

# 8903/LN LINKnet Communications Option

Product Manual  
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# Safety Information



## Requirements

**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.

Complete the following table for future reference detailing how the unit is to be installed and used.

| INSTALLATION DETAILS                                                       |                                                                          |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------|
| <b>Model Number</b><br><i>(see product label)</i>                          |                                                                          |
| <b>Where installed</b><br><i>(for your own information)</i>                |                                                                          |
| <b>Unit used as a:</b><br><i>(refer to Certification for the Inverter)</i> | <input type="radio"/> Component <input type="radio"/> Relevant Apparatus |
| <b>Unit fitted:</b>                                                        | <input type="radio"/> Wall-mounted <input type="radio"/> Enclosure       |

### Application Area

The equipment described is intended for industrial motor speed control utilising DC motors, AC induction or AC synchronous machines

### 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.

### Product Warnings

|                                                                                     |                                      |                                                                                     |                                      |                                                                                       |                                                  |
|-------------------------------------------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------|
|  | Caution<br>Risk of electric<br>shock |  | Caution<br>Refer to<br>documentation |  | Earth/Ground<br>Protective<br>Conductor Terminal |
|-------------------------------------------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------|

# Safety Information



## Hazards

### **DANGER! - Ignoring the following may result in injury**

1. This equipment can endanger life by exposure to rotating machinery and high voltages.
2. The equipment must be permanently earthed due to the high earth leakage current, and the drive motor must be connected to an appropriate safety earth.
3. Ensure all incoming supplies are isolated before working on the equipment. Be aware that there may be more than one supply connection to the drive.
4. There may still be dangerous voltages present at power terminals (motor output, supply input phases, DC bus and the brake, where fitted) when the motor is at standstill or is stopped.
5. For measurements use only a meter to IEC 61010 (CAT III or higher). Always begin using the highest range. CAT I and CAT II meters must not be used on this product.
6. Allow at least 5 minutes for the drive's capacitors to discharge to safe voltage levels (<50V). Use the specified meter capable of measuring up to 1000V dc & ac rms to confirm that less than 50V is present between all power terminals and earth.
7. Unless otherwise stated, this product must NOT be dismantled. In the event of a fault the drive must be returned. Refer to "Routine Maintenance and Repair".

### **WARNING! - Ignoring the following may result in injury or damage to equipment**

#### **SAFETY**

**Where there is conflict between EMC and Safety requirements, personnel safety shall always take precedence.**

- Never perform high voltage resistance checks on the wiring without first disconnecting the drive from the circuit being tested.
- Whilst ensuring ventilation is sufficient, provide guarding and /or additional safety systems to prevent injury or damage to equipment.
- When replacing a drive in an application and before returning to use, it is essential that all user defined parameters for the product's operation are correctly installed.
- All control and signal terminals are SELV, i.e. protected by double insulation. Ensure all external wiring is rated for the highest system voltage.
- Thermal sensors contained within the motor must have at least basic insulation.
- All exposed metalwork in the Inverter is protected by basic insulation and bonded to a safety earth.
- RCDs are not recommended for use with this product but, where their use is mandatory, only Type B RCDs should be used.

#### **EMC**

- In a domestic environment this product may cause radio interference in which case supplementary mitigation measures may be required.
- This equipment contains electrostatic discharge (ESD) sensitive parts. Observe static control precautions when handling, installing and servicing this product.
- This is a product of the restricted sales distribution class according to IEC 61800-3. It is designated as "professional equipment" as defined in EN61000-3-2. Permission of the supply authority shall be obtained before connection to the low voltage supply.

### **CAUTION!**

#### **APPLICATION RISK**

- The specifications, processes and circuitry described herein are for guidance only and may need to be adapted to the user's specific application. We can not guarantee the suitability of the equipment described in this Manual for individual applications.

#### **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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# 890 LINKnet COMMUNICATIONS OPTION

## Introduction

This manual describes the 890 LINKnet Communications Interface Option.

### Product Features

- Suitable for use with 890CD Common Bus Drive, 890SD Standalone Drive, 890PX Drive and a Grid Tie Inverter.
- Supports EtherNet/IP communications or Modbus/TCP communications option
- Supports Modbus UDP/IP Master communications.
- Can be used as a LINKnet communications option between 890 drives and other LINKnet modules like the 690+ or 590+ drives.
- Can be used as a direct replacement for an 8903/FA Firewire option card. (Virtual Master or Firewire Ref blocks are not supported)
- Can be used as a Gateway communications option between 890 drives and other LINKnet modules like the 690+ or 590+ drives (Slot A) with a 8903/FA Firewire card in Slot B
- LED to indicate Module Status and Power

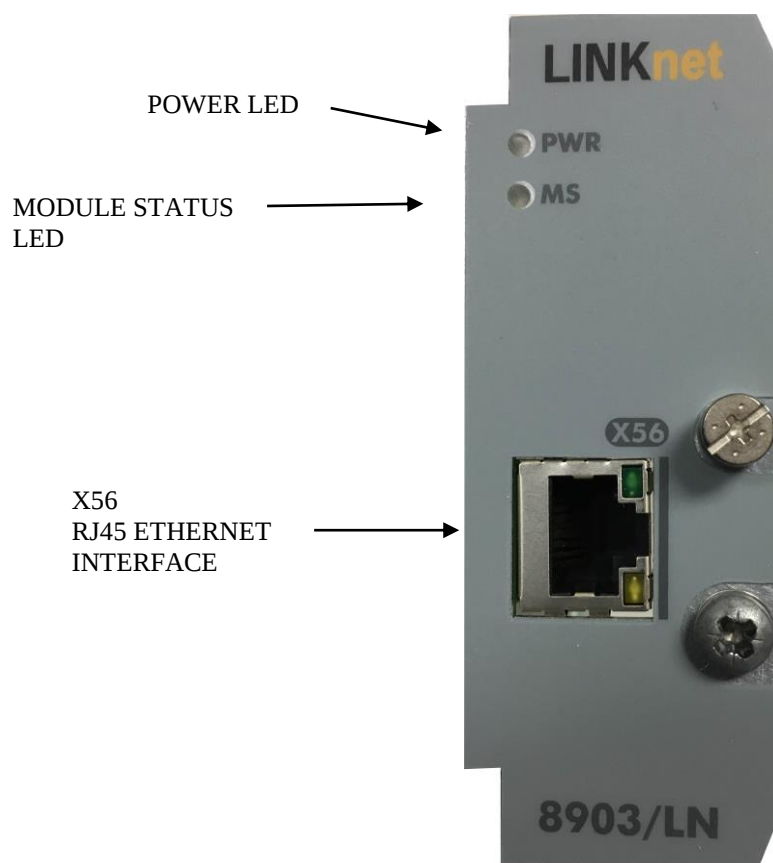


Figure 1. Front of the 8903/LN LINKnet Communications Interface Option

## Ethernet Protocols supported:

LINKnet supports the following Ethernet protocols:

Modbus UDP/IP Master - Supports Remote IO, Input / Output support.

Modbus TCP/IP Slave **or** EtherNet/IP Server (slave). Supports implicit (Class 1) for data access.

LINKnet acts as a slave device only.

Only 1 Slave protocol can be supported per LINKnet module.

Supports TS8000 HMI Touchscreen and PLCs.

Supports up to 500 bytes of input data and 500 bytes of output data, using any combination of 16 bit (2 bytes) registers and 32 bit (4 bytes) registers.

Supports up to 250, 16 bit input registers & 250, 16 bit output registers

Supports up to 125, 32 bit input registers & 125, 32 bit output registers

Supports 3 active Modbus TCP/IP connections per 890 LINKnet module.

## Product Order Code

**Part Number:** 8903/LN/83/00

## Compatible Drive Firmware

All of the above “Product Features” will work with 890 firmware version 3.13 or greater and the 890 Grid Tie inverter firmware version 5.4 or greater.

## Compatible Software

This option will work with the software DSE and DSE Lite version 3.06 or greater. The DSE Configuration Tool is Parker SSD Drives’ Windows-based block programming software.

## Restrictions

The 890 function blocks *Virtual Master* and *Firewire Ref* are not supported at this time and if these blocks are required, this option card can’t be used.

This option can be fitted in Slot A (The top slot) or Slot B (The bottom slot). But only 1 option card can be fitted per drive. It can’t be fitted to both slot A and Slot B at the same time.

If the LINKnet card is fitted in Slot B, the top Slot A, can’t have a Ethernet/IP (8903/IP), Modbus/TCP (8903/IM), Profinet/IO (8903/PN) or a EtherCAT (8903/CT) option card fitted. Also if a ControlNet card is fitted in Slot A, this card has to be manufactured after 2011. See appendix B, “Verifying the ControlNet card”.

## EtherNet/IP recommendations:

The PLC should be set up for Point To Point (Unicast) connection instead of Multicast connection. If Multicast is used, a managed switch is recommended / required.

The LINKnet module should be in a LAN / VLAN with only other equipment associated with its operation. Broadcast traffic on the LAN / VLAN should be kept to a minimum.

## Web page:

LINKnet does not support a webpage, no FTP support and no email support.



**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 blanking plates, each secured by a single screw, that fits over the option slots (1).
2. Loosen the top and bottom screws from the handles of the Control Board (2).
3. Pull gently on the handles and slide the Control Board out of the drive.

**Note:** Save the blanking plate and screw for future use. The drive should not be operated without either an option or blanking plate fitted. When fitted, these maintain the drive's IP20 rating.

**Caution**

This Option contains ESD (Electrostatic Discharge) sensitive parts. Observe static control precautions when handling, installing and servicing this Option.



Figure 2. 890 showing Control Board withdrawn with Options fitted in Slot B

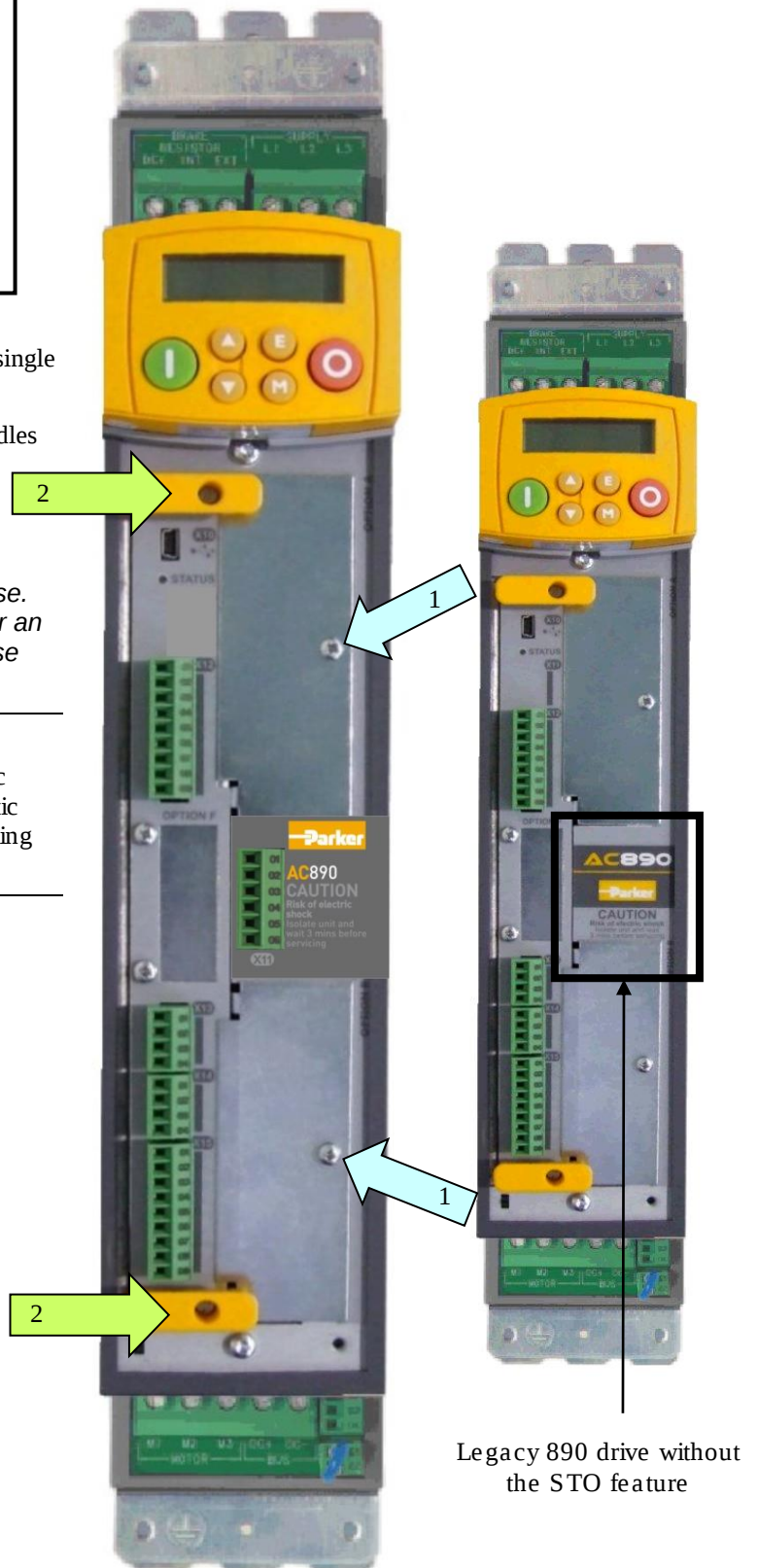
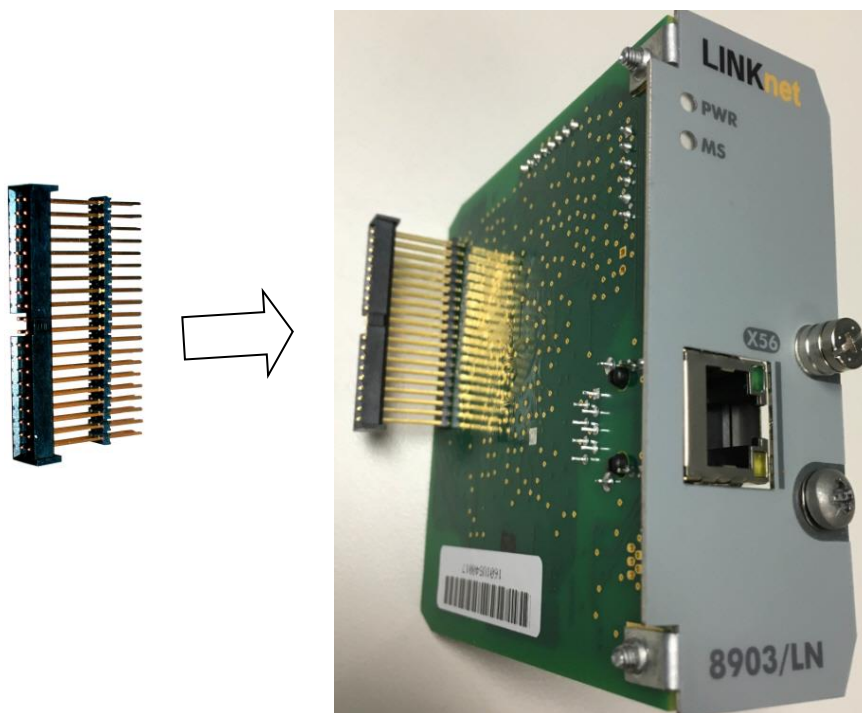


Figure 3. Front of 890 drive showing Control Board fitted

## Fitting the Option

The Option fits on to the Control Board.

1. Insert the connector into the Option as shown. The legs of the connector will protrude through into the connector on the other side of the Option.



Re-fitting the Control Board used as: LINKnet Peer To Peer, Ethernet Communications option card or replacing the 8903/FA Firewire card. Slot B

1. Fit the 8903/LN card into the bottom Slot B.
2. 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.
3. Tighten in position using the top and bottom screws in the handles of the Control Board.
4. Screw the Option in position using the captive screw on the front of the Option.
5. Press the assembly into the **Bottom** connector (adjacent to terminals X13, X14 and X15) on the Control Board. Ensure that the front panel of the Option overlaps the front of the Control Board



Figure 5. 890 Control Board with LINKnet Communications Option fitted

## Re-fitting the Control Board used as a LINKnet to 890 Gate Way. Slot A

1. Fit the 8903/LN card into the Top Slot A
2. 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.
3. Tighten in position using the top and bottom screws in the handles of the Control Board.
4. Screw the Option in position using the captive screw on the front of the Option.
5. Press the assembly into the connector (adjacent to terminal X12) on the Control Board. Ensure that the front panel of the Option overlaps the front of the Control Board

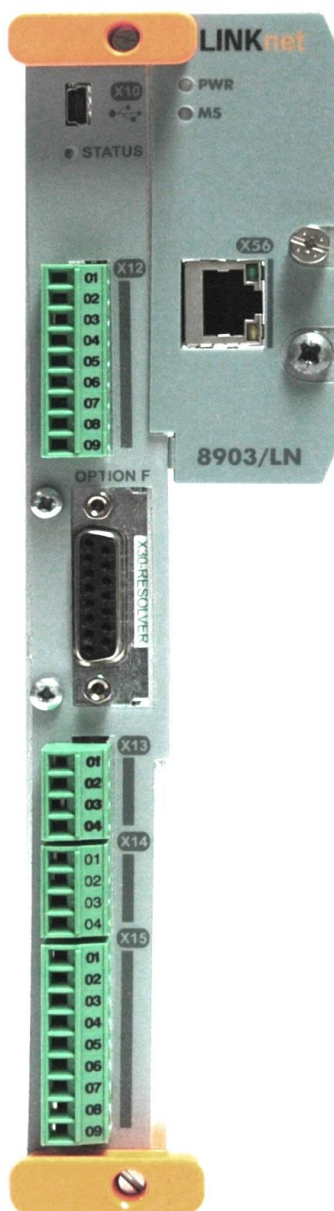


Figure 6. 890 Control Board with LINKnet Communications Option fitted

## Wiring Requirements

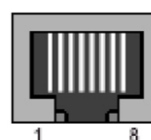
Connection to the drive(s) from a PC, or PLC for example, is made using a cable fitted with standard RJ45 connectors at both ends. The cable plugs into the PLC, for example, and into the socket on the LINKnet option. Use standard Ethernet practices.



Use only Cat 6 Shielded Ethernet, patch or crossover cable.

### Cable Connections

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



### Cable Specifications – patch or crossover

| Cable Type    | Maximum Node-to-Node Distance (m) |
|---------------|-----------------------------------|
| CAT6 Shielded | 100                               |

LINKnet operates at the nominal rate of 100 Mbit/s.



**Which slot to install to Slot A or Slot B?**

The 890LINKnet option card can be installed into the top Slot A or the bottom Slot B, but not both slots at the same time. Only 1 card per drive can be installed. Depending in which slot the card is fitted, it will function differently.

**Supports Ethernet IP or Modbus TCP communications** (Slot B recommended)

Set the *compatibility mode* to 0 if in Slot A.

The card functions as an Ethernet IP 8903/IP communications card or as a Modbus/TCP 8903/IM communications card. The option card will automatically detect which protocol is being used either Modbus TCP/IP Slave or EtherNet IP Server (slave). Thus, there is no protocol parameter to set or select. It can be used as a replacement for the 8903/IP or as an 8903/IM communications option card. Please refer to the 8903/IP manual for setup. If it is used as an 8903/IP replacement, the 8903/LN card will not support the web page, no FTP support and no email support.

In the Ethernet block, set the *IP Address*, the *subnet mask* address.

The PLC should be set up for Unicast connection instead of Multicast connection. If using Ethernet IP, some PLC manufactures recommend a Managed switch if Multicast is used.

Technically the option card can be installed into Slot A or slot B but Slot B is recommended as this slot has better performance. If it is installed in Slot A set the *compatibility mode* to 0.

If the 8903/LN LINKnet option card is installed in Slot B the *Compatibility mode* is ignored and is automatically set to 1 and functions as a LINKnet 'Peer To Peer'.

**Supports LINKnet Peer to Peer communications** (Slot B recommended)

It will function as a LINKnet Peer to Peer option card. If you want the 890 drives to communicate to other 590+ or 690+ drives fitted with LINKnet cards, drop in an Ethernet function block from the DSE *Block menu / 890 comms* and assign an *IP address* along with the *subnet mask*. (See IP address information). If a Ethernet block is not used, a IP address will be self assigned (this is not recommended). Then program the drives as one would normally program an 890 drive using *Input Slots* and *Output Slots* selected from the DSE menu *Block / Input or Output*.

Technically the option card can be installed into Slot A or slot B but Slot B is recommended as this slot has better performance.

In the Ethernet block set the *compatibility mode* to 1 in the card is in Slot A. This will put the 8903/LN LINKnet card in the Peer To Peer Mode thus allowing it to communicate to other LINKnet modules.

If the 8903/LN LINKnet option card is installed in Slot B the *Compatibility mode* is ignored and is automatically set to 1 and functions as a LINKnet 'Peer To Peer'.

**Used as a direct replacement for a 8903/FA Firewire card** (Slot B only)

When the 8903/LN is installed into Slot B (The bottom slot), it will function as a direct replacement for a Firewire option card (8903/FA). No changes to the drive configuration have to be made. Just fit every 890 drive with the option card, upgrade the drive firmware to version 3.13 and connect the Ethernet cables to an Ethernet switch. (LINKnet will self-assign a unique IP address to each module – See IP address information). If DSE is used and a USB cable is connected to any drive, you will see the entire LINKnet network.

If the *Virtual Master* function block is being used in the 890 drive, it is not supported with LINKnet at this time. The Firewire option card must be used.

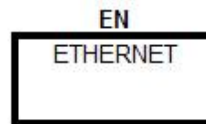
When used in this mode the top Slot A, can't have a Ethernet/IP (8903/IP), Modbus/TCP (8903/IM), Profinet/IO (8903/PN) or a 8903/CT EtherCAT option card fitted. Any other option card can be fitted.

**LINKnet to 890 Gateway** (Slot A only)

Set the *compatibility mode* to 1.

It can also function as a “LINKnet to 890 Gateway”, thus allowing other drives fitted with a LINKnet card like the 590+ or 690+ to communicate to the 890 drives. The 890 drive fitted with the 89003/LN will act as a true Gateway, meaning that it will be the only drive communicating to the other 590+ or 690+ LINKnet drives. If other LINKnet drives are communicating to the 890 drives, all of the data must pass thru this Gateway drives address and then this Gateway drive will communicate to the other 890 drives via Firewire. All of the 890 drives have to be fitted with a 8903/FA Firewire option cards in Slot B, so they can communicate via Firewire to each other. If DSE890 is used and a USB cable is connected to a 890 drive, only the 890 drives on Firewire, will be viewed / available in DSE890. The 590+ or 690+ LINKnet drives will not appear in DSE890. To view the 590+ or 690+ LINKnet drives in DSE890, you must connect an Ethernet cable to the Ethernet switch, which connects these 590+ or 690+ LINKnet drives together. See Appendix A on how to set up the ‘LINKnet to 890 Gateway’.

In the Ethernet block set the *IP Address*, the *subnet mask* address. Set the *compatibility mode* to 1. This will put the 8903/LN LINKnet card in the Peer To Peer Mode thus allowing it to communicate to other LINKnet modules. If it set to 0 the card will function as standard Ethernet card.

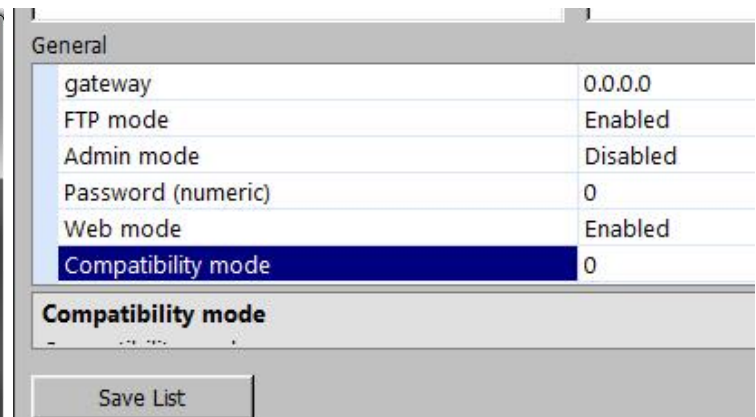
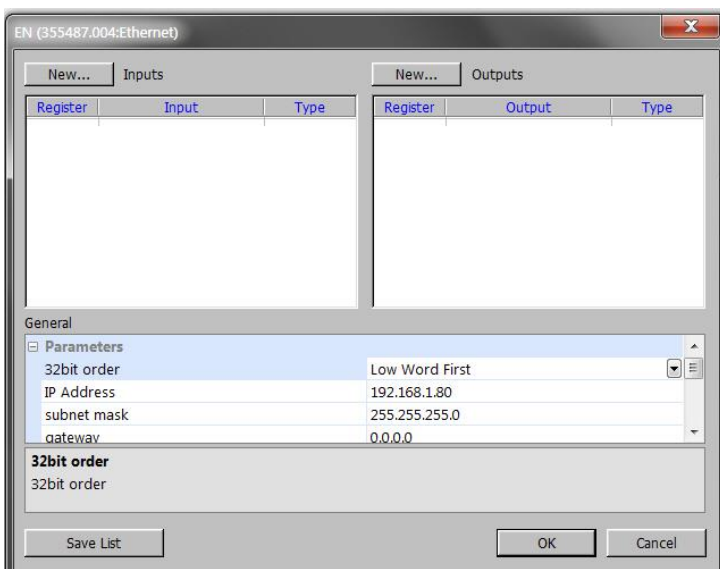
**Compatibility Mode overview**

In the Ethernet Block selected from the *DSE / Block / 890 Comms* menu, if it is opened, at the bottom in the *Parameters* menu, there is a parameter called *Compatibility mode*. By default it is set to 0. When a 8903/LN LINKnet option card is installed in Slot A on a 890 drive, the functionality of this parameter changes.

If the *Compatibility mode* is set to 0, the LINKnet card functions as a standard Ethernet card when installed into Slot A. The option card will automatically detect which protocol is being used either Modbus TCP/IP Slave or EtherNet IP Server (slave). Thus there is no protocol parameter to set or select.

If the *Compatibility mode* is set to 1, the LINKnet card functions as a LINKnet ‘Peer To Peer’ functionality thus able to communicate to other LINKnet modules or 590+ or 690+ drives fitted with a LINKnet option card. Thus, a Firewire card can be installed into Slot B.

If the 8903/LN LINKnet option card is installed in Slot B the *Compatibility mode* is ignored and is automatically set to 1 and functions as a LINKnet ‘Peer To Peer’.



## IP addressing information

Each LINKnet option must have a unique IP address. Each LINKnet option has a unique default IP shipping address of 192.168.1.xxx. The last 3 digits will be random for each LINKnet option in the range of 1 - 127. When LINKnet is powered up in a system and it has the default shipping configuration, it will *self-assign* a unique address on each Techbox as described above, with a subnet Mask of 255.255.254.0

At this point DSE can be launched and all of the LINKnet modules will appear in the Module List.

In a LINKnet configuration there is a System Control block which contains a place to set the IP address. If no IP address is entered, the default shipping address of 192.168.1.xxx will be used and the modules will be *self assigned* an IP address in the range of 192.168.1 and the last octave will be in the range of 127 – 1. Counting down.

If an IP Address is entered in the System Control block, it will override the *self-assigned* IP address. (if possible)

If there is a duplicate IP Address, the LINKnet will *self-assigned* the modules in the range of 192.168.1 and the last octave will be in the range of 128 to 199.

It is recommended that an IP Address be assigned to each LINKnet module. It is recommended that the LINKnet configuration address be used as the last 3 digits of the IP address. Thus if the configuration address is 10 the IP address would be 192.168.1.10

When using 3<sup>rd</sup> party Remote I/O and PLC's, it is recommended to use an IP Address in the range of .200 to .254 All nodes must be on the same subnet mask.

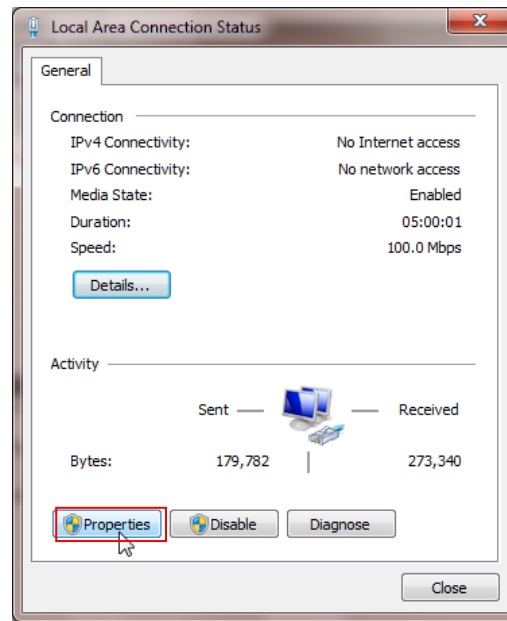
## Summary of IP address' for 192.168.1.xx

|                        |                                                                                |
|------------------------|--------------------------------------------------------------------------------|
| where xxx = 1 – 127.   | <i>Self-assigned</i> by LINKnet and assigned by the user.                      |
| where xxx = 128 – 199. | <i>Self-assigned</i> by LINKnet if there are duplicate address.                |
| where xxx = 200 – 254. | Recommended IP Address' when using 3 <sup>rd</sup> party Remote I/O and PLC's, |

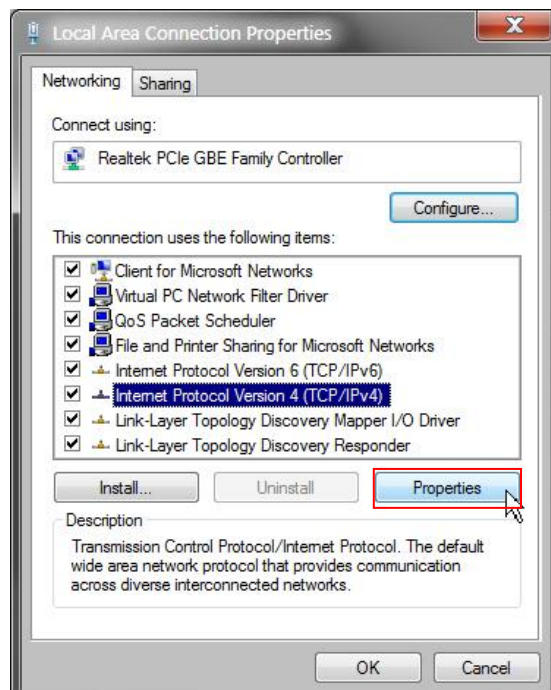
## Setting the computer IP Address for LINKnet access via Ethernet

When communicating to the LINKnet via Ethernet, the computer must be on the same subnet. To change the pc settings:

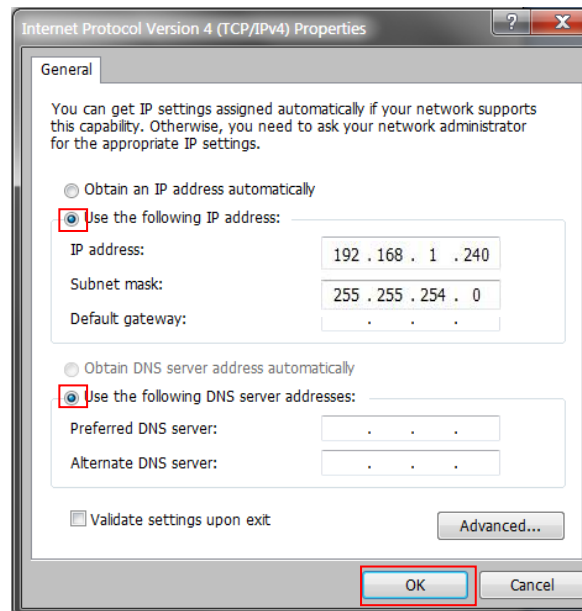
1. From the START menu, open the Control Panel and select “Network and Sharing Center” or “Network Connections” depending on the version of Windows you’re running.
2. In the window that comes up, click on “**Local Area Connection**”. That should bring up a dialog that looks something like the following:



3. Click on the **Properties** button to bring up the Local Area Connection Properties dialog. On Windows 7 it should look something like this (it will be slightly different for XP):



- As shown above the **Local Area Connection Properties** dialog will appear. Highlight the **“Internet Protocol Version 4 (TCP/IPv4)”** (“Internet Protocol TCP/IP” in XP), then click on the **Properties** box and that should bring up the Internet Protocol Dialog that should look something like:

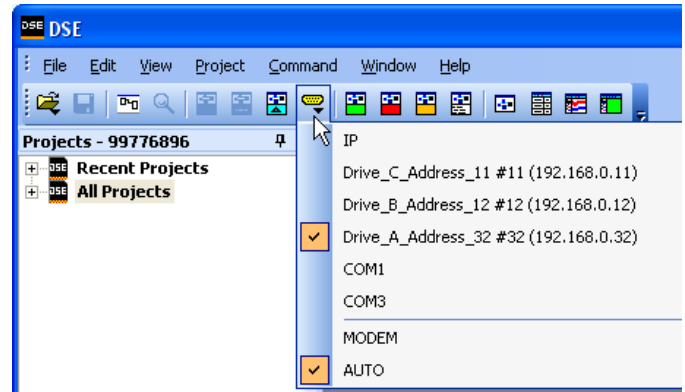


- Click on the selection **“Use the following IP address”** and enter 192.168.1.240 for the IP address and 255.255.254.0 for the Subnet mask. Make sure **“Use the following DNS server addresses”** is also selected, but you don’t have to enter anything for that. Click **OK**. (For the IP address the last octet should be any number over 200).

## Connecting to the 890 LINKnet network.

To connect to 890 LINKnet network an Ethernet connection is used.

To use the Ethernet connection the pc must be set up to be on the same subnet address as LINKnet. This setup procedure is listed on page 11 of this manual. Once this setup is complete connect the pc's Ethernet cable to a device which is on the LINKnet communications network such as a switch. Then launch DSE. Go to the yellow Serial port Icon and select it. All of the modules which are on the LINKnet will be shown along with the IP Address of each module. Also, shown will be which module the Ethernet is connected to.



In the example shown the Ethernet is connected to 'Drive\_A\_Address\_32'. There are 3 modules on this Ethernet. The 'checked box' shows which module DSE is connected via the Ethernet.

The *Module List* will look like the picture shown. The \* indicates which module, DSE is connected to.

| Module list |                    |           |        |       |       |          |      |
|-------------|--------------------|-----------|--------|-------|-------|----------|------|
| Adrs        | Name               | Library   | Status | CPU % | RAM % | Msg/s In | Errs |
| *0032       | Drive_A_Address_32 | LNTB v1.1 | OK     | 5.1   | 12.2  | 989      | 0    |
| 0012        | Drive_B_Address_12 | LNTB v1.1 | OK     | 0.0   | 2.7   | 1021     | 0    |

**CPU % (Peak)** indicates the amount of CPU activity, or how busy the microprocessor was since the last update of the module list.

**RAM % (Peak)** indicates how much RAM(SRAM) the modules CPU has used since the module list last entered the OK state & began executing the installed configuration.

**Msg/s In (Messages In/second)** Average number of Input Messages per second of network traffic for that module

**Errs** indicates the amount of Communication Errors since the Module List was refreshed.

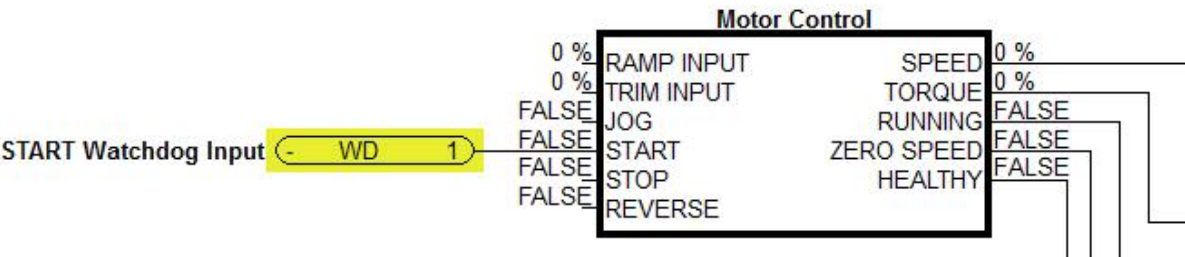
## Command / Get Info

A *Command / Get Info* shows the modules IP Address as shown below. It also shows the drive firmware *build* (shown 3.13), the remote boot *loader* firmware (shown 1.1) information and the *Input Messages* per second along with the CPU and RAM used.

| Scratch Pad             |                                                                              |
|-------------------------|------------------------------------------------------------------------------|
| Serial number:          | 1003-UK-8-3971, High Performance, MAC: 00:0D:46:80:6C:0E, IP: 192.168.1.80   |
| Hardware:               | 890 Module (ROM 11.4, rev. 3 hardware), LINKnet P2P: 1601-US-B-0015, build 1 |
| Library:                | 890 Drive (version 3.13 firmware) - build 3.13 (RD470892.013), loader 1.1    |
| Project:                | 99776900:LINKnet_8903/LN                                                     |
| Configuration:          | 890-80_Linknet                                                               |
| Modification:           | 1                                                                            |
| Permanent address:      | 80                                                                           |
| Working address:        | 80                                                                           |
| Persistents used:       | 5.3% (27 of 512)                                                             |
| Storage used:           | 14.6% (149 of 1024 pages)                                                    |
| CPU used (Recent/Peak): | 22.7%/23.5%                                                                  |
| RAM used (Static/Peak): | 20.0%/20.0%                                                                  |
| Input Messages/s:       | 49                                                                           |
| Status:                 | OK, drive not started                                                        |

Watchdog Circuit

It is recommended that a Watchdog Circuit be implemented in each LINKnet configuration to stop the drive if there is a loss of Ethernet communications. Presently if there is a loss of Ethernet communications on the LINKnet drive, it will continue to run and not fault. Within DSE there is a WATCHDOG INPUT function block located in the BLOCK MENU. It can be connected to the DRIVE START Input in place of an INPUT Slot. It must be updated with a logic True signal. If 5 seconds has passed and it is not updated with a logic True, the Output of the block will go False and the drive will stop and not fault. This WATCHDOG can also be connected to a Digital Output which can be monitored by the user to take further action. For more information on this function block, see the Help Data sheet within DSE.



## Using Remote I/O

DSE contains function blocks, which allow LINKnet to communicate to SSD Recommended\* Remote IO devices such as Analog IO and Digital IO as well as other types of hardware, which use the Modbus UDP protocol. There are function blocks in the *Block / Remote IO* menu: *Read Logics*, *Write Logics*, *Read Values* and *Write Values*. It does not matter where these hardware devices are located in the Remote IO rack when reading or writing data to these blocks. All the blocks care about is how many Digital modules there are and how many Analog modules there are.

### Read Logics

| MBRL        |        |
|-------------|--------|
| LOGIC 1 = 1 | 0x0000 |
| 0.0.0.0     |        |
| 200 ms      |        |
| LOGIC 1     |        |
| LOGIC 2     |        |
| LOGIC 3     |        |
| LOGIC 4     |        |
| LOGIC 5     |        |
| LOGIC 6     |        |
| LOGIC 7     |        |
| LOGIC 8     |        |
| LOGIC 9     |        |
| LOGIC 10    |        |
| LOGIC 11    |        |
| LOGIC 12    |        |
| LOGIC 13    |        |
| LOGIC 14    |        |
| LOGIC 15    |        |
| LOGIC 16    |        |

### Write Logics

| MBWL        |    |
|-------------|----|
| LOGIC 1 = 1 |    |
| 0.0.0.0     |    |
| LOGIC COUNT | 16 |
| LOGIC 1     |    |
| LOGIC 2     |    |
| LOGIC 3     |    |
| LOGIC 4     |    |
| LOGIC 5     |    |
| LOGIC 6     |    |
| LOGIC 7     |    |
| LOGIC 8     |    |
| LOGIC 9     |    |
| LOGIC 10    |    |
| LOGIC 11    |    |
| LOGIC 12    |    |
| LOGIC 13    |    |
| LOGIC 14    |    |
| LOGIC 15    |    |
| LOGIC 16    |    |

### Value Writer

| MBVW        |         |
|-------------|---------|
| REGISTER #1 | 0.0.0.0 |
| INPUT       |         |
| SCALE       |         |
| OFFSET      |         |

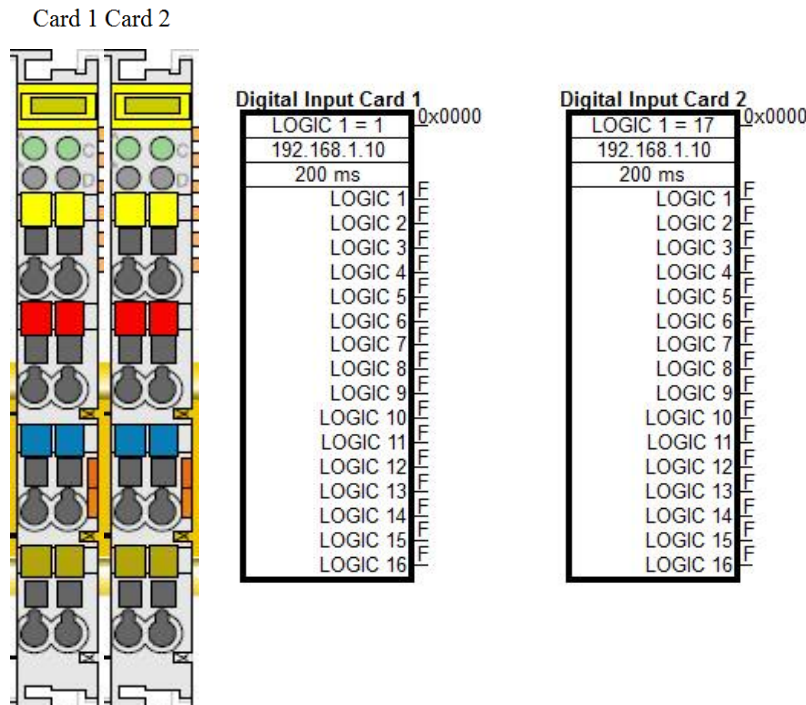
### Value Reader

| MBVR   |         |
|--------|---------|
| REG #1 | 200 ms  |
| SCALE  | 0.0.0.0 |
| OFFSET |         |

For example, let's say there physically 2 Digital Input cards with 16 channels each. To access the 1<sup>st</sup> Digital Input card, you will use a *Read Logics* block and set the *IP address* of the Digital Input card. *Logic 1* parameter refers to the 1<sup>st</sup> Digital Input cards channel Input 1. *Logic 16* refers to the Digital Input channel 16 of this same card. Set the *First Logic Count* to 1. This will access the 1<sup>st</sup> set of 16 Logic Channels.

Now to access the parameters on the 2<sup>nd</sup> Digital Input card channels 1 to channel 16, add a second *Read Logics* function block and set the *First Logic Count* to 17. This will access the 2<sup>nd</sup> set of 16 Logic Channels. It does not make a difference where this 2<sup>nd</sup> Digital Input card is located in the Remote IO rack, as long as it is the 2<sup>nd</sup> Digital Input card located from left to right. There can be a different type of cards in between these Digital Input cards and it will not affect how these Digital Input blocks are written to or read from. Now to access this 2<sup>nd</sup> Digital Input card, use the 2<sup>nd</sup> *Read Logics* block parameters *Logic 1* to *Logic 16*

Example of Digital Input cards 16 Inputs each card using the *Read Logics* blocks.



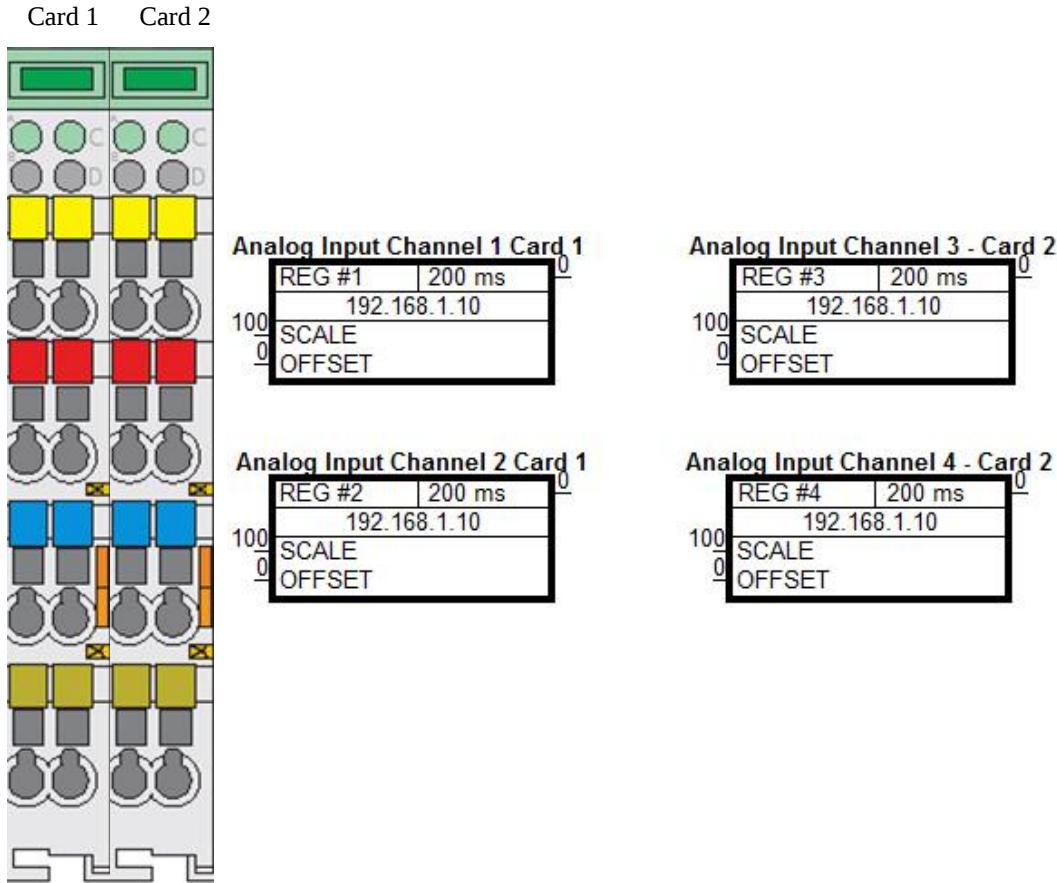
**Example of 2 Digital Input 16 Channel Cards and the configuration to access these parameters using *Read Logics* blocks.**

The above holds true for the *Write Logic* blocks also. It does not matter where the Digital Input or Digital Output modules are physically located in the Remote IO rack or what type of cards are installed in between these cards. All we care about is how many Digital Inputs cards there and they count from left to right.

As an example, when using Analog Input hardware modules the *Value Reader* function blocks are used to read data from these blocks. The same rules apply as above. We only care about how many Analog Input cards there are and they count from the left to the right. There can be different types of cards between these Analog Input cards and they are ignored. Once the *Value Reader* block is placed in the configuration, enter the *Register*

number. This is the hardware Analog Input location. If there are 2 Analog Inputs per module these 2 Inputs will be *Register 1* to *Register 2*. If a 2<sup>nd</sup> Analog input card is used, the Registers will be *Register 3* to *Register 4* and etc.

Example of Analog Input card 2 Channels each card using the *Value Reader* blocks



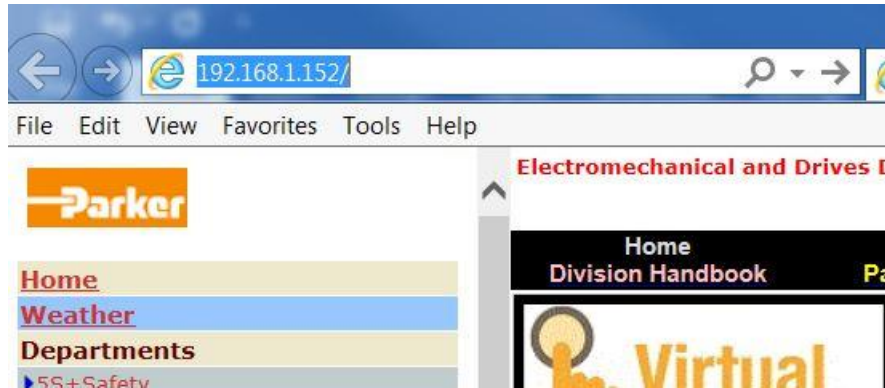
**Example of 2 Analog Input 2 Channel Cards and the configuration to access these parameters using *Value Reader* blocks.**

Note: If different LINKnet modules are writing data to the same IO point, the last module sending data will prevail.

## Setting up Internal Watchdog on Wago I/O Coupler, 750-352

By default the internal watchdog on the Wago I/O coupler is set for an internal register that has to be set up using Modbus, and writing a specific value. There is an easier way to set up the watch dog so it will shut off all the outputs if communications are lost. The following procedure will outline the steps to follow to setup and enable the internal watch dog.

The settings for the 750-352 Wago I/O coupler can be accessed, by launching Windows explorer, and typing in the IP address. For this example, the IP address is 192.168.1.152. There needs to be an ethernet connection between the computer, and the Wago I/O coupler. Type in the IP address on the address line as follows. Then press the Enter button.



The following window should appear. On the left hand of the computer screen. Click on Watchdog.



Once you click on Watchdog, the following window will pop up for you to enter program mode on the Wago IO.



User name is admin, and Password is Wago. Now the following window should appear.

| Modbus Watchdog                     |                                           |
|-------------------------------------|-------------------------------------------|
| State Modbus Watchdog:              | Disabled                                  |
| Watchdog Type :                     | Standard <input checked="" type="radio"/> |
|                                     | Alternative <input type="radio"/>         |
| Watchdog Timeout Value (100ms):     | 100                                       |
| Watchdog Trigger Mask (F1 to F16):  | 0xFFFF                                    |
| Watchdog Trigger Mask (F17 to F32): | 0xFFFF                                    |

UNDO SUBMIT

By default the Watchdog is disabled and set to standard. Click on the empty circle next to Alternative. The Watchdog timeout value is defaulted to 100, which means 100 x 100ms or 10000 msec or 10 sec. This is the time it will take to shut off the outputs once the communications have been lost to the Wago I/O coupler. Do not change the Trigger masks, they are OK at default values. Once finished click submit. It should ask for the login information again.

Now the power will need to be cycled on the Wago I/O. After the Power has been turned back on, Go back online using the Windows Explorer and make sure the Watch dog is now running. See below. Now if the Ethernet cable is unplugged or communication is lost to the Wago I/O, the watch dog will time out and all outputs will go to Zero.

NOTE: Once Communications are re-established, the Outputs will go to controlled state.

# Watchdogs

page is for the configuration of the watchdogs. The configuration is stored in an EEPROM. Connection Time will take effect immediately. Changes of the Modbus Watchdog will take software or hardware reset. For more information see the manual.

Connection Watchdog

Connection Timeout Value (100ms) :

600

UNDO

SUBMIT

Modbus Watchdog

State Modbus Watchdog:

Running

Watchdog Type :

Standard

☐

Alternative

☒

Watchdog Timeout Value (100ms):

100

Watchdog Trigger Mask (F1 to F16):

0xFFFF

Watchdog Trigger Mask (F17 to F32):

0xFFFF

UNDO

SUBMIT

If it is desired to let LINKnet know if the Wago I/O coupler has stopped communication, the following block can be programmed into the LINKnet node that is controlling it. This block is located in the DSE software in the menu **Block / Remote I/O / Watchdog**.

RIOWD

|               |           |          |
|---------------|-----------|----------|
| REG #1        | 900 ms    | -60<br>F |
| 5000 ms       | TIMED OUT |          |
| 192.168.1.152 |           |          |

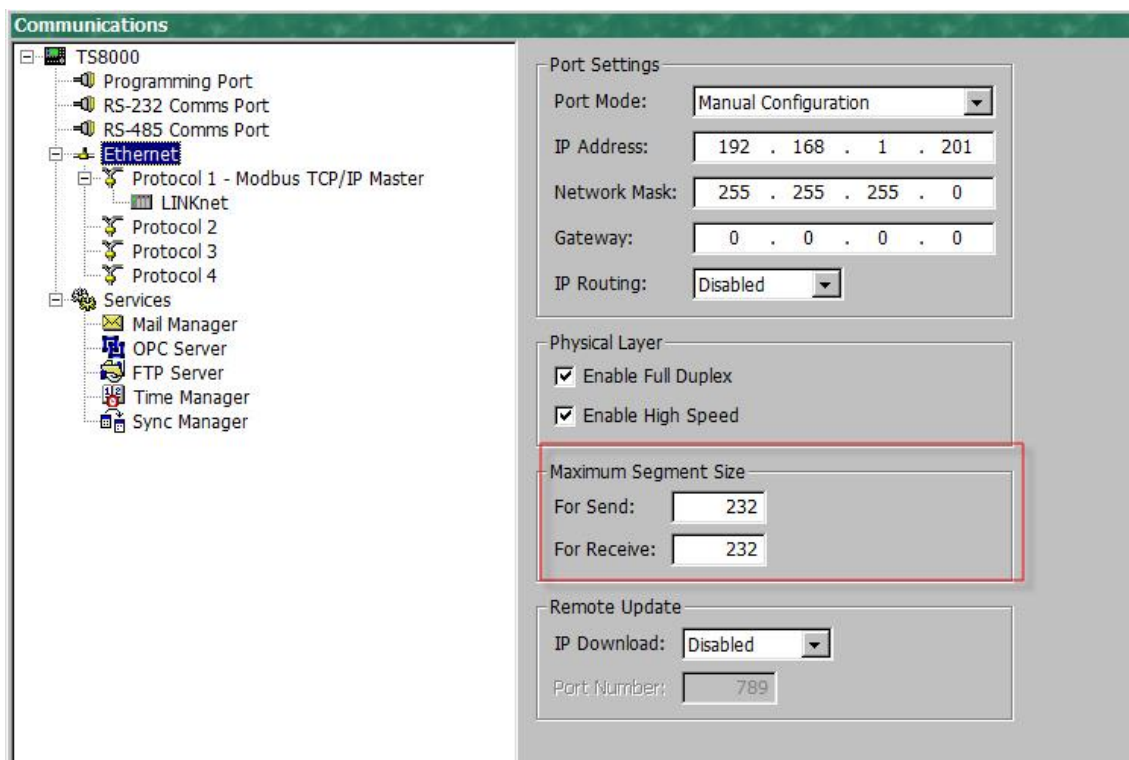
The Timed output will go to True if the Wago I/O quits talking for the Set time. In This example, the watchdog timeout is 5000ms or 5 sec.

## Programming TS8000

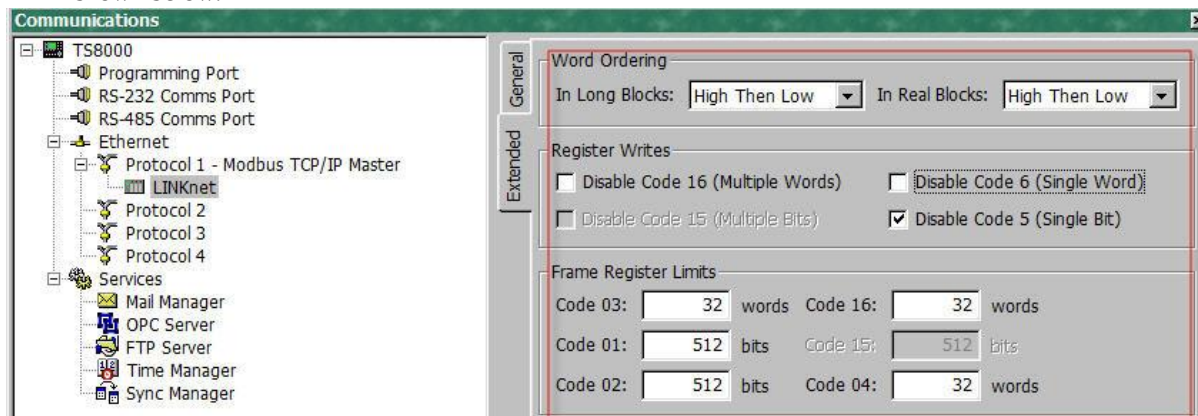
### Required Modbus Settings

There are some settings / limits that are required for the TS8000 communications.

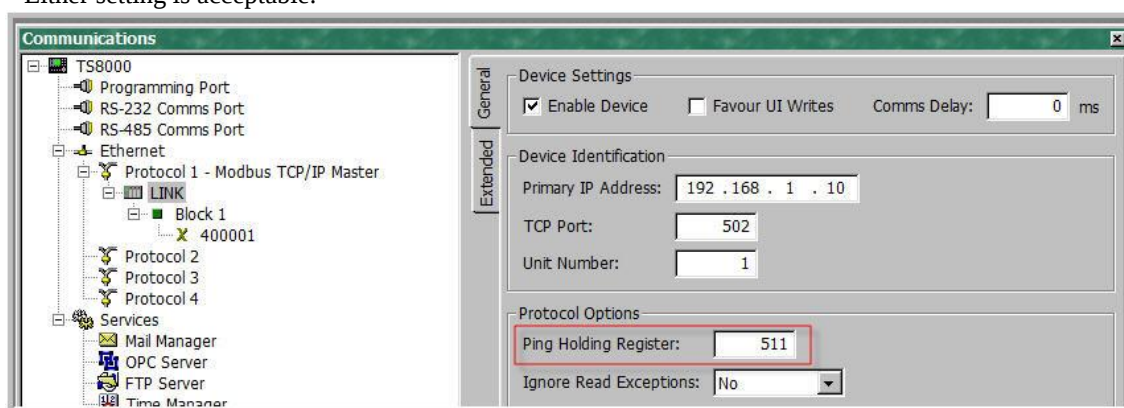
The *Maximum Segment* (Ethernet packet) size is 232:



In the *Extended Settings*, the *Word Ordering*, *Register Writes* and the *Frame Register Limits* need to be set as shown below:



For each LINKnet module the *General / Ping Holding Register* must be set to 511. If set to 0, this disables it. Either setting is acceptable.



## NOTES:

1. When powering up the TS8000, the outgoing data is only sent once to the remote devices. If the TS8000 powers up first or before the other devices, the TS8000 will send this outgoing data before the other devices have time to power up and they will not receive any of this data. To solve this issue the TS8000 must power up last or set up the command word to resend the data to the TS8000.
2. The TS8000 only sends the same data value, 1 time. Thus if a value of 10 is sent, it will not re send this value of 10 again even if it is requested to. The value must be changed to a different value like 11, then the value of 10 can be sent.
3. It is recommended that the TS8000 sends 32 bit values to the LINKnet Techbox, instead of 16 Bit values, as both devices are 32 bit. Set it up for "Word is Long".
4. Within the LINKnet Techbox, it is recommended not to access the Remote I/O data, faster than 5 ms.

## Example: Configuring a TS8000 to communicate to 890LINKnet

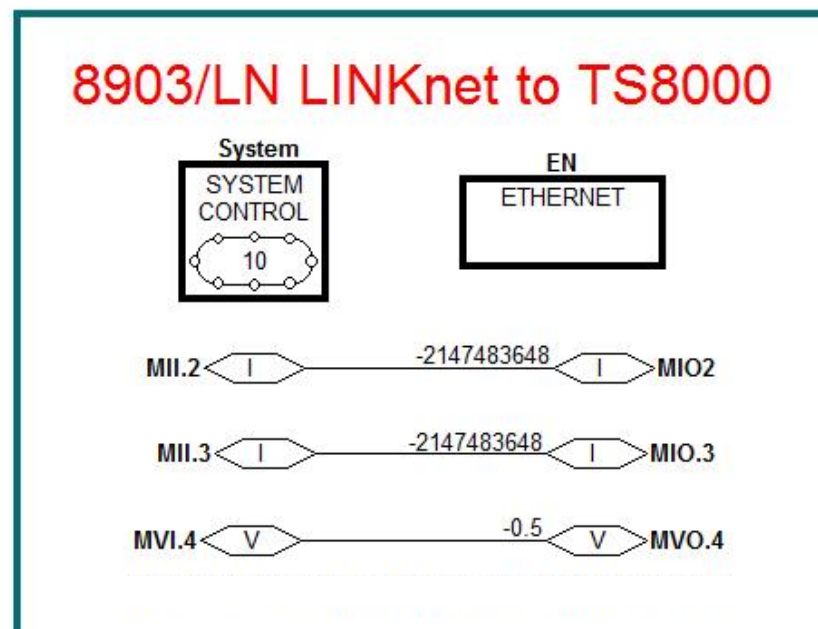
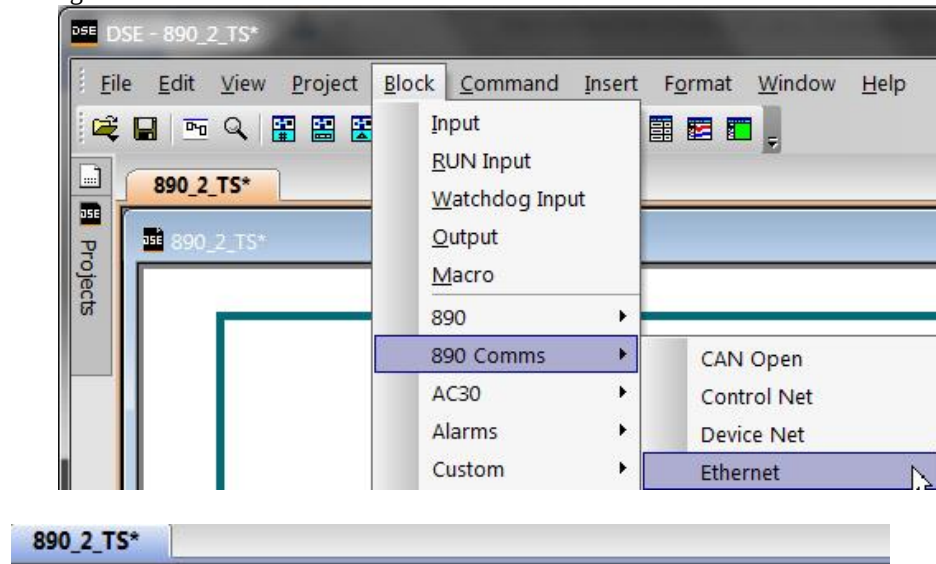
### Step 1: Configuring the Modbus Slave Option using DSE

#### Step 1.1: Inserting a Modbus Slave Function Block

(The 'DSI' & 'DSE' Example discussed in this manual is located in the directory C:\SSD\_LINK\HELP\WIN3. The files are called: 890\_2\_TS.DSI & LKN\_2\_TS.LKN.)

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

1. Move the cursor down to select "Ethernet" and select "Ethernet Slave".
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.



#### Step 1.2: Attaching Fieldbus Connectors

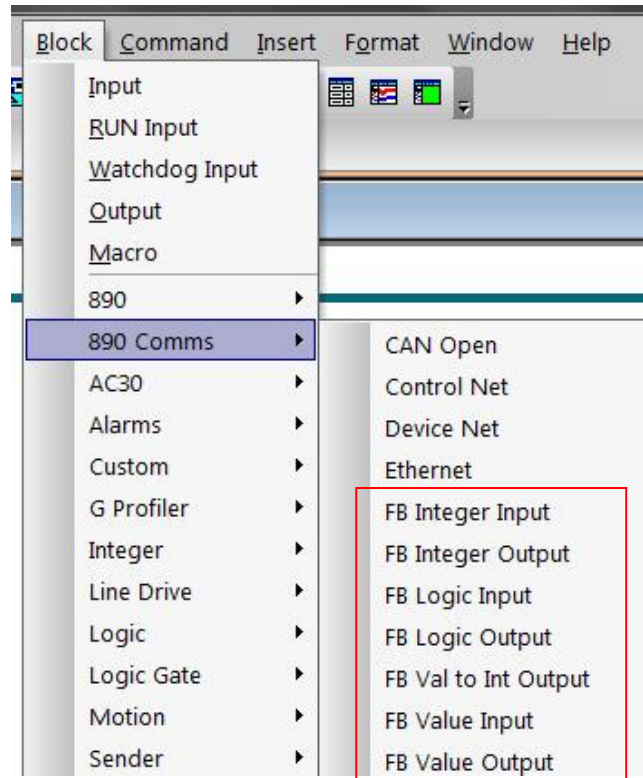
Seven fieldbus connector types are available:

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

**Input connector:** the data is sent from the TS8000 to 890LINKnet

**Output connector:** the data is sent from 890LINKnet to the TS8000

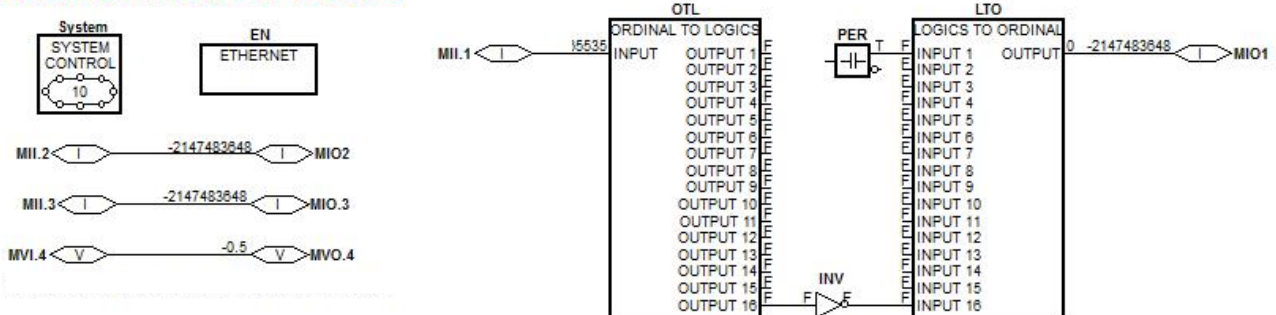
The fieldbus connectors must be added before they will appear in the EtherNet function block



This example shows that *Integer Inputs & Outputs* were added along with a *Value Input & Output*.

890\_2\_TS\*

### 8903/LN LINKnet to TS8000

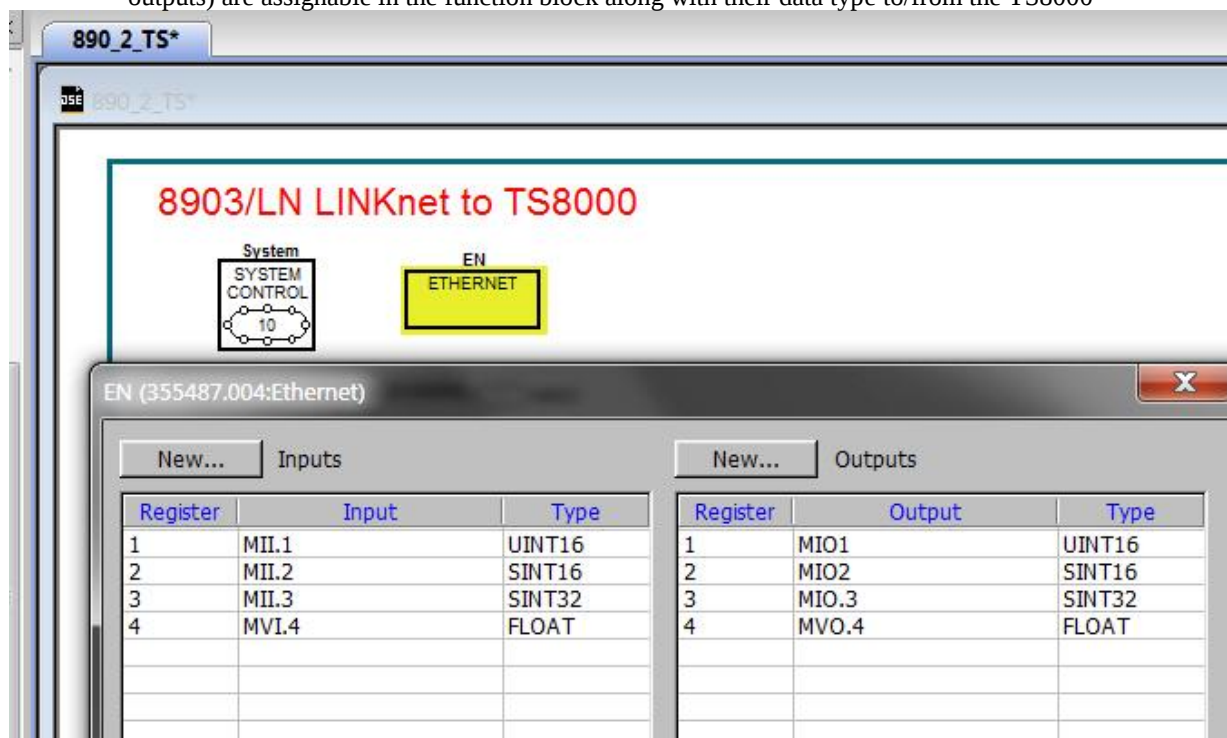


This circuit is the Watchdog which monitors the communications between the LINKnet Techbox and the TS8000. If comms are lost between the two, the TS8000 can be programmed to take action.

PER is a place holder for the Main Drive Health parameter. When this parameter is True, all data is re-sent to the TS8000. To use this feature, delete PER and connect Main Drive Health  
**Example for 890 firmware version 3.13 or greater**

### 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 TS8000



“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.

- **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. This mode must be selected when connecting to the TS8000 HMI.

#### 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.

### 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          |

Also set up the *IP address*, the *Subnet Mask* and the *Compatibility Mode* to 0 in the as shown:

The screenshot shows the configuration window for the Ethernet module (EN 355487.004). It is divided into three main sections: Inputs, Outputs, and General.

**Inputs Section:** Contains a table with 4 registers. Register 1 is MII.1 (UINT16), Register 2 is MII.2 (SINT16), Register 3 is MII.3 (SINT32), and Register 4 is MVI.4 (FLOAT).

**Outputs Section:** Contains a table with 4 registers. Register 1 is MIO1 (UINT16), Register 2 is MIO2 (SINT16), Register 3 is MIO.3 (SINT32), and Register 4 is MVO.4 (FLOAT).

**General Section:** Contains a list of parameters. The 'Parameters' group is expanded, showing the following values:

| Parameter   | Value           |
|-------------|-----------------|
| 32bit order | High Word First |
| IP Address  | 192.168.1.10    |
| subnet mask | 255.255.255.0   |
| gateway     | 0.0.0.0         |
| FTP mode    | Enabled         |
| Admin mode  | Disabled        |

Below the General section, there is a '32bit order' section with the following parameters:

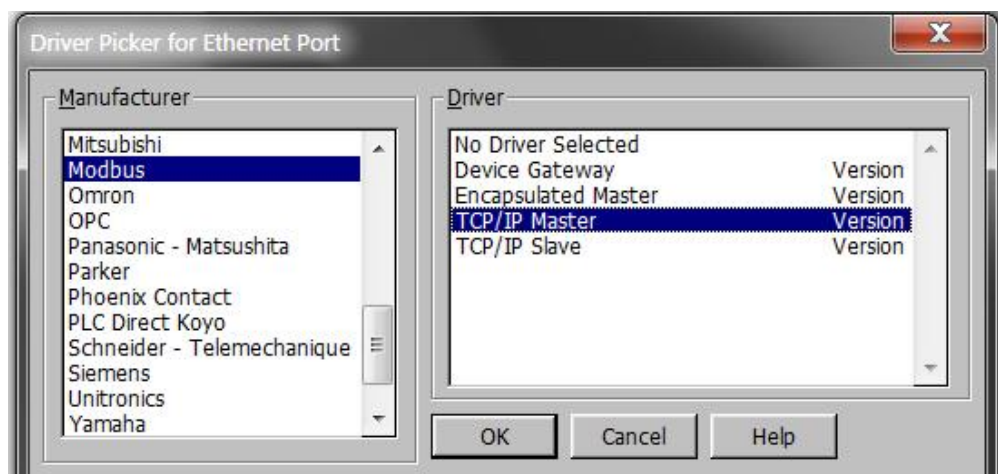
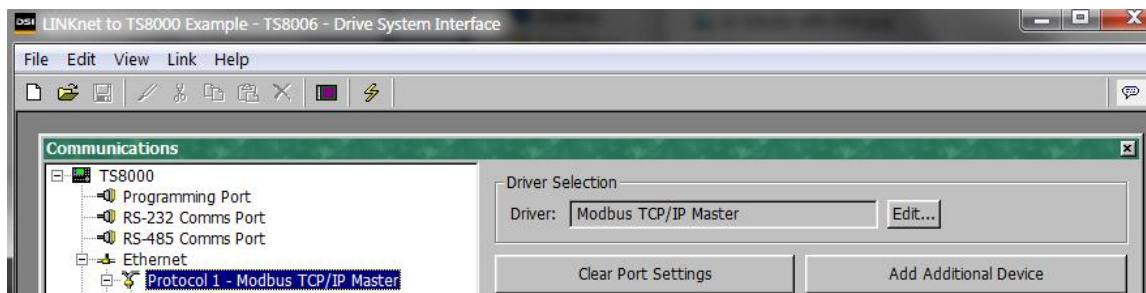
| Parameter          | Value    |
|--------------------|----------|
| gateway            | 0.0.0.0  |
| FTP mode           | Enabled  |
| Admin mode         | Disabled |
| Password (numeric) | 0        |
| Web mode           | Enabled  |
| Compatibility mode | 0        |
| BOOTP support      | NONE     |

At the bottom of the window, there are three buttons: 'Save List', 'OK', and 'Cancel'.

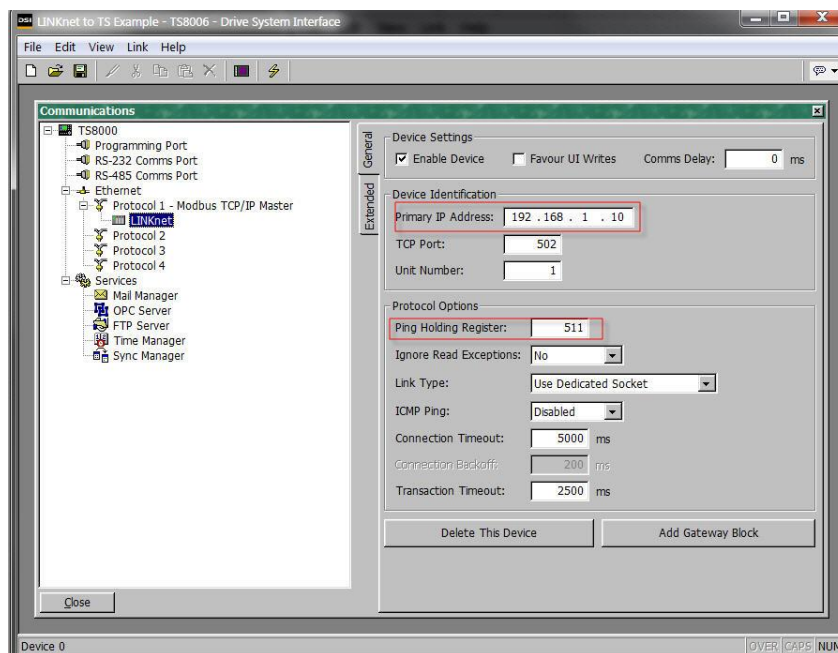
## Setting up the TS8000 Operator Station using DSI8000

(The 'DSI' & 'DSE' Example discussed in this manual is located in the directory C:\SSD\_LINK\HELP\WIN3. The files are called: 890\_2\_TS.dsi & LKN\_2\_TS.LKN.)

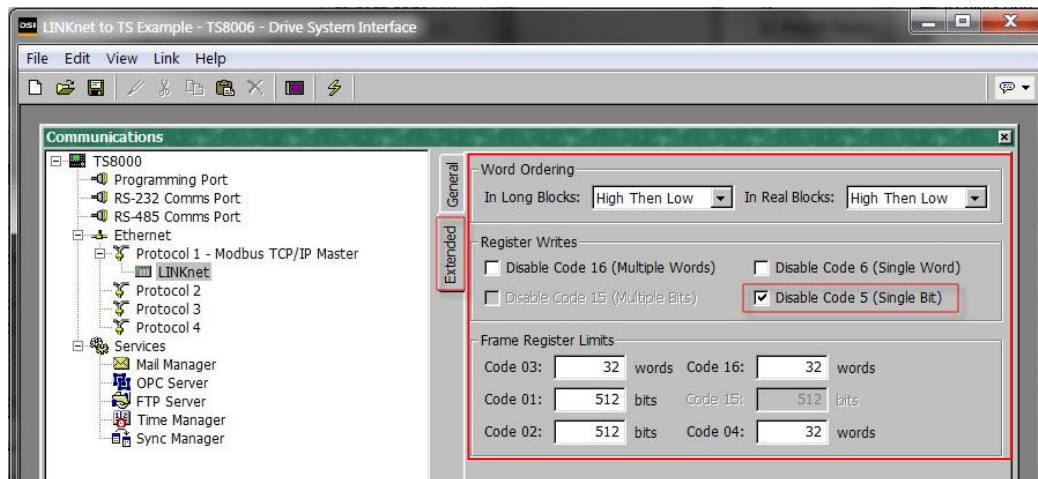
1. Select "Modbus TCP/IP Master" protocol for Ethernet Port. The TS8000 is the Master.



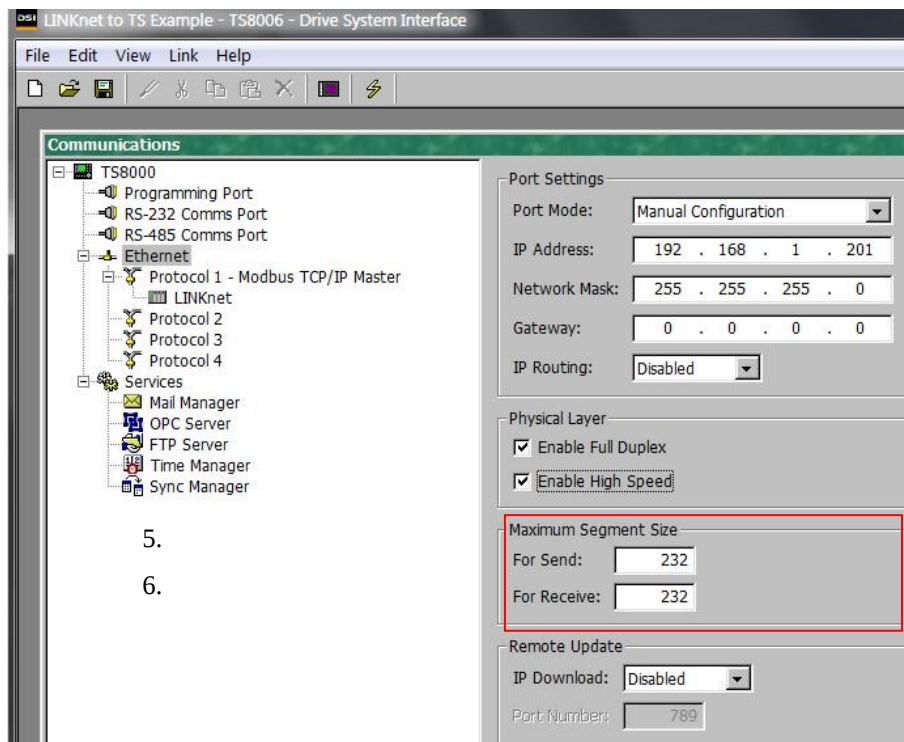
2. Set the Primary IP Address. The Ping Holding Register **MUST** be set to 511 or 0 which disables it.



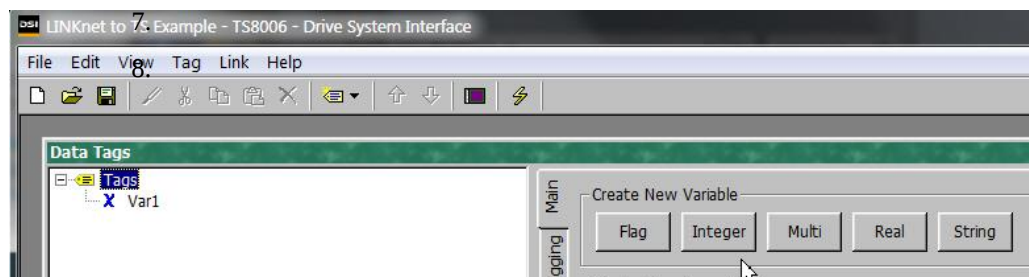
3. In the *Extended* menu the *Word Ordering*, *Register Writes*, the *Frame Register Limits* need to be set as shown. Also check the ‘*Disable Code 5 (Single Bit)*’, as shown.



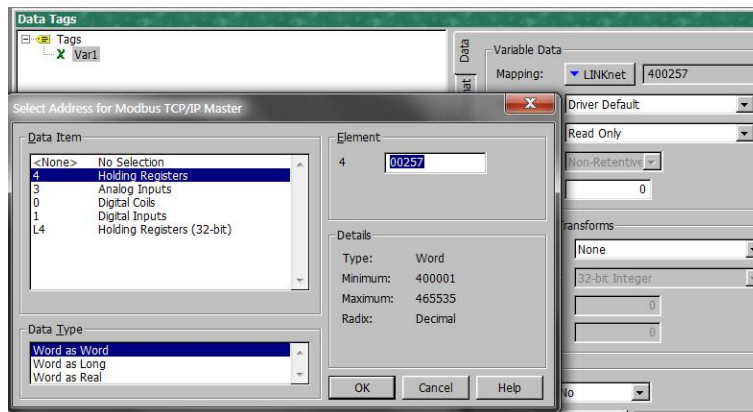
4. Set up the *Ethernet* and *Maximum Segment* as shown



5. Create the Data Tags for reading and writing variables. Please see the example for pre-defined Data Tags.



8. Create the address tags. They are all pre-defined in the example.



#### Data Item:

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

#### Element:

Set to **00001** to write to the first Input variable declared in DSE.

Set to **00257** to read the first Output variable declared in DSE.

The element number then increments by 1 if the Data Type of the previous variable is **Word as Word**, otherwise it increments by 2.

#### Data Type:

Set as follows:

| DSE Type | TS8000 Data Type |
|----------|------------------|
| SINT16   | Word as Word     |
| UINT16   |                  |
| SINT32   | Word as Long     |
| UINT32   |                  |
| REAL     | Word as Real     |

The Modbus interface is essentially the same as the 890. It on works on the holding registers (4xxxxx). Registers 400001 to 400256 are Input only (to LINKnet Techbox) and registers 400257 to 400512 are Output only (from LINKnet Techbox). There are no read/write registers. Each register is 16 bits but two registers are used to read/write 32 bit data values via Modbus TCP/IP. Whether one or two registers are used to transmit the data depends on the Input/Output Type selected in the Modbus Slave function block. The Input/Output Modbus function block selected determines the VM data format (Logic, Integer or Value) to be used to convert the VM data to the data being sent/received over Modbus. Typically, you would match the VM type to the Modbus type (Integer to SINT32 and Value to FLOAT), but there is no requirement to do this.

The following describes the conversion between VM inputs and how they are received via Modbus:

| VM TYPE       | MODBUS | # Reg | Description                                  |
|---------------|--------|-------|----------------------------------------------|
| Logic Input   | SINT16 | 1     | input = bit 0 of modbus register             |
| Logic Input   | UINT16 | 1     | input = bit 0 of modbus register             |
| Logic Input   | SINT32 | 2     | input = bit 0 of modbus register             |
| Logic Input   | UINT32 | 2     | input = bit 0 of modbus register             |
| Logic Input   | FLOAT  | 2     | input is 0 if input is 0.0, otherwise 1      |
| Integer Input | SINT16 | 1     | input = -32767 to 32767                      |
| Integer Input | UINT16 | 1     | input = 0 to 65535                           |
| Integer Input | SINT32 | 2     | input = -2147483647 to 2147483647            |
| Integer Input | UINT32 | 2     | input = 0 to 2147483647                      |
| Integer Input | FLOAT  | 2     | input = -2147483647 to 2147483647            |
| Value Input   | SINT16 | 1     | input = -32767.0 to 32767.0                  |
| Value Input   | UINT16 | 1     | input = -32767.0 to 32767.0 (same as SINT16) |
| Value Input   | SINT32 | 2     | input = -32767.0 to 32767.0                  |
| Value Input   | UINT32 | 2     | input = -32767.0 to 32767.0 (same as SINT32) |
| Value Input   | FLOAT  | 2     | IEEE format 32 converted to 16.16 value      |

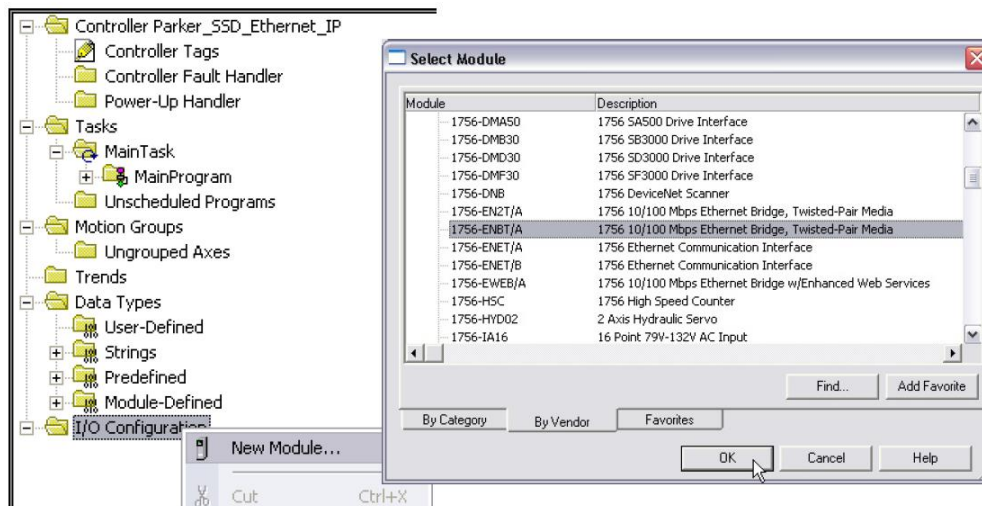
The following describes the conversion between VM outputs and how they are sent via Modbus:

| VM TYPE        | MODBUS | # Reg | Description                                                |
|----------------|--------|-------|------------------------------------------------------------|
| Logic Output   | SINT16 | 1     | output is 0 if input is 0, otherwise 1                     |
| Logic Output   | UINT16 | 1     | output is 0 if input is 0, otherwise 1                     |
| Logic Output   | SINT32 | 2     | output is 0 if input is 0, otherwise 1                     |
| Logic Output   | UINT32 | 2     | output is 0 if input is 0, otherwise 1                     |
| Logic Output   | FLOAT  | 2     | 0.0 or 1.0 sent as an IEEE format 32 floating point number |
| Integer Output | SINT16 | 1     | output clamped in range -32767 to 32767                    |
| Integer Output | UINT16 | 1     | output clamped in range 0 to 32767                         |
| Integer Output | SINT32 | 2     | output from -2147483647 to 2147483647                      |
| Integer Output | UINT32 | 2     | output treated an unsigned 32 bit number (0 to 4294967295) |
| Integer Output | FLOAT  | 2     | output sent as an IEEE format 32 floating point number     |
| Value Output   | SINT16 | 1     | output clamped in range -32767 to 32767                    |
| Value Output   | UINT16 | 1     | output clamped in range 0 to 32767                         |
| Value Output   | SINT32 | 2     | output from -2147483647 to 2147483647                      |
| Value Output   | UINT32 | 2     | output treated an unsigned 32 bit number (0 to 4294967295) |
| Value Output   | FLOAT  | 2     | output sent as an IEEE format 32 floating point number     |

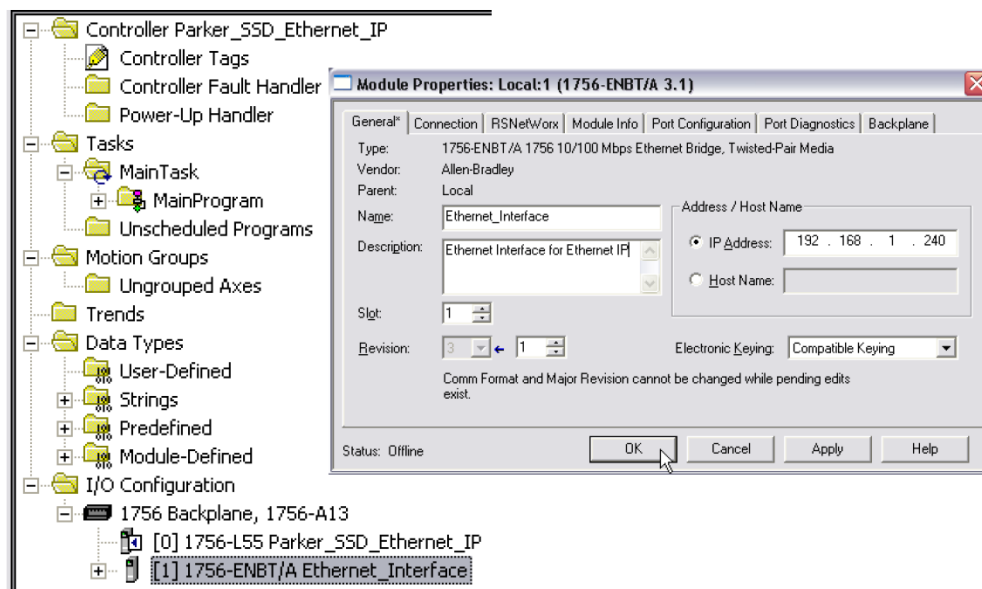
## AB EtherNet /IP server (slave) Example

### Allen Bradley ControlLogix

1. 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.
2. 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.

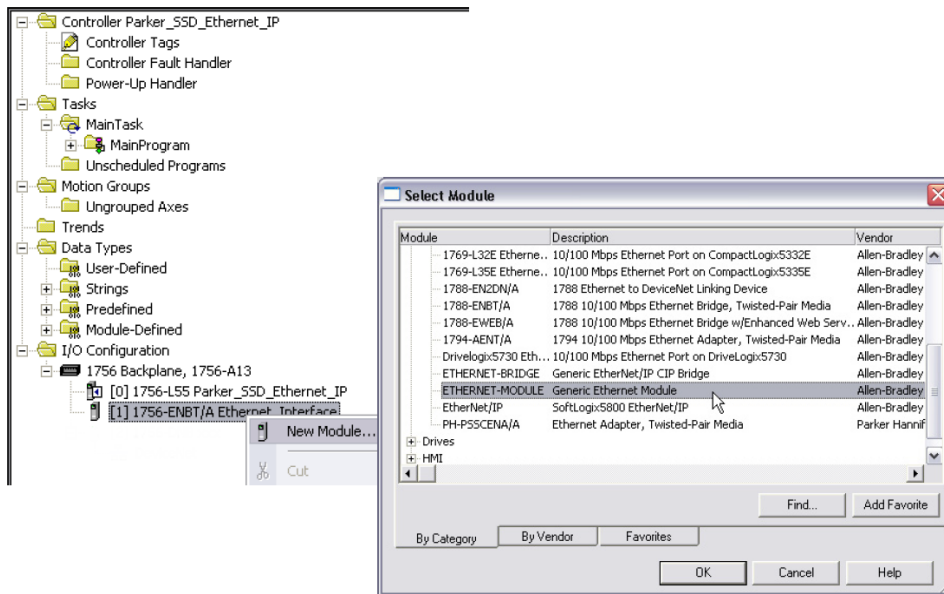


### Ethernet Interface Selection



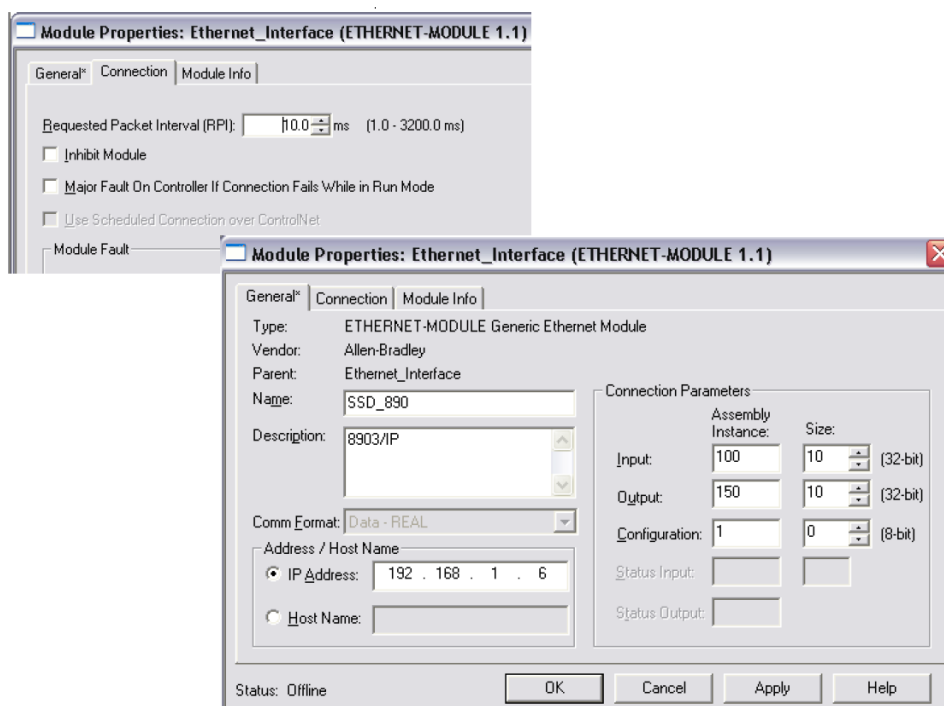
### Ethernet Interface Setup

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



### 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.
- 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.



### 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.

The screenshot displays the Rockwell Studio software interface. On the left is the Project Explorer tree, and on the right is the Controller Tags window for the 'Parker SSD Ethernet IP(controller)'.

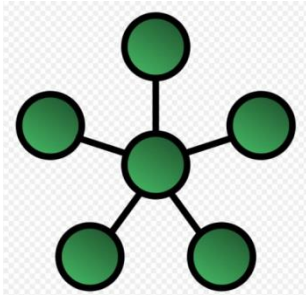
**Project Explorer Tree:**

- Controller Parker SSD Ethernet\_IP
  - Controller Tags
  - Controller Fault Handler
  - Power-Up Handler
- Tasks
  - MainTask
    - MainProgram
    - Unscheduled Programs
- Motion Groups
  - Ungrouped Axes
- Trends
- Data Types
  - User-Defined
  - Strings
  - Predefined
  - Module-Defined
- I/O Configuration
  - 1756 Backplane, 1756-A13
    - [0] 1756-L55 Parker SSD Ethernet\_IP
      - [1] 1756-ENBT/A Ethernet\_Interface
        - Ethernet
          - 1756-ENBT/A Ethernet\_Interface
          - ETHERNET-MODULE SSD\_890
      - [2] 1756-DNB xxx
        - DeviceNet

**Controller Tags**

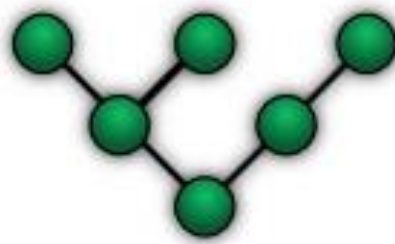
## Ethernet Network Topology & EDS file

When configuring the Ethernet topology – i.e. connecting the LINKnet modules together in a system with Ethernet switches, it is recommended to use a *Star* configuration. A *Tree* configuration will work.



**Star Configuration**

**Recommended**



**Tree Configuration**

If possible, do not use a *Daisy Chain* topology as this type adds propagation delays each time data passes from module to module.



**Daisy Chain Configuration**

**Not Recommended**

### **EDS file**

If required an Electronic Data Sheet (.eds) is available. It can be down loaded from [www.parker.com/ssdusa/software](http://www.parker.com/ssdusa/software) under the **Various AC/DC Drives Communication Files** menu.

Drive Diagnostics

The Ethernet MMI View

Diagnostic information is available through the MMI.

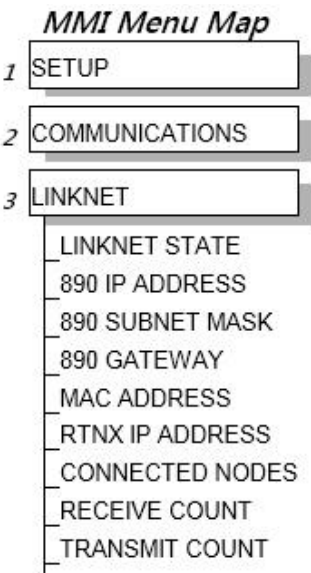
Parameter Descriptions

**LINKNET STATE**      *PREF 186.01*

Operating state of the LINKnet option.

*Enumerated Value: State*

- 0: Initializing
- 1: Setup
- 2: Resetting
- 3: Starting
- 4: Operational
- 5: Not Fitted



**890 IP ADDRSSH**      *PREF 186.02*      *Read Only*

IP address of the 890

**890 SUBNET MASK**      *PREF 186.03*      *Read Only*

Subnet Mask being used

**890 GATEWAY**      *PREF 186.04*      *Read Only*

Gateway address being used

**MAC ADDRESS**      *PREF 186.05*      *Read Only*

Unique MAC address of the LINKnet option

**RTNX ADDRESS**      *PREF 186.06*      *Read Only*

The IP Address of the device connected to the LINKnet option

**CONNECTED NODES**      *PREF 186.07*      *Read Only*

The number of devices connected to the network

**RECEIVE COUNT**      *PREF 186.08*      *Read Only*

The number of accumulative packets being received

**TRANSMIT COUNT**      *PREF 186.09*      *Read Only*

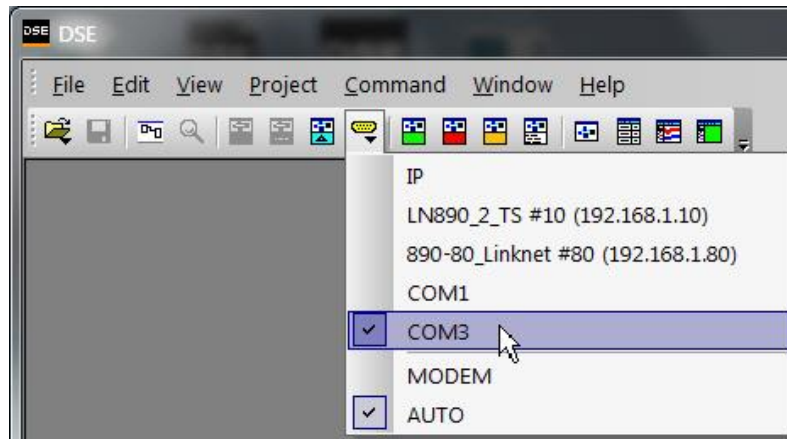
The number of accumulative packets being sent out of the module

Drive Diagnostics – Comms Code N

If the 890 MMI Keypad is displaying a ‘Comms Code N’ error message, and there is a ControlNet (8903/CN) option card fitted in slot A, there is a possibility that this option card is not compatible with the drive firmware. See Appendix B for more information.

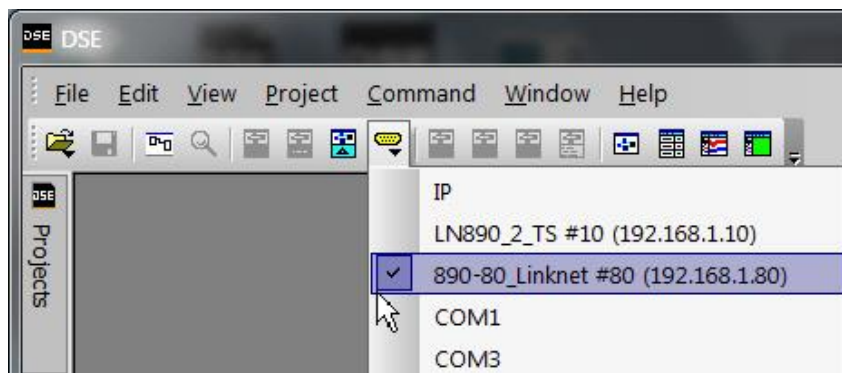
## Installing 890 Drive firmware

To install the 890 drive firmware in to the drive there are 2 methods, either use the USB cable and directly connect to the USB port on each drive. As shown below the USB cable uses COM3. Then install the firmware.



The second method is to go to the *Comms port Icon* menu and select the specific drive which you want to install the firmware into. Thus in the example shown below 890-80 is selected. Thus this is the only drive which firmware can be installed to. Then install the firmware.

Then to install firmware into a different drive select the *Comms port Icon menu* again and select the next drive you want to install firmware into. Then install the firmware. Follow the same procedure for the remaining drives.



## 890 LINKnet - MS (Module Status) LED Indication

The Status LED on the Option indicates the following states

| NCP State                                                                                                           | Techbox State | MS LED Indication – 1 second period <sup>E</sup> | Blink Code (1second <sup>E</sup> ) |
|---------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------|------------------------------------|
| 0 Initializing                                                                                                      | Initializing  | Green 10 % : Off 90 %                            |                                    |
| 2 No Config                                                                                                         | Fault         | Red 50% : Off 50%                                |                                    |
| 3 L-Error                                                                                                           | Fault         | Green 50% : Red 50%                              |                                    |
| 4 H-Error                                                                                                           | Fault         | Orange 50% : Red 50%                             |                                    |
| 5 Self Test Fail                                                                                                    | Fault         | Green 50% : Orange 50%                           |                                    |
| 7 OK                                                                                                                | Running       | Green 95% : Off 5%                               |                                    |
| 9 Network Failure                                                                                                   | Running       | Green 50% : Off 50%                              |                                    |
| B Peer Halted                                                                                                       | Starting      | Red 50% : Green 35% : Off 15%                    |                                    |
| C Duplicate Address                                                                                                 | Fault         | Green 75% : Red 25%                              |                                    |
| - Identify module *                                                                                                 | Running       | Orange 50% : Off 50%                             |                                    |
| - Hardware Initialization                                                                                           | Fault         | Orange 25:Red 25:Orange 25:Green 25              |                                    |
| - Hardware Fault                                                                                                    | Fault         | Red 25:Green 25:Red 25:Off 25                    |                                    |
| *When using DSE and a COMMAND / IDENTIFY is performed, the MS LED will flash indicating the location of the module. |               |                                                  |                                    |
| <sup>E</sup> LED blink duration is 1 second, except as noted                                                        |               |                                                  |                                    |

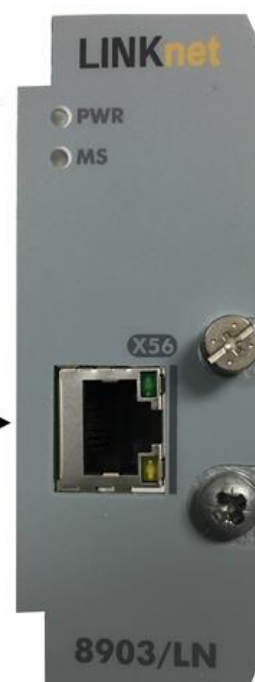
## 890 LINKnet – PWR (Power) LED Indication Status

| Module State           | PWR LED COLOR |
|------------------------|---------------|
| Power is applied       |               |
| No power to the module |               |

POWER LED

MODULE STATUS LED

X56  
RJ45 ETHERNET  
INTERFACE



Front of the 8903/LN LINKnet Communications Interface Option

## 890 LINKnet - MS (Module Status) LED Meaning / Action

| NCP State                 | Meaning / Action                                                                                                                               |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 Initializing            | Upon applying power to the Techbox it will Initialize for the first 2 seconds                                                                  |
| 2 No Config               | No valid configuration installed, install a configuration                                                                                      |
| 3 L-Error                 | Low level error; review configuration, perform Command / Get Info using DSE                                                                    |
| 4 H-Error                 | High level error; reinstall configuration, perform Command / Get Info using DSE.<br>Indicates a problem with a function block                  |
| 5 Self Test Fail          | One or more self tests failed. Replace hardware                                                                                                |
| 7 OK                      | Module is running OK, application running, network OK                                                                                          |
| 9 Network Failure         | The LINKnet module only sees itself (1 node) on the network.                                                                                   |
| B Peer Halted             | On power up the module will be Peer Halted until the other modules identify themselves on the network.                                         |
| C Duplicate Address       | The module found duplicates of its configured address in other module(s) on the network                                                        |
| - Identify module         | When using DSE and a COMMAND / IDENTIFY is performed, the LED will flash to identify the physical location of the module you are connected to. |
| - Hardware Initialization | This is the first state the module goes thru on power up.                                                                                      |
| - Hardware Fault          | Hardware fault. Replace module<br>(There is a comms loss between the option card and the control board)                                        |

Meets Class A limits of standard EN 61800-3:2004

## Recommended Auxiliary Products

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### Remote IO:

We recommend the following: Wago Series 750 products:

|         |                                                              |
|---------|--------------------------------------------------------------|
| 750-352 | Ethernet Fieldbus Coupler                                    |
| 750-600 | End Module -Terminator                                       |
| 750-601 | Power Supply Module 24 V DC, Fused                           |
| 750-430 | Digital Input Module 8 Channel DC 24 V                       |
| 750-530 | Digital Output Module 8 Channel DC 24 V                      |
| 750-457 | Analog Input Module 4 Channel $\pm 10\text{V}/0-10\text{V}$  |
| 750-557 | Analog Output Module 4 Channel $\pm 10\text{V}/0-10\text{V}$ |

### Unmanaged Ethernet switches:

N-Tron

Hirschman

Wago: SSD part number DV471068U003 for a 5 Port

SSD part number DV471068U005 for a 8 Port

### Other Communication networks:

Anybus X-Gateway Modbus TCP Master Gateway

## Disposal

---

This product contains materials which are consignable waste under the Special Waste Regulations 1996 which complies with the EC Hazardous Waste Directive - Directive 91/689/EEC.

We recommend you dispose of the appropriate materials in accordance with the valid environmental control laws. The following table shows which materials can be recycled and which have to be disposed of in a special way.

| Material              | Recycle | Disposal |
|-----------------------|---------|----------|
| metal                 | yes     | no       |
| plastics material     | yes     | no       |
| printed circuit board | no      | yes      |

The printed circuit board should be disposed of in one of two ways:

1. High temperature incineration (minimum temperature 1200°C) by an incinerator authorised under parts A or B of the Environmental Protection Act
2. Disposal in an engineered land fill site that is licensed to take aluminium electrolytic capacitors. Do not dispose of in a land fill site set aside for domestic waste.

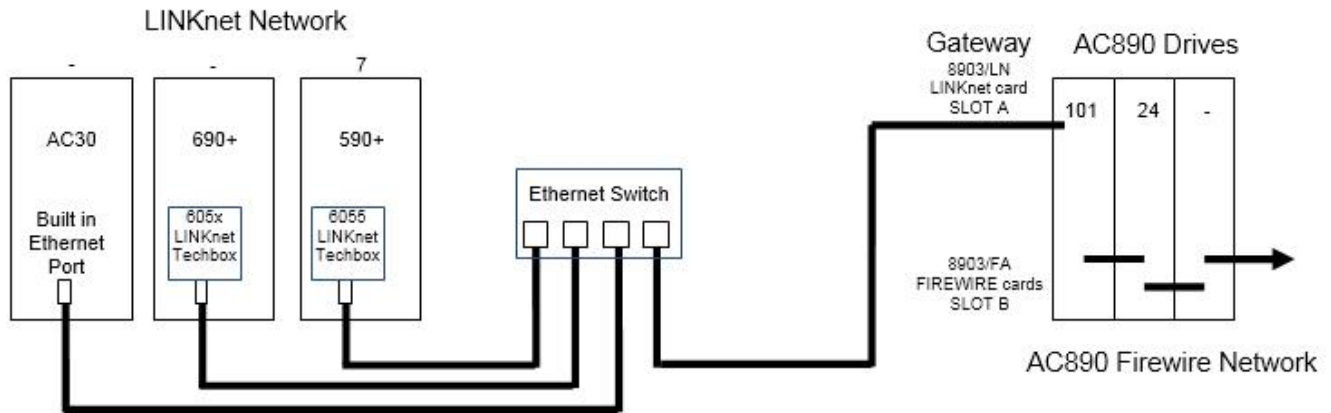
### Packaging

During transport our products are protected by suitable packaging. This is entirely environmentally compatible and should be taken for central disposal as secondary raw material.

## Appendix A – LINKnet to 890 Gateway

### Application Note: LINKnet to 890 Gateway

The 8903/LN (890 LINKnet card) can be used as a Gateway to connect LINKnet Techboxes to an 890 drive, then this 890 Gateway drive will communicate to other 890 drives via the Firewire network. The LINKnet Techboxes can be installed on 690+ or 590+ drives.



The example is showing an 890 with LINKnet option card in slot A and a FW card in slot B.

In this configuration, the host AC890 drive module, or Gateway is Node Address 101. This address must be less than or equal to 127, which is the maximum address on an AC890 Firewire network or LINKnet network.

If you put a LINKnet option card in slot A it will talk to both a LINKnet network and a FW network card in slot B as well as long as there are not duplicate node addresses on either networks. If you connect to the 890 via Ethernet, you will only see the LINKnet network. If you connect to the 890 with the USB port, you will only see the Firewire network.

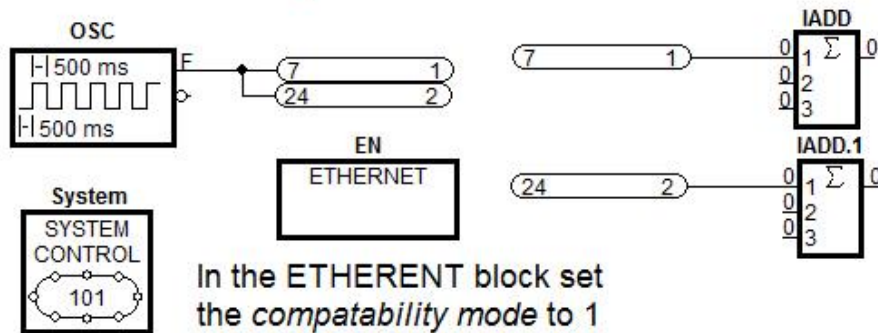
Outgoing slots go to the network that the node is on, incoming slot must be unique for both networks. Otherwise, the input and output slots have the same behavior that they have in a standard 890 Firewire configuration.

Any data that must transfer between the two networks is sent to the Gateway node's address on unique input slots. Incoming data from **either** network is connected into the 890 Gateway node's configuration using standard input slot connectors (found under **Block/Input** on the DSE menu). Thus all data will pass thru the 890 Gateway. The LINKnet network will pass data to the 890 Gateway, then the 890 Gateway will pass the data to the Firewire Network.

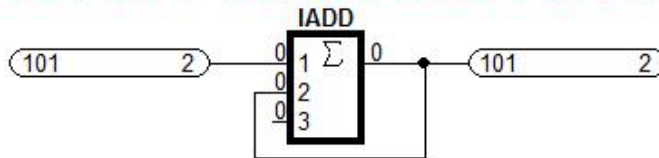
The Gateway node can still function as a normal 890 drive.

The example below is from an 890 address 101 with LINKnet option card in slot A and a Firewire card in slot B with an 890 drive on Firewire address 24 and a LINKnet Techbox address 7.

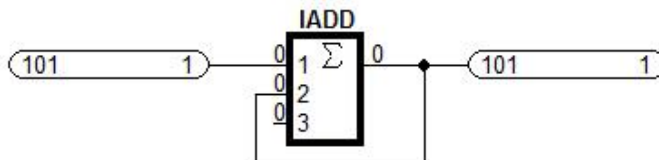
## 890 Gateway Drive Address 101



## 890 on Firewire address 24



## LINKnet Techbox address 7



Steps to configure a LINKnet to 890 Gateway:

1. Install an 8903/LN LINKnet option card in Slot A, the top slot of the 890 Gateway drive.
2. Open the configuration for this 890Gateway drive and go to **Block/890 Comms** and add a **Ethernet** block.
3. Set the **IP Address** and the **subnet mask** address. Set the **compatibility mode** to 1. This will put the 8903/LN LINKnet card in the Peer To Peer Mode thus allowing it to communicate to other LINKnet modules. If it is set to 0, the card will act as a standard Ethernet card.
4. Design the configuration so there are not duplicate node addresses on either networks. Remember there can't be duplicate node addresses on either networks.

## Appendix B – Verifying the ControlNet option card

---

### Verifying the ControlNet option card

The 890 LINKnet option can be fitted in Slot A (The top slot) or Slot B (The bottom slot). But only 1 option card can be fitted per drive. It can't be fitted to both slot A and Slot B at the same time.

If the LINKnet card is fitted in Slot B, the top Slot A, can't have a Ethernet/IP (8903/IP), Modbus/TCP (8903/IM), Profinet/IO (8903/PN) or a EtherCAT (8903/CT) option card fitted.

Also if a ControlNet card (8903/CN) is fitted in Slot A, this card has to be manufactured after 2011. If an older card is used and the 890 firmware version 3.13 is installed into the drive, the drive will get a fault with the message 'Comms Code N' on the drive MMI. To determine if the Control Net card is compatible with this version of firmware remove the ControlNet card from the drive and look at the label on the back side of the card. Look at the bottom row of numbers and the last digit must be a 3 or greater to be compatible. This number is the Build Standard number. See the picture below. Look for the number in the red box. If this Build Standard number is not 3 or greater the ControlNet card needs to be replaced.



## Appendix C – 8903/LN Firmware release Notes

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### **LINKnet Firmware version 1.7f**

- Fixed the issue with the *Remote IO / Ordinal Reader*. The 16<sup>th</sup> bit returns a signed number instead of a un signed number. It acted like an *Integer Reader*. Values greater than 32767 are not handled properly.
- Fixed an issue where the **Node Count** block may not update properly.
- Doesn't reset IP address on soft reset.
- Supports Modbus TCP/IP write of 1 word of a 32 bit register (previously had to write both to update register).

### **LINKnet Firmware version 1.6**

- Initial release



# Parker Worldwide

AE – UAE, Dubai  
Tel: +971 4 8127100  
parker.me@parker.com

AR – Argentina, Buenos Aires  
Tel: +54 3327 44 4129

AT – Austria, Wiener Neustadt  
Tel: +43 (0)2622 23501-0  
parker.austria@parker.com

AT – Eastern Europe, Wiener Neustadt  
Tel: +43 (0)2622 23501 900  
parker.easteurope@parker.com

AU – Australia, Castle Hill  
Tel: +61 (0)2-9634 7777

AZ – Azerbaijan, Baku  
Tel: +994 50 2233 458  
parker.azerbaijan@parker.com

BE/LU – Belgium, Nivelles  
Tel: +32 (0)67 280 900  
parker.belgium@parker.com

BR – Brazil, Cachoeirinha RS  
Tel: +55 51 3470 9144

BY – Belarus, Minsk  
Tel: +375 17 209 9399  
parker.belarus@parker.com

CA – Canada, Milton, Ontario  
Tel: +1 905 693 3000

CH – Switzerland, Etoy  
Tel: +41 (0)21 821 87 00  
parker.switzerland@parker.com

CL – Chile, Santiago  
Tel: +56 2 623 1216

CN – China, Shanghai  
Tel: +86 21 2899 5000

CZ – Czech Republic, Klecany  
Tel: +420 284 083 111  
parker.czechrepublic@parker.com

DE – Germany, Kaarst  
Tel: +49 (0)2131 4016 0  
parker.germany@parker.com

DK – Denmark, Ballerup  
Tel: +45 43 56 04 00  
parker.denmark@parker.com

ES – Spain, Madrid  
Tel: +34 902 330 001  
parker.spain@parker.com

FI – Finland, Vantaa  
Tel: +358 (0)20 753 2500  
parker.finland@parker.com

FR – France, Contamine s/Arve  
Tel: +33 (0)4 50 25 80 25  
parker.france@parker.com

GR – Greece, Athens  
Tel: +30 210 933 6450  
parker.greece@parker.com

HK – Hong Kong  
Tel: +852 2428 8008

HU – Hungary, Budapest  
Tel: +36 1 220 4155  
parker.hungary@parker.com

IE – Ireland, Dublin  
Tel: +353 (0)1 466 6370  
parker.ireland@parker.com

IN – India, Mumbai  
Tel: +91 22 6513 7081-85

IT – Italy, Corsico (MI)  
Tel: +39 02 45 19 21  
parker.italy@parker.com

JP – Japan, Tokyo  
Tel: +81 (0)3 6408 3901

KR – South Korea, Seoul  
Tel: +82 2 559 0400

KZ – Kazakhstan, Almaty  
Tel: +7 7272 505 800  
parker.easteurope@parker.com

LV – Latvia, Riga  
Tel: +371 6 745 2601  
parker.latvia@parker.com

MX – Mexico, Apodaca  
Tel: +52 81 8156 6000

MY – Malaysia, Shah Alam  
Tel: +60 3 7849 0800

NL – The Netherlands, Oldenzaal  
Tel: +31 (0)541 585 000  
parker.nl@parker.com

NO – Norway, Ski  
Tel: +47 64 91 10 00  
parker.norway@parker.com

NZ – New Zealand, Mt Wellington  
Tel: +64 9 574 1744

PL – Poland, Warsaw  
Tel: +48 (0)22 573 24 00  
parker.poland@parker.com

PT – Portugal, Leca da Palmeira  
Tel: +351 22 999 7360  
parker.portugal@parker.com

RO – Romania, Bucharest  
Tel: +40 21 252 1382  
parker.romania@parker.com

RU – Russia, Moscow  
Tel: +7 495 645-2156  
parker.russia@parker.com

SE – Sweden, Spånga  
Tel: +46 (0)8 59 79 50 00  
parker.sweden@parker.com

SG – Singapore  
Tel: +65 6887 6300

SK – Slovakia, Banská Bystrica  
Tel: +421 484 162 252  
parker.slovakia@parker.com

SL – Slovenia, Novo Mesto  
Tel: +386 7 337 6650  
parker.slovenia@parker.com

TH – Thailand, Bangkok  
Tel: +662 717 8140

TR – Turkey, Istanbul  
Tel: +90 216 4997081  
parker.turkey@parker.com

TW – Taiwan, Taipei  
Tel: +886 2 2298 8987

UA – Ukraine, Kiev  
Tel: +380 44 494 2731  
parker.ukraine@parker.com

UK – United Kingdom, Warwick  
Tel: +44 (0)1926 317 878  
parker.uk@parker.com

US – USA, Cleveland  
Tel: +1 216 896 3000

VE – Venezuela, Caracas  
Tel: +58 212 238 5422

ZA – South Africa, Kempton Park  
Tel: +27 (0)11 961 0700  
parker.southafrica@parker.com

