MOTORTRONICS™

Solid State AC Motor Control

VMX-synergy™

COMMUNICATION MODULES

UK CA CE

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Communication Modules

Modbus TCP

Part Number: **VMX-SGY-6603**

The Modbus TCP communications module has two RJ45 ports for daisy chain connection to multiple units.

Modbus TCP Communication Module

The Modbus TCP module is installed into the option module slot on the VMX-Synergy Plus™ unit. See page 15 for installation instructions.

VMX-Synergy Plus™ Configuration

VMX-Synergy Plus™ will configure automatically when the module is detected.

IP Address Configuration

The IP address of the module and the host VMX-Synergy Plus™ unit is set using an IPConfig tool available from:

http://www.anybus.com

After downloading the above file, unzip it to a temporary folder, and run the executable.

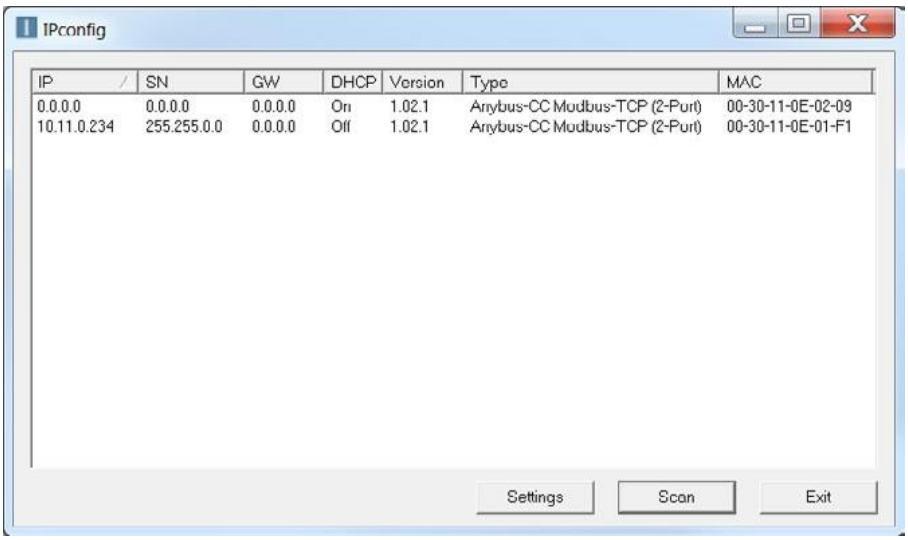
Follow the installation steps.

Communication Modules

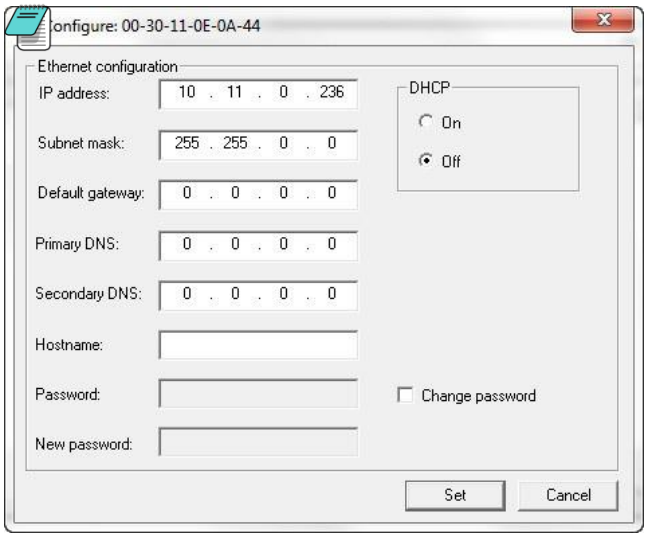
When the installation is complete, locate the download location, and run IPConfig from that folder.
The VMX-Synergy Plus™ with the installed Ethernet/IP module needs to be installed on the same network as the PC running the Ipconfig application.

Note: The messaging uses broadcast which will not pass through a router. A switch or direct connection (with cross-over cable) must be used.

Start the Ipconfig software. Press the Scan button to have the PC scan for a VMX-Synergy Plus™. The IPconfig utility will automatically find VMX-Synergy Plus™ units on the network.
See screen capture below of two detected VMX-Synergy Plus™ units located on the network.



Double click the module to be configured. And set the required IP addresses.



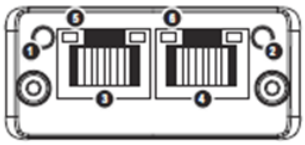
Note: To avoid the IP address being changed by a DHCP server on the network, it is recommended that DHCP is set to OFF.

Communication Modules

When all modules have been configured, recycle the corresponding VMX-Synergy Plus™ units. Confirmation of correct module installation and its IP address can be found in the VMX-Synergy Plus™ menu under:
Home > Device > Networks.

Note: when entering the 'Networks' menu, the centre button will indicate the type of module installed. If the button states 'Anybus', the module is not installed correctly.

TCP Module Front Panel Indicators

Location of Front Panel Indicators		
Item		Front Panel Diagram
1	Network Status LED	
2	Module Status LED	
3	Network Interface, Port 1	
4	Network Interface, Port 2	
5	Link/Activity Port 1	
6	Link/Activity Port 2	

Network Interface LED	
LED State	Description
Off	No link, no activity
Green	Link established (100 Mbit/s)
Green, flickering	Activity (100 Mbit/s)
Yellow	Link established (10 Mbit/s)
Yellow, flickering	Activity (10 Mbit/s)

Network Status LED	
LED State	Description
Off	No power or no IP address
Green	Online, connections active
Green, flashing	Online, no connections active
Red	Duplicate IP, fatal error
Red, flashing	Connection timeout

Module Status LED	
LED State	Description
Off	No power
Green	Controlled, Run state
Green, flashing	Not configured or idle state
Red	Major fault
Red, flashing	Recoverable error(s)

Communication Modules

Modbus TCP Functionality

The Modbus TCP Modbus communication module offers the following functionality:

- Dual switched RJ45 communication ports
- 256 bytes of I/O data in each direction
- 100 Mbps full duplex
- Supports 4 simultaneous (master) connections

All Modbus functions and addresses available are detailed in manual MAN-VMX SGY-MOD

VMX-Synergy Plus™ uses Protocol Addressing (Base 0); not PLC Addressing (Base 1). If you are not using the correct selection, all the addresses will be off by 1. Recommended test: monitor a non-critical parameter such as Start Time (address 7104), then manually change the value on the touchscreen and verify that Modbus master actually sees the correct changes.

Communication Modules

Ethernet IP

Part Number: **VMX-SGY-6604**

Caution

This option module is specifically designed to be used with the VMX-Synergy Plus™ range of soft-start products and is intended for professional incorporation into complete equipment or systems. If installed incorrectly it may present a safety hazard. Before commencing installation and commissioning, the user should ensure they are fully familiar with the VMX-Synergy Plus™ unit and have read the important safety information and warnings contained in the VMX-Synergy Plus™ User Guide.

Overview

The Ethernet IP Interface is intended to be installed in the VMX-Synergy Plus™ option slot and allows the VMX-Synergy Plus™ to be connected to an Ethernet IP network. The interface offers the following functionality:

- CIP Parameter Object Support
- 7 Input control Words from the network master to VMX-Synergy Plus™
- 5 Output status and data Words from VMX-Synergy Plus™ to the network master

Installation

See Appendix 1

VMX-Synergy Plus™ configuration

- VMX-Synergy Plus™ will automatically configure when the option module is installed

EDS File

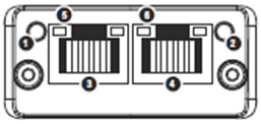
- An EDS file for the interface is available from www.motortronics.com

IP Address Configuration

- Use the IP address configuration tool. Available from:
  www.motortronics.com
  (the tool is contained in the EDS zip file)

Front panel

	Item
1	Network Status LED
2	Module Status LED
3	Ethernet Interface, Port 1
4	Ethernet Interface, Port 2
5	Link/Activity Port 1
6	Link/Activity Port 2



Network status LED

LED State	Description
Off	No power or no IP address
Green	Online, connections active
Green, flashing	Online, no connections active
Red	Duplicate IP, fatal error
Red, flashing	Connection timeout

Module status LED

LED State	Description
Off	No power
Green	Controlled, Run state
Green, flashing	Not configured or idle state
Red	Major fault
Red, flashing	Recoverable error(s)

Ethernet interface LED

LED State	Description
Off	No link, no activity
Green	Link established (100 Mbit/s)
Green, flickering	Activity (100 Mbit/s)
Yellow	Link established (10 Mbit/s)
Yellow, flickering	Activity (10 Mbit/s)

Communication Modules

Ethernet/IP Control and Data Mapping

The interface is supported by the EDS file provided for the Anybus AB6604-C M40 module by HMS Industrial Networks.

The Class1/Implicit cyclic connection is facilitated through the 150 and 100 assemblies described in the EDS.

Connection 150 (0x96), O->T, requires the controlling system/PLC to supply seven words of data which dynamically set-up the function of the host VMX-Synergy Plus™, as well as select any required data to return through T->O as it is connected.

In its simplest control mode, the first 16-bit word (1) can be used to enable or disable the control bits described below. See Table 1 to describe each bit's function. To make bits 0 to 3 visible to the VMX-Synergy Plus™, bit-4 (Network Control) must be set.

The next two words (2,3) allows the PLC to set discreet values into selected PNUs. Word 2 is used to select the PNU that is to be written to and word-3 carries the value to be assigned to that PNU(1). Note that word 3 is a 32-bit container and thus allows writing of values of up to 32 bits long. PNUs that require values less than 32 bits will ignore/truncate the more significant bytes passed into the word 3 during the assign process. If word-2 is set to zero, no data will be assigned. Note also that PLC output array will normally have to be specified as eight 16-bit words and the ladder logic will need to split a 32-bit data word into what would be word-3 and word-4 of that working array. The entire O->T message size must be specified as 16 bytes long.

The last four 16-bit words (4,5,6,7) allow the selection of what PNU data will be returned in the T->O frame "Selected PNU n Value" described in Table 2. Each address set to zero will cause the return value of 0.

WORD	BITs	Value	Note
1	16	Control Word	Bit 0: Start/Stop Bit 1: Freeze Ramp Bit 2: Reset Bit 3: External Trip Bit 4: Network Control Bit 5-15 Reserved
2	16	Write Select PNU Address	Address where word 3's value is assigned to. If zero/null there is no copy assignment.
3	32	Write Value	Value written to the Write Select PNU (assigned in word 2, above). If the PNU expects a 16-bit value, then only Least Significant 16bits are copied.
4	16	Read Select PNU 1 Address	Selects the first datum copied to connection 100.
5	16	Read Select PNU 2 Address	Selects the second datum is copied to connection 100.
6	16	Read Select PNU 3 Address	Selects the third datum is copied to connection 100.
7	16	Read Select PNU 4 Address	Selects the fourth datum is copied to connection 100.

Table 1. Connection 150 O ->T message frame.

In response Connection 100 (0x64), T->O, delivers five 32-bit words contain the status and requested PNU data. Word 1 carries the status and any fault code. Table 2, describes the meaning of each of the 6 bits making up the status report. If bit-1 (Trip) is set, then the upper 16-bits of the status word will contain the trip code that describes the fault. See the main VMX-Synergy Plus™ manual for lists of Trip codes. The remaining four words will contain any PNU values corresponding to the selected PNU addresses specified in the last four words of Connection 150.

WORD	BITs	Value	Note
1	32	Status	Status value defined as: Bit 0: Error/Fault/Trip Bit 1: Running Bit 2: Ramping Bit 3: End of Start Bit 4: Current Limited Bit 5: iERS Active Bit 6: Stopping Bit 7: Network Control Active Bit 8-15: Reserved Bits 16-31 Trip Code
2	32	Selected PNU 1 Value	If a value is less than 32 bits it will be assigned to the least significant part. If larger than 32 bits it will be truncated to its 32bit least significant part.
3	32	Selected PNU 2 Value	…as above
4	32	Selected PNU 3 Value	
5	32	Selected PNU 4 Value	

Table 2. Connection 100 T->O message frame.

Class 3 Explicit packets

All the datum described in the class 1 section can be addressed individually as explicit/class 3 messages using the following CIP addressing.

Name	Read Only	Bytes	Class Hex	Instance Hex	Attribute Hex
Control Word		2	A2	2	5
Status	Yes	4	A2	3	5
Write Select PNU Address		2	A2	100	5
Write Value		4	A2	101	5
Read Select PNU 1 Address		2	A2	102	5
Read Select PNU 2 Address		2	A2	103	5
Read Select PNU 3 Address		2	A2	104	5
Read Select PNU 4 Address		2	A2	105	5
Selected PNU 1 Value	Yes	4	A2	106	5
Selected PNU 2 Value	Yes	4	A2	107	5
Selected PNU 3 Value	Yes	4	A2	108	5
Selected PNU 4 Value	Yes	4	A2	109	5

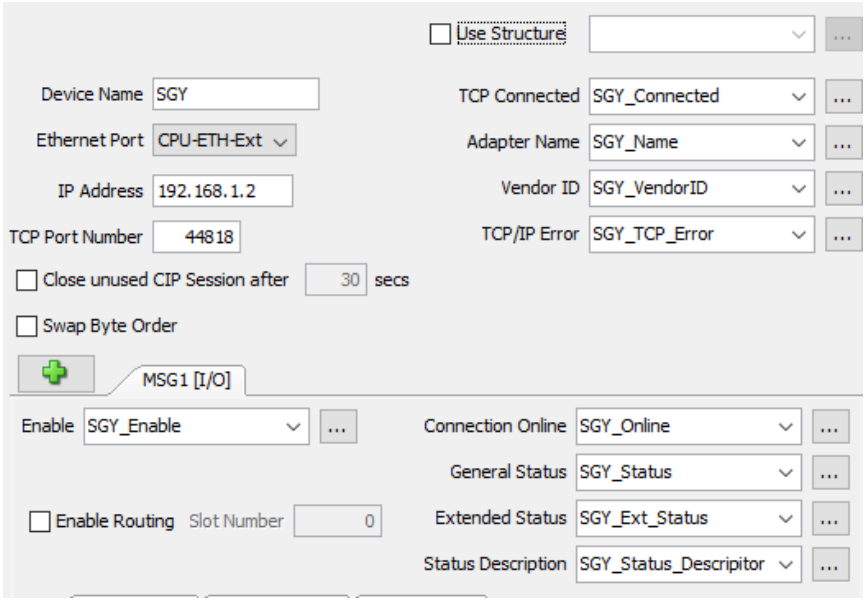
Table 3. Explicit packets

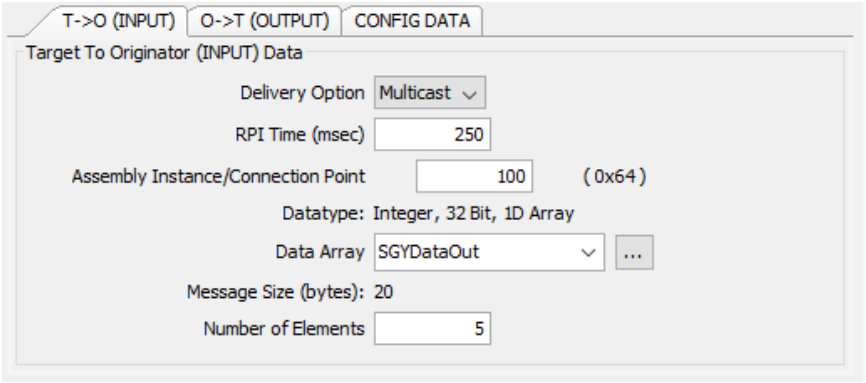
Communication Modules

PLC connection and programming guidance

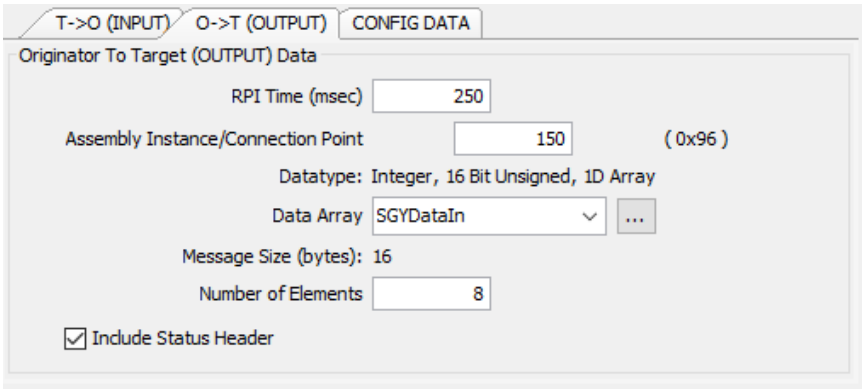
The example below is taken from a commercially available PLC interface and should be transferable, with the appropriate changes, to others.

EIP Client Properties. Tag names are just specified for this example. The IP Address would be changed to suit.



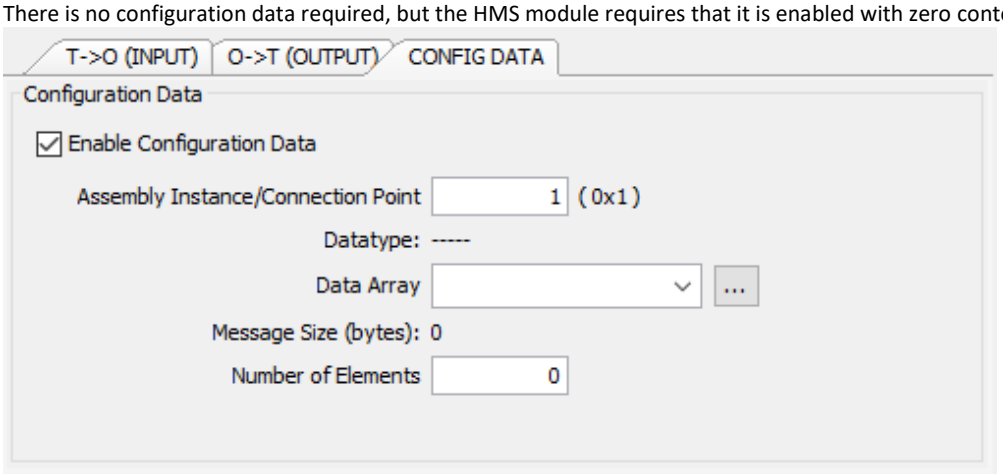


T->O setting reflect Table 2 contents.

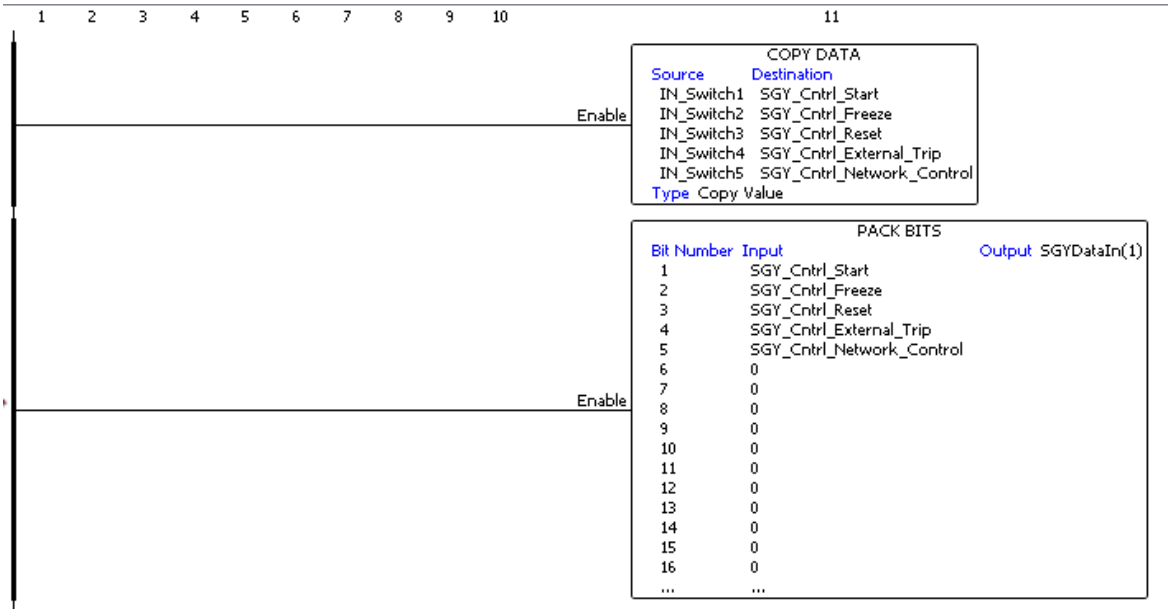


O->T settings reflect Table 1 contents. Note that this is specified as an array of 16 bit integer.

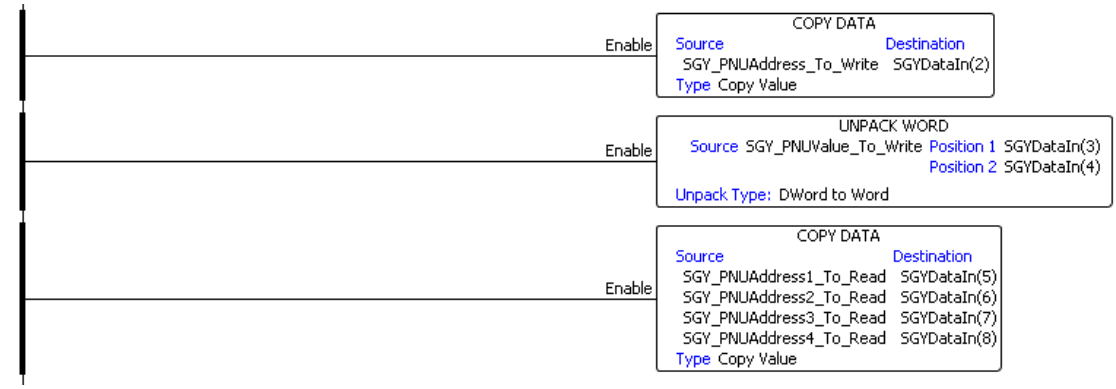
There is no configuration data required, but the HMS module requires that it is enabled with zero content as shown here.



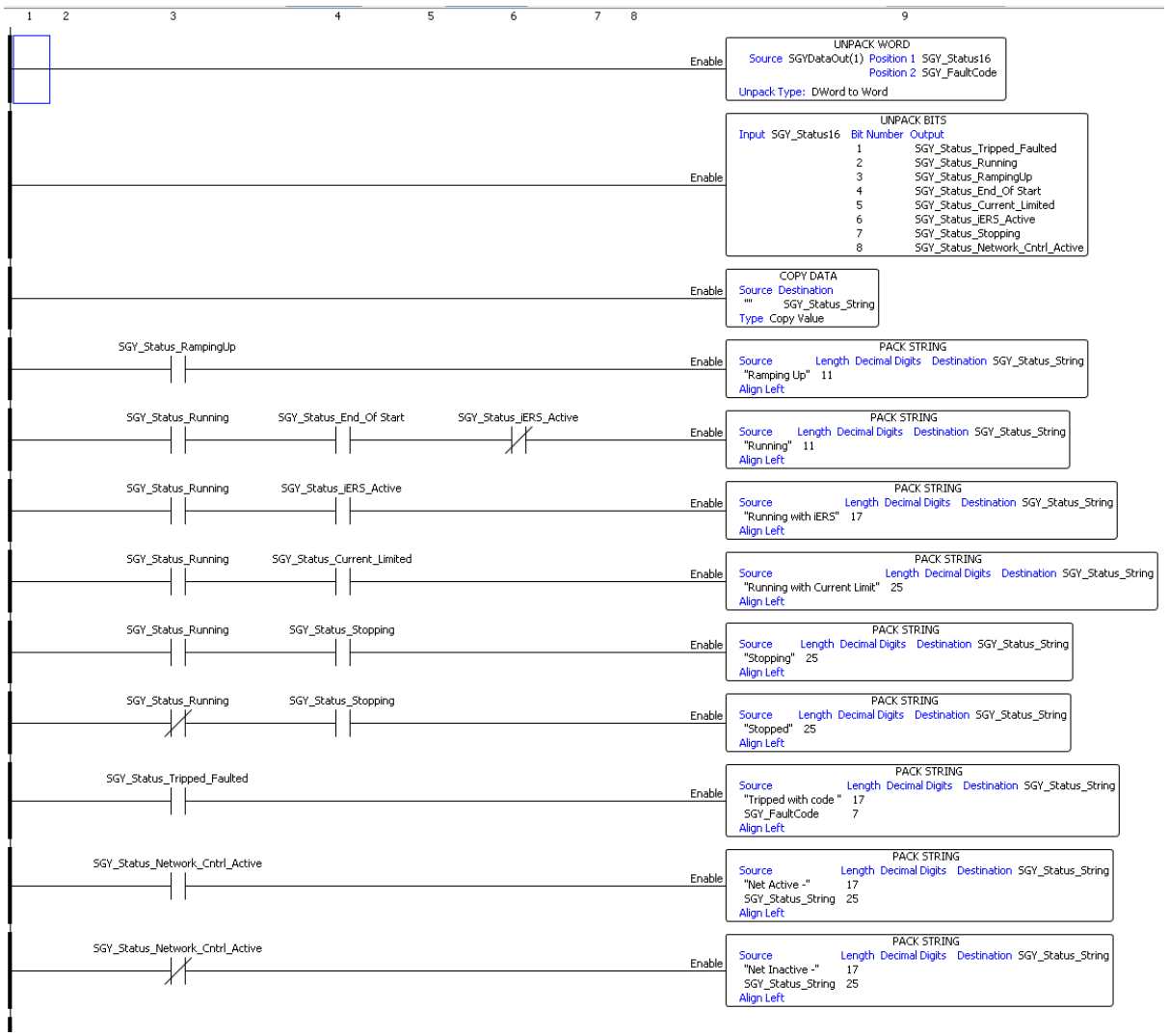
Ladder logic will need to be written which can load the required control bits into SGYDataIn(1). The example below is using a bank of switches, each of which are assigned to a Boolean which in-tern are packed into the first word of the O->T frame defined above.



The remainder of the O->T frame will need to be populated as show below. Note the unpacking of the 32bit values into the two successive 16bit array members.



The T->O frames members can be copied piece wise with the status word being stripped out. The following example shows this with the added functionality creating a description string of the status for MMI use.



Communication Modules

Profibus DP

Part Number: **VMX-SGY-6270**

The Profibus DP Interface is intended to be installed in the VMX-Synergy Plus™ option slot and allows the VMX-Synergy Plus™ to be connected to a Profibus DP network.

Profibus DP Communication Module

VMX-Synergy Plus™ Configuration

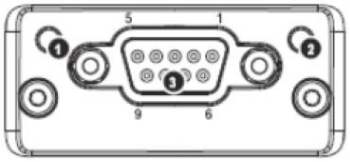
VMX-Synergy Plus™ will automatically configure when the option module is installed. Correct installation can be confirmed from the touch screen interface:

Device >> Networks >> Profibus

Profibus DP Module Front Panel Indicators

Front panel

	Item
1	Operation mode
2	Status
3	Profibus network connector



Operation mode	
State	Indication
Off	No power or not inserted
Green	Online data exchange
Green, flashing	Network OK, no data exchange
Single Red flash	Parameter error
Double Red flash	Network error
Status	
State	Indication
Off	No power
Green	Initialised
Green, flashing	Initialised, Self-testing
Red	Error

Communication Modules

Profibus DP Module Pinout

Pin	Function
1	N/C
2	N/C
3	B line Positive RxD/TxD, RS485
4	RTS
5	Bus Ground (GND)
6	+5V Bus output termination power
7	N/C
8	A Line negative RxD/TxD, RS485
9	N/C

Profibus DP Control

The current Profibus interface for this device is specified in the GSD file. This contains the configuration required to run the synchronous standard telegram 1 allowing start/stop and fault monitoring of the VMX-Synergy Plus™ unit.
The standard telegram consists of two 16 bit set-point words. The first being the drive control word.
This has the following functionality:

Output Word 1 (STW1)							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Fault Reset	-	Unfreeze Ramp	Ramp On	Enable Operation	Coast Stop	-	Start
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	-	-	-	-	Network Connect	-	-

The second Profibus Standard telegram 1 set-point word (NSOLL_A) is not implemented in this version so will not respond to set values.
The response telegram also consists of two words, this time values generated by the VMX-Synergy Plus™ unit in response to the set-points. The first word holds status information and has the following meaning:

Input Word 1 (ZSW1)							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
-	Switch on Inhibited	Quick Stop Disabled	Same as Bit 0	Fault (Tripped)	Operation Enabled	Switched On	Ready Switch On
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Bit 1	-	-	-	-	-	Network Connected	-

As with the Outputs, the second Profibus Standard telegram 1 value word (NIST_A) is not implemented in this version so should be ignored.

Communication Modules

Anybus Module Installation

1) Ensure that all power is removed from the VMX-Synergy Plus™ soft starter prior to installing the option module.
2) Remove the blanking plate from the VMX-Synergy Plus™ option module slot.
3) Carefully slide the communication module into the VMX-Synergy Plus™ module slot applying slight downward force and forward pitch as shown in Fig 1. As the module moves into the VMX-Synergy Plus™ unit, it will be necessary to reduce the pitch of the module Fig 2a and 2b. As the module approaches full insertion, apply slight downward pressure and push fully home Fig 3.

Figure 1

Figure 2a

Figure 2b

Figure 3

4) Ensure no gap is present between the module flange and the VMX-Synergy Plus™ body.
5) Tighten the T9 screws to lock the module in place.

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Communication Modules

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