LINKnet TechBox

LINKnet is compatible with the software DSE version 3.03 or greater.

Product Manual

HA473865U001

Issue 4

Safety Information

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, and to enable the user to obtain maximum benefit from the equipment.

Application Area

The equipment described is intended for industrial motor speed control using DC or AC motor controllers, with 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.

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

IMPORTANT

It is required that the user be familiar with navigating through the drive MMI menus, be able to select functions and set values and options. For further reading on this topic, refer to the appropriate drive instruction manual. If using DSE890 or DSELite it is required the user must be familiar with the software packages.

Printed in the USA

Contents

Chapter 1 - An Overview

The *LINKnet* TechBox/TechCard option allows standard drives to be a part of the *LINKnet* Ethernet network. A computer may be used to provide supervision and monitoring for each drive and other modules in the system.

6053-LNET-00 TechBox

This techbox is to be used with the AC690+ frame B. The 6053-LNET-00 fits into the same location normally occupied by the keypad. If the keypad is needed for the application, it may still be used with a remote mounting kit. An auxiliary 24VDC power supply input allows the techbox to be powered separately from the drive. If the drive shuts down, the network remains intact.

Figure 1 – 6053-LNEt-00 LINKnet Techbox

6055-LNET-00 TechBox

This techbox is to be used with the DC590+ all frames and AC690+ frames C and higher. The 6055-LNET-00 plugs into the right side technology box slot beneath the front cover of the drive. The left side location is reserved for feedback technology options. The keypad is unaffected by the presence of a techbox. An auxiliary 24VDC power supply input is provided allowing the techbox to be powered separately from the drive. In the event of a drive shut down, the network integrity remains intact.

Figure 2 – 6055-LNET-00 LINKnet Techbox

6055-LNET-00-D TechBox Din Rail Mount

This techbox is a DIN Rail Mount, to be used as a stand alone device for extra processing power.

An external 24VDC power supply must be provided.

Figure 3 – 6055-LNET-00-D LINKnet Techbox

Further Reading

AC690+ Drive Instruction Manuals
DC590+ Drive Instruction Manual

Product Features

- Available for AC690+ and DC590+ products
- Compact 5H x 3W x 1D inches
- Easy snap on installation
- Eliminates hard wired signal connections
- Standalone processing with built in macros
- Auxiliary power supply input for network backup
- Indicator LED's for Drive and power On status
- Direct tag access for all drive parameters

Part Number and Identification

The Option can be supplied with the drive or independently.

- DC590+ Drive

  Supplied with the DC590+ drive: **590P**/xxxx/xxx/xxxx/xx/**LNET**/xxx/xxxx
  Enclosed in a "Technology Box" for use with the 590+ all Frames: **6055-LNET-00**

- AC690+ Drive

  Supplied with the AC690+ drive: **690PB**/xxxx/xxx/x/x/xxxx/xxxx/xxxx/**LNET**/xxx/xxxx

  690P/xxxx/xxx/xxxx/xx/xxx/ **LNET** /xxx/xxx /xxx/xxxx
  Enclosed in a "Technology Box" for use with the 690+ Size B: **6053-LNET-00**
  Enclosed in a "Technology Box" for use with the 690+ Sizes C+: **6055-LNET-00**

Ethernet Protocols supported:

LINKnet supports the following Ethernet protocols:

1. Modbus UDP/IP Master - Supports Remote IO, Input / Output support.
2. Modbus TCP/IP Slave **or** EtherNet IP Server (slave).

   LINKnet acts as a slave device only.

   Only 1 Slave protocol can be supported per LINKnet card.

   Supports TS8000 HMI Touchscreen and PLCs.

   EtherNet IP Server (slave) is supported in LINKnet firmware version 1.5 or greater and DSE v 3.03 or greater.

Software Requirements:

1. The software DSE (Drive System Explorer) & DSELite version 3.03 or greater supports LINKnet.

Hardware supported:

1. The 690+ drive with firmware version 5.x
2. The 590+ drive with firmware version 8.10 or greater only. If the firmware version is 8.9 or less, the drive can be flashed to the latest firmware version using DSELite.
3. The 590+ drives with firmware version 5.x and 7.x drives.

Chapter 2 - Installation

Installing the Option

WARNING

Before installing, ensure that the drive power is switched off and cannot be switched on accidentally by other personnel.

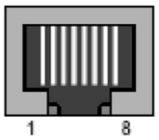
Wait 5 minutes after disconnecting power before working on any part of the system or removing the covers from the drive.

Wiring Requirements:

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.

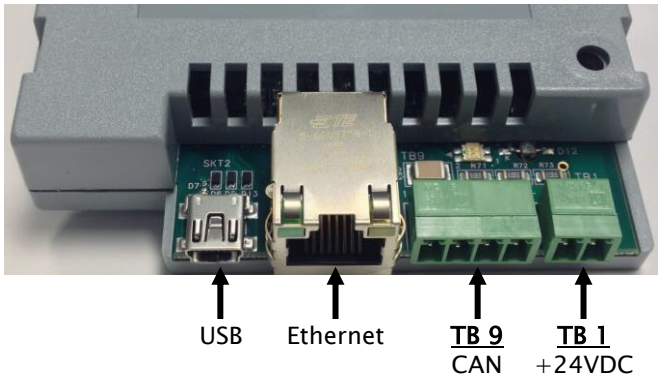


Figure 4 - LINKnet Techbox Connections

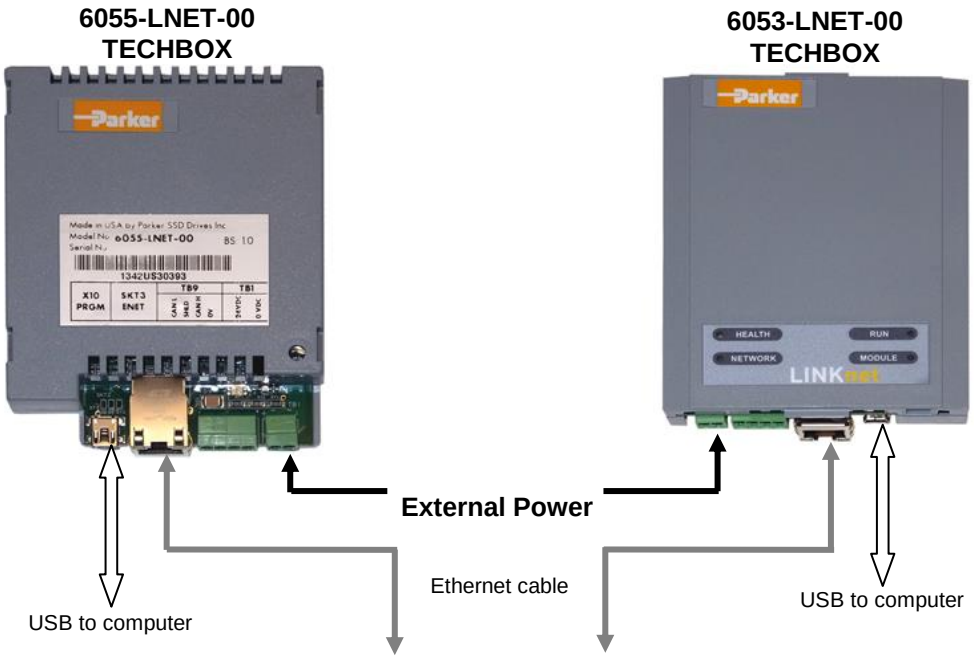


Figure 5 -Sample LINKnet Network

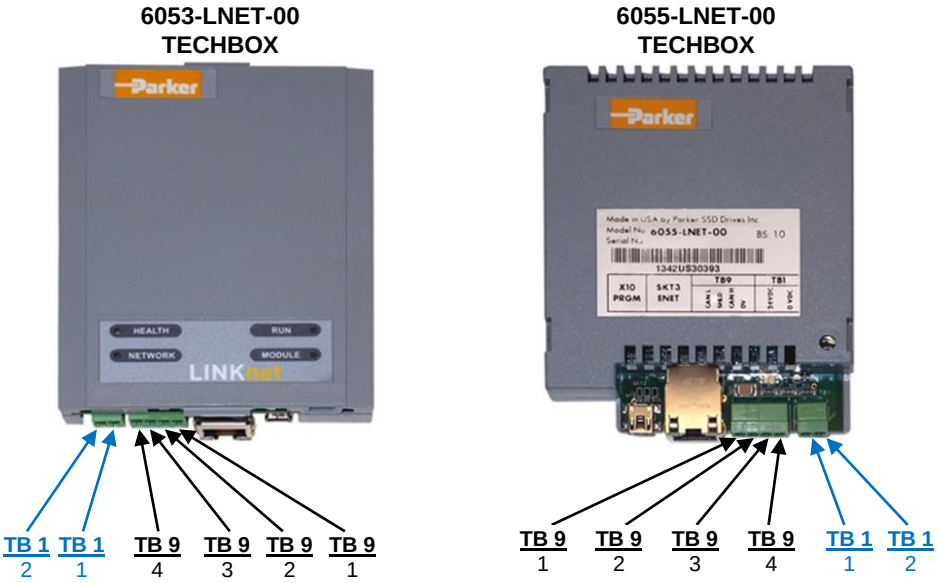


Figure 6 - LINKnet Terminations

24VDC External Power Terminal block

Techbox TB 1	PIN 1	PIN 2
6053-LNET-00	+24VDC	0V
6055-LNET-00	+24VDC	0V

(The +24V terminal is always on the inboard terminal)

Ethernet Connection – (RJ45)

The Ethernet port is primarily intended for peer to peer communications with other modules in the system. Other functions include direct support between the LINKnet module and a PC, ModBus TCP/UDP access to remote I/O, HMI's and PLCs. A computer connected to the Ethernet connector on the LINKnet module or via an Ethernet switch, can be used to install LINKnet configurations or monitor (Go On line) with any element within the LINKnet network. SSD Drives graphic configuration software package Drive System Explorer 890 (DSE890) version 3.03 and all subsequent versions support LINKnet. If you have an older version, updates may be obtained simply by contacting Parker SSD Drives Product Support.

Firmware cannot be installed into a LINKnet module, over Ethernet. The USB port must be used.

USB Computer Connection – USB mini B connector.

A computer connected to the USB socket on a LINKnet module can be used to install configurations, install firmware or monitor (Go On line) with a LINKnet Techbox. The USB cable can also supply power to the individual LINKnet module. The connector is a USB mini B socket. A USB cable is supplied with the DSE890 software package. The connected LINKnet Techbox can also forward (act as a gateway for) commands to other LINKnet Techbox connected via Ethernet. When using DSE the entire LINKnet network can be viewed using this connection. Since the USB cable can supply power to the LINKnet Techbox, a Powered USB Hub may be required, as some PC's may not have enough power on the USB port, to properly power the Techbox. If the USB cable is connected to the LnTB and it does not have the required amount of power to power the Techbox, the *Module Status LED* will flash in the *Power Fail* mode and communications will not be established.

If using this method to communicate to the LINKnet Techbox, the USB cable **MUST** be connected to the Techbox first, then launch DSE. If DSE is launched first and then you connect the USB cable to the Techbox, communications will not be established. (The USB driver does not get loaded into Windows until the USB cable is connected to the Techbox. Once this driver is loaded into Windows, DSE can detect it. DSE can only detect drivers, if it is closed.)

DSE must always be closed before connecting the USB cable to the Techbox.

External Power Connection (Optional) Terminal Block (TB 1)

The LINKnet Techbox incorporates a switch mode power supply. When the LINKnet Techbox is fitted to the 590+ or 690+ drive, the power will be supplied from the drive. If power is supplied externally from the Terminal Block TB1 connector, the Techbox will be powered from this external supply and not the drive.

Note: Power requirements: 200ma @24Vdc with a 15 to 30Vdc range. 320 mA @ 15 Vdc and 160 mA @ 30 Vdc.

24VDC External Power Terminal block – 2 pin connector (TB 1)

The plug-in connectors for TB1 are physically different for the 6055-LNET-00 TechBox, and the 6053-LNET-00 TechBox.

Techbox TB 1	PIN 1	PIN 2
6053-LNET-00	+24VDC	0V
6055-LNET-00	+24VDC	0V

(The +24V terminal is always on the inboard terminal)

CAN peer-to-peer Terminal block – 4 pin connector (TB 9)

This option is not implemented yet

The Can port will support peer to peer communication of run time data between LINKnet Techboxes.

Techbox TB 9	PIN 1	PIN 2	PIN 3	PIN 4
6053-LNET-00	CAN L	SHLD	CAN H	0V
6055-LNET-00	CAN L	SHLD	CAN H	0V

(The CAN L (pin 1) terminal is always on the inboard terminal)

Fitting the TechBox to the frame B AC690+ Drives

WARNING!
Ensure that all power is off
prior to working on the drive

The option is supplied as a "6053-LNET-00 Technology Box" which fits into the front of the AC690+ drive in place of the keypad or blank cover.

- Remove the terminal cover and screws.
- Plug the ribbon cable into the back of the TechBox and into the socket on the AC690+B drive
- Snap the TechBox into place in the recess on the front of the AC690+B
- Make all user-wiring connections. Connect all shields to the ground post on the chassis. Make a connection from the TechBox TB1 ground terminal to the ground post on the chassis.
- Re-install the terminal cover securely with the screws.

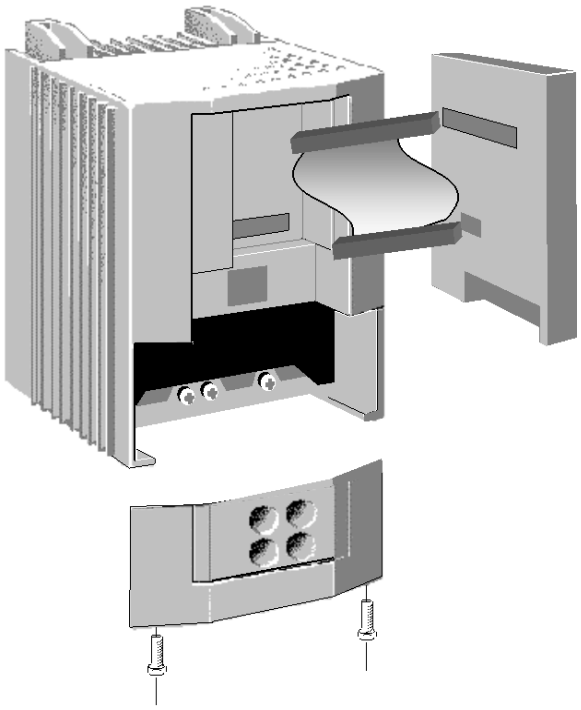


Figure 7 – 6053 *LINKnet* Installation

Note: *If permanently using the keypad with the Technology Box fitted, mount the keypad remotely using the Panel Mounting Kit with part number (6052). The connecting lead enters the AC690+ drive through the gland plate.*

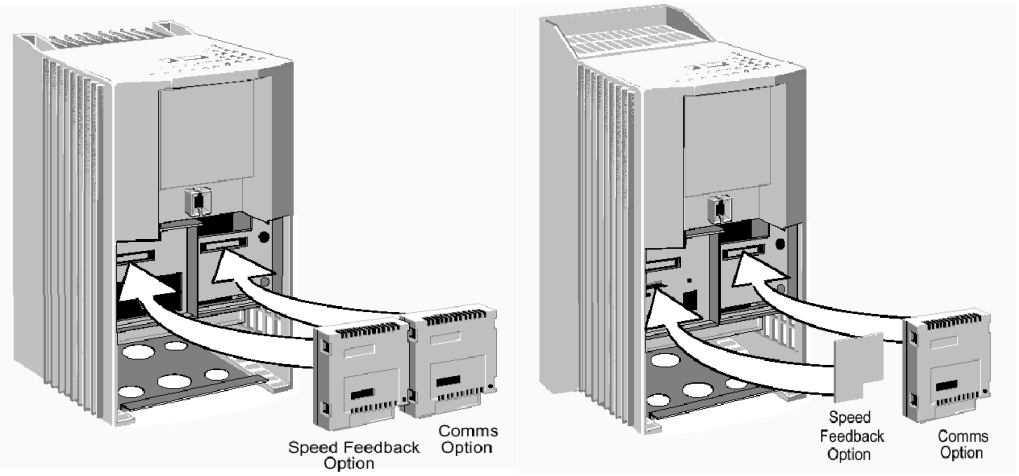
Fitting the TechBox to a DC590+ and AC690+ frames C and above

The option is supplied as a "6055-LNET-00 TechBox" which fits into the lower right front of the AC690+C - K drive.

Note: *The 6055-LNET-00 TechBox does not affect the operation of the 6051/6901 keypad.*

WARNING!
Ensure that all power is off prior to working on the drive.

- Remove the terminal cover.
- Plug the techbox into the socket located in the lower right side of the AC690+ C-K drive.
- Tighten the screw to secure the techbox to the drive. This also serves as a ground connection for the TechBox.
- Make all user-wiring connections. Connect all shields to the ground post on the chassis.
- Re-install the terminal cover securely with the screws.



AC690+ C-F frames **DC590+ all frame sizes**

Figure 8 – 6055 *LINKnet* Installation

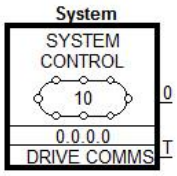
Chapter 3 - Initial Set-up

There are 2 ways to communicate to the LINKnet Techbox: USB & Ethernet

The USB port is primarily intended to use for initial set up of the Techbox and setting up of the IP address. But it can be used to install configurations, install firmware and monitor the entire LINKnet System. All of the nodes in the system will appear in the DSE Module List when using the USB. Also if there are Ethernet issues or IP address conflicts, the USB port can be used to directly connect to each Techbox for analysis. When using the USB for the first time, the USB driver must be installed. Refer to *Installing the USB driver for DSE and the LINKnet Techbox* at the end of this section.

An Ethernet connection can also be used to connect to the LINKnet Techbox. It will have a faster connection than the USB method. A pc can be connected directly to the Ethernet port or it can be connected to the Ethernet switch where all of the modules in the system will appear in the DSE Module List. When communicating to the LINKnet modules via Ethernet, the computer must be on the same subnet and the LINKnet modules. For set up instructions on using Ethernet communications, see page 15 to or if in DSE go to *HELP / LINKnet Support / Setting the computer IP Address for LINKnet access*.

IP addressing information



Each LINKnet Techbox must have a unique IP address. Each LINKnet Techbox has a unique default IP shipping address of 192.168.1.xxx. The last 3 digits will be random for each Techbox in the range of 1 - 127. When the LINKnet TB 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 Techboxes 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 TB 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 over ride 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 TB. 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 3rd 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.xxx

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

Configuring the LINKnet Techbox IP addressing

There are two ways to set the IP Address. One way is to set the IP Address is in the SYSTEM CONTROL function block, which is located in the LINKnet configuration, as shown below. If you enter an IP Address you MUST also enter the Subnet Mask address. If the IP Address in the SYSTEM CONTROL block is left at 0.0.0.0, the IP Address which is currently in the Techbox will be used. If an IP Address is set in the SYSTEM CONTROL block, it will override the present IP Address which is in the Techbox.

The remaining way is to use the USB cable and connect it directly to the individual TechBox via the USB port on the Techbox. The USB cable will supply power to the Techbox so it does not have to be fitted to a drive. To use this method, connect the USB cable to the LINKnet Techbox, then launch DSE and go to COMMAND / REFRESH FULL. The module will appear in the MODULE LIST. Then do a COMMAND / SET IP ADDRESS. Enter the desired IP ADDRESS. Then do a COMMAND / GET INO and verify this data in the SCRATCHPAD. Because of the way the USB driver loads and unloads from Windows, there is a specific procedure which must be followed. Connect the USB cable to the Techbox first then launch DSE. DSE can't be open when connecting the USB cable to the Techbox. The USB driver will not load, thus the module will not appear in the MODULE LIST. Thus if you are setting the IP ADDRESS on multiple Techboxes, after removing the USB cable from the Techbox, DSE must be closed. Then connect the USB cable to the next Techbox, then launch DSE and repeat the procedure.

The IP address of the Techbox will be set as long as there is no IP address entered in the *System Control* block. It must have an address of 0.0.0.0

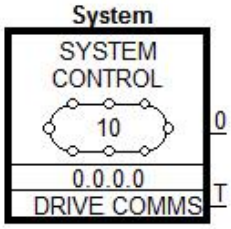
If there is an IP address entered in the *System Control* block it will get over ridden with the set entered address.

Setting the Node Address

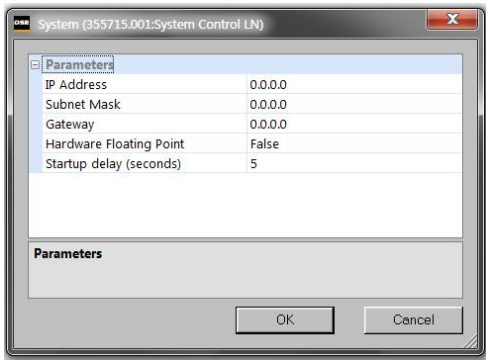
Up to 127 LINKnet nodes can be addressed in the LINKnet configuration. Thus the NODE ADDRESS range is 1 – 127.

To set the *Node Address* go to *EDIT / Net Address* and set the Node Address. The NodeAddress in the example shown below is address 10.

There is no limitation on the IP address, but they all MUST be on the same subnet.

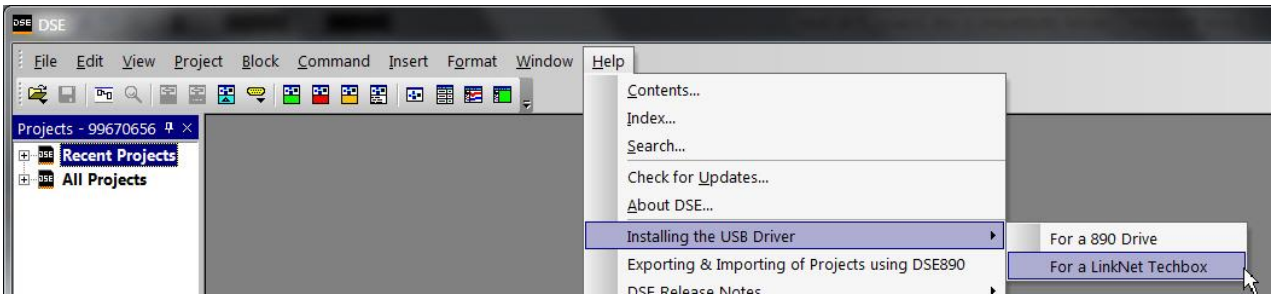


The SYSTEM CONTROL block is located in the LINKnet configuration.



Installing the USB driver for DSE and the LINKnet Techbox

When using the LINKnet Techbox for the first time, the USB **STMicroelectronics Virtual COM driver** must be installed, so DSE can communicate to the LINKnet Techbox. To do this launch DSE, go to the menu on the top, called **Help / Installing the USB Driver / For a LINKnet Techbox.** View this document and follow the instructions.

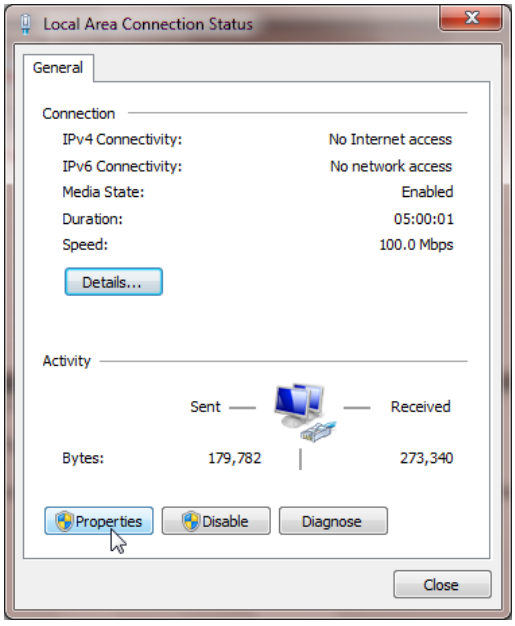


Setting the computer IP Address for LINKnet access via Ethernet

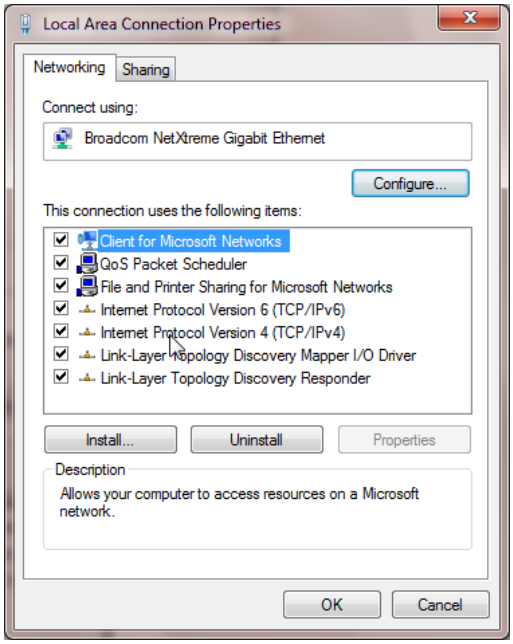
When communicating to the LINKnet via Ethernet, the computer must be on the same subnet. To change the pc settings:

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.

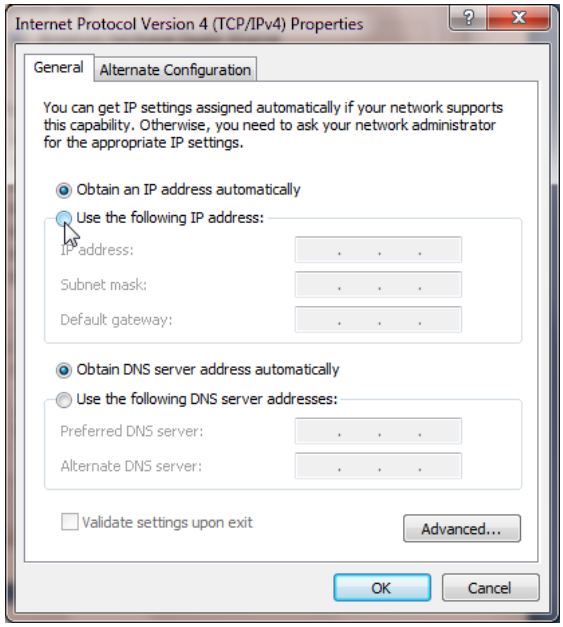
2. In the window that comes up, click on “Local Area Connection”. That should bring up a dialog that looks something like the following:



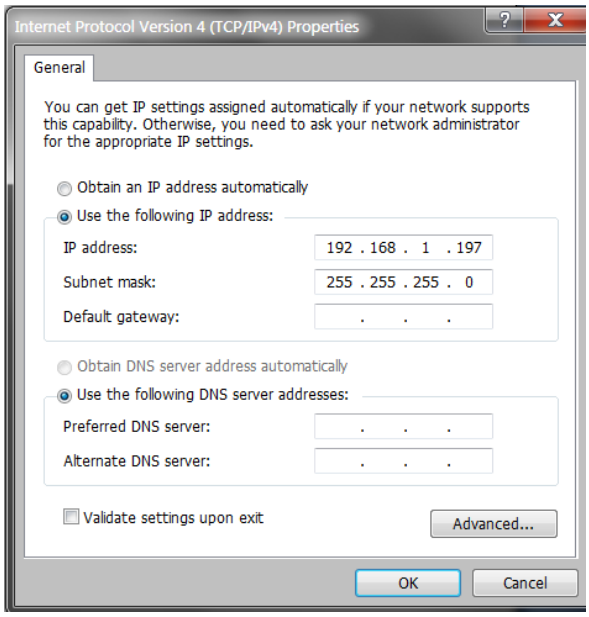
3. Click on the Properties button to bring up the Local Area Connection Properties dialog. On Windows 7 it should look something like this (it will be slightly different for XP):



4. Double click on "Internet Protocol Version 4 (TCP/IPv4)" ("Internet Protocol TCP/IP" in XP) and that should bring up the Internet Protocol Dialog that should look something like:



5. Click on the selection "Use the following IP address" and enter 192.168.1.197 for the IP address and 255.255.255.0 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. It should look something like:


Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 1 . 197
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

Configuring the Drive

MMI Menu Map

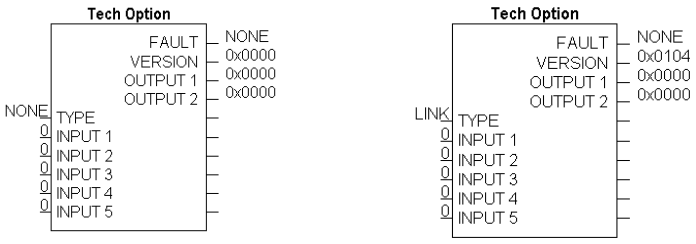
- 1 SETUP PARAMETERS
- 2 FUNCTION BLOCKS
- 3 SERIAL LINKS
- 4 TEC OPTION
  - TEC OPTION TYPE
  - TEC OPTION IN 1
  - TEC OPTION IN 2
  - TEC OPTION IN 3
  - TEC OPTION IN 4
  - TEC OPTION IN 5
  - TEC OPTION FAULT
  - TEC OPTION VER
  - TEC OPTION OUT 1
  - TEC OPTION OUT 2

The first step in using the technology option is configuring the drive to accept the TechBox. The keypad (MMI), DSE890 (SSD Drives' device level configuration software), must be used to configure the TEC OPTION function block parameters inside the drive before commissioning the *LINKnet* technology option.
The parameter names/functions in this function block are inter-dependent and will change with different parameter values and various technology options.

The Function Block diagram below shows the DSE890 parameter names, which are also displayed on the MMI if no Option is fitted or an incorrect TYPE is selected for the fitted Option.

IMPORTANT

The user must be familiar with navigating through the drive MMI menus, be able to select functions and set values and options. For further reading on this topic, refer to the appropriate drive instruction manual. If using DSE890, the user must be familiar with the software package



Under TYPE, select LINK

Parameter Descriptions

TYPE *Range: Enumerated - see below*

Selects the type of TechBox.

Enumerated Value : Technology Option

0 : NONE
1 : RS485
2 : PROFIBUS DP
3 : LINK
4 : DEVICENET
5 : CANOPEN
6 : LONWORKS
7 : TYPE 7

FAULT *Range: Enumerated - see below*

The fault state of the Technology Option card.

Enumerated Value : Fault State

0 : NONE: Normal operating mode.
1 : PARAMETER: Confirm that tag exists in the *LINK* Configuration.
2 : TYPE MISMATCH: Confirm that type of tag is valid.
3 : SELF TEST: The self test has failed. Replace TechCard/TechBox.
4 : HARDWARE: Hardware error. Replace TechCard/TechBox.
5 : MISSING: TechCard/TechBox not installed/

VERSION *Range: 0000 to FFFF*

The version of the Technology Option. If no option is fitted then the version is set to zero.

INPUTS (1–5) *Range: 0000 to FFFF*

Not used with the *LINK* Technology Option

OUTPUTS (1–2) *Range: 0 to 9999*

Not used with the *LINK* Technology Option

Other Function blocks

While configuring the "TEC OPTION", you may also insert other Link function blocks into the TechBox template. This can be done by using DSE890.

DSE890

When configuring the "TEC OPTION" function block using DSE890 the TechBox and drive can be programmed completely using the DSE890 software. Drive System Explorer (DSE890) version 3.03 or greater provides the TechBox templates for the DC590+ and AC690+ drives.

Chapter 4 - Using DSE Macros and Templates

Node Addressing the LINKnet Modules

Each LINKnet module must have a unique Node Address assigned to it.
The range allowed in DSE is 1 to 127.

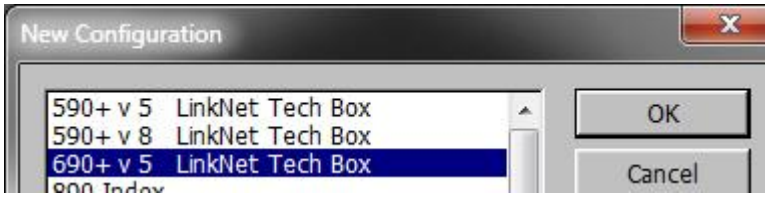
AC690+ and DC590+ Macros/Templates

The DSE program has pre-configured macros for the AC690+ and the DC590+. These macros contain a template for the specific drive. The internal drive parameters are programmed via the template and are stored in the TechBox/TechCard. The macros are loaded every time the drive is energized; thus all drive parameters are loaded into the volatile memory. DSE version 3.0 or a subsequent revision is required.

Additional *LINK* function blocks may be inserted into the Techbox/Techcard configuration.

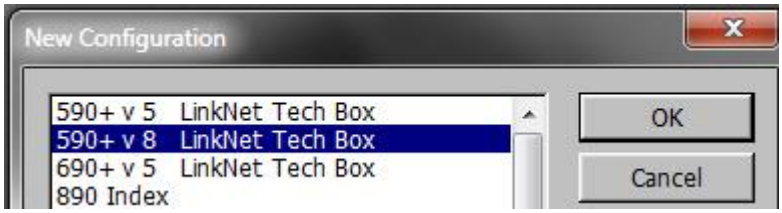
AC690+ Macro Template

The 690+ macro is selected from the **File/New** drop down menu as shown below. This **690+_v5** supports a 690+ drive with firmware version 5.x. If the drive is an earlier firmware version, it can be field upgradeable to the latest firmware, by using DSELite.



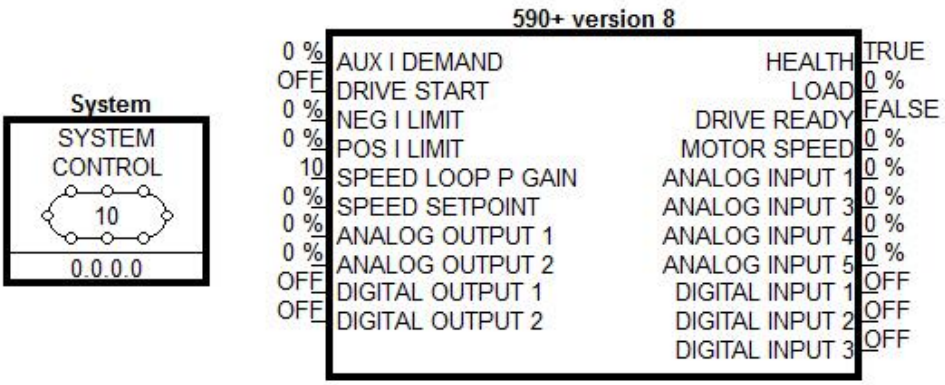
DC590+ Macro Template

The 590+ macro is selected from the **File/New** drop down menu in DSE. There are two choices: the **590+ v5 LINKnet Techbox** for a 590+ drive with firmware version 5.x and a **590+ v8 LINKnet Techbox** for a 590+ drive with firmware version 8.x drive. In DSELite the choices are the **590v5_f1.LKN and the 590v8_f1_.LKN.** A **590+ v5** template will install into a firmware version 5, 7 or 8 drive. A **590v8f1.LNK** template will install into a firmware version 8 drive only. **Note:** When using a v8 drive, make sure the firmware version is at least version 8.10 or later.

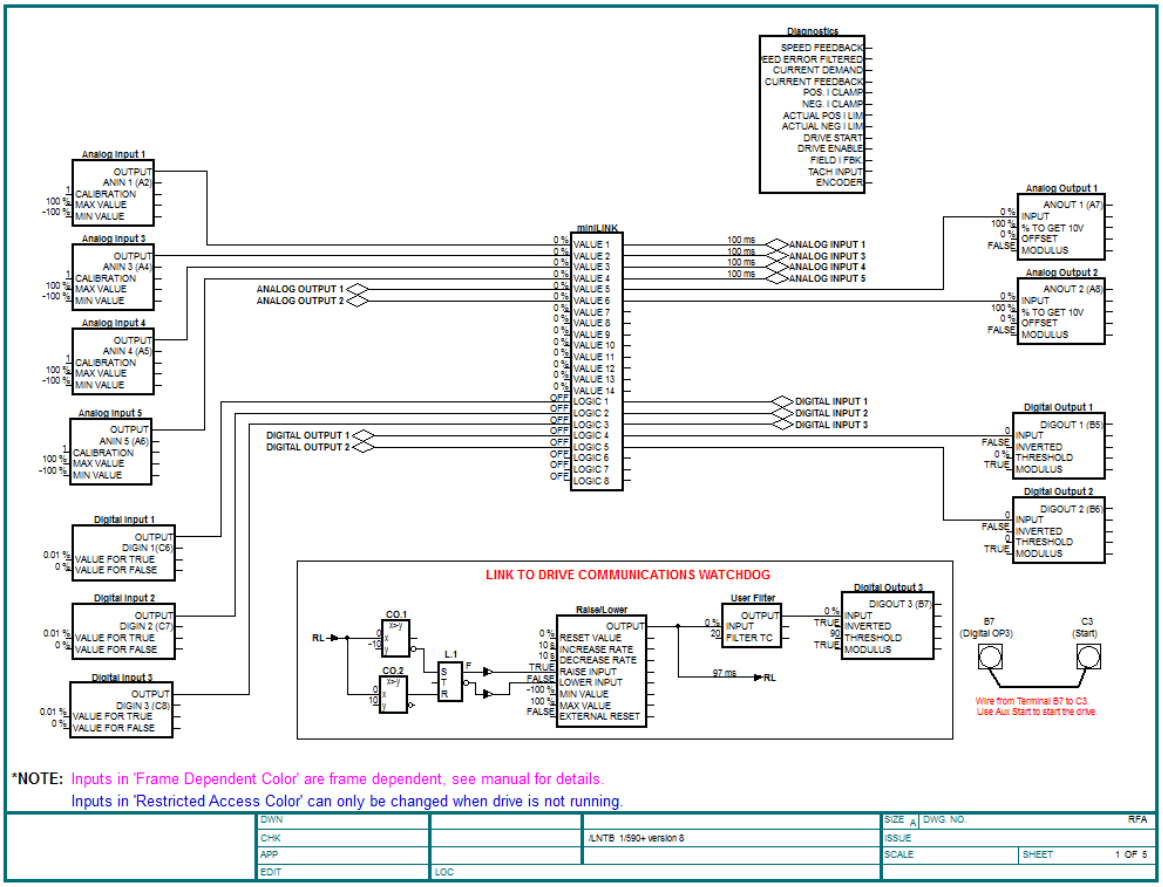


Select the applicable configuration for your drive. The program will prompt you for the module name.

LINKnet L590+ Version 8 Template



The 590+ macro has some preconfigured inputs and outputs as default. If another tag or parameter is needed, it can be added inside the macro. It is possible to use both the drives' internal function blocks and the Link function blocks. Simply double-click on the macro to access the 590+ internal function blocks.



Modifying inside the macro

All the drive functions are available through the TechBox. When using some of the DC590+ drives with firmware version 5.x function blocks, it may be necessary to use the Mini-Link block or a 'Native drive' block as the connection point to the TechBox. If a parameter is Orange in color, it must be connected to a Native drive block. The purpose for doing this is to ensure proper triggering of non-system function blocks.

***Note**: The DC590+ drive with firmware version 8.x and the AC690+ drives do not require the use of the Mini-Link block or 'Native drive' block to ensure proper triggering. Drive blocks can be connected to other blocks without a triggering problem.*

Deleting and/or moving an internal connection

The connections inside the macro can be deleted or moved in the same fashion that is used in DSE.– If the connection is only being moved from one block to another block it is not necessary to delete the external macro connection.

Inserting a new internal connection

Input connection points to the 590+ macro do not need to be connected to the Mini-Link block. When you are adding an output connection point to the 590+ macro it may be necessary to connect to the Mini-Link or system block. If the output connection point is originating from a Native drive block it is not necessary to link the connection to the Mini-Link block.

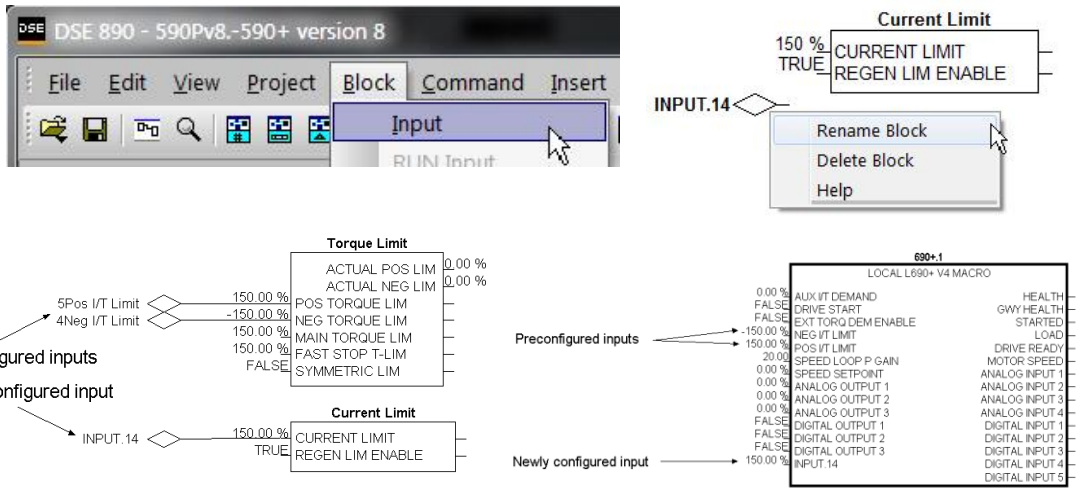
Inserting function blocks

Link function blocks may be programmed into the TechBox. *LINK* function blocks can be inserted outside or outside the macro. The function blocks are accessed in the same manner as other *Link2* modules.

Inserting and deleting macro Inputs/Outputs

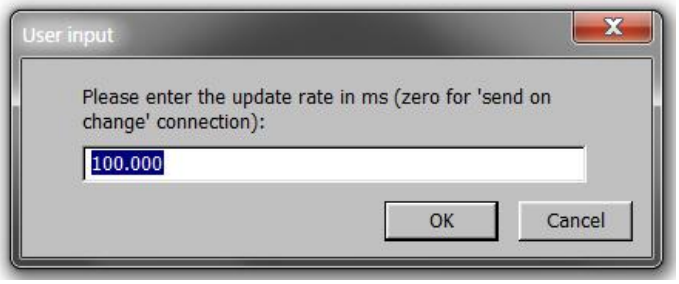
Connections in and out of the macros are made by the following methods.

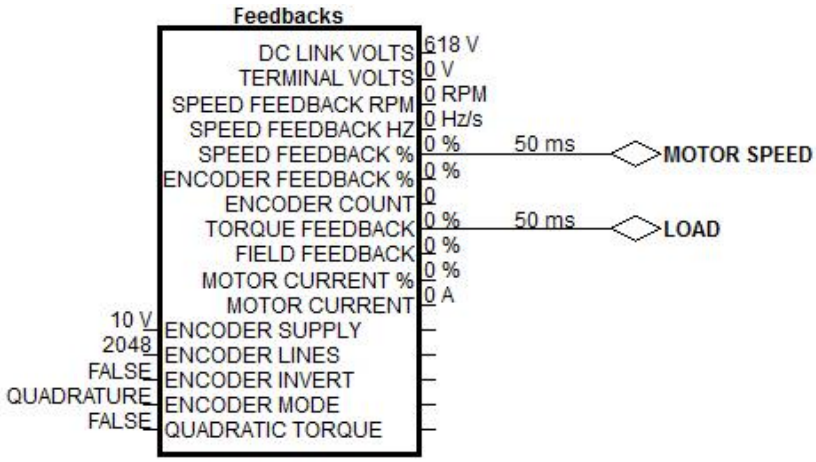
1. Selecting the inputs and outputs from the BLOCK menu will allow the I/O diamonds to be inserted into the macro. The diamond shaped Input and Output tags can be dropped anywhere inside the drive macro. Drawing a link from the Input/Output diamond to the desired connection point will make the connection to outside the macro.
2. Highlighting the tag and pressing the "DELETE" key will delete inputs or outputs. Prior to deleting the tag, be sure to disconnect all external connections to the macro.



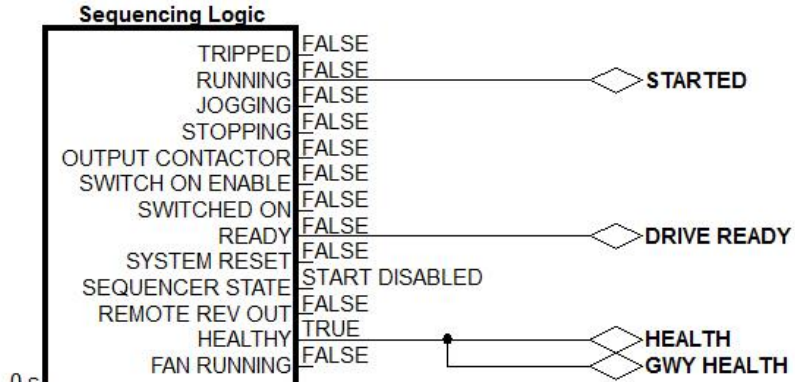
***Note**: Internal tags do not get a module address or slot address. The tag appears as a connection point on the outside of the macro. Right mouse clicking on the diamond will allow you to change the name of the tag. This name will appear inside and outside the macro. The number preceding the tag name controls the order of appearance on the macro outside connection points. The number may be changed in the same manner as changing the name of the tag. Input connection points to the 590+ macro do not need to be connected to the Mini-Link block. When adding an output connection point to the 590+ macro it may be necessary to connect to the Mini-Link or system blocks.*

3. Certain output tags will require an entry for the connection speed. The faster connection speeds require more of the CPU heap usage. If too many fast connections are made, it may be possible to run out of CPU heap and cause an "L-Error" fault. Keep fast connections to a minimum.



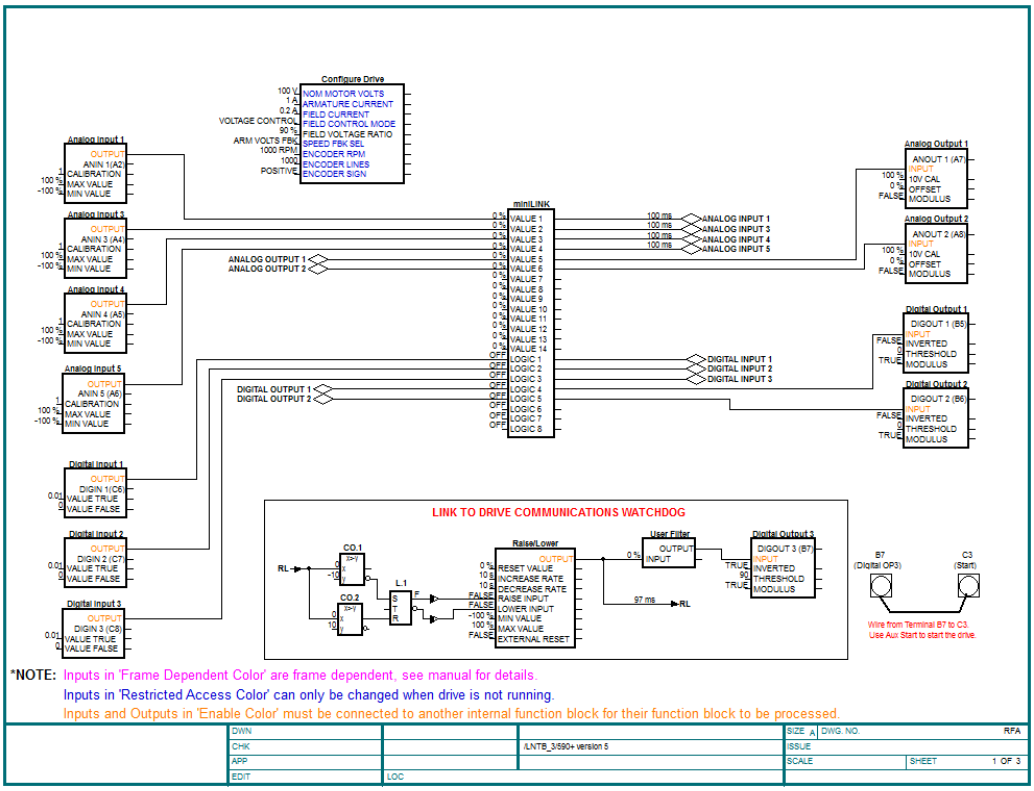


4. A Digital Input or Output will not require a connection speed as they are updated on a change of state only. Meaning that if the state is always True, an Output will not be sent until the state changes to a False. The Digital Outputs are scanned at a default rate of 100 ms. This update rate can be changed by right mouse clicking on the connection line and selecting Update Rate.

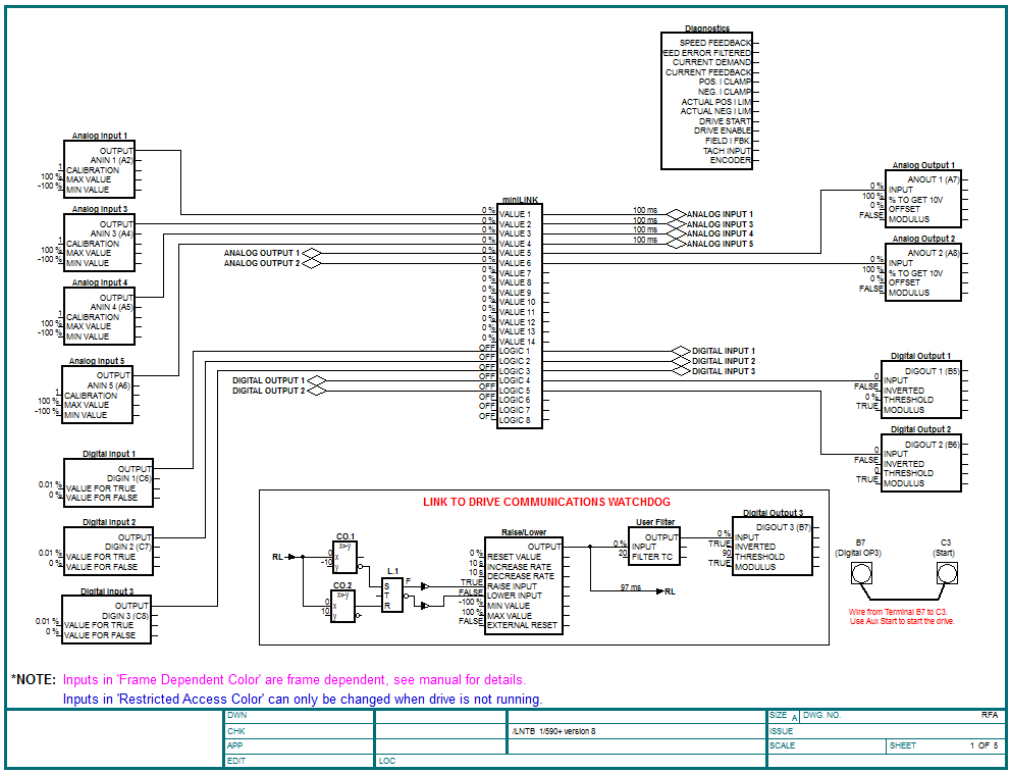


Using Drive I/O

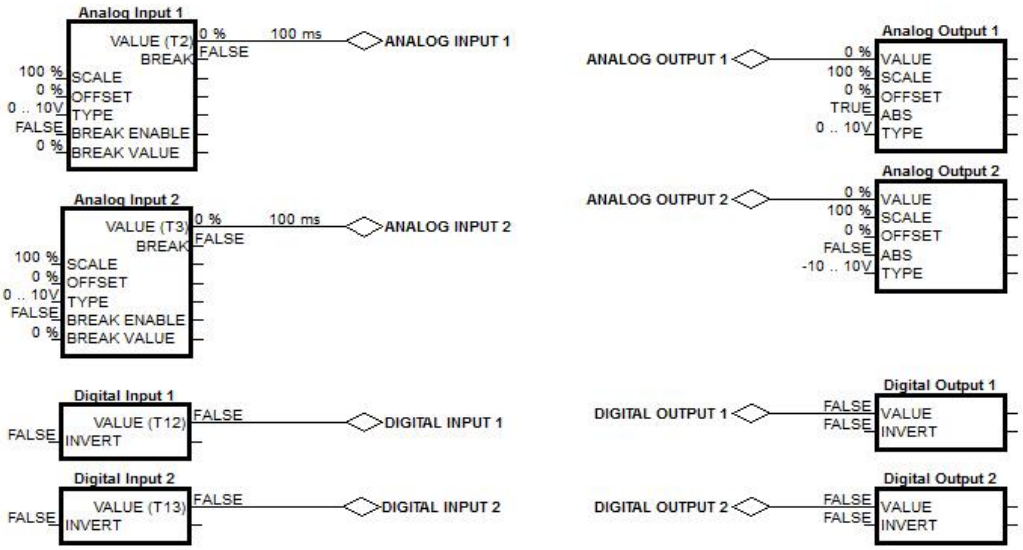
Drive analog and digital inputs are available for use as I/O for the *Link* system. The DC590+ drive firmware version 5.x requires the use of the MiniLink or system function blocks. The DC590+ drive with firmware v8.x and the AC690+ drive don't require the use of the MiniLink or system blocks. But for consistancey the Minilink block has been used in the 590+ v8



DC590+ Version 5.x Analog and Digital I/O



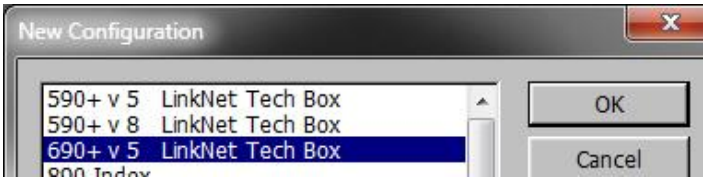
DC590+ Version 8.x Analog and Digital I/O



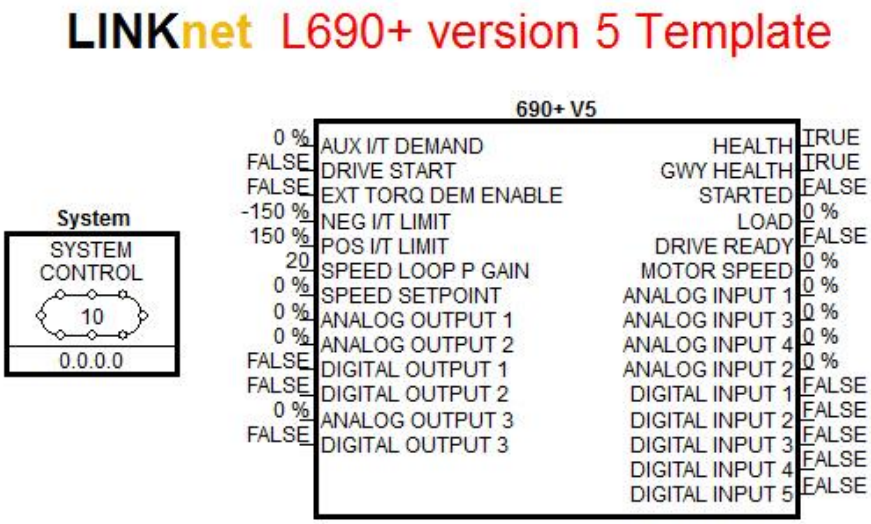
AC690+ Analog and Digital

690+ Macro Sample Configuration

Select the 690+ template from the "FILE / NEW" menu.

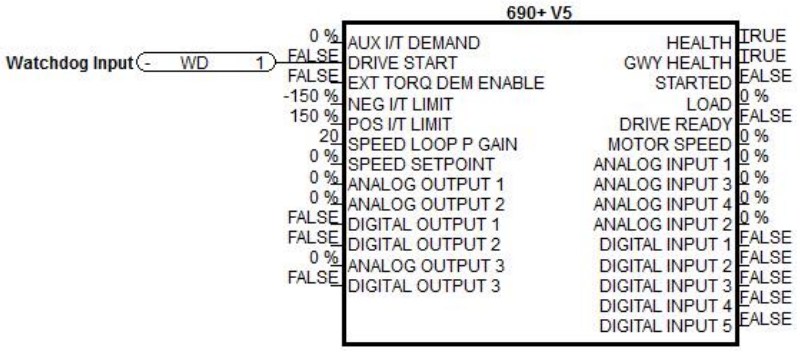


After completing the above steps you should see the 690+ macro without any Link connections as shown below.



Watchdog Circuit

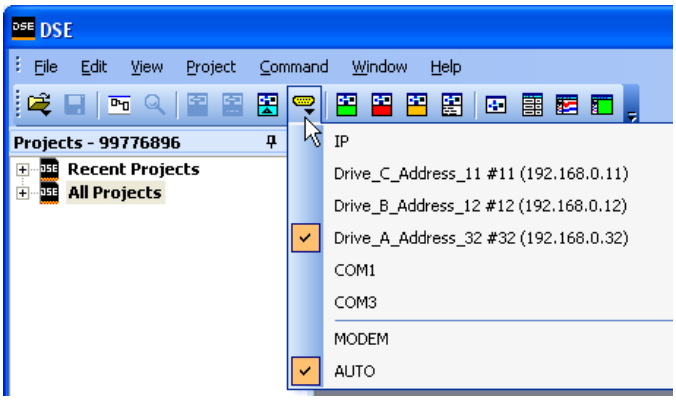
It is recommended that a Watchdog Circuit be implemented in each LINKnet configuration to stop the drive if there is a loss of Ethernet communications. Presently if there is a loss of Ethernet communications on the LINKnet drive, it will continue to run and not fault. Within DSE there is a WATCHDOG INPUT 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.



Chapter 5 – Connecting to the LINKnet Techbox

There are two ways to connect to LINKnet Techbox network. One way is using the USB port and the other way is via Ethernet. The recommended way is the Ethernet, as it is faster. The USB port can be used if there is a problem connecting via Ethernet.

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 8 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, the Ethernet is connected to.

Module list

Adrs	Name	Library	Status	CPU %	Heap %	Msg/s	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 execution of the module list.

Heap % (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 (Messages/second) Is the 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* displays the modules *IP Address* as shown below. It also shows the firmware build (shown 1.5), the firmware boot *loader* (shown 1.1) information and the *Events/s*. This is the number of vm functions blocks, executing per second.

Scratch Pad

```
-----Module Information----- Thu Feb 19 13:45:18 2015
Serial number:      1505-US-0-0100, MAC: 00:0D:46:84:68:63, IP: 192.168.1.10
Hardware:           LINKnet TB (ROM 12.0, rev. 2 hardware)
Library:    LINKnet Techbox (version 1.5 firmware) - RD470905.005, build 1.5, loader B1.1
Project:    99776898:LINKnet Examples
Configuration:      LKN_2_TS
Modification:       2
Permanent address:          10
Working address:    10
Persistents used:   0.9% (22 of 2400)
Storage used:       3.7% (38 of 1024 pages)
Heap used:          Static: 8.6%, Peak: 8.6% (1060/1060 of 11899 nodes)
Events/s: 8
Input Messages/s:   0
Status:     OK - Net Fail, drive not started
```

Installing and updating a configuration for the first time

1. Using DSE obtain a *Module List*. This *Module List* will show all of the modules in the network.
2. Open the LINKnet configuration which you want to install. Make sure the correct motor data is entered in the *Motor Data* block for the 690+ or in the *Configure Drive* block for the 590+ drive.
3. In the *Module List* highlight the module where you to install this configuration.
4. Do a *Command / Install at Selected*. This will install the Application configuration and all of the drive settings, except the *Frame dependent* parameters into the Techbox. Frame dependent parameters appear magenta in color in the configuration.
5. Perform and *Autotune* on the drive.
6. Do a *Parameter Save* either from the Drive MMI keypad of from DSE by doing a *Command / Parameters Save*.
7. Now to get the Product Code, Frame dependent and Autotune parameters back into the DSE configuration, do a *Project / Update*.
8. Open the configuration and make sure these Autotune parameters did get updated into the configuration.
9. To get the configuration and the Product Code installed into the Techbox, do a *Command / Install at Selected* or *Full Install at Selected*.

Note: For Cloning of drives, see page 31

Cloning of Drives

If the above procedure is followed, the **P C**ODE (**P**roduct **C**ode) of the drive, will be stored in the LINKnet Techbox, for that specific configuration. The P CODE is the Power Output rating of the drive, including *frame dependent and reserved menu* parameters, which are specific to each individual P CODE.

The *frame dependant* parameters appear magenta in color, in the configuration.

If this 'programmed' Techbox is removed and then installed on another or new drive of an **identical** P CODE, all of the parameters including the *frame dependent* & *reserved menu* parameters will be installed into this new drive. Thus this new drive will be an identical clone of the original drive.
If this 'programmed' Techbox is removed and then installed on another or new drive with a **different** P CODE, **none** of the *frame dependent* or *reserved menu* parameters will be installed into this new drive. Only the basic parameters will be installed.

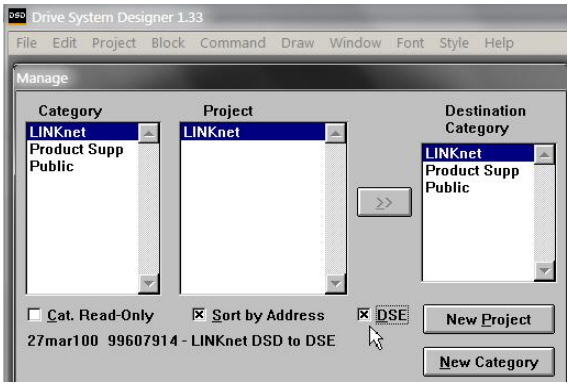
Thus motor data or other parameters will not get installed into this new drive. The drive may not operate properly or damage to the motor may occur. These motor parameters should be set in the drive and an Autotune should be performed.

If you want to get this new drives P CODE back into the Techbox:

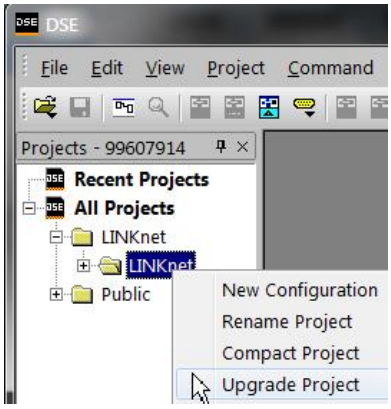
1. Set the required motor data in the drive, then perform an Autotune
2. Do a *Parameter Save* either from the Drive MMI keypad of from DSE by doing a *Command / Parameters Save*.
3. Now to get the Product Code, Frame dependent and Autotune parameters back into the DSE configuration, do a *Project / Update*.
4. Open the configuration and make sure these Autotune parameters did get updated into the configuration.
5. To get the configuration and the Product Code installed into the Techbox, do a *Command / Install at Selected* or *Full Install at Selected*.

Chapter 6 – Extracting the DSD Configuration data

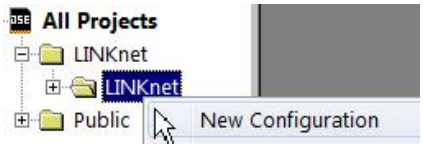
If you have an existing DSD project which contains 590+ and 690+ drives, you can extract the motor data as well as all of the configuration parameter data only and Import it into a DSE LINKnet configuration. (Parameter data only, will be imported into the LINKnet template. Connections lines' or Link blocks will NOT be imported). Thus the Autotune data can be preserved and an Autotune will not have to be performed on the LINKnet drives. Follow this procedure:

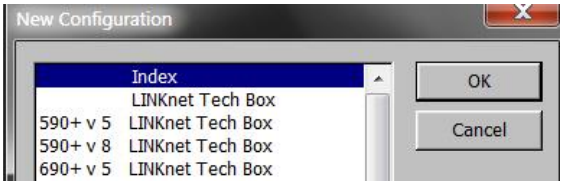


1. Launch DSD (Drive System Designer) and select PROJECT / MANAGE. Locate the DSD PROJECT which is being converted into a DSE LINKnet project. Select the CATEGORY and then the PROJECT.
2. In this example the PROJECT selected is LINKnet. To get this project to appear into DSE, select the "DSE box" as shown. Then select DONE.



3. Launch DSE and go to ALL PROJECTS as shown. The DSD project now appears as shown here in this LINKnet example.
4. Then right mouse click on the LINKnet project and select UPGRADE PROJECT. This will upgrade the DSE project to the latest, thus all of the current DSE configurations will be available including LINKnet.
5. Then right mouse click on the LINKnet project and select NEW CONFIGURATION. Then select the appropriate 590+ or 690+ LINKnet configuration. Name the configuration.

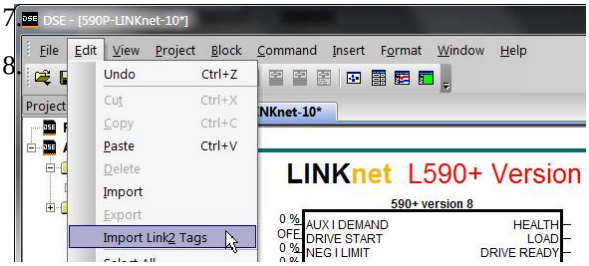


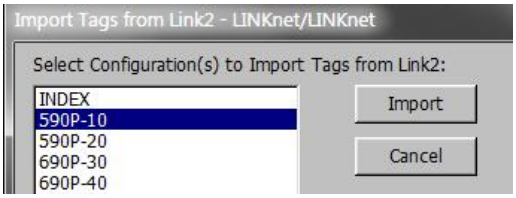


6. With the configuration open, select EDIT / IMPORT LINK2 TAGS. Then select the DSD configuration which you want to Import. Native parameter data only (like Motor current, Accel Time and etc) will be imported into the LINKnet template. Connections lines' or Link blocks will NOT be imported. Link blocks will have to be manually added.

7

8





Chapter 7 – Extracting Drive data into a new template

1. If you have an existing 590+ or a 690+ drive and you want to extract the native drive tag parameter data in to a new LINKnet configuration, this can be done. The data extracted, will be the drive native parameters only. (Like Motor current, Accel Time and etc). No connection lines will be drawn or exteacted. Also if this drive has a Link Techbox on it, none of the VM (Virtual Machine) Link parameter blocks will be extracted. Link blocks will have to be manually added. Thus the Autotune data can be preserved and an Autotune will not have to be performed on the LINKnet drive.

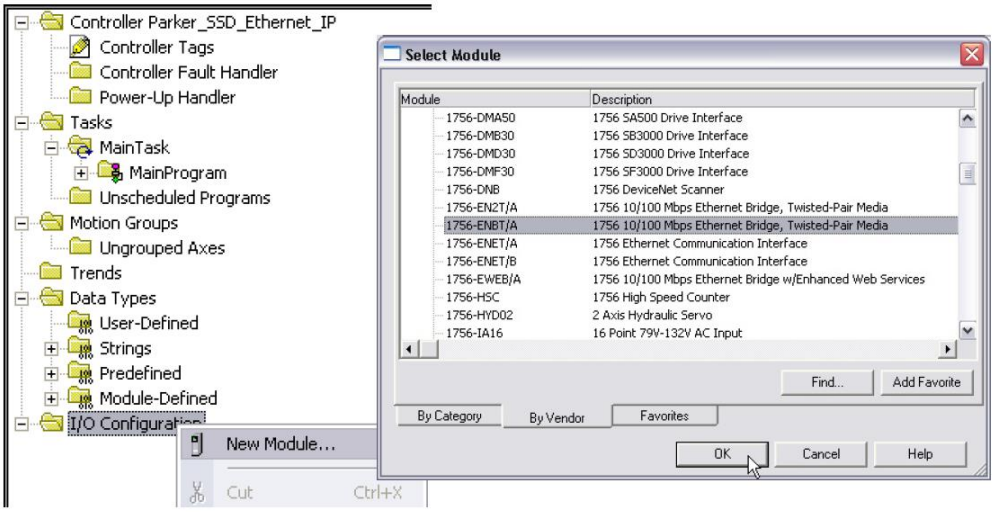
This is the procedure:

1. Launch DSE890 version 3.03 or later and open the LINKnet configuration which you want to have the drive parameters extracted from the drive. The configuration type must match the drvie type, meaning that if the drive is a 690+ the LINKnet configuration template must be for the 690+.
2. Connect the RS232 Comms cable to the P3 port of the drvie. (This is the same comms cable used when using DSELite and communicating to a standard 590+ or 690+ Digital drvie).
3. Do a COMMAND / REFRESH FULL and view the message in the Scratchpad to make sure DSE890 is communicating to the drvie. There should be a message something like: *590P version 8.10 (connected, drive NOT running)*.
4. Do a COMMAND / EXTRACT DRIVE PARAMETERS.
5. Do a FILE / SAVE. The native drive parameters have now been updated into the configuraton.

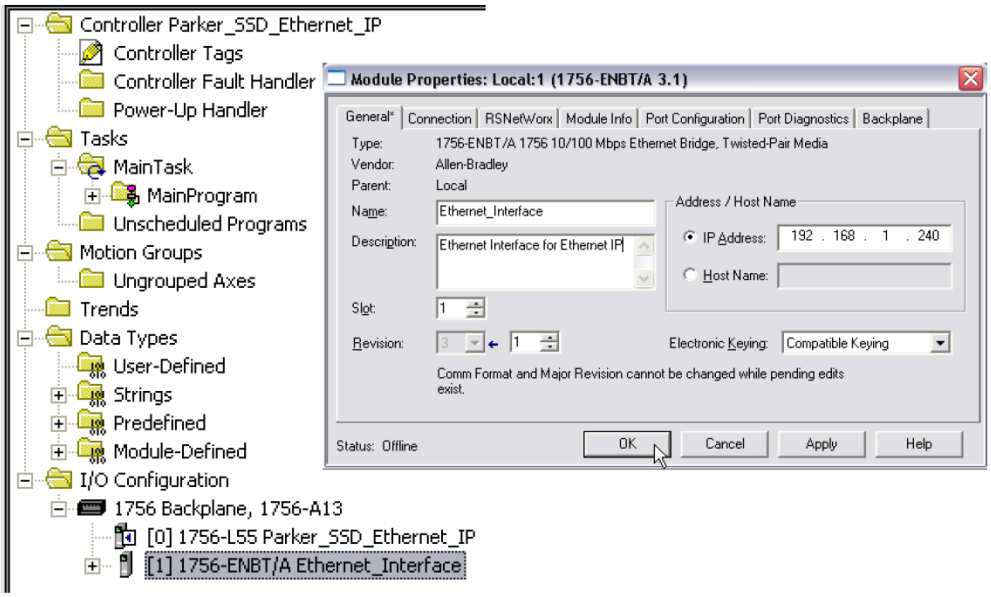
Chapter 8 – AB EtherNet /IP server (slave) Example

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 thedesired IP address and slot in the PLC.

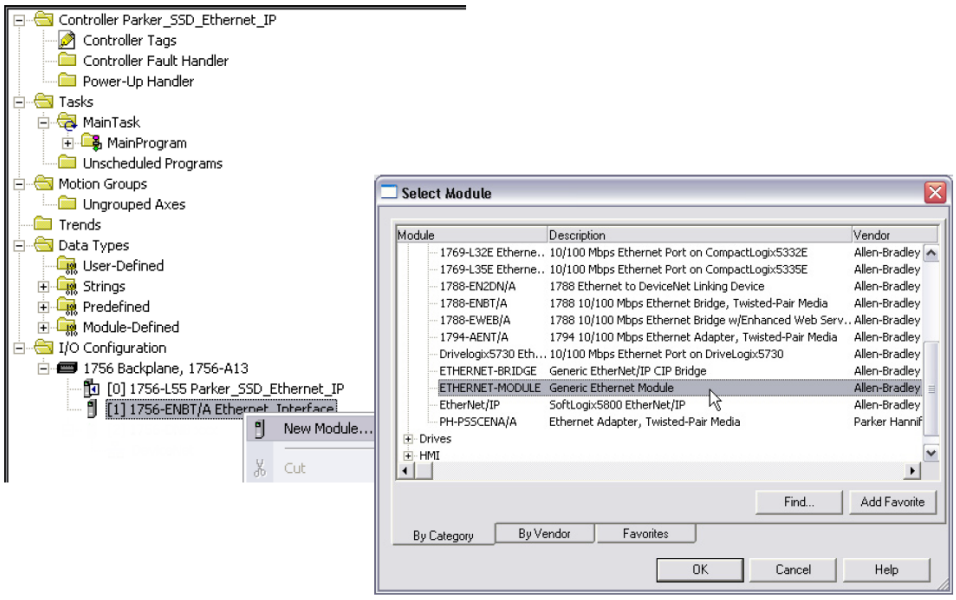


Ethernet Interface Selection



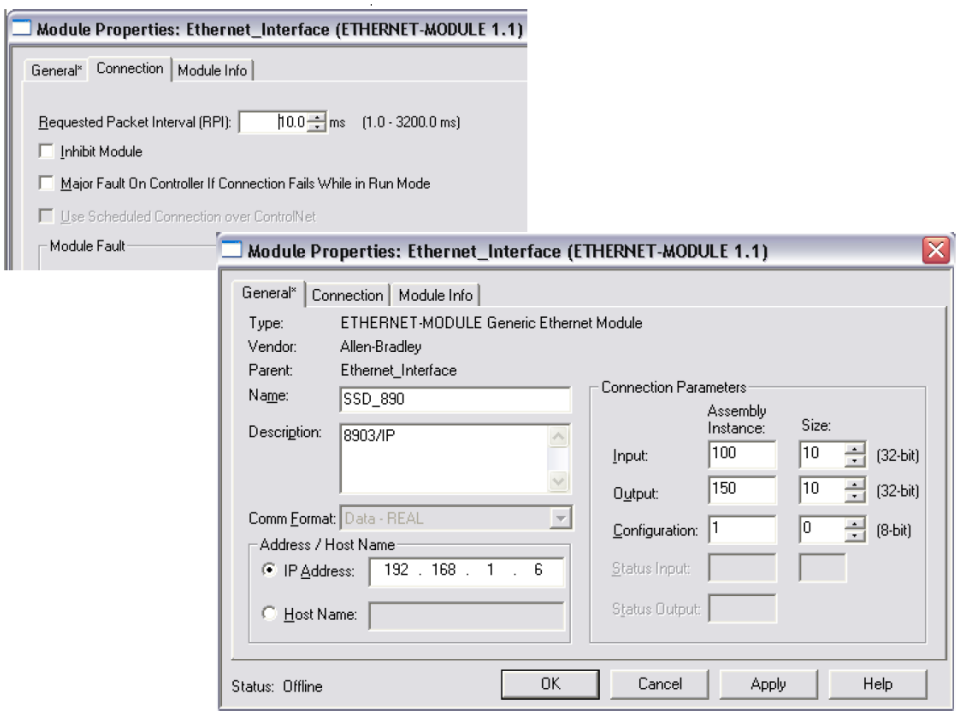
Ethernet Interface Setup

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



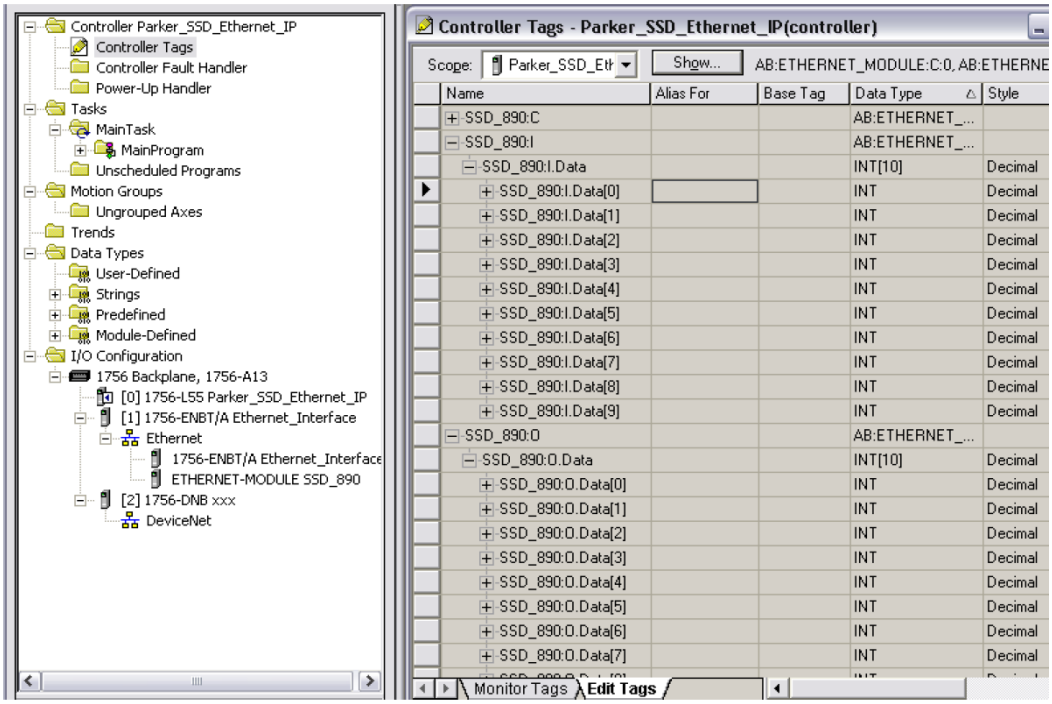
Generic Ethernet Module Select

4. 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.
5. 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

6. 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.

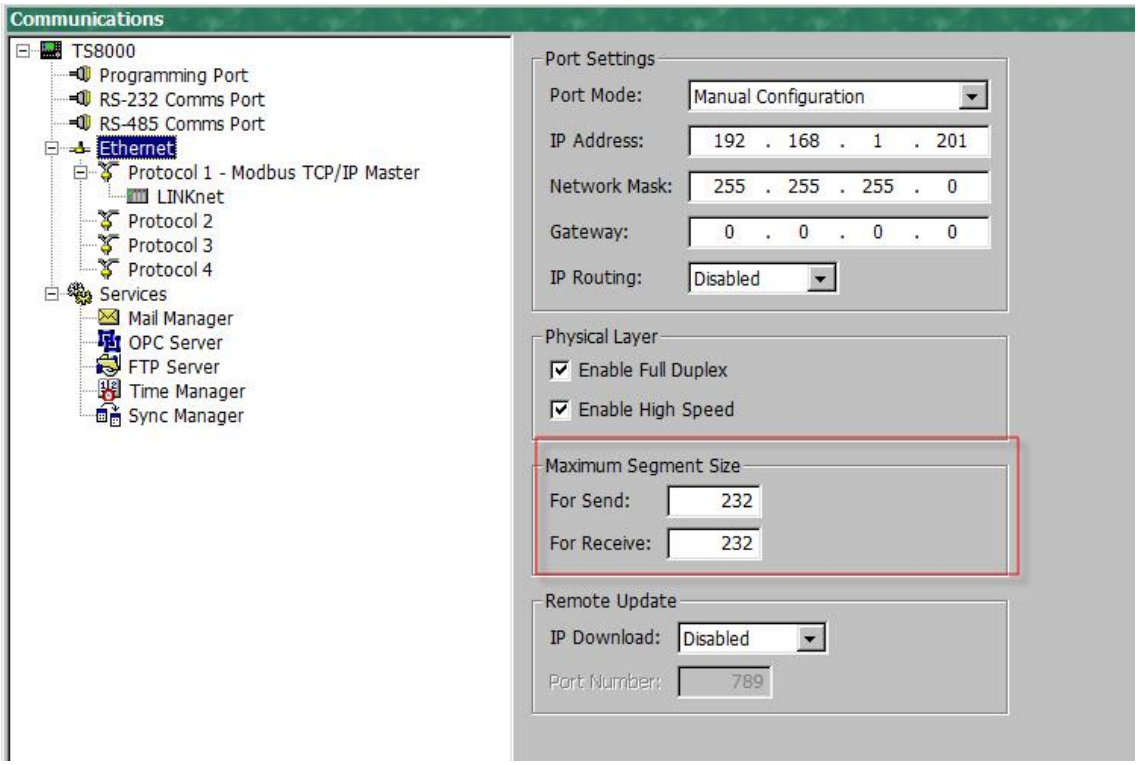


Controller Tags

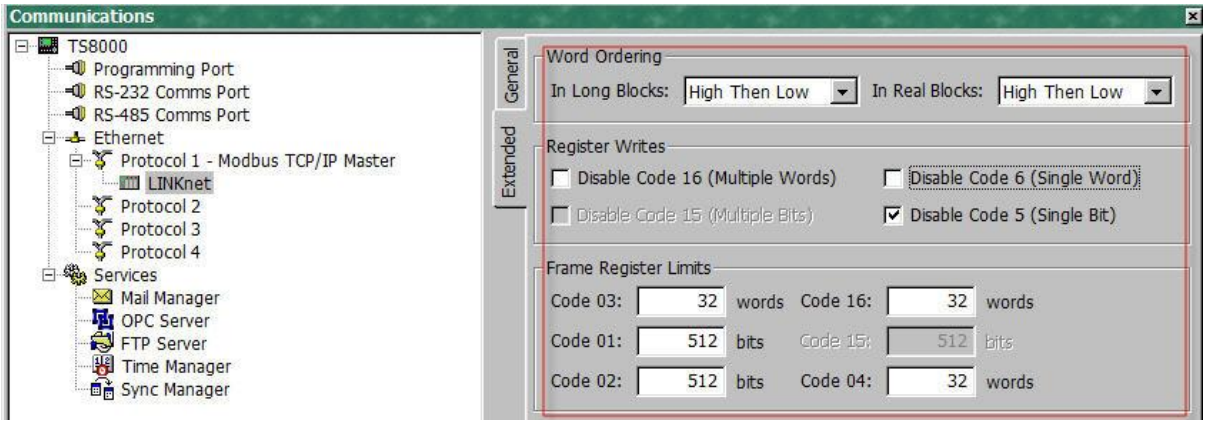
Chapter 9 – Programming TS8000

Required Modbus Settings

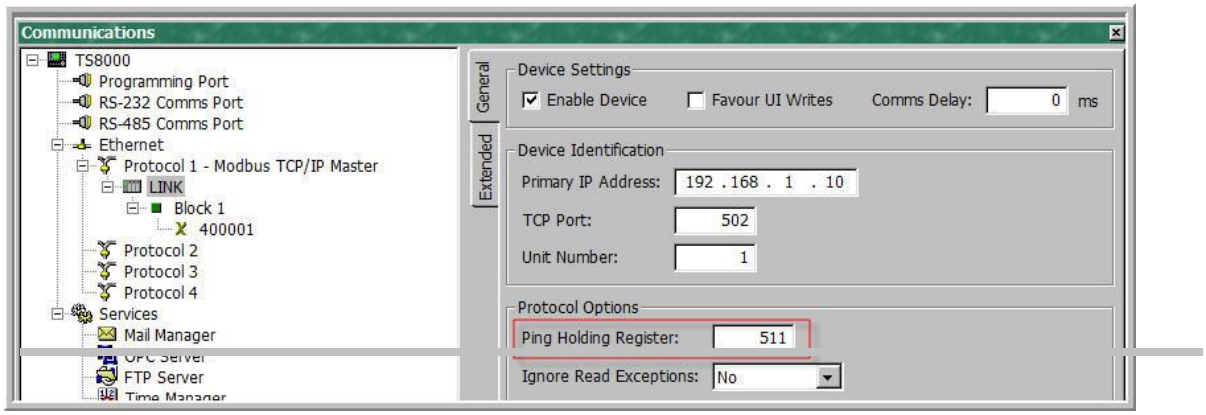
There are some settings / limits that are required for the TS8000 communications.
The *Maximum Segment* (Ethernet packet) size is 232:



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: Configurating a TS8000 to communicate to a LINKnet Techbox

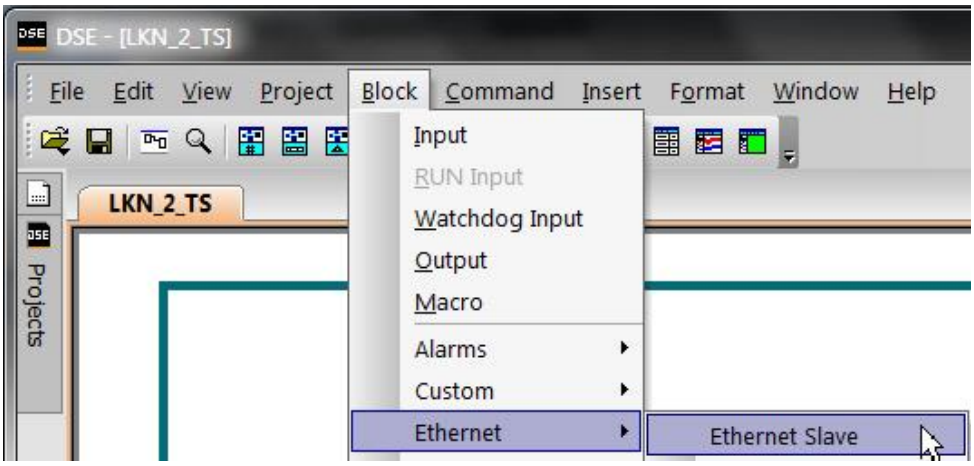
Step 1: Configuring the Modbus Slave Option using DSE

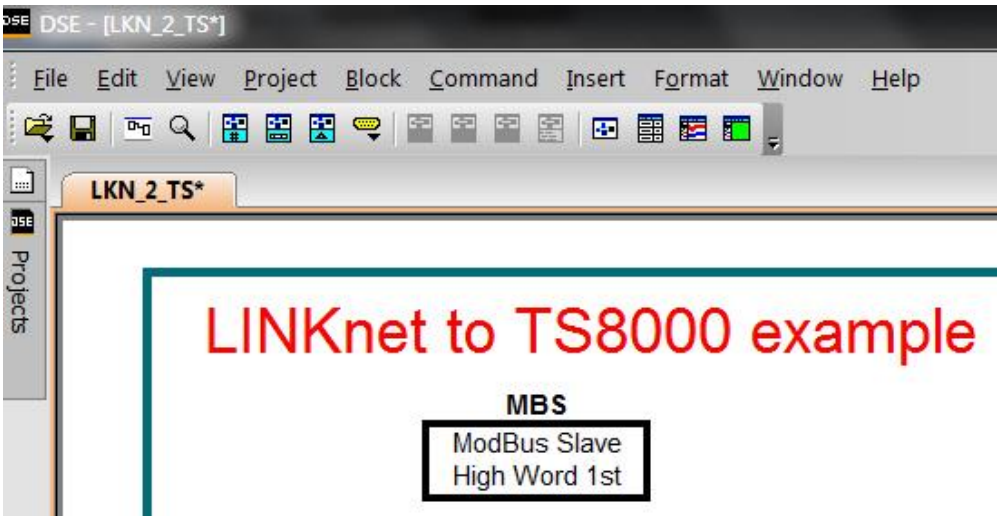
Step 1.1: Inserting an Modbus Slave Function Block

(The 'DSI' & 'DSE' Example discussed in this manual is located in the directory C:\SSD_LINK\HELP\WIN3. The files are called: LKN_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:

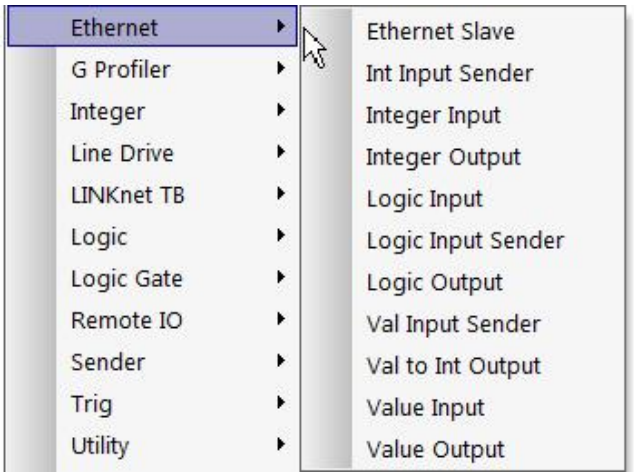
Logic Input	Integer Input	Value Input	
Logic Output	Integer Output	Value Output	FB Val to Int Output

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

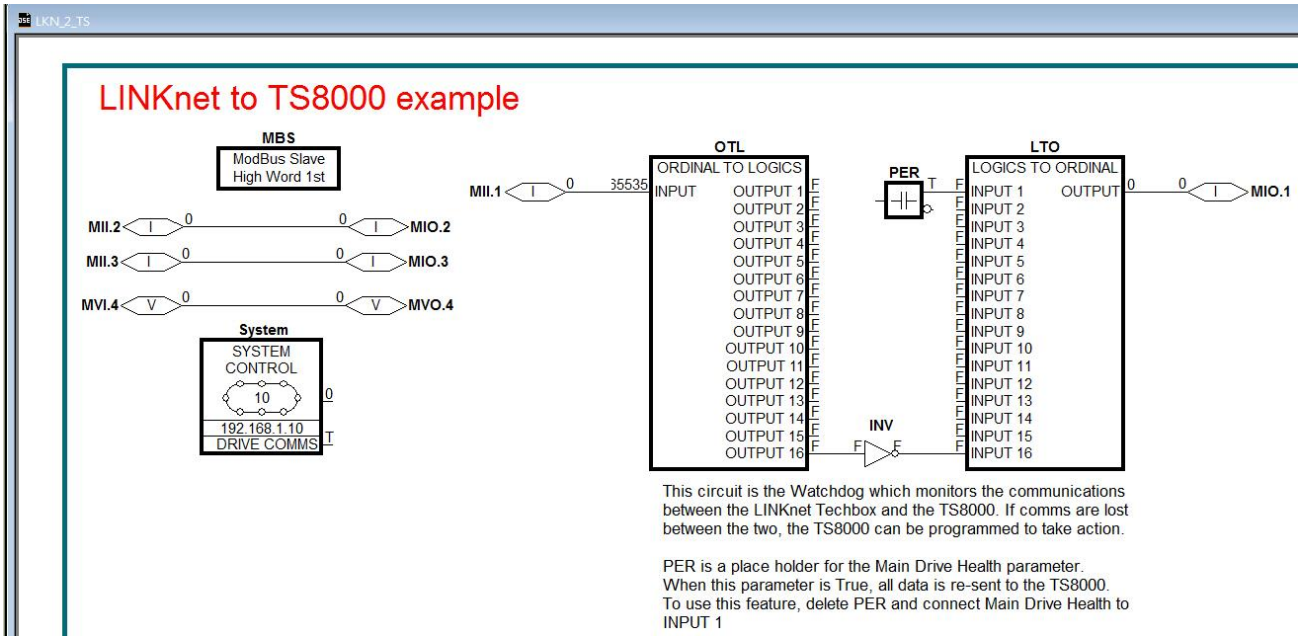
Output connector: the data is sent from LINKnet to the TS8000

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

The function block and connectors

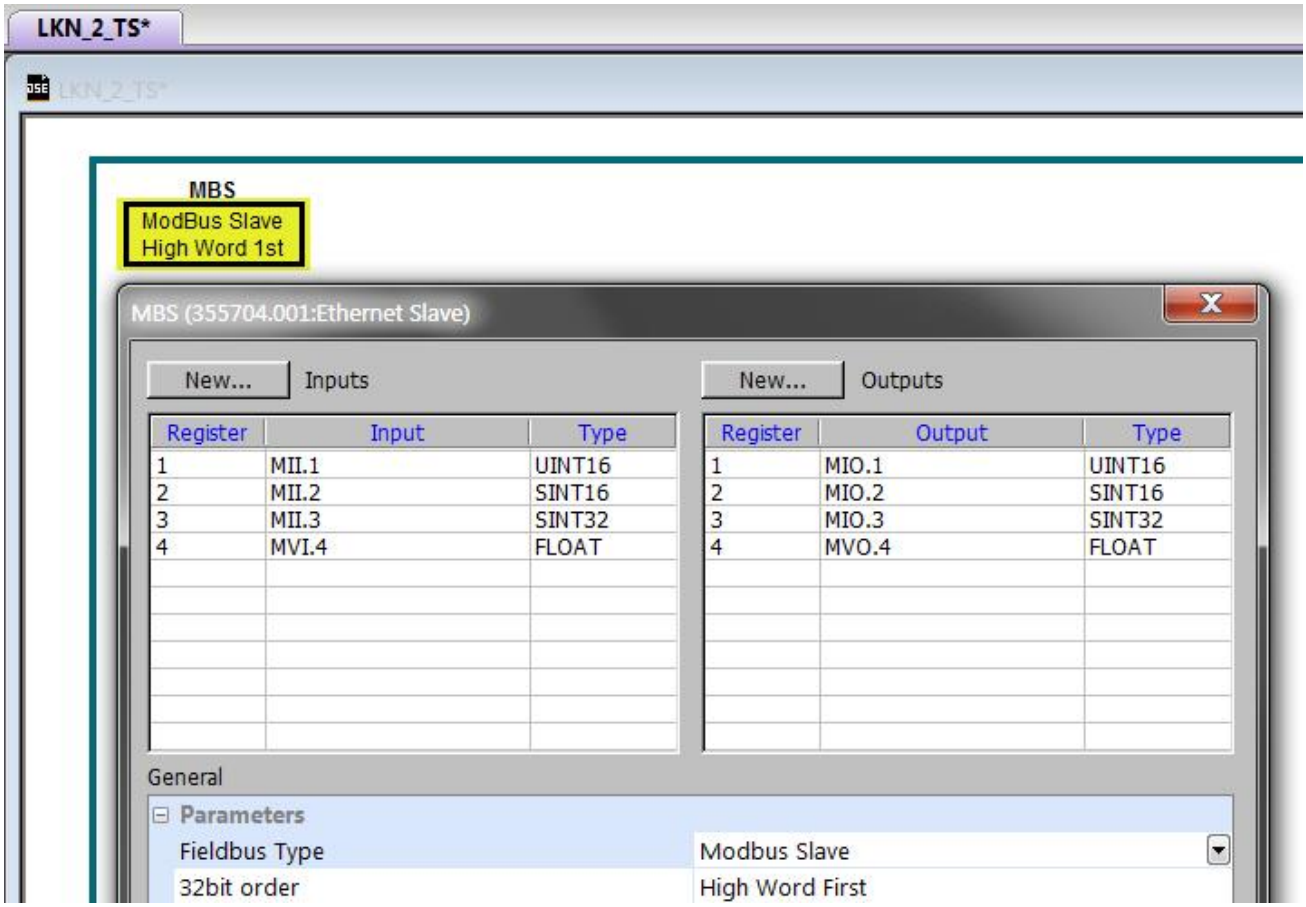


This example shows that *Integer Inputs* & *Outputs* were added along with a *Value Input* & *Output*.



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 "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.

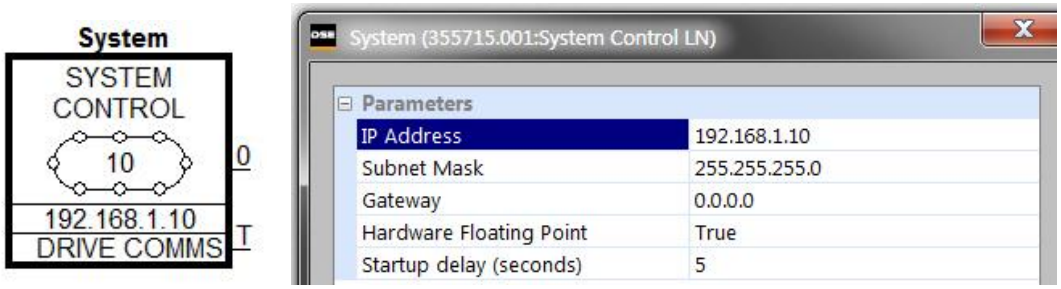
DSE Data Types

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

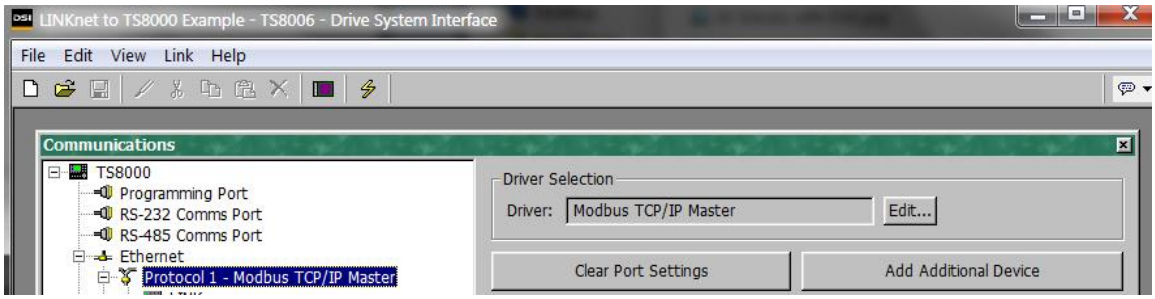
Also set up the *IP address* and the *Subnet Mask* in the *System Control* block as shown:

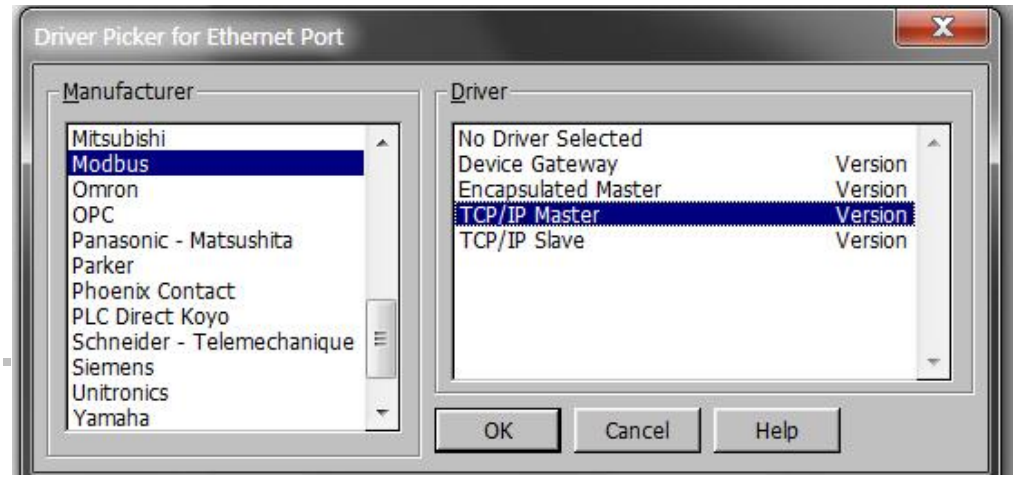


Setting up the TS8000 Operator Station using DSI8000

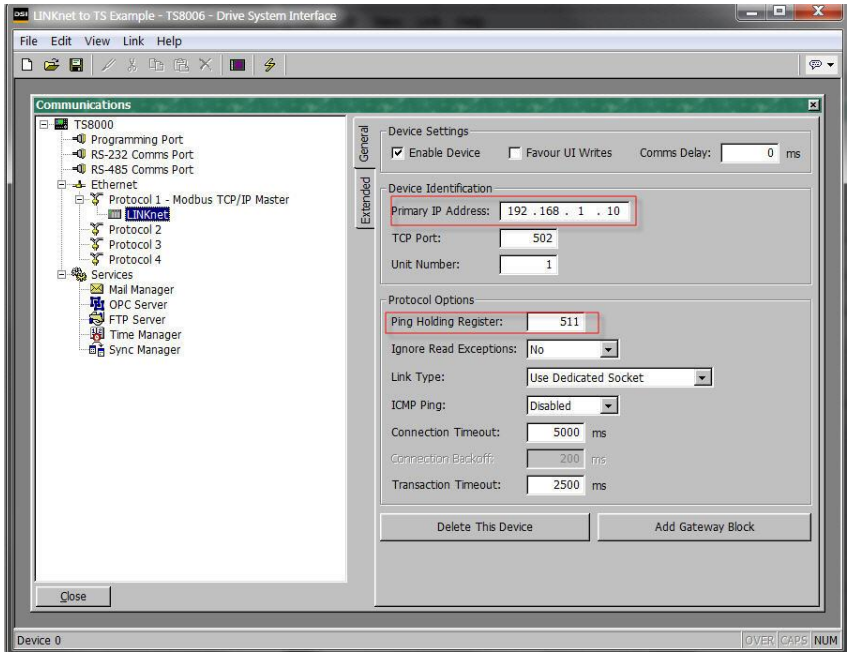
(The 'DSI' & 'DSE' Example discussed in this manual is located in the directory C:\SSD_LINK\HELP\WIN3. The files are called: LKN_2_TS.dsi & LKN_2_TS.LKN.)

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

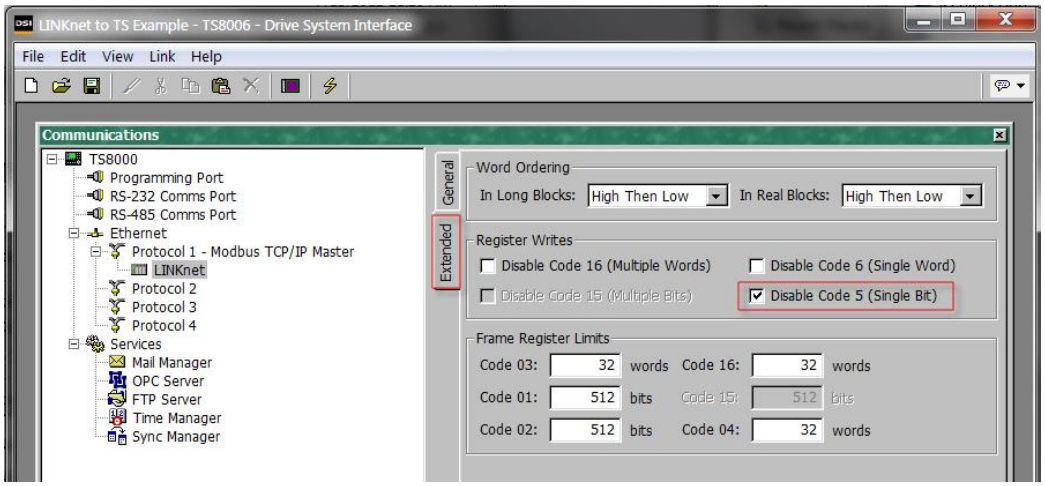




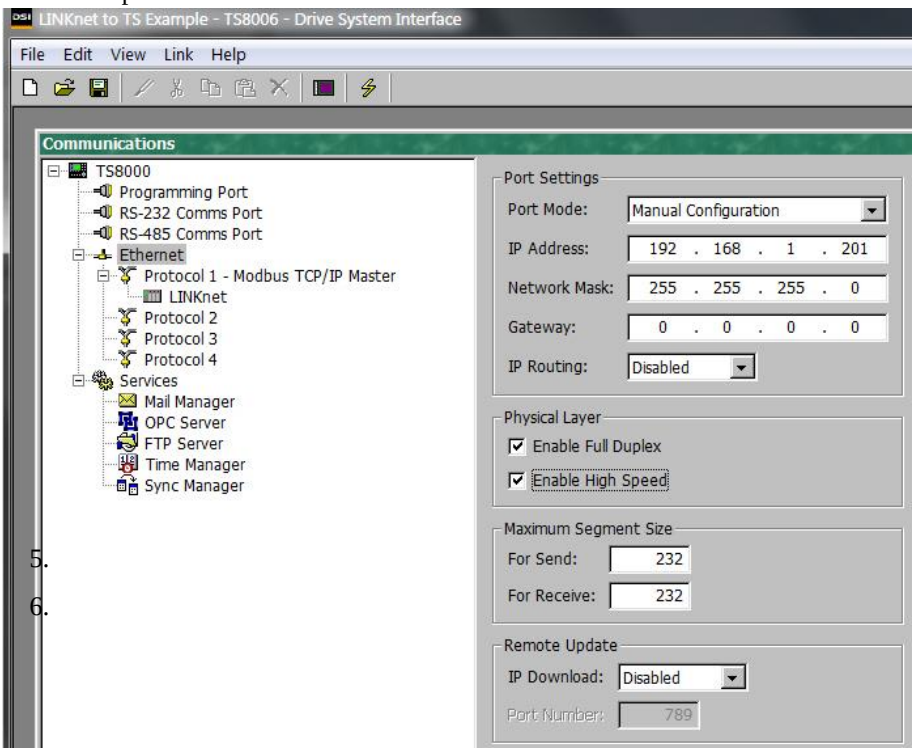
2. Set the *Primary IP Address*. The *Ping Holding Register* **MUST** be set to 511 or 0 which disables it.



3. In the *Extended* menu check the '*Disable Code 5 (Single Bit)*", as shown.



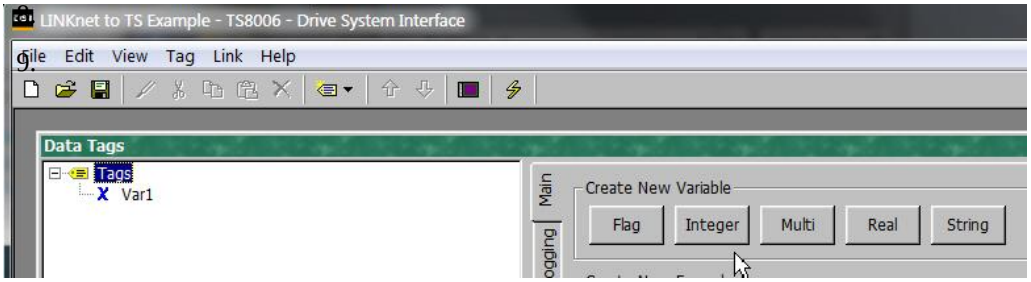
4. Set up the Ethernet as shown



5.

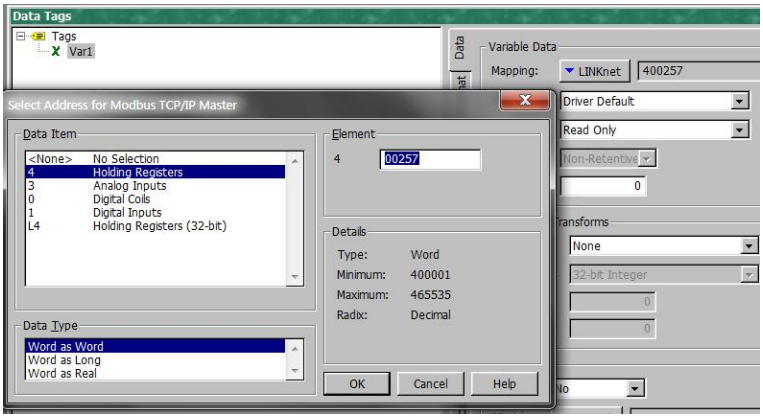
6.

7. Create the Data Tags for reading and writing variables. Please see the example for pre definmed Data Tags.



9.

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:

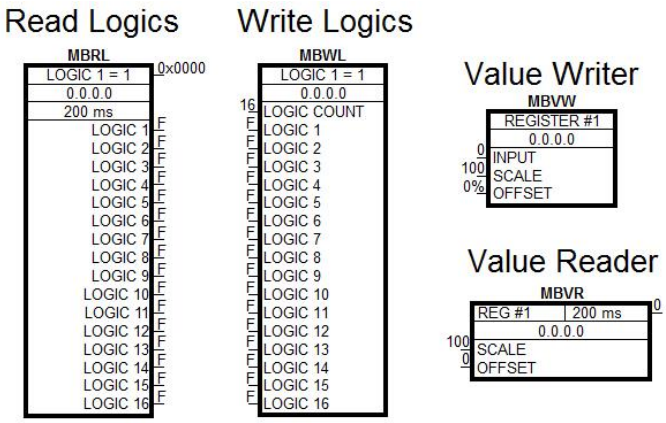
VM TYPE	MODBUS	# Reg	Description
Logic Input	SINT16	1	input = bit 0 of modbus register
Logic Input	UINT16	1	input = bit 0 of modbus register
Logic Input	SINT32	2	input = bit 0 of modbus register
Logic Input	UINT32	2	input = bit 0 of modbus register
Logic Input	FLOAT	2	input is 0 if input is 0.0, otherwise 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

Chapter 10 - Using Remote I/O

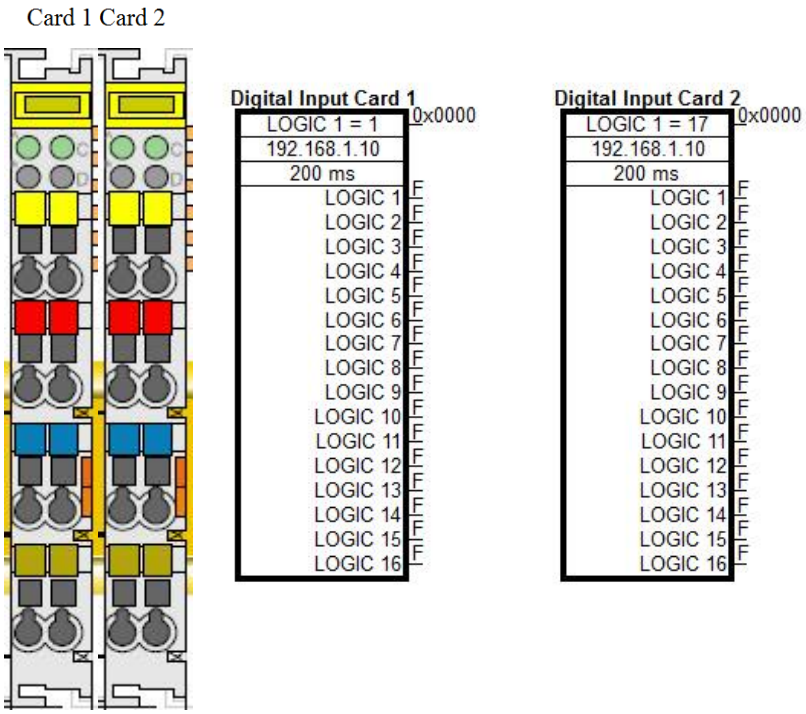
DSE contains function blocks, which allow LINKnet to communicate to SSD Recommended* Remote IO devices such as Analog IO and Digital IO as well as other types of hardware, which use the Modbus UDP protocol. There are function blocks in the *Block / Remote IO* menu: *Read Logics*, *Write Logics*, *Read Values* and *WriteValues*. 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 Dgital modules there are and how many Analog modules there are.



For example let's say there physically 2 Digital Input cards with16 channels each. To access the 1st 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 1st 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 1st set of 16 Logic Channels.

Now to access the parameters on the 2nd 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 2nd set of 16 Logic Channels. It does not make a difference where this 2nd Digital Input card is located in the Remote IO rack, as long as it is the 2nd 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 2nd Digital Input card, use the 2nd *Read Logics* block parameters *Logic 1* to *Logic 16*.

Example of Digital Input cards16 Inputs each card using the *Read Logics* blocks.

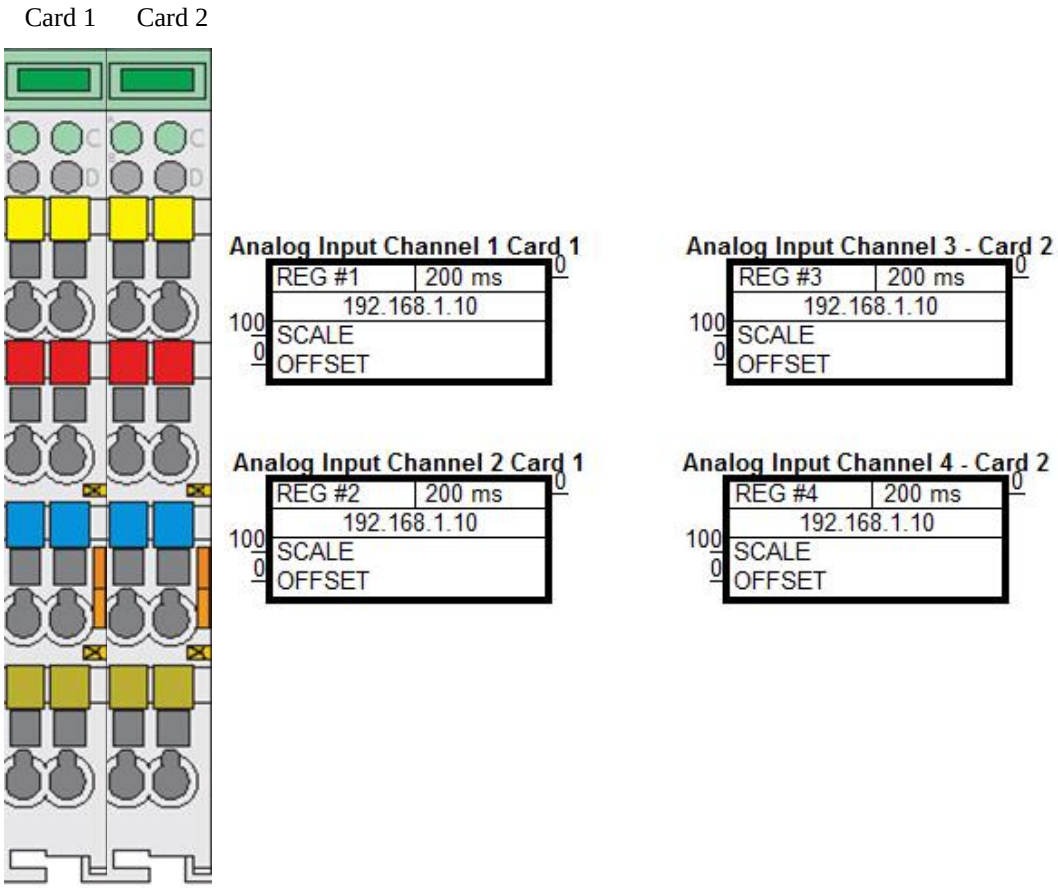


Example of 2 Digital Input 16 Channel Cards and the configuration to access these parameters using *Read Logics* blocks.

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 form 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 2nd 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

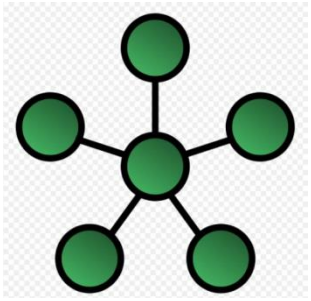


Example of 2 Analog Input 2 Channel Cards and the configuration to access these parameters using *Value Reader* blocks.

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

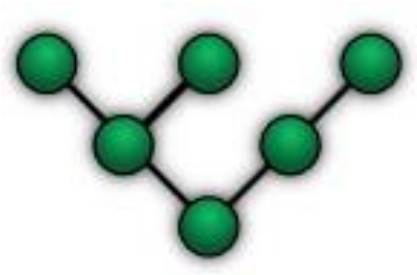
Chapter 11 – Ethernet Network Topology & EDS file

When configuring the Ethernet topology – i.e. connecting the LINKnet Techbox's 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 dowmloaded from **www.parker.com/ssdusa/software** under the **Communication Files** menu.

Chapter 12 – Troubleshooting

6055-LNET-00
TECHBOX

6053-LNET-00
TECHBOX

Health and Run LED's

Health and Run are drive functions and are not associated with the operation of the technology feature.

On the AC690+ frame B the Techbox is mounted in place of the keypad or blank cover. The Run and Health LED's from the keypad are replicated on the face of the Techbox. The bottom two LED indicators are for the Module (located on the right hand side) and Network (Power On status), located on the left hand side..

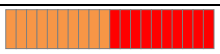
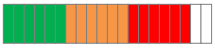
On the AC690+ frames C and above and DC590+ the Run and Health LED's are on the drive itself. Located on the TechBox are 2 LEDs that indicate the Status of the Module and the Power on.

Network (Power On LED)

This indicates that the LINKnet Technology Box Option has power applied to it.

LED STATE	FAULT	DESCRIPTION
OFF	No Power	Apply power to drive or supply external power via terminal connector TB1.
ON (Red)	None	Module has power applied to it.

Module LED Status

NCP State	Techbox State	LED Indication – 1 second period[E]	Blink Code (1second[E])
0 Initializing	Initializing	Green 10 % : Off 90 %	
1 Halt	Config	Red 95% : Green 5%	
2 No Config	Fault	Red 50% : Off 50%	
3 L-Error	Fault	Green 50% : Red 50%	
4 H-Eror	Fault	Orange 50% : Red 50%	
5 Self Test Fail	Fault	Green 50% : Orange 50%	
6 Shutdown **	Stopping	Green 30% : Orange 30% : Red 30% : Off 10% (over a **8 second period)**	
7 OK	Running	Green 95% : Off 5%	
8 Power Fail disabled **	Running	Orange 25%:Green 50%:Off 25% (a very slow blink over a **2 second period)**	
9 Network Failure	Running	Green 50% : Off 50%	
A Checking Network	Starting	Green 25% : Off 75%	
B Peer Halted	Starting	Red 50% : Green 35% : Off 15%	
C Duplicate Address	Fault	Green 75% : Red 25%	
- Debugging	Fault	Red 25% : Off 75%	
- Identify USB power *	Running	Orange 25% : Off 75%	
- Identify drive power *	Running	Orange 50% : Off 50%	
- Identify External power *	Running	Orange 75% : Off 25%	
- Hardware Initialization	Fault	Orange 25:Red 25:Orange 25:Green 25	

*When using DSE and a COMMAND / IDENTIFY is performed, the LED will flash at this Blink Code indicating where the Techbox power is coming from, either the USB port, drive power or External power.

** To clear this fault all power must be removed from the Techbox and the USB cable must not be disconnected from the Techbox.

[E] LED blink duration is 1 second, except as noted

Chapter 13 – Compliance

* Recommended Ferrite Core for Ethernet cable to meet CE EMC radiated emission (Ferrite Core, Parker part number **DJ467799**).
* The Ferrite Core and CAT 6 shielded Cable are needed to meet Class A limits of standard EN 61800-3:2004

6055-LNET-00 TECHBOX with FERRITE CORE Installed

Chapter 14 – Technical Specifications & Performance

Environmental

Operating Temperature:	0ºC to 45ºC (32ºF to 113ºF)
Humidity:	Maximum 85% relative humidity at 40ºC (114ºF) Non-condensing environment

Supply

Supply Voltage:	Internal power supply is taken from the drive But it can be supplied externally

External Supply

Voltage Range:	15 to 30 VDC nominal
Current draw:	320 mA @ 15 VDC 200 mA @ 24 VDC 160 mA @ 30 VDC

Physical

Height:	5 inches
Width:	3 inches
Depth:	1 inch
Weight:	0.2 pounds

Performance

- A LINKnet TechBox has about the same configuration capacity as a Link 2 Techbox.
- With no Application data installed into the LINKnet TB:
  - A LINKnet module can process approximately 10,000 messages / second.
  - A Link 2 module can process approximately 1000 messages / second.
  - A 890 Drive can process approximately 2000 messages / second.
- Buss Speed:
  - A LINKnet module is Ethernet based with a buss speed of 100 Mbps.
  - A Link 2 fiber Optic module operates at 2.6 Mbps.
  - Just because the buss speed is faster in LINKnet, it doesn't mean that the data can be sent that fast. It has to be processed first and then sent.

Chapter 15 – Recommended Auxiliary Products

Remote IO:

We recommend the following: Wago Seires 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 ±10V/0-10V
750-557 Analog Output Module 4 Channel ±10V/0-10V

Unmanaged Ethernet switches:

N-Tron

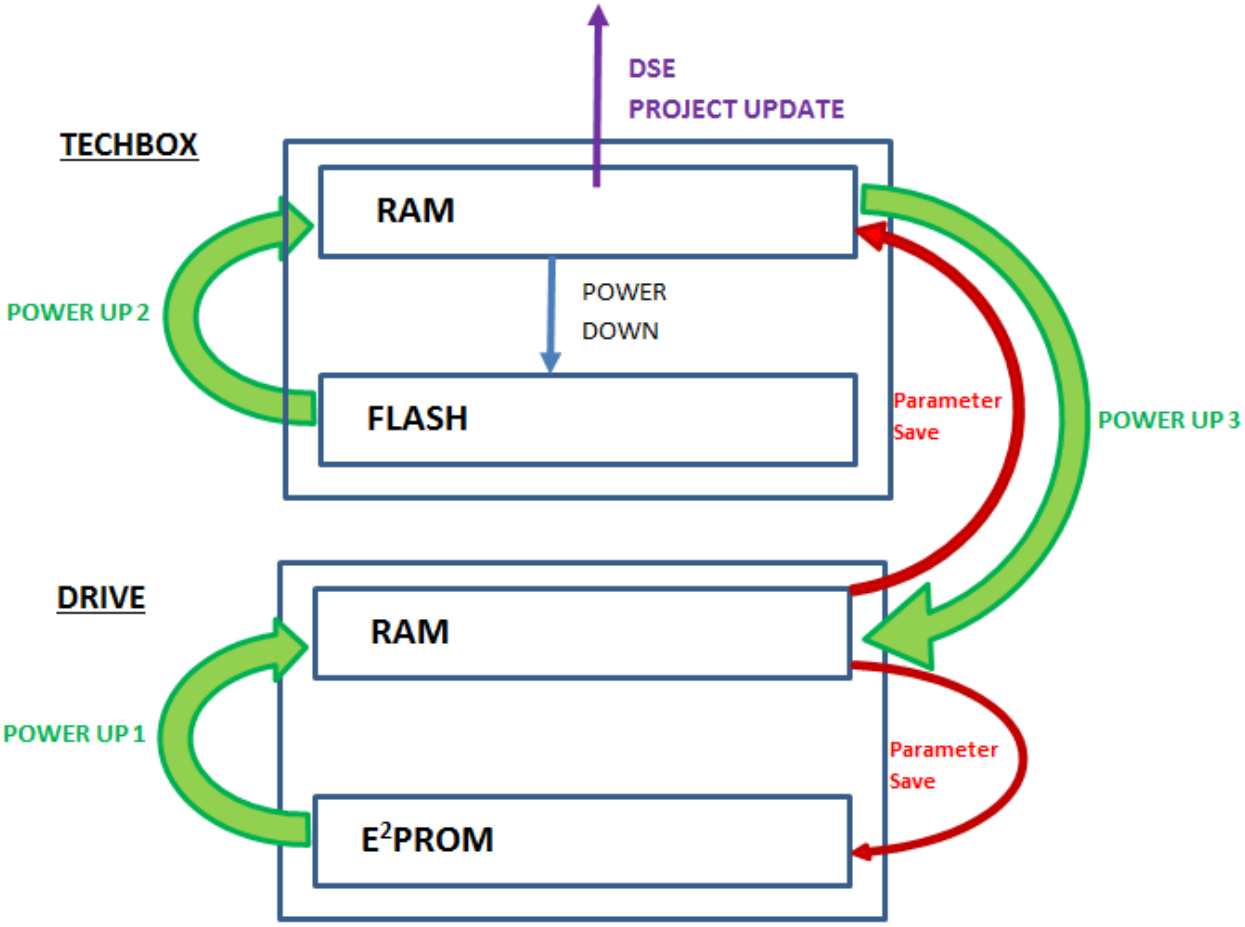
Hirschman

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

Appendix A - Sequencing States



On Power Up the sequence is as follows:

1. When the drive is powered up, data is transferred from the *Drives E Squared PROM* to the *Drives RAM*.
2. Then data is transferred from the *Techbox's Flash* to the *Techbox's RAM*.
3. The last step is: data is transferred from the *Techbox's RAM* to the *Drives RAM*.

On a "Drive Parameter Save" the sequence is as follows:

1. Data is transferred from the *Drives RAM* to the *Drives E Squared PROM*.
2. Data is transferred from the *Drives RAM* to the *Techbox's RAM*.

On a "DSE / Project / Update" the sequence is as follows:

1. When using DSE and a *Project / Update* is performed, data taken from the *Techbox's RAM* and the *LINK Configurations* are updated. This is why a *Parameter Save* MUST be done prior to doing a *Project / Update*. If a *Parameter Save* is not performed, the *LINK Configurations* will not be updated with the drives latest parameters.

On a Power down:

1. Data is transferred from the *Techbox's RAM* to the *Techbox's FLASH*.

Appendix B - Firmware Notes

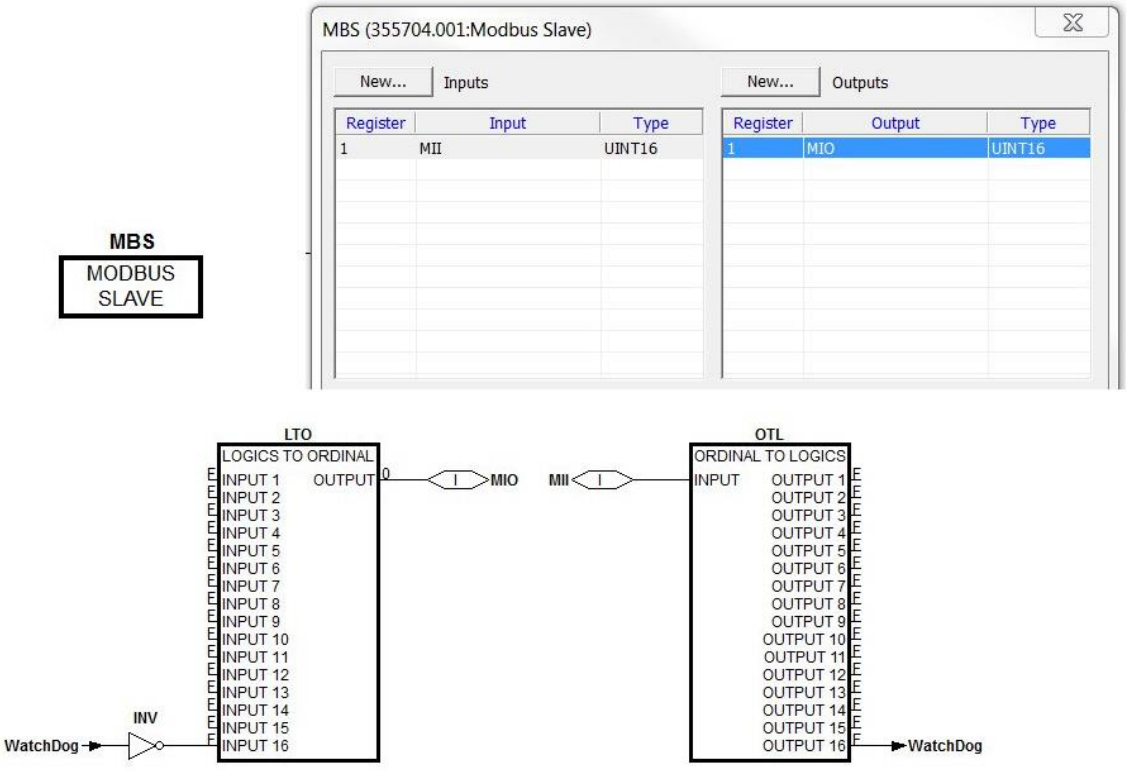
LINKnet firmware version 1.5 notes

Added EtherNet IP Server (slave) protocol. (DSE versoin 3.03 is recommended)

LINKnet firmware version 1.4 notes

With the release of LinkNet Firmware 1.4 there have been some changes/fixes to the Modbus TCP/IP, 16 bit integer data types.

For an interger data point that is going to be broken out to 16 bits via modbus TCPIP, the data type will now need to be set to UINT16 instead of Sint16



In Firmware 1.4, if the above is programmed and the data type is set to Sint16, all the data points will turn on if the 16th bit is on. If the data type is set for Uint16, the data points will work correctly.

LINKnet firmware version 1.3 notes

With LINKnet firmware version 1.3 (and earlier versions), the ModBus Slave/Integer Output" Function Block does not process some values properly:

If the Network (ModBus) type is UINT16:

If bit 16 of the VM value is set (doesn't matter what bits 1 thru 15 are), the value sent to the network is 0.

If the Network (ModBus) type is SINT16:

If bit 16 of the VM value is set and bits 1 thru 15 are zero (value of -32768), the value sent to the network is -32767 (bits 1 and 15 set).

Simplistically, it is best to just not use bit 16 if using the output as bit values and if using the output for a numerical value, send it as an SINT16 and make sure the number is in the range of -32767 to +32767.

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