

# Do-more T1H Series PLC System Specifications

## General Specifications

General Specifications	
<b>Ambient Operating Temperature</b>	32°F to 131°F (0°C to 55°C)
<b>Storage Temperature</b>	-4°F to 158°F (-20°C to 70°C)
<b>Ambient Humidity</b>	5% to 95% (Non-condensing)
<b>Atmosphere</b>	No corrosive gases. The level of environmental pollution = 2 (UL 840)
<b>Vibration Resistance</b>	MIL STD 810C, Method 514.2
<b>Shock Resistance</b>	MIL STD 810C, Method 516.2
<b>Voltage Withstand (Dielectric)</b>	1500VAC, 1 minute
<b>Insulation Resistance</b>	500VDC, 10Mq
<b>Noise Immunity</b>	NEMA ICS3-304 Impulse noise 1μs, 1000V FCC class A RFI (144 MHz, 430MHz 10W, 10cm)
<b>Agency Approvals</b>	UL E185989, CE, FCC class A, NEC Class 1 Division 2

# Do-more T1H Series PLC System Specifications

## Module Placement and I/O Usage Tables

There are no I/O module placement restrictions with the Do-more T1H Series PLC family. In general, any mix of up to 16 analog and discrete I/O module types can be used in any local or Ethernet I/O base. Specialty modules can also be used in any local or Ethernet I/O base. Reference the Module Placement Restrictions table to the right for the Do-more T1H Series PLC.

### Analog I/O in the Ethernet I/O bases

When using an analog module in an Ethernet I/O base, the analog update time to the CPU will be asynchronous to the scan time. Critical analog I/O should be located in the local base.

## I/O point usage

The table to the right indicates the number of I/O points consumed by each module. These X (discrete input), Y (discrete output), WX (analog input) and WY (analog output) addresses are automatically assigned by Do-more Designer.

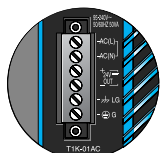
Module Placement Restrictions		
Module/Unit	Local CPU Base	Ethernet I/O Base
<b>CPUs</b>	CPU slot only	
<b>Discrete I/O</b>	3	3
<b>Analog I/O</b>	3	3
<b>Base Controller</b> <b><u>T1H-EBC100</u></b>		CPU slot only
<b>Specialty Module</b> <b><u>T1H-CTRIO</u></b>	3	3

I/O Module Point Usage					
DC INPUT		RELAY OUTPUT		SPECIALTY MODULES	
<u>T1K-08ND3</u>	8 X	<u>T1K-08TR</u> <u>T1K-16TR</u> <u>T1K-08TRS</u>	8 Y 16 Y 8 Y	<u>T1H-CTRIO</u>	None
<u>T1K-16ND3</u>	16 X				
<u>AC INPUT</u>					
<u>T1K-08NA-1</u>	8 X				
<u>T1K-16NA-1</u>	16 X				
<u>DC OUTPUT</u>		<u>ANALOG</u>			
<u>T1K-08TD1</u>	8 Y	<u>T1F-08AD-1</u> <u>T1F-08AD-2</u> <u>T1F-16AD-1</u> <u>T1F-16AD-2</u> <u>T1F-16RTD</u> <u>T1F-16TMST</u> <u>T1F-14THM</u> <u>T1F-08DA-1</u> <u>T1F-08DA-2</u> <u>T1F-16DA-1</u> <u>T1F-16DA-2</u> <u>T1F-8AD4DA-1</u> <u>T1F-8AD4DA-2</u>	8 X, 8 WX 8 X, 8 WX 16 X, 16 WX 16 X, 16 WX 16 X, 16 WX 16 X, 16 WX 16 X, 16 WX 8 Y, 8 WY 8 Y, 8 WY 8 Y, 16 WY 8 Y, 16 WY 8 X, 8 WX/8 Y, 4 WY 8 X, 8 WX/8 Y, 4 WY		
<u>T1K-16TD1</u>	16 Y				
<u>T1K-08TD2-1</u>	8 Y				
<u>T1K-16TD2-1</u>	16 Y				
<u>T1H-08TDS</u>	8 Y				
<u>AC OUTPUT</u>					
<u>T1K-08TA</u> <u>T1K-16TA</u> <u>T1K-08TAS</u>	8 Y 16 Y 8 Y				

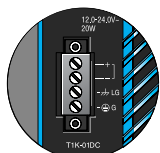
# Do-more T1H Series PLC System Specifications

## Power supplies

The T1H Series PLC offers two power supply options: AC or DC. More than one power supply can be installed in a T1H series PLC system with each power supply positioned to the left of the modules they supply power to.



**T1K-01AC**  
\$00e41:



**T1K-01DC**  
\$00e42:

## Power supply specifications

Power Supply Specifications	T1K-01AC	T1K-01DC
<b>Input Voltage Range</b>	110/220 VAC	12/24 VDC
<b>Input Frequency</b>	50/60 Hz	N/A
<b>Maximum Power</b>	50VA	30W
<b>Max. Inrush Current</b>	20A	10A
<b>Insulation Resistance</b>	> 10M $\Omega$ @ 500VDC	
<b>Voltage Withstand</b>	1 min. @ 1500 VAC between primary, secondary and field ground	
<b>5VDC PWR</b>	<b>Voltage</b>	5.25 VDC
	<b>Current Rating</b>	2000mA max (see the table below)
	<b>Ripple</b>	5% max.
<b>24VDC PWR</b>	<b>Voltage</b>	24VDC
	<b>Current Rating</b>	500mA max. (see the table below)
	<b>Ripple</b>	10% max.
<b>Fuse</b>	1 (primary), not replaceable	
<b>Replacement Terminal Block (Phoenix Contact)</b>	MVSTBW 2.5/4-ST-5.08 BK	MVSTBW 2.5/6-ST-5.08 BK

### T1K-01AC Current Output

<b>5VDC PWR</b>	2000mA	1500mA
<b>24VDC PWR</b>	300mA	500mA

Note: 500mA @ 24VDC can be achieved by lowering the 5 VDC from 2000mA to 1500mA.

## Power requirements

Module	5VDC	24VDC	Module	5VDC	24VDC	Module	5VDC	24VDC
<b>CPU Modules</b>			<b>DC Output Modules</b>			<b>Analog Input Modules</b>		
<b>T1H-DM1</b>	250	0	<b>T1H-08TDS</b>	200	0	<b>T1F-08AD-1</b>	75	50*
<b>T1H-DM1E</b>	275	0	<b>T1K-08TD1</b>	100	200*	<b>T1F-08AD-2</b>	75	50*
<b>Interface Module</b>			<b>T1K-16TD1</b>	200	400*	<b>T1F-16AD-1</b>	75	50*
<b>T1H-EBC100</b>	300	0	<b>T1K-08TD2-1</b>	100	0	<b>T1F-16AD-2</b>	75	50*
<b>DC Input Modules</b>			<b>T1K-16TD2-1</b>	200	0	<b>T1F-16RTD</b>	150	0
<b>T1K-08ND3</b>	35	0	<b>AC Output Modules</b>			<b>T1F-16TMST</b>	150	0
<b>T1K-16ND3</b>	70	0	<b>T1K-08TA</b>	250	0	<b>T1F-14THM</b>	60	70*
<b>AC Input Modules</b>			<b>T1K-16TA</b>	450	0	<b>Analog Output Modules</b>		
<b>T1K-08NA-1</b>	35	0	<b>T1K-08TAS</b>	300	0	<b>T1F-08DA-1</b>	75	150*
<b>T1K-16NA-1</b>	70	0	<b>Relay Output Modules</b>			<b>T1F-08DA-2</b>	75	150*
			<b>T1K-08TR</b>	350	0	<b>T1F-16DA-1</b>	75	150*
			<b>T1K-16TR</b>	700	0	<b>T1F-16DA-2</b>	75	150*
			<b>T1K-08TRS</b>	400	0	<b>Combination Analog Modules</b>		
			<b>Specialty Module</b>			<b>T1F-8AD4DA-1</b>	75	60*
			<b>T1H-CTRIO</b>	400	0	<b>T1F-8AD4DA-2</b>	75	70*
			* Use either internal or external source for 24VDC			* Use either internal or external source for 24VDC		

### Calculating the power budget

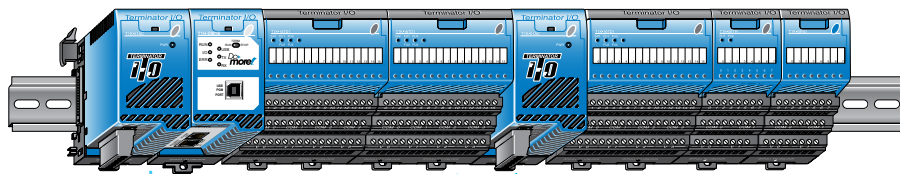
To calculate the power budget, read the available power (current rating) from the Power Supply Specifications table and subtract the power consumed by each module to the right of the power supply. Do not include modules to the right of an additional power supply.

### Adding additional power supplies

Each power supply furnishes power only to the modules to its right. Inserting a second power supply closes the power loop for the power supply to the left, while also powering the modules to its right. Perform a power budget calculation for each power supply in the system.

### Power Budget Example

Module	5VDC	24VDC
<b>T1K-01AC</b>	+2000mA	+300mA
<b>T1H-DM1E</b>	-275mA	-0mA
<b>T1K-16ND3</b>	-70mA	-0mA
<b>T1K-16TD2-1</b>	-200mA	-0mA
<b>T1F-08AD-1</b>	-75mA	-50mA
<b>Remaining</b>	+1380mA	+250mA



This power supply powers the CPU module and the next two I/O modules

This power supply powers these three I/O modules

# CPU Modules

## Specifications



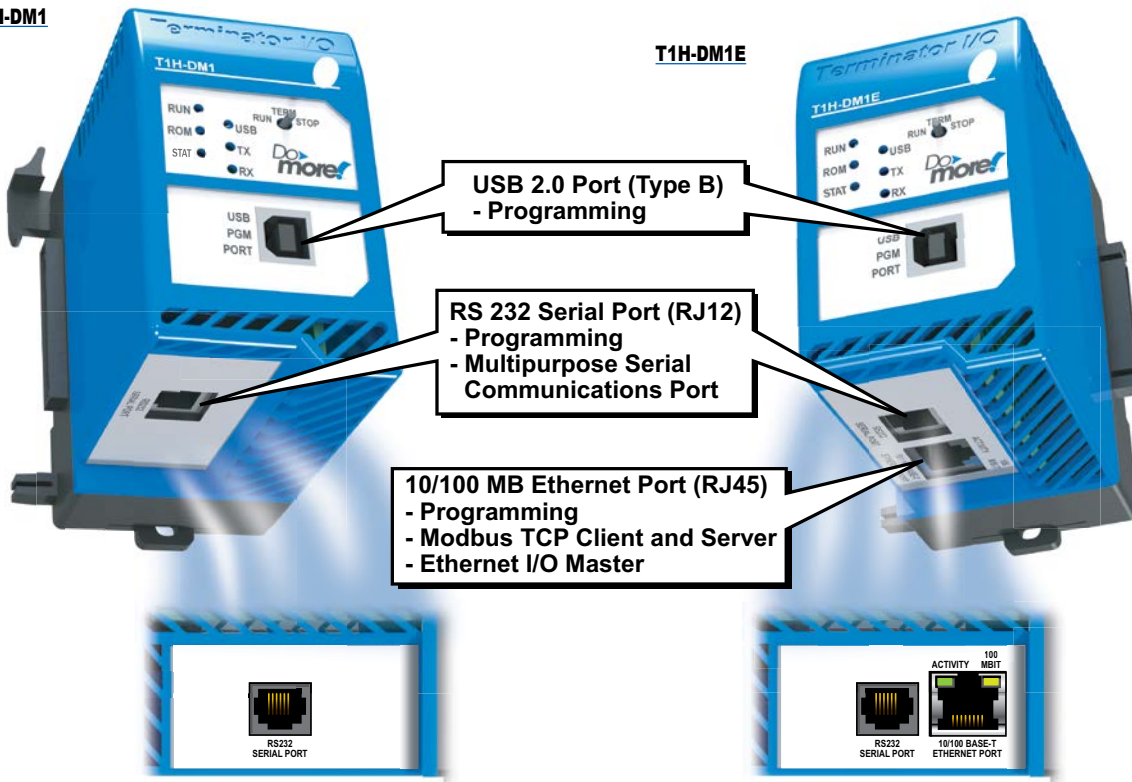
**T1H-DM1**  
\$00b?\_:



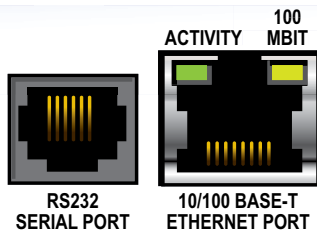
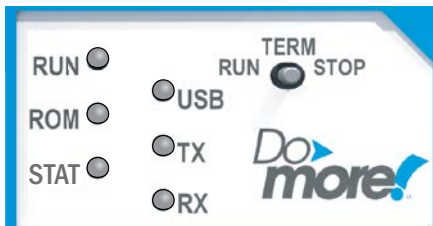
**T1H-DM1E**  
\$00b?#:

Feature	T1H-DM1	T1H-DM1E
<b>Total Memory (bytes)</b>	262,144 bytes	
<b>Ladder Memory (instruction words)</b>	65,536 instruction words	
<b>V-Memory (words)</b>	Configurable up to 65536 (4096 default)	
<b>Non-volatile V Memory (words)</b>	Configurable up to 65536 (4096 default)	
<b>D-memory (DWORDs)</b>	Configurable up to 65536 (4096 default)	
<b>Non-volatile D Memory (DWORDs)</b>	Configurable up to 65536 (4096 default)	
<b>R-memory (REAL DWORDs)</b>	Configurable up to 65536 (4096 default)	
<b>Non-volatile R Memory (REAL DWORDs)</b>	Configurable up to 65536 (4096 default)	
<b>Boolean execution</b>	50us	
<b>Stage Programming</b>	Yes	
<b>Number of Stages</b>	128 per Program code-block; number of code-blocks configurable to memory limit	
<b>Handheld Programmer</b>	No	
<b>Programming Software for Windows</b>	FREE Do-more Designer version 1.2 or newer	
<b>Built-In communications ports</b>	USB, RS-232	USB, RS-232, Ethernet (10/100 base-T)
<b>Program Memory</b>	Flash ROM	
<b>Total I/O points available</b>	X, Y, each configurable up to 65536 (2048 default); WX, WY (analog in/out) each configurable up to 65536 (256 default)	
<b>Max Number of Local I/O Modules</b>	16	
<b>Local I/O points available</b>	256	
<b>Ethernet I/O Discrete points</b>	131,072	
<b>Ethernet I/O Analog I/O Channels</b>	32,768	
<b>Max Number of Ethernet slaves per PLC</b>	16	
<b>I/O points on Ethernet I/O</b>	32,768	
<b>Discrete I/O Module Point Density</b>	8/16	
<b>Number of instructions available</b>	>160	>170
<b>Control relays</b>	Configurable up to 65536 (2048 default)	
<b>Special relays (system defined)</b>	1024	
<b>Special registers (system defined)</b>	512	
<b>Timers</b>	Configurable up to 65536 (256 default)	
<b>Counters</b>	Configurable up to 65536 (256 default)	
<b>System Date/Time structures</b>	8	
<b>User Date/Time structures</b>	Configurable up to 65536 (32 default)	
<b>ASCII String/Byte buffer structures</b>	Configurable up to memory limit (192 default)	
<b>Modbus Client memory</b>	Yes, configurable up to memory limit, default 1024 input bits, 1024 coil bits, 2048 input registers, 2048 holding registers	
<b>DL Classic Client memory</b>	Up to memory limit, default 512 X, 512 Y, 512 C, 2048 V	
<b>Immediate I/O</b>	No	
<b>Interrupt input (hardware / timed)</b>	No	
<b>Subroutines</b>	Program and Task code-blocks, up to memory limit	
<b>Drum Timers</b>	Yes, up to memory limit	
<b>Table Instructions</b>	Yes	
<b>Loops</b>	FOR/NEXT, WHILE/WEND, REPEAT/UNTIL loops	
<b>Math</b>	>60 operators and functions: Integer, Floating Point, Trigonometric, Statistical, Logical, Bitwise, Timing	
<b>ASCII</b>	Yes, IN/OUT, Serial, Ethernet TCP and UDP; 11 output script commands	
<b>PID Loop Control, Built In</b>	Yes, configurable to memory limit (over 2,000)	
<b>Time of Day Clock/Calendar</b>	Yes	
<b>Run Time Edits</b>	Yes	
<b>Supports True Force</b>	Yes	
<b>Internal Diagnostics</b>	Yes	
<b>Password security</b>	Multi-user, credentialed, session-based security	
<b>System error log</b>	Yes	
<b>User error log</b>	Yes	
<b>Battery backup</b>	Yes (Battery included)	

# CPU Modules

**T1H-DM1****T1H-DM1E**

## LED Status Indicators



LED Indicators		
Indicator	Status	Description
RUN	Green	CPU is in RUN Mode
	Yellow	Forces are Active
ROM	Yellow	CPU is updating Non-volatile Memory
STAT	Red	CPU Fatal Error
	Yellow	Low Battery
	Green	Status OK (good)
USB	Green	USB Receive Activity
	Yellow	USB Transmit Activity
TX	Green	RS-232 Transmit Activity
RX	Green	RS-232 Receive Activity
ACTIVITY	Green	Ethernet Port Activity
100 MBIT	Yellow	Ethernet Port communicating at 100 MBIT Rate

## PLC Mode Switch



Mode Switch Functions	
Mode Switch Position	CPU Action
RUN (Run Program)	CPU is forced into RUN Mode if no errors are encountered.
TERM (Terminal)	RUN, PROGRAM and DEBUG modes are available. In this switch position, the mode of operation can be changed through the Programming Software.
STOP (Stop Program)	CPU is forced into STOP Mode.

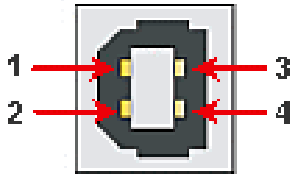
# CPU Modules

## Communication Ports

### USB Port

Used exclusively for programming and monitoring via a PC running Do-more Designer.

USB Port Specifications	
<b>Description</b>	Standard USB 2.0 Slave input for programming and online monitoring, with built-in surge protection. Not compatible with older full speed USB devices.
<b>Cables (ADC part #)</b>	USB Type A to USB Type B: <a href="#">USB-CBL-AB3</a> (3ft) <a href="#">USB-CBL-AB6</a> (6ft) <a href="#">USB-CBL-AB10</a> (10ft) <a href="#">USB-CBL-AB15</a> (15ft)



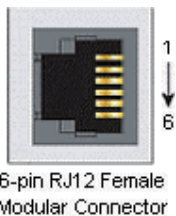
Pin	Description	
1	5V	Bus Voltage Sense
2	D-	Data -
3	D+	Data +
4	0V	Ground

### RS-232 Port

RJ-12 style connector used for:

- Connection to a PC running Do-more Designer
- Modbus RTU Master connections
- Modbus RTU Slave connections
- ASCII Incoming and Outgoing communications
- Custom Protocol Incoming and Outgoing communications

RS-232 Port Specifications	
<b>Description</b>	Non-isolated, full duplex RS-232 DTE port used for programming, online monitoring or can connect the CPU as a Modbus RTU or ASCII master or slave to a peripheral device. Includes ESD and built-in surge protection.
<b>Baud Rates</b>	1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200
<b>+5V Cable Power Source</b>	220mA maximum at 5V, $\pm 5\%$ . Reverse polarity and overload protected.
<b>Maximum Output Load (TXD/RTS)</b>	3kV, 1000pf
<b>Minimum Output Voltage Swing</b>	$\pm 5V$
<b>Output Short Circuit Protection</b>	$\pm 15mA$
<b>Cable Options (ADC part #)</b>	<a href="#">D2-DSCBL</a> <a href="#">USB-RS232-1 with D2-DSCBL</a> <a href="#">FA-CABKIT</a> <a href="#">FA-ISOCAN</a> for converting RS-232 to isolated RS-422/485 <a href="#">EA-MG-PGM-CBL</a>



Pin	Description	
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection (220mA max.)
3	RXD	Receive Data (RS-232)
4	TXD	Transmit Data (RS-232)
5	RTS	Request to Send (RS-232)
6	CTS	Clear to Send (RS-232)

For a list of protocols supported by each port, please refer to the Communications topic of the Do-more T1H Series PLC Overview in this section.

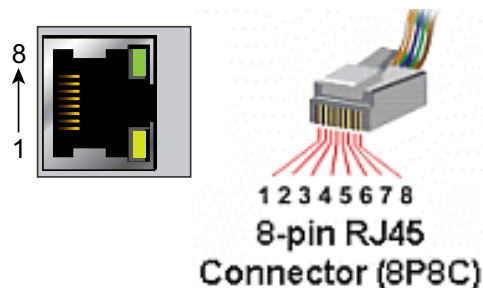


# CPU Modules

## Ethernet Port

RJ-45 style connector used for:

- Connection to a PC running Do-more Designer
- Modbus TCP Client connections (Modbus requests sent from the CPU)
- Modbus TCP Server connections (Modbus requests received by the CPU)
- Ethernet I/O Master

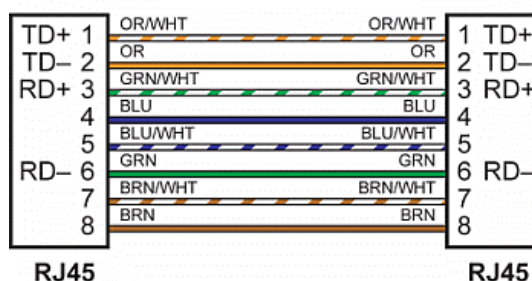


For a list of protocols supported by each port, please refer to the Communications topic of the Do-more T1H Series PLC Overview in this section.

## Ethernet Port Specifications

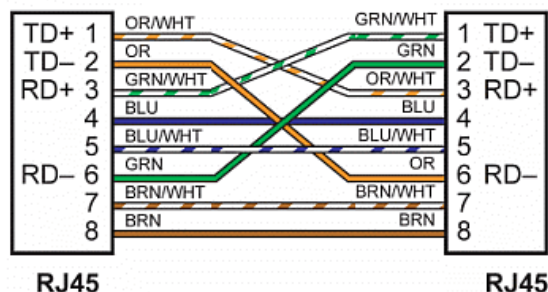
<b>Description</b>	Standard transformer isolated Ethernet port with built-in surge protection for programming, online monitoring, Modbus/TCP client/server connections (fixed IP or DHCP) and Ethernet I/O capabilities.
<b>Transfer Rate</b>	10/100 Mbps
<b>Cables</b>	Use a Patch (Point to Point) cable when a switch or hub is used. Use a Crossover cable when a switch or hub is not used.

## Patch (Point to Point) Cable



## Crossover Cable

10/BASE-T/100BASE-TX



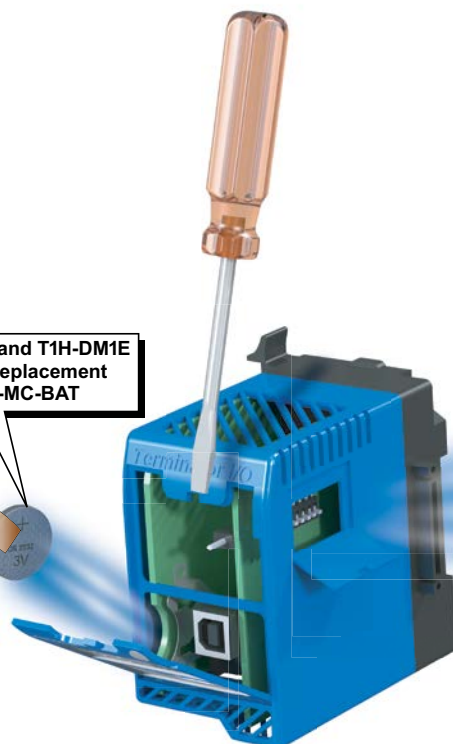
## Battery Specifications

A battery is included with the Do-more CPU and is used to retain the Time and Date along with any Tagname values that are set up as retentive. It is recommended that the battery be replaced once every five years or when one year of cumulative OFF time has been exceeded.

At least two hours is allowed to change out a battery without loss of data.

T1H-DM1 and T1H-DM1E  
Battery Replacement  
Part # D0-MC-BAT

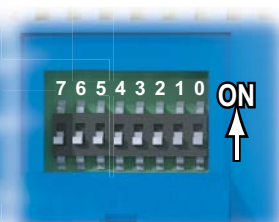
Battery		
D0-MC-BAT	Coin type, 3.0 V Lithium battery, number CR2032	\$,6t8:



## DIP Switch Specifications

The T1H Series Do-more CPU also comes equipped with a set of eight DIP switches (0-7) that can be used to affect the boot sequence of the controller.

The default position for all of the DIP switches is OFF.



# CPU Modules

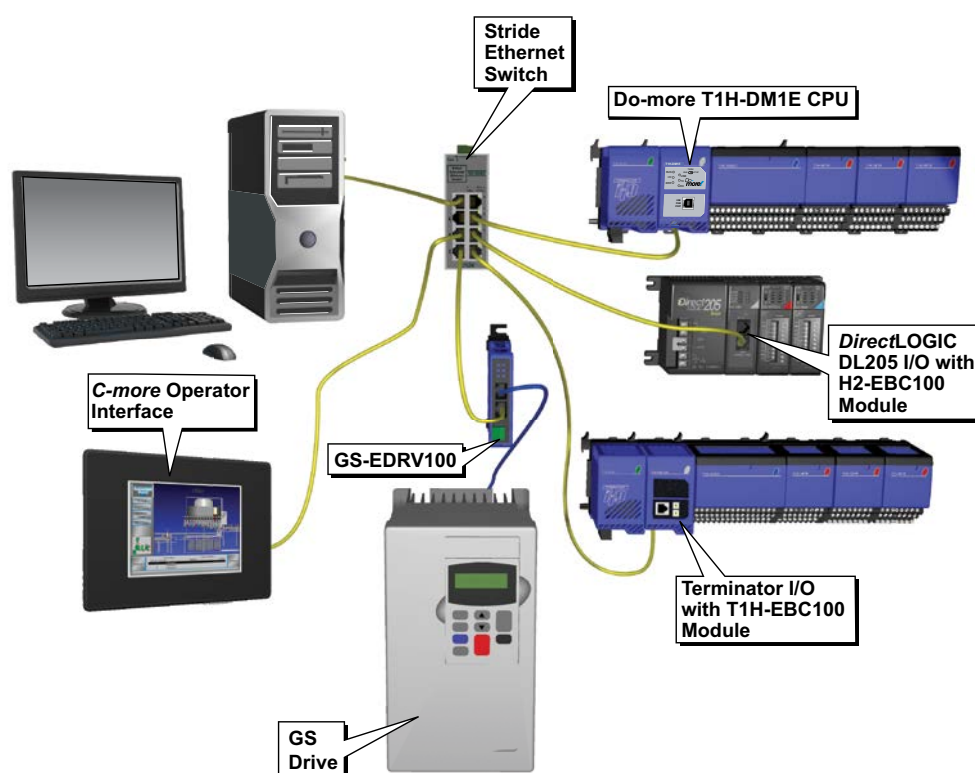
## Ethernet I/O

The T1H-DM1E CPU's built-in Ethernet port can be configured as an Ethernet I/O master. The Ethernet I/O feature allows expansion beyond the local base to slave I/O using the onboard high-speed Ethernet link. The onboard Ethernet port can support up to 16 slave devices. The slave I/O modules supported are:

- [H2-EBC100](#)
- [T1H-EBC100](#) (Terminator I/O)
- [GS-EDRV100](#) (GS Drives)

The Ethernet I/O network uses Category 5 UTP cables for cable runs up to 100 meters (328ft) with extended distances achieved through Ethernet switches.

It is highly recommended that a dedicated network be used with the Ethernet I/O feature. Ethernet I/O networks and ECOM/office networks should be isolated from one another to prevent network delays.





# Do-more T1H Series PLC Overview

## Do-more T1H Series PLC Hardware User Manual (T1H-DM-M)

Do-more T1H Series PLC Hardware User Manual is available as a free download from Automationdirect.com. A hard copy is also available for purchase.

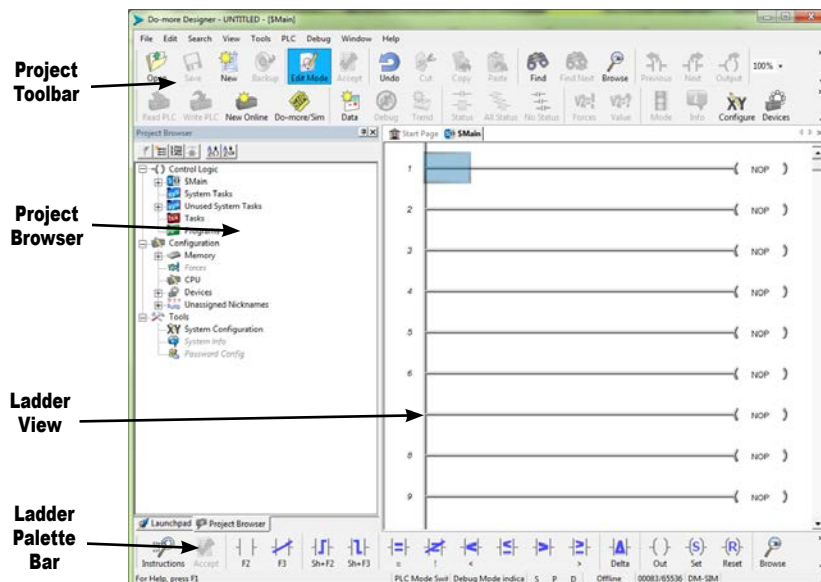
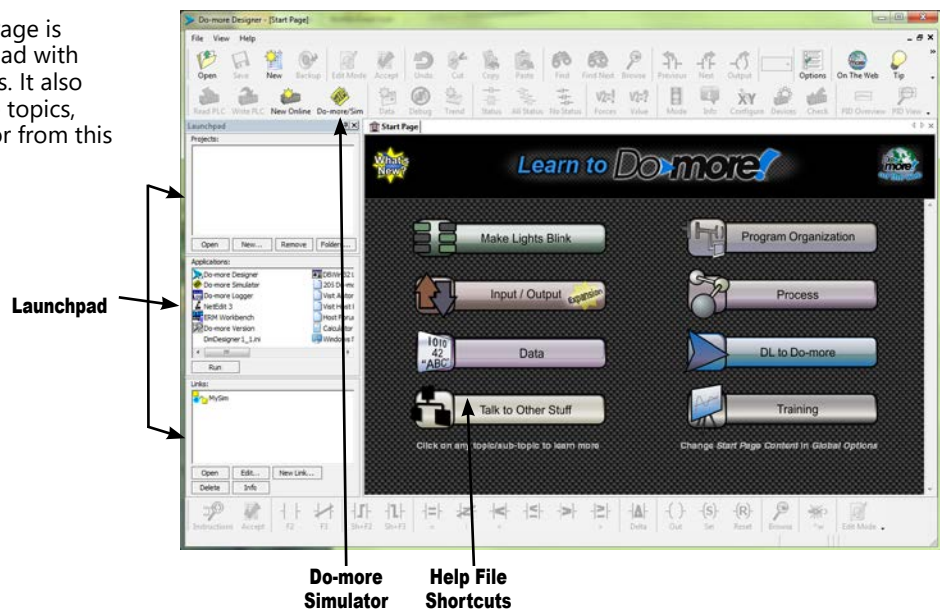
## Do-more Designer (Part No. [DM-PGMSW-USB](#))

Do-more Designer is the full-featured programming software for the Do-more PLC series. Do-more Designer is a free download from Automationdirect.com. A USB version is also available for purchase for \$10c9:.



### Start Page

When the software is started, the Start Page is displayed. This page contains a Launchpad with Projects, Applications and Links windows. It also contains shortcuts to important help file topics, and you can start the Do-more Simulator from this page.



### Main Programming Window

The Main Programming Window is displayed when a new project is started or an existing project is opened. It is divided into Menus, Toolbars, and Windows that work together to make project development simple.