
8903/IM and 8903/IP Ethernet Communications Interfaces

Technical Manual

HA500522U001 Issue 2

Compatible with 890 Firmware Version 3.2 onwards

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Safety Information



WARNING!

During commissioning, remove the fuses (or trip the circuit breaker) on your 3-phase supply.
Make sure the power is OFF, and that it cannot be switched on accidentally whilst you are working.

REFER TO YOUR MAIN PRODUCT MANUAL FOR SPECIFIC SAFETY INFORMATION ABOUT THE DEVICE YOU ARE CONTROLLING

IMPORTANT: Please read this information BEFORE installing the equipment.

Intended Users

This manual is to be made available to all persons who are required to install, configure or service equipment described herein, or any other associated operation.

The information given is intended to highlight safety issues, EMC considerations, and to enable the user to obtain maximum benefit from the equipment.

Application Area

The equipment described is intended for industrial motor speed control.

Personnel

Installation, operation and maintenance of the equipment should be carried out by qualified personnel. A qualified person is someone who is technically competent and familiar with all safety information and established safety practices; with the installation process, operation and maintenance of this equipment; and with all the hazards involved.

Safety

All control and signal terminals are SELV, i.e. protected by double insulation.

EMC

In a domestic environment this product may cause radio interference in which case the user may be required to take adequate counter-measures.

This equipment contains electrostatic discharge (ESD) sensitive parts. Observe static control precautions when handling, installing and servicing this product.

Safety Information



CAUTION!

At any time, there may be a loss of motor control and separate/independent application measures should be taken to ensure that such loss of motor control cannot present a safety hazard.

RISK ASSESSMENT

Under fault conditions, power loss or unintended operating conditions, the drive may not operate as intended. In particular:

- Stored energy might not discharge to safe levels as quickly as suggested, and can still be present even though the drive appears to be switched off
- The motor's direction of rotation might not be controlled
- The motor speed might not be controlled
- The motor might be energised

A drive is a component within a drive system that may influence its operation or effects under a fault condition. Consideration must be given to:

- Stored energy
- Supply disconnects
- Sequencing logic
- Unintended operation

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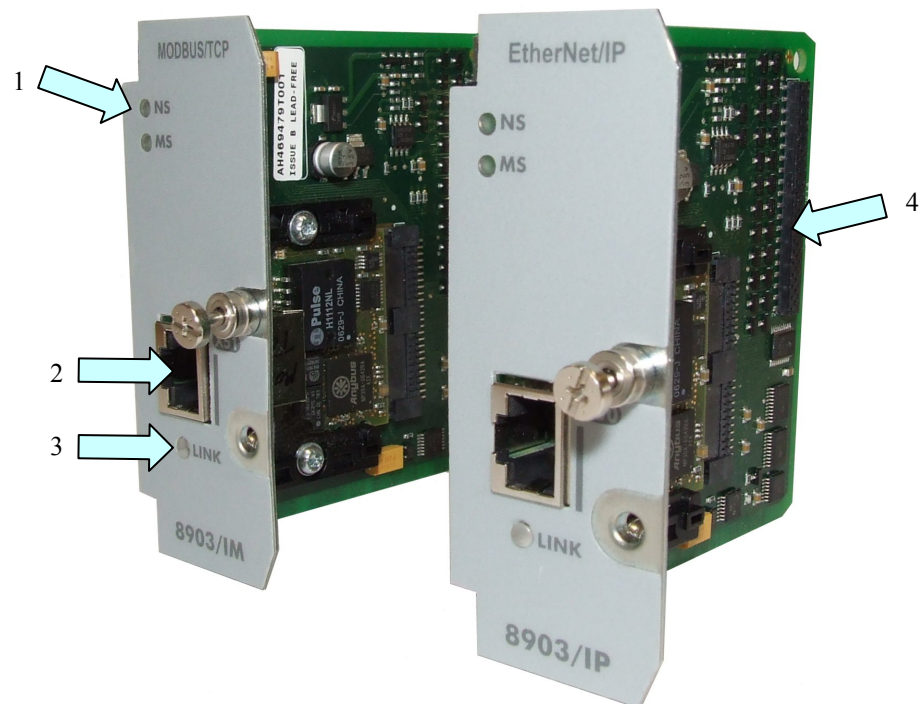
ETHERNET COMMUNICATIONS INTERFACE

Introduction

This manual describes the Parker SSD Drives' Ethernet Communications Interface Options (TechCards).

Product Features

- Available for 890 products
- Easy plug-in installation
- Suitable for use with drive models:
 - 890CD Common Bus Drive and 890SD Standalone Drive
 - using 890 firmware version 3.2 onwards
- Galvanically isolated bus electronics
- 10/100Mbit operation
- LEDs to indicate network and module status
- Supports Modbus/TCP protocol (**8903/IM only**)
- Supports Ethernet/IP protocol (**8903/IM only**)
- Supports RTNX protocol to connect to Drive System Explorer



1	NETWORK and MODULE status LEDs	3	LINK Activity LED
2	RJ45 Ethernet Interface	4	Connector to Control Board

Figure 1. Ethernet TechCard

Product Codes

Part Number: 8903/IM/00 – Ethernet Modbus/TCP TechCard
 8903/IP/00 – Ethernet/IP TechCard

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Installation

WARNING!

Before installing, ensure that the drive wiring is electrically isolated and cannot be made "live" unintentionally by other personnel. Wait 5 minutes after disconnecting power before working on any part of the system or removing the covers from the drives.

To Remove the Control Board

1. Remove the blank covers, each secured by a single screw, that fit over the TechCard holes.
2. Loosen the top and bottom screws in the handles of the Control Board (2).
3. Pull gently on the handles and slide the Control Board (2) out of the drive.

Note: Save the blank cover and screw for future use. The drive should not be operated without a TechCard or blank cover. When fitted, these maintain the drive's IP20 rating.

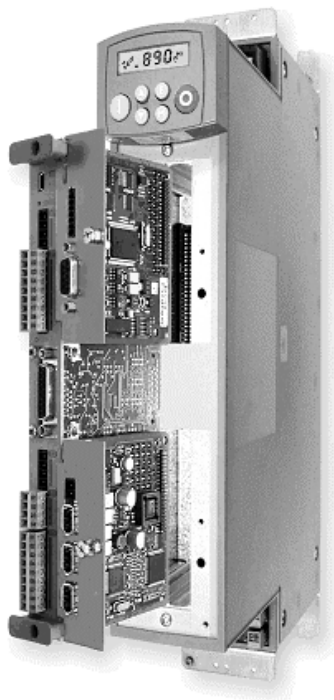


Figure 2. 890 showing Control Board withdrawn, with Options fitted

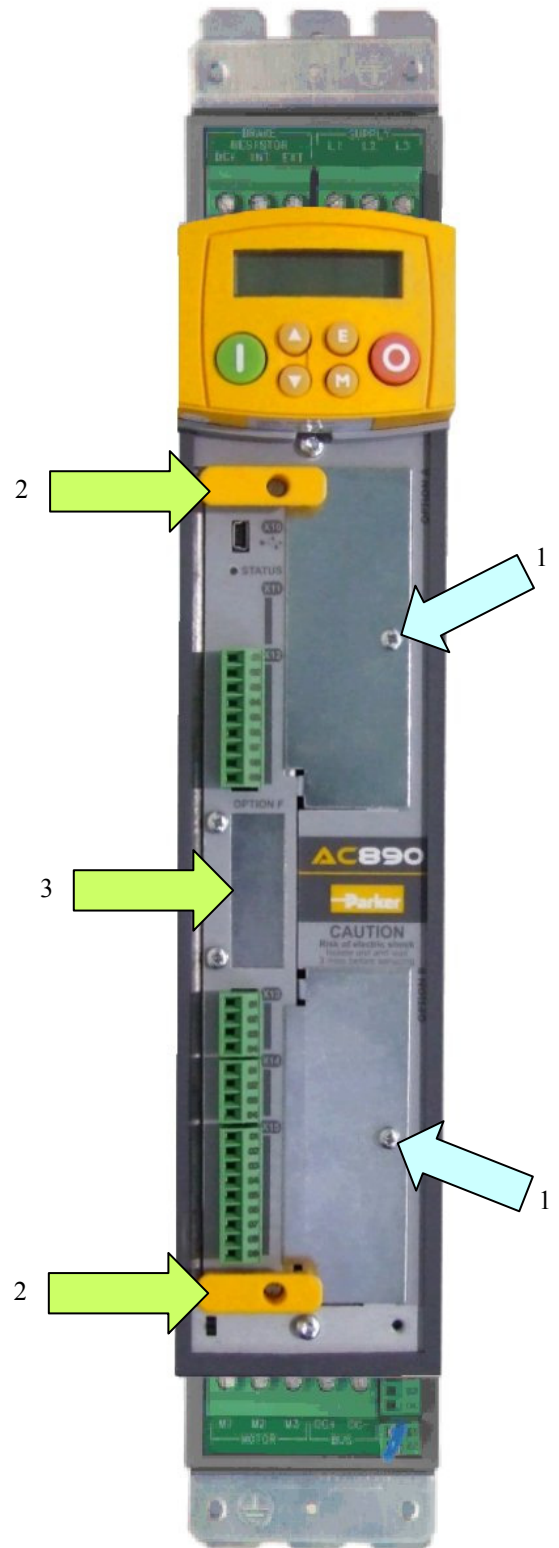


Figure 3. Front of 890 drive showing Control Board fitted

Fitting the TechCard

The TechCard fits onto the Control Board.

1. Insert the connector into the TechCard as shown. The legs of the connector will protrude through into the connector on the other side of the TechCard.
2. Press the assembly into the **TOP** connector (adjacent to terminals X10, X11 and X12) on the Control Board. Ensure that the front panel of the TechCard overlaps the front of the Control Board. Ease the connector at the TechCard so that the two pcb's are parallel when viewed on edge.

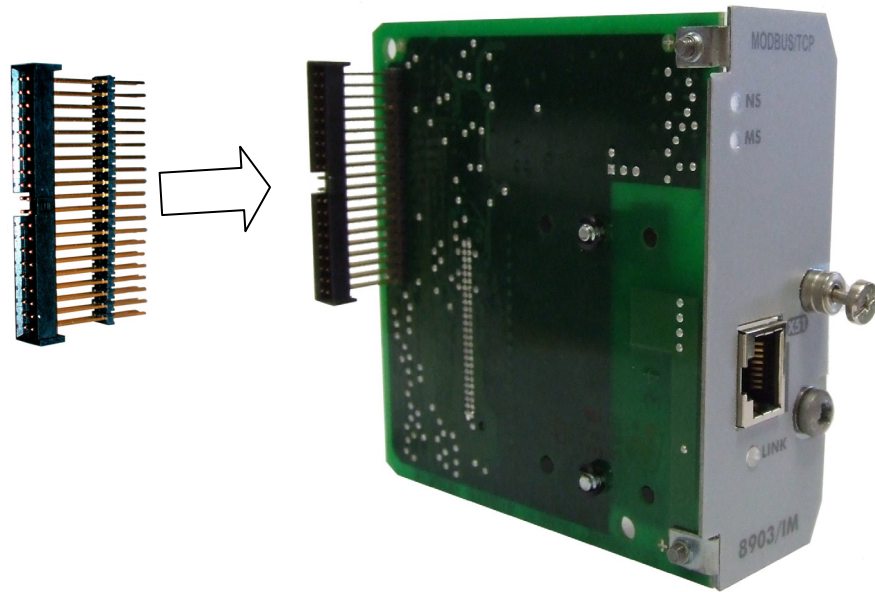


Figure 4. Fitting the connector to the TechCard

Re-fitting the Control Board

1. Slide the board into the drive, engaging the edges of the boards into the slots. Push until the back edge of the Control Board pcb locates with the connectors in the drive.
2. Tighten in position using the top and bottom screws in the blue handles of the Control Board.
3. Screw the TechCard in position using the captive screw on the front of the TechCard.

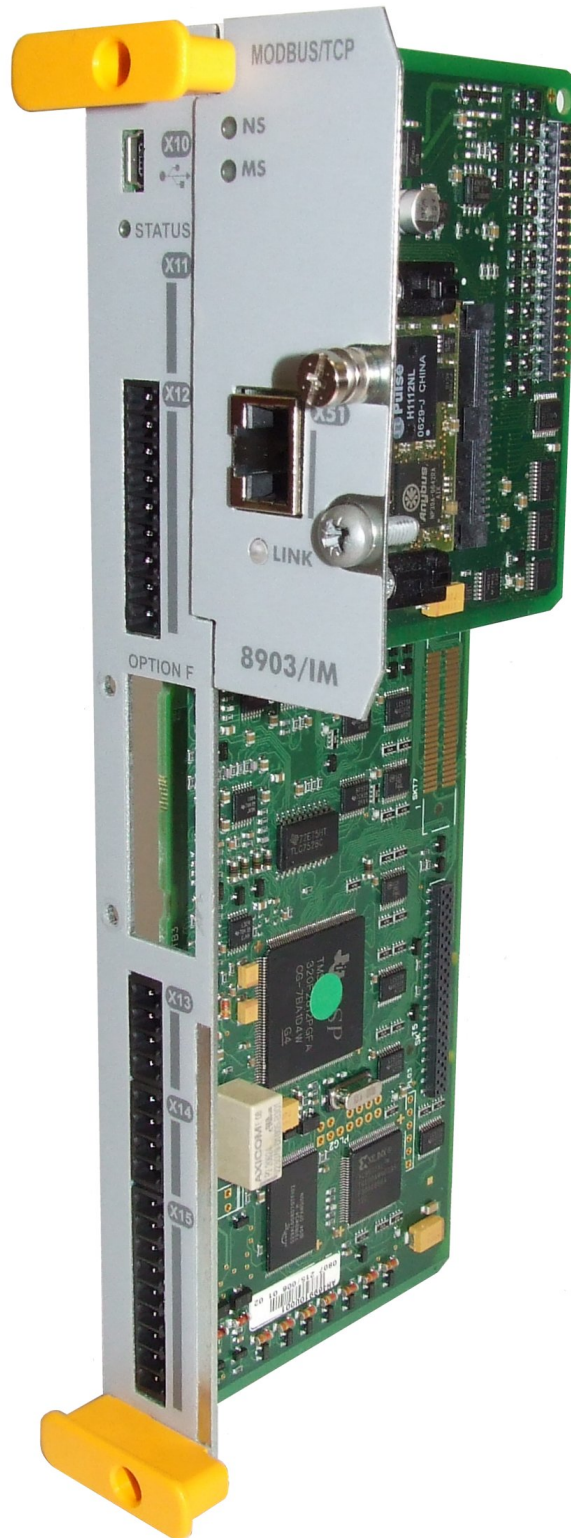


Figure 5. 890 Control Board with TechCard fitted

Wiring the System

Connection to the drive(s) from a PC, or PLC for example, is made using a cable fitted with standard RJ45 connectors at both ends. The cable plugs into the PLC, for example, and into the socket on the Ethernet techbox.

Note: When connecting to one drive direct from PC/PLC, you must use a crossover cable.

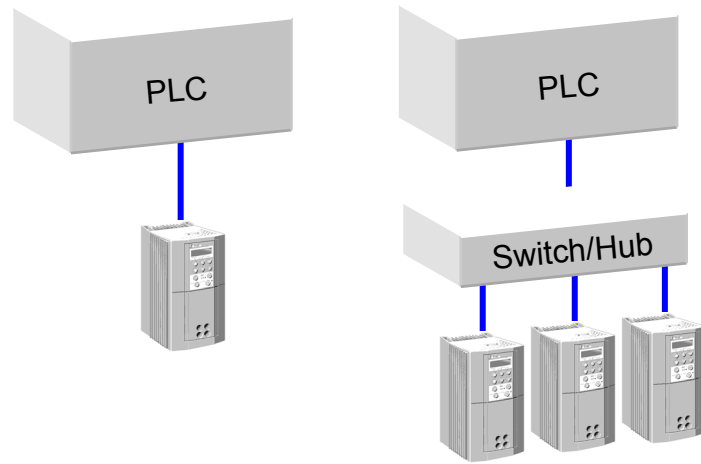
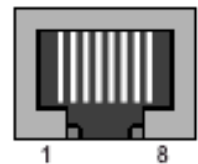


Figure 6. Typical connections to a PLC

RJ45 (Standard) Pin Details

Pin	Signal
1	TD+
2	TD-
3	RD+
4	Termination
5	Termination
6	RD-
7	Termination
8	Termination



Cable Specifications

Cable Type	Maximum Node-to-Node Distance (m)
CAT5	100
CAT5E	100

LED Indications

Network Status LED (NS)

Note: A test sequence is performed on this LED during start-up.

Modbus/TCP





Colour	LED Indication	Description
 OFF	OFF	No power or no IP Address set
 GREEN	ON	Normal operation
 GREEN	FLASHING	Waiting for connections
 RED	ON	Duplicate IP Address

Figure 7. Modbus/TCP NS LED

Ethernet/IP






Colour	LED Indication	Description
 OFF	OFF	No power or no IP Address set
 GREEN	ON	On-line, one of more connections established
 GREEN	FLASHING	On-line, no connections established
 RED	ON	Duplicate IP address
 RED	FLASHING	One or more connections timed out

Figure 8. Ethernet/IP NS LED

Module Status LED (MS)

Note: A test sequence is performed on this LED during start-up.

Modbus/TCP






Colour	LED Indication	Description
 OFF	OFF	No power
 GREEN	ON	Normal operation
 GREEN	FLASHING	Major fault
 RED	ON	Duplicate IP Address
 RED	FLASHING	Minor fault

Figure 9. Modbus/TCP MS LED

Ethernet/IP






Colour	LED Indication	Description
 OFF	OFF	No power
 GREEN	ON	Controlled by a Scanner in Run state
 GREEN	FLASHING	Not configured, or Scanner in idle state
 RED	ON	Major fault
 RED	FLASHING	Recoverable fault(s)

Figure10. Ethernet/IP MS LED

LINK/Activity LED




Colour	LED Indication	Description
 OFF	OFF	No link, no activity
 GREEN	ON	Link established
 GREEN	Flickering	Activity

Figure 11. LINK/Activity LED

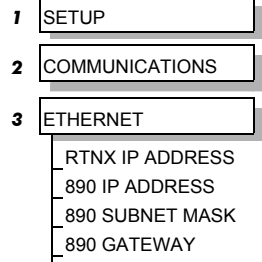
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Drive Diagnostics

The Ethernet MMI View

Diagnostic information is available through the MMI.

MMI Menu Map



Parameter Descriptions

RTNX IP ADDRESS *Read Only* *Range: NOT CONNECTED, XXX.XXX.XXX.XXX*

The IP Address of the computer running Drive System Explorer (DSE) is displayed if connected to the 890 via Ethernet.

If DSE is not connected, then *NOT CONNECTED* is displayed. Note – this is also displayed if there has been no communications activity from the connected DSE in the last 5 minutes.

890 IP ADDRESS *Read Only* *Range: XXX.XXX.XXX.XXX*
IP Address of the 890.

890 SUBNET MASK *Read Only* *Range: XXX.XXX.XXX.XXX*
Subnet Mask being used.

890 GATEWAY *Read Only* *Range: XXX.XXX.XXX.XXX*
Gateway Address being used.

Configuring the Ethernet System

To configure the Ethernet system, complete the steps below.

Step 1: Configuring the Ethernet TechCard using DSE 890

Step 1.1: Inserting an Ethernet Function Block

Display your configuration page. Click on the Block menu at the top of the screen.

1. Move the cursor down to select "890 Comms" and select "Ethernet".
2. Click to attach the block icon to the cursor. Move the icon to where you want on the screen. Click again to release the icon.

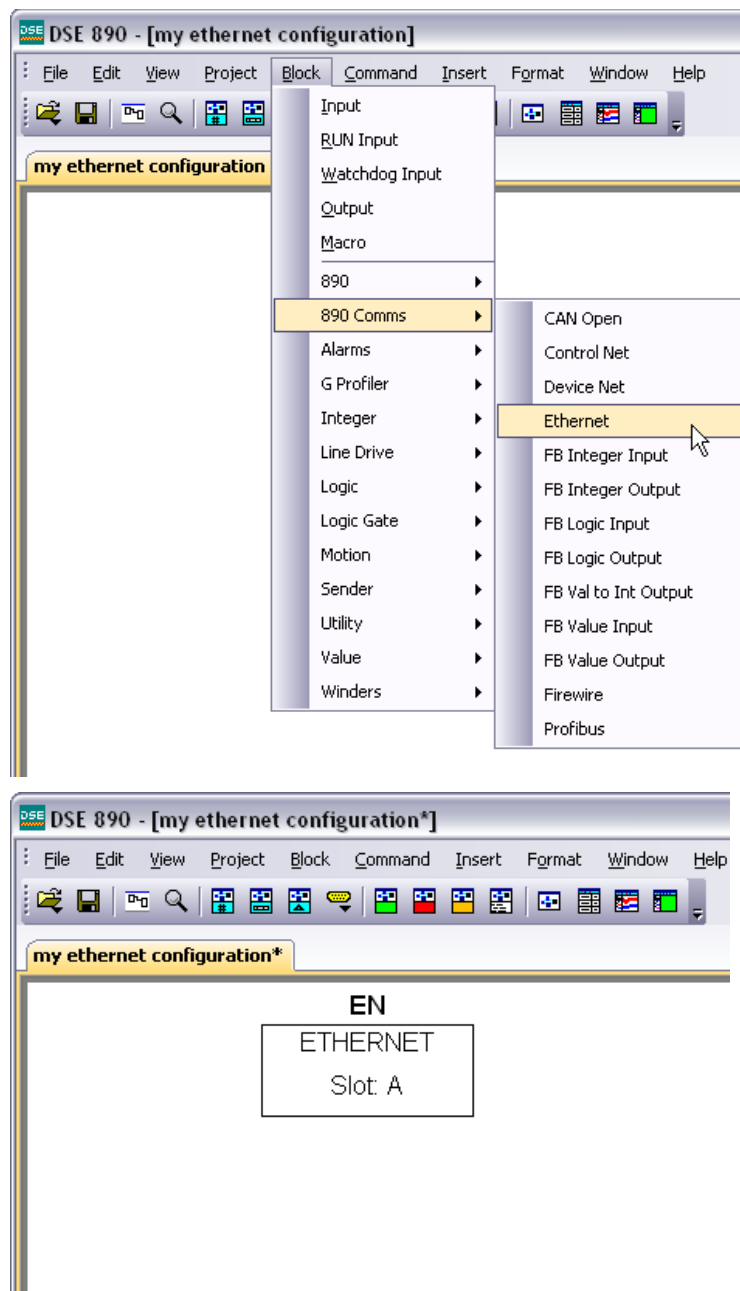


Figure 12. Configuration showing EN Function Block

Step 1.2: Attaching Fieldbus Connectors

Seven fieldbus connector types are available:

- FB Logic Input
- FB Integer Input
- FB Value Input
- FB Logic Output
- FB Integer Output
- FB Value Output
- FB Val to Int Output

Input connector : the data is sent from PLC → 890

Output connector : the data is sent from 890 → PLC

The fieldbus connectors must be added before they will appear in the EtherNet function block.

Note: The function block and connectors can be renamed by using the right mouse button and selecting **Rename Block**.

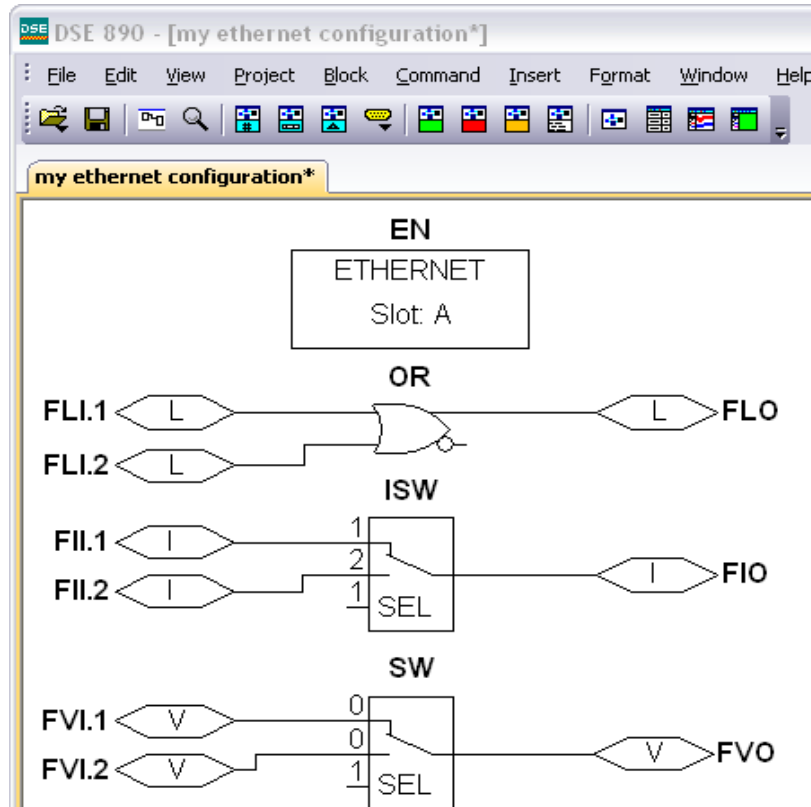
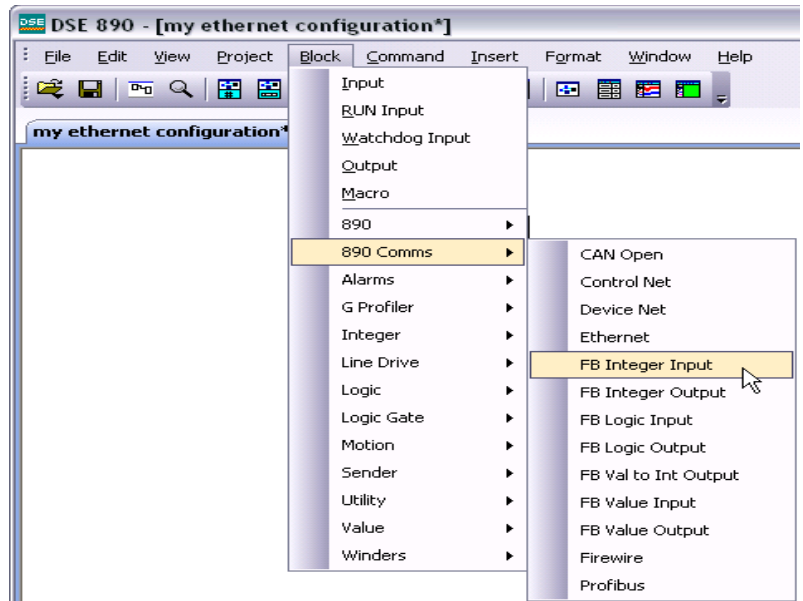
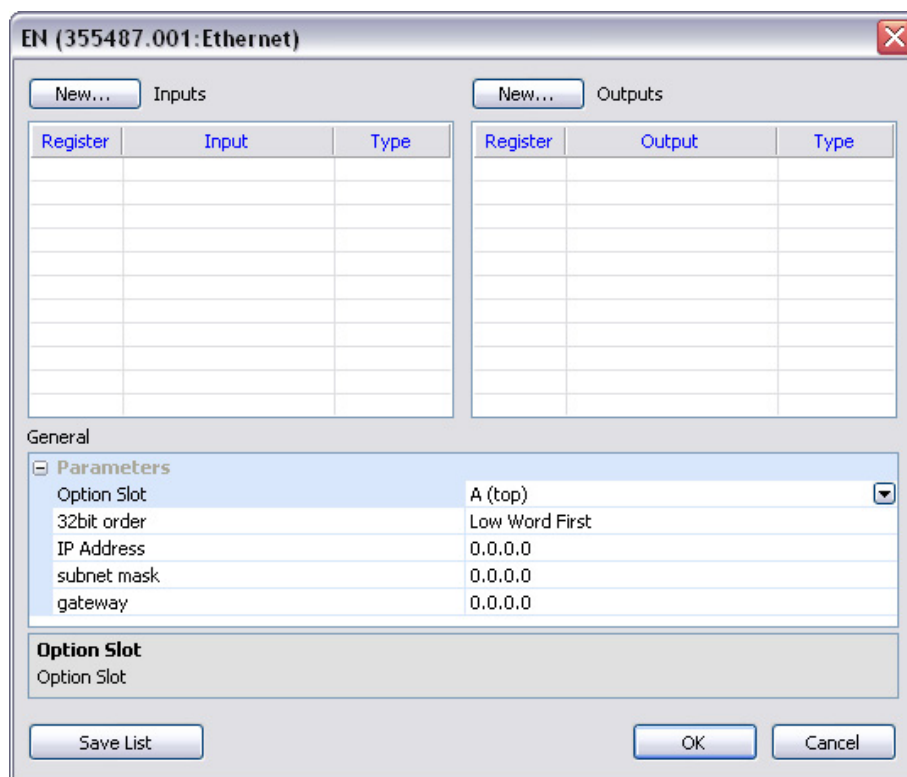



Figure 13. Configuration showing EN Function Block and Fieldbus Connectors

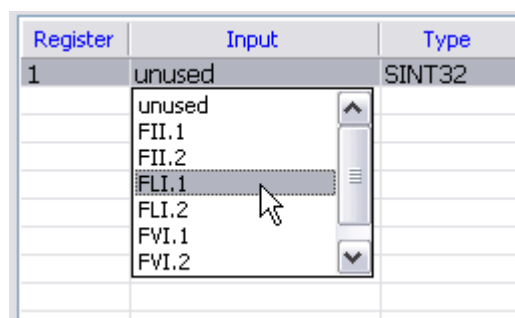
Step 1.3 : Configuring the Fieldbus Connectors

Double-click on the function block to display the dialog below. The fieldbus connectors (inputs and outputs) are assignable in the function block along with their data type to/from the PLC. The Option Slot, 32-bit Order, IP Address, Subnet Mask and Gateway Address can also be selected.

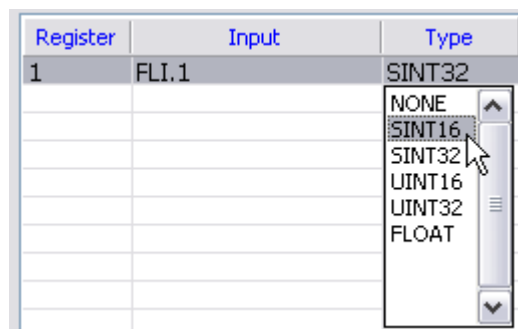


To configure the input and output connectors you have placed in the configuration:

1. Expand the **Inputs** and **Outputs** trees to reveal the registers. By default the trees each have one register. To add more registers click on  adjacent to **New...**
2. Select the drop-down menu in the **Input** column to choose the required input/output connector on the Register. For example below, Register 1 "Input" is shown with the possible fieldbus selections that have been placed in the configuration: FII.1 (Fieldbus Integer Input 1), FLI.1 (Fieldbus Logic Input 1), FVI.1 (Fieldbus Value Input 1) etc.



- Select the drop down menu in the **Type** column to choose the required PLC type on Register 1, for example.

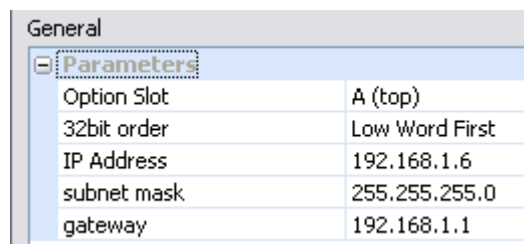


- Set up all the input/output registers in a similar way.

Remember:

- ◆ The order and size of the *inputs* in the DSE Ethernet configuration **MUST** match the order and size of the *outputs* from the PLC configuration.
- ◆ The order and size of the *outputs* in the DSE ControlNet configuration **MUST** match the order and size of the *inputs* to the PLC configuration.

- Set up the option parameters:



"Option Slot" = A (top). The Ethernet TechCard can only be fitted in the OPTION A slot of the drive. This is the default setting for "Option Slot".

"32bit order" is set to either "Low Word First" or "High Word First". This refers to how 32-bit data types, i.e. SINT32, UINT32 and FLOAT are encoded on Ethernet. If Ethernet/IP is being used, this should always be Low Word First. If Modbus/TCP is being used, it depends on the master.

- **Low Word First** is sometimes referred to as "Modicon Mode" and is used when the least significant 16-bits are sent in a lower register number than the most significant 16-bits, i.e. Little-endian.
- **High Word First** is sometimes referred to as "IEEE Mode" and is used when the most significant 16-bits are sent in a lower register number than the least significant 16-bits, i.e. Big-endian.

"IP Address", "subnet mask" and "gateway" are used to set the IP parameters. If set to 0.0.0.0 they may be configured over Ethernet, e.g. by using the Address Resolution Protocol (ARP).

DSE Data Types

Data Type	Description	Range
LOGIC	Logic	False (F) and True (T)
INTEGER	32-bit signed integer	-2,147,483,648 to 2,147,483,647
VALUE	32-bit fixed point value	-32768.0 to 32767.9999

Ethernet Data Types

Data Type	Description	Range	Bytes Used
SINT16	16-bit signed integer	-32,768 to 32,767	2
SINT32	32-bit signed integer	-2,147,438,648 to 2,147,483,647	4
UINT16	16-bit unsigned integer	0 to 65,535	2
USINT32	32-bit unsigned integer	0 to 4,294,967,295	4
FLOAT	32-bit IEEE-754 floating-point value	1.19209290e-38 to 3.4028235e+38	4

Conversion of DSE Type < > Ethernet Type

The DSE fieldbus connectors are each assigned an Ethernet "Type" as described in "Step 1.3 : Configuring the Fieldbus Connectors" on page 11.

The conversion between the DSE type and the PLC type is performed automatically (refer to Appendix B : DSE/Ethernet Conversion Rules, page 29).

Any PLC type can be assigned to a fieldbus connector.

Step 2: Configuring the PLC/SCADA Supervisor

This section contains examples for configuring a Modicon PLC, an Allen-Bradley PLC and the TS8000 Operator Interface. The Ethernet Technology Box supports the ModBus/TCP protocol and the Ethernet/IP protocol.

Modicon Momentum

1. Start a new program and select the PLC processor and chassis type used in your project. Our example uses an M1 980-20 Momentum PLC. Stay offline until you are ready to download the program.
2. Place an MSTR block in the ladder logic. MSTR blocks move data from the PLC data table to the drive or from the drive to the PLC data table. Two MSTR blocks are necessary for a Read and Write operation.
3. Right click over the MSTR block. This will access the Register Editor. Use the Register Editor to configure the block. The MSTR block has two types of operations: Read or Write. The first register defines the type of operation. In our case address 40100 is used for write command and address 40200 is used for read command. A value of 1 in the data column defines a Write operation. A value of 2 in the data column defines a Read operation.

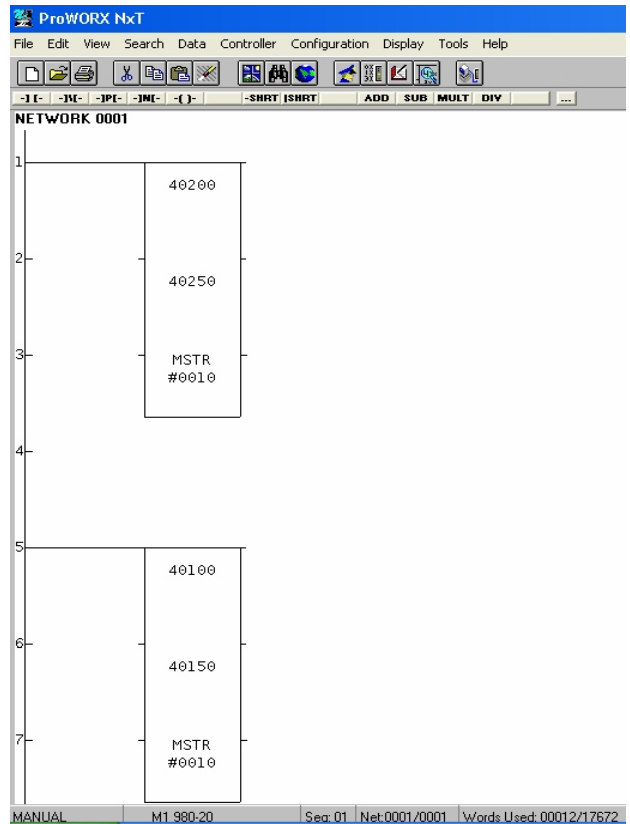


Figure 14. PLC Ladder Logic showing MSTR Blocks

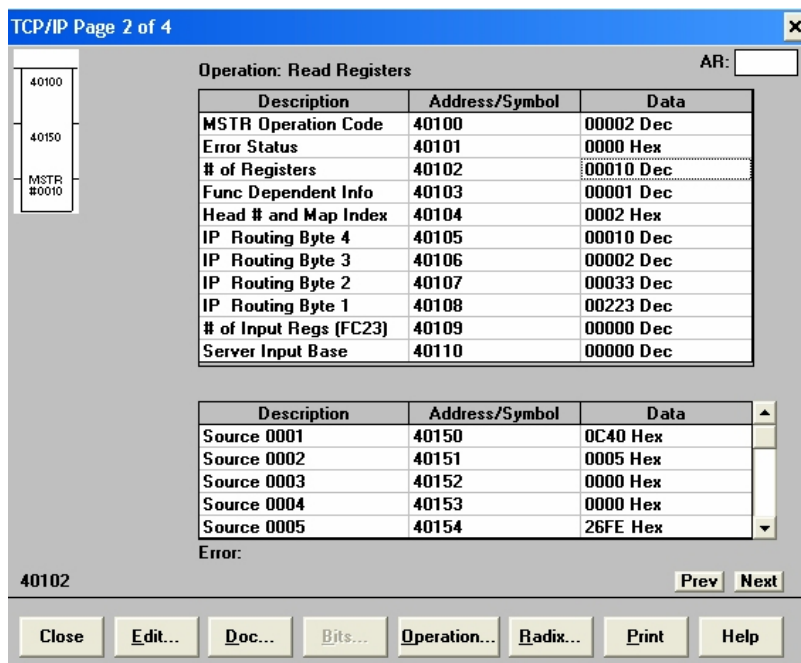


Figure 15. Read Registers

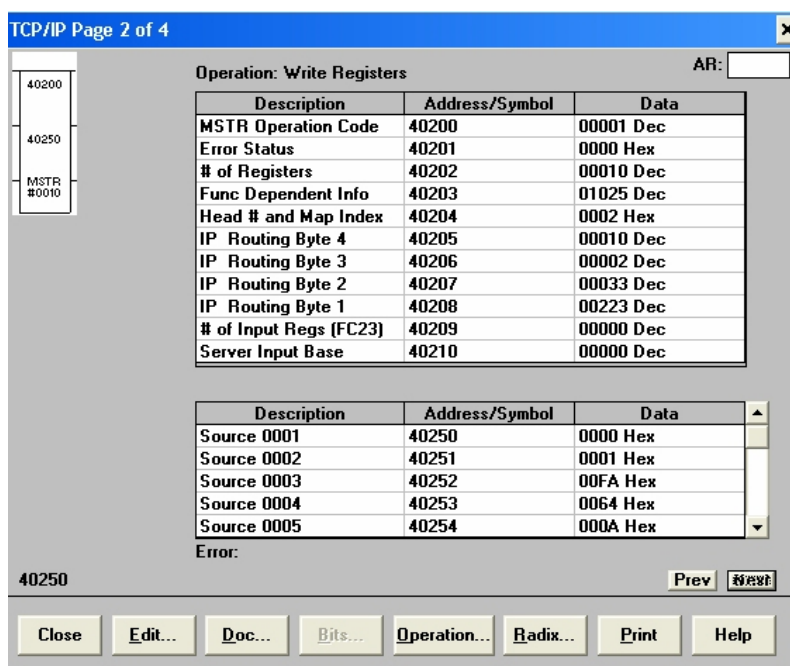


Figure 16 Write Registers

4. The second register contains the error status. Refer to Appendix A for a list of the error codes. The PLC software also has help files that contain a list of error codes.
5. The third register defines the data length (address 40102 or address 40202). The value in the data column depends on which parameter set that has been selected in the drive. The value can be smaller than or equal to the selected parameter set.
6. The fourth register defines the Read and Write locations of the data in the PLC (address 40103 or address 40203). **For a Read function, this value is set to 1, and for a Write function this value is set to 257.**
7. Registers 5, 6, 7 and 8 define the IP address on the Ethernet network (address 40104 or address 40204). Our example shows the data registers starting at locations 40150 and 40250.
8. When using a Modicon PLC, the “32bit Word Order” parameter in the Ethernet function block must be set to “Low Word First”. This applies to Modicon products and most other manufactures using the ModBus/TCP protocol.

Allen Bradley ControlLogix

9. Start a new program and select the PLC processor and chassis type that is used in your project. Our example uses a 1756-L55A processor and 1756-A7/B rack. Remain Offline until you are ready to download the program.
10. Using the I/O Configuration insert the Ethernet interface that will be installed. Right click on the I/O Configuration, select New Module. Our example uses 1756-ENBT/A. Input the desired IP address and slot in the PLC. Refer to Figures 17 and 18.

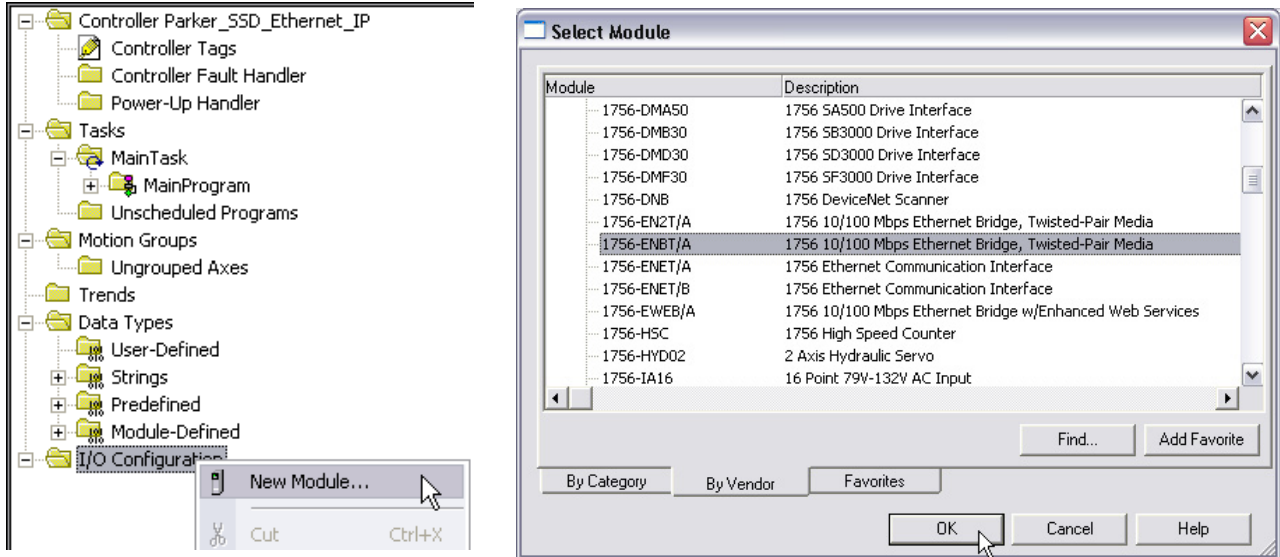


Figure 17. Ethernet Interface Selection

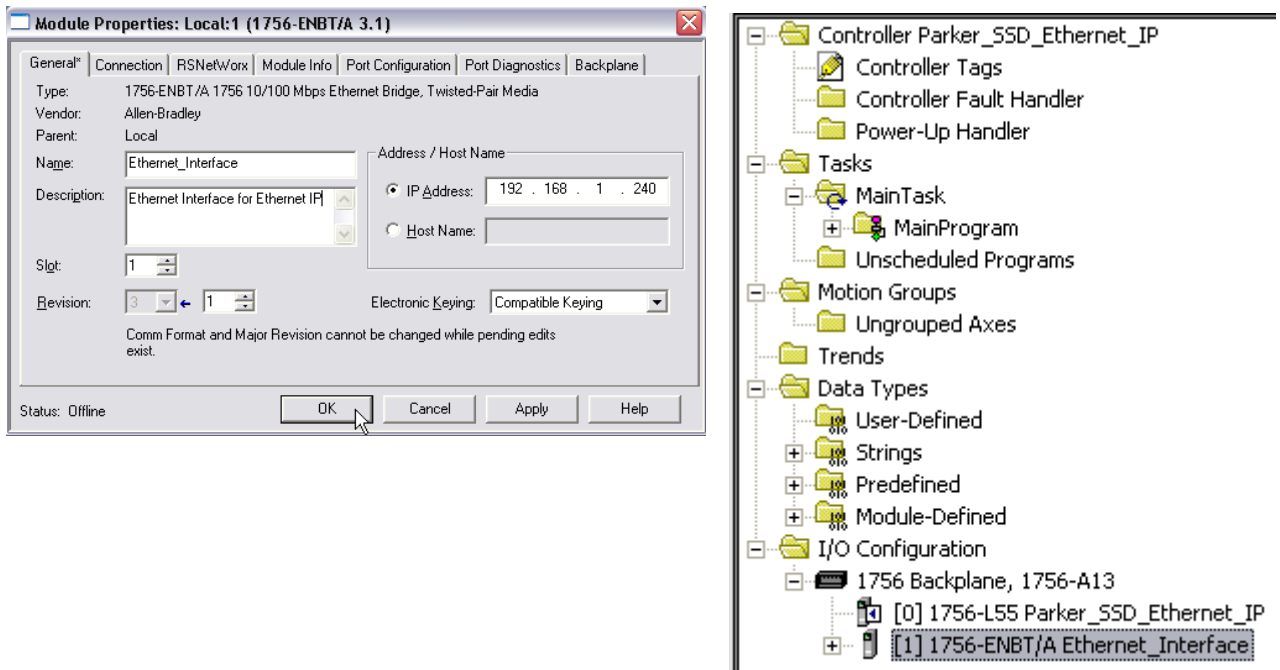


Figure 18. Ethernet Interface Setup

- Right click on the Ethernet Interface Module, select New Module. This screen will allow the selection of the Generic Ethernet Module. Refer to Figure 19.

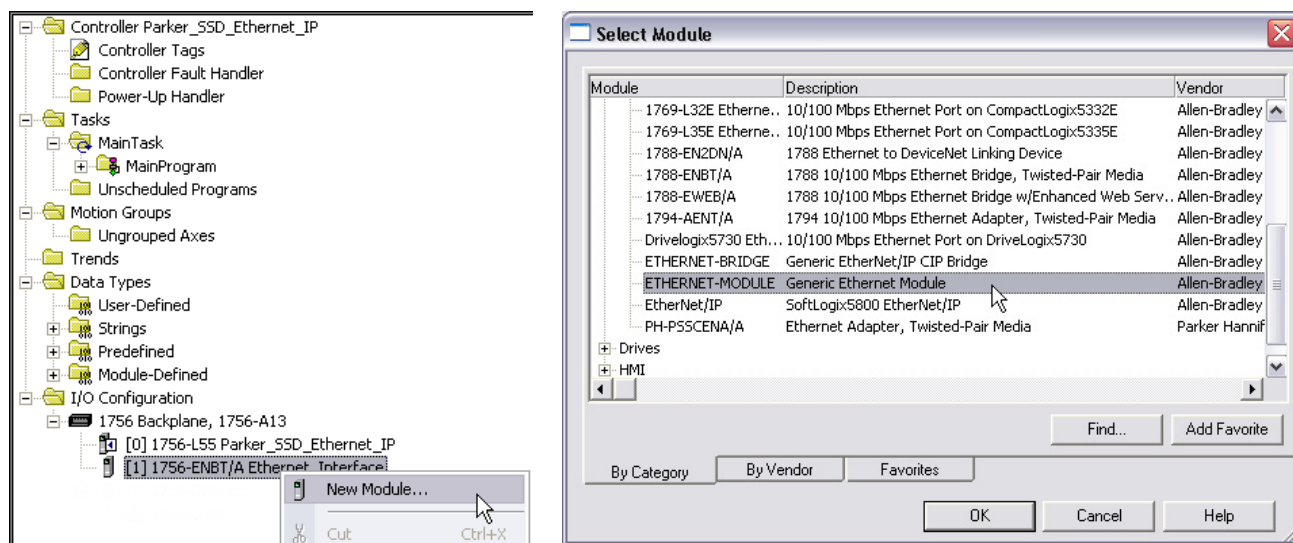


Figure 19. Generic Ethernet Module Select

- Input the desired module name and IP address. The Comms format will be DATA Int if 16-bit signed integer, or Data-REAL if 32-bit floating point. The Input Assembly Instance is 100 and the Output Assembly Instance is 150. Refer to Figure 20.
- Click on Next to change the Requested Packet Interval (RPI). The default value of 10ms should be sufficient. If the RPI is set below 5ms unreliable communications may be experienced. Refer to Figure 20.

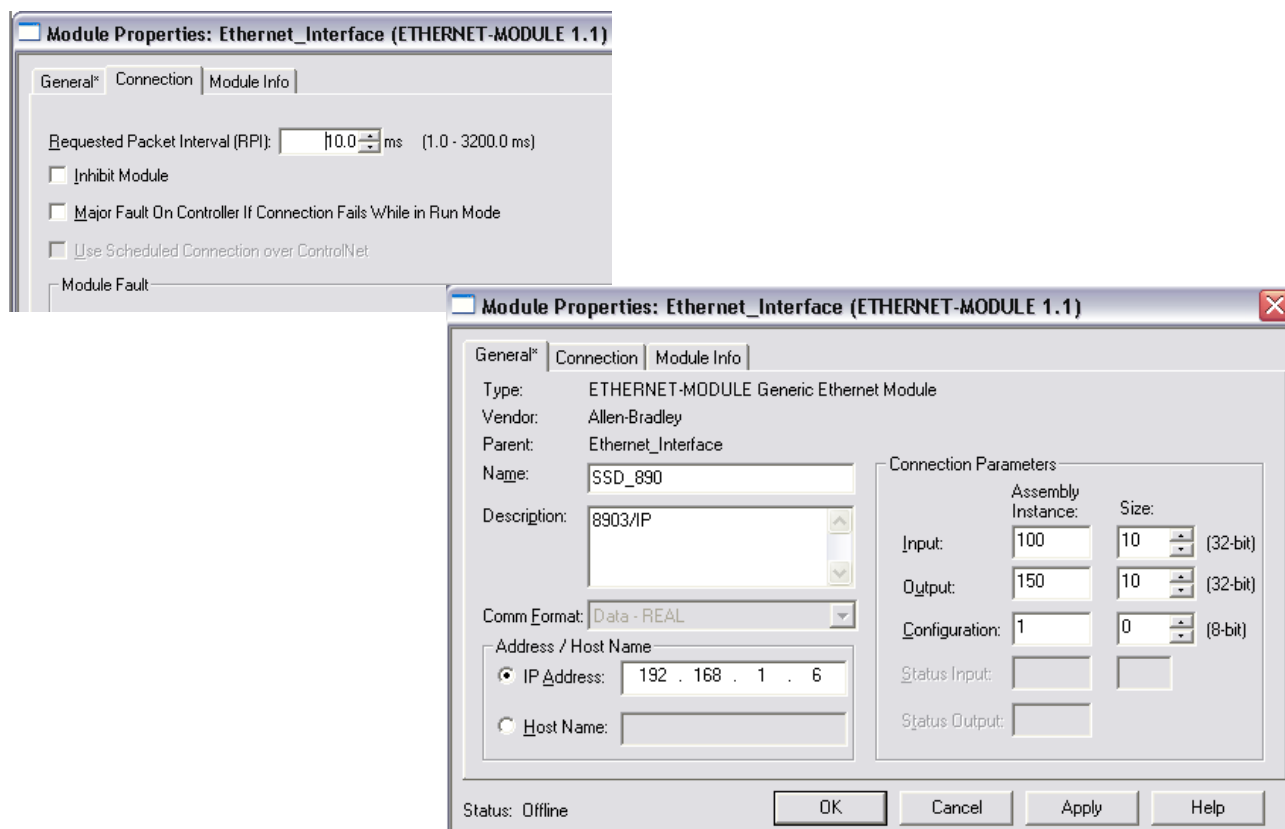


Figure 20. Generic Ethernet Module Setup

- When completed with the setup of the Generic Ethernet Module it can be downloaded to the PLC. For testing purposes it is not necessary to program Ladder Logic in the PLC. The data can be accessed and monitored via Controller Tags. Refer to Figure 21.

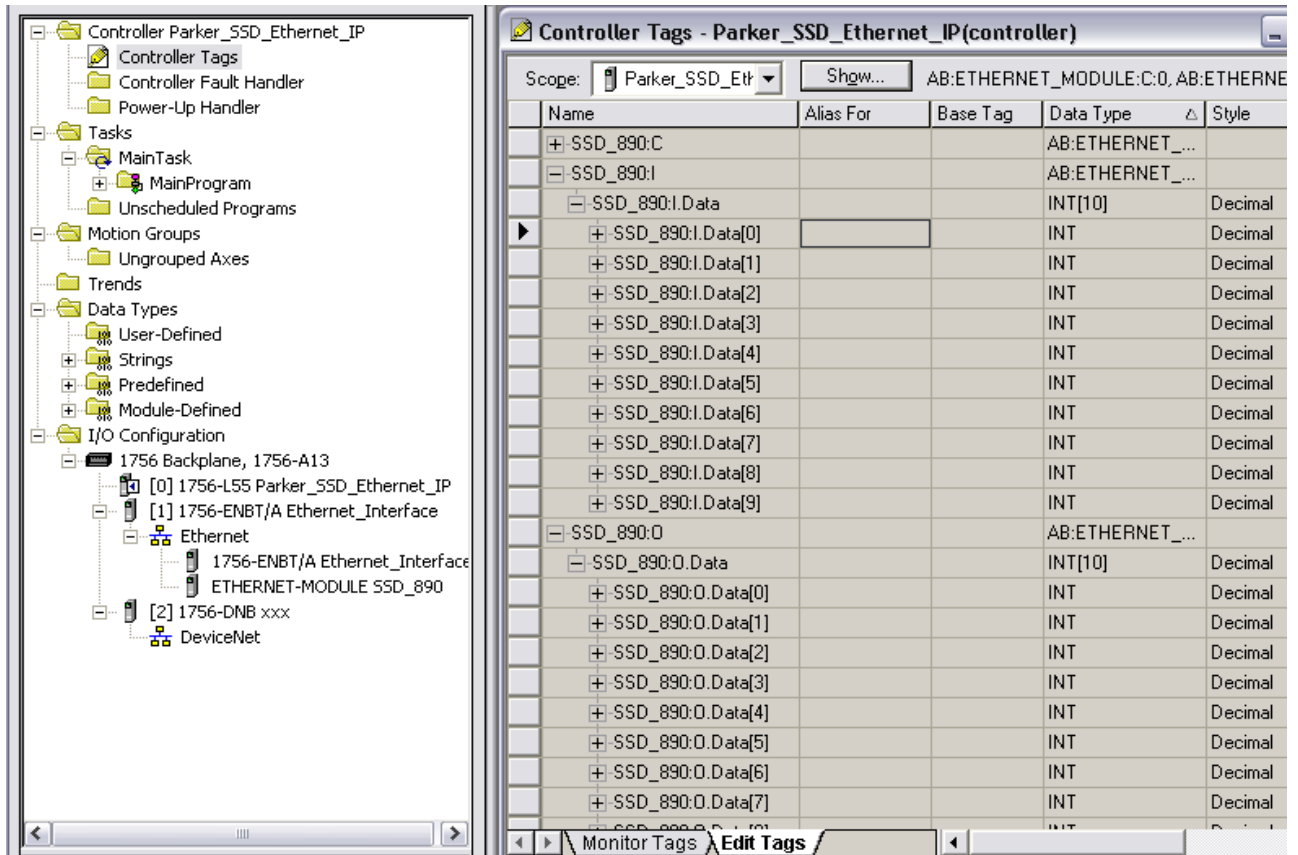
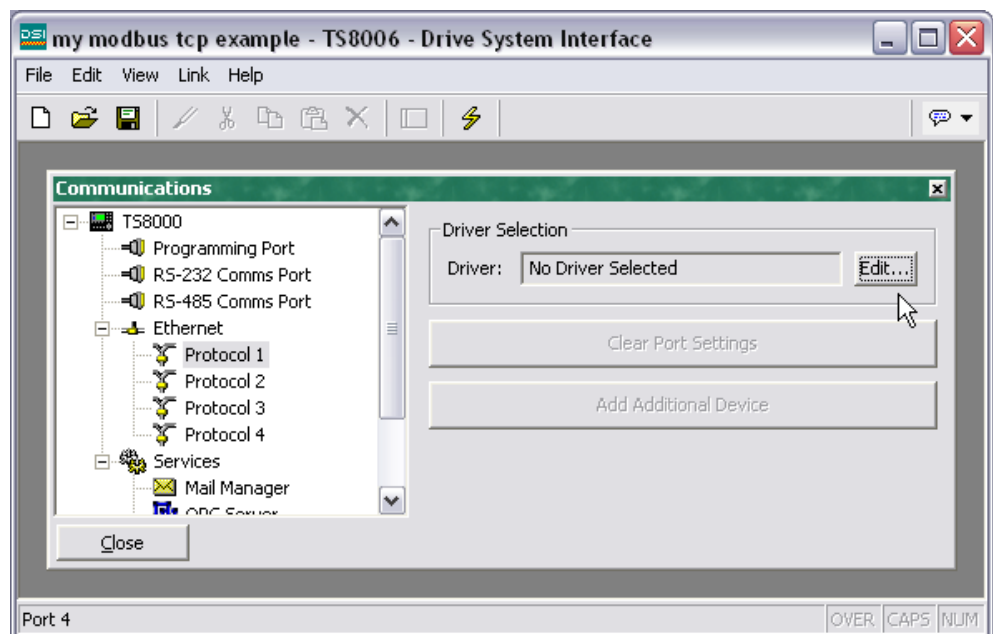
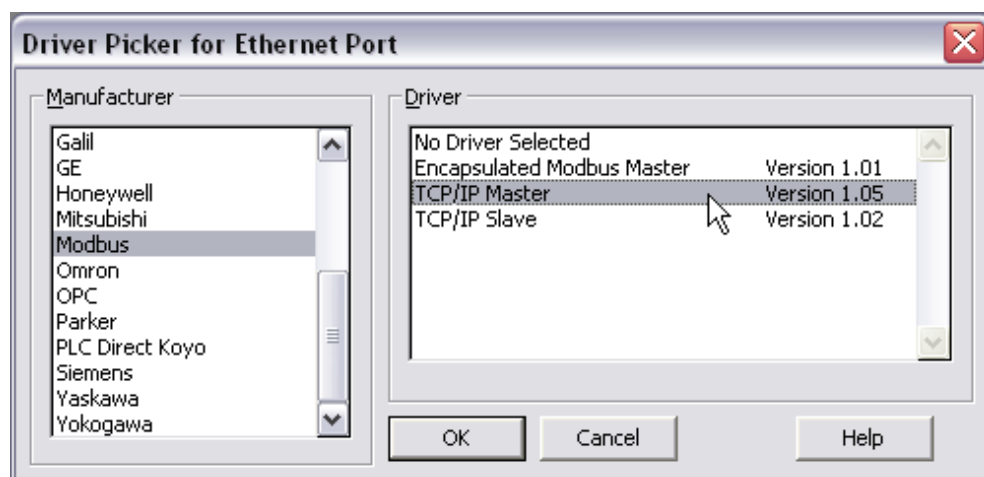


Figure 21. Controller Tags

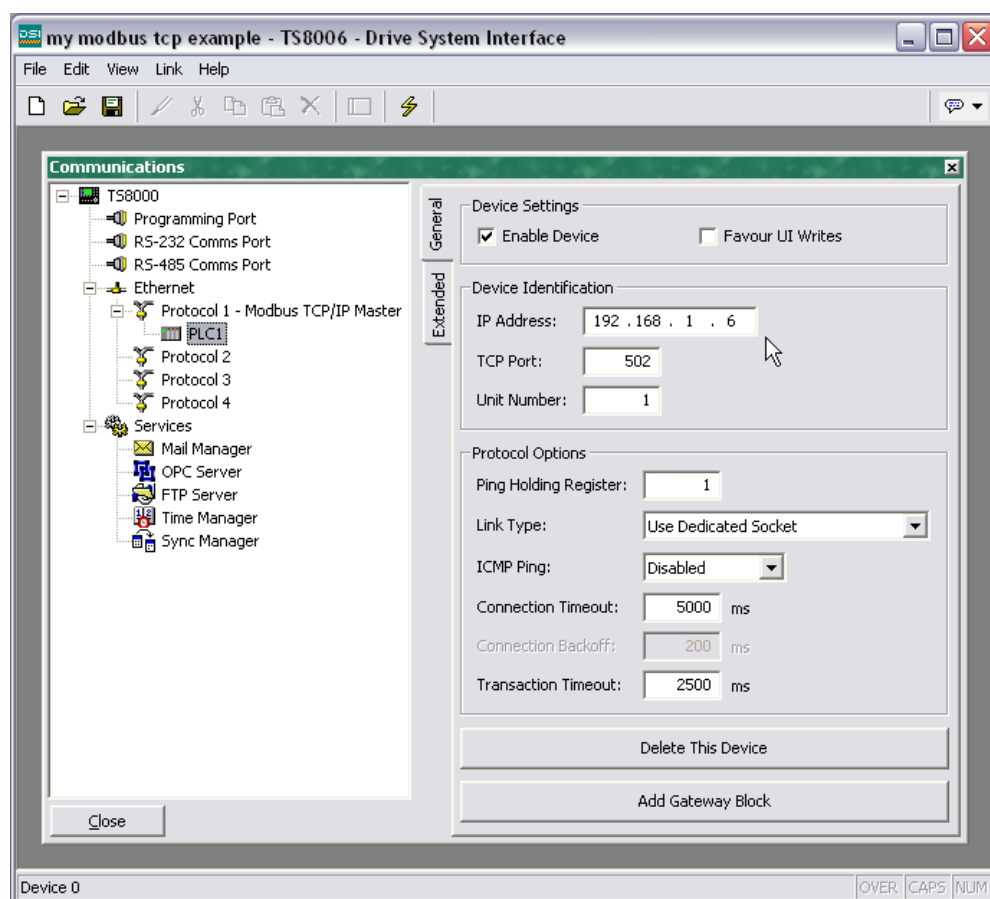
TS8000 Operator Station using DSI8000

- Select Modbus TCP/IP protocol for Ethernet Port. The TS8000 is the Master.

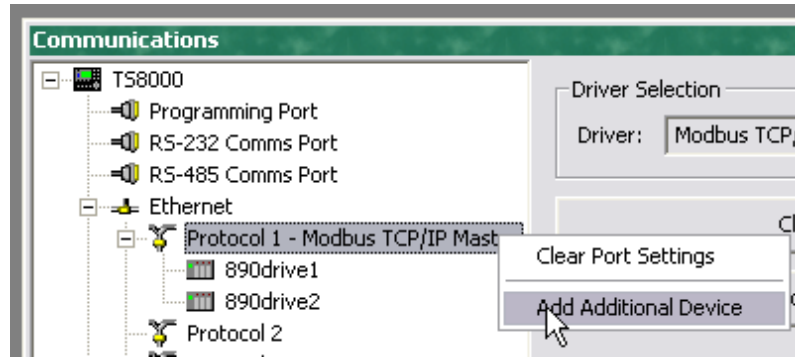




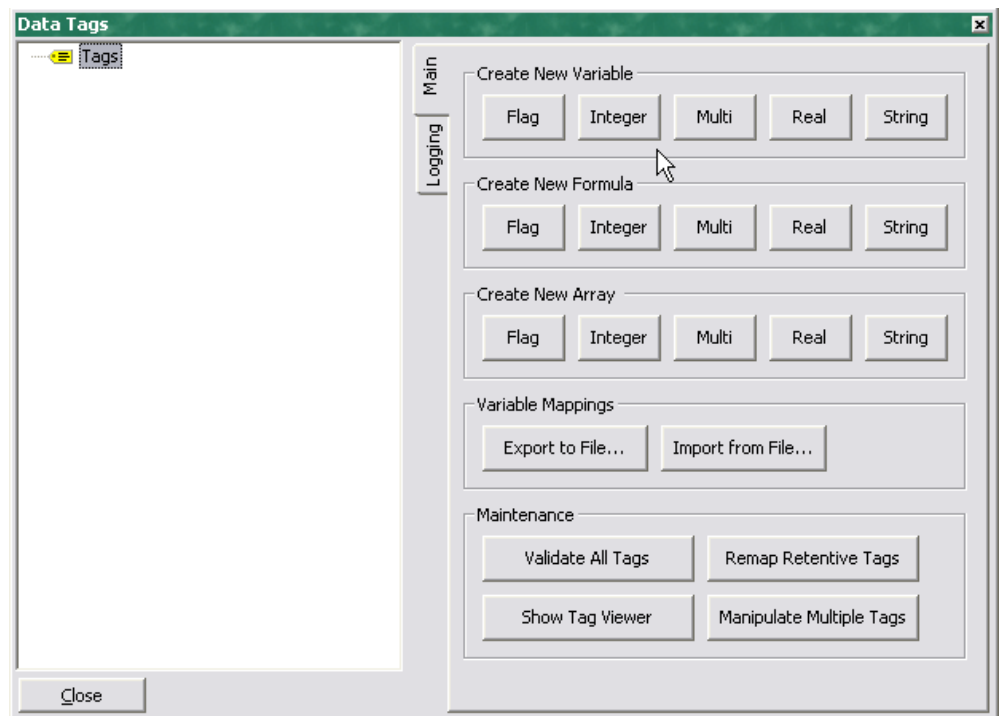
- Set the Slave IP address to match the one configured in the 890.



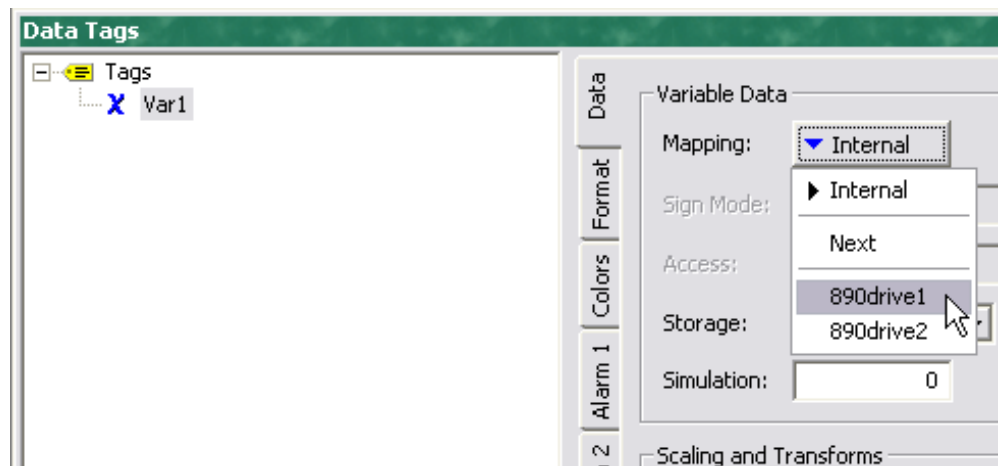
17. The name of the Slave can be changed and additional Slaves added.



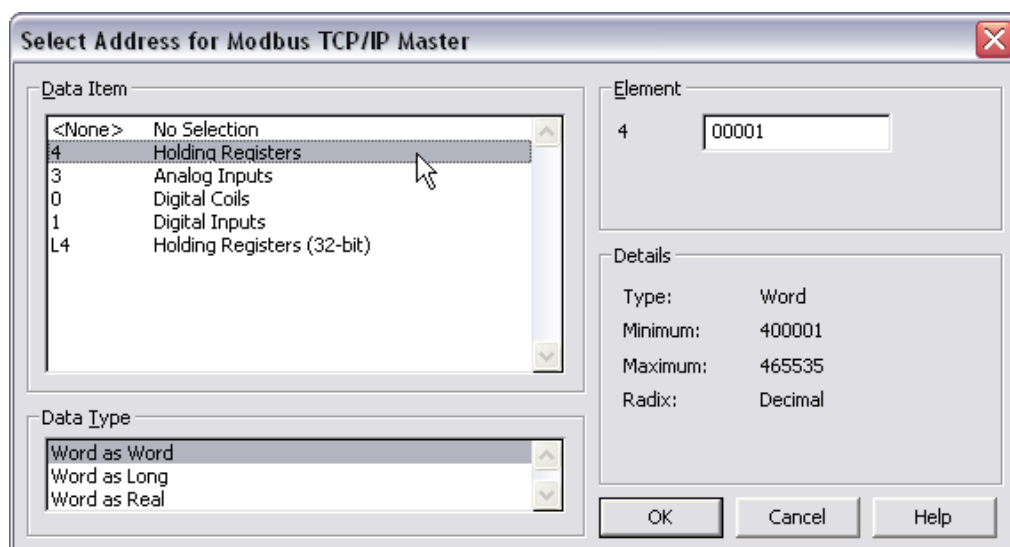
18. Create Tags for reading and writing variables.



Create either an Integer or a Real variable and map it to the correct Slave.



Always select Holding Register for both 16-bit and 32-bit data types. **DO NOT SELECT “Holding Registers (32-bit)”**.



To write to the first Input variable declared in DSE, the Register number (Element) is set to 00001. To write to the second variable declared in DSE, the Register number is 00002 if the first Input variable is a 16-bit data type or 00003 if it is a 32-bit data type.

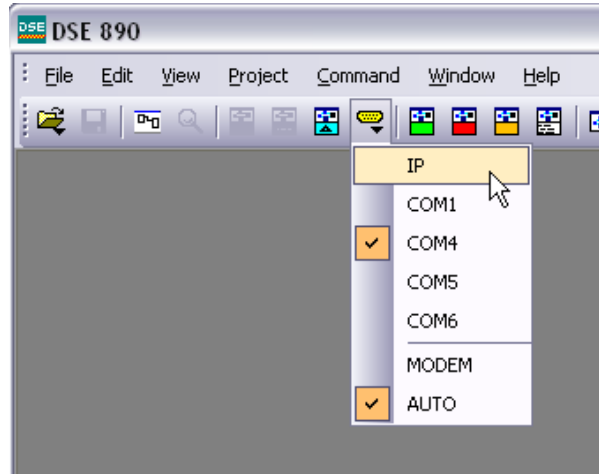
To read the first Output variable declared in DSE, the Register number is set to 00257. To read the second variable declared in DSE, the Register number is 00258 if the first Output variable is a 16-bit data type or 00259 if it is a 32-bit data type.

If variable is SINT16 or UINT16, select Data Type “Word as Word”. If variable is SINT32 or UINT32, select Data Type “Word as Long”. If variable is REAL, select Data Type “Word as Real”.

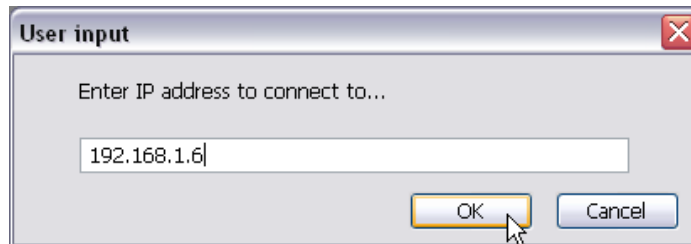
Configuring DSE to Connect over Ethernet

It is possible to connect DSE to any 890 Drive with an Ethernet option to allow Configuration Installation, Update and On-Line Monitoring. This is an alternative to the USB connection, with the advantage of speed and remote connection. Note – it is not possible to Install Firmware over Ethernet, this must always be done over USB.

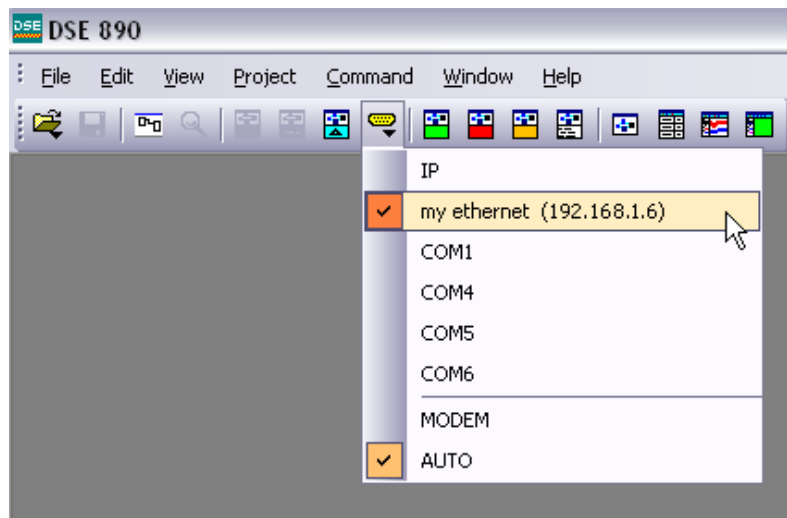
Click on the Comm Port icon and select IP.



Enter IP address of 890 Drive to connect to.



If a 890 Drive is already connected on the same LAN as the PC running DSE when DSE is launched, the Drive will appear in the list of available Comm Ports.



Appendix A: Ethernet Error Codes

Error Codes (Modbus Plus & SY/MAX Ethernet)

Error Status Register: 4xxxx + 1 (HEX)

Error Coding: Mmss where M = major code, m = minor code, ss = sub code

- n 16#1001: User initiated abort.
- n 16#20ss: Invalid command errors.
- n 16#30ss: Modbus slave exception response.
- n 16#4001: Inconsistent Modbus slave response.
- n 16#5001: Inconsistent network response.
- n 16#6mss: Routing failure.
- n 16#F001: Selected S985 option is not present.

Invalid Command Errors

Error Status Register: 4xxxx+1 (HEX)

Error Coding: Mmss where M = major code, m = minor code, ss = sub code

- n 2001: Invalid operation type.
- n 2002: User parameter changed.
- n 2003: Invalid length.
- n 2004: Invalid offset.
- n 2005: Invalid length + offset.
- n 2006: Invalid SDDA (Slave Device Data Area).
- n 2007: Invalid SDNA (Slave Device Network Address).
- n 2008: Invalid SDNR (Slave Device Network Routing).
- n 2009: Invalid route (= own address).

- n 200A: Global read request > available.
- n 200B: Peer Cop conflict on write/read global data.
- n 200C: Bad pattern for change address request.
- n 200D: Bad address for change address request.

Ethernet/Modbus Slave Exception Response

Error Status Register: 4xxxx+1 (HEX)

Error Coding: Mmss where M = major code, m = minor code, ss = sub code

- n 3001: Illegal function request (not available in slave).
- n 3002: Illegal data address (not configured in slave).
- n 3003: Illegal data value (Read/Write data not valid).
- n 3004: Not used (unknown error).
- n 3005: Slave accepted long duration program command.
- n 3006: Requested function cannot be performed due to long command in progress.
- n 3007: Slave rejected long program command.

Routing Failures

Error Status Register: 4xxxx + 1 (HEX)

Error Coding: Mmss where M = major code, m = minor code, ss = sub code

Routing failure error code: 6mjj

- n 6m01: No response.
- n 6m02: Program access denied.
- n 6m03: Node is offline and unable to communicate.
- n 6m04: Exception response received.
- n 6m05: Route node data paths busy.
- n 6m06: Slave device down.
- n 6m07: Bad destination address.
- n 6m08: Invalid node type in routing.
- n 6m10: Slave rejected the Modbus command.
- n 6m20: Slave forgot initiated translation.

- n 6m40: Unexpected master output path received.
- n 6m80: Unexpected response received.

Note: m = index to location in the routing information where routing problem was discovered.

0 = local network station

1 = first device in route

2 = second device in route, etc.

Error Codes (Allen Bradley Communication Modules)

Module Faults: 16#0001 - 16#00ff		
Code:	String:	Explanation and Possible Causes/Solutions:
16#0004	Connection Request Error: Bad Segment	The controller is attempting to make a connection to the module and has received an error.
16#0005	Connection Request Error: Bad Class	The controller is attempting to make a connection to the module and has received an error
16#0008	Service Request Error: Unsupported Service	The controller is attempting to request a service from the module and has received an error.
16#0009	Module Configuration Invalid: parameter error. Note: Additional Error Information for this fault will be displayed as a hex code on the Connection Tab.	The configuration for the module is invalid. The module configuration may have been changed in the Tag Monitor or programmatically. Verify that the configuration is valid by using the module configuration software to validate your configuration.
16#000c	Service Request Error: Invalid mode/state for service request	The controller is attempting to request a service from the module and has received an error. Ensure that the module is not faulted. § For a Discrete I/O module, this indicates that the module still has limited communications, but has a Major Fault or is currently being Flash Updated. Refer to the Module Info tab to determine the exact cause.
16#0013	Module Configuration Invalid: data size too small.	The configuration for the module is invalid – not enough configuration data was sent.
16#0015	Module Configuration Invalid: data size too large.	The configuration for the module is invalid – too much configuration data was sent.
16#0016	Service Request Error: Unknown Object	The controller is attempting to request a service from the module and has received an error.

Module Faults: 16#0100 - 16#01ff		
Code:	String:	Explanation and Possible Causes/Solutions:
16#0100	Connection Request Error: Module in Use.	The controller is attempting to make a specific connection to a module and the module cannot support more than one of these connections.
16#0103	Service Request Error: CIP transport class not supported.	The controller is requesting services not supported by the module.
16#0106	Connection Request Error: Module owned and configured by another controller.	The Connection Request to this module has been rejected due to an Ownership conflict with another Owner (e.g., another Controller). This may occur with modules such as output modules which only allow a single Owner to configure and control its outputs.
16#0108	Connection Request Error: Connection type not supported.	The controller is requesting a connection type not supported by the module.

Module Faults: 16#0100 - 16#01ff		
Code:	String:	Explanation and Possible Causes/Solutions:
16#0109	Connection Request Error: Invalid connection size Note: Additional Error Information for this fault will be displayed as the tag name associated with the connection instance number that has the fault.	The controller is attempting to set up a connection with the module and cannot – the size of the connection is invalid. The controller may be attempting to connect to a tag in a producing controller whose size does not match the tag in this controller.
16#0110	Connection Request Error: Module not configured	The controller is attempting to set up a Listen Only connection with the module and cannot – the module has not been configured and connected to by an Owner (e.g., another Controller). This controller is not an Owner of this module since it is attempting to establish a Listen-Only connection, which requires no module configuration. It cannot connect until an Owner configures and connects to the module first.
16#0111	Requested Packet Interval (RPI) out of range.	The Requested Packet Interval (RPI) specified is invalid for this module or for a module in the path to this module.§ For Listen-Only connections: the RPI set by the owner of this module is slower than the one requested. Either increase the requested RPI or decrease the RPI the owner controller is using. See the Connection tab for valid RPI values.
16#0113	Connection Request Error: Module connection limit exceeded.	This module (or a module in the path to this module) has exceeded its connection capacity. Reduce the total number of connections used by this module.
16#0114	Electronic Keying Mismatch: Electronic Keying product code mismatch.	The Product Code of the actual module hardware does not match the Product Code of the module created in the software. Electronic Keying failed for this module. You may have a mismatch between the module created in the software and the actual module hardware.
16#0115	Electronic Keying Mismatch: Electronic Keying product type mismatch.	The Product Type of the actual module hardware does not match the Product Type of the module created in the software. Electronic Keying failed for this module. You may have a mismatch between the module created in the software and the actual module hardware.
16#0116	Electronic Keying Mismatch: Major and/or Minor revision invalid or incorrect	The Major and/or Minor revisions of the module do not match the Major and/or Minor revisions of the module created in the software. Ensure that you have specified the correct Major and Minor Revision if you have chosen Compatible Module or Exact Match keying. Electronic Keying failed for this module. You may have a mismatch between the module created in the software and the actual module hardware.

Module Faults: 16#0100 - 16#01ff		
Code:	String:	Explanation and Possible Causes/Solutions:
16#0117	Connection Request Error: Invalid Connection Point. Note: Additional Error Information for this fault appears as the tag name associated with the controller to controller (C2C) that has the fault.	The controller is attempting to make a connection to the module and has received an error. Another controller owns this module and has connected with a Communications Format different than the one chosen by this controller. Ensure that the Communications Format chosen is identical to that chosen by the first owner controller of the module. The controller may be attempting to connect to a non-existent tag in a producing controller.
16#0118	Module Configuration Invalid: format error	The configuration for the module is invalid.
16#0119	Connection Request Error: Module does not have an owner	The controller is attempting to set up a listen-only connection with the module and cannot – the module does not have an owner. This fault may temporarily occur when the system is powered up and will be cleared when an owner controller connects to and configures the module.
16#011a	Connection Request Error: Out of Connection Resources	The controller is attempting to set up a connection with the module and cannot – resources required are unavailable.

Module Faults: 16#0200 - 16#02ff		
Code:	String:	Explanation and Possible Causes/Solutions:
16#0203	Connection timed out.	The connection to this module has been interrupted causing a loss of communication. Ensure that the module has not been removed and is still functioning and is receiving power. Ensure that the network connection to this module has not been interrupted. Note: If a connection to an output module times out and the output module supports Fault Mode and the output module is still functioning, its outputs will transition to the configured Fault Mode.
16#0204	Connection Request Error: Connection request timed out.	The controller is attempting to make a connection to the module and the module is not responding. The controller is not able to communicate with the module. Ensure that the module has not been removed and is still functioning and is receiving power. Ensure you have entered the correct slot number. Ensure that the network connection to the module has not been interrupted.
16#0205	Connection Request Error: Invalid parameter.	The controller is attempting to set up a connection with the module and has received an error – a parameter is in error.
16#0206	Connection Request Error: request size too large.	The controller is attempting to set up a connection with the module and has received an error – the request size is too large. Ensure that the path to this module is sufficiently close to the controller.

Module Faults: 16#0300 - 16#03ff		
Code:	String:	Explanation and Possible Causes/Solutions:
16#0301	Connection Request Error: Out of buffer memory.	<p>The controller is attempting to set up a connection with the module and has received an error – a module in the path is out of memory.</p> <p>The controller may be attempting to connect to a tag in a producing controller that is not marked as being produced.</p> <p>The controller may be attempting to connect to a tag in a producing controller. That tag may not be configured to allow enough consumers. § Reduce the size or number of connections through this module.</p> <p>One of the network modules between the module and the controller may be out of memory. Check network configuration of the system.</p> <p>The module may be out of memory. Check system configuration and capabilities of module.</p>
16#0302	Connection Request Error: Out of communication bandwidth.	<p>The controller is attempting to set up a connection with the module and has received an error – a module in the path has exceeded its communication bandwidth capacity. Increase the Requested Packet Interval (RPI).</p> <p>Distribute the load on another bridge module.</p>
16#0303	Connection Request Error: No bridge available.	<p>The controller is attempting to set up a connection with the module and has received an error – a module in the path has exceeded its communication bandwidth capacity. Distribute the load on another bridge module.</p>
16#0311	Connection Request Error: Invalid port.	<p>The controller is attempting to set up a connection with the module and has received an error.</p>
16#0312	Connection Request Error: Invalid link address.	<p>The controller is attempting to set up a connection with the module and has received an error – an invalid link address has been specified. A link address can be a slot number, a network address, or the Remote I/O Rack number and starting group.</p> <p>Ensure that the chosen slot number for this module is not greater than the size of the rack.</p>
16#0315	Connection Request Error: Invalid segment type.	<p>The controller is attempting to set up a connection with the module and has received an error – the connection request is invalid.</p>
16#0317	Connection Request Error: Connection not scheduled.	<p>The controller is attempting to set up a connection with the module and has received an error.</p>
16#0319	Connection Request Error: No secondary resources available in redundant chassis.	<p>The controller is attempting to set up a connection with the module and has received an error – the redundant module does not have the necessary resources to support the connection.</p> <p>Reduce the size or number of connections through this module or add another Controller.</p>
16#031d	Connection Request Error: Tag not published.	<p>The controller is attempting to connect to a tag in a producing controller and has received an error.</p> <p>The controller may be attempting to connect to a tag in a producing controller and that tag is not marked as 'published'.</p>
16#031e	Connection Request Error: Cannot consume tag.	<p>The controller is attempting to connect to a tag in a producing controller and has received an error.</p> <p>The controller is attempting to connect to a tag in a producing controller and that tag has already been used by too many consumers. Increase the maximum number of consumers on the tag.</p>

Appendix B : DSE/Ethernet Conversion Rules

The rules governing the conversion between DSE data types and Ethernet data types are given below. Note carefully that some conversions will result in rounding, limiting and truncation of the original value

LOGIC Type Connector

	Data from PLC	Data to DSE
From SINT16 to LOGIC	Zero Non-zero	False True
From SINT32 to LOGIC	Zero Non-zero	False True
From UINT16 to LOGIC	Zero Non-zero	False True
From UINT32 to LOGIC	Zero Non-zero	False True
From FLOAT to LOGIC	Zero Non-zero	False True

	Data from DSE	Data to PLC
From LOGIC to SINT16	False True	0 1
From LOGIC to SINT32	False True	0 1
From LOGIC to UINT16	False True	0 1
From LOGIC to UINT32	False True	0 1
From LOGIC to FLOAT	False True	0.0 1.0

INTEGER Type Connector


	Data from PLC	Data to DSE
From SINT16 to INTEGER	-32,768 to 32,767	-32,768 to 32,767
From SINT32 to INTEGER	-2,147,483,648 to 2,147,483,547	-2,147,483,648 to 2,147,483,547
From UINT16 to INTEGER	0 to 65,535	0 to 65,535
From UINT32 to INTEGER	0 to 4,294,967,295	0 to 2,147,483,647 limits apply
From FLOAT to INTEGER	32-bit IEEE floating-point	-2,147,483,648 to 2,147,483,547 Fractional part rounded

	Data from DSE	Data to PLC
From INTEGER to SINT16	-2,147,483,648 to 2,147,483,647	-32768 to 32767 limits apply
From INTEGER to SINT32	-2,147,483,648 to 2,147,483,647	-2,147,483,648 to 2,147,483,647
From INTEGER to UINT16	-2,147,483,648 to 2,147,483,647	0 to 65,535 limits apply
From INTEGER to UINT32	-2,147,483,648 to 2,147,483,647	0 to 2,147,483,647 limits apply
From INTEGER to FLOAT	-2,147,483,648 to 2,147,483,647	32-bit IEEE floating-point

VALUE Type Connector

	Data from PLC	Data to DSE
From SINT16 to VALUE	-32,768 to 32,767	-32,768.0 to 32,767.0
From SINT32 to VALUE	-2,147,483,648 to 2,147,483,547	-32,768.0 to 32,767.0 limits apply
From UINT16 to VALUE	0 to 65,535	0.0 to 32,767.0 limits apply
From UINT32 to VALUE	0 to 4,294,967,295	0.0 to 32,767.0 limits apply
From FLOAT to VALUE	32-bit IEEE floating-point	-32,768.0 to 32,767.9999 limits apply

	Data from DSE	Data to PLC
From VALUE to SINT16	-32,768.0 to 32,767.9999	-32,768 to 32,767 limits apply/ rounding applies
From VALUE to SINT32	-32,768.0 to 32,767.9999	-32768 to 32,767 limits apply/ rounding applies
From VALUE to UINT16	-32,768.0 to 32,767.9999	0 to 32767 limits apply/ rounding applies
From VALUE to UINT32	-32,768.0 to 32,767.9999	0 to 32767 limits apply/ rounding applies
From VALUE to REAL	-32,768.0 to 32,767.9999	32-bit IEEE floating- point

ISS.	MODIFICATION	ECN No.	DATE	DRAWN	CHK'D
1	Initial Issue (HA500522U001). New Terms and Conditions document number.	17852 (20358)	03/04/08	CM	KJ
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FIRST USED ON		MODIFICATION RECORD 8903/IM and 8903/IP Ethernet Communications Interfaces			
		DRAWING NUMBER ZZ500522C001			SHT. 1 OF 1

