

data SHEET



ARCNET® Hub with USB Interface

The AI-USB hub alters how you connect to an ARCNET network. It gives you easy access to the network via a PC without removing the cover. It helps to prevent any service technician aggravation because it eliminates the installation of an ARCNET card in the PC.

This is an active hub with similar hub functionality as an AI Series hub, but it allows access to the Universal Serial Bus (USB) to a host PC. It has three ports — two external and one internal. The internal port has a connection to a USB adapter (network interface module) resident in the AI-USB. The USB connection is brought out to the front panel so a laptop or desktop computer can gain Plug-and-Play (PnP) access to an ARCNET network.

This unit conforms to the high-speed USB 2.0 standard. It is a very fast and convenient method of accessing an ARCNET network without the need of removing a cover and installing a network interface module into a computer.

Today, most computers are equipped with a USB port so it is only necessary to make a connection between the computer and the AI-USB. It also operates with the earlier lower-speed USB 1.1 standard.

An ideal application for the AI-USB is temporary access to an ARCNET network by simply hooking from a laptop computer using its USB port. With the AI-USB permanently connected to the ARCNET network, field wiring is not disturbed when attaching the USB cable. Thus, an ARCNET network can be monitored, stations configured and troubleshooting can be accomplished with minimal disruption to the network. With two external hub ports, the AI-USB can be inserted between two bus segments and function as a bus extender. Models are available for coaxial bus, twisted-pair bus and both AC- and DC-coupled EIA-485

Features:

- Functions as both a hub and a USB interface to the ARCNET network
- Exchanges ARCNET packets with a USB-connected computer
- Two external hub ports for expansion
- Supports coaxial and twisted-pair including AC- and DC-coupled EIA-485
- Operates with either the USB 1.1 or 2.0 standard
- Incorporates a COM20022 ARCNET controller chip
- LEDs identify reconfigurations and port activity
- Minimizes bit jitter with precision delay-line timing
- Low-voltage AC- or DC-powered
- CE Mark
- RoHS compliant
- Embedded microcontroller provides 128 Kbytes of receiver buffering



Data Sheet — AI-USB Series

When the USB cable is first attached to a Windows[®] machine, you are prompted for a driver on a disk. We offer a USB driver and a DLL with an API (Application Programming Interface) compatible with our Null Stack Driver API. By avoiding a protocol stack, a null stack driver outperforms a layered protocol stack by directly linking the app to the ARCNET hardware — beneficial for timely access to a real-time network like ARCNET.

The USB adapter in the AI-USB consists of a high-speed microcontroller and a COM20022 ARCNET controller.

Each unit provides 128 Kbytes of ARCNET receiver buffering — greatly aiding the reception of broadcast messages. With a 400 Mbps USB link, the potential of dropping ARCNET packets is remote.

The AI-USB has the same connector as the AI Series of hubs. The unit can be powered from a wide range of low-voltage AC or DC power sources — and provisions exist for redundant power connections. It is shipped with a CD containing Windows compatible software and a USB cable.

Transceiver Options — Model number suffixes indicate the various transceiver types.

-CXS Coaxial Star

Most ARCNET networks use RG-62/u coaxial cable (with BNC connectors) in a star topology where each NIM connects directly to a port on an AI hub. But the coaxial star configuration provides the longest coaxial distance and simplifies troubleshooting. This port terminates a coaxial segment without requiring a passive terminator.

-TB5 Twisted-Pair Bus

Twisted-pair can be used in a bus and dual RJ-45 jacks support a “daisy-chain”. Distances and node count are limited. Passive terminators are inserted in unused jacks at each far end of the segment. Shielded as well as unshielded cable is supported.

-485 DC-Coupled EIA-485

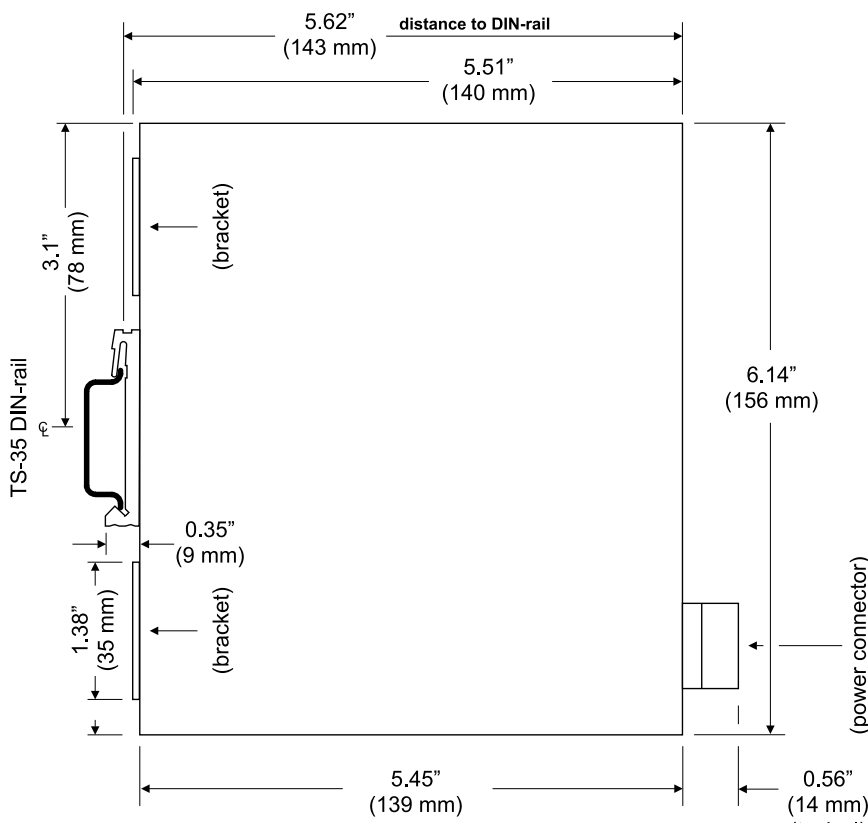
A shielded or unshielded EIA-485 twisted-pair can support several nodes over a limited distance. Screw terminals permit a “daisy-chain” segment. EIA-485 offers a hubless solution but with limited distance and low common mode breakdown voltage. Segments can be extended with AI repeaters and hubs and each port accommodates failsafe bias and cable termination.

-485X AC-Coupled EIA-485

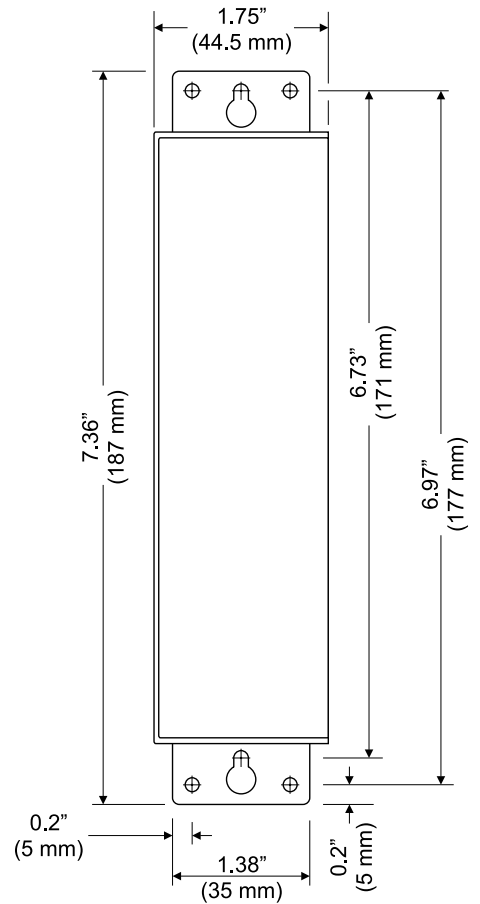
The EIA-485 transformer-coupled option provides the convenience of EIA-485 connectivity — but with a much higher common mode breakdown voltage. The -485X option eliminates the phase reversal issue of the -485 option, but distance and node count are lower.



Mechanical Diagram



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



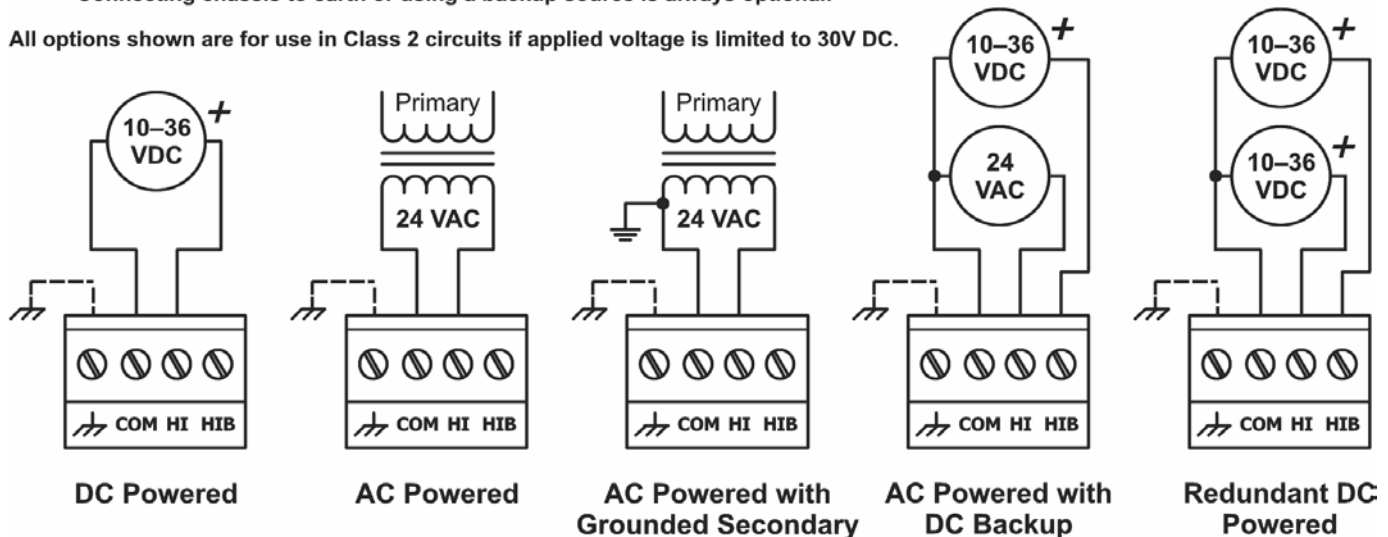
**Front View with
Mounting Brackets Extended**

Power Diagrams

Input power: 10–36 VDC or 24 VAC ± 10%, 47–60 Hz.

Connecting chassis to earth or using a backup source is always optional.

All options shown are for use in Class 2 circuits if applied voltage is limited to 30V DC.



Specifications

Electrical Input

	DC	AC
Voltage	10–36 VDC	8–24 VAC
Power	5 W	5 VA
Frequency	N/A	47–63 Hz

Environmental/Mechanical

Operating temperature	0°C to 60°C
Storage temperature	–40°C to +85°C
Relative humidity	10–95%, non-condensing
Protection	IP30

Functionality

	Transceiver	Data Rates
Data rates	485 485X CXS, TB5	78 kbps to 10 Mbps 1.25 Mbps to 10 Mbps 2.5 Mbps
Extended timeouts	Supports all three extended ARCNET timeouts	
Hub, repeaters and link delay	320 ns max at 2.5 Mbps	
Unlatch delay time	5.9 µs max at 2.5 Mbps	
Compliance	ATA 878.1-1999	

LED indicators

RECON	yellow
ACTIVITY	green
STATUS	green

Regulatory Compliance

CE Mark
RoHS
CFR 47, Part 15 Class A



Permissible Cable Lengths and Nodes Per Segment (2.5 Mbps)

Transceiver	Description	Cable	Connectors	Cable Length		Max Nodes Bus Segment	Notes
				Min	Max		
-485	DC-coupled EIA-485	IBM type 3	screw	0	274 m (900 ft)	17	DC coupled
-485X	AC-coupled EIA-485	IBM type 3	screw	0	213 m (700 ft)	13	Transformer isolated
-CXS	Coaxial star	RG-59/u	BNC	0	457 m (1500 ft)	N/A	7.0 dB/1000 ft max
-CXS	Coaxial star	RG-62/u	BNC	0	610 m (2000 ft)	N/A	5.5 dB/1000 ft max
-TB5	Twisted-pair bus	IBM type 3	RJ-45	6 ft / 2 m ¹	122 m (400 ft)	8	For dipulse signalling

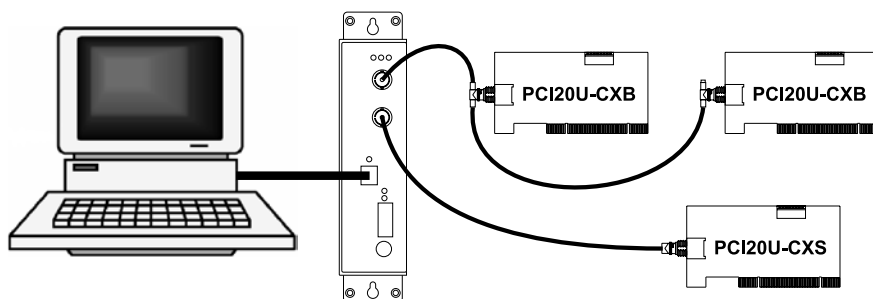
¹ This represents the minimum distance between any two nodes or between a node and a hub.

Electromagnetic Compatibility

Standard	Test Method	Description	Test Levels
EN 55024	EN 61000-4-2	Electrostatic Discharge	6 kV contact, 8 kV air
EN 55024	EN 61000-4-3	Radiated Immunity	10 V/m, 80 MHz to 1 GHz
EN 55024	EN 61000-4-4	Fast Transient Burst	1 kV clamp, 2 kV direct
EN 55024	EN 61000-4-5	Voltage Surge	1 kV L-L, 2 kV L-Earth
EN 55024	EN 61000-4-6	Conducted Immunity	10 Volts (rms)
EN 55024	EN 61000-4-11	Voltage Dips & Interruptions	1 Line Cycle, 1 to 5 s @ 100% dip
EN 55022	CISPR 22	Radiated Emissions	Class A
EN 55022	CISPR 22	Conducted Emissions	Class A
CFR 47, Part 15	ANSI C63-4	Radiated Emissions	Class A

Typical Installation

The AI-USB/CXB will accommodate either a star or bus topology. When using coaxial bus (-CXB) adapters, terminate the far end of the bus segment, but do not terminate the AI-USB port. Star connections never use terminators nor BNC "T" connectors.



Ordering Information

Model	Description
AI-USB-485	USB interface with two DC-coupled EIA-485 ports
AI-USB-485X	USB interface with two AC-coupled EIA-485 ports
AI-USB-CXS	USB interface with two coaxial star ports
AI-USB-TB5	USB interface with two twisted-pair ports

Accessories

Model	Description
AI-XFMR	Wall-mount plug-in transformer, 120 VAC input/24 VAC output (nominal values)
AI-XFMR-E	Wall-mount plug-in transformer, 230 VAC input/24 VAC output (nominal values)

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