

# AI-SRVR Series

ARCNET® Server to Ethernet Client

---

## 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 100 BASE-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 via an EIA-232 serial console port (COM1). A second serial port (COM2) 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.

# SPECIFICATIONS

<i>Electrical</i>	<b>DC</b>	<b>AC</b>
Input voltage:	10–36 volts	8–24 volts
Input power:	8 W	8 VA
Input frequency:	N/A	47–63 Hz

*Environmental*

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

*ARCNET Data Rates*

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

*Ethernet Data Rates*                      10/100 Mbps

*Shipping Weight*  
 1 lb. (.45 kg)

*Compatibility*  
 ANSI/ATA 878.1 and IEEE 802.3

*Regulatory Compliance*  
 CE Mark  
 CFR 47, Part 15 Class A  
 UL 508 Listed Device (intended for use with Class 2 circuits)

*LED Indicators*  
 Status—green

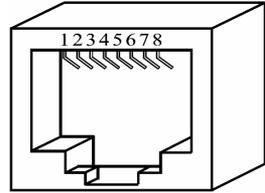
<b>ARCNET</b>	<b>Ethernet</b>
RX—green	LINK/ACT— green/yellow
ACT—yellow	DUP— green/yellow

## Connector Information

### Ethernet Socket Pin Assignments (RJ-45 connector)

1	TD+
2	TD-
3	RD+
6	RD-

(all other pins are unused)



**Figure 1 — RJ-45 Connector**

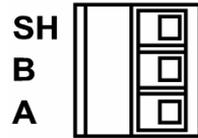
### ARCNET Socket Pin Assignments (RJ-45 connector)

4	Line – (Phase B)
5	Line + (Phase A)

(all other pins are unused)

### ARCNET Socket Pin Assignments (3-pin screw terminal connector)

	<b>485</b>	<b>485X</b>
SH	Shield	Shield
B	Line –	Line
A	Line +	Line

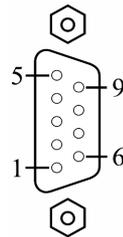


**Figure 2 — 3-pin Connector**

### Console Port EIA-232 Pin Assignments (DB9 connector)

<b>PIN</b>	<b>Signal</b>	<b>Function</b>
2	RXD	Receive Data
3	TXD	Transmit Data
5	GND	Ground

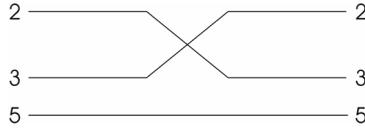
(all other pins are unused)



**Figure 3 — DB9 Pins**

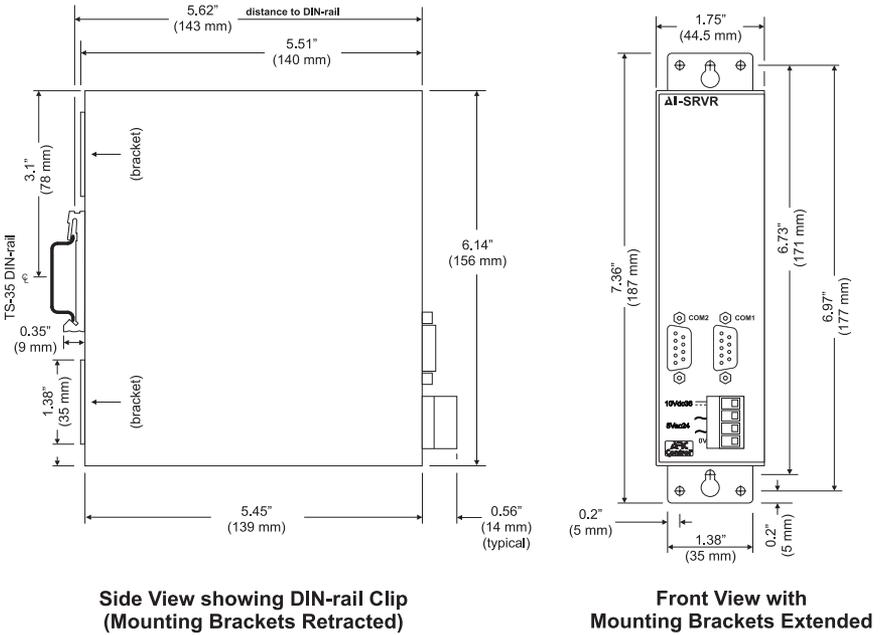
### Console Port EIA-232 Communication Parameters (DB9 connector)

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



**Figure 4 — Null-Modem Cable Wiring**

## Mechanical



**Figure 5 — AI-SRVR Dimensions**

---

# INSTALLATION

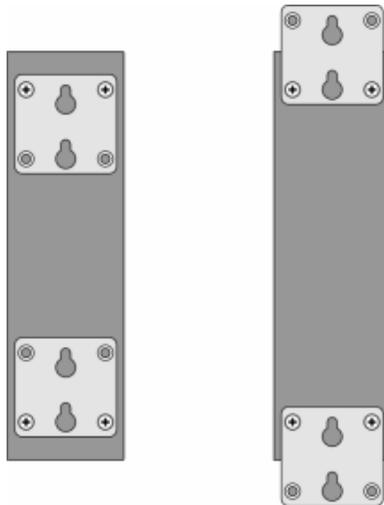
## Mounting

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
DIN rail clip support bracket
4-40 screws, pan-head (2)

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

For quick snap-mounting to 35 mm DIN rail, a reinforced 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 vertical surface with two #8 pan-head screws (not provided). The left illustration of *Figure 6* shows a rear view of the unit with brackets in retracted position. The right illustration of *Figure 6* shows the brackets extended and secured to the unit enclosure with the same screws used in retracted position.



*Figure 6 — Using the Panel-Mounting Brackets*

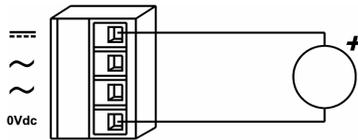
---

## POWERING THE AI-SRVR

To operate, the AI-SRVR requires that low voltage AC or DC power be provided to its four-pin removable keyed connector. Consult the specifications for power requirements. There are several methods for providing power.

### *DC Powered*

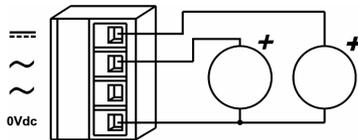
Make connections as shown in the diagram. The AI-SRVR uses a DC-DC converter that accepts a wide range of voltage (10–30 VDC) which it converts for internal use. The “0Vdc” connection is connected to chassis within the AI-SRVR. The input connections are reverse-voltage protected.



**Figure 7 — DC Powered**

### *Redundant DC Powered*

Redundant diode-isolated DC power inputs are provided on the AI-SRVR when a concern exists that the AI-SRVR remain operational in the event of a primary power failure. Make connections as shown in the diagram. Each power supply must be capable of powering the AI-SRVR. Do not assume that input currents from the two supplies will be balanced.

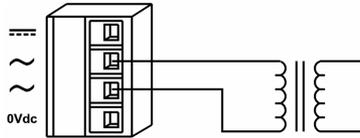


**Figure 8 — Redundant DC Power**

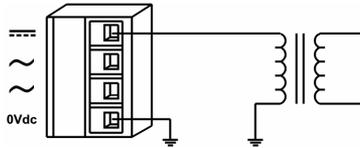
---

## AC Powered

If only AC power is available, the AI-SRVR can be powered by the secondary of a low-voltage transformer whose primary is connected to the AC mains. The secondary voltage must be in the range of 8–24 VAC and must not be grounded. When using a grounded secondary transformer, refer to *Figure 10*. For convenience, 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.



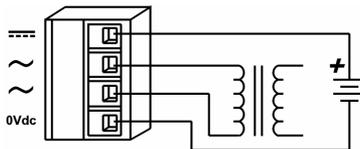
**Figure 9 — AC Powered**



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

## AC Powered with Battery Backup

The AI-SRVR can also be powered from both an AC and DC source. Usually the DC source is from a battery connected as the DC powered option. Refer to the diagram for details. In this application the AI-SRVR does not charge the battery, so separate provisions are required for charging. If the AC source fails, the AI-SRVR will operate from the battery.



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

---

## 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.

---

## *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.

---

## *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 ¼ 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.

---

## *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,  $\frac{1}{4}$  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 non-residential 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.

---

## **NEED MORE HELP INSTALLING THIS PRODUCT?**

More comprehensive information can be found on our web site at [www.ccontrols.com](http://www.ccontrols.com). This includes our on-line technical manuals, downloadable software drivers and utility programs that can test the product. 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.

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**

Before returning a product for repair, contact Customer Service. A representative will instruct you on our return procedure.

Contemporary Control Systems, Inc.  
2431 Curtiss Street  
Downers Grove, Illinois 60515 USA  
Tel: +1-630-963-7070  
Fax: +1-630-963-0109  
E-mail: [info@ccontrols.com](mailto:info@ccontrols.com)  
WWW: <http://www.ccontrols.com>

Contemporary Controls Ltd  
Sovereign Court Two, UWSP  
Sir William Lyons Road  
Coventry CV4 7EZ UK  
Tel: +44 (0)24 7641 3786  
Fax: +44 (0)24 7641 3923  
E-mail: [info@ccontrols.co.uk](mailto:info@ccontrols.co.uk)

---

# DECLARATION OF CONFORMITY

## Applied Council Directives:

Low Voltage Directive 2006/95/EC  
General Product Safety Directive 2001/95/EC  
Electromagnetic Compatibility Directive, 2004/108/EC  
Restriction of Hazardous Substances Directive 2002/95/EC  
Waste Electrical and Electronic Equipment Directive 2002/96/EC

## Standards to which Conformity is Declared

EN 55022:1998 + A1:2000 + A2:2003, Class A, Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment  
EN 55024:1998 + A1:2001 + A2:2003, Information Technology Equipment — Immunity Characteristics — Limits and Methods of Measurement

## Manufacturer:

Contemporary Control Systems, Inc.  
2431 Curtiss Street  
Downers Grove, IL 60515  
USA

## Authorized Representative:

Contemporary Controls Ltd  
Sovereign Court Two — UWSP  
Sir William Lyons Road  
Coventry CV4 7EZ  
UNITED KINGDOM

**Type of Equipment:** ARCNET Server to Ethernet Clients

**Models:**    **AI-SRVR-1/CXB**    **AI-SRVR-1/TB5**    **AI-SRVR-1/485**    **AI-SRVR-1/485X**  
                  **AI-SRVR-8/CXB**    **AI-SRVR-8/TB5**    **AI-SRVR-8/485**    **AI-SRVR-8/485X**

Regulatory Compliance Standards			
Standard	Test Method	Description	Test Levels
EN 55024	EN 61000-4-2	Electrostatic Discharge	4 kV Contact & 6 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 to L & 2 kV L to Earth
EN 55024	EN 61000-4-6	Conducted Immunity	10 Volts (rms)
EN 55024	EN 61000-4-11	Voltage Dips & Interruptions	1 to 5 Seconds @ 100% Dip 1 Line Cycle @ 100% Dip
EN 55022	CISPR 22	Radiated Emissions	Class A
EN 55022	CISPR 22	Conducted Emissions	Class B
CFR 47,15	ANSI C63.4	Radiated Emissions	Class A

**Manufacturer's Declaration:** I, the undersigned, hereby declare that the products specified above conform to the listed directives and standards.

George M. Thomas, President

July 1, 2006

**TD000200-0IE**

---

# AI-SRVR Configuration Settings

## *Settings for Server Function or Proxy Function*

Function:    SERVER     PROXY

Boot Protocol:    NONE     DHCP

IP Address:     .  .

Subnet Mask:     .  .

Gateway:     .  .

DNS 1:     .  .

DNS 2:     .  .

Speed:   

Extended Timeout:    STD     16X     8X     4X

Recon Timeout:    STD     64N     32N     16N

TCP Port:   

Software Version:   

Hardware Version:   

## *Settings for Server Function Only*

Node ID:   

Receive All:    ON     OFF

Nodelist Timeout:   

FIFO Depth:   

UDP Port:   

## *Settings for Proxy Function Only*

Node ID List:

---

**(This page was left intentionally blank.)**

---

**(This page was left intentionally blank.)**