Do-more T1H Series PLC System Specifications

General Specifications

General Specifications	
Ambient Operating Temperature	32°F to 131°F (0°C to 55°C)
Storage Temperature	-4°F to 158°F (-20°C to 70°C)
Ambient Humidity	5% to 95% (Non-condensing)
Atmosphere	No corrosive gases. The level of environmental pollution = 2 (UL 840)
Vibration Resistance	MIL STD 810C, Method 514.2
Shock Resistance	MIL STD 810C, Method 516.2
Voltage Withstand (Dielectric)	1500VAC, 1 minute
Insulation Resistance	500VDC, 10MΩ
Noise Immunity	NEMA ICS3-304 Impulse noise 1µs, 1000V FCC class A RFI (144 MHz, 430MHz 10W, 10cm)
Agency Approvals	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*
CPUs	CPU slot only	
Discrete I/O	✓	✓
Analog I/O	✓	✓
Base Controller T1H-EBC100		CPU slot only
Specialty Module T1H-CTRIO	✓	✓

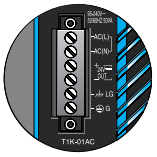
I/O Module Point Usage

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

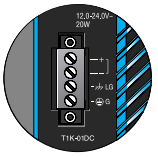
Do-more T1H Series PLC System Specifications

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



T1K-01DC

Power supply specifications

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

T1K-01AC Current Output		
5VDC PWR	2000mA	1500mA
24VDC PWR	300mA	500mA

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

Power requirements

Module	5VDC	24VDC
CPU Modules		
T1H-DM1	250	0
T1H-DM1E	275	0
Interface Module		
T1H-EBC100	300	0
DC Input Modules		
T1K-08ND3	35	0
T1K-16ND3	70	0
AC Input Modules		
T1K-08NA-1	35	0
T1K-16NA-1	70	0

Module	5VDC	24VDC
DC Output Modules		
T1H-08TDS	200	0
T1K-08TD1	100	200*
T1K-16TD1	200	400*
T1K-08TD2-1	100	0
T1K-16TD2-1	200	0
AC Output Modules		
T1K-08TA	250	0
T1K-16TA	450	0
T1K-08TAS	300	0
Relay Output Modules		
T1K-08TR	350	0
T1K-16TR	700	0
T1K-08TRS	400	0
Specialty Module		
T1H-CTRIO	400	0

* Use either internal or external source for 24VDC

Module	5VDC	24VDC
Analog Input Modules		
T1F-08AD-1	75	50*
T1F-08AD-2	75	50*
T1F-16AD-1	75	50*
T1F-16AD-2	75	50*
T1F-16RTD	150	0
T1F-16TMST	150	0
T1F-14THM	60	70*
Analog Output Modules		
T1F-08DA-1	75	150*
T1F-08DA-2	75	150*
T1F-16DA-1	75	150*
T1F-16DA-2	75	150*
Combination Analog Modules		
T1F-8AD4DA-1	75	60*
T1F-8AD4DA-2	75	70*

* Use either internal or external source for 24VDC

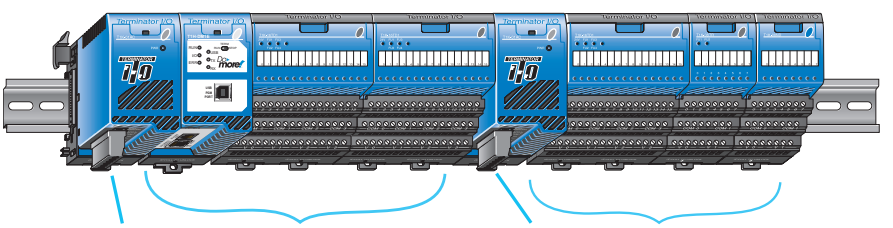
Calculating the power budget

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.

Power Budget Example		
Module	***5VDC***	***24VDC***
T1K-01AC	+2000mA	+300mA
T1H-DM1E	-275mA	-0mA
T1K-16ND3	-70mA	-0mA
T1K-16TD2-1	-200mA	-0mA
T1F-08AD-1	-75mA	-50mA
Remaining	+1380mA	+250mA

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.



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

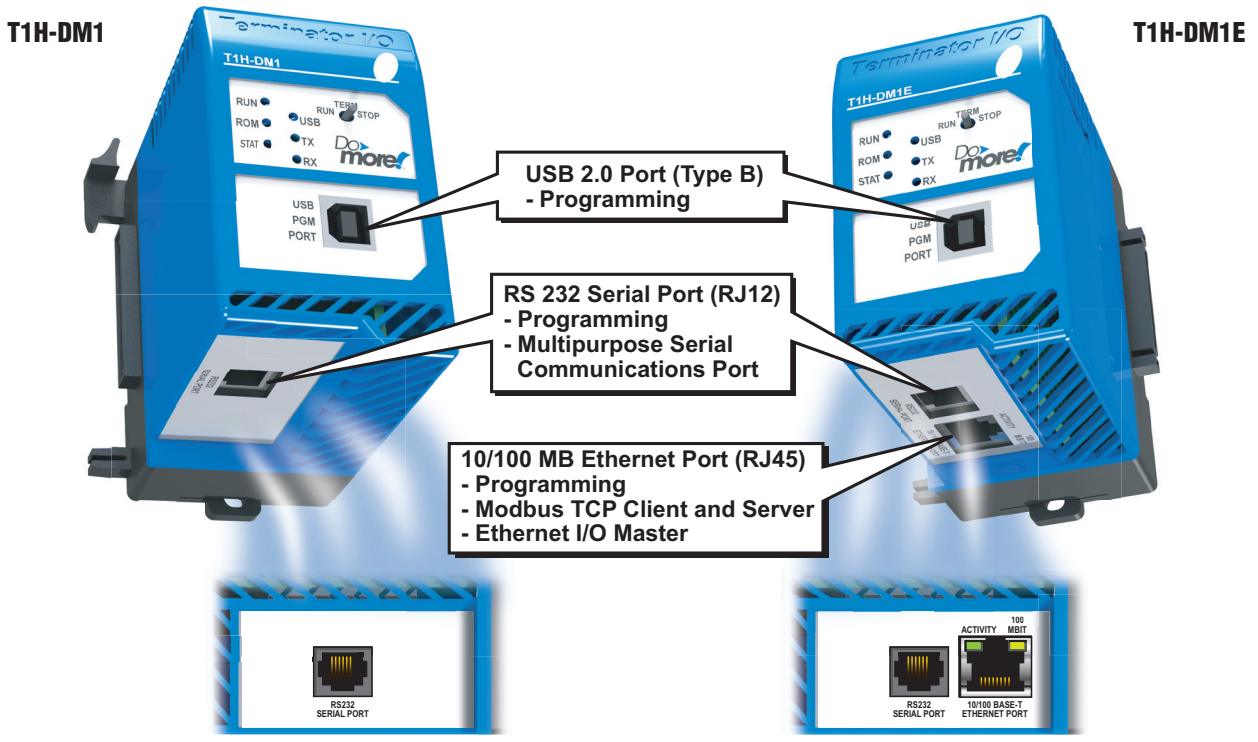
Specifications

T1H-DM1

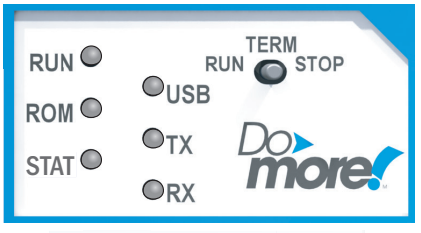
T1H-DM1E

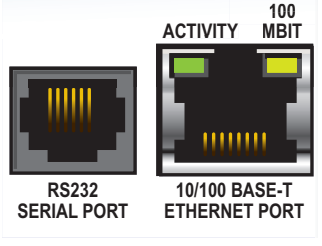
Feature	T1H-DM1	T1H-DM1E
Total Memory (bytes)	262,144 bytes	
Ladder Memory (instruction words)	65,536 instruction words	
V-Memory (words)	Configurable up to 65536 (4096 default)	
Non-volatile V Memory (words)	Configurable up to 65536 (4096 default)	
D-memory (DWORDs)	Configurable up to 65536 (4096 default)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

CPU Modules



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.

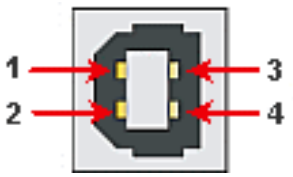
CPU Modules

Communication Ports

USB Port

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

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



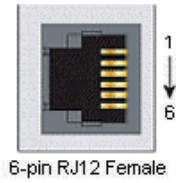
Pin	Description	
1	5V	Bus Voltage Sense
2	D-	Data -
3	D+	Data +
4	0V	Ground

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	
Description	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.
Baud Rates	1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200
+5V Cable Power Source	220mA maximum at 5V, ±5%. Reverse polarity and overload protected.
Maximum Output Load (TXD/RTS)	3kΩ, 1000pf
Minimum Output Voltage Swing	±5V
Output Short Circuit Protection	±15mA
Cable Options (ADC part #)	D2-DSCBL USB-RS232 with D2-DSCBL FA-CABKIT FA-ISOCON for converting RS-232 to isolated RS-422/485 EA-MG-PGM-CBL



6-pin RJ12 Female Modular Connector

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)

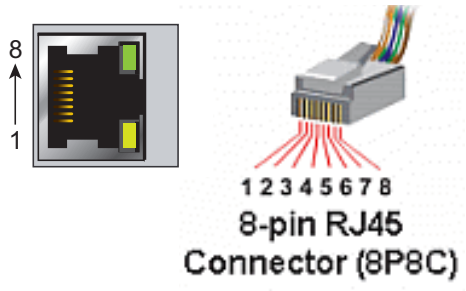
For a list of protocols supported by each port, please refer to the Communications topic of the Do-more T1H Series PLC Overview in this section.

CPU Modules

Ethernet Port

RJ-45 style connector used for:

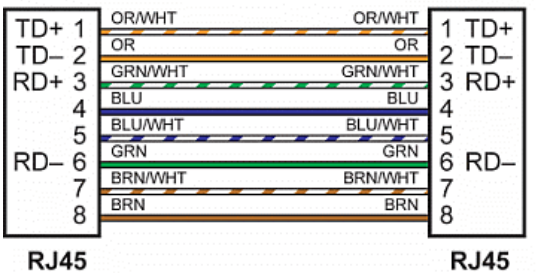
- Connection to a PC running Do-more Designer
- Modbus TCP Client connections (Modbus requests sent from the CPU)
- Modbus TCP Server connections (Modbus requests received by the CPU)
- Ethernet I/O Master



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.

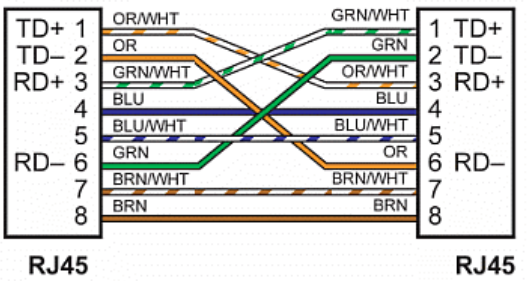
Ethernet Port Specifications	
Description	Standard transformer isolated Ethernet port with built-in surge protection for programming, online monitoring, Modbus/TCP client/server connections (fixed IP or DHCP) and Ethernet I/O capabilities.
Transfer Rate	10/100 Mbps
Cables	Use a Patch (Point to Point) 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

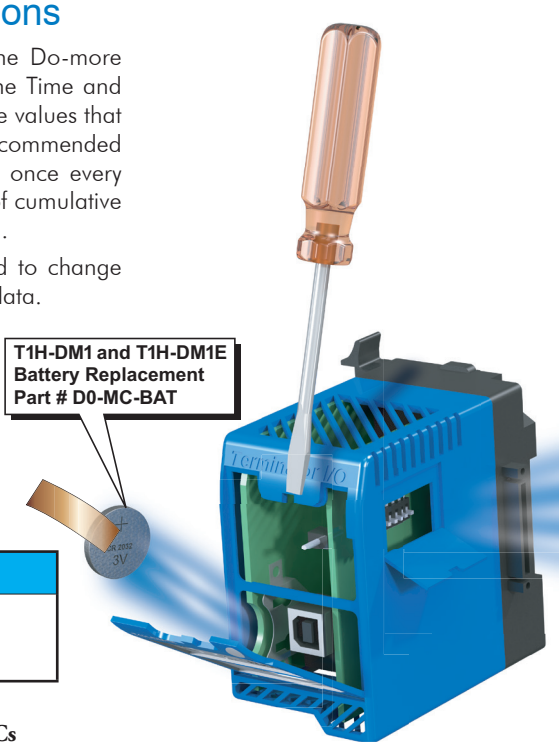
10/BASE-T/100BASE-TX



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.

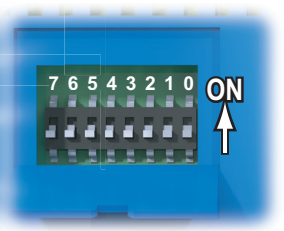


Battery		
D0-MC-BAT	Coin type, 3.0 V Lithium battery, number CR2032	

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

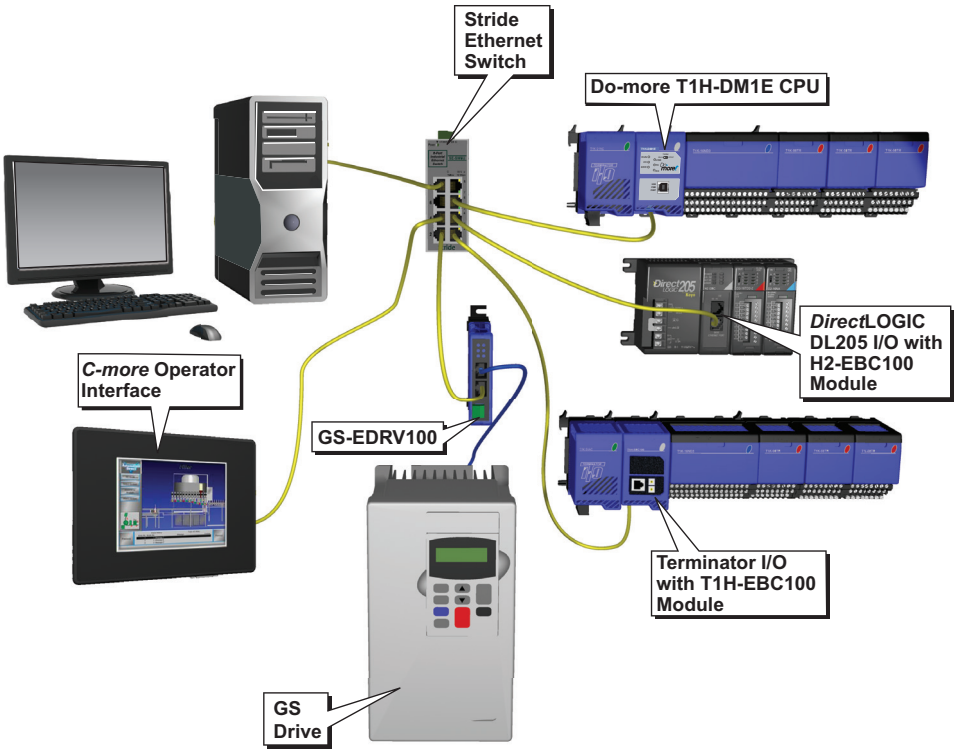
Ethernet I/O

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)

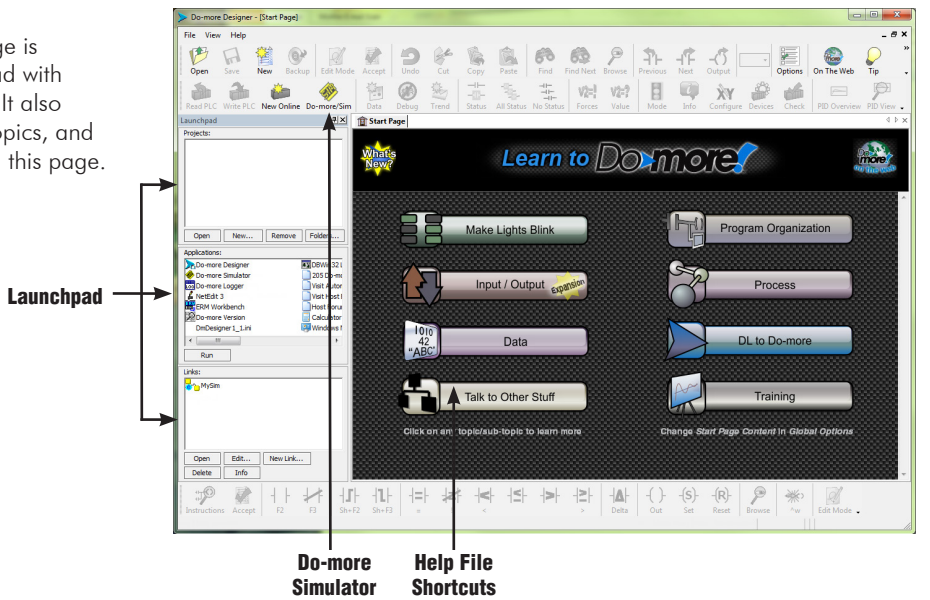
Do-more T1H Series PLC Hardware User Manual is available as a free download from Automationdirect.com. A hard copy is also available for purchase.

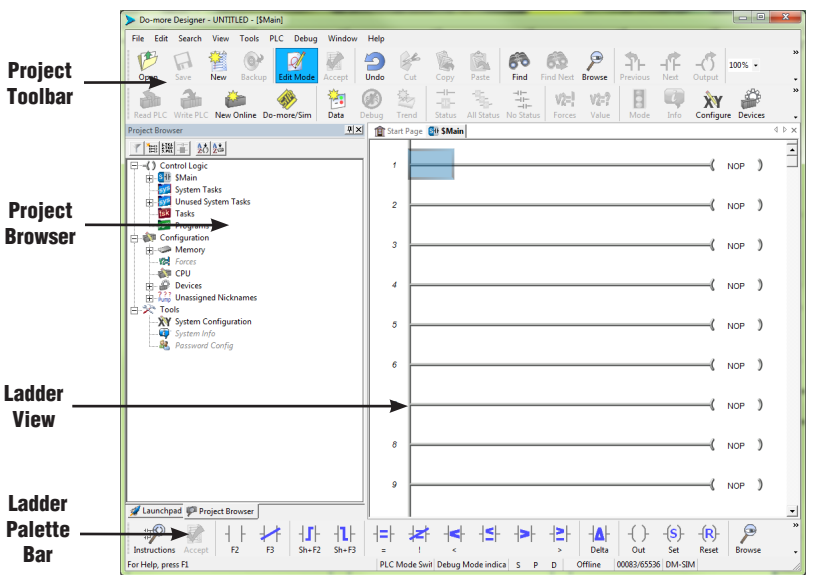
Do-more Designer (Part No. DM-PGMSW)

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 CD-ROM version is also available for purchase for .

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.