

AI Series

*A Line of External Fixed Port Active Hubs and Links
for ARCNET® Local Area Networks*

Description

The ARCNET Interconnect (AI) series of external fixed port hubs provides a low cost method of expanding ARCNET local area networks. Expansion methods include the use of repeaters, links and hubs. Repeaters are used to extend a wiring segment using the same cabling technology. A link allows the mixing of two cabling technologies within one segment. A hub allows for the addition of a segment and support for distributed star topologies. The AI can implement all three expansion methods depending upon the number of ports on the AI. The AI2 provides two ports for repeater and link applications while the AI3 implements the hub function. However, the AI2 and AI3 utilize the same robust hub timing electronics found in Contemporary Controls' MOD HUB series of modular active hubs. This includes precision delay line timing, digitally controlled timers for dependable operation and reduced bit jitter.



The AI is available in two and three port models.

Benefits

- Compatible with the baseband ARCNET network
- Compatible with all of Contemporary Controls' network interface modules (NIMs) and active hubs
- Supports either 2 or 3 ports
- Panel-mount enclosure
- Configurations available for either link, repeater or hub operation
- Supports coaxial, twisted-pair and fiber optic cable
- LED indicator identifies reconfiguration of the network
- Minimizes bit jitter with precision delay line timing
- Watch-dog timer prevents hub lockup
- Hub unlatch delay digitally controlled
- Low voltage AC or DC powered
- Provision for redundant power supplies
- Supports variable data rates from 78 kbps to 10 Mbps
- Accommodates AC or DC coupled EIA-485 networks

The AI operates from either low voltage AC or DC power. For DC operation, a voltage source in the range of 10 to 36 volts is required. For AC operation, a voltage source in the range of 8 to 24 volts is required. Redundant power supplies can be attached for critical applications.

The AI series supports variable data rates from 78 kbps to 10 Mbps to accommodate the newer ARCNET controller chips and popular EIA-485 transceivers. A watchdog timer is included to prevent the possibility of hub lockup eliminating the necessity of cycling power on a failed hub.

Active hubs increase the robustness of ARCNET networks. They maximize the distance that can be achieved on each cable segment—up to 2000 feet (610 m) on coaxial segments. They prevent interference to the network by squelching reflections caused by open or shorted cable segments attached to the hub. Unused hub ports need not be terminated. Active hubs allow for a distributed star topology, thereby minimizing the cabling required in a plant. Active links and repeaters provide extensions to bus systems or bridging to other cable media.



Transceivers Match the Cable and Topology

-CXS Coaxial Star

Typically, ARCNET is cabled with RG-62/u coaxial cable (with BNC connectors) in a star topology, each network interface module (NIM) connects directly to a port on an AI hub. The coaxial star configuration provides the longest coaxial distance and simplifies troubleshooting. A -CXS port can effectively terminate the end of a coaxial bus segment without the need of a passive terminator.

-CXB Coaxial Bus

RG-62/u coaxial cable can be used in a bus configuration using BNC tee connectors with passive terminators at each end of the cable. Although hubs are not required, cabling distances are reduced and troubleshooting is much more difficult. There is a minimum distance between adjacent nodes. Coaxial bus segments can be extended using AI repeaters or hubs.

-TPB, -TB5 Twisted-Pair Bus

The convenience of twisted-pair wiring can be used in a bus configuration using a transceiver similar to the -CXB. Multiple screw terminals or RJ-45 connectors are provided so that modules can be wired in a “daisy-chain” fashion even though electrically they are connected as a bus. Distances are limited as well as node count. Passive terminators are inserted at the far ends of the segment. Shielded as well as unshielded cable is supported.

-FOG Glass Fiber Optics

Duplex glass, multimode fiber optic cable uses either SMA or ST™ connectors and is

available in three sizes: 50/125, 62.5/125 and 100/140. Larger core sizes launch more energy allowing longer distances. The industry appears to have selected 62.5/125 as the preferred size. This core size provides long distances, immunity to electrical noise, lightning protection and data security. This transceiver utilizes 850 nm technology.

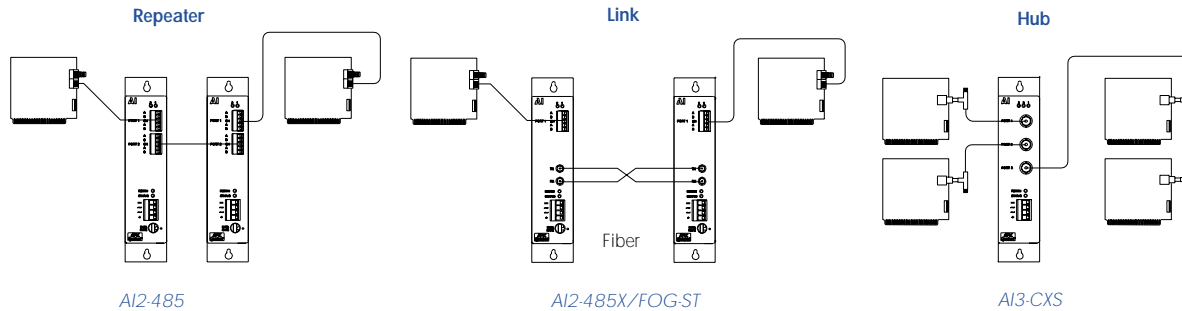
-485 DC Coupled EIA-485

One popular cabling standard in industrial installations is EIA-485. A single shielded or unshielded twisted-pair supports several nodes over a limited distance. Screw terminal connections or twin RJ-11 jacks are provided on each NIM so that the modules can be wired in a “daisy-chain” fashion. EIA-485 offers a hubless solution, but with limited distance and low common mode breakdown voltage. These segments can be extended using AI repeaters and hubs. Each EIA-485 AI port has provisions for applying the necessary 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 due to its transformer coupling. Distances and node count are reduced from the DC coupled EIA-485 (-485) option. The AC coupled option is insensitive to phase reversal of the single twisted-pair which connects the various nodes.

Topology



Specifications

Electrical	DC	AC
Input voltage:	10-36 Volts	8-24 Volts
Input power:	4 watts	4 VA
Input frequency:	N/A	47-63 Hz
Regulatory Compliance	CE Mark FCC Part 15 Class A	

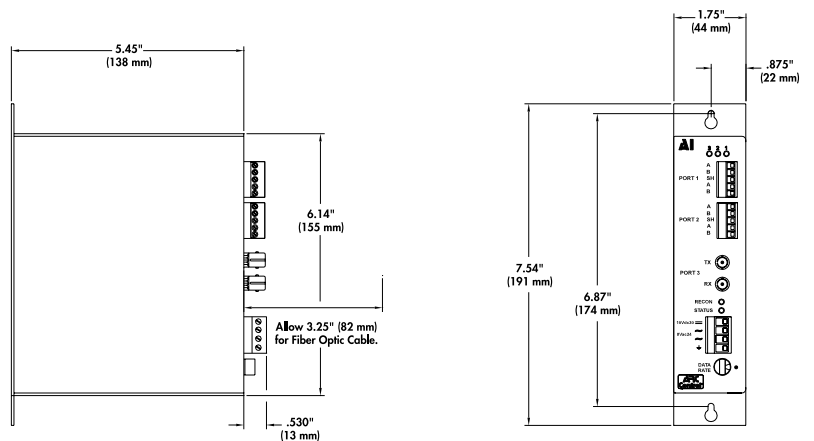
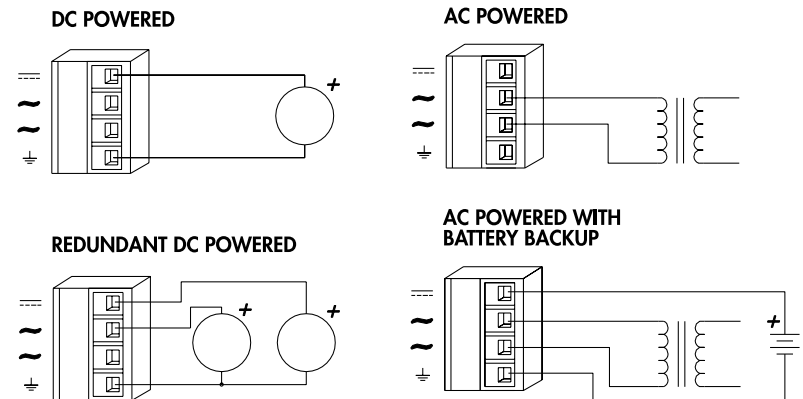
Optical Power Budget (25°C)	Fiber Size (Microns)	-FOG 850 nm (dB)
	50/125	6.6
	62.5/125	10.4
	100/140	15.9

Environmental	
Operating temperature:	0°C to 60°C
Storage temperature:	-40°C to +85°C

Transceiver	Data Rate (bps)							
	78K	156K	312K	625K	1.25M	2.5M	5M	10M
-CXS								
-CXB								
-TPB, -TB5								
-FOG								
-485								
-485X								

Compliance:	ANSI/ATA 878.1
Extended timeouts:	Supports all three extended ARCNET timeouts
Hub, Repeaters and Link delay:	320 ns max @ 2.5 Mbps
Unlatch delay time:	5.9 µs max @ 2.5 Mbps
LED Indicators:	RECON—yellow ACTIVITY—green STATUS—green

Power Options



Permissible Cable Lengths and Nodes Per Segment (2.5 Mbps)

Transceiver	Description	Cable	Connectors	Cable Length		Max Nodes Bus Segment	Notes
				Min	Max		
-CXS	coaxial star	RG-62/u	BNC	0	2000ft/610m	N/A	5.5 dB/1000ft max
-CXB	coaxial bus	RG-62/u	BNC	6ft/2m ¹	1000ft/305m	8	5.5 dB/1000ft max
-FOG	duplex fiber optic	50/125	SMA or ST	0	3000ft/915m	N/A	4.3 dB/km max
-FOG	duplex fiber optic	62.5/125	SMA or ST	0	6000ft/1825m	N/A	4.3 dB/km max
-FOG	duplex fiber optic	100/140	SMA or ST	0 ²	9000ft/2740m	N/A	4.0 dB/km max
-TB5	twisted-pair bus	IBM type 3	RJ-45	6ft/2m ¹	400ft/122m	8	
-TPB	twisted-pair bus	IBM type 3	screw	6ft/2m ¹	400ft/122m	8	
-485	DC coupled EIA-485	IBM type 3	screw	0	900ft/274m	17	DC coupled
-485X	AC coupled EIA-485	IBM type 3	screw	0	700ft/213m	13	transformer isolated

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

² May require a jumper change on the AI module to achieve this distance.

Ordering Information

Repeaters

Model	Description
AI2-CXB	Coaxial bus repeater
AI2-TPB	Twisted-pair bus repeater
AI2-485	DC coupled EIA-485 repeater
AI2-485X	AC coupled EIA-485 repeater

Links

Model	Description
AI2-CXB/FOG-ST	Coaxial bus to fiber optic link
AI2-TPB/FOG-ST	Twisted-pair bus to fiber optic link
AI2-485/FOG-ST	DC EIA-485 to fiber optic link
AI2-485X/FOG-ST	AC EIA-485 to fiber optic link

Contact factory regarding special requirements.

Hubs

Model	Description
AI3-CXS	Coaxial star hub
AI3-485	DC coupled EIA-485 hub
AI3-485X	AC coupled EIA-485 hub
AI3-485/FOG-ST	DC coupled EIA-485 to fiber hub
AI3-485X/FOG-ST	AC coupled EIA-485 to fiber hub
AI3-FOG-ST/485	EIA-485/fiber backbone hub
AI3-FOG-ST/CXB	Coaxial bus/fiber backbone hub
AI3-FOG-ST/TB5	Twisted-pair bus/fiber backbone hub
AI3-TB5	Twisted-pair bus hub

Accessories

Model	Description
AI-XFMR	Wall-mount transformer 120VAC (nom)
AI-XFMRE	Wall-mount transformer 240VAC (nom)
AI-DIN	DIN-rail mounting kit
BNC-T	BNC "T" connector
BNC-TER	93 ohm BNC terminator

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