FIBER OPTIC DATALINK REPEATER

> 2-wire or 4-wire hook-ups

> Asynchronous operation independent of baud rate, parity, or stop bits

> Baud rates to 115.2K baud

> Up to 32 AC40s per fiber link
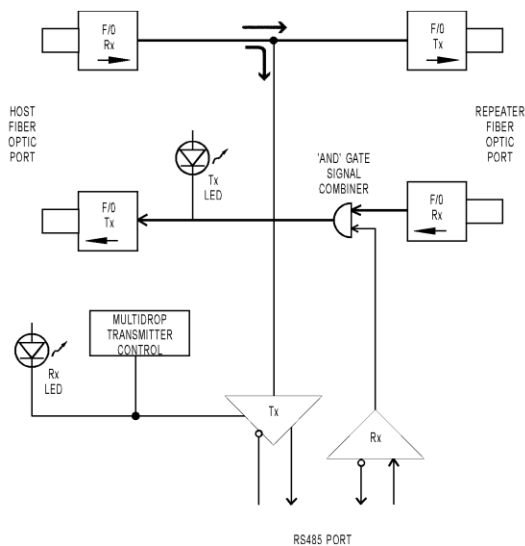
DESCRIPTION

The AC40 is a fiber optic repeater designed to allow RS-485 communication devices to communicate over a fiber optic data link. AC40 has a host fiber optic port, a repeater fiber link port, and an RS-485 port.

A daisy chain of AC40's connected by fiber optic cable provides complete electrical isolation and high baud rates over very long distances.

AC40A [OBSOLETE]

Industrial automation often requires reliable communications between equipment sites separated by long distances or harsh electrical environments. The AC40 fiber optic data link adapter satisfies the requirements of industrial communications by using light instead of conventional electrical signals. The fiber optic data link between two pieces of equipment is electrically isolated and completely immune to electrical noise.

The AC40 has three I/O ports; the RS-485 port, the host fiber port, and the repeater fiber port. When operating, the AC40 passes and amplifies all signals between the host and repeater fiber ports. All signals from the host fiber port receiver are transmitted out the RS485 port, and any signals received at the RS-485 port are transmitted out the host fiber port.

NOTE: Signals are not passed from the repeater fiber port to the RS-485 port nor are they passed from the RS485 port to the repeater port.


Part Numbers

Part	Description
AC40A [OBSOLETE]	Fiber Optic Repeater-120 VAC [OBSOLETE]
AC40B [OBSOLETE]	Fiber Optic repeater-240 VAC [OBSOLETE]

MADE IN THE USA

OPTO 22 · 800-321-6786 · 1-951-695-3000 · www.opto22.com · sales@opto22.com

OPTO 22

SPECIFICATIONS:

|	
Ambient Temperature:	0 °C - 70 °C, 95% relative humidity, non-condensing
Power Requirements: AC40A Power Requirements: AC40B	120 VAC ± 10 VAC 60 Hz 240 VAC ± 20 VAC 50 Hz
Fiber Optic: Recommended Fiber Size:	62.5/125 µm
Recommended Fiber: "ST" Style Connectors:	Belden Type 225812 (Duplex) Belden Type 225811 (Single)
Maximum Fiber Length:	3.5 kilometers
Transmitter Characteristics (All Typical) Optical Power Output: Peak Emission Wavelength: Numerical Aperture: Optical Port Diameter:	-12.0 dBm 820 nm 0.31 150 µm
Receiver Characteristics (All Typical) Receiver Sensitivity: Equivalent Numerical Aperture: Optical Port Diameter:	-24.0 dBm 0.50 400 µm
RS-485:Maximum Cable Length:	3,000 feet
Recommended Cable Type (twisted pair):	100 ohms impedence, 12.5 picofarads per foot
Termination Resistance:	220 ohms
Tri-state Biasing Resistance:	470 ohms
Agency Approvals	CE, UKCA

AC40 Architecture
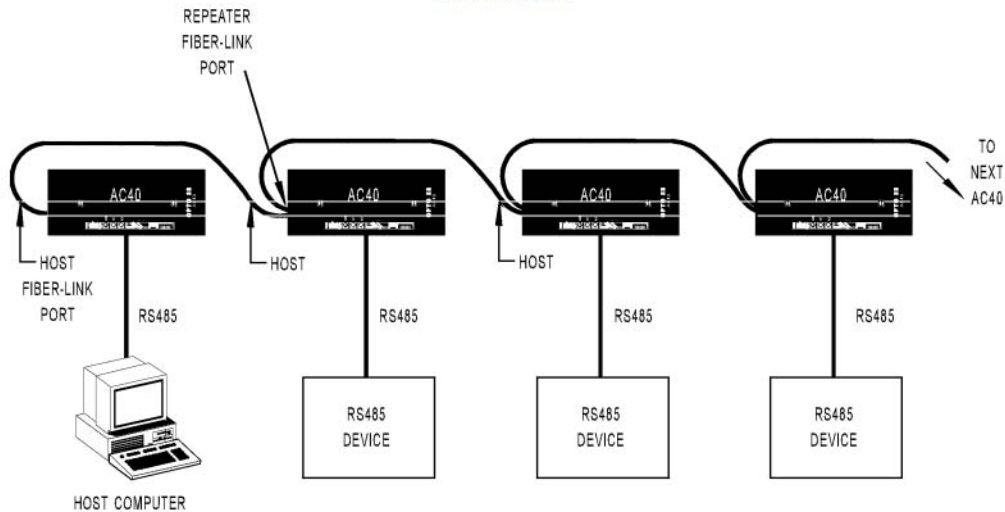
The host fiber port on the first AC40 must be connected to the host fiber port on the next AC40. All others are connected host to repeater of the previous AC40.

DISASSEMBLY

The AC40 must be disassembled to access the mounting hardware, power, and communications connectors. The case is opened by turning the two captive screws on the top of the AC40 counterclockwise.
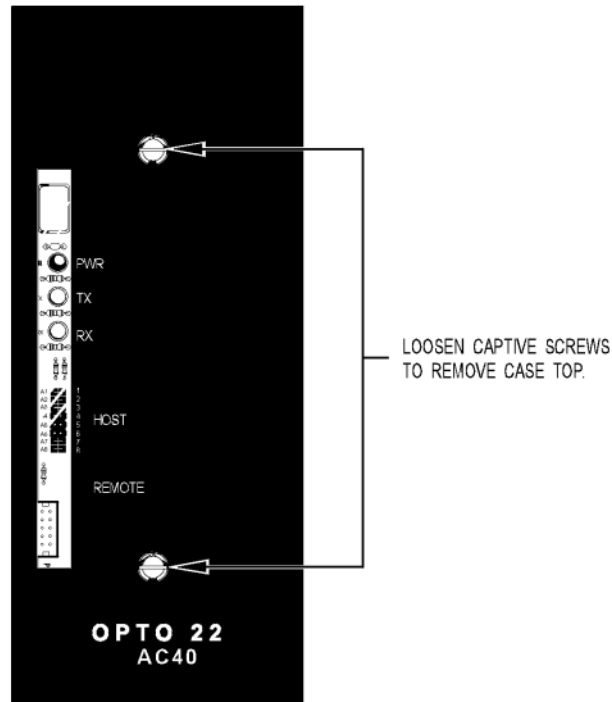
MOUNTING

The bottom case half has two captive #10 screws for mounting. If the AC40 is being mounted in a Misticpanel, it is typically mounted in the bottom left corner of the panel.
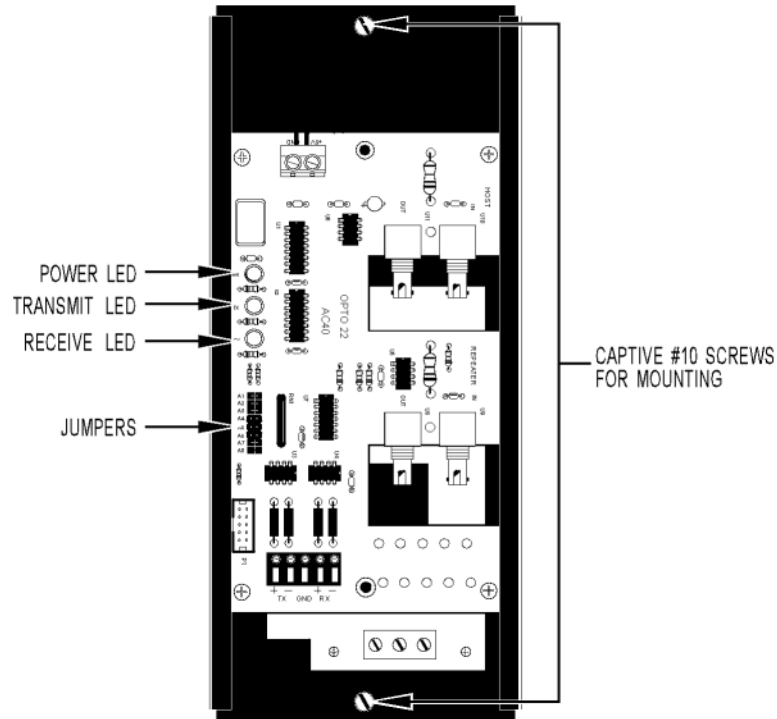
POWER WIRING

The AC40 has two power supply options. The AC40A has a 120 VAC power requirement; the AC40B has a 240 VAC power requirement. The power wires are routed to the power connector block on the lower PC board. The power wiring should be run along the left side of the case half.
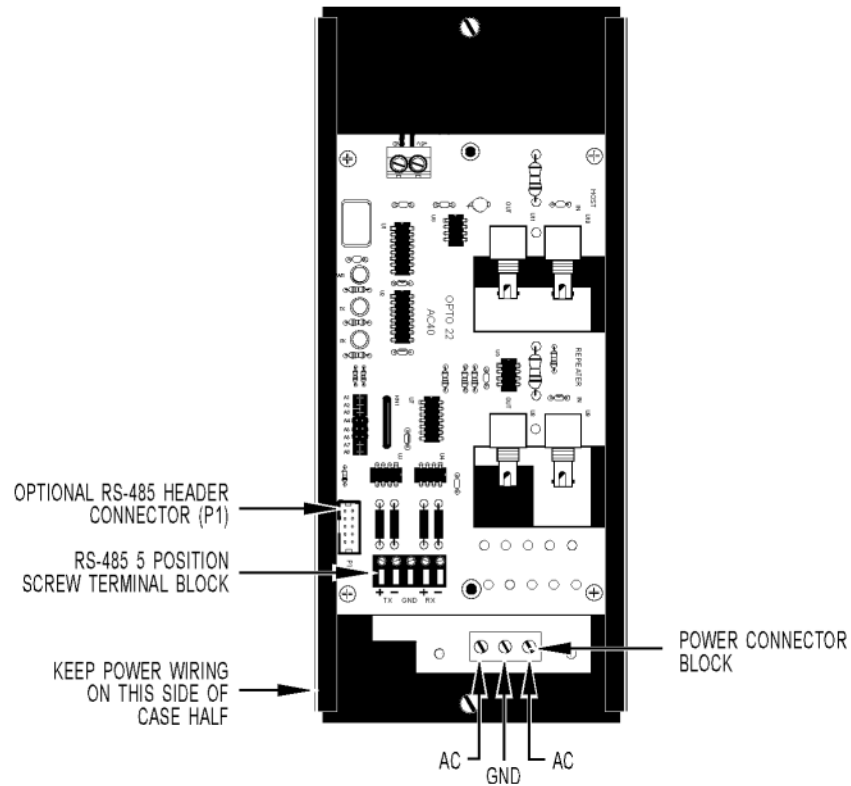
RS-485 CONNECTION

The AC40 supports two connection methods for the RS-485 port. The primary connection is through the 5 position screw terminal block located on the lower edge of the elevated printed circuit board. The optional connection method is through the 10 position male header connector labeled P1. The optional connection method allows for easy hook-up to Mistic remote panels using the flat 10-pin twisted pair cable found in a G4RCOMMKIT.

10-PIN HEADER

When connecting to the 5 position screw terminal block, the option of 2-wire or 4-wire hook-up is available.* The 10-pin header can only operate in 2-wire hook-up. When the 5 position screw terminal block is set to 2-wire operation, use the TX + and TX - terminals.
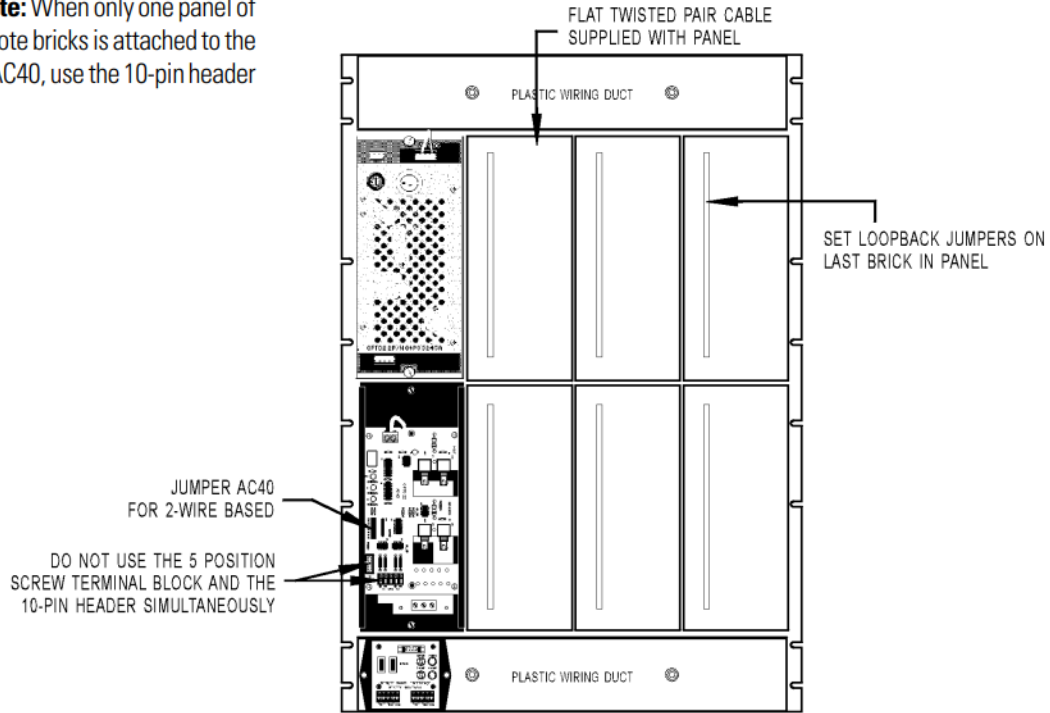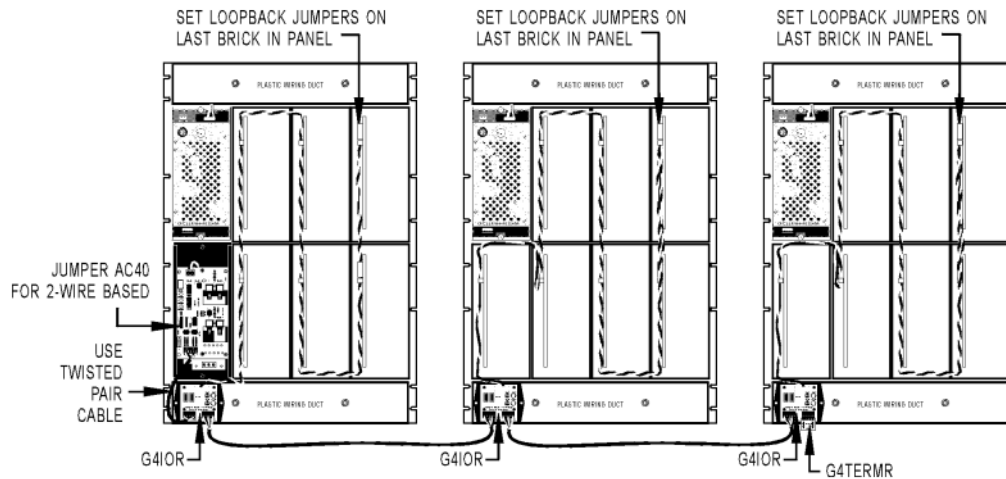
5-POSITION SCREW TERMINAL BLOCK
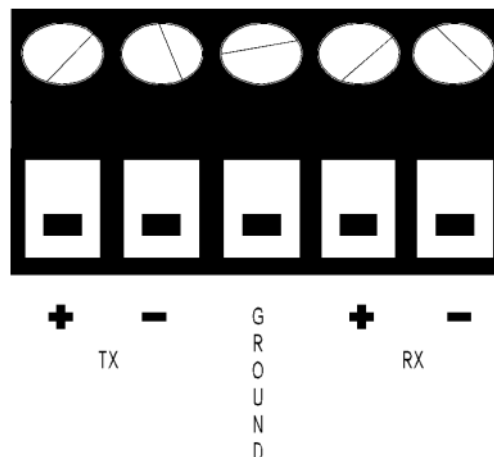
RS-485 WIRING EXAMPLES

The AC40 does not support the interrupt capability of remote bricks. * Jumpering information is on page 10.

Note: When only one panel of remote bricks is attached to the AC40, use the 10-pin header

FLAT TWISTED PAIR CABLE SUPPLIED WITH PANEL

SET LOOPBACK JUMPERS ON LAST BRICK IN PANEL

JUMPER AC40 FOR 2-WIRE BASED

DO NOT USE THE 5 POSITION SCREW TERMINAL BLOCK AND THE 10-PIN HEADER SIMULTANEOUSLY

Note: When using multiple panels of remote bricks, use the 5-position screw terminal.

SET LOOPBACK JUMPERS ON LAST BRICK IN PANEL

JUMPER AC40 FOR 2-WIRE BASED

USE TWISTED PAIR CABLE

G4IOR   G4IOR   G4IOR   G4TERMR

MADE IN THE USA

FIBER OPTIC CONNECTION

The fiber optic connectors on the AC40 are 'ST' style female. The 'ST' male is inserted and the outer barrel rotated until the posts on the female connector lock in place.

The AC40 is optimized to operate with 62.5 µm/125 µm fiber optic cable. It is possible to use other fiber diameters, however, the performance specifications fall off rapidly.

Connect a fiber optic cable to the transmitter port on the AC40. Connect the other end of this fiber optic cable to the receiver port of the connecting device. Likewise, connect a fiber optic cable to the receiver port on the AC40, and connect the other end of the cable to the transmitter port of the connecting device.

After the fiber connections are in place, use cable ties to secure the fiber cables.
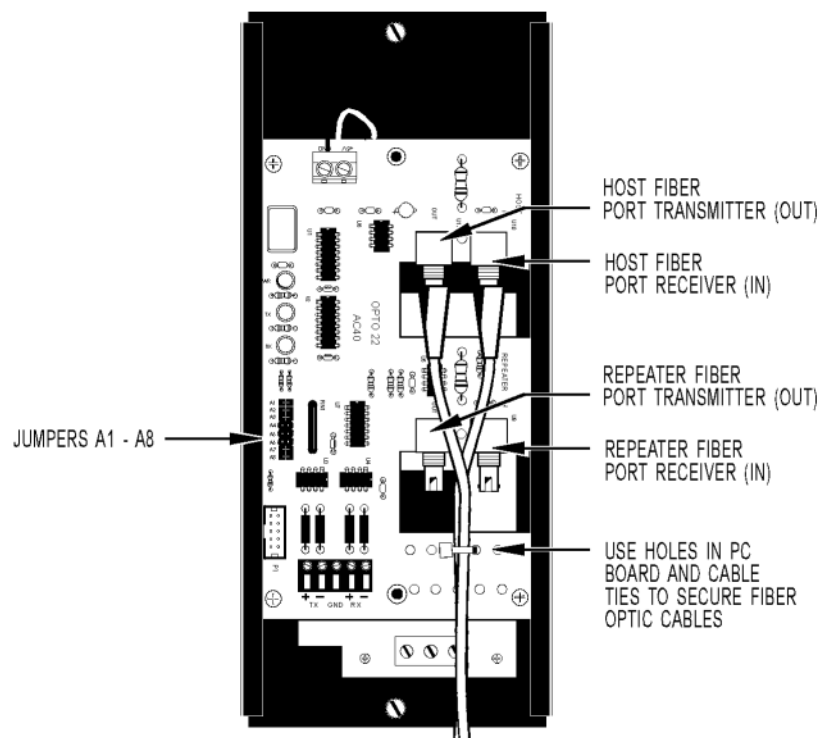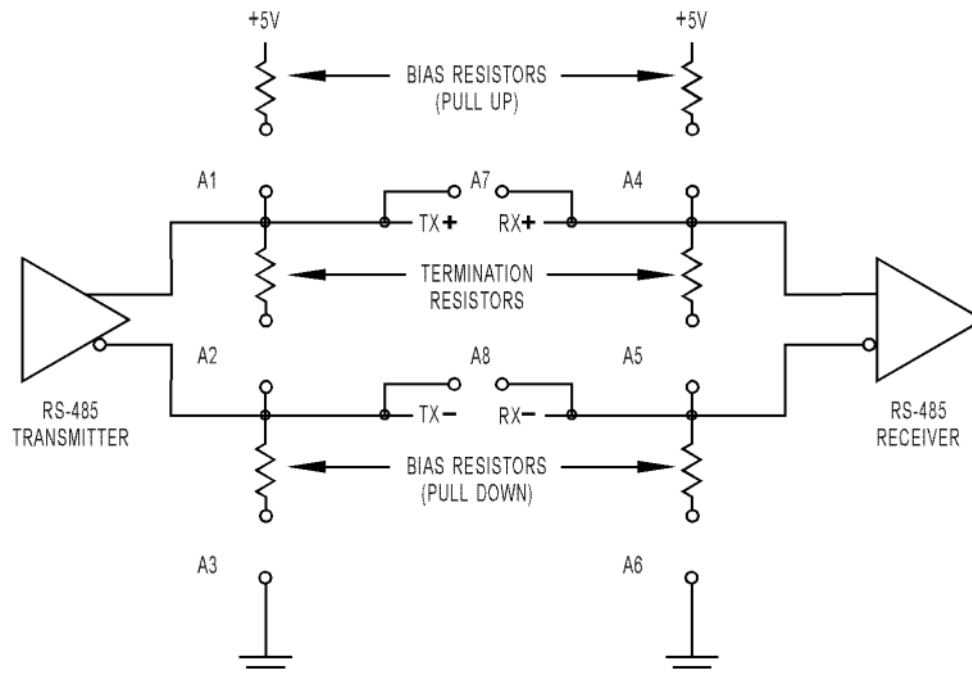
JUMPERING

A group of 8 jumpers labeled A1 - A8 is located on the left-hand side of the upper printed circuit board on the AC40. The jumpers are inserted to configure the AC40 RS-485 port. Jumpers A1 - A6 select various possibilities for biasing and termination of the RS-485 link.

Jumpers A7 and A8 are used to select 2-wire or 4-wire mode.

Mode	Install Jumpers
2-wire Terminated/Not Biased	A2, A7, A8
2-wire Unterminated	A7, A8
2-wire Terminated/Biased	A1, A2, A3, A7, A8 (AC40 is shipped with these jumpers installed.)
4-wire Unterminated	No Jumpers
4-wire Terminated/Biased	A1, A2, A3, A4, A5, A6
4-wire Terminated/Not Biased	A2, A5

When you configure your AC40 RS-485 communications link, keep these facts in mind:

1) RS-485 requires termination at both ends of the communications wiring.

2) The link must be biased in one place only.

3) Opto 22 remote Bricks have no bias or termination options.

4) The G4TERMR terminator does not have bias options.

5) When G4LC32 RS-485 serial ports are terminated, they are automatically biased.

6) Biasing is usually done at the "HOST" end.

REASSEMBLY

After all connections and jumpering are complete, the AC40 can be reassembled. It is important that all wires are routed so they will not be pinched by the case top. After case top has been placed on top of the case bottom, start both thumbscrews. Tighten both thumbscrews evenly until the top case is secured.
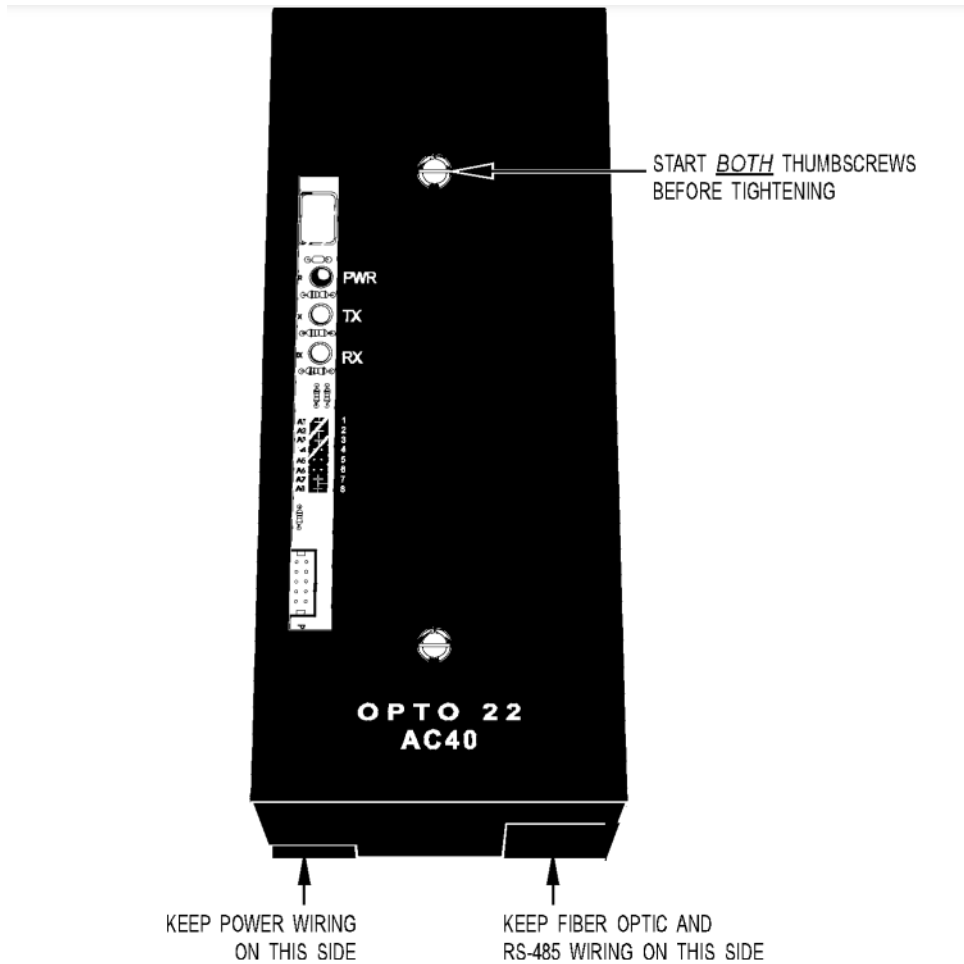
LEDS/DIAGNOSTICS

When power is applied to the AC40, the green LED labeled PWR is on. If it is not on, check voltage and polarity of input power.

When the LED labeled RX is illuminated, data is being received from the host fiber port and transmitted down the RS-485 port and the repeater fiber port.

When the LED labeled TX is illuminated, data is being received from either the repeater fiber port or the RS-485 port and transmitteddown the host fiber port.

The most common start-up problems on the AC40 are:

1) Receive and transmit fiber optic cables are swapped.

2) The RS-485 port is incorrectly jumpered. Check:

(a) 2-wire or 4-wire option

(b) termination at both ends

(c) biasing at one place only

3) The RS-485 port is incorrectly wired. Check:

(a) polarity of signals

(b) twisted pair cable must be used

DIMENSIONS
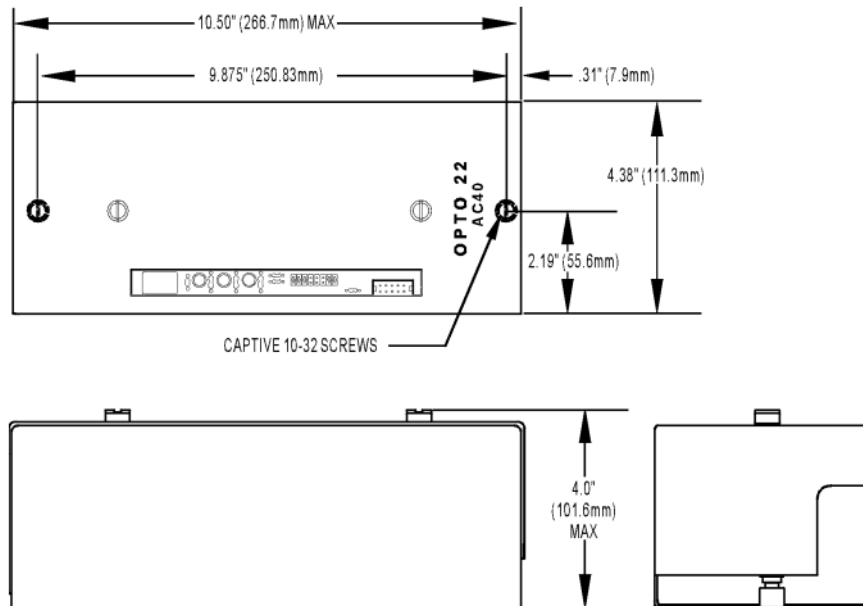
CABLE AND CONNECTOR MANUFACTURERS

Belden Wire And Cable

P. O. Box 1980

Richmond, IN 47375

800/235-3361

Model:

62.5/125 Single - 225811

62.5/125 Duplex - 225812

AT&T Network Systems

505 No. 51st. Avenue

Phoenix, AZ 85043

800/344-0223

Hewlett-Packard

3003 Scott Blvd.

Santa Clara, CA 95054

408/988-7000

DISTRIBUTOR OF FIBER OPTIC CABLES, CONNECTORS, AND ACCESSORIES

Fibertron

6400 Artesia Blvd.

Buena Park, CA 90620

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OPTO 22

PRODUCTS

Opto 22 develops and manufactures reliable, easy-to-use, open standards-based hardware and software products. Industrial automation, process control, remote monitoring, data acquisition, and industrial internet of things (IIoT) applications worldwide all rely on Opto 22.

groov RIO®

groov RIO edge I/O offers a single, compact, PoE-powered industrial package with web-based configuration and IIoT software built in, support for multiple OT and IT protocols, and security features like a device firewall, data encryption, and user account control.

Standing alone, *groov* RIO connects to sensors, equipment, and legacy systems, collecting and securely publishing data from field to cloud. Choose a universal I/O model with thousands of possible field I/O configurations, with or without Ignition from Inductive Automation®, or a RIO EMU energy monitoring unit that reports 64 energy data values from 3-phase loads up to 600 VAC, Delta or Wye.

You can also use *groov* RIO with a Modbus/TCP master or as remote I/O for a *groov* EPIC system.

groov EPIC® System

Opto 22's *groov* Edge Programmable Industrial Controller (EPIC) system gives you industrially hardened control with a flexible Linux®-based processor with gateway functions, guaranteed-for-life I/O, and software for your automation and IIoT applications.

groov EPIC Processor

The heart of the system is the *groov* EPIC processor. It handles a wide range of digital, analog, and serial functions for data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

In addition, the EPIC provides secure data communications among physical assets, control systems, software applications, and online services, both on premises and in the cloud. No industrial PC needed.

Configuring and troubleshooting I/O and networking is easier with the EPIC's integrated high-resolution color touchscreen. Authorized users can manage the system locally on the touchscreen, on a monitor connected via the HDMI or USB ports, or on a PC or mobile device with a web browser.

groov EPIC I/O

groov I/O connects locally to sensors and equipment. Modules have a spring-clamp terminal strip, integrated wireway, swing-away cover, and LEDs indicating module health and discrete channel status. *groov* I/O is hot swappable, UL Hazardous Locations approved, and ATEX compliant.

groov EPIC Software

The *groov* EPIC processor comes ready to run the software you need:

- Programming: Choose flowchart-based PAC Control, CODESYS Development System for IEC61131-3 compliant programs, or secure shell access (SSH) to the Linux OS for custom applications
- Node-RED for creating simple IIoT logic flows from pre-built nodes
- Efficient MQTT data communications with string or Sparkplug data formats
- Multiple OPC UA server options
- HMI: *groov* View to build your own HMI viewable on touchscreen, PCs, and mobile devices; PAC Display for a Windows HMI; Node-RED dashboard UI
- Ignition or Ignition Edge® from Inductive Automation (requires license purchase) with OPC-UA drivers to Allen-Bradley®, Siemens®, and other control systems, and MQTT communications

Older products

From solid state relays, to world-famous G4 and SNAP I/O, to SNAP PAC controllers, older Opto 22 products are still supported and working hard at thousands of installations worldwide. You can count on us for the reliability and service you expect, now and in the future.

QUALITY

Founded in 1974, Opto 22 has established a worldwide reputation for high-quality products. All are made in the U.S.A. at our manufacturing facility in Temecula, California.

Because we test each product twice before it leaves our factory rather than testing a sample of each batch, we can afford to guarantee most solid-state relays and optically isolated I/O modules for life.

FREE PRODUCT SUPPORT

Opto 22's California-based Product Support Group offers free technical support for Opto 22 products from engineers with decades of training and experience. Support is available in English and Spanish by phone or email, Monday–Friday, 7 a.m. to 5 p.m. PST.

Support is always available on our website, including free online training at OptoU, how-to videos, user's guides, the Opto 22 KnowledgeBase, and OptoForums.

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Opto 22 products are sold directly and through a worldwide network of distributors, partners, and system integrators. For more information, contact Opto 22 headquarters at **800-321-6786** (toll-free in the U.S. and Canada) or **+1-951-695-3000**, or visit our website at www.opto22.com.

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MADE IN THE USA

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