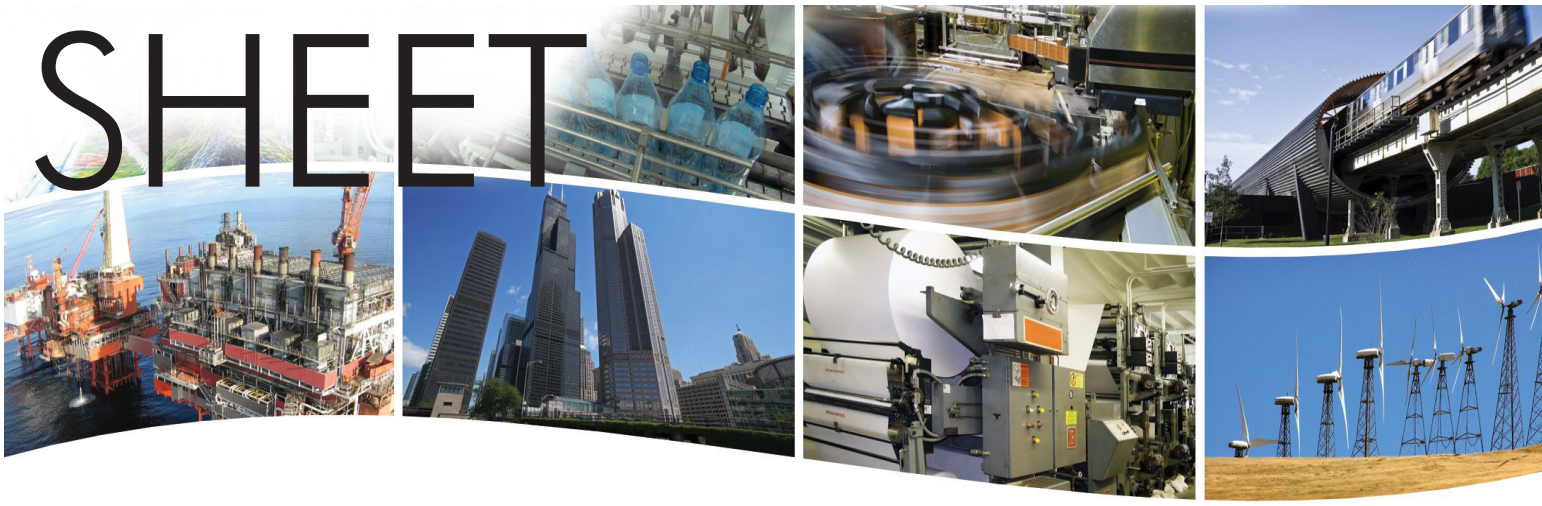
data SHEET



# AI Series — Fixed-Port Active Hubs and Links

The ARCNET® Interconnect (AI) Series of fixed-port hubs expand ARCNET Local Area Networks (LANs) with repeaters, links and hubs. **Repeaters** extend a network using the same cabling technology. A **link** mixes two cabling technologies — functioning as a **media converter**. A **hub** adds a segment to support a distributed star topology. The method implemented depends on the number of ports. The AI2 has two ports for repeater and link applications — while the AI3 implements the hub function.

The AI operates from either wide-range, low-voltage AC (8–24 VAC) or DC (10–36 VDC) power. If needed, a redundant power source can be attached. Each port LED indicates received data or token passing. Each unit has one LED for unit status and one for reporting network reconfigurations. EIA-485 data rates of 78 kbps to 10 Mbps are supported.

A watchdog timer stops hub lockup, eliminating the need to cycle power on signal transmission error.

Active hubs boost network robustness and extend segment distance up to 2,000 feet (610 m) on coaxial segments and 6,000 feet (1,825 m) on multimode fibre optic segments. Unused hub ports need not be terminated. A distributed star topology minimizes required cabling — while inks and repeaters extend bus systems or bridge to other media.

**Compatible with the baseband 2.5 Mbps ARCNET® network**

- Provides either 2 or 3 ports
- Panel-mount or DIN-rail mount
- Configure for either link, repeater or hub operation
- LED identifies reconfiguration of the network
- Minimizes bit jitter with precision delay line timing
- Watch-dog timer prevents hub lockup
- Hub unlatch delay digitally controlled
- Wide-range, low-voltage AC- or DC-powered
- Provision for redundant power sources
- Variable data rates from 78 kbps to 10 Mbps
- Accommodates AC- or DC-coupledEIA-485 networks
- CE Mark

ARCNET®

# Transceivers Match the Cable and Topology

**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. A -CXS port terminates a coaxial segment without requiring a passive terminator.

### -CXB Coaxial Bus

BNC tee connectors can be used in a bus built of RG-62/u cable — with passive terminators at each end of the cable. Although hubs are unneeded, cabling options are restricted, troubleshooting is more difficult and a minimum distance is required between adjacent nodes. Coaxial bus segments can be extended using AI repeaters or hubs.

### -TPB, -TB5 Twisted-Pair Bus

Twisted-pair can be used in a bus and dual RJ-11 or RJ-45 jacks are provided so a "daisy-chain" can be wired — even though electronically the AI units are connected as a bus. Distances and node count are limited. Passive terminators are inserted in unused jacks at the far end of the segment. Shielded as well as unshielded cable is supported.

### -FOG Glass Fibre Optics

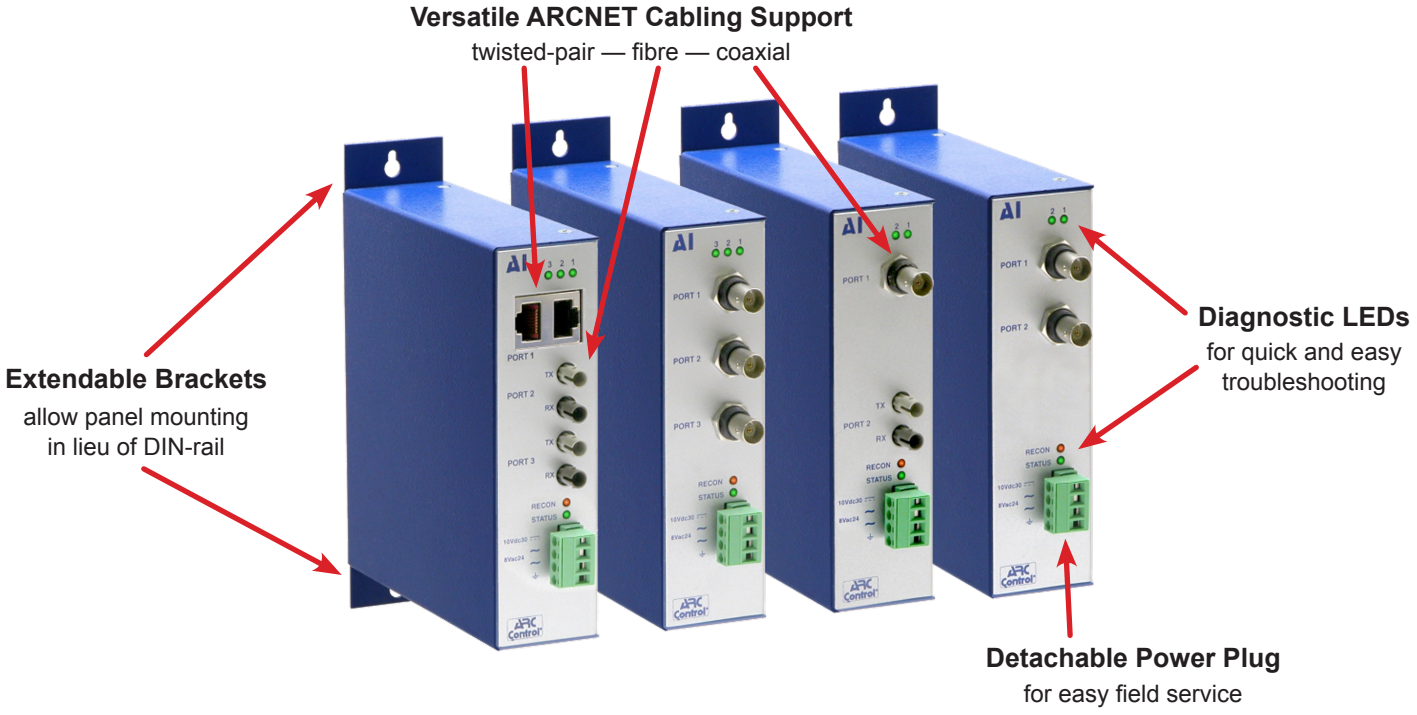
Using ST connectors, these duplex 850 nm transceivers support three sizes of glass multimode fibre optic cable: 50/125µ, 62.5/125µ and 100/140µ. Larger sizes allow greater distances, but the popular 62.5/125µ cable provides good distance, reasonable cost, immunity to electrical noise, lightning protection, and data security.

### -485 DC-Coupled EIA-485

A shielded or unshielded EIA-485 twisted-pair can support several nodes over a limited distance. Screw terminals or twin RJ-11 jacks 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.

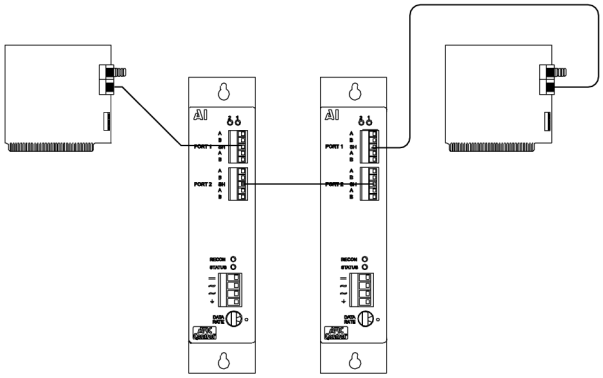
### -485X AC-Coupled EIA-485

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.

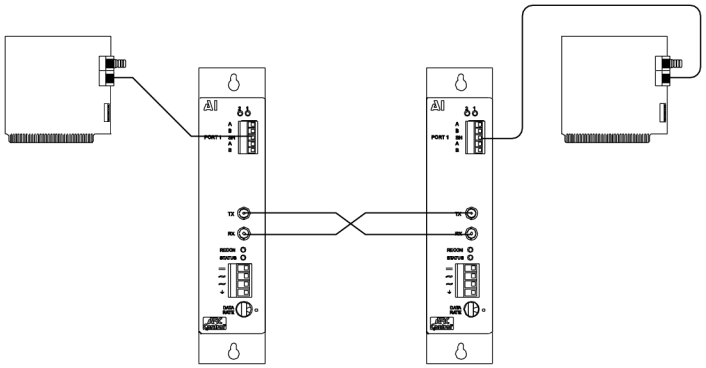


# Topologies

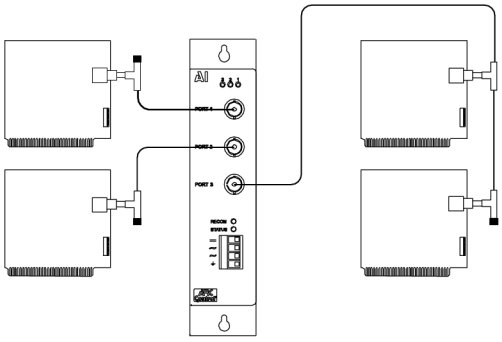
***Repeater***



***Link***



***Hub***



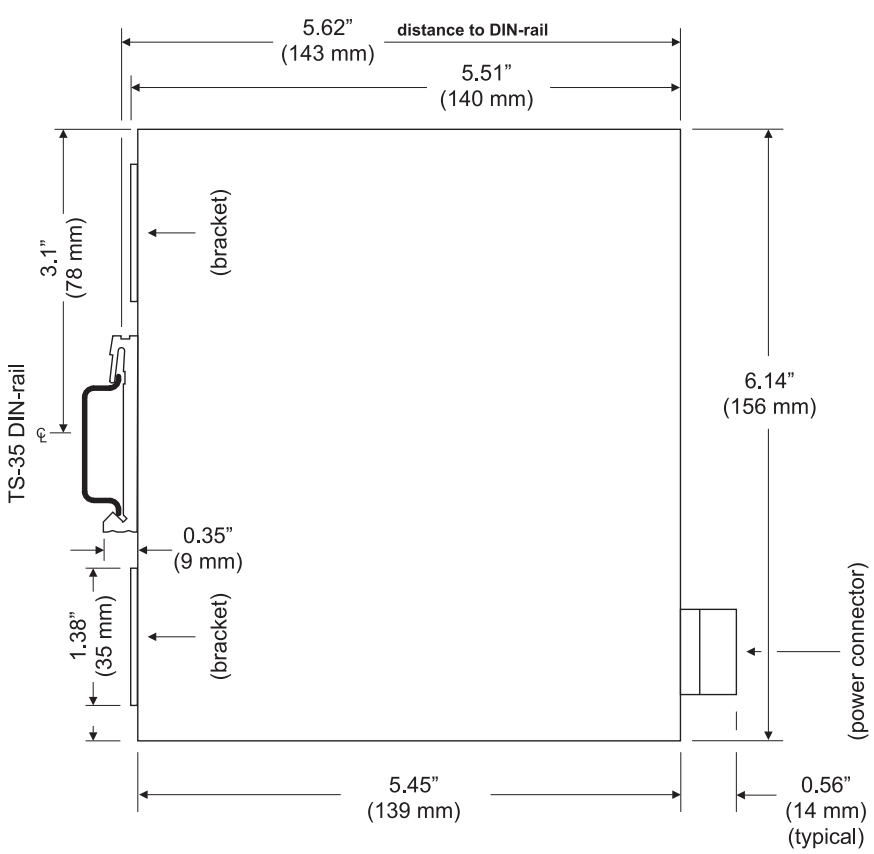
# Permissible Cable Lengths and Nodes Per Segment (2.5 Mbps)

| *Transceiver* | *Description* | *Cable* | *Connectors* | *Cable Length* | | *Max Nodes* | *Notes* |
|---|---|---|---|---|---|---|---|
| | | | | *Min* | *Max* | *Bus Segment* | |
| -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 |
| -CXB | Coaxial bus | RG-62/u | BNC | 6ft/2m[1] | 1000ft/305m | 8 | 5.5 dB/1000 ft max |
| -CXS | Coaxial star | RG-62/u | BNC | 0 | 2000ft/610m | N/A | 5.5 dB/1000 ft max |
| -FOG | Duplex fibre optic | 50/125 | ST | 0 | 3000ft/915m[2] | N/A | 4.3 dB/km max |
| -FOG | Duplex fibre optic | 62.5/125 | ST | 0 | 6000ft/1825m[2] | N/A | 4.3 dB/km max |
| -FOG | Duplex fibre optic | 100/140 | 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 | |

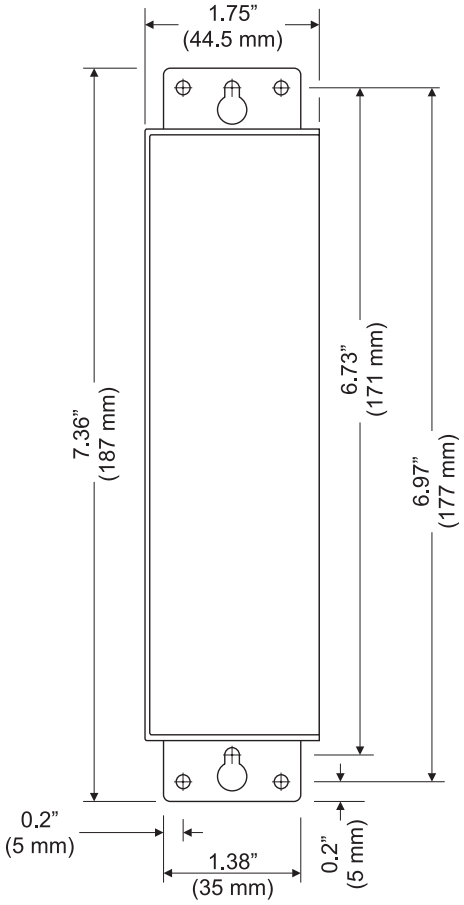
[1] This represents the minimum distance between any two nodes or between a node and a hub.

[2] A jumper change on the AI module may be required to achieve this distance.

# Mechanical Diagram




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



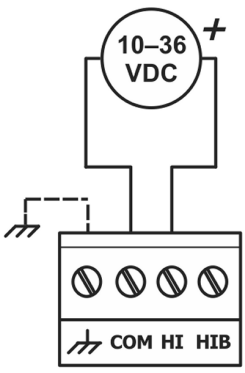

**Front View with Mounting Brackets Extended**

# Power Diagrams

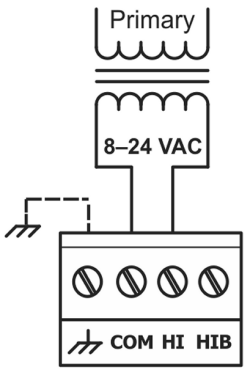
**Input power: 10–36 VDC or 8–24 VAC, 47–60 Hz.**

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

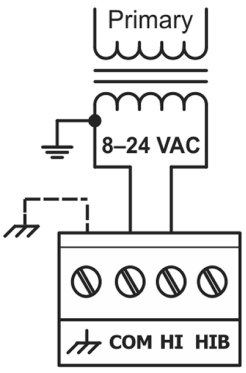
**All options shown are for use in Class 2 circuits if applied voltage is limited to 30V DC.**



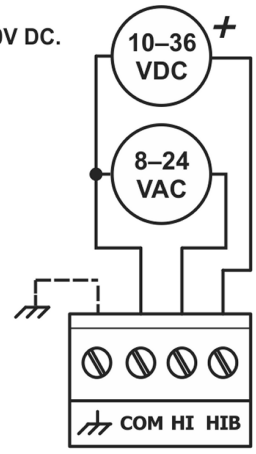

**DC Powered**



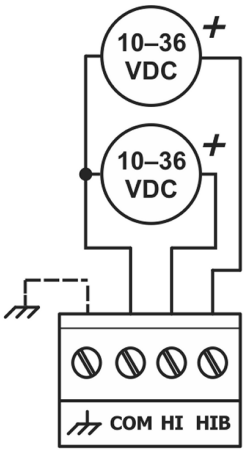

**AC Powered**




**AC Powered with Grounded Secondary**




**AC Powered with DC Backup**




**Redundant DC Powered**

# Specifications

| Electrical Input | DC | AC |
|---|---|---|
| Voltage | 10–36 VDC | 8–24 VAC |
| Power | 4 W | 4 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

| | | |
|---|---|---|
| Data rates | *Transceiver* | *Data Rates* |
| | 485 | 78 kbps to 10 Mbps |
| | 485X | 1.25 Mbps to 10 Mbps |
| | CXB, CXS, TB5, TPB | 2.5 Mbps |
| | FOG | 78 kbps to 10 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
CFR 47, Part 15 Class A

# Electromagnetic Compatibility

| Standard | Test Method | Description | Test Levels |
|---|---|---|---|
| EN 55024 | EN 61000-4-2 | Electrostatic Discharge | 4 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 |

# Ordering Information

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

| Links | Description |
|---|---|
| AI2-485/FOG-ST | DC-coupled EIA-485 to fibre optic link |
| AI2-485X/FOG-ST | AC-coupled EIA-485 to fibre optic link |
| AI2-CXB/FOG-ST | Coaxial bus to fibre optic link |
| AI2-TPB/FOG-ST | Twisted-pair bus to fibre link |

| Hubs | Description |
|---|---|
| AI3-485 | DC-coupled EIA-485 hub |
| AI3-485X | AC-coupled EIA-485 hub |
| AI3-CXS | Coaxial star hub |
| AI3-485/FOG-ST | DC-coupled EIA-485 fibre hub |
| AI3-485X/FOG-ST | AC-coupled EIA-485 |
| AI3-FOG-ST/485 | Fibre backbone to DC-coupled EIA-485 |
| AI3-FOG-ST/485X | Fibre backbone to AC-coupled EIA-485 |
| AI3-FOG-ST/CXB | Fibre backbone to coaxial bus hub |
| AI3-FOG-ST/TB5 | Fibre backbone to twisted-pair bus hub |
| AI3-TB5 | Twisted-pair bus hub |

# 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) |
| BNC-T | BNC “T” connector |
| BNC-TER | 93-ohm BNC terminator |
| TB5-TER | 100-ohm RJ-45 terminator |
| TPB-TER | 100-ohm RJ-11 terminator |

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