

Errata Sheet

This Errata Sheet contains corrections or changes made after the publication of this manual.

Product Family:	Terminator I/O	Date:	June 2023
Manual Number	T1H-EBC-M		
Revision and Date	2nd Edition, Rev. B; May, 2014		

Changes to Chapter 3. Configuring the T1H-EBC(100) Using NetEdit3

Page 3-8. Using NetEdit3

Add the following NOTE to the top of page 3-8:

NOTE: T1H-EBC100 modules have a DIP switch located under the cover on the left side. Turning this switch on will reset the IP Address, subnet and gateway to the factory defaults. (T1H-EBC modules do not have a DIP switch.)

Changes to Chapter 4. MODBUS® TCP/IP for T1H-EBC100

Page 4-8. T1H-EBC100 System Memory

In the fourth column of the table, replace the existing text for "4 - Flags:" with the following:

4 - Flags:

Bit 0: REBOOT BIT (R/W) - This bit is a status bit indicating if any module has rebooted. In other words it is OFF after a proper power up. It is ON only if a module has disappeared from the base and has reappeared. This normally might occur if a module in the base has been hot swapped. To clear this bit write ANY value to this word.

Bit 1: RE-SCAN BIT (WO) - Turning this bit ON will cause the EBC100 to re-scan its base. This should be done after a hot swap of a module.

Bit 2: CLEAR OUTPUTS BIT (WO) - Setting this bit ON prior to, or at the same time as Bit 1 will cause all discrete outputs to go OFF and all analog putputs to go to zero during the rescan. Leaving this bit OFF will cause al discrete and analog outputs to remain at their current value after the rescan.

Bit 3-15: Reserved

Added Note for Appendix A . Using T1H-EBC(100) with Think & Do

Note: Think & Do software (PC-TD8-USB & PC-TD8-WEB4-USB) has been retired and no longer supported. *Please consider Do-more software as a consideration for your project.*

VAUTOMATIONDIRECT Terminator I/O Ethernet Base Controller Manual

Manual Number T1H-EBC-M

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Manual Revisions

If you contact us in reference to this manual, be sure and include the revision number.

Title: Terminator Installation and I/O Manual **Manual Number:** T1H-EBC-M

Edition/Rev	Date	Description of Changes
Original	11/01	original issue
2nd Edition	08/04	added T1H-EBC100, NetEdit3, HTML Configuration
2nd Edition, Rev A	01/05	added Holding Register Mirror Image ad- dressing for Modbus Function Code 3 Clients
2nd Edition, Rev B	05/14	added Appendix D and Appendix E (T1H-EBC100 addressing)

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Introduction

In This Chapter. . . .

- Manual Overview
- Ethernet Base Controller Overview
- Ethernet Standards

Manual Overview

Overview of this Manual	This manual describes the installation and operation of the Ethernet Base Controller (EBC) . You will find the necessary information for configuring the T1H-EBC or T1H-EBC100, installing the module, and connecting the EBC to a 10Base-T or 100BaseT Ethernet network. In this manual, the EBC designation is used when the subject applies to both the T1H-EBC and T1H-EBC100. Otherwise, the specific part number will be listed.
Other Reference Materials	You may find other technical manuals useful for your application. For technical information related to your PC-based control software, your PC or other network masters, please refer to the appropriate manual for that product.
	 Terminator I/O Installation and I/O Manual (T1K-INST-M)
Who Should Read This Manual	You will find this manual helpful for setup and installation if you have chosen to use the following:
	 Network master – PC-based Control with embedded Ethernet I/O drivers, KEPDirect EBC I/O Server or <i>Direct</i>Logic PLCs/WinPLC using the Ethernet Remote Master (ERM) module
	Automationdirect Terminator I/O products
	A familiarity with Ethernet communications and with the setup and installation of industrial controls is helpful. An understanding of electrical codes is essential.
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When you see the "notepad" icon in the left-hand margin, the paragraph to its immediate right will be a **special note**.

When you see the "exclamation mark" icon in the left-hand margin, the paragraph to its immediate right will be a **warning**. This information could prevent injury, loss of property, or even death.

Key Topics for Each Chapter

The beginning of each chapter will list the key topics that can be found in that chapter.

Introduction	1
In This Chapter	
- Overview - Oramitation of Toolog	

Ethernet Base Controller Overview

The Ethernet Base Controllers provide a low-cost, high-performance Ethernet link between a network master controller and an Automationdirect Terminator I/O slave system. Network masters include the DL205, DL405 *Direct*Logic PLCs and WinPLCs using the Ethernet Remote Master module (ERM), and PCs using PC-based control software that includes embedded Ethernet I/O drivers or through a compatible OPC server. The T1H-EBC100 also supports the MODBUS TCP/IP protocol.

The Ethernet Base Controller serves as an interface between the master control system and the Terminator I/O modules. The control function is performed by the master controller, not the EBC slave. The EBC is positioned immediately to the right of the first power supply and communicates across the backplane to input and output modules. The function of the EBC is to:

- process analog and digital input signals
- format the I/O signals to conform to the Ethernet standard
- transmit the signals to the network master
- · receive and translate output signals from the network master
- distribute the output signals to the appropriate output module in the base

I/O Values Stored in Cache Memory in Cache Memory as a block of data or by individual slot location. The EBC reads all channels of digital and analog modules on each scan.

Typically, the network master will request *all* input and output values at the same time from the EBC. The EBC passes the cache memory values for all channels of all input and output modules. By using this method, very fast response times can be achieved by the network master control system. Various master controllers with EBC slaves are shown below.



Example EBC Systems: Various Masters with EBC Slaves

Industry Standard Ethernet

The T1H-EBC module supports industry standard 10Base-T Ethernet communications. It allows up to10Mbps transfer rates between your master controller and and your I/O.

The T1H-EBC100 module supports industry standard 10/100Base-T Ethernet communications. It allows up to100Mbps transfer rates between your master controller and your I/O.

WARNING: For deterministic Ethernet communication you must use a dedicated network of EBC modules connected to your master control system. The EBC modules and the master controller must be the only devices on the network.

I/O

T1H-EBC/ T1H-EBC100

RS-232

Serial Port

further information about installing power supplies and I/O modules, consult the Terminator Installation and I/O Manual (T1K-INST-M).

An RJ12 RS-232 serial port on-board the EBC module allows serial communication to an operator interface device or other serial device. See your master controller documentation to determine whether this EBC feature is supported.

The EBC installs to the right of the

first power supply (see chapter 2

for basic installation steps). For





Important Note: The T1H-EBC100 is configured at the factory to look for a DHCP (Dynamic Host Configuration Protocol) server at power up. Refer to Chapter 5 for information on DHCP.

Installation and Setup

In This Chapter. . . .

- Installing the Ethernet Base Controller
- EBC Network Identifiers
- Setting the Node Address
- 10BaseT / 100BaseT Network Cabling
- Maximum 10BaseT / 100BaseT Cable Length
- Specifications
- LED Indicators and Hot Swapping I/O Modules
- Ethernet Standards

Installing the Ethernet Base Controller

The EBC installs to the *right* of the first power supply. To mount the module on the DIN rail, follow steps 1 through 3 below.

- 1. Push in the locking tab on the bottom of the module.
- 2. Hook the upper tab over the upper flange of the DIN rail.
- 3. Tilt the module toward the DIN rail until it snaps securely into place.



Assure that power wiring is not connected.

When the module is securely attached to the DIN rail, push the module toward the power supply until the connectors are joined and the release arm of the EBC has clamped the two modules together.



Continue to add I/O modules to the right of the EBC as necessary for your application. More information about power wiring and power budgeting is available in the Terminator I/O Installation Manual, T1K-INST-M.

EBC Network Identifiers

Each Ethernet Base Controller module must be assigned at least one unique identifier to make it possible for PCs or other clients (masters) to recognize it on the network. Two methods of identifying the EBC module give it the flexibility to fit most networking schemes.

The identifiers are:

- Module ID (IPX protocol only)
- IP Address (for TCP/IP and MODBUS TCP protocols); see Chapter 3

Setting the Node Address

Each Ethernet Base Controller residing on a network must have a Node Address, and each Node Address must be unique. **Duplicate Node Addresses** on the same network will cause unpredictable results and **must be avoided**.

Several Methods for Setting Node Address

Setting the

Switches

Node Address

Using the Rotary

- There are several methods for setting the Node Address:
 - The **rotary switches** on the face of the EBC module
 - The NetEdit3 software utility (described in Chapter 3)
 - HTML Confguration (after IP address is assigned to module using NetEdit3; described in Chapter 5)
 - The software utility in your PC-based Control software (if a utility is provided)

Two rotary switches, each labeled 0 – 9, are located on the face of the EBC. Use a small screwdriver to set the switches to a two-digit number.

The upper switch sets the *tens* position and the lower switch sets the *ones* position. Setting the upper switch to 1 and the lower switch to 4 yields a Node Address of 14.

Do not use Node Address "0" for communications. Node Address "0" is used only to allow communications with a PC while changing the Node Address (Module ID) in software. If the rotary switches are set to a number greater than 0, the software tools are disabled from setting the Node Address.





Setting Node Address with Software Tool **NOTE: The rotary switch settings are read only at powerup**. You must cycle power if you change the rotary switches. If you change the rotary switches and cycle power, the rotary switch setting will override any previous software setting.

Software changes to the Node Address do not require cycling power. To set the Node Address using one of the available software tools, do the following:

- Check to be sure both rotary switches are set to the "0" position
- Connect module to the Ethernet network
- Apply power
- Link to the module and change the Node Address using the software of your choice. Remember to "update" the module before exiting the software.

10BaseT / 100BaseT Network Cabling

The T1H-EBC module supports the Ethernet 10BaseT standard. The T1H-EBC100 module supports the Ethernet 10/100BaseT standard. The standards call for twisted pairs of copper wire conductors.



10BaseT/100BaseT The EBC has an eight-pin modular jack that accepts RJ45 connector plugs. UTP connections (Unshielded Twisted-Pair) cable is rated according to its data-carrying ability (bandwidth) and is given a "category" number. We strongly recommend using a Category 5 (CAT5) cable for all Ethernet 10BaseT/100BaseT connections. For convenient and reliable networking, we recommend that you purchase commercially manufactured cables (cables with connectors already attached).

> To connect an EBC (or PC) to a hub or repeater, use a patch cable (sometimes called a straight-through cable). The cable used to connect a PC directly to an EBC or to connect two hubs is referred to as a **crossover cable**. Some hubs provide a crossover port which eliminates the need for a crossover cable.



1 2 3 4 5 6 7 8 8-pin RJ45 Connector (8P8C)

10BaseT/100BaseT

We recommend that you use only Category 5, UTP cable.

Serial Port (RS-232)

Serial Port



The Serial Port on the EBC can be used to communicate with operator interfaces or ASCII devices. The T1H-EBC100 also supports MODBUS RTU serial protocol.

Use Automationdirect.com cable Part Number D2-DSCBL to connect your PC to the RJ12 Serial Port.

Serial Port Pinout			
Pin Signal			
1	0V		
2	+5V		
3	RXD		
4	TXD		
5	RTS		
6	CTS		

Maximum 10BaseT / 100BaseT Cable Length

123456

The **maximum distance** per **10BaseT**/**100BaseT** cable segment is **100 meters** or **328 feet**. Repeaters extend the distance. Each cable segment attached to a repeater can be 100 meters long. Two repeaters connected together extend the total range to 300 meters.



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T1H-EBC Specifications

T1H-EBC Ethernet Base Controller

Module Type	Ethernet slave		
Communications	10BaseT		
Auto-configuring	I/O type/position automatically identified during power-up		
Ethernet Protocols	UDP/IP, IPX		
Ethernet Port	RJ45		
Node Address	1 to 99 (decimal) set by rotary switches or software (0 used for setting address via software only)		
Link Distance	100 meters (328 feet)		
Data Transfer Rate	10Mbps		
LED Indicators Note: All indicators re-initialize during power-up.	MODULE GOOD (green): On = module passed diagnostic check during last power-up Fast blink = configured I/O module no longer reporting (see auto-configuring, above) Slow blink = unconfigured I/O module added to system (see auto-configuring, above) LINK GOOD (green): On = 10Base-T link pulses are being received ACTIVITY (red): On= Ethernet network activity detected ERROR (red): On = watchdog timer timeout represents hardware, communications, or network fault; power-on reset or reset within master device software		
Serial Communications Port	RJ12, RS232C K-Sequence protocol, ASCII (not functional when used with H2-ERM / H4-ERM)		
Base Power Reguirement	350mA @ 5VDC		

General Specifications

Installation Requirements	mounts to right of first power supply
Operating Temperature	32° F to 131° F (0° C to 55° C)
Storage Temperature	-4° F to 158° F (-20° C to 70° C)
Relative Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases, pollution level = 2 (UL 840)
Vibration	MIL STD 810C 514.2
Shock	MIL STD 810C 516.2
Noise Immunity	NEMA ICS3-304 Impulse noise 1us, 1000V FCC class A RFI (144MHz, 430MHz, 10W, 10cm)

T1H-EBC100 Specifications

T1H-EBC100 Ethernet Base Controller

Module Type	Ethernet slave
Communications	10/100BaseT
Auto-configuration	I/O type/position automatically identified during power-up
IP Configuration	-Obtain an IP address from a DHCP Server automati- cally at power-up (Default); -Dedicated IP address using NetEdit3 or HTML config- uration
Ethernet Protocols	TCP/IP, UDP/IP, IPX, MODBUS TCP/IP
Ethernet Port	RJ45
Node Address	1 to 99 (decimal) set by rotary switches or software (0 used for setting address via software only)
Link Distance	100 meters (328 feet)
Data Transfer Rate	10/100Mbps
LED Indicators Note: All indicators re-initialize during power-up.	MODULE GOOD (green): On = module passed diagnostic check during last power-up Fast blink = configured I/O module no longer reporting (see auto-configuring, above) Slow blink = unconfigured I/O module added to system (see auto-configuring, above) LINK/ACTIVITY (green): On= Ethernet network activity detected 100MBIT (green): On= Ethernet activity is auto-detected at 100bps Off = (with LINK/ACTIVITY On) Ethernet activity is auto-detected at 10Mbps ERROR (red): On = watchdog timer timeout represents hardware, communications, or network fault; power-on reset or reset within master device software SERIAL TX (green): On= EBC RJ12 serial port is transmitting SERIAL RX (green): On= EBC RJ12 serial port is receiving
Serial Communications Port	RJ12, RS232C K-Sequence protocol, ASCII, MODBUS RTU serial (not functional when used with H2-ERM / H4-ERM at this time)
Base Power Requirement	350mA @ 5VDC

General Specifications

Installation Requirements	mounts to right of first power supply
Operating Temperature	32° F to 131° F (0° C to 55° C)
Storage Temperature	-4° F to 158° F (-20° C to 70° C)
Relative Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases, pollution level = 2 (UL 840)
Vibration	MIL STD 810C 514.2
Shock	MIL STD 810C 516.2
Noise Immunity	NEMA ICS3-304 Impulse noise 1us, 1000V FCC class A RFI (144MHz, 430MHz, 10W, 10cm)

LED Indicators and Hot Swapping I/O Modules

The "Hot Swap" feature allows Terminator I/O modules to be replaced with Terminator I/O system power ON. Be careful not to touch the terminals with your hands or any conductive material to avoid the risk of personal injury or equipment damaged. *Always remove power if it is equally convenient to do so.*

WARNING: Only authorized personnel fully familiar with all aspects of the application should replace an I/O module with system power ON.

LED Indicators when Hot Swapping an I/O Module



Check External 24VDC Wiring Before Hot Swapping Before "Hot Swapping" an analog I/O module or a DC output module in a Terminator I/O system, make sure that each of the analog I/O and DC output module's 24VDC and 0VDC base terminals are wired directly to the external power supply individually (see diagram below). If the external 24VDC / 0VDC is jumpered from base to base in a daisy chain fashion, and an analog I/O or DC output module is removed from its base, the risk of disconnecting the external 24VDC to the subsequent I/O modules exists.



Hot Swap: I/O Module Replacement The following steps explain how to "Hot Swap" an I/O module.

1. Remove I/O module from base. (If necessary, refer to the Terminator I/O Installation & I/O Manual for steps on removing an I/O module).

2. The EBC Module Good LED will begin to fast blink.

3. Install a new I/O module with the exactly the same part number.

4. Verify that the EBC LEDs have returned to normal.

Ethernet Standards

Various institutes and committees have been involved in establishing Ethernet data communication standards. These specification standards assure Ethernet network compatibility for products from a broad variety of manufacturers.

The EBC module complies with American National Standards Institute (ANSI) and Institute of Electrical and Electronic Engineers standard ANSI/IEEE 802.3, Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Methods and Physical Layer Specifications. This standard has been adopted by the International Organization for Standardization (ISO) as document ISO/IEC 8802-3.

The Electronic Industries Association (EIA) and Telecommunications Industries Commercial Building Telecommunications Wiring Standard designated EIA/TIA-568A defines implementation of 10Base-T (twisted pair) Ethernet communications.

The same two organizations produced EIA/TIA TSB40-Additional Transmission Specifications for Unshielded Twisted-Pair Connecting Hardware. The purpose of this document is to specify transmission performance requirements and connecting hardware requirements.

Configuring the T1H-EBC(100) Using NetEdit3

In This Chapter. . . .

- NetEdit3 Software
- Using NetEdit3
- Locating the MAC Address Label

NetEdit3 Software

NetEdit3 is a software utility which can be used to set network identifiers (Module ID or IP Address), configure the EBC serial port, perform diagnostic and troubleshooting tasks and upgrade the firmware in the EBC module if necessary. The T1H-EBC100 requires NetEdit 3.x or later.

Installing NetEdit3 You can install NetEdit3 on Windows98/ME/2000/XP[™] or Windows NT4[™]. NetEdit3 is included with this manual on the AutomationDirect Software Product Showcase CD (also available online at www.automationdirect.com). After inserting the CD into the drive, the following window will appear.



Click on the Essential Tools button. The following window will be displayed.



Click on Install NetEdit3. A series of windows will step you through the installation process. Fill in the necessary information as the installation wizard prompts through the install. In the Setup Type window, select Typical setup. This setup type is recommended for most users. The installation process places NetEdit3 in the C:\HAPTools directory (default).

Launching NetEdit3

There are three methods to launch NetEdit3. The three methods are:

- using the Windows Start menu Programs>AutomationDirect Tools> NetEdit3 as shown below
- launching *Direct*Soft32 (if installed), from the programming window, select PLC>Tools>NetEdit3
- launching *Direct*Soft32 (if installed), then select Utilities>NetEdit3



The NetEdit3Starting NetEdit brings up the screen below. All NetEdit3 functions are accessed
from this screen.

着 NetEdit 3			
Eile Network Yiew Help IPX TCPAP Scan			
Ethernet Address F B C Modu	ype 🛆 IP Address ID	Name	Description
00 E0 62 40 19 44 T1H-E	100 10.1.37.99 10	TERMEBC	TERM Ethernet Base Controller,
00 E0 62 20 20 36 * * H0-E4	4 10.1.1.5 1	d105	H0 Ethernet data communications
00 E0 62 20 1B B4 * H2-EF	255.255.255.255 1	205ERM	205 Ethernet remote master.
<	III		>
Module Info EBC Settings EBC Help G	eral Help		
General Info	Ethernet State	s[F	Reset Stats
Firmware Rev: 4.0.1233 PWB	w: 5C Missed Fr.	0 Bad Pkts:	0
Booter Rev: 4.0.136 PLD F	/ 1A TX Coll:	0 Unknown:	0
Switch Setting: 00 CPU I	1.0.6 Lost Pkts:	0 TX Errors:	0
Ready			

Adding Network Protocol Support to the NetEdit3 PC

You may have already set up your PC with selected networking protocols for Ethernet communications. If not, you will need to select the protocols now for communication with the Ethernet modules. We strongly recommend that you include the IPX protocol. For Windows 2000, go from My Computer on your Windows desktop to Control Panel. Double click on Network and Dial-up Connections, then double click on the desired Network Device to see the installed Protocols. If IPX is not listed among the protocols already loaded, add it now by clicking on the Install button. For Windows XP, go from Start>Settings>Control Panel. The steps are the same as Windows 2000 from this point.

Add the TCP/IP protocol if it is necessary for your application. The TCP/IP selection will give you support for the UDP/IP protocol. Also, add the IPX protocol if it is not already active.



NOTE: We strongly recommend you load IPX protocol on your PC for the connection from your PC to the ethernet modules. Use UDP/IP in your application, if required, but also add IPX to your list of active protocols. Having IPX loaded on your PC gives you a backup for troubleshooting communication problems.

Using NetEdit3

This section steps through the features and uses of NetEdit3. We will describe the individual segments of the NetEdit3 screen and the function of each.



NOTE: Your PC-based Control software may be capable of configuring the EBC module. If so, please refer to the appropriate documentation for that software product to determine the best method to configure the EBC. Depending on which software you are using, it may not be necessary to use NetEdit3.

Ethernet Communication Protocol

In the upper left corner of the NetEdit3 screen, you will find buttons labeled *IPX* and *TCP/IP*. The EBC module understands these protocols. Both protocols are *permanently resident* in the firmware of the module.

When you click on one of these buttons, you are selecting the protocol you want your PC to use to communicate with the EBC module. You are not telling the module which protocol to use, because it is using both protocols all the time. IPX is a Novell standard in widespread use, and UDP/IP is a popular protocol supported by the TCP/IP suite of protocols in your PC.

The figure to the right shows the Protocol selection buttons in the upper left corner of the NetEdit3 screen. The choice you make here tells **your PC** which protocol to send to the EBC to link NetEdit3 to the module.

Some PC-based control software products may support only one of these protocols. Read the documentation for your software to be sure the protocol you select is supported.

🦾 NetEdit 3						
File Network View Help						
IPX TCP/IP Scan						
Ethernet Address F B						
00 E0 62 40 00 02						
00 F0 62	20.01.0	8				

Ethernet Address The upper left section of the NetEdit3 screen displays the *Ethernet Address* of the modules currently on the network.

If modules are added or removed from the network, click on the *Scan Network* button to update the list. Notice that the MAC Address is the factory-assigned address that is on the permanent label on the module.

Select a specific module here by clicking on the MAC Address or by using the arrow keys. The selected module is highlighted.





NOTE: The Module window may list the MAC Addresses of devices not covered by this manual.

Module Type, IP Address and ID

Module Type 4	IP Address	ID	Name	Description
T1H-EBC100	192,168,26,47	33	Station 1	Machine Control/Oper-
1.004	10.1.1.31	55		

The upper mid section of the NetEdit3 screen displays the *Module Type, IP Address,* module *ID, Name* and *Description* of the modules currently on the network.

A new EBC will have an IP Address of 0.0.0.0, a Module ID of 0 (zero), and no Module Name or Description. To assign or change a module an IP address, ID, name or description refer to the EBC Settings>General Information description later in this section.

Right clicking on an EBC module listed on the NetEdit3 screen will display the window to the right. This is an alternative to using the Module Info or EBC settings tabs (shown below) to access the module's configuration settings. The settings are discussed later in this section.

General... Serial Port... I/O Base,... Show Base Contents... Update Firmware... Update Booter... Restore Factory Settings...

Module Info | EBC Settings |

Module Info>
General
InformationWhen the Module Info tab is selected, the General Info box lists the
selected module's Firmware Revision, Booter Revision, DIP Switch
Setting, PWB Revision, PLD Revision and CPU Revision.
This box is in the lower left section of the NetEdit3 screen.

Ν	Module Info EBC Settings EBC Help General						
	General Info						
	Firmware Rev:	4.0.1233	PWB Rev:	5C			
	Booter Rev:	4.0.136	PLD Rev:	1A			
	Switch Setting:	00	CPU Rev:	1.0.6			

Module Info> Ethernet Stats

When the Module Info tab is selected, the *Ethernet Stats* box displays statistics related to the selected module's communication errors. Click on the Reset Stats button to reset all categories to 0 (zero).

This box is in the lower middle section of the NetEdit3 screen.

- Ethernet Stats			Reset Stats
Missed Frames:	Ū	Bad Packets:	0
TX Collisions:	0	Unknown Type:	0
Lost Packets:	0	Send Errors:	0

EBC Settings When the EBC Settings tab is selected, the selected module's Configuration, Utilities and Firmware tools can be accessed.

This box is in the lower middle section of the NetEdit3 screen.

Module Info EBC Settings EE	3C Help General Help	
Configuration	Utils	Firmware
General	Show Base Contents	Update Firmware
Serial Port		Update Booter
1/0 Base		Restore Factory Settings

EBC Settings> Configuration> General

See Errata Sheet at the beginning of this file. Add this note: NOTE: T1H-EBC100 modules have a DIP switch located under the cover on the left side. Turning this switch on will reset the IP Address, subnet and gateway to the factory defaults. (T1H-EBC modules do not have a DIP switch.)

Clicking the General button in the EBC Settings>Configuration box brings up the General Settings window below.

- Configuration	Ń
General	
Serial Port	

General Settings	<u>×</u>
Module ID: 9	Obtain an IP address automatically Use the following IP settings IP Address: 10 . 1 . 25 . 59
Contoinci.	Subnet mask: 0 . 0 . 0 . 0 . 0 . 0 . 0 . 0
OK I	Cancel

EBC modules do not have a DIP switch.) The General Settings box allows you to assign a **Module ID**. Module IDs must be unique for each EBC, but they do not have to be in sequence. The module's Node Address rotary switches must both be set to zero to allow NetEdit3 to set a Module ID. Do not use address zero for communications.

The Name field and Description field are optional.

To set an **IP Address**, highlight the number in each of the four boxes, and overwrite the number. Use the twelve-digit number assigned to the EBC module by your network administrator. If you change the IP Address, do not use the number "255" in any field. Doing so will cause communication problems.

The OK button sends all the entries to the module's flash memory.

IP Address

An **IP Address** is assigned to the EBC module if your network will be using the TCP/IP or MODBUS TCP/IP (T1H-EBC100 only) protocols. If you have a separate dedicated network for your EBCs, you may be able to use the Module ID identifier (IPX protocol) for communications instead of an IP address. To set an IP Address, use the twelve-digit number assigned to the EBC module by your network administrator. If you change the IP address, do not use the number "0" or "255" in any field. Doing so will cause communications problems. The **valid settings are 1 through 254.** The module ships from the factory with an IP Address of 0.0.0.0. This is not a usable IP Address for communications. Click on *Use the following IP settings* radio button before clicking on the OK button to write the updated settings to the module's flash memory. It is extremely important not to have duplicate IP Addresses on your network.

Example

255.255.0.0	
192.168.50.2	1-254
192.168.55.5	Valid settings for Bold number fields
192.168.70.15	(Do not duplicate)
	255.255.0.0 192.168.50.2 192.168.55.5 192.168.70.15

WARNING: If you are using the T1H-EBC100, be sure to read Chapter 5 concering DHCP issues.

EBC Settings> Configuration> Serial Port Clicking the Serial Port button in the EBC Settings>Configuration box brings up the Serial Port Settings window below.

On the *Serial Port Settings* window, make any necessary changes to the serial communication parameters. After making changes, be sure to click on the OK button. Also, Be sure these parameters match the parameters of the serial device with which you are communicating.

Note: Some PC-based Control software packages may automatically overwrite settings selected here. Refer to the documentation for your PC-based Control software.

The OK button sends all the entries to the module's flash memory.

	Conf	iguration-			
		Gene	ral		
		Serial	Port		
Port Set	tings				×
nc Setting uud Rate:	18	•		Ok	
ata Bits:	8	•		Cancel	
on Bite:	1	-			

•

0

0

milliseconds

milliseconds

● K-Seq Slave ○ Modbus Slave ○ Master/Proxy

Serial

Asy

Ba

Da

SI

Parity:

Port Mode

Use RTS

RTS Pre-transmit Delay:

RTS Post-transmit Delay:

Odd

EBC Settings> Utils>Show Base Contents Clicking the Show Base Contents button in the EBC Settings>Utilities box brings up the Show Base Contents Window shown below.

Γ	Utils	
	Show Base Contents	

This function queries the EBC for a list of I/O modules it has in its base. The Module Type and the MODBUS 584/984 addressing will be listed as well. This will help confirm that the EBC can recognize all the I/O modules connected to the EBC controller. The Show Base Contents information can be saved as a (*.txt) file or printed for reference or future use.

Show Base Contents	X
Base 0 : Slot 1 - Module Type 11 - Discrete Input 8 - Bit inputs (Modbus 584/984 - Inputs 10001-10008)	
Base 0 : Slot 2 - Module Type 12 - Discrete Output 16 - Bit outputs (Modbus 564/964 - Coils 1-16)	
<	>
Save	Close

EBC Settings> Firmware

The functions in the Firmware box are used to update the selected module's Firmware and Booter versions. The Restore Factory Settings buttons resets the selected module's IP address, ID, Name and Description to factory defaults. Refer the sections on the next page to determine if updates are necessary.

Clicking on the either of the Update buttons opens the appropriate EBC folder within the Images folder, which is created during the install of NetEdit3. The Images folder is located in the same folder as NetEdit3.exe. Each module folder contains the module's firmware and boot loader files. The next section discusses keeping the firmware files up to date.



Open	?	×
Look in: 🔂] T1H-EBC 🚽 ← 🖻 📸 -	
BCOT.BIN Boot_3_0 Boot_3_0 Boot_3_0 Boot_3_0 Seebctio.b t1hebc_1	J Mithebc_1_0_457.Bin _102.bin _120.Bin _92.Bin oin _0_444.Bin	
File name:	t1hebc_1_0_457.Bin Open]
Files of type:	Ethernet Firmware Files (*.bin)]

KE

FileMenu> Live Update

The Live Update will retrieve the latest firmware and boot loader files from the Host Engineering web site and place them in the NetEdit3 Images folder that was created during the install of NetEdit3. The feature requires that you have a functional Internet connection (dial-up or broadband). If the Images folder does not exist on your PC, it will be created as part of the retrieval process.



When you click the Go! button on the Live Update window, NetEdit3 will compare the version information of the files on the Host Engineering web site against the files you have locally on your PC, and it will download any newer files. Once this process is complete, NetEdit3 will rescan the devices on your network and refresh the "F" and "B" columns next to the listed devices.

ve Update				
This utility will check for the latest firmware for most Hx and T1H products and download them to the images directory.				
Prior to continuing please make su	e your internet connection is active.			
When you are i	eady, press Go!"			
Update	complete!			
Update complete!				
Go!	Stop			
	к			

F / B / C Columns

The F, B, and C columns are provided to signify potential issues with devices on the network.

The "F" column will display an asterick beside any device whose firmware is older than its firmware file in your Images folder.

-	-				
Ethernet Address		F	В	C	Module Type
00 E0 62 40 06 34		*			T1H-EBC
00 E0 62 20 21 ED					H0-ECOM
00 E0 62 20 01 08					H2-ECOM
' º 0 E0 62 20 01 0F					10 565

The "B" column will display an asterick beside any device whose boot loader is older than its boot loader file in your Images folder.

The "C" column will display an asterick beside any device that has a configuration conflict with another device on the network. Duplicate module IDs (that are non-zero) and duplicate IP Addresses (that are not 255.255.255.255) will report as conflicts.

Locating the MAC Address Label





MAC Address A unique Media Access Control (MAC) Address is assigned to each module at the factory and cannot be changed. It is a twelve digit number, and it is printed on a label permanently attached to the EBC circuit board. The MAC address label can be viewed through the translucent module cover. NetEdit3 and HTML Configuration can be used to read the MAC address.
Modbus[®] TCP for T1H-EBC100

In This Chapter....

- Modbus TCP/IP
- Supported Modbus Function Codes
- Modbus 584/984 Addressing
- Modbus 584/984 Addressing for Function 3 Clients
- T1H-EBC100 System Memory
- Current / Last State Error Codes
- Extended Error Codes
- Analog Input Module Configuration
- Analog Output Module Configuration

Modbus TCP

Modbus TCP is essentially the serial MODBUS RTU protocol encapsulated in a TCP/IP wrapper. Modbus RTU is used for serial communications between a master and slave(s) devices. Modbus TCP is used for TCP communications between client and server devices on an Ethernet network. The TCP version of Modbus follows the OSI Network Reference Model.

Client / Server Model The Modbus messaging service provides a Client/Server communication between devices connected on an Ethernet TCP network. This client / server model is based on four type of messages:

- Modbus Request the message sent on the network by the Client to initiate a transaction
- Modbus Confirmation the Response Message received on the Client side
- Modbus Indication the Request message received on the Server side
- · Modbus Response the Response message sent by the Server

Client / Server Model



Protocol Description A typical Modbus TCP/IP frame consists of the following fields:

TCP HEADER	MBAP HEADER	FUNCTION	DATA
------------	-------------	----------	------

The **MBAP header** (MODBUS Application Protocol header) is seven bytes long. It consists of the following fields.

- Transaction Identifier It is used for transaction pairing, the Modbus server copies in the response the transaction identifier of the request. (2 bytes)
- Protocol Identifier It is used for intra-system multiplexing. The Modbus protocol is identified by the value 0. (2 bytes)
- Length The length field is a byte count of the following fields, including the Unit Identifier and data fields. (2 bytes)
- Unit Identifier This field is used for intra-system routing purpose. It is typically used to communicate to a Modbus or a Modbus+ serial line slave through a gateway between an Ethernet TCP/IP network and a Modbus serial line. This field is set by the Modbus Client in the request and must be returned with the same value in the response by the server. (1 byte)

The MBAP header provides some differences compared to the Modbus RTU application data unit used on serial line.

- The Modbus "slave address" field usually used on Modbus Serial Line is replaced by a single byte "Unit Identifier" within the MBAP Header. The "Unit Identifier" is used to communicate via devices such as bridges, routers and gateways that use a single IP address to support multiple independent Modbus end units.
- All Modbus requests and responses are designed in such a way that the recipient can verify that a message is finished. For function codes where the Modbus PDU has a fixed length, the function code alone is sufficient. For function codes carrying a variable amount of data in the request or response, the data field includes a byte count.
- Protocol Identifier It is used for intra-system multiplexing. The Modbus protocol is identified by the value 0. (2 bytes)

The **function code field** of a message contains 8 bits. Valid function codes are in the range of 1 – 255 decimal. The function code instructs the slave what kind of action to take. Some examples are to read the status of a group of discrete inputs; to read the data in a group of registers; to write to an output coil or a group of registers; or to read the diagnostic status of a slave.

When a slave responds to the master, it uses the function code field to indicate either a normal response or that some type of error has occurred. For a normal response, the slave echoes the original function code. In an error condition, the slave echoes the original function code with its MSB set to a logic 1.

The **data field** is constructed using sets of two hexadecimal digits in the range of 00 to FF. According to the network's serial transmission mode, these digits can be made of a pair of ASCII characters or from one RTU character.

The data field also contains additional information that the slave uses to execute the action defined by the function code. This can include internal addresses, quantity of items to be handled, etc.

The data field of a response from a slave to a master contains the data requested if no error occurs. If an error occurs, the field contains an exception code that the master uses to determine the next action to be taken. The data field can be nonexistent in certain types of messages. Δ_



ModScan32 is a Windows based application program that can be used as a Modbus master (client) to access and change data points in a connected slave (server) device (i.e. T1H-EBC100).

The utility is ideally suited for quick and easy testing of Modbus TCP network server devices. Visit www.win-tech.com to download a free ModScan32 trial demo and for more information on ModScan32.

Supported Modbus Function Codes

The following Modbus function codes are supported by the T1H-EBC100 base controller.

Modbus Function Code	Function
01	Read Output Table
02	Read Input Table
03	Read Holding Registers (when addressing mode is 584/984, this function is used to ac- cess analog output registers)
04	Read Input Registers (when addressing mode is 584/984, this function is used to access analog input registers)
05	Force Single Output
06	Preset Single Registers
08	Loop back / Maintenance
15	Force Multiple Outputs
16	Preset Multiple Registers

Modbus 584/984 Addressing

Modbus Data Type		T1H-EBC100					
		Range (Decimal)	Poi	nts	Memory Type	Access	
Coil		1 - 1024	1024		Discrete Output	Read / Write	
		1025 - 10000	-		Reserved	-	
Ir	nput	10001 - 11024	1024		Discrete Input	Read only	
		11025 - 20000	-		Reserved		
Modbus Data Type		Range (Decimal)	Words (16-bit)	Channel (32-bit)	Memory Type		
	Analog Input (see table below)	30001 - 30512	512	256	Analog Input Register	Read only	
Innut Pegieter	Input Register	30513 - 32000	-	-	Reserved	-	
Input Register	Bit Input Register	32001 - 32064	64	32	Discrete Input Bit Register	Read only	
	Input Register	32065 - 37000	-	-	Reserved	-	
	Analog output (see table below)	40001 - 40512	512	256	Analog Output Register	Read / Write	
Hold Register	Hold Register	40513 - 42000	-	-	Reserved	-	
	Bit Output Register	42001 - 42064	64	32	Discrete Output Bit Register	Read / Write	
	Hold Register	42065 - 44000	-	-	Reserved	-	

Note: NetEdit3 Show Base Contents function will list the MODBUS addressing for each I/O module on the base. For the analog I/O, the module Configuration Data registers are also listed. Refer to Chapter 3 for information on NetEdit3.

Show Base Contents		
Base O : Slot 1 - Module Type :	26 - Analog Output	~
8 - Bit outputs 8 - Double word outp	(Modbus 584/984 - Configuration puts (Modbus 584/984 - Holding regist	data 50022) ers 40001-40016)
Base 0 : Slot 2 - Module Type	12 - Discrete Output	
16 - Bit outputs	(Modbus 584/984 - Coils 1-16)	
		~
1		>
Save Print	Font	Close

Modbus 584/984 Addressing for Function Code 3 Clients

The following memory map offers duplicate registers from the 30001 range and Bit memory data type into the 411000 range for clients/masters that only support function code 3. These ranges are word level data only.

Modbus Word Data Type		T1H-EBC100				
			Words		Memory Type	Access
Coil		411000 - 411063	64		Discrete Output	Read / Write
		411064 - 411124	-		Reserved	-
Ir	iput	411625 - 411688	64		Discrete Input	Read only
		411689 - 412062	-		Reserved	
Modbus Word Data Type		Range (Decimal)	Words (16-bit)	Channel (32-bit)	Memory Type	
	Analog Input (see table below)	412251 - 412762	512	256	Analog Input Register	Read only
	Input Register	412763 - 414250	-	-	Reserved	-
Input Register	Bit Input Register	414251 - 414314	64	32	Discrete Input Bit Register	Read only
	Input Register	414315 - 419250	-	-	Reserved	-
	Analog output (see table below)	40001 - 40512	512	256	Analog Output Register	Read / Write
Hold Register	Hold Register	40513 - 42000	-	-	Reserved	-
	Bit Output Register	42001 - 42064	64	32	Discrete Output Bit Register	Read / Write
	Hold Register	42065 - 44000	-	-	Reserved	-

4-7

T1H-EBC100 System Memory

			T1H-EBC100	
	Modbus Addressing Range (Decimal)	Words (16-bit)	Word Descriptions	Access
Module Version Information	37001 - 37006 (419251 - 419256)*	6	 1 - OS Major Version 2 - OS Minor Version 3 - OS Build Version 4 - Booter Major Version 5 - Booter Minor Version 6 - Booter Build Version 	R only
	37007 - 37010 (419257 - 419260)	-	Reserved	-
Device Data	37011 - 37100 (419261 - 419350)*	90	 Version of Device Family Processor Module Type Status Code (6-8) - Ethernet Address RAM Size Flash Size Flash Size Batt Switch DIP Settings Media Type Media Type Reserved Reserved Reserved Reserved Reserved IN ethernet Speed Reserved IO Total Byte Count Bit Output Byte Count Bit Output Byte Count Non-bit Input Byte Count Non-bit Output Byte Count Non-bit Output Byte Count 	R only
I/O Module ID's	37101 - 37132 (419351 - 419382)*	32 (1 word per slot)	I/O module ID numbers per slot loca- tion	R only
	37133 - 37200 (419383 - 419450)	-	Reserved	-
Module Information	37201 - 37328 (419451 - 419578)*	128 (4 words per slot)	1 – Bit Input Count 2 – Bit Output Count 3 – Non-bit Input Count 4 – Non-bit Output Count	R only
	37329 - 37400 (419579 - 419650)	-	Reserved	-

*For clients that only support function code 3 to read word data.

(continued)

T1H-EBC100 System Memory (continued)

			T1H-EBC100	
	Modbus Addressing Range (Decimal)	Words (16-bit)	Word Descriptions	Access
EBC Dynamic Module Data	410001 - 410020 See Errata Shee at the beginning this file. This information for "4 Flags:" has been revised.	20 t of	 1 - See Error Codes on p. 4-9. 2 - Error bit-per-slot for first 16 slots If any bit is set, see extended error info of Module Status data for specific problem 3 - Error bit-per-slot for second 16 slots (if present) If any bit is set, see extended error info of Module Status data for specific problem NOTE: Any write to [1], [2], or [3] above will clear the module / slot errors. 4 - Flags: Bit 0: If 1, module has rebooted since this bit was cleared, a write to the Flags word with this bit set will clear this reboot bit. Bit 1: Write Only Bit - A write to the Flags word with this bit set will cause the base to be rescanned. Bit 2: Write Only Bit - If Bit 1 is set to do rescan, this bit is used to indicated if RESCAN_LEAVE_IMAGE_RAM or RESCAN_CLEAR_IMAGE_RAM Bit 3-7: Reserved 5 - Reboot Count (LSW) - Read Only 6 - Reboot Count (MSW) - Read Only 7 - Link Monitor Timeout - 0 to disable 	R/W
Configuration Data	410021 - 410052	32	1 word per slot to read/write module configuration data (See Analog I/O Module Configuration tables at the end of this chapter for bit definitions)	R/W
	410053 - 425536	-	Reserved	-

(continued)

T1H-EBC100 System Memory (continued)

	T1H-EBC100				
	Modbus Addressing Range (Decimal)	Words (16-bit)	Word Descriptions	Access	
I/O Module Status	37401 - 38040 (419651 - 420290)*	640 (20 words per slot)	 1 - Flags with bits indicating presence of Error, Warning, Info Values Bit 0: If set, indicates that Error Value is non-zero Bit 1: If set, indicates that Warning Value is non-zero Bit 2: If set, indicates that Info Value is non-zero Bit 3: Reserved Bit 4: If set, indicates that Extended error info is present Bit 5: Reserved Bit 6: Reserved Bit 7: Reserved For Words 2-4, refer to Current/Last State Error Codes Table (p.4-9) 2 - Error Code 3 - Warning Code 4 - Info Code For Words 5-20, refer to Extended Error Codes Table (p.4-9) 5 - Extended Error Code 1 (i.e channel 1 of an analog module) 6 - Extended Error Code 2 (i.e channel 2 of an analog module) 7 - Extended Error Code 3 (i.e channel 3 of an analog module) 8 - Extended Error Code 5 (i.e channel 5 of an analog module) 10 - Extended Error Code 6 (i.e channel 6 of an analog module) 11 - Extended Error Code 8 (i.e channel 7 of an analog module) 12 - Extended Error Code 9 (i.e channel 10 of an analog module) 13 - Extended Error Code 10 (i.e channel 10 of an analog module) 14 - Extended Error Code 10 (i.e channel 10 of an analog module) 15 - Extended Error Code 10 (i.e channel 10 of an analog module) 16 - Extended Error Code 11 (i.e channel 10 of an analog module) 17 - Extended Error Code 12 (i.e channel 10 of an analog module) 18 - Extended Error Code 13 (i.e channel 13 of an analog module) 19 - Extended Error Code 13 (i.e channel 13 of an analog module) 10 - Extended Error Code 13 (i.e channel 14 of an analog module) 16 - Extended Error Code 13 (i.e channel 13 of an analog module) 17 - Extended Error Code 13 (i.e channel 14 of an analog module) 18 - Extended Error Code 15 (i.e channel 16 of an analog module) 19 - Extended Error Code 15 (i.e channel 16 of an analog module) 19 - Extended Error Code 15 (i.e channel 16 of an analog mod	Ronly	
	38041 - 40000 (420291 - 422250)	-	Reserved	-	

*For clients that only support function code 3 to read word data.

(continued)

Current / Last State Error Codes

The following table lists the error codes for Words 2-4 in the Module Status System Memory area.

Error Code (Decimal)	Description
E0	No error.
E121	Channel failure.
E122	Unused analog input channels exist.
E139	Broken transmitter on one of the analog input channels (if supported by analog module)
E142	Multiple channels failed.
E153	The module which was in this slot is no longer responding. User has removed a module in a Terminator I/O slave system. If Automatic Reset (default) is enabled for this slave, it will reset itself once the replacement module is inserted. If Manual Reset is enabled for this slave, the user must 1) SET the slave disable flag for that slave in the first diagnostic output word, 2) wait for bits 8-15 in second diagnostic input word to equal 1, then 3) RESET the slave disable flag in the first diagnostic output word.
E154	I/O configuration has changed. See E153 for reset methods.
E200- E216	Unused analog input channels exist at channel xx (1-16), where xx = Value -200. (example: E212 indicates unused analog channel exists at channel 12.

Extended Error Codes

The following table lists the error codes for Words 5-20 in the Module Status System Memory area.

Error Code (Decimal)	Description			
E32- E63	Bitwise error where bit 5 is always SET. Look at bit 0 thru bit 4 to get a possible list of errors. Example 34 decimal =22 hexadecimal (Bit 5 SET and Bit 1 SET). BIT Type of Error 0 Terminal block off 1 External P/S voltage low 2 Fuse blown 3 Bus error 4 Module initialization error (intelligent module) 5 Fault exists in module (this bit is SET if any of the above bits are SET)			
E117	Write attempt to an invalid analog channel.			
E119	Data not valid. Subnet mask or IP address not allowed // EBC SDK data packet not constructed properly.			
E121	Analog input channel error.			
E122	Unused analog input channels exist.			
E139	Broken transmitter on one of the analog input channels.			
E142	Channel failure.			
E146	Communications failure. Hitachi drive on-board relay set.			
E153	The module which was in this slot is no longer responding. User has removed a module in a Terminator I/O slave system. If Automatic Reset is enabled for this slave, it will reset itself once the replacement module is inserted. If Manual Reset is enabled for this slave, the user must 1) SET the slave disable flag for that slave in the first diagnostic output word, 2) wait for bits 12-15 in second diagnostic input word to equal 1, then 3) RESET the slave disable flag in the first diagnostic output word.			
E154	One or more new modules has been inserted into the base. See E153 for reset methods.			
E155	Terminator module status error. One or more of the modules in the T1H-EBC100 base has an error. For more detail check extended errors			
E200- E216	Unused analog input channels exist at channel xx (1-16), where xx = Value -200.			

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Analog Input Module Configuration

The Terminator I/O analog input modules are configured using the following bit definitions located in the Configuration Data memory area of the T1H-EBC100's System Memory. Only the T1F-08AD1 and T1F-08AD2 support Fast Response mode.

Analog Input Module Configuration Bits				
Bit 0-4	Input Enable 0 = All Channels Enabled 1 - 31 = Number of Channels Enabled Starting With Channel 1	Write		
Bit 5–6	Reserved	-		
Bit 7	0 = Normal Response 1 = Fast Response (T1F-08AD1 and T1F-08AD2 only)	Write		
Bit 8-15	Reserved	_		

Analog Output Module Configuration

The Terminator I/O analog output modules are configured using the following bit definitions located in the Configuration Data memory area of the T1H-EBC100's System Memory.

Analog Output Module Configuration Bits				
Bit 0	Outputs Enable 0 = All outputs OFF 1 = All outputs Enabled	Write		
Bit 1	Unipolar / Bipolar 0 = Unipolar selected 1 = Bipolar selected	Write		
Bit 2	5V / 10V Range 0 = 5V range 1 = 10V range	Write		
Bit 3	0 - 20mA / 4-20mA Range 0 = 0 - 20mA range 1 = 4 - 20mA range	Write		
Bit 4-15	Reserved	-		

T1H-EBC100 DHCP & HTML Configuration

In This Chapter. . . .

- T1H-EBC100 DHCP
- Disabling DHCP and Assigning a Static IP Address
- Using HTML Configuration

T1H-EBC100 DHCP

DHCP Issues

The T1H-EBC100 is configured at the factory to look for a DHCP (Dynamic Host Configuration Protocol) server at power up. DHCP provides a way to allocate IP address dynamically to devices on a local area network (LAN). A system or network administrator configures a DHCP server with a range of IP addresses that can be assigned to DHCP enabled clients (i.e. T1H-EBC100).

In addition to an IP address, a DHCP server can provide other information such as DNS domain or a gateway IP address.

DHCP uses the concept of a "lease" or amount of time that an assigned IP address will be valid for a client. The lease time can vary depending on how long a user is likely to require the network connection at a particular location. Since the TCP/IP configuration is "leased" to the client, that is, it's not a permanent configuration. This information can change from one power up session to the next. While this is an acceptable solution for the initial testing and setup of your T1H-EBC100 device, we **do not** recommend that you use DHCP to assign IP addresses for your runtime operation. Use NetEdit3 or the T1H-EBC100's HTML Configuration page to assign a static IP address to the module (shown below).

NetEdit3 can be used to connect to a T1H-EBC100 using the IPX protocol, regardless of the IP address that was assigned to it by a DHCP server.

Disabling DHCP and Assigning a Static IP Address

You can use NetEdit3 or the T1H-EBC100's HTML Configuration page to disable DHCP and assign a static IP address to the module. Click on the *Use the following IP Address* button and enter a valid IP address for your network application.

General Settin	igs	2	Ľ
Module ID: Name: Description:	3	C Obtain an IP address automatically IV use the following IP settings IP Address: 10 1 25 59 Subnet mask: 0 0 0 0 Gateway: 0 0 0 0 0	
	OK	Cancel	

NetEdit3 (refer to chapter 3)

HTML Configuration

IP Configuration					
Mode:	© Obtain an IP address automatically © Use the following IP address				
IP Address:	10.1.37.100				
Subnet Mask:	0.0.0				
Gateway:	0.0.0.0				

Back Send Reset

Using HTML Configuration

The T1H-EBC100 can be configured by using your PC's internet browser to access the module's HTML configuration page. This method of configuration uses the TCP/IP protocol, so you must know T1H-EBC100's IP address to establish communications. The IP address may have been assigned by a DHCP server (default) or may have been set by using NetEdit3.

Connecting to the T1H-EBC100

Enter the module's IP address in your browsers Address field. Connecting to the module's HTML Configuration utility brings up the window below



TINCOC:	100 Main - Microsoft In	sternet Explorer		X
Filo Edk	View Pavorites To	als Help		19 C
da . Radi		Endrado Micros Consch Co	3	
Address	http://10.1.37.100	Partear Parte Statut Pa	VARIES FORMAL TINKING FORM FORK LUK	▼ @Go Links ¹⁰
Favor X				*
Ad *		T1HEBC	C100 by Automation Direct.com	
0 F. A				
<u>с</u> н.				
Щн.		Module ID:	0 (0x0)	
ат. ау.		Module Name:	T1HEBC100	_
۵.		Module Description:	T1HEBC100 Ethernet Base Controller.	_
<u>а</u> м.		Ethernet Address:	00 E0 62 40 19 3F	_
a I		IP Setup:	Address: 10.1.37.100 Subnet: 0.0.0.0 Gateway: 0.0.0.0	_
8 0.		Booter Version:	4.0.136	_
0 2		OS Version:	4.0.1216	
Щи.		Serial Port Setup:	9600-8-O-1-KSeq Slave Mode-No RTS	
<u>ອ</u> ແ ອັນ		CPU Rev:	1.0.6	
<u>С</u> н.		PWB/PLD Rev:	5.2 1.0	
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To configure the module, click on the desired parameter field. A new window will open, which are all described below and on the following page. Clicking the Back button will take you back to the main configuration screen shown above. Clicking the Send button writes the entry or change to the module's flash memory and clicking the Reset button reads the module's flash memory.

Module ID: Module IDs must be unique for each EBC, but they do not have to be in sequence. The module's Node Address rotary switches must both be set to allow the HTML configuration tool to set a Module ID. Do not use address zero for communications.

Module Name field and Module						
Description fields are optional to						
identify the module. Click	the					
Send button to write to	the					
module's flash memory.						

Module Name: T1HEBC100
Back Send Reset
Module Description: T1H-EBC100 IP.100
Back Send Reset

Ethernet Address: this is the MAC Address. It is a factory-assigned address that is on the permanent label on the module.

IP Configuration: Address, Subnet Ma Gateway addresses. Send button to write module's flash memory.	Set IP ask and Click the to the		Π	P Configuration
		Mode:	• Obtain an IP • Use the follo	e address automatically owing IP address
		IP Address:	10.1.37.100	

Subnet Mask: 0.0.0.0 Gateway: 0.0.0.0

Reset

Back

Send

The module's current **Booter Version** and **OS Version** are listed. The latest versions can be found by clicking Hosteng.com in the Firmware Updates field.

Serial Port Setup: configure or make necessary changes to the serial port communication parameters. Click the Send button to write to the module's flash memory.

	Setup Serial Port
Baud Rate:	C 115200 C 57600 C 38400 C 19200 C 14400 € 9600 C 4800 C 2400 C 1200 C 600 C 300
Parity:	© Even ⊙ Odd © None
Data Bits:	○7 ◎8
Stop Bits:	©1 02
Mode:	\odot K-Sequence Slave \bigcirc Modbus Slave \bigcirc Master/Proxy
□ Use RTS	
RTS Pre-Transmit Delay (ms):	0
RTS Post-Transmit Delay (ms):	0
	Back Send Reset

The module's current **CPU Rev** and **PWB/PLD Rev** are listed. The latest versions can be found by clicking Hosteng.com in the Firmware Updates field.

Firmware Updates: If your PC is connected to the internet, clicking on Hosteng.com will take you to Host Engineering's web site where the most current firmware files are available for downloading to your PC. You must use NetEdit3 to upgrade the module.

Using the T1H-EBC(100) with Think & Do

In This Appendix. . . .

- Mapping T1H-EBC(100) I/O Points
- Hot Swap Setup
- Analog I/O Module Configuration
- I/O Module Status Words / Bits
- Using EZTouch/EZText Panel with the RJ-12 Serial Port

NOTE: Think & Do Software has been retired and therefore is no longer supported.

EBC(100) with T&D

Appendix A

Mapping T1H-EBC(100) I/O Points

We recommend that you are familiar with the "Getting Started" and "Creating a Project" chapters in the Think & Do Studio Learning Guide before attempting to map the EBC I/O points/channels to Data Items using ConnectivityCenter.

Launching Connectivity Center Tool

To launch ConnectivityCenter:

1) Launch Think & Do Studio ProjectCenter from the Windows desktop by clicking on Start > Programs > Think & Do Studio > ProjectCenter. Or, click on the ProjectCenter icon to start.

2) Click on the File Menu and either Open your Think & Do Project or select New.3) Within ProjectCenter select Windows 2000 or NT Certified PC as the Runtime Target.

4) Then click Tools > ConnectivityCenter to launch ConnectivityCenter. Or, click on the ConnectivityCenter shortcut in the Project Explorer.

5) Once in ConnectivityCenter click on Drivers > Add and select Automationdirect.com Ethernet I/O Driver.

5)Then click on Configuration > Connect or click on the Connect toolbar button.

Connecting to the EBC

ConnectivityCenter will draw a picture of your EBC I/O system.



Mapping I/O PointsThis procedure is discussed in detail in the "Creating a Project" chapter in the Thinkto Data Items& Do Studio Learning Guide. This will map your real world I/O to Data Items.

A-3

Hot Swap Setup

Hot Swap: Automatic Mode Click on the T1H-EBC(100) graphic and the Module Info tab in ConnectivityCenter. The Hot Swap Settings can be set to either Automatic or Manual mode. If Automatic mode is selected, the base will automatically rescan once a module has been "Hot Swapped".



T1H-EBC

Module Info tab

Hot Swap: Manual Mode Reset

If Manual mode is selected, you will need to write a logical "1" to the Eth_Rescan And Clear Errors Status Item Value to force the base rescan once the module Hot Swap has been performed. This information is listed under the Board Status Mapping tab.



Appendix A Using EBC(100) with T&D

Analog I/O Module Configuration

Click on the analog I/O module graphic to be configured and the Module Info tab in ConnectivityCenter. For the analog output modules, select the module Signal Sign and Range. For the analog input modules (T1F-08AD1 and T1F-08AD2 only), select either Fast Response or Normal Response (default) mode.

Analog Output Module Analog Input Module - 18 × NT se/Module or Any Other Erro: /Module Base or Module Mismatch NT Ether tal B T1H-EBC Slave-1 <u>B</u>ehech Grid Befresh Grid * [1E-00AD-1E th Slavefit Slot . 🚺 Thirk & Do Studio - Desig.. 🔀 Th 12:15 PM Module Info Tab Module Info Tab

I/O Module Status Word / Bits

I/O Module diagnostic information is listed for each I/O module under the Module Status Mapping tab. Click on a module graphic to display its Status Item Descriptions.



Module Status Mapping Tab

Appendix A Jsing EBC(100) with T&D

Using EZTouch/EZText Panel with the RJ-12 Serial Port

The T1H-EBC has a built-in RS232C serial port that can be used to connect to an operator interface panel. Use ConnectivityCenter to configure the connection from the T1H-EBC to the EZTouch or EXText panel. The "HMI Options for Remote Base Controllers" section in the "Operator Screen Techniques" chapter in the Think & Do Studio Learning Guide discusses configuring and using Optimate Panels with the EBC.

Adding Operator Interface Device Click on the T1H-EBC graphic and Module Info tab in ConnectivityCenter. The Serial Port Settings attribute is only visible in ConnectivityCenter when the I/O is disconnected. Following the steps below will configure the EBC's RJ12 serial port to be used with the EZTouch or EZText panels.



1. Click to access port settings



4. Set the Family to Modbus Master and the Panel Type to EZTouch/Text.

Once the EZTouch or EZText panel has been added, it will show up in the list of the configured devices, and an EZTouch/Text panel graphic symbol will be located under the I/O base next to the EBC.



Using Monitor I/O to Verify Panel Operation Re-connect to the I/O in ConnectivityCenter by clicking on the Configuration menu > Connect or by clicking on the Connect toolbar button. Then Scan the I/O by clicking on the Configuration menu > Scan or by clicking on the Scan toolbar button. Doubleclick on the EZ panel box graphic to launch the Monitor I/O Dialog Box. The Monitor I/O tool allows the user to update the fields at any moment, but the panel continuously updates the fields with any changes as well. All of the "Value" fields in the Monitor I/O Dialog Box are read/write and updates from the the Monitor I/O Dialog box take precedence over updates from the panel.

The user can update bit values (Input, Output and Flag) immediately by one mouse click or by pressing the "space bar".

When typing in numbers, the grid enters the "edit mode", which blocks off any conflicting updates from the panel. The "edit mode" entry completes after pressing "Enter", any arrow key or selecting a new line.



Using the T1H-EBC(100) with *KEPDirect* OPC Server

In This Appendix....

- Introduction to KEPDirect
- KEPDirect Project: Adding and Configuring a Channel
- *KEPDirect* Project: Adding and Configuring a Device
- KEPDirect Project: Adding Tags to the Project
- T1H-EBC(100) I/O Addressing
- Analog Output Module Configuration

Introduction to *KEPDirect*

Introduction to OPC OPC (Object Linking and Embedding) for Process Control, is an industry standard created by a number of worldwide leading hardware and software suppliers in cooperation with Microsoft. The OPC Data Access specification, as maintained by the OPC Foundation, is a non-proprietary technical specification that defines a set of standard interfaces based upon Microsoft's OLE/COM technology. An OPC server (driver) allows items such as distributed control systems, programmable logic controllers, I/O systems and smart field devices to communicate with a wide range of HMI/SCADA (client) software packages residing on a PC. Traditionally, each software or application developer was required to write a custom interface, or server/driver, to exchange information with hardware field devices. OPC eliminates this requirement allowing manufacturing customers true plug and play connectivity and the freedom to choose products based on their automation requirements.

DDE Support While *KEPDirect* is first and foremost an OPC server, KEPware recognized that a number of legacy applications still depend upon DDE for their underlying client server technology. Early in the development of Windows, Microsoft provided a generic client server technology called DDE (Dynamic Data Exchange). DDE did provide a basic architecture that would allow many windows applications from a wide range of vendors to share data. But there was one problem, DDE was not designed for the industrial market lacking much of the speed and robustness desired in an industrial setting. However, this did not stop DDE from becoming a dominant client/server architecture, largely due to its availability in most windows applications.

KEPDirect KEPDirect Enhanced OPC/DDE Server is a 32 bit windows application that provides a means of bringing data and information from a wide range of industrial devices and systems into client applications on your Windows PC. KEPDirect falls under the category of a "Server" application. It is very common to hear the term "client/server application" in use across many software disciplines and business segments. In the industrial market, it has usually come to mean the sharing of manufacturing or production data between a variety of applications ranging from human machine interface software and data historians, to large MES and ERP applications.

At a high level, the *KEPDirect* OPC Server is comprised of several objects that are described on the next page.

🛥 KEPDirect EBC I/O Server - [untitled.oj	pf *]						
File Edit View Users Tools Help							
) 🖆 🖬 🕅 🛅 🛅 📾 l 🗠 🕺 🖻 🖻 🗙 l 🏖							
⊡-े 🐙 Channeli ————————————————————————————————————	Tag Name	Address	Data Type Byte	Scan Rate	Scaling	Description	
Group1		51,015	5700	100	Mono		
	ا					Þ	
Ready				Clients: I	0 Active tags:	0 of 0 //;	
	LEPDirect EBC 1/0 Server - [untitled.o File Edit View Users Tools Help C Channell C Channell	KEPDirect EBC 1/O Server - [untitled.opf *] File Edit View Users Tools Help File Channel Or Channel Tag Name Tag 1 Tag 1 Keedy	Letter Letter Line Letter Lin	Like Edit View Users Tools Help Image: State of the state	Letter LEBC 1/O Server - [untitled.opf *] File Edit View Users Tools Help Image: Strange in the server is th	Line Left View Users Tools Help Image: Scan Rate Scaling Im	

B-2

Channel Object: Each protocol or driver used in a *KEPDirect* project is referred to as a channel. A channel refers to a specific communications driver. A *KEPDirect* project can consist of many channels each with unique communications drivers or each with the same communications driver.

Each channel name must be unique in a *KEPDirect* application. The channel name entered here will be part of the OPC browser information.

Device Object: Unlike the channel name, "Device names" can be the same from one channel to the next. The device name is a user defined logical name for the device. The device name and channel name will be part of the OPC browser information as well as a DDE item name. Within an OPC client the combination of channel name and device name would appear "ChannelName.DeviceName".

Group Object: *KEPDirect* allows tag groups to be added to your project. Tag groups allow you to tailor the layout of OPC data in logical groupings that fit the needs of your application. Using tag groups allows multiple sets of identical tags to be added under the same device. This can be very convenient when a single device handles a number of similar machine segments. From an OPC client standpoint, the use of tag grouping allows you to segregate your OPC data into smaller tag lists, which can make finding a specific tag easier when browsing the server.

Tag Object: *KEPDirect* allows both dynamic tags, (tag entered directly at the OPC client that specify device data) and user defined tags. User defined tags have the benefit of allowing the tag to be browsed from an OPC client that supports tag browsing. User defined tags also support tag scaling. Unlike many of the dialogs you will find in *KEPDirect*, the tag properties dialog has a number of features that are driven by icons. The tag name is part of the OPC browse data. Tag names must be unique within a given device branch or tag group branch. If your application is best suited by using blocks of tags with the same names, use tag groups to segregate the tags.

KEPDirect Project: Adding and Configuring a Channel

Running the Server *KEPDirect*, like any OPC server, can be started a number of ways. One of the benefits of OPC technology is that your OPC client can automatically invoke the server when it attempts to connect and collect data from it. In order for this automatic mode of operation to occur you must first create and configure a project. Once you have created a project, *KEPDirect* will automatically select the most recently used project when it is invoked by an OPC client.

Initially however, you need to manually invoke *KEPDirect* using either the desktop icon, if you chose to install it, or by selecting *KEPDirect* from the windows start menu. Depending on any changes you may have made to the appearance of *KEPDirect*, once invoked you should be presented with the following interface. To learn more about the various elements of the user interface see (Basic *KEPDirect* Components).

While discussing how to start *KEPDirect* its important to understand what the system requirements are for running the server. *KEPDirect* has been designed to place as little strain on your system as possible.

Recommended System Requirements:

400Mhz Pentium

64 Megs of Ram

10 Megs of Hard Disk Space

Windows NT(SP6a)/2000 (Strongly recommended for industrial settings) Available Ethernet Card

Adding a Channel A channel refers to a specific communications driver. A *KEPDirect* project can consist of many channels each with unique communications drivers or each with the same communications driver. Depending on the driver or drivers you have installed you can define a number of channels within a single project. A channel acts as the basic building block of an OPC link. Properties like communications port, baud rate, and parity are contained at the channel level. Each channel name must be unique in a *KEPDirect* project. The channel name can be up to 31 characters long. To add a new channel to your project you can use the Edit menu > New Channel, the Toolbar Add Channel, or the "Click to add a channel" dialog.



Selecting the
Device DriverSelect the device driver you want to assign to the channel. A driver list will be
presented displaying all of the device drivers that are installed in your system.



Selecting the "Enable diagnostics" check box will enable diagnostic information to be available to your OPC application for this channel. With diagnostic functions enabled, diagnostic tags are available for use within client applications. In addition to diagnostic tags, a diagnostic window is also available when this feature is enabled. The diagnostic features of *KEPDirect* do require a minimal amount of overhead processing. For this reason it is recommended that you only use the diagnostic features when needed and disable them when not in use which is the default case.

Selecting the Network Adapter

The Network Interface selection allows you to select a specific NIC card for the Automationdirect EBC Ethernet driver to use based on the NIC name or its assigned IP address. By selecting a specific NIC interface you will be able to force the driver to send all Ethernet communication through the specified NIC. If you do not know which NIC you should use, select the "Default" condition.



Setting the Server Writes Optimizations

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As with any OPC server, writing data to your device may be the most important aspect of your application. Insuring that the data written from your OPC client application gets to the device in a timely manners is the goal of the server. *KEPDirect* provides a number of optimization settings that can be used to tailor the server to meet the needs, and improve the responsiveness of your application.

There are currently three write optimization modes. The following is a brief description of the modes. For a detailed explanation, refer to the "Channel Properties – Write Optimizations" section in the *KEPDirect* on–line help file.

NOTE: We strongly suggest that you characterize your application for compatibility with these write optimization enhancements before using them in a production environment.

The default mode, "Write all values for all tags" will force the server to attempt to write every value to the controller. This mode insures that everything written from your OPC client applications will be sent to the target device. While writing every value to the device may seem like the best course of action, there are a number of applications where writing every value, many of which may be the same value, over and over may be simply a waste of communications bandwidth.

The "Write only latest value for non-boolean tags" allows any value that is not a boolean value to be updated in the server's internal write queue and will then be sent to the device at the next possible opportunity. This can dramatically improve the overall performance of your application. This feature must be used with a clear understanding of how it will affect the operation of your application.

The final write optimization mode, "Write only the latest value for all tags", takes the operation described for the second mode and applies it to all tags.

The **Duty Cycle** selection allows you to control the ratio of write operations to read operations. By default the duty cycle is set to ten. This means that ten writes will occur for each read operation. If your application is doing a large number of continuous writes but you need to insure that read data is still given time to process, you may want to reduce the Duty Cycle. A setting of one will result in one read operation for every write operation. In all cases if there are no write operations to perform, reads will be processed continuously.



Saving the New With "Channel1" channel added to the server, the KEPDirect window will appear as **Channel Settings** follows:



Note that the channel is shown using the channel name given, but it is also has a small red "x" below the channel icon. The red "x" indicates that the channel does not contain a valid configuration. "Channel1" is not valid because a device has not yet been added to the channel.

KEPDirect supports the use of multiple channels. As you add channels to your **Using Multiple** Channels in a project you can specify either the same communications driver or different communications drivers. Most communication drivers offered by KEPware support operation on up to 16 communications ports or ethernet network connections simultaneously. By defining multiple channels you can improve the overall performance of you application. In the case of either a serial driver or Ethernet driver using multiple channels allows you to spread large communications loads across the multiple channels. A good example of this would be a serial driver that is being used to communicate with eight devices on the serial line. Normally the communications driver used in this application would be responsible for gathering data from all eight devices in a round robin fashion. If this same application is reconfigured to use multiple channels assigned to multiple communications ports, the device load can be divided across the channels. The end result is reduce work load on each channel and dramatic improvements in the responsiveness of your application. The need to use multiple channels is dependent solely on the needs of your application. In either case there is no additional cost involved to use a licensed driver on multiple communications or Ethernet ports.

Project

B_

KEPDirect Project: Adding and Configuring a Device

Adding a Device

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Once a channel has been configured in a *KEPDirect* project, a device must be added to the channel. Devices represent PLCs, I/O devices or other hardware that the server will communicate with. Device selection is restricted by the device driver the channel is using.

To add a device to a channel, select the desired channel and use the Edit menu > New Device, the Toolbar Add Device, or the "Click to add a device" dialog.

KEPDirect EBC I/O Server - [untitled.opf *]			
File Edit View Users Tool New Device - Name		×	
Cick to add a device	A device name can be from 1 to 256 characters in length. It must begin with a letter but the remaining characters can be any combination of letters, numbers and the underscore character. Device name: Device name: Vack Next Cancel Help		Description
Ready		Clients: 0	Active tags: 0 of 0

Selecting the Device Model

The "Model" parameter allows you to select the specific type of the device associated with a device ID. The contents of the model selection drop down will vary depending on the chosen communication driver.

KEPDirect EBC I/O Server - [untitled.opf *]		×
File Edit View Users Tool Image: Second stress Image: Second stress Image: Second stress Image: Second stress Image: Second stress Image: Second stress Image: Second stress Image: Second stress	The device you are defining uses a device driver that supports more than one model. The list below shows all supported models	
	Select a model that best describes the device you are defining.	
	Device model: Terminator I//0 H2 H4 Terminator I//0 GS1 Drive GS2 Drive GS3 Drive	
	< Back Next > Cancel Help	<u> </u>
Ready	Clients: 0 Active tags: 0 of 0	//.

Selecting the Device Model The "Device ID" parameter allows you to specify the driver specific station or node address for a given device. Since the Automationdirect EBC driver is an Ethernet based driver, a unique and valid TCP/IP address must be entered. IPX protocol is not supported.



Setting the Device Timeout Properties Device timeout parameters allow a driver's response to error conditions to be tailored to the needs of your application. The timeout parameters are specific to each device you configure. Each of the field parameters is defined in detail in the "Device Properties – Timeout" section in the *KEPDirect* on–line help file.



The "**Connection timeout**" allows the time required to establish a socket connection to a remote device to be adjusted. The "**Request timeout**" is used by all drivers to determine how long the driver will wait for a response from the target device. The "**Fail after**" parameter is used to determine how many times the driver will retry a communications request before considering the request to have failed. If your environment is prone to noise induced communications failures you may want to increase the number of **retries** the driver performs.

Automatic OPC Tag Database Generation

The automatic OPC tag database generation features of *KEPDirect* have been designed to make the setup of your OPC application a Plug and Play operation. Since the Automationdirect EBC communication driver supports this feature, you can configure it to automatically build a list of OPC tags within *KEPDirect* that correspond to device specific data. The automatically generated OPC tags are then browsable from your OPC client. The OPC tags that are generated are dependent upon the nature of the supporting driver. Each field selection is defined in detail in the "Automated OPC Tag Base Generation" section in the *KEPDirect* on-line help file.

Ele Edit View Users Tools	[unlitled.opf *] U.L. New Device - Database Creation	
E-	The device you are defining has the ability to automatically generate a tag database. Definition of the device should create a database or statup, what action should be performed on previously generated tags, group to add tags to, and allowing subgroups. Status: Do not generate on statup Action: Delete on create Add to group: Image: Add to group: Add to group: Image: Add to group:	Description
	< Back Next > Cancel Help	
Ready	Clien	nts: 0 Active tags: 0 of 0 //.

The "Automatic tag database generation on device startup" selection allows you to configure when OPC tags will be automatically generated. There are three possible selections. The default condition, "Do not generate on startup", will prevent the driver from adding any OPC tags to tag space of *KEPDirect*. The selection "Always generate on startup", will cause the driver to always evaluate the device for tag information and to add OPC tags to the tag space of the server each time the server is launched. The final selection "Generate on first startup" will cause the driver to evaluate the target device for tag information the first time this *KEPDirect* project is run and to add any OPC tags to the server tag space as needed. When the automatic generation of OPC tags is selected, any tags that are added to the server's tag space must be saved with the project. You can configure your *KEPDirect* project to auto save from the Tools > Options menu.

With "Device1" added to "Channel1", the KEPDirect window will appear as follows:

- KEPDirect EBC I/O Server - [untitled.or	opf *]						<u>- 0 ×</u>
File Edit View Users Tools Help							
🗅 📽 🖬 🕅 🛅 🔂 😭 🗤 .	ä 🖻 🖻 🗙	2					
E P Channel1	Tag Name	Address	Data Type	Scan Rate	Scaling	Description	
Device1	Click to add	a static tag. Tag	s are not require	d, but are brows	sable by OPC clier	nts.	
							Þ
<u>الم</u>			,				Þ
Ready					Clients: 0	Active tags: 0	of 0 //,

Saving the New Device Settings

KEPDirect Project: Adding Tags to the Project

There are two ways to get data from a device to your client application using *KEPDirect*. The first method and most common method of defining tags is called **User Defined Tags**. This requires that you define a set of tags in the server project and then use the name you assigned to each tag as the item of each OPC/DDE link between the client and the server. The primary benefit to this method is that all user defined tags are available for browsing within OPC clients. Additionally, user defined tags also support scaling.

The second method of defining tags is called **Dynamic Tags**. Dynamic tags allow you to define tags in the client application. Instead of providing the server with a tag name as the OPC/DDE item, you would provide the device address (and optionally a data type). The server will create a tag for that location and start scanning for data automatically. *KEPDirect* allows tag groups to be added to your project.

Tag groups allow you to tailor the layout of OPC data in logical groupings that fit the needs of your application. Using tag groups allows multiple sets of identical tags to be added under the same device. This can be very convenient when a single device handles a number of similar machine segments. From an OPC client standpoint, the use of tag grouping allows you to segregate your OPC data into smaller tag lists, which can make finding a specific tag easier when browsing the server.

User Defined Tags Each field selection is defined in detail in the "Tag Properties" section in the *KEPDirect* on-line help file. A brief description of each is listed below.

- KEPDirect EBC I/O Se	Tag Properties	
File Edit View Users	General Scaling	
Channel1		escription
E Beneer	Name:	
	Address:	
	Description:	
	Data properties	
	Data type: Default	
	Client access: Read/Write	
	Scan rate: 100 🔤 miliseconds	
	✓ Do not allow clients to override data type.	
Ready	OK Cancel Apply He	Active tags: 0 of 0

The tag "**Name**" parameter allows you to enter the string that will represent the data available from this tag. The tag name can be up to 31 characters in length. While using long descriptive names is generally a good idea, keep in mind that some OPC client applications may have a limited display window when browsing the tag space of an OPC server. The tag name is part of the OPC browse data. Tag names must be unique within a given device branch or tag group branch. If your application is best suited by using blocks of tags with the same names, use tag groups to segregate the tags.

The "Address" parameter allows you to enter the desired driver address for this tag. To determine how an address should be entered, you can use the **Hints button** next to the address parameter. Hints provide a quick reference guide to the address format of the driver. Once you have entered an address you can test it using the check address button. When pressed, the check address button attempts to validate the address with the driver. If the driver accepts the address as entered no message will be displayed. If an error is detected a pop-up will inform you of the error. Keep in mind that some errors will be related to the data type selection and not the address string.

The "**Description**" parameter allows you to attach a comment to this tag. A string of up to 64 characters can be entered for the description. If you are using an OPC client that supports Data Access 2.0 Tag Properties, the description parameter will be accessible from the Item Description property of the tag.

The "**Data Type**" selection allows you to specify the format of the tag's data as it is found in the physical device. The data type setting is an important part of how a communication driver reads and writes data to a device. For many drivers the data type of a particular piece of data is rigidly fixed. The available data type selections are:

- **Default** This type allows the driver to choose its default data type see the specific driver help for details
- Boolean Single bit data On or Off
- Char Signed 8 bit data
- Byte Unsigned 8 bit data
- Short Signed 16 bit data
- Word Unsigned 16 bit data
- Long Signed 32 bit data
- Dword Unsigned 32 bit data
- Float 32 bit Real value IEEE format
- String Null terminated ASCII string
- Double 64 bit Real value IEEE format
- BCD Two byte packed BCD value range is 0 9999
- LBCD Four byte packed BCD value range is 0 99999999

The "**Client access**" selection allows you to specify whether this tag is Read Only or Read/Write. By selecting Read Only you can prevent client applications from changing the data contained in this tag. By selecting Read/Write you are allowing client applications to change this tag's value as needed.

The "**DDE scan rate**" parameter allows to you specify the the update interval for this tag when used in a DDE client. OPC clients can control the rate at which data is scanned by using the update rate that is part of all OPC groups.

The "Allow client to override data type" selection allows you force OPC clients to use the data type you have specified for this tag. OPC clients can specify how they desire to view the data from a particular tag.

Creating a User Define Tag

To determine how an address should be entered, use the Hints button "?" to the right of the address field. Hints provide a quick reference guide to the address format of the driver.



Once you have entered an address you can test it using the check address " ν " button. When pressed, the check address button attempts to validate the address with the driver. If the driver accepts the address as entered no message will be displayed. If an error is detected a pop-up will inform you of the error. Keep in mind that some errors will be related to the data type selection and not the address string. Below is an example of a valid tag properties.

🛥 KEPDirect EBC I/O Se	Tag Properties	<u> </u>
File Edit View Users	General Scaling	
Channel1	Identification	pescription ,
	Address: \$1:D10 ?	
	Description: Module Slot 1, DC Prox Sensor 1	
	Data properties	
	Data type: Boolean	
	Client access: Read Only	
	Scan rate: 100 📩 milliseconds	
	Do not allow clients to override data type.	
Ready	OK Cancel Apply Hel	Active tags: 0 of 0

The window below shows a valid configured channel, device and several user defined tags.

KEPDirect EBC I/O Server - [untitled.c	pf*]					_ 🗆 🗵
File Edit View Users Tools Help						
🗅 🗳 🔲 💯 🛅 🎦 😁 🔐 🗠 .	š 🖻 🖻 🗙 歳					
E P Channel1	Tag Name	Address	Data Type	Scan Rate	Scaling	Description
- III Device1	ASCII_Data_Input	EBC:SP0.DATAIN	String	100	None	
	Input_0	51:DI0	Boolean	100	None	
	Set_Port_to_ASCII	EBC:SP0.MODE	Byte	100	None	
	1					
1						
Ready				Clien	ts: 0 Active ta	gs:0 of0

T1H-EBC(100) I/O Addressing

I/O slots must be individually addressed in the following form: S<ss>:<t><nn> where ss is the slot number (1 to 93), t is the address type (DI, DO, WI, WO, etc.), and nn is the address. The address ranges from 0 to an upper limit determined by the module occupying the slot.

I/О Туре	Syntax	Data Type
Discrete Inputs	DI <nn> nn = Bit Number (decimal)</nn>	Boolean , Byte, Char, Word, Short, DWord, Long
Discrete Outputs	DO <nn> nn = Bit Number (decimal)</nn>	Boolean , Byte, Char, Word, Short, DWord, Long
Byte Inputs	BI <nn> nn = Bit Number (decimal)</nn>	Byte , Char
Byte Outputs	BO <nn> nn = Bit Number (decimal)</nn>	Byte , Char
Word Inputs	WI <nn> nn = Bit Number (decimal)</nn>	Word, Short
Word Outputs	WO <nn> nn = Bit Number (decimal)</nn>	Word, Short
DWord Inputs	DWI <nn> nn = Bit Number (decimal)</nn>	DWord, Long
DWord Outputs	DWO <nn> nn = Bit Number (decimal)</nn>	DWord, Long
Float Inputs	FI <nn> nn = Bit Number (decimal)</nn>	Float
Float Outputs	FO <nn> nn = Bit Number (decimal)</nn>	Float
Double Inputs	DBI <nn> nn = Bit Number (decimal)</nn>	Float
Double Outputs	DBO <nn> nn = Bit Number (decimal)</nn>	Float

T1H-EBC(100) I/O Addressing Example

Each field selection is defined in detail in the "Tag Properties" section in the *KEPDirect* on-line help file.

Terminator I/O	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6
EBC Module	8 Digital Input	16 Digital Input	8 Digit Output	16 Digital Output	8 Analog Input	16 Analog Output
Slot 0	Addresses	Addresses	Addresses		Addresses	
Serial I/O Port	S1:DI0 to	S2:DI0 to	S3:DO0 to	Addresses S4:DO0	S5:DWI0 to	Addresses S6:DWO0
EBC:SP0.item	S1:DI7	S2:DI15	S3:DO7	to S4:DO15	S5:DWI7	to S6:DWO15

Analog Output Module Configuration

Analog Output Module Configuration Byte				
Module Control Byte	KEPDirect Byte	Description		
Bit 24	DO0_POINT	Outputs Enable 0 = All outputs OFF 1 = All outputs Enabled	Write	
Bit 25	DO1_POINT	Unipolar / Bipolar 0 = Unipolar selected 1 = Bipolar selected	Write	
Bit 26	DO2_POINT	5V / 10V Range 0 = 5V range 1 = 10V range	Write	
Bit 27	DO3_POINT	0 - 20mA / 4-20mA Range 0 = 0 - 20mA range 1 = 4 - 20mA range	Write	
Bit 28-31	DO4_POINT - DO7_POINT	Reserved	-	

The following example shows the KEPDirect OPC Quick Client (discussed in Appendix C) used to setup a Terminator I/O analog output voltage module in slot 3. The highlighted selections are configured for Output Enabled (DO0_Point=1), BiPolar (DO1_Point=1), and 5V (DO2_Point=0). The analog output data value is 1024 decimal and results in a voltage output of -2.5V.

🚠 OPC Quick Client - Untitled *			<u>_ 0 ×</u>				
Eile Edit View Iools Help							
D 🖻 🔲 📸 💣 📽 🗼 🖻 🖻 🗙							
	Item ID	Data Type	Value 🔺				
Channel1System	Channel1.T1HEBC21.SLOT_03.S3_DW00_LONG	Long	1024				
Channell.T1HEBC21	Channel1.T1HEBC21.SLOT_03.S3_DW00_DWORD	DWord	1024				
Channell, T1HEBC21, _System	Channel1.T1HEBC21.SLOT_03.S3_D07_POINT	Boolean	0				
Channell, THEBC21, SLOT_UI	Channel1.T1HEBC21.SLOT_03.S3_D06_POINT	Boolean	0				
Channell TIHEBC21.5LOT_02	Channel1.T1HEBC21.SLOT_03.S3_D05_POINT	Boolean	0				
	Channel1.T1HEBC21.SLOT_03.53_D04_POINT	Boolean	0				
	Channel1.T1HEBC21.SLOT_03.S3_D03_POINT	Boolean	0				
	Channel1.T1HEBC21.SLOT_03.S3_D02_POINT	Boolean	0				
	Channel1.T1HEBC21.SLOT_03.S3_D01_POINT	Boolean	1				
	Channel1.T1HEBC21.SLOT_03.S3_D00_WORD	Word	3				
	Channel1.T1HEBC21.SLOT_03.S3_D00_SHORT	Short	3				
	Channel1.T1HEBC21.SLOT_03.S3_D00_POINT	Boolean	1				
	Channel1.T1HEBC21.SLOT_03.S3_D00_LONG	Long	3				
	Channel1.T1HEBC21.SLOT_03.S3_D00_DWORD	D'Word	3				
	Channel1.T1HEBC21.SLOT_03.S3_D00_CHAR	Char	3				
	Channel1.T1HEBC21.SLOT_03.S3_D00_BYTE	Byte	3 🔽				
I F	•		•				
r Readv			Item Count: 91				
Diagnostic bits for Terminator I/O family of analog I/O are supported differently on each module but will present themselves as error bits/values or messages to the KEPDirect EBC I/O server using a common convention. A complete definition of the error information, and it's format convention, is available in the AutomationDirect EBC Help file. This can be accessed either from the Start Menu > Program > KEPDirect EBC I/O Server > Help

Documentation or through the Help menu from within the server. The example below shows the list of error codes supported by the EBC I/O server. The most common errors for analog I/O are 139, 142, 155, and 200–216 depending on the features supported in the specific analog module.

😭 AutomationDirect EBC Device Driver Help			
Hide Locate Back Forward Print			
Contents Index Search Favorites - O AutomationDirect EBC	Previous 1	Image: Sector of the secto	Drive Error M
Getting Started Help Contents Querview Device Setup Addressing Addressing Addressing Addressing Addressing Contents Getting Started Getti	133 134 135 136 137 138 139 140 142 153 154 155	Range error. Length warning. Invalid base number. Invalid module type. Invalid offset. Invalid offset. Invalid boot version for OS. Broken transmitter; nn contains channel number that failed. Invalid address. Channel fail multiple; nn contains channel BITS from module. Ex: If bit 0 is set then channel 0 has failed If bit 1 and 3 are set then channel 1 and 3 have failed. I/O module missing (I/O module replaced in hot swap). I/O Base has changed (I/O module replaced in hot swap). I/O Base has changed (I/O module replaced in hot swap). Module in error. Possible errors: - missing 24V on analog modules - blown fuses on discrete modules - missing 24V on analog modules - missing 24V on analog modules	4
	200-216	XX unused analog input channels exist where: XX = Value - 200,	•

Using the *KEPDirect* OPC Quick Client

In This Appendix. . . .

- Creating a KEPDirect Quick Client Project
- Using the RJ12 Serial Port in ASCII Mode

Creating a KEPDirect Quick Client Project

KEPDirect Quick Client can be used to assist in the test and development of KEPware's OPC Data Access 1.0 and 2.0 Servers.

Connecting the Client to the OPC Server A server connection provides a link between the Quick Client and the *KEPDirect* OPC server. To add a server connection to the Quick Client, you can use the Edit menu>New Server Connection or click on the New Server icon in the toolbar menu.



Specify the Prog ID of the OPC Server the client should connect to. You can browse for registered servers by expanding any of the branches. Double-clicking on any registered server will automatically update the Prog ID field. For more information on the registered servers, click on the "Help" button to display the "Server Connection" section of the on-line help file. Once a connection to the OPC server has been established, additional "Server Operations" can be accessed by right clicking on the highlighted server in the right window column or by using the Tools menu>Server selection.

Creating a Client Group

A group is used to organize a collection of items with a common set of properties. To add a Group to the Quick Client, you can use the Edit menu>New Group or click on the New Group icon in the toolbar menu.

COPC Quick C	lient - Untitled *		_ _ ×
File Edit Vie	Group Properties		
	General		
: Autom			
	Name:		
	Update Rate (ms.):	100	
	Time Bias (min.):	0	
	Percent Deadband:	0	
	Language ID:	1033	
Date Ready	Update Notification:	OPC 2.0	🔽 Active State

The group specifies the following properties: group name, update rate, time bias, percent deadband, language ID, active state, and the type of data connection that should be made to the server. For detailed information on the group properties, click on the "Help" button to display the "Group" section of the on-line help file. Once a Group has been created, additional "Group Operations" can be accessed by right clicking on the highlighted branch Group or by using the Tools menu>Group selection.

Selecting a Group Item

Items represent data that may be accessed via the OPC server. An item specifies the following properties: item ID, access path, requested data type and active state. For detailed information these properties, click on the Help button to display the "Item" section of the on-line help file. To add an Item to the Quick Client Group, you can use the Edit menu>New Item or click on the New Item icon in the toolbar menu.

OPE Quick Eliept	Add Items	
File Edit View Too	Item Properties OK	
n 🗃 🖬 👘	Access Path: Cancel	
AutomationDire	Item ID: Device1.51:80000	Value Timestamp
🗌 🔄 MyGroup	Data Type: Byte	0 16:21:20:127
	Active 🔽	0 16:17:54:600
		16:17:54:600
Ready	Branch Filter: Leef Filter: Type: Access: Branch Filter: Native Any Charmeli S1:81000 - \$253 B1255 Char Device1 S1:80000 - \$253 B0255 Byte S1:08000 - \$253 B0255 Char S1:08000 - \$253 B0255 Float S1:08000 - \$253 B0255 Float S1:08000 - \$253 D0255 Float S1:01001 - \$253 D0255 Float S1:01001 - \$253 D0255 Float S1:01000 - \$253 D0255 Float S1:01001 - \$253 D0255 Float S1:01000 - \$253 D0255 Float S1:01001 - \$253 D0255 Fl	Item Count: 3

If the OPC Server was configured to automatically generate OPC tags, the generated tags would be browsable from the OPC client. If automatic tag generation was not selected, create an item by:

- 1) browsing the OPC Server branch tags
- 2) highlighting the desired tag in the right column
- 3) clicking on the "Add Leaves" button
- 4) clicking on the "Green Check Mark" button to validate the item
- 5) and clicking on the "OK" button.

After clicking on the "OK" button, the following window will be display the created items.

🔐 OPC Quick Client - Untitled *				<u>- 🗆 ×</u>
File Edit View Tools Help				
🗅 📽 🖬 😹 💣 💣 😭 👗 🖻 💼 >	<			
AutomationDirect.KEPDirectServer	Item ID	Data Type	Value	Timestamp
MyGroup	Channel1.Device1.Slot1_Output0	Boolean	0	16:21:20:127
	Channel1.Device1.Set_Port_to_ASCII	Byte	0	16:17:54:600
	Channel1.Device1.ASCII_Data_Input	String		16:17:54:600
	hat			
Ready			I	em Count: 3 🏼 🎢

Item Operations Item operations can be accessed by right clicking on the desired item or by using the Tools menu>Group selection.

File Edit View Tools Help		New Item			<u>- 🗆 ×</u>
D I L I L I L III III III III IIII IIII	Item ID Channel1.Dev Channel1.Dev Channel1.Dev	Set Active Set Inactive Synchronous Cache Read Synchronous Device Read Synchronous Write		Value O O	Timestamp 16:21:20:127 16:17:54:600 16:17:54:600
		Asynchronous 2.0 Read Asynchronous 2.0 Cache Refresh Asynchronous 2.0 Device Refresh Asynchronous 2.0 Write			
Ready	<u>.</u>	Cut Copy Paste Delete	Ctrl+X Ctrl+C Ctrl+V Del		Item Count: 3
		Properties			

After clicking on the desired item operation, a window similar to the following will be displayed. In this example, a logical "1" (Boolean data type) is being written to a discrete output to turn it on. The item operations can be used to read discrete/analog inputs and write to discrete/analog outputs, etc.

OPC Quick Client - Untitle	d *				<u>- 🗆 ×</u>
File Edit View Tools H	nchronous 2.0 Write			×	
🗅 🖻 🖬 📩 💣 🗍				 пк 1	
	Item ID	Current Value	Write Value	 	Timestamo
MyGroup	Channel1.Device1.Slot1	0	1	Apply	16:21:20:127
				Cancel	16:21:20:127
					10;17;54;000
					16:17:54:600
					<u> </u>
Ready					Item Count: 3
	<u> </u>				

C-5

Using the RJ12 Serial Port in ASCII Mode

The EBC RJ12 serial port can be configured for generic ASCII communications (refer to the "Advanced Settings" section in the "Using NetEdit" chapter to confirm or change the RJ12 serial port settings). Both the transmit buffer and receive buffer of the driver are 127 bytes in size. Thus, the corresponding tags can be a maximum of 127 bytes. Incoming bytes are appended to the receive buffer.

Port specifiers precede the serial port address. It defines which port the serial port address corresponds to. To define an EBC address the mnemonic "EBC" is used and the mnemonic SP0 specifies serial port 0. For addressing the EBC serial port, no base or slot information is needed.

As shown below in the Hints dialog, there are several port address parameters. In many cases the default values can be used. A detailed list explaining the parameters are found by clicking on the "Help" button in the Hints window. Then click on the "Index" button in the Terminator I/O, I/O Addressing window. Then locate the "H2, H4, Terminator I/O Serial Port Addressing" help section.

Tag Properties	×
General Scaling	
IC Hints	×
EBC:SP0.BAUD DWord Image: Comparison of the comparison o	OK Cancel
DDE <u>s</u> can rate: 100 💼 milliseconds	
Do not allow clients to override data type.	
OK Cancel App	ly Help

The communication parameter defaults are:

9600 baud

8 data bits (7 may be selected)

no parity (odd or even may be selected)

1 stop bits (2 may be selected)

The following tags were created in the *KEPDirect* OPC server for this example. EBC:SP0.MODE EBC:SP0.DATAIN

📲 KEPDirect EBC 1	I/O Server - [C:\P	rogram Files\Auto	omationDirect	KEPDirect (JPC Servers	Projects\Exan	nple1.opf]	<u>- 0 ×</u>
File Edit View U	Jsers Tools Help							
🗅 🛸 🖬 🐖	1 🖆 🗂 👔	い 🎖 🛍 💼 🕽	K 🛵 👘					
🖃 🛷 Channel 1		Tag Name	Addr	ess	Data Type	Scan Rate	Scaling	Description
Device		☑ Slot1_Out	put0 S1:D	00	Boolean	100	None	
		Set_Port_	to_ASCII EBC:	SP0.MODE	Byte	100	None	
		ASCII_Da	ta_InputEBC:	SPO.DATAIN	String	100	None	
		•						Þ
Date	Time	User Name	Source	Event				<u>+</u>
Ready						Client	s: 1 Active t	ags: 3 of 3 🦷 🥼

The tags created above were browsed and selected as items within the Quick Client as shown below. The EBC.SP0.MODE address must be set to a value of 1 to select the ASCII communications mode. The ASCII string "ASCII String Input Test Successful" was entered via the RJ12 serial port. The ASCII Sting displays in the "ASCII Data Input " Item ID's Value column.

🔐 OPC Quick Client - test3.otc			
File Edit View Tools Help			
🗅 📽 🖬 🎽 🎬 🗳 😭 👗 🖻 💼 🕽	Ķ.		
AutomationDirect.KEPDirectServer	Item ID	Data Type	Value
	Channel1.Device1.ASCII_Data_Input	String 🤇	ASCII Input String Test Successful
	Channel 1. Device 1. Slot 1_Output 0	Boolean	0
	Channel1.Device1.Set_Port_to_ASCII	Byte	1
	<u> • </u>		
Ready			Item Count: 3 🏼 🎢

C-6

T1H-EBC100 Analog Module Addressing -Modbus TCP



In This Appendix...

T1H-EBC100 Analog Module Addressing - Modbus TCPD-2

T1H-EBC100 Analog Module Addressing - Modbus TCP

Using the NetEdit3 utility, find and select the IP address of the desired T1H-EBC(100). Then select the 'EBC Settings' tab and the 'Show Base Contents' button to see the I/O modules in the T1H-EBC100 base and the Modbus addressing for those modules. You should see something similar to the following:

Base 0 : Slot 1 - Module Type	25 - Analog Input	
16 - Double word inp	uts (Modbus 584/984 - Input registers 30001-30032)	
Base 0 : Slot 2 - Module Type	25 - Analog Input	
16 - Double word inp	uts (Modbus 584/984 - Input registers 30033-30064)	
Base 0 : Slot 3 - Module Type	25 - Analog Input	
16 - Double word inp	uts (Modbus 584/984 - Input registers 30065-30096)	
Base 0 : Slot 4 - Module Type	27 - Analog Input / Analog Output	
8 - Bit outputs	(Modbus 584/984 Configuration data 50024)	
8 - Double word inp	uts (Modbus 584/984 - Input registers 30097-30112)	
4 - Double word out	puts (Modbus 584/984 - Holding registers 40001-40008)	
T		

Use the addresses shown in the 'Show Base Contents' section of NetEdit3 along with the following table to access the analog I/O with your Modbus TCP master.

For example, to read the current temperature detected by Channel 1 of the T1F-16RTD module in Slot 2, Modbus addresses 30033 and 30034 are required. For analog output modules with a Module Control Byte, find the required address in the Show Base Contents table. 'Configuration data' is the address needed (shown in the red box above). Then use the bit definitions below to determine how to configure the module. Be aware that the address could be displayed as a six digit or five digit address. In Modbus, 50024 and 410024 are equivalent. The screen capture shows it as five digit. DirectSOFT MRX and MWX instructions require six digit in the upper ranges.

T1H-EBC100 Analog Module Addressing - Modbus TCP						
Part Number	Channel Data	Module Configuration Data	Diagnostics Data			
T1F-08AD-1	Input Registers Word 1 = Ch1 Word 3 = Ch2 Word 5 = Ch3 Word 7 = Ch4 Word 9 = Ch5 Word 11 = Ch6 Word 13 = Ch7 Word 15 = Ch8	No Software Configuration Input Range Depends on Input Signal: -20 to 20mA = -8192 to 8191 0 to 20mA = 0 to 8191 4 to 20mA = 1638 to 8191	No Built-In Broken Transmitter Detection Monitor for counts less than 1638 when using 4 to 20mA			
T1F-08AD-2	Input Registers Word 1 = Ch1 Word 3 = Ch2 Word 5 = Ch3 Word 7 = Ch4 Word 9 = Ch5 Word 11 = Ch6 Word 13 = Ch7 Word 15 = Ch8	No Software Configuration Input Range Depends on Input Signal: 0 to 5V = 0 to 4095 0 to 10V = 0 to 8191 +/-5V = -4095 to 4095 +/-10V = -8192 to 8191	No Broken Transmitter Detection (N/A for Voltage)			
T1F-16AD-1	Input Registers Word 1 = Ch1 Word 3 = Ch2 Word 5 = Ch3 \therefore Word 27 = Ch14 Word 29 = Ch15 Word 31 = Ch16	No Software Configuration Input Range Depends on Input Signal: -20 to 20mA = -8192 to 8191 0 to 20mA = 0 to 8191 4 to 20mA = 1638 to 8191	No Built-In Broken Transmitter Detection Monitor for counts less than 1638 when using 4 to 20mA			
T1F-16AD-2	Input Registers Word 1 = Ch1 Word 3 = Ch2 Word 5 = Ch3 Word 27 = Ch14 Word 29 = Ch15 Word 31 = Ch16	No Software Configuration Input Range Depends on Input Signal: 0 to 5V = 0 to 4095 0 to 10V = 0 to 8191 +/-5V = -4095 to 4095 +/-10V = -8192 to 8191	No Broken Transmitter Detection (N/A for Voltage)			
T1F-14THM	Input Registers Word 1 = Ch1 Word 3 = Ch2 Word 5 = Ch3 Word 25 = Ch13 Word 27 = Ch14 Word 29 = Status Word 31 = Status	No Software Configuration THM Type Set by Jumpers	I/O Module Status: 37401: Indicates if an error is present 37405 to 37420: One word per channel gives 1 if broken transmitter, 0 if OK Once error condition is corrected write 0 (zero) to 410001 to clear errors			
T1F-16RTD	Input Registers Word 1 = Ch1 Word 3 = Ch2 Word 5 = Ch3 \therefore Word 27 = Ch14 Word 29 = Ch15 Word 31 = Ch16	No Software Configuration RTD Type Set by Jumpers	I/O Module Status: 37401: Indicates if an error is present 37405 to 37420: One word per channel gives 1 if broken transmitter, 0 if OK Once error condition is corrected write 0 (zero) to 410001 to clear errors			

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	T1H-EBC100 Analog Module Addressing - Modbus TCP						
Part Number	Channel Data	M	odule Configuration Data	Diagnostics Data			
Input Registers Word 1 = Ch1	Analog Ou Bit O	utput Configuration (T1F-8AD4DA-1) Output Enable 0: Outputs OFF 1: Outputs Enabled	_				
	Word 3 = Ch2 Word 5 = Ch3	Bit 1	N/A	-			
	Word 7 = Ch4 Word 9 = Ch5	Bit 2	N/A	No Built-In Broken Transmitter			
T1F-8AD4DA-1	Word 11 = Ch6 Word 13 = Ch7 Word 15 = Ch8 Holding Registers	Bit 3	0-20mA or 4-20mA 0: 0-20mA range 1: 4-20mA range	Detection Monitor for counts less than 1638 when using 4 to 20mA			
	Word 1 = $Ch1$ Word 3 = $Ch2$	Bits 4-15	Reserved	_			
Word 3 = Ch2 Word 5 = Ch3 Word 7 = Ch4	Input -2	Range Depends on Input Signal: 20 to 20mA = -8192 to 8191 0 to 20mA = 0 to 8191 4 to 20mA = 1638 to 8191	-				
		Analog O	utput Configuration (T1F-8AD4DA-2)				
Input Registers Word 1 = Ch1 Word 3 = Ch2 Word 5 = Ch3 Word 7 = Ch4	Input Registers	Bit 0	Output Enable 0: Outputs OFF 1: Outputs Enabled				
	Word $T = ChT$ Word $3 = Ch2$ Word $5 = Ch3$ Word $7 = Ch4$	Bit 1	Unipolar/Bipolar 0: Unipolar 1: Bipolar				
T1F-8AD4DA-2	Word 9 = Ch5 Word 11 = Ch6 Word 13 = Ch7 Word 15 = Ch8	Bit 2	5V/10V Range 0: 5V Range 1: 10V Range	No Broken Transmitter Detection (N/A for Voltage)			
	Holding Registers	Bit 3	N/A				
	Word $1 = Ch1$ Word $3 = Ch2$	Bits 4-15	Reserved				
	Word 5 = Ch3 Word 7 = Ch4	Word 5 = Ch3 Word 7 = Ch4	Input	Range Depends on Input Signal: 0 to 5V = 0 to 4095 0 to 10V = 0 to 8191 +/-5V = -4095 to 4095 +/-10V = -8192 to 8191			
		Analog (Output Configuration (T1F-08DA-1)				
Holding Registers Word 1 = Ch1	Holding Registers Word 1 = Ch1 Word 3 = Ch2	Bit 0	Output Enable 0: Outputs OFF 1: Outputs Enabled				
T1F-08DΔ-1	Word $5 = Ch3$ Word $7 = Ch4$	Bit 1	N/A	None			
	Word $9 = Ch5$	Bit 2	N/A	NOILE			
	Word 11 = Ch6 Word 13 = Ch7 Word 15 = Ch8	Bit 3	0-20mA or 4-20mA 0: 0-20mA range 1: 4-20mA range				
		Bits 4-15	Reserved				

T1H-EBC100 Analog Module Addressing - Modbus TCP							
Part Number	Channel Data	Mo	dule Configuration Data	Diagnostics Data			
T1F-08DA-2		Analog Ou	utput Configuration (T1F-08DA-2)				
	Holding Registers	Bit 0	0: Outputs OFF 1: Outputs Enabled				
	Word 1 = Ch1 Word 3 = Ch2 Word 5 = Ch3 Word 7 = Ch4	Bit 1	Unipolar/Bipolar 0: Unipolar 1: Bipolar	None			
	Word 9 = Ch5 Word 11 = Ch6 Word 13 = Ch7 Word 15 = Ch8	Bit 2	5V/10V Range 0: 5V Range 1: 10V Range				
		Bit 3	N/A				
		Bits 4-15	Reserved				
		Analog Ou	tput Configuration (T1F-16DA-1)				
	Holding Registers Word 1 = Ch1 Word 3 = Ch2 Word 5 = Ch3 Word 27 = Ch14 Word 29 = Ch15 Word 31 = Ch16	Bit 0	Output Enable 0: Outputs OFF 1: Outputs Enabled	- None			
T1F-16DA-1		Bit 1	N/A				
		Bit 2	N/A				
		Bit 3	0-20mA or 4-20mA 0: 0-20mA range 1: 4-20mA range				
		Bits 4-15	Reserved				
		Analog Ou	utput Configuration (T1F-16DA-2)				
T1F-16DA-2	Holding Registers Word 1 = Ch1 Word 3 = Ch2 Word 5 = Ch3 Word 27 = Ch14 Word 29 = Ch15 Word 31 = Ch16	Bit 0	Output Enable 0: Outputs OFF 1: Outputs Enabled				
		Bit 1	Unipolar/Bipolar 0: Unipolar 1: Bipolar	None			
		Bit 2	5V/10V Range 0: 5V Range 1: 10V Range				
		Bit 3	N/A				
		Bits 4-15	Reserved				

T1F-8AD4DA-2 Example (Module in Slot 4)

Using the 'Show Base Contents' dialog below and the 'T1H-EBC100 Analog Module Addressing - Modbus TCP' chart above, we can find all of the addresses associated with the T1F-8AD4DA-2 module in Slot 4. The addresses are in the following chart. Be aware that the configuration data address could be displayed as a six digit or five digit address. In Modbus, 50024 and 410024 are equivalent. The screen capture below shows it as five digit.



Innut Channel	Address	Coi	ntrol Byte (Address 50024)
input onanner	Auuress	Bit	Function
Channel 1	30097 - 30098	Bit 0	Output Enable 0: Outputs OFF 1: Outputs Enabled
Channel 2	30099 - 30100		I Inipolar/Bipolar
Channel 3	30101 - 30102	Bit 1	0: Unipolar
Channel 4	30103 - 30104		1: Bipolar
Channel 5	30105 - 30106		5V/10V Range
Channel 6	30107 - 30108	Bit 2	0: 5V Range
Channel 7	30109 - 30110		1: 10V Range
Channel 8	30111 - 30112		
Output Channel	Address	Bit 3	N/A
Channel 1	40001 - 40002		
Channel 2	40003 - 40004		
Channel 3	40005 - 40006	Bit 4	Reserved
Channel 4	40007 - 40008		

Control Byte	Corre			
(Address 50024)	Output Enable/Disable	Unipolar/Bipolar	5V/10V Range	
0	Disabled	Unipolar		
1	Enabled		51/	
2	Disabled	Pipolar	50	
3	Enabled	- Dipulai		D
4	Disabled	Unipolar		
5	Enabled		101/	
6	Disabled	Ripolar	IUV	
7	Enabled			

The chart below, lists all of the possible Control Byte combinations and their resulting configuration.

T1F-16RTD Example (Module in Slot 2)

Using the 'Show Base Contents' dialog below and the 'T1H-EBC100 Analog Module Addressing - Modbus TCP' chart, we can find all of the addresses associated with the T1F-16RTD module in Slot 2. The addresses are in the following chart.

9	Show Base Contents	×
	Base 0 : Slot 1 - Module Type 25 - Analog Input 16 - Double word inputs (Modbus 584/984 - Input registers 30001-30032)	-
	Base 0 : Slot 2 - Module Type 25 - Analog Input 16 - Double word inputs (Modbus 584/984 - Input registers 30033-30064)	
	Base 0 : Slot 3 - Module Type 25 - Analog Input 16 - Double word inputs (Modbus 584/984 - Input registers 30065-30096)	
	Base 0 : Slot 4 - Module Type 27 - Analog Input / Analog Output 8 - Bit outputs (Modbus 584/984 - Configuration data 50024) 8 - Double word inputs (Modbus 584/984 - Input registers 30097-30112) 4 - Double word outputs (Modbus 584/984 - Holding registers 40001-40008)	
	4	V F
	Save Print Font	Close

Input Channel	Address	Error Words
Channel 1	30033 - 30034	
Channel 2	30035 - 30036	
Channel 3	30037 - 30038	
Channel 4	30039 - 30040	37421 is the Error Flag Word:
Channel 5	30041 - 30042	For Words 2 to 4, refer to the Current/Last State Error Codes Table (Chapter 4)
Channel 6	30043 - 30044	
Channel 7	30045 - 30046	Extended Error Codes (0 = Transmitter OK, 1 = Broken Transmitter)
Channel 8	30047 - 30048	37425 is the Extended Error Code for Ch1
Channel 9	30049 - 30050	37420 is the Extended Error Code for Ch3
Channel 10	30051 - 30052	
Channel 11	30053 - 30054	37439 is the Extended Error Code for Ch15 37440 is the Extended Error Code for Ch16
Channel 12	30055 - 30056	
Channel 13	30057 - 30058	410001 is the EBC Dynamic Module Data Error Code (Write zero to clear errors)
Channel 14	30059 - 30060	
Channel 15	30061 - 30062	
Channel 16	30063 - 30064	



In This Appendix...

T1H-EBC(100) Analog Module Addressing - H2/4-ERM(100)E-2

T1H-EBC(100) Analog Module Addressing - H2/4-ERM(100)

When using an H2-ERM(100) or H4-ERM(100) to T1H-EBC(100) configuration, the analog module data in the EBC base is mapped to V-memory or Discrete I/O.

The ERM Workbench software will tell you what the mapping is for each I/O module in the T1H-EBC(100) base. Once you have configured the ERM using ERM Workbench you will get a screen similar to the following:

	🚟 ERM Module [00 E0 62 60 0D 29] - ERM Workbench					
F	File View Help					
Т						
	Ethernet Remote Mast CPU F Last ERM Error: Read E Detailed E	All TH BY All TH BY All TH BY All TH BY er H4-ERM Etherr LC CPU: error PLC Mode: RM Status Time of last read: IRM Status Time of	8 het Address: 440 Program 12:37:09	00 E0 62 60 Slave S 9 Click to Clea	0 0D 29	P: 192.168. 0.147 Module ID: 47 4 5 6 7 8 12 13 14 15 16 bove Slave 1 - no error 3. Write to ERM Iave 1 Slave 1's Error List 1
	[([
L	1/0 Module	1/0 Points	PLC Start	PLC End	V-Map	Notes
L	<reserved></reserved>	Slave Status Bits	×300	X317	V40414	
L		Erimi Status Word Disable Slave Comm	×320	A337 V317	V40415 V40514	
L	Slave 1	T1H-FBC100	1300	1017	140314	hotswap(auto);Ethernet Address(00 E0 62 40 22 9E) on
L	Slave 1/Slot 1	16 Double Word Input	V2000	V2037		32-bit Binary:
L	Slave 1/Slot 2	16 Double Word Out	V2100	V2137		32-bit Binary;
L		8 Discrete Output	Y320	Y327	V40515	
L	Slave 1/Slot 3	8 Double Word Input	V2040	V2057		32-bit Binary;
L		4 Double Word Output	V2140	V2147		32-bit Binary;
L		8 Discrete Output	Y330	Y337	V40515	
L	Slave 1/Slot 4	8 Double Word Input	V2060	V2077		32-bit Binary;
L	Slave 1/Slot 5	8 Double Word Output	V2150	V2167		32-bit Binary;
L	Claure 1./Clash C	8 Discrete Uutput	Y340	Y347	V40515	
T	Slave 1/Slot 7	8 Discrete Autout	∧340 ¥350	∧347 ¥357	v40416 V/0516	
		o pisciele output	1000	1007	*+0310	
L						
Re	eady					Read ERM Status : AUTO MODIFIED NUM //

For the example above, the I/O configuration for Slave 1 is:

Slot 1 = T1F-14THM Slot 2 = T1F-16DA-2 Slot 3 = T1F-8AD2DA-2 Slot 4 = T1F-08AD-2 Slot 5 = T1F-08DA-2 Slot 6 = T1K-08NA-1 Slot 7 = T1K-08TR

Use the addresses shown in the ERM Workbench along with the following table to access the analog I/O with your ERM master.

T1H-EBC(100) Analog Module Addressing - H2/4-ERM(100)							
Part Number	Channel Data	Module Configuration Data	Diagnostics Data				
T1F-08AD-1	Input Data V+0 = Ch1 V+2 = Ch2 V+4 = Ch3 V+6 = Ch4 V+10 = Ch5 V+12 = Ch6 V+14 = Ch7 V+16 = Ch8	No Software Configuration Input Range Depends on Input Signal: -20 to 20mA = -8192 to 8191 0 to 20mA = 0 to 8191 4 to 20mA = 1638 to 8191	No Built-In Broken Transmitter Detection Monitor for counts less than 1638 when using 4 to 20mA				
T1F-08AD-2	Input Data V+0 = Ch1 V+2 = Ch2 V+4 = Ch3 V+6 = Ch4 V+10 = Ch5 V+12 = Ch6 V+14 = Ch7 V+16 = Ch8	No Software Configuration Input Range Depends on Input Signal: 0 to 5V = 0 to 4095 0 to 10V = 0 to 8191 +/-5V = -4095 to 4095 +/-10V = -8192 to 8191	No Broken Transmitter Detection (N/A for Voltage)				
T1F-16AD-1	Input Data V+0 = Ch1 V+2 = Ch2 V+4 = Ch3 V+34 = Ch15 V+36 = Ch16	No Software Configuration Input Range Depends on Input Signal: -20 to 20mA = -8192 to 8191 0 to 20mA = 0 to 8191 4 to 20mA = 1638 to 8191	No Built-In Broken Transmitter Detection Monitor for counts less than 1638 when using 4 to 20mA				
T1F-16AD-2	Input Data V+0 = Ch1 V+2 = Ch2 V+4 = Ch3 V+34 = Ch15 V+36 = Ch16	No Software Configuration Input Range Depends on Input Signal: 0 to 5V = 0 to 4095 0 to 10V = 0 to 8191 +/-5V = -4095 to 4095 +/-10V = -8192 to 8191	No Broken Transmitter Detection (N/A for Voltage)				
T1F-14THM	Input Data V+0 = Ch1 V+2 = Ch2 V+4 = Ch3 V+32 = Ch14 V+34 = Status 1 V+36 = Status 2 Status info is only available if T1F- 14THM is date code 1205 or later	No Software ConfigurationTHM Type Set by JumpersStatus 1 DataBits 0-3Number of Channels Enabled (Inverted) 0001 = All Channels 1110 = One ChannelBit 4T/C Type Jumper 0 0=installed, 1=removedBit 5T/C Type Jumper 1Bit 6T/C Type Jumper 1Bit 6T/C Type Jumper 2Bit 7T/C Type Jumper 2Bit 8Units 0 Jumper 3Bit 9Units 1 JumperBit 10Calibrate Enable JumperBit 11CJC Installed 0=Yes, 1=NoBits 12,13Always ONBits 14, 15Always OFFStatus 2 Data is the Temperature of the Convertional decimal place.	Broken Thermocouple Indication. The channel data goes to zero and ERM Workbench 'Slave Error List' shows error in 'Extended Error column.				

	T1H-EBC	(100) Anal	og Module Addressing - H2/4-	ERM(100)	
Part Number	Channel Data	M	odule Configuration Data	Diagnostics Data	
T1F-16RTD	Input Data V+0 = Ch1 V+2 = Ch2 V+4 = Ch3 V+34 = Ch15 V+36 = Ch16	No Software Configuration RTD Type Set by Jumpers		Broken RTD Indication. The channel data goes to zero and ERM Workbench 'Slave Error List' shows error in 'Extended Error' column.	
		Analog Ou	utput Configuration (T1F-8AD4DA-1)		
	Input Data V+0 = Ch1 V+2 = Ch2 V+4 = Ch3	Y+0	Output Enable 0: Outputs OFF 1: Outputs Enabled		
	V+6 = Ch4 V+10 - Ch5	Y+1	N/A	_	
	V+10 = 0.03 V+12 = Ch6	Y+2	N/A	No Built-In Broken Transmitter	
T1F-8AD4DA-1	V+14 = CH7 V+16 = Ch8	Y+3	0-20mA or 4-20mA 0: 0-20mA range 1: 4-20mA range	Monitor for counts less than 1638 when using 4 to 20mA	
	V+0 = Ch1	Y+4 to Y+7	Reserved		
	V+2 = Ch2 V+4 = Ch3 V+6 = Ch4	Input -2	Range Depends on Input Signal: 20 to 20mA = -8192 to 8191 0 to 20mA = 0 to 8191 4 to 20mA = 1638 to 8191		
		Analog Ou	utput Configuration (T1F-8AD4DA-2)		
	Input Data V+0 = Ch1	Y+0	Output Enable 0: Outputs OFF 1: Outputs Enabled		
	V+2 = Ch2 V+4 = Ch3 V+6 = Ch4 V+10 = Ch5	Y+1	Unipolar/Bipolar 0: Unipolar 1: Bipolar		
T1F-8AD4DA-2	V+12 = Ch6 V+14 = Ch7 V+16 = Ch8 Output Data	Y+2	5V/10V Range 0: 5V Range 1: 10V Range	No Broken Transmitter Detection (N/A for Voltage)	
		Y+3	N/A	-	
	V+0 = Ch1	Y+4 to Y+7	Reserved	_	
	V+2 = 012 V+4 = Ch3 V+6 = Ch4	Input Range Depends on Input Signal: 0 to 5V = 0 to 4095 0 to 10V = 0 to 8191 +/-5V = -4095 to 4095 +/-10V = -8192 to 8191			
		Analog (Output Configuration (T1F-08DA-1)		
	Output Data V+0 = Ch1 V+2 = Ch2	Y+0	Output Enable 0: Outputs OFF 1: Outputs Enabled		
T1F-08DA-1	V+4 = Ch3 V+6 - Ch4	Y+1	N/A	None	
	V+0 = 0.04 V+10 = Ch5	Y+2	N/A		
	V+12 = Cho V+14 = Ch7 V+16 = Ch8	Y+3	0-20mA or 4-20mA 0: 0-20mA range 1: 4-20mA range		
		Y+4 to Y+7	Reserved	1	

E-4

T1H-EBC(100) Analog Module Addressing - H2/4-ERM(100)							
Part Number	Channel Data	Mo	dule Configuration Data	Diagnostics Data			
		Analog Ou	tput Configuration (T1F-08DA-2)				
T1F-08DA-2	Output Data V+0 = Ch1	Y+0	Output Enable 0: Outputs OFF 1: Outputs Enabled				
	V+2 = Ch2 V+4 = Ch3 V+6 = Ch4 V+10 = Ch5	Y+1	Unipolar/Bipolar 0: Unipolar 1: Bipolar	None			
	V+12 = Ch6 V+14 = Ch7 V+16 = Ch8	Y+2	5V/10V Range 0: 5V Range 1: 10V Range				
		Y+3	N/A				
		Y+4 to Y+7	Reserved				
		Analog Ou	tput Configuration (T1F-16DA-1)				
	Output Data V+0 = Ch1 V+2 = Ch2 V+4 = Ch3 V+34 = Ch15 V+36 = Ch16	Y+0	Output Enable 0: Outputs OFF 1: Outputs Enabled				
		Y+1	N/A	None			
T1F-16DA-1		Y+2	N/A				
		Y+3	0-20mA or 4-20mA 0: 0-20mA range 1: 4-20mA range				
		Y+4 to Y+7	Reserved				
		Analog Ou	tput Configuration (T1F-16DA-2)				
T1F-16DA-2	Output Data V+0 = Ch1 V+2 = Ch2 V+4 = Ch3	Y+0	Output Enable 0: Outputs OFF 1: Outputs Enabled				
		Y+1	Unipolar/Bipolar 0: Unipolar 1: Bipolar	None			
	V+34 = Ch15 V+36 = Ch16	Y+2	5V/10V Range 0: 5V Range 1: 10V Range				
		Y+3	N/A				
		Y+4 to Y+7	Reserved				

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T1F-14THM Example (Module in Slot 1)

Using ERM Workbench (below) and the 'T1H-EBC(100) Analog Module Addressing -H2/4-ERM(100) chart above, we can find all of the addresses associated with the T1F-14THM module in Slot 1. The addresses are listed in the tables below.

) 🗁 🖬 🧯	• \$\$	* + +	6	?				
Ethernet Remo	ote Maste	H4-ER	M Ethern	et Address:	00 E 0 62 60	0D 29	P: 192.168. 0.147 - Module ID: 47	
CPU			0011	110	Slave S	itatus	1	1. <u>C</u> onfigure ERM
Interface:	PI	LL	LPU:	440	1	2 3	4 5 6 7 8	2 Coloot Clause
LastEBM	no e	error	PLC Mode:	Run		10		2. <u>Select Slaves</u>
Error:			Lik ID and	CDM Chabarl		10 11	12 13 14 15 16	2 Mainto EDM
			hutton	to refresh	Click	on slave # a	bove Slave 1 - no error	<u>J. witte to Litim</u>
_			Time of		to	see its Last	Error:	
	Read EF	RM Status	last read:	15:05:45				
		DH CL I	1		Clear	r Last Error S	ilave 1 Slave 1's <u>E</u> rror List	
	etalled El	nm status						
1/0 Module		1/0 Points		PLC Start	PLC End	V-Map	Notes	
I/O Module <reserved></reserved>		1/0 Points Slave State	us Bits	PLC Start ×300	PLC End X317	V-Map V40414	Notes	
I/O Module <reserved></reserved>		I/O Points Slave State ERM State	us Bits 1s Word	PLC Start ×300 ×320	PLC End X317 X337	V-Map V40414 V40415	Notes	
I/O Module <reserved></reserved>		I/O Points Slave State ERM State Disable Sla	us Bits ıs Word ave Comm	PLC Start X300 X320 Y300	PLC End X317 X337 Y317	V-Map V40414 V40415 V40514	Notes	
I/O Module <reserved></reserved>		I/O Points Slave State ERM State Disable Sla T1H-EBC1	us Bits is Word ave Comm 00	PLC Start X300 X320 Y300	PLC End X317 X337 Y317	V-Map V40414 V40415 V40514	Notes hotswap(auto),Ethernet Address[00 E0 6	2 40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1</reserved>		I/O Points Slave State ERM State Disable Sla T1H-EBC1 16 Double	us Bits Is Word ave Comm 00 Word Input	PLC Start X300 X320 Y300 V2000	PLC End X317 X337 Y317 V2037	V-Map V40414 V40415 V40514	Notes hotswap(auto),Ethernet Address[00 E0 6 32-bil Binary;	2 40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2</reserved>		I/O Points Slave Statu ERM Statu Disable Sla T1H-EBC1 16 Double 16 Double	us Bits Is Word ave Comm 00 Word Input Word Dut	PLC Start X300 X320 Y300 V2000 V2100	PLC End X317 X337 Y317 V2037 V2137	V-Map V40414 V40415 V40514	Notes hotswap(auto),Ethernet Address(00 E0 6 32-bit Binary; 32-bit Binary;	2 40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2</reserved>		I/O Points Slave State ERM State Disable Sla T1H-EBC1 16 Double 8 Discrete	us Bits is Word ave Comm 00 Word Input Word Out Output	PLC Start X300 X320 Y300 V2000 V2100 Y320	PLC End X317 X337 Y317 V2037 V2137 Y327	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto),Ethernet Address[00 E0 6 32-bit Binary; 32-bit Binary;	2 40 22 9F) on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3</reserved>		I/O Points Slave Statu ERM Statu Disable Sla T1H-EBC1 16 Double 8 Discrete 8 Double V	us Bits Is Word ave Comm 00 Word Input Word Out Output Vord Input	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040	PLC End X317 X337 Y317 V2037 V2137 Y327 V2057	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto),Ethernet Address[00 E0 6 32-bit Binary; 32-bit Binary; 32-bit Binary;	2 40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3</reserved>		I/O Points Slave State ERM State Disable Sla T1H-EBC1 16 Double 8 Discrete 8 Double \ 4 Double \	us Bits Is Word ave Comm 00 Word Input Word Dut Output Vord Input Vord Input Vord Output	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040 V2140	PLC End X317 X337 Y317 V2037 V2137 Y327 V2057 V2147	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto),Ethernet Address[00 E0 6 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	2 40 22 SF] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3</reserved>		I/O Points Slave State ERM State Disable Sla T1H-EBC1 16 Double 16 Double 8 Discrete 8 Double \ 8 Discrete	us Bits is Word ave Comm 00 Word Input Word Out Output Word Input Word Output Output	PLC Start X300 X320 Y300 V2000 V2100 Y200 V2040 V2040 V2140 Y330 V2040	PLC End X317 X337 Y317 V2037 V2137 V2037 V2057 V2147 Y337	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto),Ethernet Address[00 E0 6 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	2 40 22 9F] on
1/0 Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3 Slave 1/Slot 4</reserved>		I/O Points Slave Statt ERM Statu Disable Sla T1H-EBC1 16 Double 8 Discrete 8 Double V 8 Discrete 8 Double V 8 Discrete	us Bits Is Word ave Comm 00 Word Input Word Out Output Vord Input Vord Uutput Output Output Output Output	PLC Start X300 X320 Y300 V2100 Y2100 Y200 V2040 V2140 Y330 V2060 V2060	PLC End X317 X337 Y317 V2037 V2137 V2037 V2057 V2147 Y337 V2077	V-Map V40414 V40415 V40514 V40515 V40515	Notes hotswap(auto),Ethernet Address[00 E0 6 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	2 40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3 Slave 1/Slot 4 Slave 1/Slot 5</reserved>		I/O Points Slave Statt ERM Statu Disable Sla T1H-EBC1 16 Double 8 Discrete 8 Double \ 4 Double \ 8 Discrete 8 Double \ 8 Double \	us Bits is Word ave Comm 00 Word Input Word Output Word Output Vord Input Vord Output Vord Input Vord Output	PLC Start X300 X320 Y300 V2100 Y320 V2140 V2140 V2140 V2140 Y330 V2060 V2150	PLC End X317 X337 Y317 V2037 V2137 V2057 V2147 Y337 V2077 V2147 Y337 V2077 V2167	V-Map V40414 V40415 V40514 V40515 V40515	Notes hotswap(auto),Ethernet Address(00 E0 6 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	2 40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3 Slave 1/Slot 4 Slave 1/Slot 5 Slave 1/Slot 5</reserved>		I/O Points Slave Statu ERM Statu Disable Sla T1H-EBC1 16 Double 8 Discrete 8 Double \ 8 Double \ 8 Double \ 8 Double \ 8 Double \ 8 Discrete	us Bits is Word ave Comm 00 Word Input Word Out, Vord Input Word Output Output Word Input Word Unput Word Output Output	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040 V2140 Y330 V2060 V2150 Y340	PLC End X317 X337 Y317 V2037 V2137 V2057 V2147 Y337 V2077 V2167 Y347	V-Map V40414 V40415 V40514 V40515 V40515	Notes hotswap(auto),Ethernet Address[00 E 0 6 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	2 40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3 Slave 1/Slot 4 Slave 1/Slot 5 Slave 1/Slot 6</reserved>		I/O Points Slave State ERM State Disable Sla T1H-EBC1 16 Double 8 Discrete 8 Double V 8 Discrete 8 Double V 8 Double V 8 Double V 8 Discrete 8 Double V	us Bits is Word ave Comm 00 Word Input Word Dutput Word Output Output Vord Output Output Vord Output Output Input	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040 V2140 Y330 V2060 V2150 Y340 X340	PLC End X317 X337 V2037 V2037 V2057 V2057 V2057 V2147 Y337 V2057 V2147 X347 X347	V-Map V40414 V40415 V40514 V40515 V40515 V40515 V40516 V40416	Notes hotswap(auto);Ethernet Address[00 E0 6 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	2 40 22 9F] on

Input Channel	Address
Channel 1 Temperature	V2000
Channel 2 Temperature	V2002
Channel 3 Temperature	V2004
Channel 4 Temperature	V2006
Channel 5 Temperature	V2010
Channel 6 Temperature	V2012
Channel 7 Temperature	V2014
Channel 8 Temperature	V2016
Channel 9 Temperature	V2020
Channel 10 Temperature	V2022
Channel 11 Temperature	V2024
Channel 12 Temperature	V2026
Channel 13 Temperature	V2030
Channel 14 Temperature	V2032
Status Words	Address
Status1	V2034
CJC Temperature	V2036

In this example, 24VDC is applied to the T1F-14THM in Slave 1 Slot 1 and all channels are shorted CH+ to CH-. As seen in the DirectSoft Data View window below, all channels will read the terminal block ambient temperature when shorted (degrees F in this configuration). All V-memory values in this DirectSoft Data View window are displayed as Decimal DWORDs except V2034 which is displayed as a Binary WORD.

V2036 is the CJC temperature reading in degrees C with one implied decimal place. So 27.2° C = 80.9° F.

Dat	al	
El	Decimal 💌	DWORD -
	Element	Status
1		
2	V2000	806
3	V2002	809
4	V2004	811
5	V2006	815
6	V2010	811
7	V2012	819
8	V2014	821
9	V2016	813
10	V2020	799
11	V2022	803
12	V2024	805
13	V2026	809
14	V2030	806
15	V2032	788
16	V2034	0011010000000001
17	V2036	272

V2034 Status 1 Word							
Bits 0-3	All Channels Enabled (0001)						
Bit 4	T/C Type Jumper 0 Installed (0)						
Bit 5	T/C Type Jumper 1 Installed (0)						
Bit 6	T/C Type Jumper 2 Installed (0)						
Bit 7	T/C Type Jumper 3 Installed (0)						
Bit 8	Units 0 Jumper Installed (0)						
Bit 9	Units 1 Jumper Installed (0)						
Bit 10	Calibrate Enable Jumper Removed (1)						
Bit 11	CJC Installed Yes (0)						
Bits 12,13	Always ON						
Bits 14, 15	Always OFF						

T1F-14THM Example (Broken Thermocouple)

In this example, 24VDC is applied to the T1F-14THM in Slave 1 Slot 1 and all channels are shorted CH+ to CH- except Channel 8 which is open.

Image: WORD 1 Status 1 As seen in the DirectSoft Data View window, channels will read the terminal block ambient temperature when shorted (degrees F in this configuration) except the open Channel 8 whi reads 0. 2 V2000 807 3 V2002 810 4 V2004 812 5 V2006 815 6 V2010 812 7 V2012 820 8 V2014 821 9 V2016 0 10 V2020 801 11 V2022 804 12 V202 804 12 V202 804 13 V2016 C 14 V202 804 15 V202 FIE Were Model [DE 06 00 02] - EFO Workbench 14 V202 804 15 V202 804 16 V202 804 17 V205 FIE Were Model [DE 06 02 02] - EFO Workbench 16 V205 FIE Were Model [DE 06 02 02] - EFO Workbench 17 <	Data	1									
Element Status 1	El	Binary	- WORD			As see	n in t	he DirectSoft Data V	View window, al		
1 V2000 807 3 V2002 810 4 V2004 812 5 V2006 815 6 V2010 812 7 V2012 820 8 V2014 821 9 V2016 0 11 V2020 801 12 V2020 801 13 V2020 801 14 V2031 Ethernet Ramote Mater 15 V2020 801 14 V2031 Ethernet Ramote Mater 15 V2031 Ethernet Ramote Mater 16 V2031 Ethernet Ramote Mater H4EEM 17 V2031 Ethernet Ramote Mater 110 18 V2031 Ethernet Ramote Mater 110 19 V2031 Ethernet Ramote Mater 12000 116 V2031 Ethernet Ramote Mater 13000 117 V2031 Slave Status X300 X317 <v4015< td=""> 18 Slave 1 110 120000 1120000 1</v4015<>		Eler	nent	Status	C	channels will read the terminal block ambient					
2 V2000 807 configuration storted (degrees 1 in this configuration) except the open Channel 8 whi reads 0. 3 V2002 810 configuration) except the open Channel 8 whi reads 0. 5 V2006 815 6 6 V2010 812 reads 0. 7 V2012 820 8 8 V2014 821 reads 0. 9 V2016 0 reror on Slave 1 as seen below. 10 V2020 804 Image: 1 as seen below. 11 V2020 804 Image: 1 as seen below. 12 V2015 Image: 1 as seen below. Image: 1 as seen below. 13 V2021 Image: 1 as seen below. Image: 1 as seen below. 14 V2021 Image: 1 as seen below. Image: 1 as seen below. 14 V2021 Image: 1 as seen below. Image: 1 as seen below. 15 V2021 Image: 1 as seen below. Image: 1 as seen below. 16 V2021 Image: 1 as seen below. Image: 1 as seen below. 16 V2021 Image: 1 as seen below. Image: 1 as seen below. <td>1</td> <td></td> <td></td> <td></td> <td></td> <td>emne</td> <td>rature</td> <td>when shorted (deg</td> <td>rees E in this</td>	1					emne	rature	when shorted (deg	rees E in this		
3 V2002 810 4 V2004 812 5 V2006 815 6 V2010 812 7 V2012 820 8 V2014 821 9 V2016 0 10 V2020 801 11 V2022 804 12 V2015 Effert Module [00 E0 62 60 00 29] - ERM Workbench Image: CPU Figure EIM. 13 V202 B14 V202 14 V202 Effert Module [00 E0 62 60 00 29] - ERM Workbench Image: CPU Figure EIM. 13 V202 Effert Module [00 E0 62 60 00 29] - ERM Workbench Image: CPU Figure EIM. 14 V202 Effert Module [00 E0 62 60 00 29] - ERM Workbench Image: CPU Figure EIM. 14 V203 Image: CPU Figure EIM. Image: CPU Figure EIM. 15 V203 Image: CPU Figure EIM. Image: CPU Figure EIM. 16 V203 Image: CPU Figure EIM. Image: CPU Figure EIM. 17 V203 Elsere Eistel: Encore Figure Eistel: Encore Figure Eistel: Encore Figure EIM. Image: CPU Figure EIM. 16	2	V2	000	807	U	cmpe	iatuit		C_1 10 1.1		
4 V2004 B12 reads 0. 5 V2006 B15 B 6 V2010 B12 B 7 V2012 B20 B Calibratic State Calibratic State 9 V2016 0 Calibratic State Calibratic State Calibratic State 10 V2020 B01 Calibratic State	3	√2	002	810	C	configuration) except the open Channel 8 whic					
5 V2006 815 6 V2010 812 7 V2012 820 8 V2014 821 9 V2016 0 10 V2020 801 11 V2022 804 12 V202 804 13 V202 804 14 V202 804 15 V200 801 16 V200 801 17 V202 804 18 V2015 Fiber Member Master H4ERM Ethernet Address 00 E0 20 00 29 PF 132168.0147 Mode ID 47 14 V202 Ethernet Remote Master H4ERM Ethernet Address 01 11 12 13 14 15 6 8 16 V200 Ethernet Remote Master H4ERM Ethernet Address 01 11 12 13 14 15 6 3 <t< td=""><td>4</td><td>V2</td><td>004</td><td>812</td><td>r</td><td colspan="6">reads 0.</td></t<>	4	V2	004	812	r	reads 0.					
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7 V2012 820 8 V2014 821 9 V2016 0 10 V2020 801 11 V2022 804 12 V202 804 12 V202 804 14 V202 804 15 V202 804 16 V202 804 17 V205 Ethernet Remote Master H4ERM 16 V205 Ethernet Remote Master H4ERM 16 V205 12 3 4 5 6 7 8 1 1. Configure ERM 16 V205 Ethernet Remote Master H4ERM State Status 00.0.0.2.9 H9 152.168.0.147 Module ID. 47 1. Configure ERM 17 V205 Ethernet Remote Master H4ERM State Status 00.0.0.2.9 H9 152.168.0.147 Module ID. 47 1. Configure ERM 16 V205 State Status Item of 15.05.45 Distores It Last Encor Slave 1's Encor List 3. Wite to ERM 17 <td< td=""><td>6</td><td>V2</td><td>010</td><td>812</td><td></td><td></td><td></td><td></td><td></td></td<>	6	V2	010	812							
8 V2014 821 9 V2016 0 10 V2020 801 11 V2022 804 12 V202 804 13 V202 804 14 V202 804 ••• 13 V202 Ethemote Master H4ERM Ethemote Address: 00 E0 G 60 00 29 - FP. 192 168. 0.147 Module ID 44 15 V202 Ethemote Master H4ERM Ethemote Address: 00 E0 G 60 00 29 - IP. 192 168. 0.147 Module ID 44 16 V203 Immode Master H4ERM Ethemote Address: 0 E0 G 60 00 29 - IP. 192 168. 0.147 Module ID 44 17 V203 Immode Master H4ERM Ethemote Address: 0 E0 G 60 00 29 - IP. 192 168. 0.147 Module ID 44 17 V203 Immode TS 05.45 18 Immode TS 05.45 18 Immode TS 05.45 Immode TS 05.45 Immode TS 05.45 Immode TS 05.45 I	7	V2	012	820							
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11 V2022 804 12 V202 ERM Module [00 E0 52 60 00 29] - ERM Workbench Image: Comparison of the second	10	√2	020	801	e	error o	on Sla	ve 1 as seen below.			
12 V200 FERM Module [00 E0 62 60 00 29] - ERM Workbench Image: Second Sec	11	V2	022	804							
13 V200 14 V201 15 V201 16 V203 17 V203 18 V204 19 V205 10 V205 11 V205 12 V205 14 V205 15 V205 16 V205 17 V205 17 V205 18 Bead ERM Status 19 10 11 12 12 3 13 14 14 15 15 V205 14 PLC 15 V205 16 V205 17 V205 17 V205 18 Bead ERM Status 19 10 10 11 10 11 10 12 10 Module 10 Module 10 Module 10	12	V2	02 ERM Modu	ile [00 E0 62 60 0D 29] - ERM	1 Workbench						
14 V200 15 V200 16 V200 17 V200 18 V200 19 V200 10 V200 11 V200 12 V200 13 V200 14 PLC Mode: 15 PLC Mode: 16 V200 17 V200 18 PLC Mode: 19 10 11 12 12 13 13 14 14 15 15 PLC Mode: 16 V200 17 V200 17 V40414 18 PLC Statt PLC End V40414 19 PLC Statt PLC End V40414 10 Slave 1 16 Double Vord Input <td>13</td> <td>V2</td> <td>D2 File View H</td> <td>elp</td> <td></td> <td></td> <td></td> <td></td> <td></td>	13	V2	D2 File View H	elp							
15 V202 16 V202 17 V202 V202 Ethemet Remote Master H4/ERM Ethemet Address: 00 E0 E0 00 29 IP: 192.168. 0.147 Module ID: 47 1. Configure ERM 16 V202 17 V202 V202 Interface: PLC CPU: 440 State Status 10 11 12 13 14 15 16 2. Select Slaves 3. Write to ERM 17 V202 V202 Interface: Interface: Slave 1 at the other status 11 at the other status 10 11 12 13 14 15 16 3. Write to ERM 17 V203 Interface: Interface: Slave 1 at the other status Slave 1 at the other status 3. Write to ERM 18 Eead ERM Status Interface: Interface: Slave 1 Slave 1's Error List 3. Write to ERM 10 Module I/O Points PLC End VMap Notes 1. Configure ERM 110 Module I/O Points PLC End VMap Notes 1. Slave 1's Error List 110 Module I/O Points PLC End VMap Notes 1. Slave 1's Error List 111 Blobale Word Input V2000 V237 32-bit Braay; 32-bit Braay;	14	V2				-					
16 V203 CPU PLC CPU: 440 Style Status 1 2 3 4 5 6 7 8 9 10 11 13 14 15 16 2. Select Slaves 3. Write to ERM 17 V203 V203 Itherates: Ither	15	V2	D3 CEthernet R	emote Master H4-ERM - E	thernet Address:	00 E 0 62 6	0 OD 29 —I	P: 192.168. 0.147 - Module ID: 47 -	1 Configure ERM		
17 V203 Improvement PLC Mode: Run PLC Mode: Run PLC Mode: PLC Mode: <td>16</td> <td>V2</td> <td>CPU</td> <td>PLC</td> <td>CPU: 440</td> <td>SN e S</td> <td>Status</td> <td>4 5 6 7 9</td> <td></td>	16	V2	CPU	PLC	CPU: 440	SN e S	Status	4 5 6 7 9			
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Bead ERM Status Ist read: 15:05:45 Detailed ERM Status Clear Last Error Slave 1 Slave 1's Error List I/O Module I/O Points PLC Start PLC End V-Map Notes Kreserved> Slave Status Bits X300 X317 V40414 ERM Status: Disable Slave Comm Y300 Y317 V40514 Slave 1 T1H-EBC100 hotswap(auto).Ethernet Address[00 E0 62 40 22 9F] on Slave 1/Slot 1 16 Double Word Input V2000 V2037 32-bit Binay; Slave 1/Slot 2 16 Double Word Output V2100 V2137 32-bit Binay; Slave 1/Slot 3 8 Double Word Output V2100 V2167 32-bit Binay; Slave 1/Slot 4 8 Double Word Output V2100 V2167 32-bit Binay; Slave 1/Slot 4 8 Double Word Output V2160 V2167 32-bit Binay; Slave 1/Slot 5 8 Double Word Output V2160 V2167 32-bit Binay; Slave 1/Slot 6 8 Discrete Output V340 Y347 V40515 Slave 1/Slot 7 8 Discrete Output <thv340< th=""> Y347 V40415</thv340<>				′в	utton to refresh	LIICK	see its Last	Error:			
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Stave 1/Stot 5 Double Word Output Y2140 Y2147 32-bit Binary; Slave 1/Stot 5 B Double Word Output Y330 Y40515 32-bit Binary; Slave 1/Stot 5 B Double Word Output Y2060 Y2077 32-bit Binary; Slave 1/Stot 5 B Double Word Output Y2150 Y2167 32-bit Binary; Slave 1/Stot 5 B Double Word Output Y2160 Y2167 32-bit Binary; Slave 1/Stot 5 B Double Word Output Y2160 Y2167 32-bit Binary; Slave 1/Stot 5 B Double Word Output Y340 Y347 V40516 Slave 1/Stot 6 B Discrete Input X340 X347 V40516 Slave 1/Stot 7 8 Discrete Output Y350 Y357 V40516			Slave 1/Slo	8 Discrete Output 8 Double Word Inc	Y320	Y327 V2057	V40515	32-bit Rinaru:			
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Slave 1/Slot 5 8 Double Word Duput Y2150 Y2150 Y2150 Slave 1/Slot 6 8 Discrete Duput Y340 Y347 Y40516 Slave 1/Slot 7 8 Discrete Duput Y340 Y347 Y40516			Slave 1/Cl-	8 Discrete Output 8 Double Word Im	V330	Y337 V2077	V40515	32-bit Binaru:			
8 Discrete Output Y340 Y347 V40516 Slave 1/Slot 6 8 Discrete Input X340 X347 V40416 Slave 1/Slot 7 8 Discrete Output Y350 Y357 V40516			Slave 1/Slo	t 5 8 Double Word Ou	itput V2150	V2167		32-bit Binary;			
Slave 1/Slot 7 8 Discrete Dutput Y350 Y357 V40516			Claus 1.101	8 Discrete Output	Y340	Y347	V40516				
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Dead TDM Class. A Construction of the Construc) Dan da					Designation of the second second			

T1F-16DA-2 Example (Module in Slot 2)

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Ethernet Remote M CPU Interface: Last ERM Error: <u>Ree</u> Detail	PLC PLC no error d ERM Status ed ERM Status	M Etherr CPU: PLC Mode: Hit [Read button Time of last read:	440 A40 Run ERM Status] to refresh 15:05:45	00 E0 62 60 Slave S 9 Click to	0D 29 -1 itatus 2 3 10 11 on slave # a see its Last r Last Error S	P: 192.168. 0.147 - Module ID: 47 4 5 6 7 8 12 13 14 15 16 sbove Slave 1 - no error Slave 1 Slave 1's Error List	1. <u>C</u> onfigure ERM 2. <u>S</u> elect Slaves 3. <u>W</u> rite to ERM
	1					Lawrence .	
I/O Module	1/0 Points		PLC Start	PLC End	V-Map	Notes	[
I/O Module <reserved></reserved>	I/O Points Slave Stat ERM Statu	us Bits us Word	PLC Start X300 X320	PLC End X317 X337	V-Map V40414 V40415	Notes	
I/O Module <reserved></reserved>	I/O Points Slave Stat ERM Statu Disable Sla	us Bits us Word ave Comm	PLC Start ×300 ×320 ¥300	PLC End ×317 ×337 ¥317	V-Map V40414 V40415 V40514	Notes	
I/O Module <reserved></reserved>	I/O Points Slave Stat ERM Statu Disable Sla T1H-EBC1	us Bits us Word ave Comm 00	PLC Start X300 X320 Y300	PLC End X317 X337 Y317	V-Map V40414 V40415 V40514	Notes	9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1</reserved>	I/O Points Slave Stat ERM Stat Disable Sk T1H-EBC1 16 Double	us Bits us Word ave Comm 00 Word Input	PLC Start X300 X320 Y300 V2000	PLC End X317 X337 Y317 V2037	V-Map V40414 V40415 V40514	Notes hotswap(auto),Ethernet Address[00 E0 62 40 22 32-bit Binary;	9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2</reserved>	I/O Points Slave Stat ERM Stat. Disable Sk T1H-EBC1 16 Double 16 Double	us Bits us Word ave Comm 00 Word Input Word Out	PLC Start X300 X320 Y300 V2000 V2100 V2200	PLC End X317 X337 Y317 V2037 V2037 V2137	V-Map V40414 V40415 V40514	Notes hotswap(auto);Ethernet Address[00 E0 62 40 22 32-bit Binary; 32-bit Binary;	9F] on
I/D Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2</reserved>	I/O Points Slave Stat ERM Statu Disable Sk T1H-EBC1 16 Double 8 Discrete 2 Double	us Bits us Word ave Comm 00 Word Input Word Dut Output	PLC Start X300 X320 Y300 V2000 V2100 Y320 Y3200 Y3200	PLC End X317 X337 Y317 V2037 V2137 V2137 Y327 Y327	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto);Ethernet Address[00 E0 62 40 22 32-bit Binary; 32-bit Binary;	9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3</reserved>	I/O Points Slave Stat ERM Statu Disable Sk T1H-EBC1 16 Double 8 Discrete 8 Double 4 Dauble 1	us Bits Is Word ave Comm 00 Word Input Word Out Output Word Input Word Input Vord Input	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040 V2040	PLC End X317 X337 Y317 V2037 V2137 Y2057 V2057 V2057	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto);Ethernet Address[00 E0 62 40 22 32-bit Binary; 32-bit Binary; 32-bit Binary;	9F] on
I/D Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3</reserved>	I/O Points Slave Stat ERM Statu Disable Sla T1H-EBC1 16 Double 16 Double 8 Discrete 8 Double \ 4 Double \ 9 Disable	us Bits Jave Comm 00 Word Input Word Out Output Word Output Word Output	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040 V2140 V2140 V2140	PLC End X317 X337 Y317 V2037 V2137 Y327 V2057 V2147 V2147	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto),Ethernet Address[00 E0 62 40 22 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3 Slave 1/Slot 4</reserved>	I/O Points Slave Stat ERM Statu Disable Ski T1H-EBC1 16 Double 8 Discrete 8 Double \ 8 Discrete 9 Double \ 8 Discrete 9 Double \	us Bits Is Word ave Comm 00 Word Input Word Out Output Word Output Output Uord Input (Iord Input)	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040 V2140 Y330 V2040 V2140 Y320	PLC End X317 X337 Y317 V2037 V2137 Y327 V2057 V2147 Y337 Y2027	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto);Ethernet Address[00 E0 62 40 22 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	9F] on
I/D Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3 Slave 1/Slot 4 Slave 1/Slot 5</reserved>	I/O Points Slave Stat ERM Statu Disable Sk T1H-EBC1 16 Double 8 Discrete 8 Double \ 4 Double \ 8 Discrete 8 Double \ 8 Double \ 8 Double \	us Bits Is Word ave Comm 00 Word Input Word Output Word Output Output Output Output Word Input Word Input Word Input	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040 V2140 Y330 V2060 V2150	PLC End X317 X337 Y317 V2037 V2137 V2057 V2057 V2147 Y337 V2077 V2167	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto);Ethernet Address[00 E0 62 40 22 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	9F] on
I/D Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3 Slave 1/Slot 4 Slave 1/Slot 5</reserved>	I/O Points Slave Stat ERM Stat Disable Sit T1H-EBCI 16 Double 8 Discrete 8 Double \ 4 Double \ 8 Discrete 8 Double \ 8 Double \ 8 Double \ 8 Double \	us Bits us Word ave Comm 00 Word Input Word Output Word Output Output Word Output Word Output Word Output	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040 V2140 Y330 V2060 V2150 X340	PLC End X317 X337 Y317 V2037 V2137 V2057 V2057 V2147 Y337 V2077 V2077 V2167 Y347	V-Map V40414 V40415 V40514 V40515 V40515	Notes hotswap(auto),Ethernet Address[00 E0 62 40 22 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3 Slave 1/Slot 3 Slave 1/Slot 5 Slave 1/Slot 5 Slave 1/Slot 5</reserved>	1/0 Points Slave Stat ERM Statu Disable Sk T1H-EBC1 16 Double 8 Discrete 8 Double \ 8 Double \ 8 Double \ 8 Double \ 8 Discrete 8 Discrete	us Bits us Word ave Comm 00 Word Input Word Output Word Output Output Output Vord Input Word Output Output Input	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040 V2140 Y330 V2060 V2150 Y340 X340	PLC End X317 X337 Y317 V2037 V2137 V2057 V2147 Y337 V2077 V2167 Y2167 X347	V-Map V40414 V40415 V40514 V40515 V40515 V40516 V40516	Notes hotswap(auto);Ethernet Address[00 E0 62 40 22 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	9F] on

In this example, 24VDC is applied to the T1F-16DA-2 in Slave 1 Slot 2 and a multi-meter is used to measure the output. The outputs are enabled and configured for -5 to +5V range.

All V-memory values in this DirectSoft Data View window are displayed as Decimal DWORDs.

Data	ə1			Output Channel	Address	Value	Discrete Bits	Value
C	Decimal 💌	DWORD _	- 🗅 🔛	Channel 1	\/2100	0 = -5V	¥320	ON for Output Enable
	Element	Status	Edits		V2100	0 = -3 V	1020	
1	V2100	0	0	Channel 2	V2102	270 = -4.34V	Y321	UN selects
2	V2102	270	270	Ob succession	10101			
3	V2104	525	525	Channel 3	V2104	525 = -3.71V	Y322	OFF selects
4	V2106	780	780	Channel 4	1/2106	7803.00\/		5V output range
5	V2110	1035	1035	Unanner 4	VZ100	700 = -3.03V	Y323 to Y327	N/A
6	V2112	1545	1545	Channel 5	V2110	1035 = -2.47V		
7	V2114	1800	1800			4545 4 0014		
8	V2116	2055	2055	Channel 6	V2112	1545 = -1.22V		
9	V2120	2310	2310	Channel 7	\/211/	18000.601/		
10	V2122	2565	2565		V2114	1000 - 0.000		
11	V2124	2820	2820	Channel 8	V2116	2055 = 0.01V		
12	V2126	3075	3075	Channel O	1/0100	0010 0.041/		
13	V2130	3330	3330	Ghannel 9	VZIZU	2310 = 0.04V		
14	V2132	3585	3585	Channel 10	V2122	2565 = 1.26V		
15	V2134	3840	3840					
16	V2136	4095	4095	Channel 11	V2124	2820 = 1.88V		
17	Y320	ON	ON OFF	Channel 12	V2126	3075 = 2.50V		
18	Y321	ON	ON OFF		12120	0070 - 2.007		
19	Y322	OFF	ON OFF	Channel 13	V2130	3330 = 3.13V		
20	Y323	OFF	ON OFF	Channel 14	1/0100	2505 2 751/		
21	Y324	DFF	ON OFF		VZ13Z	3000 = 3.75V		
22	Y325	OFF	ON OFF	Channel 15	V2134	3840 = 4.37V		
23	Y326	OFF	ON OFF	Channel 16	V2136	4095 = 5V		
24	Y327	UFF	ON OFF					

T1F-08AD-2 Example (Module in Slot 4)

Mem Helb							
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Ethernet Remote M CPU Interface: Last ERM Error: <u>Rea</u>	PLC PLC no error d ERM Status	M Ethern CPU: PLC Mode: Hit [Read B button I ast read:	et Address: 440 Run ERM Status] to refresh 15:05:45	00 E0 62 60 Slave S 9 Click to	0 0D 29 -1 Status 2 3 10 11 on slave # a see its Last r Last Error S	P: 192168. 0.147 - Module ID: 47 - 4 5 6 7 8 12 13 14 15 16 bove Slave 1 · no error Fror: Slave 1 · Slave 1 · Stare 1	1. <u>C</u> onfigure ERM 2. <u>S</u> elect Slaves 3. <u>W</u> rite to ERM
Detail	ed EHM Status].		-			
LO M. H.L.	LIO Deliver		DLCCL	DICERT	V.H	No.	1
I/O Module	I/O Points	uo Dito	PLC Start	PLC End	V-Map	Notes	
I/O Module <reserved></reserved>	I/O Points Slave State	us Bits us Word	PLC Start X300 X320	PLC End X317 X327	V-Map V40414 V40415	Notes	
I/O Module <reserved></reserved>	I/O Points Slave State ERM State Disable Sla	us Bits Is Word	PLC Start X300 X320 Y300	PLC End X317 X337 Y317	V-Map V40414 V40415 V40514	Notes	
I/O Module <reserved> Slave 1</reserved>	I/O Points Slave State ERM State Disable Sla T1H-FBC1	us Bits Is Word ave Comm NN	PLC Start X300 X320 Y300	PLC End X317 X337 Y317	V-Map V40414 V40415 V40514	Notes	40.22.9E1.on
I/O Module <reserved> Slave 1 Slave 1/Slot 1</reserved>	I/O Points Slave State ERM State Disable Sla T1H-EBC1 16 Double	us Bits Is Word ave Comm 00 Word Input	PLC Start X300 X320 Y300 V2000	PLC End X317 X337 Y317 V2037	V-Map V40414 V40415 V40514	Notes hotswap(auto);Ethernet Address(00 E0 62 32-hit Binaur	40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2</reserved>	I/O Points Slave State ERM State Disable Sla T1H-EBC1 16 Double 16 Double	us Bits is Word ave Comm 00 Word Input Word Out	PLC Start X300 X320 Y300 V2000 V2100	PLC End X317 X337 Y317 V2037 V2137	V-Map V40414 V40415 V40514	Notes hotswap(auto);Ethernet Address(00 E0 62 32-bit Binary:	40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2</reserved>	I/O Points Slave State ERM State Disable Sla T1H-EBC1 16 Double 16 Double 8 Discrete	us Bits Is Word ave Comm 00 Word Input Word Out Output	PLC Start X300 X320 Y300 V2000 V2100 Y320	PLC End X317 X337 Y317 V2037 V2037 V2137 Y327	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto),Ethernet Address[00 E0 62 32-bit Binary; 32-bit Binary;	40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3</reserved>	I/O Points Slave Statu ERM Statu Disable Sla T1H-EBC1 16 Double 16 Double 8 Discrete 8 Double V	us Bits is Word ave Comm 00 Word Input Word Out Output Vord Input	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040	PLC End X317 X337 Y317 V2037 V2037 V2137 Y327 V2057	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto):Ethernet Address[00 E0 62 32-bit Binary; 32-bit Binary; 32-bit Binary;	40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3</reserved>	I/O Points Slave State ERM State Disable Sla T1H-EBC1 16 Double 8 Discrete 8 Double \ 4 Double \	us Bits is Word ave Comm 00 Word Input Word Out Vord Input Vord Input	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040 V2040 V2140	PLC End X317 X337 Y317 V2037 V2137 Y227 V2057 V2147	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto);Ethernet Address[00 E0 62 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3</reserved>	I/O Points Slave State ERM State Disable Site T1H-EBC1 16 Double 8 Discrete 8 Double \ 4 Double \ 8 Discrete	us Bits is Word ave Comm 00 Word Input Word Out Output Vord Input Vord Output Output Output	PLC Start X300 X320 Y300 V2000 V2100 Y2100 V2040 V2140 Y330	PLC End X317 X337 Y317 V2037 V2137 V2037 V2057 V2057 V2147 Y337	V-Map V40414 V40415 V40514 V40515	Notes hotswap(auto);Ethernet Address(00 E0 62 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	40 22 9F) on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3 Slave 1/Slot 4</reserved>	I/O Points Slave Statu ERM Statu Disable Sla T1H-EBC1 16 Double 8 Discrete 8 Double \ 4 Double \ 8 Discrete 8 Double \	us Bits is Word ave Comm 00 Word Input Word Out Output Vord Input Vord Output Output Vord Input	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040 V2140 Y330 V2060	PLC End X317 X337 Y317 V2037 V2137 V2057 V2147 Y337 V2077	V-Map V40414 V40415 V40514 V40515 V40515	Notes hotswap(auto):Ethernet Address[00 E0 62 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3 Slave 1/Slot 4 Slave 1/Slot 5</reserved>	I/O Points Slave Stat ERM Statu Disable Sla THH-EBC1 16 Double 8 Discrete 8 Double \/ 8 Discrete 8 Double \/ 8 Double \/ 8 Double \/	us Bits Is Word ave Comm 00 Word Input Word Input Vord Input Vord Input Vord Input Vord Input Vord Input Vord Unput	PLC Start X300 X320 Y300 V2000 V2100 Y320 V2040 V2140 Y330 V2060 V2150	PLC End X317 X337 Y317 V2037 V2137 V2057 V2147 Y337 V2077 V2077 V2167	V-Map V40414 V40415 V40514 V40515 V40515	Notes hotswap(auto);Ethernet Address[00 E0 62 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3 Slave 1/Slot 4 Slave 1/Slot 5</reserved>	I/O Points Slave Statu ERM Statu Disable Sk T1H-EBC1 16 Double 8 Discrete 8 Double \ 8 Discrete 8 Double \ 8 Double \ 8 Discrete	us Bits is Word ave Comm 00 Word Input Word Dut Output Vord Dutput Output Vord Output Output Vord Output Output Output Output	PLC Start X300 X320 Y300 V2000 V2100 V2040 V2040 V2140 Y330 V2060 V2150 Y340	PLC End X317 X337 Y317 V2037 V2137 V2057 V2147 Y337 V2077 V2167 Y347	V-Map V40414 V40415 V40514 V40515 V40515 V40516	Notes hotswap(auto):Ethernet Address(00 E0 62 32-bit Binary: 32-bit Binary: 32-bit Binary: 32-bit Binary: 32-bit Binary: 32-bit Binary:	40 22 9F] on
I/O Module <reserved> Slave 1 Slave 1/Slot 1 Slave 1/Slot 2 Slave 1/Slot 3 Slave 1/Slot 4 Slave 1/Slot 5 Slave 1/Slot 5</reserved>	I/O Points Slave Statu ERM Statu Disable Sla T1H-EBC1 16 Double 8 Discrete 8 Double \ 8 Double \ 8 Double \ 8 Double \ 8 Double \ 8 Double \ 8 Discrete 8 Discrete	us Bits is Word ave Comm 00 Word Input Word Input Vord Input Vord Input Vord Input Vord Input Vord Output Output Dutput Input	PLC Start X300 X320 Y300 V2000 V2100 Y2100 V2140 V2140 V2140 V2140 V2150 V2150 X340	PLC End X317 X337 Y317 V2037 V2137 V2057 V2147 Y337 V2077 V2167 V2167 X347	V-Map V40414 V40415 V40514 V40515 V40515 V40515 V40516 V40416	Notes hotswap(auto):Ethernet Address[00 E0 62 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary; 32-bit Binary;	40 22 9F] on

In this example, 24VDC is applied to the T1F-08AD-2 in Slave 1 Slot 4. Voltage is applied to all eight channels.

V2060 and V2062 are displayed as both Signed Decimal DWORD and BCD/Hex DWORD in this DirectSoft Data View. V2064-V2076 are displayed as Signed Decimal DWORD.

Dat	a3		Input Channel	Address	Value	
EI BCD/Hex V DWORD				Channel 1	V2060	-4097 = -5V
	Element	Status		Channel 2	V2062	-4097 = -5V
2	V2060	FFFFEFFF		Channel 3	V2064	1 = 0V
3	√2062 √2062	-4097 FFFFEFFF		Channel 4	V2066	1 = 0V
5	V2064	1		Channel 5	V2070	4097 = 5V
ь 7	V2066 V2070	4097		Channel 6	V2072	4097 = 5V
8	√2072	4097		Channel 7	V2074	8190 = 10V
9 10	√2074 √2076	8190 8191		Channel 8	V2076	8190 = 10V

Notes: