Ethernet Networking

T1H-EBC100 <--->

The T1H-EBC100 module provides a low-cost, high-performance Ethernet link between Terminator I/O and your PC-based control or WinPLC/DL205/DL405 CPUs using the H*-ERM module for remote I/O.

These interface modules support industry standard 10Base-T or 100Base-T communications.

Supported protocols

The Terminator T1H-EBC100 supports TCP/IP, UDP/IP, IPX and Modbus TCP at 100 Mbps maximum.

Network masters

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.

T1H-EBC100 as H*-ERM slave

When using a *Direct*LOGIC CPU with an ERM module as the network master, the T1H-EBC100 slave will provide faster analog I/O update times than a *Direct*LOGIC CPU system with a T1K-RSSS slave system. The ERM/EBC system can also support a much higher analog I/O count than the T1K-RSSS remote I/O system.

Inexpensive cables and connecting devices

The Terminator EBC modules are made with industry standard RJ45 connections for easy networking. Off-the-shelf Ethernet hubs and repeaters make configuring a network a breeze.

No DIP-switch settings

All addressing and setup features are configurable through the software configuration tool. All I/O data are passed into the EBC buffer and communicated as a block almost instantaneously to the host device.

T1H-EBC100
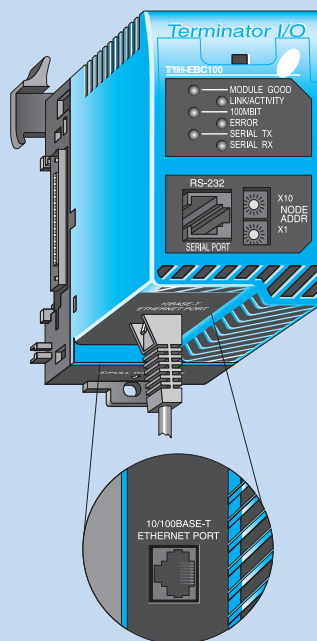
- Save money on your Terminator I/O system when compared with competitive I/O
- Virtually unlimited number of I/O points (up to sixteen modules per EBC system)
- Deterministic I/O updates on dedicated networks
- Use off-the-shelf networking components to connect to your existing network
- Fast I/O updates of <1 ms per base
- On-board serial port for operator panel or ASCII devices

Specifications	T1H-EBC100
Communications	100Base-T Ethernet
Data Transfer Rate	10/100 Mbps
Link Distance	100 meters (328 ft.)
Ethernet Port	RJ45
Ethernet Protocols	TCP/IP, UDP/IP, IPX, Modbus TCP
Power Consumption	300 mA
Manufacturer	Host Automation Products, L.L.C.
RJ12 Serial Port [1]	K-sequence, ASCII, Modbus RTU

[1] *At this time, the serial port is unavailable when these modules are used as slave devices to the H2-ERM or H4-ERM modules.*

Adding I/O modules

The T1H-EBC100 supports the full lineup of Terminator I/O discrete and analog modules.

Ethernet Networking

Off-the-shelf system solutions

You can purchase PC-based control software to connect to our T1H-EBC100 Ethernet Base Controller. PC-based control packages are equipped with compatible I/O device drivers, program development tools, and run-time environments. See the PC-based Control section of this catalog for a single-source integrated PC-based control solution that ships with everything you need to make your PC into an industrial controller.

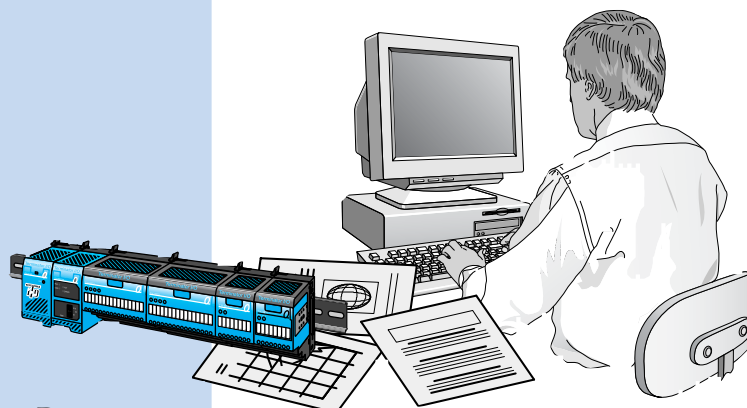**E-SW05U Ethernet Switch (See the Communications Products section of this catalog for details).**
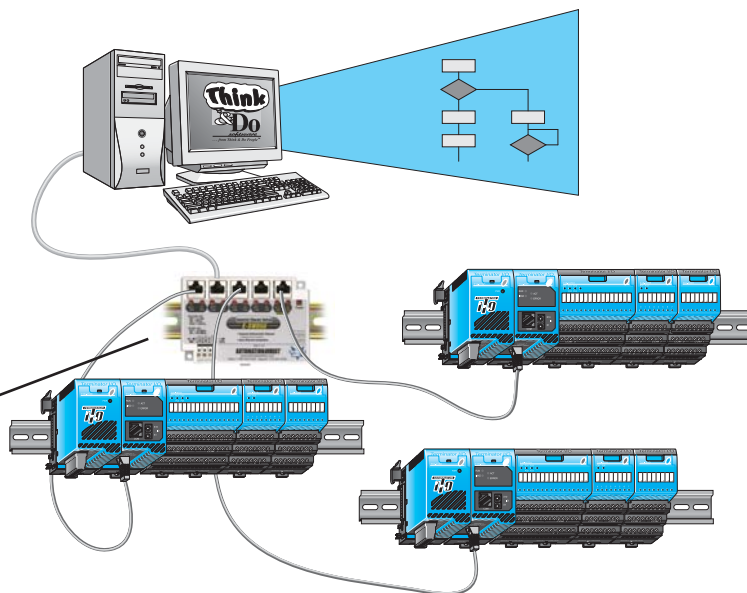
Vendor	Product	Web Address
AutomationDirect	KEP*Direct* EBC I/O Server	www.automationdirect.com
Phoenix Contact	LIVE! Studio with Think & Do	www.phoenixcon.com/software
KEPWare	KEPServerEX	www.kepware.com
MDSI	Open CNC	www.mdsi2.com

Software developers

For programmers developing custom drivers for our I/O, we offer a free Ethernet Software Development Kit (SDK). The software interface libraries are provided for WIN32, WIN16, and DOS operating systems. The source code is available to developers under a non-disclosure agreement. Visit the technical support link at our Web site for more information.

```
READ I/O

int HEIReadIO
    (
    HEIDevice *pDevice,
        Byte *pBuffer,
        WORD BuffSize
    );

WRITING I/O

int HEIWriteIO
    (
    HEIDevice *pDevice,
        BYTE *pData,
        WORD SizeofData,
        BYTE *pReturnData,
        WORD *pSizeofReturnData
    );
```

Company Information

Systems Overview

Programmable Controllers

Field I/O

Software

C-more & other HMI

Drives

Soft Starters

Motors & Gearbox

Steppers/ Servos

Motor Controls

Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Current Sensors

Pressure Sensors

Temperature Sensors

Pushbuttons/ Lights

Process

Relays/ Timers

Comm.

Terminal Blocks & Wiring

Power

Circuit Protection

Enclosures

Tools

Pneumatics

Appendix

Product Index

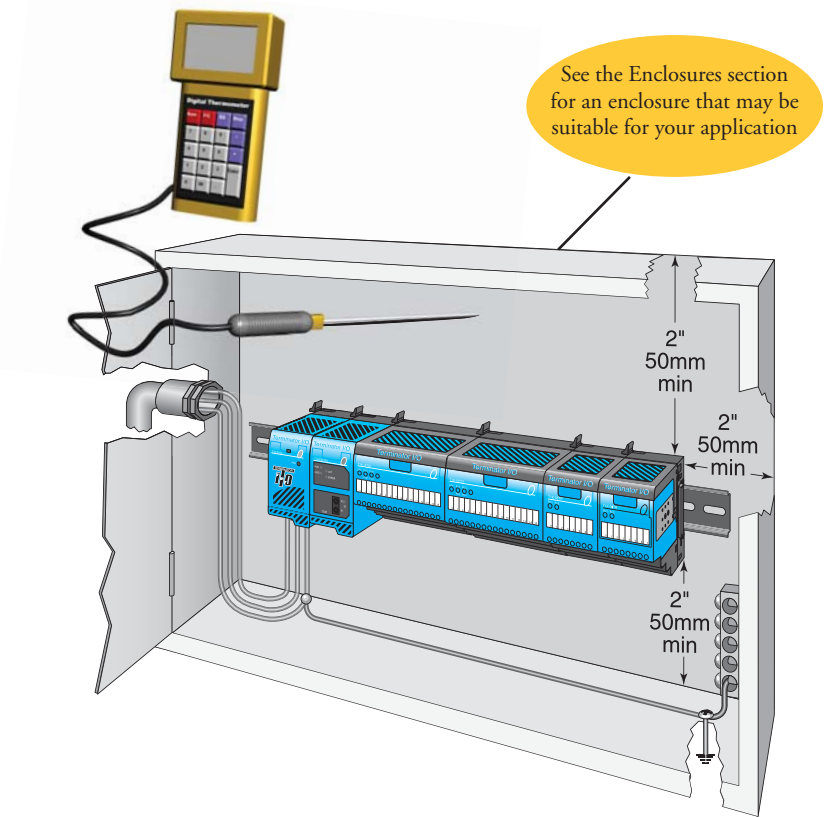Part # Index

Dimensions and Installation

It is important to understand the installation requirements for your Terminator I/O system. This will ensure that the Terminator I/O products work within their environmental and electrical limits.
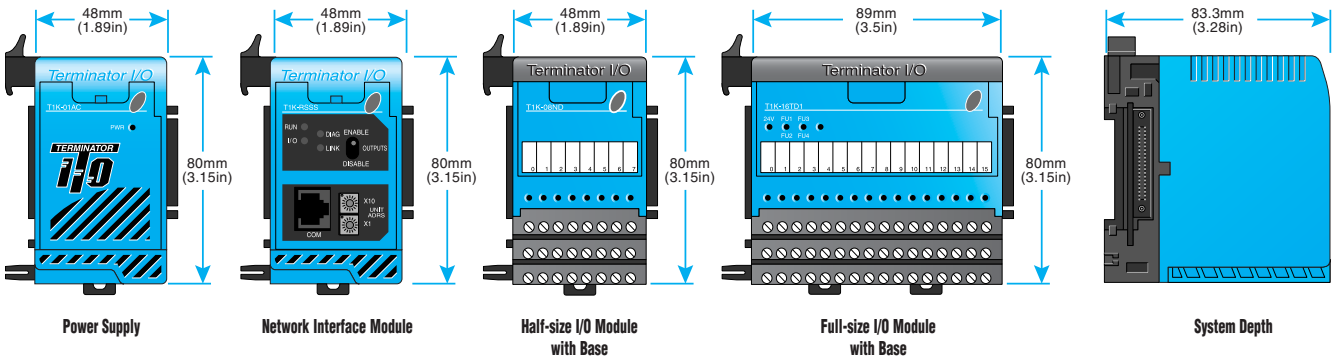
Plan for safety

This catalog should never be used as a replacement for the technical data sheet that comes with the products or the T1K-INST-M Installation and I/O Manual (available online at www.automationdirect.com.) The technical data sheet contains information that must be followed. The system installation should comply with all appropriate electrical codes and standards.

Unit dimensions and mounting orientation

Use the following diagrams to make sure the Terminator I/O system can be installed in your application. Terminator I/O units should be mounted horizontally. To ensure proper airflow for cooling purposes, units should not be mounted upside-down. It is important to check the Terminator I/O dimensions against the conditions required for your application. For example, it is recommended to leave 2" depth for ease of access and cable clearance. However, your distance may be greater or less. Also, check the installation guidelines for the recommended cabinet clearances.

See the Enclosures section for an enclosure that may be suitable for your application

2"
50mm
min

2"
50mm
min

2"
50mm
min

Terminator I/O Environmental 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)	1500 VAC, 1 minute
Insulation Resistance	500 VDC, 10 MΩ
Noise Immunity	NEMA ICS3-304 Impulse noise 1µs, 1000 V FCC class A RFI (144 MHz, 430 MHz 10 W, 10 cm)
Agency Approvals	UL, CE, FCC class A, NEC Class 1 Division 2

48mm
(1.89in)

80mm
(3.15in)

Power Supply

48mm
(1.89in)

80mm
(3.15in)

Network Interface Module

48mm
(1.89in)

80mm
(3.15in)

Half-size I/O Module with Base

89mm
(3.5in)

80mm
(3.15in)

Full-size I/O Module with Base

83.3mm
(3.28in)

System Depth

# I/O Module Installation

I/O module installation

Terminator I/O modules feature separate terminal bases for easy installation.
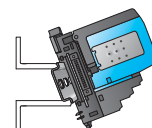
To install I/O modules:

1. Slide the module into its terminal base (until it clicks into position)
2. Hook upper DIN rail tabs over the top of DIN rail, and press the assembly firmly onto the DIN rail.
3. Slide the module along the DIN rail until it engages with the adjacent module.
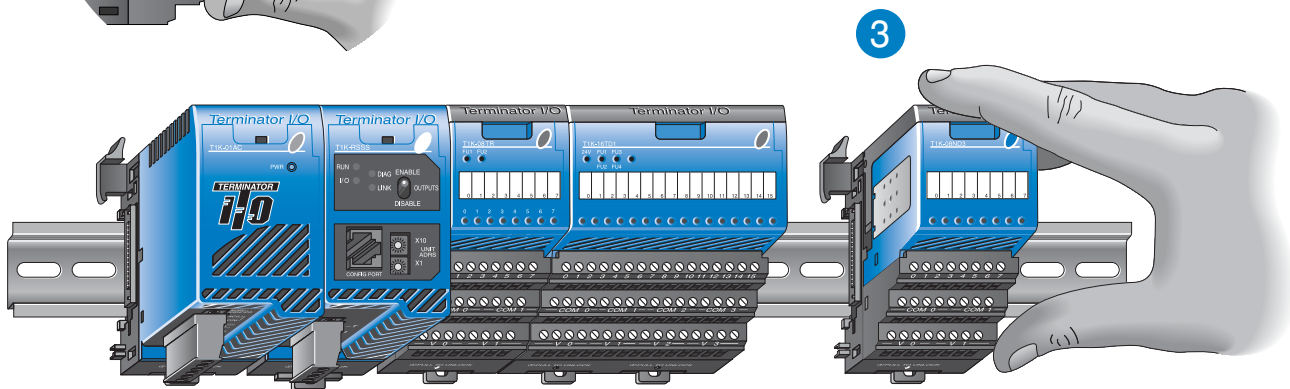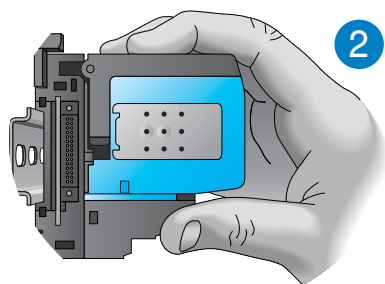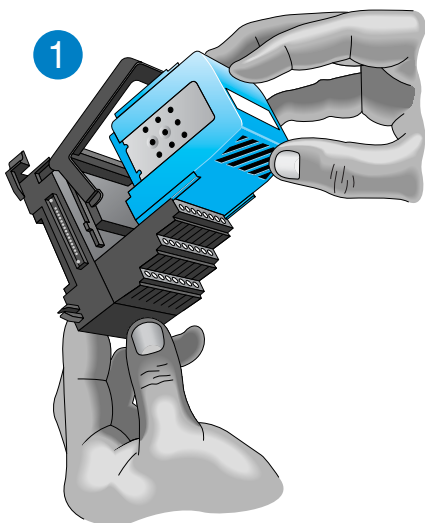
## DN-ASB-1 angled mounting bracket
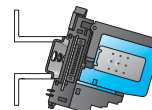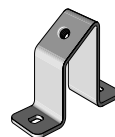
Great for mounting in upper locations

Great for mounting in lower locations

Optional angled support bracket raises and tilts the mounting rail for easier access and wiring. Use with 35 mm DIN rail. See the Connection Systems in this catalog for details.

Removing I/O modules is a snap

Grip the locking handle, as shown, and pull gently to eject the I/O module from its base. The module will slide out for easy replacement. This procedure does not apply to network interface modules or power supplies, which have integral bases.
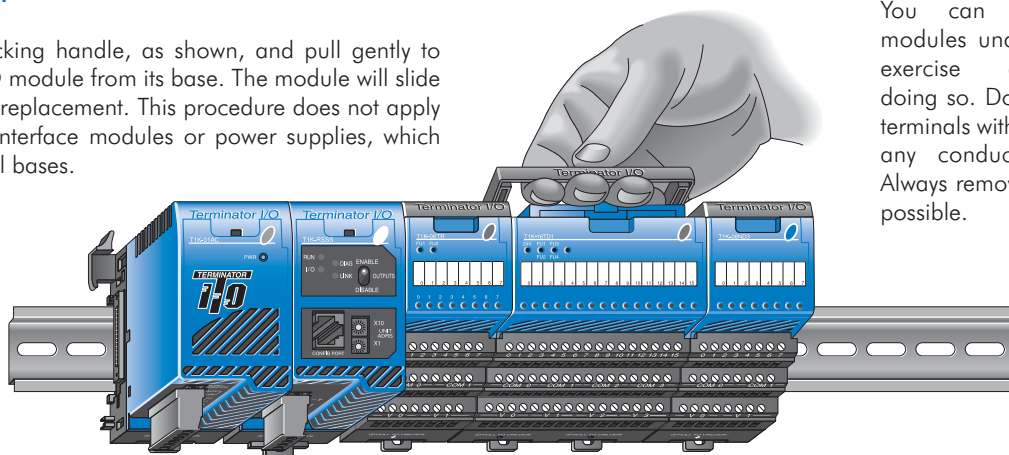
Hot-swappable I/O modules

You can remove I/O modules under power, but exercise caution while doing so. Do not touch the terminals with your hands or any conductive material. Always remove power when possible.

Company Information

Systems Overview

Programmable Controllers

Field I/O

Software

C-more & other HMI

Drives

Soft Starters

Motors & Gearbox

Steppers/ Servos

Motor Controls

Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Current Sensors

Pressure Sensors

Temperature Sensors

Pushbuttons/ Lights

Process

Relays/ Timers

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Terminal Blocks & Wiring

Power

Circuit Protection

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Appendix

Product Index

Part # Index

Power Supplies and Power Requirements

Power supplies

The Terminator I/O product line offers two power supply options: AC or DC. The power supplies are always positioned to the left of the modules to which they supply power. Consult the system configuration examples and the power budgeting example for more information on positioning power supplies.
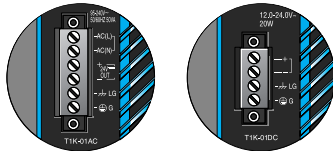
Power supply specifications

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	50 VA	30 W
Max. Inrush Current	20 A	10 A
Insulation Resistance	> 10 MΩ @ 500 VDC	
Voltage Withstand	1 min. @ 1500 VAC between primary, secondary and field ground	
5VDC PWR — Voltage	5.25 VDC	5.25 VDC
5VDC PWR — Current Rating	2000 mA max (see current option note below)	2000 mA max
5VDC PWR — Ripple	5% max.	5% max.
24VDC PWR — Voltage	24 VDC	N/A
24VDC PWR — Current Rating	300 mA max. (see current option note below)	N/A
24VDC PWR — 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

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

Power requirements

Module	5VDC	24VDC
Interface Modules		
T1H-EBC100	300	0
T1H-PBC	530	0
T1K-DEVNETS	250	45
T1K-RSSS	250	0
T1K-MODBUS	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	200	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 Modules		
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-14THM	60	70*
T1F-16RTD	150	0
Analog Output Modules		
T1F-08DA-1	75	75*
T1F-08DA-2	75	75*
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.

Adding additional power supplies

Each power supply furnishes power only to the network interface and I/O 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
T1K-01AC	+2000 mA	+300 mA
T1H-EBC100	-300 mA	-0 mA
T1K-16ND3	-70 mA	-0 mA
T1K-16TD2	-200 mA	-0 mA
T1F-08AD-1	-75 mA	-50 mA
Remaining	+1355 mA	+250 mA

Accessories available for Terminator I/O are listed in the Terminator Field I/O section of the Price List
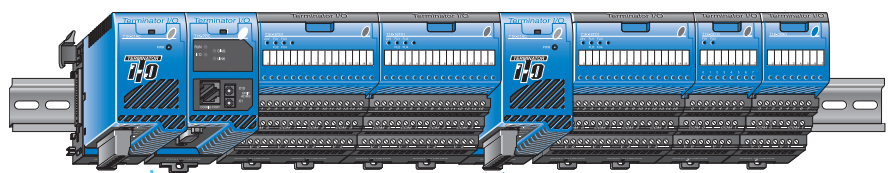
This power supply powers the network interface module and the next two I/O modules

This power supply powers these three I/O modules
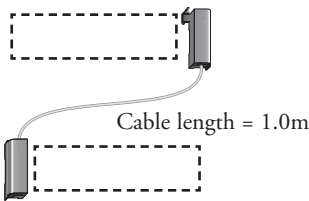
Expansion I/O Configurations

Expansion cables

T1K-10CBL   **<--->**
T1K-10CBL-1* **<--->**
Right side to left side expansion cable

The T1K-10CBL(-1) connects the right side of an I/O base to the left side of the next I/O base. A maximum of two T1K-10CBL(-1) cables can be used per expansion system.
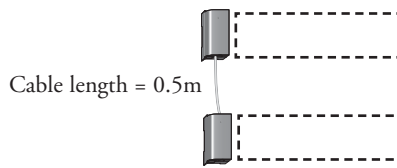

Cable length = 1.0m

T1K-05CBL-LL   **<--->**
T1K-05CBL-LL-1* **<--->**
Left side to left side expansion cable

The T1K-05CBL-LL(-1) connects the left side of an I/O base to the left side of the next I/O base. Only one T1K-05CBL-LL (-1) cable can be used per expansion system and must be used with a T1K-05CBL-RR(-1) cable. **This cable cannot be connected to the left side of the network interface base.**
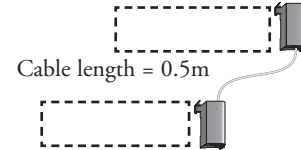

Cable length = 0.5m

T1K-05CBL-RR   **<--->**
T1K-05CBL-RR-1* **<--->**
**Right side to right side expansion cable**

The T1K-05CBL-RR(-1) connects the right side of an I/O base to the right side of the next I/O base. A maximum of one T1K-05CBL-RR(-1) cable can be used per expansion system. **Note: When this cable is used, the expansion I/O assignments are from right to left (reversed).**

Cable length = 0.5m

***Note:** The (-1) versions of the expansion cables pass 24 VDC through on an isolated wire. (All cables pass the 5 VDC base power.) Any local <u>expansion</u> DC input module configured for "internal power" (current sourcing) must either have a power supply preceding it on the same base or, have a (-1) version cable pass 24 VDC from a power supply on the preceeding base.
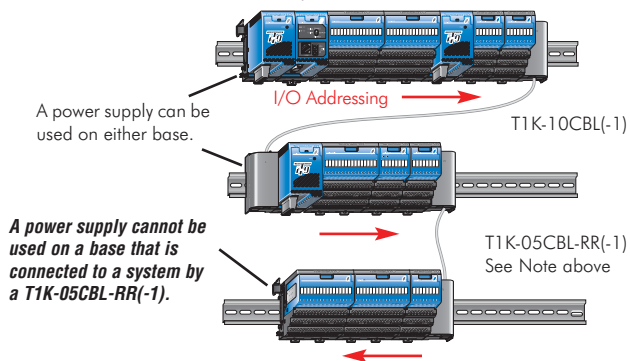
Using two T1K-10CBL expansion cables

In the system below, power supplies can be used anywhere.

T1K-10CBL(-1)

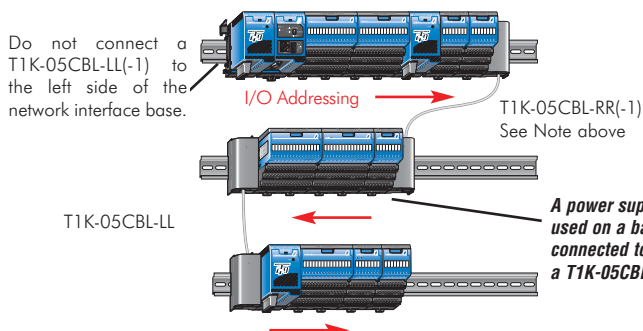I/O Addressing
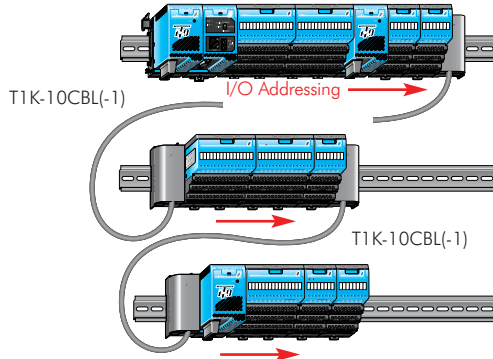
T1K-10CBL(-1)

Using T1K-10CBL expansion cable and T1K-05CBL-RR expansion cable

Power supplies can be used anywhere in the first two bases, but not in the last expansion base.

A power supply can be used on either base.

I/O Addressing

T1K-10CBL(-1)

A power supply cannot be used on a base that is connected to a system by a T1K-05CBL-RR(-1).

T1K-05CBL-RR(-1)
See Note above

Using T1K-05CBL-RR expansion cable and T1K-05CBL-LL expansion cable

Power supplies can be used anywhere in the first and third bases, but not in the second base.

Do not connect a T1K-05CBL-LL(-1) to the left side of the network interface base.

I/O Addressing

T1K-05CBL-RR(-1)
See Note above

T1K-05CBL-LL

A power supply cannot be used on a base that is connected to a system by a T1K-05CBL-RR(-1).

Using T1K-05CBL-RR expansion cable

Power supplies can be used anywhere in the first base, but not in the second base.

I/O Addressing

T1K-05CBL-RR(-1)
See Note above

A power supply cannot be used on a base that is connected to a system by a T1K-05CBL-RR(-1).
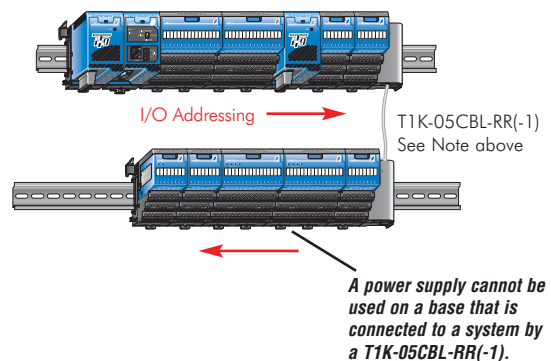
Field Device Wiring and Power Options

Terminal base specifications

Terminator I/O terminal bases are available in screw clamp and spring clamp versions for both half-size and full-size modules. Hot stamp silkscreen labeling is used for numbering I/O points, commons, and all power terminals.
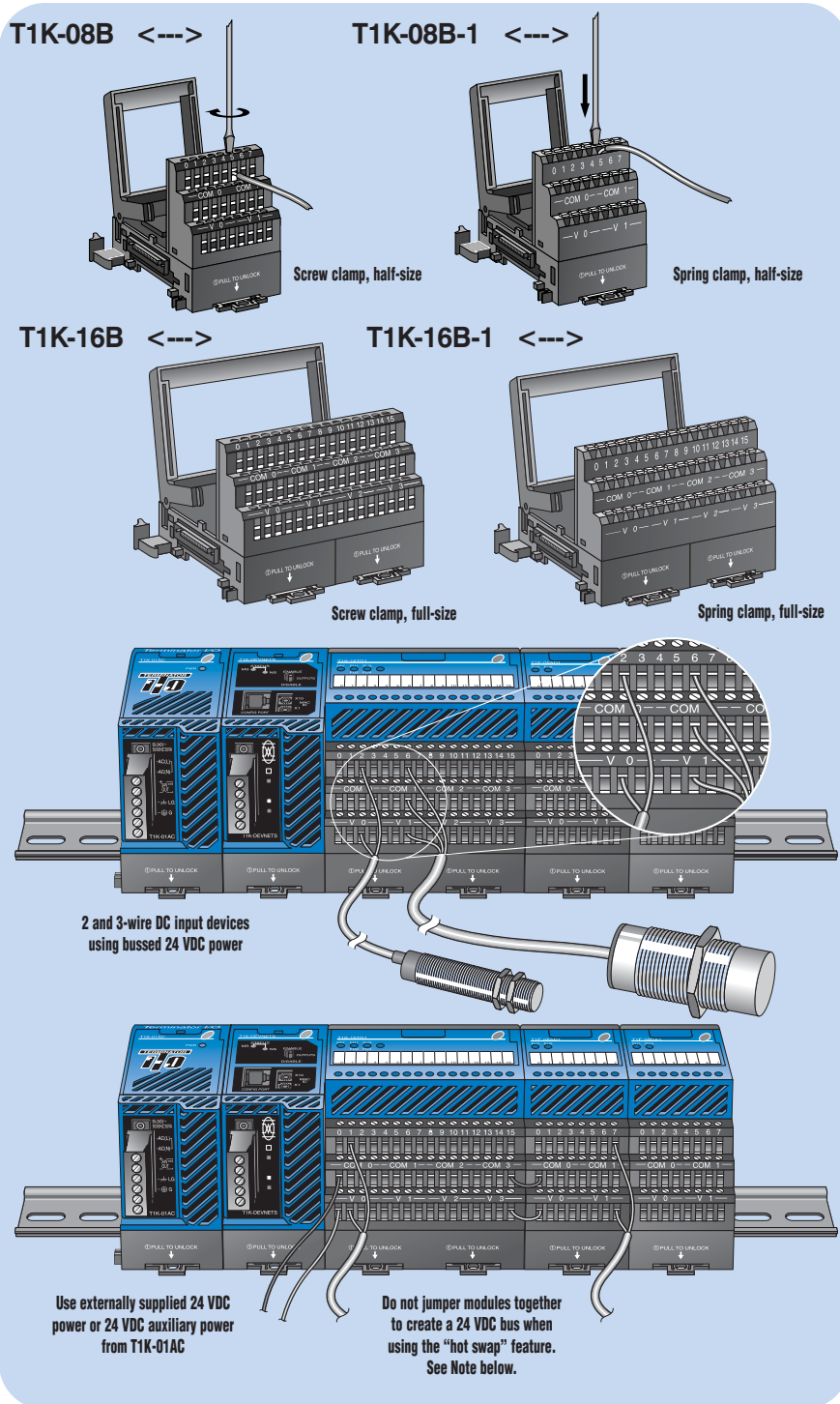
Terminal Base Specifications		
Terminal Type	Screw type	Spring clamp
Recommended Torque	1.77-3.54 lb-in (0.2 - 0.4 Nm)	n/a
Wire Gauge	Solid: 25-12 AWG Stranded: 26-12 AWG	Solid: 25-14 AWG Stranded: 26-14 AWG

Field device wiring options

Power your DC input devices from the integrated 24 VDC power supply bus. T1K-08ND3 and T1K-16ND3 DC input modules include jumpers for selecting the internal 24 VDC power supply available for 2- and 3-wire field devices. Clearly labeled triple stack terminals make it easy to wire 2- and 3-wire devices ensuring clean wiring with only one wire per termination.

External user supplied 24 VDC power, or auxiliary 24 VDC terminals from T1K-01AC, can be easily applied directly to one end of the terminal rows and jumpered across each base in the system.

This is a convenient solution for powering analog I/O and discrete DC output devices whose modules do not have direct access to the internal bussed 24 VDC. If current consumption increases, simply add additional T1K-01AC power supplies into the system.

T1K-08B <---> Screw clamp, half-size

T1K-08B-1 <---> Spring clamp, half-size

T1K-16B <---> Screw clamp, full-size

T1K-16B-1 <---> Spring clamp, full-size

2 and 3-wire DC input devices using bussed 24 VDC power

Use externally supplied 24 VDC power or 24 VDC auxiliary power from T1K-01AC

Do not jumper modules together to create a 24 VDC bus when using the "hot swap" feature. See Note below.

Hot-swap feature

The hot-swap feature allows Terminator I/O modules to be replaced while system power is on. Be careful not to touch the terminals with your hands or other conductive material to avoid the risk of personal injury or equipment damage. Always remove power if it is equally convenient to do so.

Note: Before hot-swapping analog or DC output modules in a Terminator I/O system, make sure that each of the analog and DC output module's 24 VDC and 0 VDC base terminals are wired directly to the external power supply individually. If the external 24 VDC and 0 VDC is jumpered from base to base in a daisy chain fashion, and an analog or DC output module is removed from its base, the risk of disconnecting the external 24 VDC and 0 VDC to the subsequent I/O modules exists.