EISwitch

CTRLink®

A Line of Fixed-Port Industrial Ethernet 10/100 Mbps Switches

INSTALLATION GUIDE

INTRODUCTION

The EIS series — Ethernet Interconnect Switch in the CTRLink® family — provides a solution for those industrial applications requiring a larger network diameter and greater throughput. The EIS series is an essential element of the control strategy.

Classified as switching hubs, each device segments the Ethernet network into separate collision domains. The EIS8-100T offers eight ports of expansion via twisted-pair cabling. Three models offer two fibre ports when greater distance or galvanic isolation is required while offering four twisted-pair ports for local drops: The EIS6-100T/FC and EIS6-100T/FT accommodate a multimode fibre backbone and the EIS6-100T/FCS accommodates single-mode fibre.

Each switch functions as a "bridge" between the various data links — creating a larger network diameter than can be achieved with repeating hubs. To optimize speed and throughput, some functions are *automatically* negotiated:

> Each twisted-pair port automatically optimises its data rate to 10 Mbps or 100 Mbps. The data rate of fibre ports is fixed at 100 Mbps.
>
> Each port negotiates flow control — supporting the PAUSE function for full-duplex links, and the backpressure scheme for half-duplex links.

The switch learns the ports of devices by reading Ethernet frames and noting source addresses. It then creates and maintains a table of addresses and port assignments by which traffic is restricted to only those ports party to a data exchange. This allows other data to be simultaneously exchanged on other ports — with improved throughput. If a broadcast, multicast, or unicast transmission to an unknown destination arrives at a port, all other ports receive the transmission.

The switch front-panel features LEDs for link status, port activity, and data rate of each port. All units operate from low-voltage AC or DC power and are either DIN-rail or panel mountable.

CONTEMPORARY CONTROLS

c UL us LISTED 4EA4 INDUSTRIAL CONTROL EQUIPMENT

SPECIFICATIONS

Electrical

INPUT	**DC**	**AC**
Voltage:	10–36 V	8–24 V
Power:	10 W	10 VA
Frequency:	N/A	47–63 Hz

Environmental

Operating Temperature: 0ºC to +60ºC
Storage Temperature: –40ºC to +85ºC

Regulatory Compliance

CE Mark, CFR 47 Part 15 Class A,
UL 508 Industrial Control Equipment
(intended for use with Class 2 circuits)
UL 864, 10th Ed. Recognized Component – Control Units and Accessories for Fire Alarm Systems

Functional

Compliance: ANSI/IEEE 802.3
Data Rate: 10 Mbps and 100 Mbps
Signalling: 10BASE-T, 100BASE-TX
100BASE-FX

LED Indicators

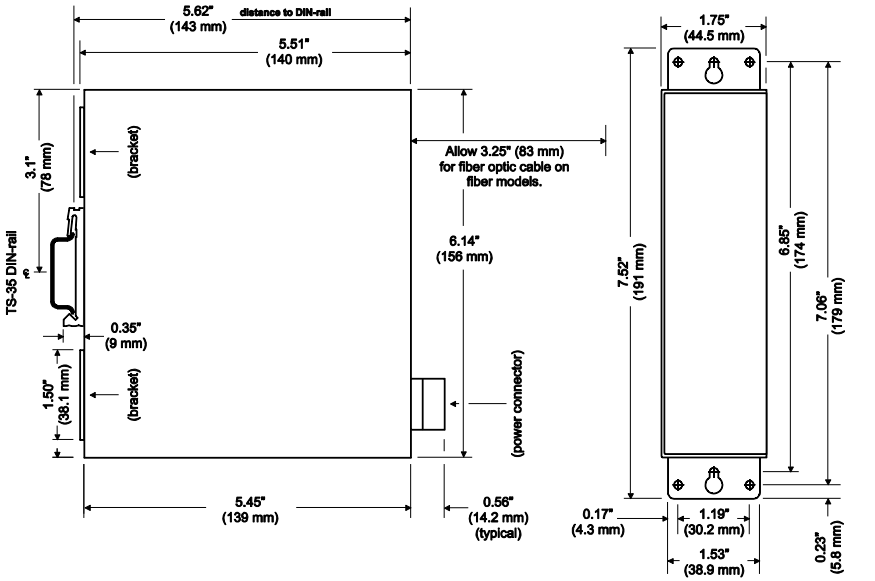
SWITCH	EACH PORT
Power — green	Link/Data — green
	HS (100 Mbps) — yellow

Shipping Weight

2 lbs. (.9 kg)

Warning: This is a Class A product. In a domestic environment the product may cause radio interference in which case the user may be required to take adequate measures.

Mechanical

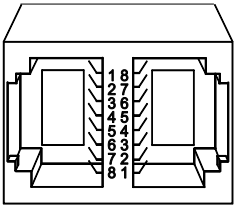


Side View showing DIN-rail Clip (Mounting Brackets Retracted)

Front View with Mounting Brackets Extended

100BASE-T MDI-X CONNECTOR PIN ASSIGNMENTS

RJ-45	Usage
1	TD+
2	TD–
3	RD+
4	Not Used
5	Not Used
6	RD–
7	Not Used
8	Not Used



Note : The EIS Series provides the Auto-MDIX function, eliminating the need for crossover cables between switches.

INSTALLATION

A clip is pre-attached for mounting on 35 mm DIN-rail. For panel-mounting, remove the clip, extend the mounting brackets and secure with two #8 pan-head screws (not provided). See the mechanical drawing on page two for mounting in an industrial enclosure or wiring closet.

Cabling Considerations

When attaching cables to the EISwitch, Table 1 should be considered.

Medium	Signaling and Data Rate	Minimum Required Cable	Maximum Segment Distance
Copper	10BASE-T 10 Mbps	Category 3 UTP	100 m (328 ft)
Copper	100BASE-TX 100 Mbps	Category 5 UTP	100 m (328 ft)
Fibre	100BASE-FX 100 Mbps	1300 nm, multimode 50/125 or 62.5 µm	Full-Duplex : 2 km (6562 ft) Half-Duplex : 412 m (1352 ft)
Fibre	100BASE-FX 100 Mbps	1300 nm, single-mode	Full-Duplex : 15 km (49213 ft) Half-Duplex : 412 m (1352 ft)

Table 1 — Cabling Considerations

Observe in Table 1 that segment distance is very limited when using copper media — regardless of the data rate. Although 10BASE-T segments can successfully use Category 3, 4 or 5 cable, 100BASE-TX segments must use Category 5 cable.

A popular choice for improved distance is multimode fibre — which also gives good electromagnetic noise immunity and optimum protection from lightning strikes. Considerable distance can be achieved in full-duplex mode — and the greatest distance can be realized in full-duplex mode with single-mode fibre. Note that half-duplex operation yields a modest, fixed distance which does not vary with the type of fibre in use. This is because half-duplex mode is limited by the collision domain — irrespective of the length and type of fibre.

EIS switches offer three types of field connectors. Copper ports accept RJ-45 modular plugs and fibre ports accept either ST or SC style connectors.

Powering

The EISwitch requires low-voltage power — AC or DC — via a four-pin removable keyed connector. Consult the specifications for power requirements. The various power options are explained below.

NOTE: This device is intended for use with Class 2 circuits.

DC Powered (Figure 1)

The EISwitch accepts a voltage range of 10–36 VDC and draws a current value commensurate with 10-watt power consumption. Power conductors should be sized accordingly. Circuit common is directly connected to zero volts and the equipment chassis is isolated from zero volts. The input connections are reverse-polarity protected.

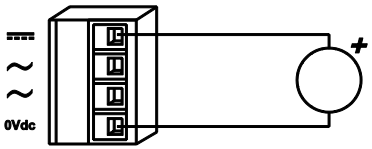


Figure 1 — DC Powered

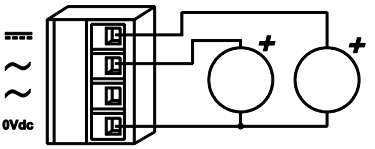


Figure 2 — Redundant DC Powered

Redundant DC Powered (Figure 2)

Redundant diode-isolated DC power inputs are provided so the EISwitch can operate despite the loss of primary power. Both sources must provide 10 watts of power.

AC Powered (Figure 3 and Figure 4)

The EISwitch can be powered by an AC voltage in the range of 8–24 V capable of delivering 10 VA of apparent power. Two auxiliary power supplies are available: The AI-XFMR is for use with 120 VAC. The AI-XFMR-E is for use with 230 VAC.

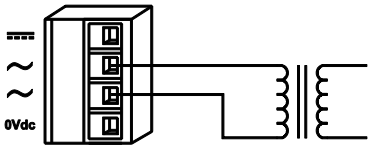


Figure 3 — AC Powered

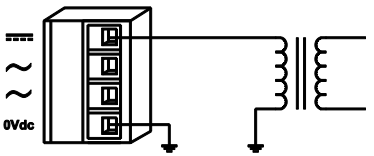


Figure 4 — AC Powered with Grounded Secondary

AC Powered with Battery Backup (Figure 5)

The EISwitch can also operate in the AC mode with a backup battery providing power if the AC source fails. The EISwitch does NOT charge the battery, so separate provisions are required for charging.

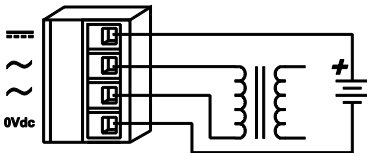


Figure 5 — AC Powered with Battery Backup

OPERATION

Switching

The EISwitch can learn and store up to 2K MAC addresses in its address look-up table. An address-hashing algorithm is used to update the table. Addresses are aged in 300 seconds. Runt packets (less than 64 bytes) are always discarded. Oversize packets (greater than 1518 or 1522 bytes) or packets with a bad CRC are discarded.

Data Storage

Data storage consists of 768 Kbits of built-in SRAM memory divided into 512 bytes per block. Received packets will be separated into several 512-byte blocks and chained together for storage before forwarding. The inter-packet gap (IPG) is the idle time between any two successive packets from the same port and is typically 96 bit times. This translates to 9.6 µs for 10 Mbps and 960 ns for 100 Mbps.

Flow Control

Each port automatically negotiates flow control for either half- or full-duplex operation. In full-duplex mode, the PAUSE function is supported. In half-duplex mode, the backpressure method is used.

Far End Fault

Auto negotiation provides a mechanism for transferring information from the Local Station to the link Partner that a remote fault has occurred for 100BASE-TX. As auto negotiation is not currently specified for operation over fibre, the far end fault indication function (FEFI) provides this capability for 100BASE-FX applications.

A remote fault is an error in the link that one station can detect while the other cannot. An example of this is a disconnected wire at a station's transmitter. This station will be receiving valid data and detect that the link is good via the link integrity monitor but will not be able to detect that its transmission is not propagating to the other station.

A 100BASE-FX station that detects such a remote fault may modify its transmitted idle stream from all ones to a group of 84 ones followed by a single 0. This is referred to as the FEFI idle pattern.

LEDs

PWR (green)	Power — Glows when proper power is supplied to the EISwitch.
LINK (green)	Link — Each port has one of these LEDs which glows to indicate that a valid Ethernet link has been established. The LED flashes when data transfer is occurring.
HS (yellow)	Data Rate — Each port has one of these LEDs which glows to indicate that data is transferring at 100 Mbps.

NEED MORE HELP INSTALLING THIS PRODUCT?

More comprehensive information can be found on our web site at www.ccontrols.com. This includes on-line technical manuals and other documents. When contacting one of our offices, just ask for Technical Support.

Warranty

Contemporary Controls (CC) warrants its new product to the original purchaser for two years from the product shipping date. Product returned to CC for repair is warranted for one year from the date that the repaired product is shipped back to the purchaser or for the remainder of the original warranty period, whichever is longer.

If a CC product fails to operate in compliance with its specification during the warranty period, CC will, at its option, repair or replace the product at no charge. The customer is, however, responsible for shipping the product; CC assumes no responsibility for the product until it is received.

CC's limited warranty covers products only as delivered and does not cover repair of products that have been damaged by abuse, accident, disaster, misuse, or incorrect installation. User modification may void the warranty if the product is damaged by the modification, in which case this warranty does not cover repair or replacement.

This warranty in no way warrants suitability of the product for any specific application. IN NO EVENT WILL CC BE LIABLE FOR ANY DAMAGES INCLUDING LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT EVEN IF CC HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BY ANY PARTY OTHER THAN THE PURCHASER.

THE ABOVE WARRANTY IS IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED OR STATUTORY, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE OR USE, TITLE AND NONINFRINGEMENT.

Returning Products for Repair

Return the product to the location where it was purchased by following the instructions at the URL below:

www.ccontrols.com/rma.htm

DECLARATION OF CONFORMITY

Additional compliance documentation can be found on our website.

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