

# AI-SRVR Series

ARCNET® Server to Ethernet Client

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## INSTALLATION GUIDE

### INTRODUCTION

The AI-SRVR performs as an ARCNET Server to Ethernet Client by executing communication requests from an Ethernet client. Any number of Ethernet TCP/IP clients can initiate requests to any node on an ARCNET network. The AI-SRVR receives ARCNET packets and sends the data to Ethernet clients and does the reverse for data received from the Ethernet.

To the ARCNET, the unit is just another node with no need of changes or protocol overhead. It is transparent and uses dipulse or EIA-485 transceivers. Its Ethernet port accepts 10BASE-T or 100BASE-TX data using TCP/IP and UDP.

AI-SRVR-8/ models use a special PROXY mode in which two units pass data between eight nodes in two ARCNET LANs via the Ethernet. AI-SRVR-1/ models can also act as proxies but only for one node per LAN.

Coaxial bus is supported by CXB models (BNC connector). Twisted-pair is supported by TB5 models (RJ-45 connector). DC-coupled EIA-485 is supported by 485 models and AC-coupled EIA-485 by 485X models (both models using 3-pin screw-terminal connectors).

Configuration is done by a Windows®-based terminal-emulation program such as HyperTerminal or PuTTY via an EIA-232 serial console port (COM2). A second serial port (COM1) is for factory service.

The Ethernet port auto-negotiates data rate, duplex mode and flow control (PAUSE for full-duplex, backpressure for half-).

The unit is powered from a wide-range, low-voltage AC or DC source with redundant power connections for backup schemes. It comes with the ability for either DIN-rail or panel mounting. The switch front panel features a general status LED and there are LEDs for link status, activity, and data rate of each port.



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## SPECIFICATIONS

### Electrical

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

Ethernet Data Rates 10/100 Mbps

### LED Indicators

Status—green

ARCNET	Ethernet
RX—green	LINK/ACT— green/yellow
ACT—yellow	DUP— green/yellow

### ARCNET Data Rates

Transceiver	Data Rate (bps)							
	156K	312K	625K	1.25M	2.5M	5M	10M	
CXB					■			
TPB					■			
485	■							
485X			■					

### Environmental

Operating temperature: 0°C to +60°C  
 Storage temperature: –40°C to +85°C  
 Humidity, non-cond.: 10% to 95%

### Regulatory Compliance

CE Mark, RoHS  
 CFR 47, Part 15 Class A  
 UL 508 Listed  
 (intended for use with Class 2 circuits only)

### Compatibility

ANSI/ATA 878.1 and IEEE 802.3

Shipping Weight 1 lb. (.45 kg)

## CONNECTOR INFORMATION

### Ethernet Socket Pins (RJ-45)

PIN	USAGE
1	TD+
2	TD–
3	RD+
6	RD–

(All other pins are unused.)

### ARCNET Socket Pins (RJ-45)

- 4 Line – (Phase B)
  - 5 Line + (Phase A)
- (all other pins are unused)

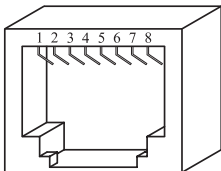


Figure 1 — RJ-45 Connector

### ARCNET Socket Pins (3-pin screw connector)

	485	485X
SH	Shield	Shield
B	Line –	Line
A	Line +	Line

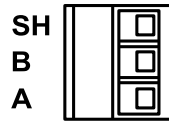


Figure 2 — 3-pin Connector

### Console Port EIA-232 Pins (DE-9 connector)

PIN	Signal	Function
2	RXD	Receive Data
3	TXD	Transmit Data
5	GND	Ground

(all other pins are unused)

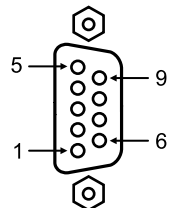


Figure 3 — DE-9 Connector

### Console Port EIA-232 (DE-9)

#### Communication Parameters

Baud Rate	57,600 bps
Data Bits	8
Parity	No Parity
Stop Bit	1

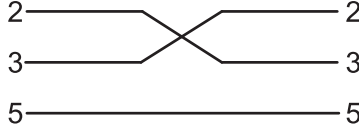
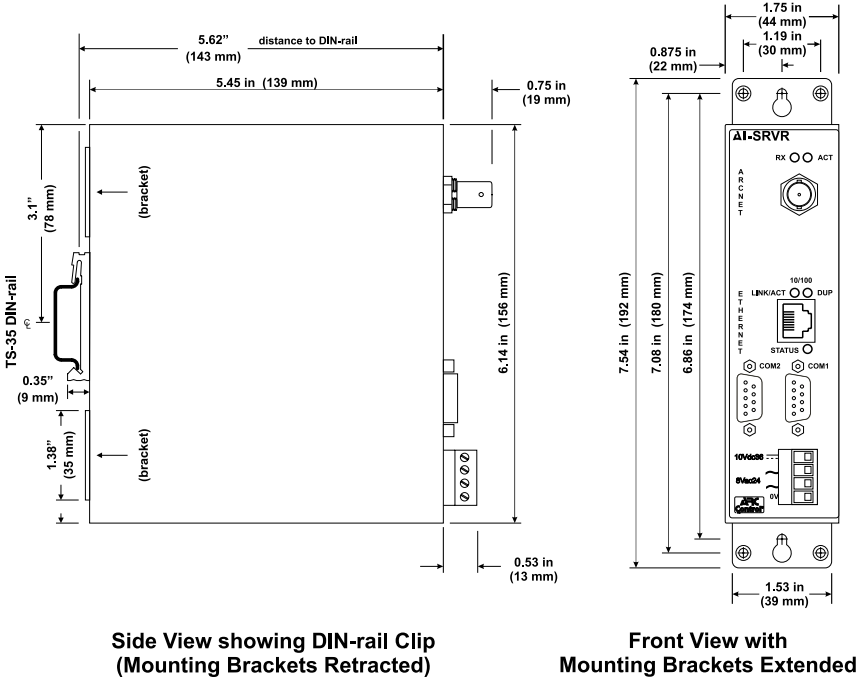


Figure 4 — Null-Modem Cable Wiring



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

Front View with Mounting Brackets Extended

Figure 5 — AI-SRVR Dimensions

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## INSTALLATION

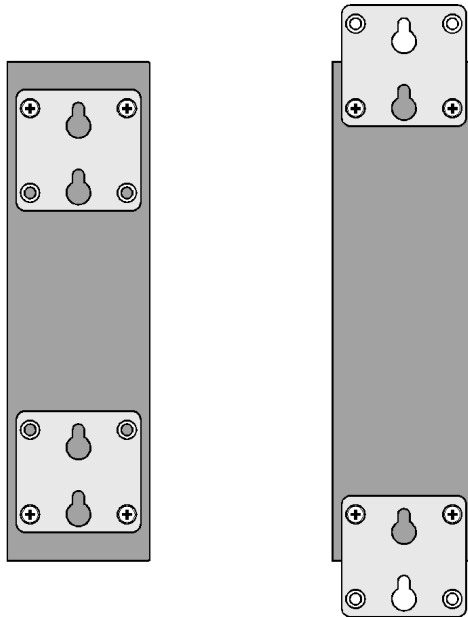
### Mounting

The AI-SRVR is designed for mounting in an industrial enclosure or wiring closet using either set of the provided mounting hardware listed below:

TS-35 DIN Rail Mounting
DIN rail clip
4-40 screws, pan-head (2)

Panel Mounting
Panel mounting bracket
4-40 screws, flat-head (4)

For quick snap-mounting onto TS-35 mm DIN rail, a DIN rail clip is pre-attached to the back of the enclosure with two #4-40 pan-head screws. If the clip is removed, the unit can be panel-mounted by extending the top and bottom brackets which are shipped in retracted position. The extended brackets can then anchor the unit to a wall or other flat surface with two #8 pan-head screws (not provided). The left illustration of Figure 1 shows a rear view of the unit with brackets in retracted position. The right illustration of Figure 1 shows the brackets extended and secured to the unit enclosure using the same screws that were used in the retracted position.



*Figure 1 — Using the Panel-Mounting Brackets*

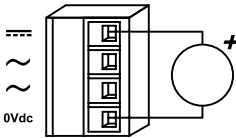
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## POWERING THE AI-SRVR

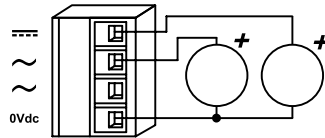
See the specifications for power requirements. Apply low voltage to the four-pin removable keyed connector using one the powering methods.

### *DC Powered — Figure 7*

The unit accepts 10–36 VDC. The “0Vdc” connection is connected to chassis within the unit. Input connections are reverse-voltage protected.



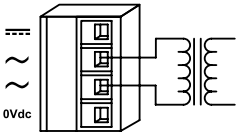
**Figure 7 — DC Powered**



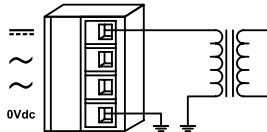
**Figure 8 — Redundant DC Power**

### *Redundant DC Powered — Figure 8*

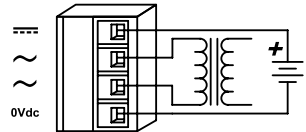
For backup power, redundant diode-isolated DC power inputs are provided. Either power supply must be capable of powering the unit. Do not assume that input currents from the two supplies will be balanced.



**Figure 9 — AC Powered**



**Figure 10 — AC Power with Grounded Secondary**



**Figure 11 — AC Power with Battery Backup**

### *AC Powered — Figure 9*

The AI-SRVR can be powered by 8–24 VAC from the secondary of a low-voltage transformer. If using a grounded secondary transformer, refer to *Figure 10*. If needed, two auxiliary power supplies are available from Contemporary Controls: the AI-XFMR is for 120 VAC primary power and the AI-XFMR-E uses 230 VAC.

### *AC Powered with Battery Backup — Figure 11*

You can apply power from both an AC and DC source (usually a battery). If the AC source fails, the unit will operate from the battery — but separate provisions are required for charging the battery.

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## INDICATOR LIGHTS

**STATUS:** During boot, this LED flashes green. Once all files have loaded, it glows solid to indicate the unit is operational.

**ARCNET:** The RX LED glows green when the unit *receives* data from the ARCNET LAN. The ACT LED flashes yellow when unit *transmits* data to the ARCNET LAN.

**Ethernet:** The LINK/ACT LED glows if a valid link exists to an operating Ethernet device and indicates speed by colour: green for 100 Mbps and yellow for 10 Mbps. It flashes to indicate activity. The DUP LED glows green to indicate full-duplex operation and yellow for half-duplex.

## FIELD CONNECTIONS

The AI-SRVR Series is available in several transceiver options for connecting to an ARCNET LAN. Each transceiver is matched to a particular cable type and identified by a three-character suffix appended to the model number. The capabilities of each transceiver differs.

### *CXB — Coaxial Bus*

The CXB transceiver presents a high-impedance connection in both the powered and unpowered states. Although nominally a bus device, it can be used in either bus or star ARCNET topologies that use RG-62/u coaxial cable.

Regardless of the topology implemented, the AI-SRVR coaxial port will require a BNC Tee connector with at least one leg of the connector fastened to coaxial cable. If the AI-SRVR passes traffic from one portion of an ARCNET bus to another, the remaining leg of the Tee connector will tie to another coaxial cable. But if the AI-SRVR occupies the end of a bus segment, the remaining leg of the Tee connector must be fitted with a BNC-style terminator having 93 (nominal) ohms of resistance.

The maximum ARCNET segment length is 1000 feet and the maximum number of nodes per segment is eight. To extend a bus segment beyond 1000 feet, an active hub is required. If the hub port is of the CXS type (internally terminated), the coaxial cable should attach directly to the hub port without using a BNC Tee connector. Do not add termination to such a hub port since the port internally terminates the end of a bus segment.

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### *TB5 — Twisted-Pair Bus*

The CXB transceiver can be modified to drive a balanced cable system. This configuration is called TB5 and it supports shielded or unshielded twisted-pair cable such as Category 5. To support the popular modular plug connectors, dual RJ-45 jacks replace the single BNC connector. Follow the connector pin assignments on page 3 when preparing cables for TB5 use. Wiring between nodes is accomplished in a daisy-chain fashion with point-to-point cables connecting the various nodes to create a bus segment. The end device will have one vacant RJ-45 jack to hold the RJ-45 style 100-ohm terminator required to terminate the bus segment. Use twisted-pair cable and observe polarity. Modular plugs must be installed on this cable such that they do not invert the signals. Do not use cable which does not twist the pairs nor maintain signal polarity. To test for proper cable connections, hold both ends of the cable side by side with the RJ-45 plugs facing the same direction. The colour of the wire in the rightmost position of each plug must be the same if there is no inversion of the cable. If this is not the case, the cable is inverted. Up to eight TB5 nodes can attach to one segment which cannot exceed 400 feet in length. The overall distance of a twisted-pair network can be extended beyond 400 feet if active hubs are used — providing the hub ports support the same TB5 interface.

### *485 — DC-Coupled EIA-485*

The 485 model supports DC-coupled EIA-485 communication via a daughter board that replaces the coaxial hybrid transceiver. This daughter board receives the conventional P1 and P2 pulses intended for the coaxial hybrid transceiver and converts them to an elongated P1 pulse (with a width equal to P1 plus P2) suitable for the EIA-485 differential driver. One 3-position screw terminal is supplied for either bus or star topologies. Each segment can be up to 900 feet of Category 5 STP or UTP cable with as many as 17 nodes on the segment. Make sure the phase integrity of the wiring remains intact. Refer to page 3 for connector wiring.



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### *Termination*

Each end of a segment must be terminated in the characteristic impedance of the cable. A 120-ohm internal resistance can be invoked with a jumper on the EIA-485 daughter board. With the middle jumper inserted at E1 on the daughter board, 120 ohms of resistance is applied across the twisted-pair. With the jumper removed, no termination is applied. To apply external termination instead, remove this jumper and install a 120-ohm  $\frac{1}{4}$  watt resistor across pins A and B of the screw terminal connector. A resistance value under 120 ohms is not recommended since it may excessively load the EIA-485 transceivers.

### *Bias*

In addition to termination, bias must be applied to the ends of a twisted-pair network (and nowhere else) so that when the line is floated, differential receivers will not assume an invalid logic state. There are two precision bias resistors (Rb) of equal value on the daughter board, one tied to +5 V and the other to ground. Each resistor has a jumper associated with it. If both jumpers are installed, the resistor tied to +5 V is connected to the (+) signal and the grounded resistor is connected to the (-) line.

The termination and bias rules are simple. If the AI-SRVR/485 is at the end of the segment, install all three jumpers at location E1 on the daughterboard. Otherwise, remove all three jumpers. To use external termination, removed the middle jumper at E1.

For EIA-485 DC operation, it is very important that all devices on the segment be referenced to the same ground potential so that the common mode voltage requirement (+/-7 Vdc) of the EIA-485 specification is achieved. This can be accomplished by a separate ground wire tied to all devices or using the third wire ground of the power connector. Alternately, connect the DC common of each node to a cold water pipe. Connected systems having different grounds, can cause unreliable communications or can damage the drivers. Therefore, adequate grounding must be implemented. A ground connection can be found at pin 3 of the screw terminal connector.

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## 485X — AC-Coupled EIA-485

The AC-coupled EIA-485 transceiver offers advantages over the DC-coupled version. No bias adjustments are needed and wiring polarity is unimportant. Much higher common mode voltage levels can be achieved with AC coupling because the transformer coupling has a breakdown rating of 1000 Vdc.

However, AC-coupling also has disadvantages. AC-coupled segments are shorter (700 feet max) and are limited to 13 nodes compared to the 17 of DC-coupling. AC-coupled transceivers operate only at 1.25, 2.5 and 5.0 Mbps while DC-coupled transceivers function over all six standard data rates.

Cabling rules for 485X are similar to those for 485. Wire nodes in a daisy-chain fashion. On the end devices, insert a jumper at E1 on both 485X daughter boards to invoke 120 ohms of termination or leave the jumpers open and install a 120-ohm, ¼ watt resistor across pins A and B of the screw terminals at each end of the bus segment. Refer to page 3 for connector wiring. Termination should not be applied to any device located between the two ends of the segment. Do not mix 485 and 485X devices on the same segment; however, bridging the technologies is possible with active hubs having appropriate transceivers. To extend 485X segments, use a hub as discussed under the 485 section. Make sure the active hub transceivers are 485X types. Cable inversion is insignificant.

## **ELECTROMAGNETIC COMPATIBILITY**

AI-SRVR units comply with Class A radiated and conducted emissions as defined by CFR 47, Part 15 and by EN55022. This equipment is intended for use in nonresidential areas.

### **Warning**

This is a Class A product as defined in EN55022. In a domestic environment this product may cause radio interference — in which case the user may be required to take adequate measures.

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## *NEED MORE HELP INSTALLING THIS PRODUCT?*

More information can be found at [www.ccontrols.com/support/aisrvr.htm](http://www.ccontrols.com/support/aisrvr.htm).  
When contacting one of our offices, just ask for Technical Support.

### *Warranty*

Contemporary Controls (CC) warrants this 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 the 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.

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July 2014

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