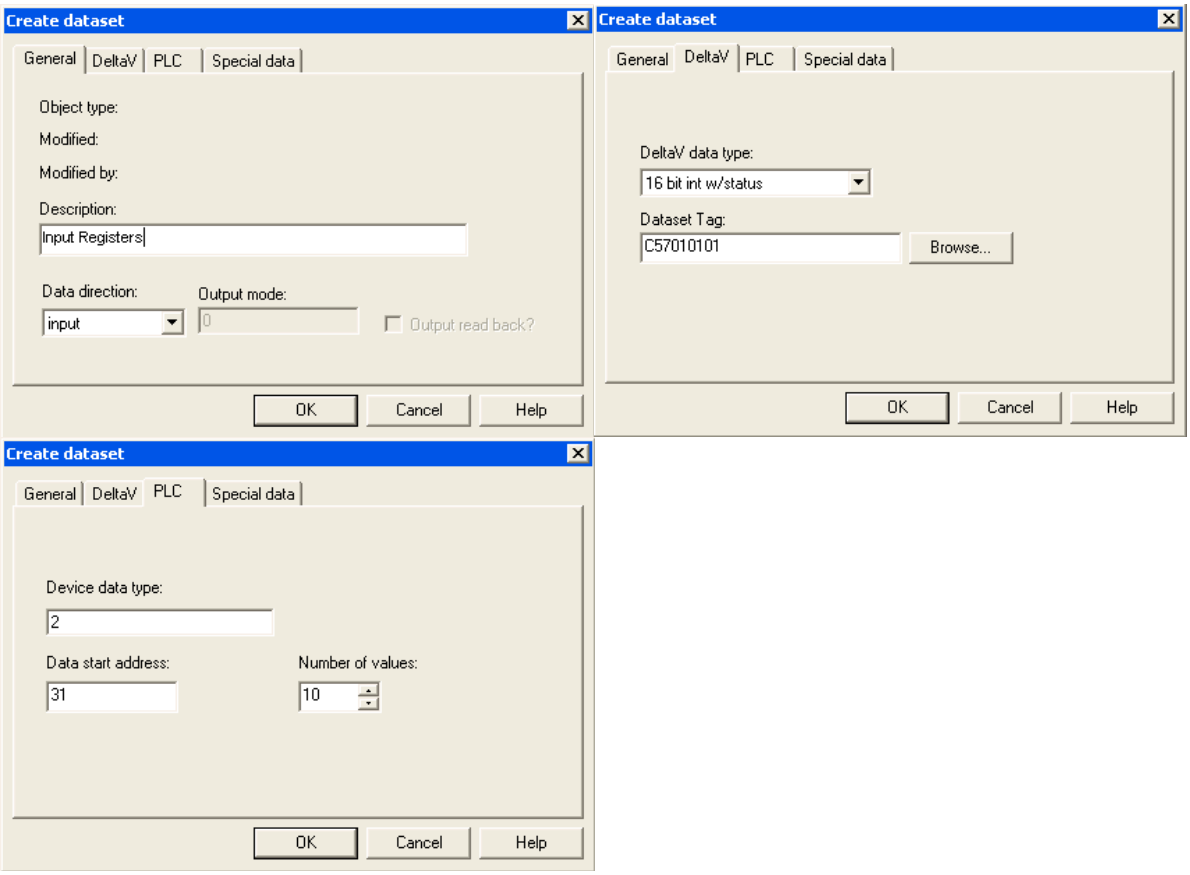
Right-click on “P01” under "C57" and select “New Serial Device”.



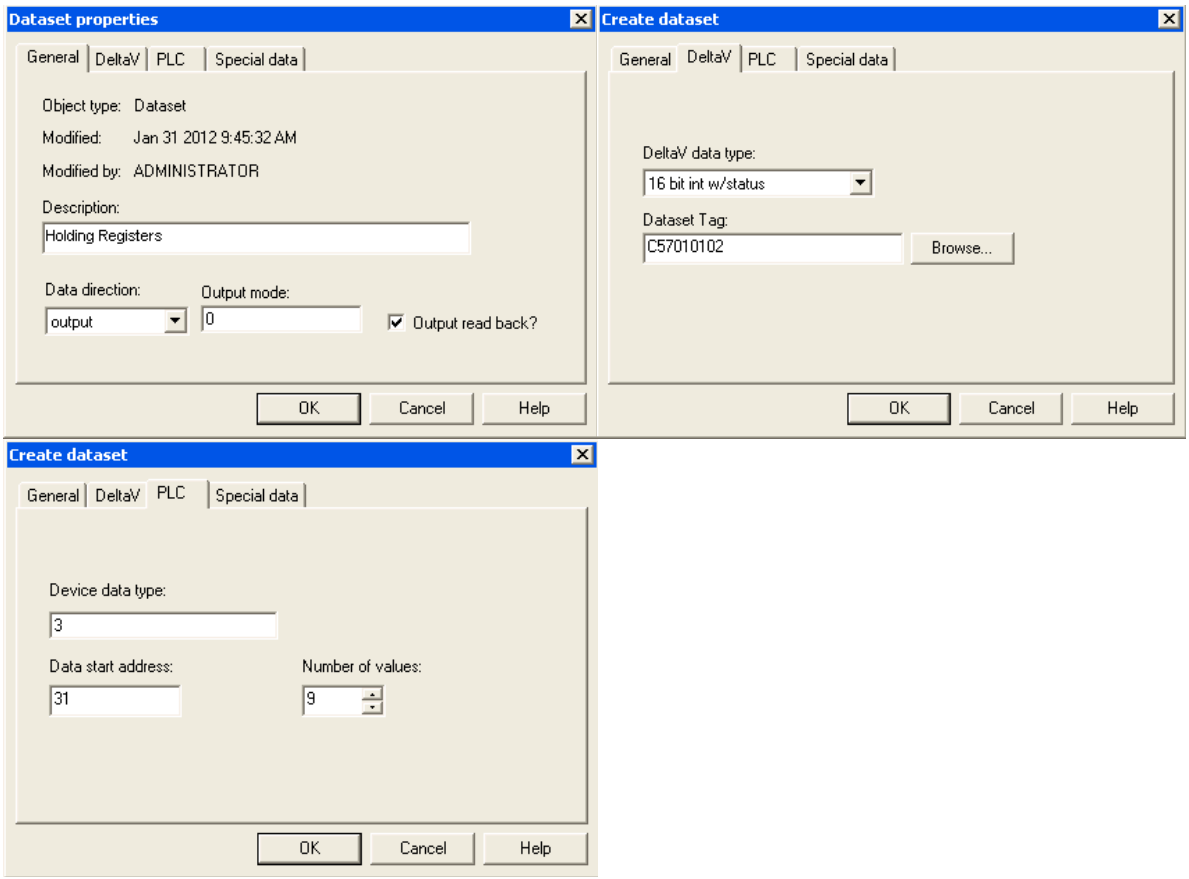
Ensure that the “Device Address” parameter is set to “1”.



Right-click “DEV01” under "P01" and select “New Dataset” (Three new Datasets will be created in this way - the following instructions are for configuring each of the new Datasets).

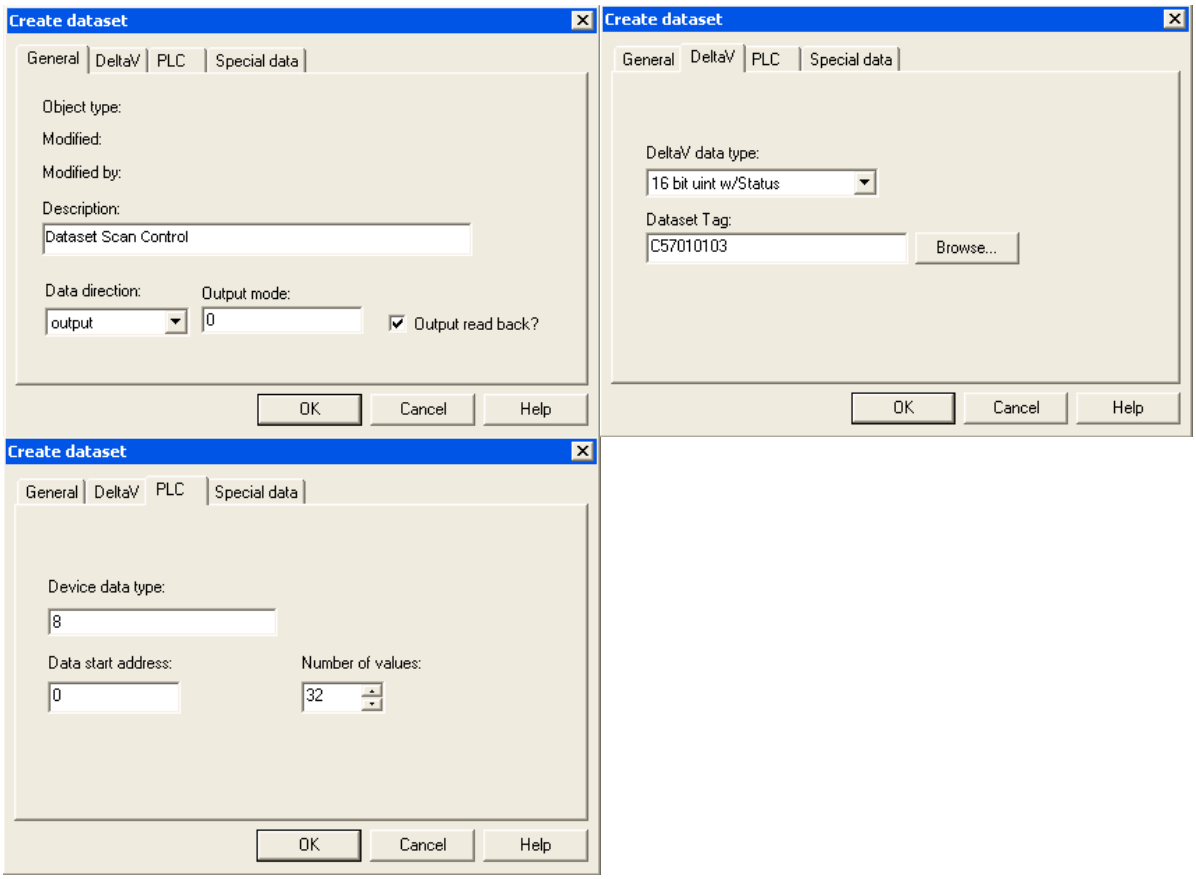


The first new Dataset will be used for all of the input modules on the Stahl IS1 bus rail. Under the “General” tab, set “Data direction” to “input”. Under the “DeltaV” tab, set “DeltaV data type to “16 bit int w/status” and set “Dataset Tag” to the desired name (the one used in the screenshot above is an example, but does not necessarily need to be replicated). Under the “PLC” tab, set “Device data type” to “2” and set “Data start address” to “31” (This sets the Dataset to read data from Input Registers starting at register number 32. Note that 31 was entered as the “Data start address” because DeltaV begins counting registers at 1, not at 0 - this means that DeltaV will begin reading registers starting at the one AFTER the entered number). The “Number of values” parameter will depend on the amount and type of I/O Modules connected to the Stahl IS1 bus rail (a list of each available I/O Module and the amount of registers that module contains is provided in the Appendix). Ignore the “Special data” tab.



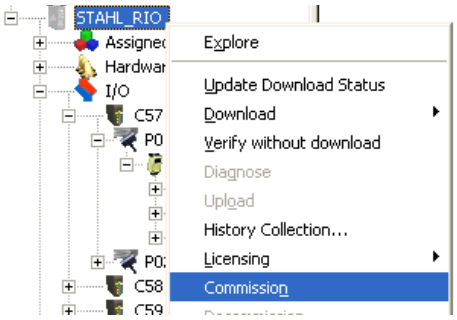
The second new Dataset will be used for all of the output modules on the Stahl IS1 bus rail. Under the “General” tab, set “Data direction” to “output” and set “Output mode” to “0”. Leave the “Output readback?” box unchecked. Under the “DeltaV” tab, set “DeltaV data type to “16 bit int w/status” and set “Dataset Tag” to the desired name (the one used in the screenshot above is an example, but does not necessarily need to be replicated). Under the “PLC” tab, set “Device data type” to

“3” and set “Data start address” to “31” (This sets the Dataset to write data to Holding Registers starting at register number 32. Note that 31 was entered as the “Data start address” because DeltaV begins counting registers at 1, not at 0 - this means that DeltaV will begin reading registers starting at the one AFTER the entered number). The “Number of values” parameter will depend on the amount and type of I/O Modules connected to the Stahl IS1 bus rail (a list of each available I/O Module and the amount of registers that module contains is provided in the Appendix). Ignore the “Special data” tab.

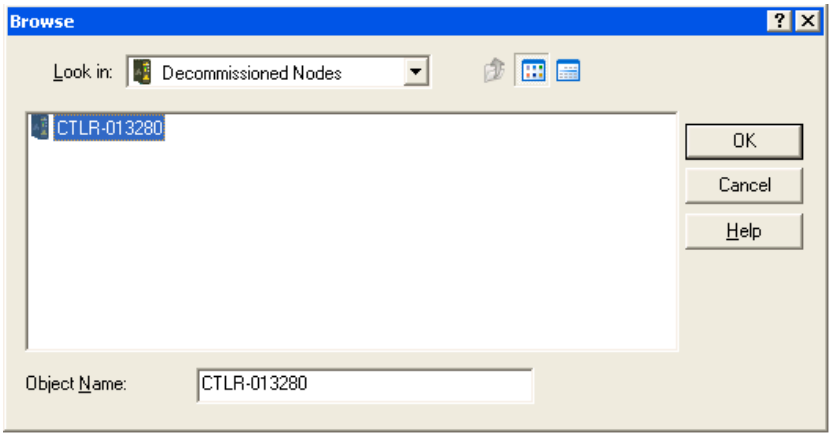


The third new Dataset will be used as a Dataset Scan Control. This Dataset stores bit masks that will allow the user to control which the VIM can and cannot scan. When a Dataset is disabled, the VIM will not make any attempt to scan that Dataset and no changes will be made to any of the contents of that Dataset by the VIM (see section 6.1 for more information on the Dataset Scan Control and the bit masking scheme). Under the “General” tab, set “Data direction” to “output” and set “Output mode” to “0”. Make sure the “Output readback?” box is checked. Under the “DeltaV” tab, set “DeltaV data type to “16 bit uint w/status” and set “Dataset Tag” to the desired name (the one used in the screenshot above is an example, but does not

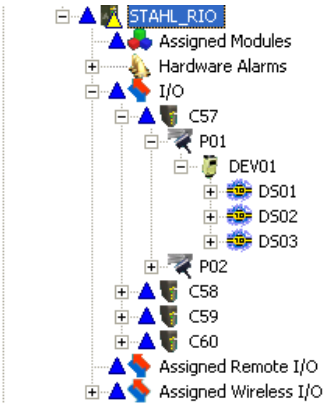
necessarily need to be replicated). Under the “PLC” tab, set “Device data type” to “8”, set “Data start address” to “0”, and set “Number of values” to “32”. Ignore the “Special data” tab.



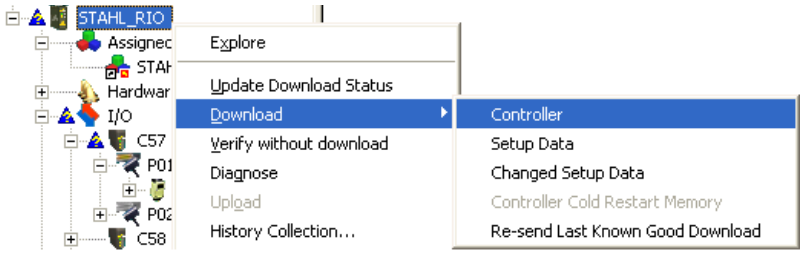
After P01 has been enabled, right-click on the controller created earlier and select “Commission”.



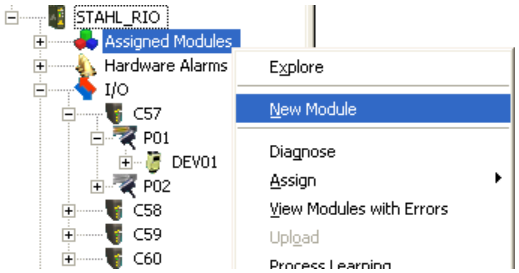
Select the controller from the list of Decommissioned Nodes in the prompt, then click OK (Make sure that the number of the controller matches the last three values of the MAC Address of the controller connected to the controller carrier containing the VIM). When prompted to Auto-sense DeltaV I/O cards for the selected controller, select “No”.



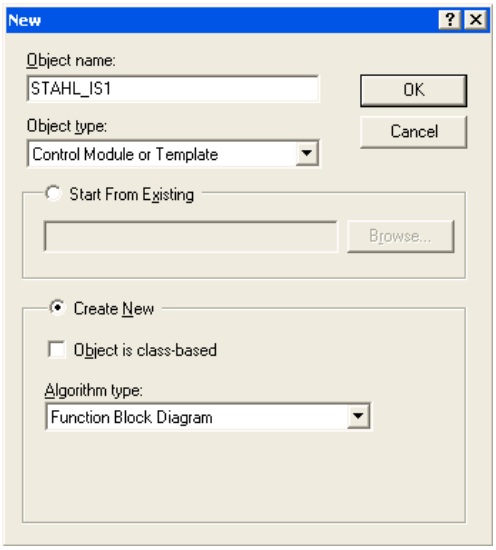
After the controller has been commissioned, there will be blue arrows next to several of the items in the explorer tree. This is because the DeltaV Controller requires a download of the control schematic.



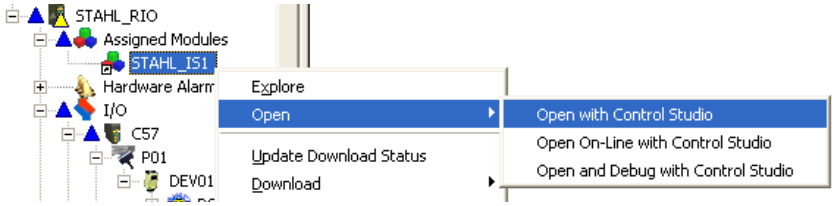
Right-click on the controller created earlier and select “Download › Controller”. Select “Yes” at the confirmation prompt to begin the download.



After the controller download is complete, right-click “Assigned Modules” under the controller and select “New Module”.



Set each of the parameters based on the type of module you are creating. In this example, the parameters shown in the image above are used.



Right-click on the newly created Module and select “Open > Open with Control Studio”. This will open Control Studio with a blank work area.

6.1 - Using the Dataset Scan Control

The Dataset Scan Control uses a series of registers to store bit masking data. This bit masking data controls which Datasets can and cannot be scanned by the VIM. The Dataset Scan Control is divided into four sections.

1. Registers 1-8 are designated for scan control trigger bits.

2. Registers 9-16 are designated to specify if a dataset is to be scanned based on scan control.

3. Registers 17-24 are designated to hold the extended timeout value.

4. Registers 25-32 are designated to completely disable the scan of selected dataset.

The tables below describe each of the register ranges in detail and their respective functions within the Dataset Scan Control.

1) Dataset Scan Trigger Registers:
R1-R8 are used as a bit mask. A bit set to 1 by the DeltaV Control Module triggers scan of the corresponding dataset. By default, all bits are 0. On a normal scan completion or a timeout, the bit is reset to 0. Bit 1 of the register corresponds to Dataset 1, and bit 16 corresponds to Dataset 16. Bits corresponding to unconfigured datasets are ignored.

R1	Controls all 16 datasets in Simplex C57 Port 1 or C61 Port 1, and Redundant C57/58 Port 1.
R2	Controls all 16 datasets in Simplex C57 Port 2 or C61 Port 2, and Redundant C57/58 Port 2.
R3	Controls all 16 datasets in Simplex C58 Port 1 or C62 Port 1, and Redundant C59/60 Port 1.

R4	Controls all 16 datasets in Simplex C58 Port 2 or C62 Port 2, and Redundant C59/60 Port 2.
R5	Controls all 16 datasets in Simplex C59 Port 1 or C63 Port 1, and Redundant C61/62 Port 1.
R6	Controls all 16 datasets in Simplex C59 Port 2 or C63 Port 2, and Redundant C61/62 Port 2.
R7	Controls all 16 datasets in Simplex C60 Port 1 or C64 Port 1, and Redundant C63/64 Port 1.
R8	Controls all 16 datasets in Simplex C60 Port 2 or C64 Port 2, and Redundant C63/64 Port 2.

2) Controlled Dataset Registers:
R9-R16 are a bit mask specifying if a dataset is part of the scan control mechanism. A bit value of 0 implies that the corresponding dataset is not part of the scan control (0 by default). Such a dataset will be scanned continuously. If a bit is set to 1, then the dataset will be scanned only if the corresponding bit in registers R1-8 is also set. The VIM does not change the value of registers R9-R16.

R9	Enables/Disables scan control of all 16 datasets in Simplex C57 Port 1 or C61 Port 1, and Redundant C57/58 Port 1.
R10	Enables/Disables scan control of all 16 datasets in Simplex C57 Port 2 or C61 Port 2, and Redundant C57/58 Port 2.
R11	Enables/Disables scan control of all 16 datasets in Simplex C58 Port 1 or C62 Port 1, and Redundant C59/60 Port 1.

R12	Enables/Disables scan control of all 16 datasets in Simplex C58 Port 2 or C62 Port 2, and Redundant C59/60 Port 2.
R13	Enables/Disables scan control of all 16 datasets in Simplex C59 Port 1 or C63 Port 1, and Redundant C61/62 Port 1.
R14	Enables/Disables scan control of all 16 datasets in Simplex C59 Port 2 or C63 Port 2, and Redundant C61/62 Port 2.
R15	Enables/Disables scan control of all 16 datasets in Simplex C60 Port 1 or C64 Port 1, and Redundant C63/64 Port 1.
R16	Enables/Disables scan control of all 16 datasets in Simplex C60 Port 2 or C64 Port 2, and Redundant C63/64 Port 2.

3) Extended Timeout Time

For R17-R24, a non-zero number specifies the message timeout time value to be used, instead of the default port level timeout. The time units are 5 seconds per count. If the register contains a 2, then all datasets under the corresponding port will timeout after 10 seconds. The maximum value can be 65535, which amounts to a timeout of 91 hours.

R17	Timeout value for Simplex C57 Port 1 or C61 Port 1, and Redundant C57/58 Port 1.
R18	Timeout value for Simplex C57 Port 2 or C61 Port 2, and Redundant C57/58 Port 2.
R19	Timeout value for Simplex C58 Port 1 or C62 Port 1, and Redundant C59/60 Port 1.
R20	Timeout value for Simplex C58 Port 2 or C62 Port 2, and Redundant C59/60 Port 2.

R21	Timeout value for Simplex C59 Port 1 or C63 Port 1, and Redundant C61/62 Port 1.
R22	Timeout value for Simplex C59 Port 2 or C63 Port 2, and Redundant C61/62 Port 2.
R23	Timeout value for Simplex C60 Port 1 or C64 Port 1, and Redundant C63/64 Port 1.
R24	Timeout value for Simplex C60 Port 2 or C64 Port 2, and Redundant C63/64 Port 2.

4) Dataset Scan Disable

R25-R32 are a bit mask specifying if the scan of a dataset has been completely disabled. A bit value of 0 implies that the corresponding dataset is part of the scan, either controller or continuous. Note that the values are 0 by default. If a bit is set to 1, then the dataset will not be scanned. Instead, an error will be reported to DeltaV Diagnostics indicating the dataset state ("Disabled Dataset via Scan Control"). In this way the datasets of one or more devices may be removed from the scan if the devices are down for maintenance. Scan of all other devices will continue to function normally. The VIM does not change the value of registers R25-R32.

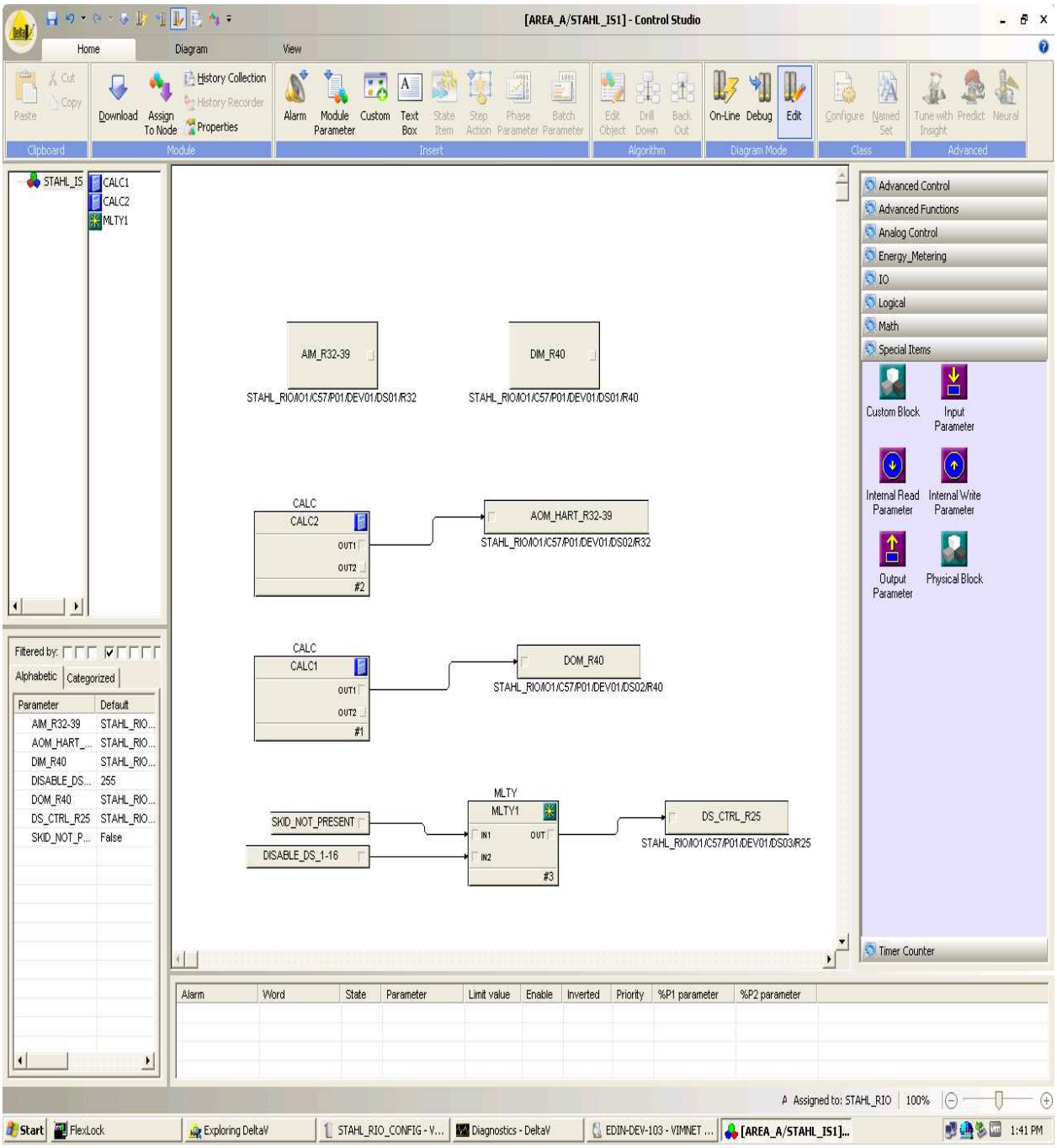
R25	Enables/Disables scan of all 16 datasets in Simplex C57 Port 1 or C61 Port 1, and Redundant C57/58 Port 1.
R26	Enables/Disables scan of all 16 datasets in Simplex C57 Port 2 or C61 Port 2, and Redundant C57/58 Port 2.
R27	Enables/Disables scan of all 16 datasets in Simplex C58 Port 1 or C62 Port 1, and Redundant C59/60 Port 1.

R28	Enables/Disables scan of all 16 datasets in Simplex C58 Port 2 or C62 Port 2, and Redundant C59/60 Port 2.
R29	Enables/Disables scan of all 16 datasets in Simplex C59 Port 1 or C63 Port 1, and Redundant C61/62 Port 1.
R30	Enables/Disables scan of all 16 datasets in Simplex C59 Port 2 or C63 Port 2, and Redundant C61/62 Port 2.
R31	Enables/Disables scan of all 16 datasets in Simplex C60 Port 1 or C64 Port 1, and Redundant C63/64 Port 1.
R32	Enables/Disables scan of all 16 datasets in Simplex C60 Port 2 or C64 Port 2, and Redundant C63/64 Port 2.

As an example, if the value 3 (bit mask: 0000 0000 0000 0011) is written to R25 of the Dataset Scan Control, Datasets D01-D02 would not be scanned by the VIM, while Datasets D03-D16 would continue to be scanned as normal.

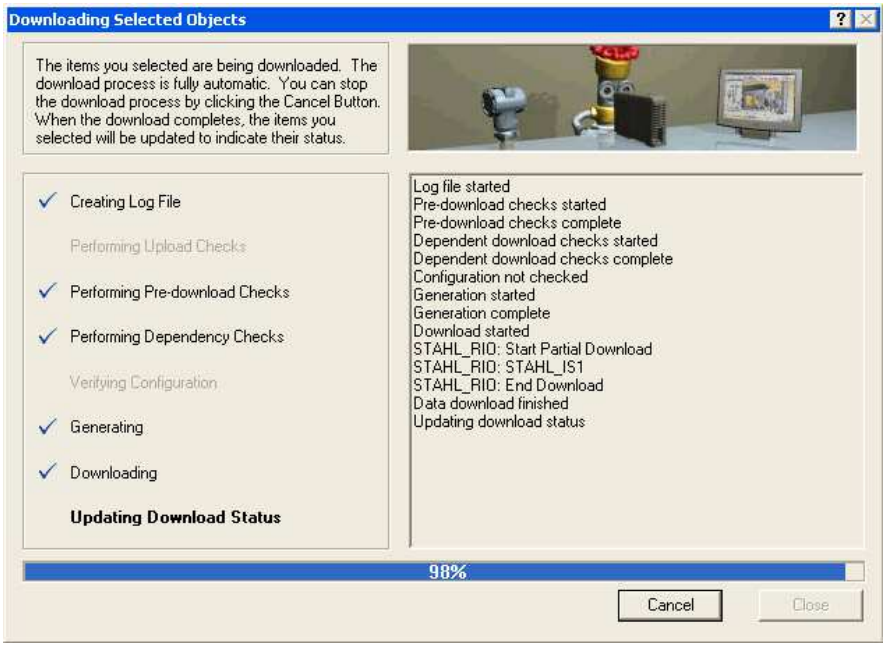
7 - Configuration in DeltaV Control Studio

Using the DeltaV Control Studio software, construct a digital configuration for the DeltaV controller to use with the Stahl IS1 Remote I/O System. An example configuration is shown below.



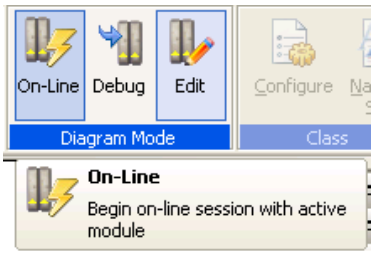
The top two input parameter blocks are used to read the data stored in the registers of the AIM and the DIM on the Stahl IS1 bus rail. The two output parameter blocks attached to calc blocks are used to energize the AOM-HART and DOM on the Stahl IS1 bus rail with test data to ensure proper communication. The sequence of blocks at the bottom is used to set the values for the Dataset Scan Control to prevent the DeltaV controller from looking for data if the Stahl IS1 system becomes disconnected.

Once the configuration is complete, click the blue floppy disk icon in the top-left corner of the window to save the configuration. Then, once the configuration is saved, click the blue arrow labeled “Download”.

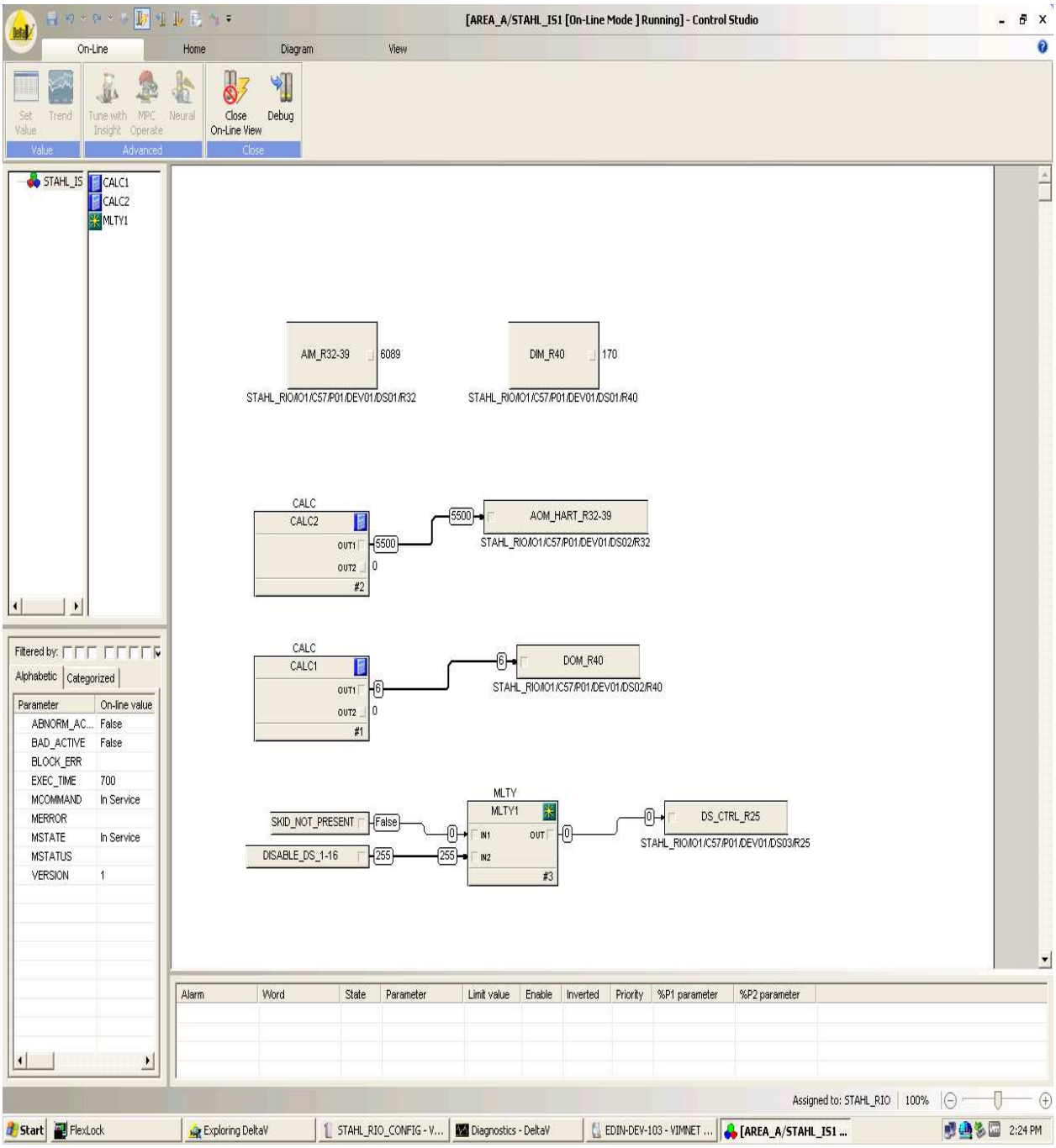


Select “Yes” for any of the prompts that appear prior to the download progress window shown above, and then the download will start.

After the download completes, close the progress window. The configuration should now be running on the DeltaV controller and the Stahl IS1 Remote I/O System should have communications to the VIM and DeltaV controllers.



In the top toolbar, select “On-Line” to view an actively updating version of the DeltaV Control Studio configuration. This configuration displays I/O data from the DeltaV controller, refreshing every few seconds. An example of an online DeltaV Control Studio configuration is shown below.



Appendix

List of Stahl IS1 I/O Modules w/ Register Count (*1)

Module selection in FDT frame	Data length [Registers] Input	Output
9460/12-08-11 **AIM** 4/8 Exi	8	-
9461/12-08-11 **AIMH**8 2w Exi	8	-
9461/12-08-11 **AIMH**8+4HV 2w Exi	16	-
9461/12-08-11 **AIMH**8+8HV 2w Exi	24	-
9461/12-08-21 **AIMH** 8 Exi	8	-
9461/12-08-21 **AIMH** 8 +4HV Exi	16	-
9461/12-08-21 **AIMH** 8 +8HV Exi	24	-
9461/15-08-12 **AIMH**8 2w Exn	8	-
9461/15-08-12 **AIMH**8+4HV 2w Exn	16	-
9461/15-08-12 **AIMH**8+8HV 2w Exn	24	-
9462/... SAIMH	Usable with PROFIBUS and PROFIsafe only	
9465/12-08-11 **AOM** 8 Exi	-	8
9466/12-08-11 **AOMH** 8 Exi	-	8
9466/12-08-11 **AOMH** 8 +4HV Exi	8	8
9466/12-08-11 **AOMH** 8 +8HV Exi	16	8
9466/15-08-12 **AOMH** 8 Exn	-	8
9466/15-08-12 **AOMH** 8+4HV Exn	8	8
9466/15-08-12 **AOMH** 8+8HV Exn	16	8
9470/22-16-11 **DIM** 16 NamExi	2	-
9470/22-16-11 **DIM** 16+CF NamExi	4	1
9470/25-16-12 **DIM**16 Nam Exn	2	-
9470/25-16-12 **DIM**16+CF Nam Exn	4	1
9471/10-16-11 **DIM** 16 24V	2	-
9471/10-16-11 **DIM** 16+CF 24V	4	1
9471/15-16-12 **DIM** 16 24V Exn	2	-
9471/15-16-12 **DIM** 16+CF24V Exn	4	1
9475/12-04-11 **DOM** 4 Exi1	-	1
9475/12-04-21 **DOM** 4 Exi2	-	1
9475/12-04-31 **DOM** 4 Exi3	-	1
9475/12-08-41 **DOM** 8 Exi1	-	1
9475/12-08-51 **DOM** 8 Exi2	-	1
9475/12-08-61 **DOM** 8 Exi3	-	1
9475/12-07-71 **DOM** 7 Exi4	-	1
9475/22-04-21 **DOM** 4 OD Exi2	-	1
9475/22-08-51 **DOM** 8 OD Exi2	-	1
9475/22-08-61 **DOM** 8 OD Exi3	-	1
9477/10-08-12 **DOM** 8 Rel	-	1
9477/12-08-12 **DOM** 8 60V Rel Z1	-	1
9477/12-06-12 **DOM** 6 250VRel Z1	-	1
9477/15-08-12 **DOM** 8 Rel Z2	-	1
9478/28-08-51 **DOMV** 8 OD Exi1	-	1
9480/12-08-11 **TIM** 8 R Exi	8	-
9481/12-08-11 **TIM** 8 mV Exi	8	-
AIM 4/8 (9460/.., 9461/..)	8	-
AOM 8 (9465/.., 9466/..)	-	8
DIM 16 (9470/.., 9471/..)	1	-
DOM 4/8 (9475/..)	-	1
Empty module	-	-

Things to Note

- The Stahl IS1 Remote I/O System can accept up to 5 simultaneous I/O connections. If an attempt is made to establish a connection beyond this limit, the Stahl IS1 CPU Module will forcibly reset the connection indefinitely and will not connect until it can accept another connection.

- The VIMs usually take approximately 5 seconds to reconnect after being disconnected, though it may take as long as 15 seconds for a reconnect, depending of the status of the scan cycle of the VIM.

Contact

If you have any questions regarding the procedures and components described in this document, please feel free to contact MYNAH Support by creating a Support Ticket from your MYNAH My Account (http://www.mynah.com/knowledge-base/my-account-mynahcom-features-and-directions).

MYNAH Technologies LLC
390 South Woods Mill Road, Suite 100
Chesterfield, MO 63017 USA
+1.636.728.2000 (International)
+1.636.728.2001 (Fax)
Email: support@mynah.com
Web: www.mynah.com