

ISOLATED MULTIDROP REPEATER

Features

- > The AC38 is an optically-isolated RS-485 repeater
- > AC38 can operate at up to 115.2K baud
- > The remote RS-485 port is always a 2-wire connection and the host RS-485 port can be 2-wire or 4-wire mode
- > Operating temperature: 0 to 70 °C



AC38A

DESCRIPTION

The AC38 is an optically-isolated RS-485 repeater. AC38 can operate at up to 115.2K baud and is completely independent of parity, stop bits, and data word size considerations. The AC38 has 3 connection ports; the host RS-485 port, the host RS-232 port, and the remote RS-485 port. The remote RS-485 port is always a 2-wire connection and the host RS-485 port can be 2-wire or 4-wire mode. The AC38 fully supports the Mystic protocol IRQ interrupt line.

***** NOTE: This product is obsolete and no longer available.*****

SPECIFICATIONS

Power Requirements	
AC38A:	120 VAC ± 10 VAC 60 Hz
AC38B:	240 VAC ± 20 VAC 50 Hz
Ambient Temperature:	
	0° C - 70° C 95% relative humidity, non-condensing
Host RS-485 Port:	
	3,000 feet maximum cable length twisted pair wire 2-wire or 4-wire hook ups Asynchronous operation, independent of baud rate, parity, stop bits or data word size 115.2 KBd maximum Supports Mystic IRQ interrupt line
Host RS-232 Port:	
	30 feet maximum 38.4 KBd maximum Mistic IRQ interrupt line is on pin 8 of connector (CTS) Has option jumpers to reverse pins 2 and 3
Remote RS-485 Port:	
	3,000 feet maximum cable length twisted pair wiring 2-wire hook-up only Asynchronous operation independent of baud rate, parity, stop bits or data word size 115.2 KBd maximum Supports Mystic IRQ interrupt line
Agency Approvals	
	UL, CE, CSA; UKCA

Part Number

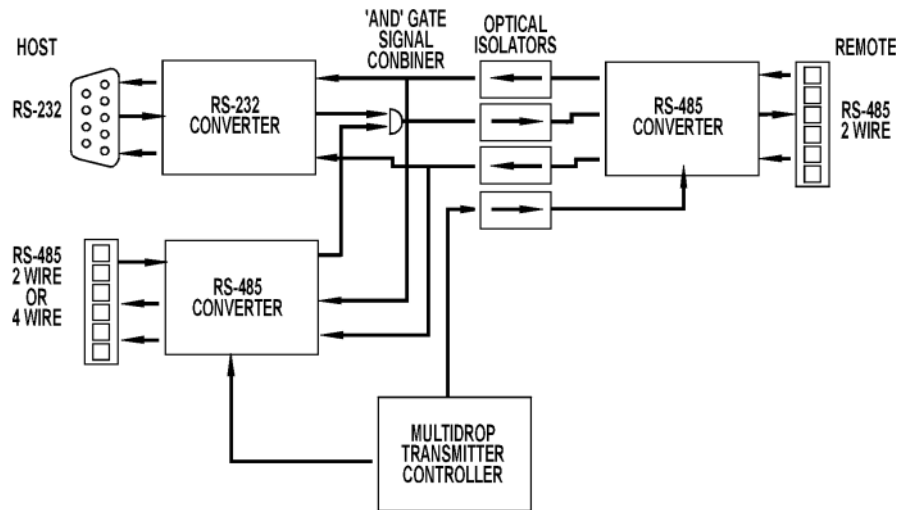
Part	Description
AC38A [Obsolete]	High Speed RS-485 Repeater 120 VAC [Obsolete]
AC38B [Obsolete]	High Speed RS-485 Repeater 220 VAC [Obsolete]

INTRODUCTION

The AC38 is an optically isolated 2-wire to 2-wire RS-485 repeater. The AC38 can operate at up to 115.2 Kbd and is completely independent of parity, stop bit, and data word size considerations.

The AC38 has three connection ports; the host RS-485 port, the host RS-232 port, and the remote RS-485 port.

The remote RS-485 port is always a 2-wire connection; the host RS-485 can be used in 2-wire or 4-wire mode. The host RS-232 port allows an interface with a maximum baud rate of 38.4 Kbd; this interface will echo any data transmitted out of it, and it will receive communication coming from either the HOST or REMOTE RS-485 ports provided it does not exceed 38.4 Kbd.



While the AC38 is primarily an RS-485 repeater, it can also perform other convenient functions.

These are:

RS-485 REPEATER

The AC38 may be used simply as an RS-485 communications line repeater. When used in this manner, it is typically the last drop of one RS485 link and the first drop of another. The AC38 will transfer data from one link to the other, amplifying the signal in the process. Up to 3,000 feet of cable and 32 drops are permitted on each RS-485 link. Electrical isolation exists between the two links.

RS-485 'T-BRANCH' OR 'STAR' ADAPTER

The AC38 also allows RS-485 communication links to be wired in a 'T' configuration. By making an AC38 one drop in the middle of an RS-485 link, data can be transferred to and from a separate communication.

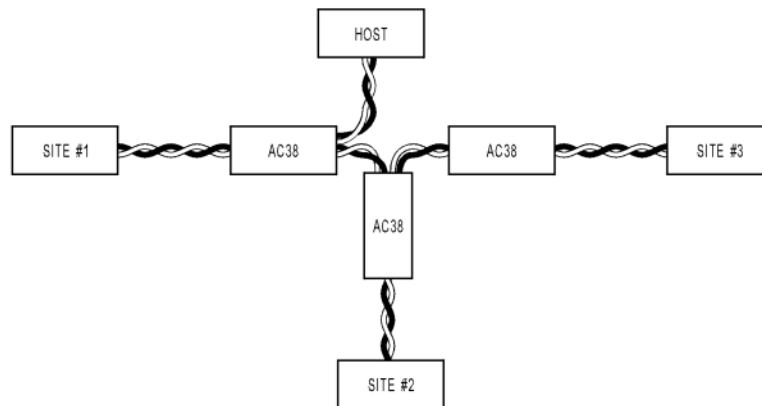
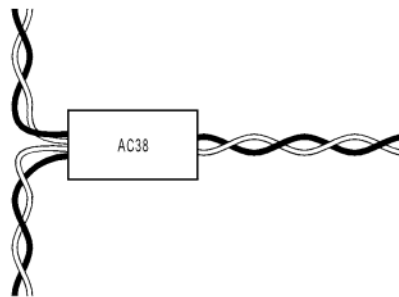
RS-232 TO RS-485 ADAPTER

The RS-232 port is designed to connect directly to an IBM AT RS-232 serial COM port, allowing it to be the host (master) of an Opto 22 Remote I/O Bus. The AC38 will convert the RS-232 signal to RS-485 while maintaining electrical isolation between the two links.

NOTE: The RS-232 port will automatically echo-back any data transmitted out of it, and it will receive communication coming from either the HOST or REMOTE RS-485 ports provided it does not exceed 38.4 Kbd.

4-WIRE RS-485/422 TO 2-WIRE RS-485 ADAPTER

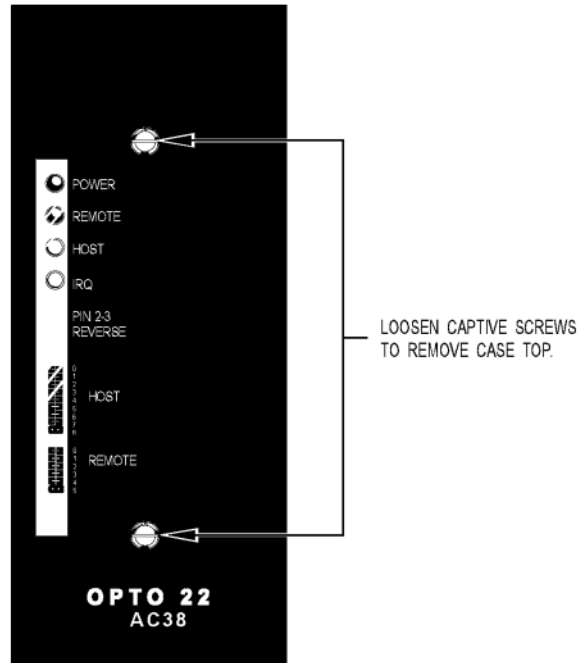
The AC38 may be used to convert RS-422 signals to RS-485. Many RS-422 communication ports do not have the ability to enable and disable the drivers used to transmit data and therefore cannot be used on a two-wire network. (The Remote I/O Bus is a two-wire communications network) The host RS-485 port of the AC38 may be used with either 4-wire or 2-wire communication lines. The AC38 will transfer data to and from the 2-wire network on the Remote port while maintaining electrical isolation from the host link.



When configuring RS-485 communication lines, it is important to remember that it must be terminated at each END of the link and that each link may have only TWO ends. Wiring RS-485 communication lines in a 'star' configuration is not permitted. If it is necessary to run a link in multiple directions, an AC38 may be used to bridge electrically separate links.

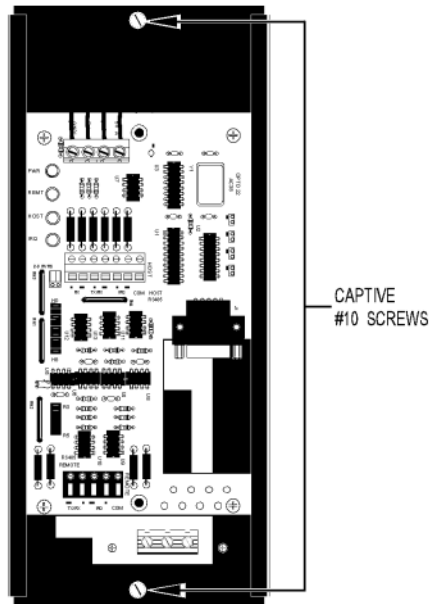
DISASSEMBLY

The AC38 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 AC38 counterclockwise.



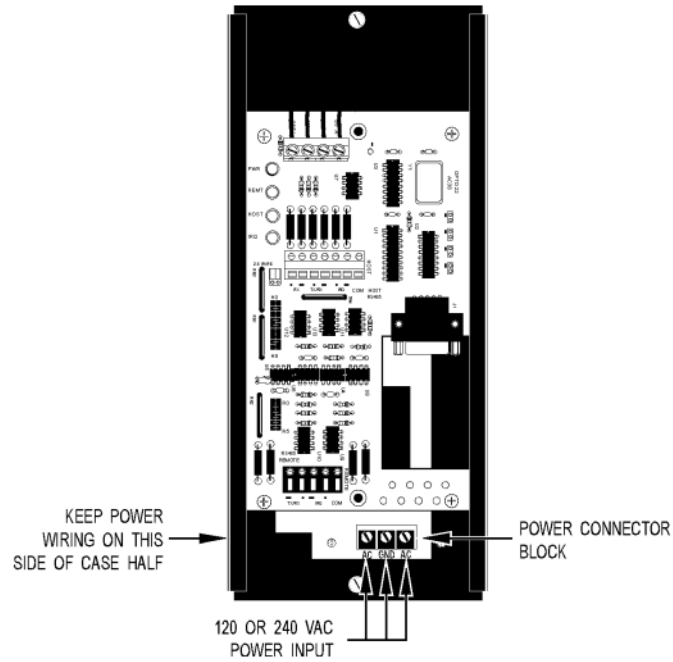
MOUNTING

The bottom case half has two captive #10 screws for mounting. If the AC38 is being mounted in a Mystic panel, it is typically mounted in the bottom left corner of the panel.

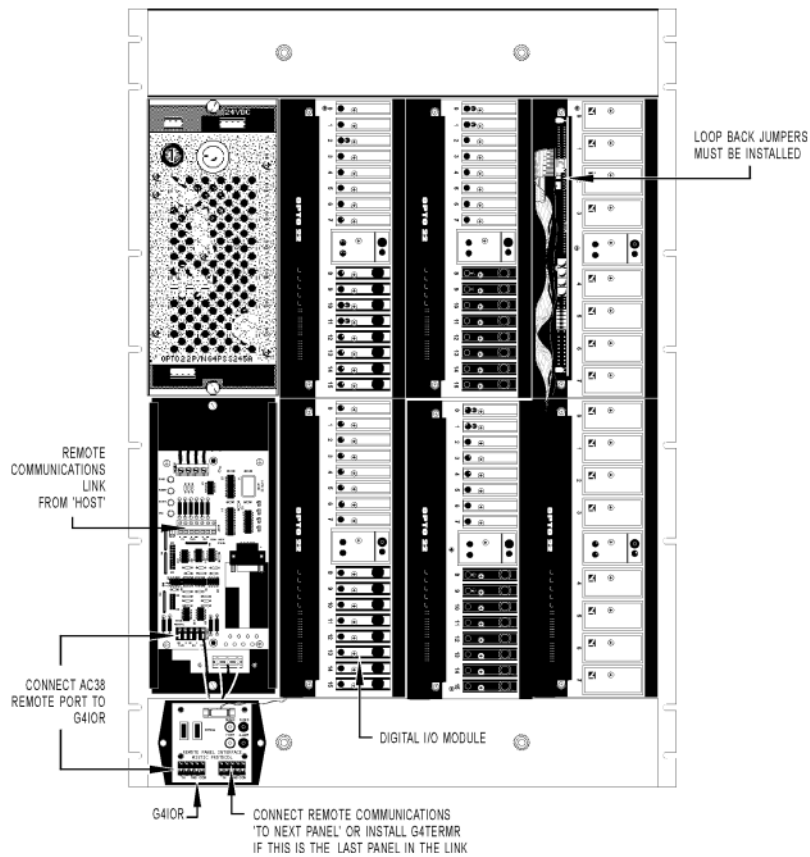


POWER WIRING

The AC38 has two different power supply options. The AC38A has a 120 VAC power requirement; the AC38B 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.



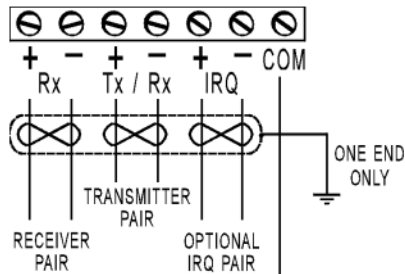
REMOTE PANEL WIRING



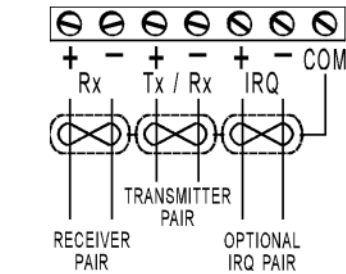
RS-485 CONNECTION

The AC38 has two RS-485 ports; the host port and the remote port. The remote port is 2-wire hook up only; the host port can be 2-wire or 4-wire. When the AC38 is being used to repeat a Mystic remote communications link, the host port will be wired for 2-wire operation. The IRQ line only repeats from the remote port to the host port.

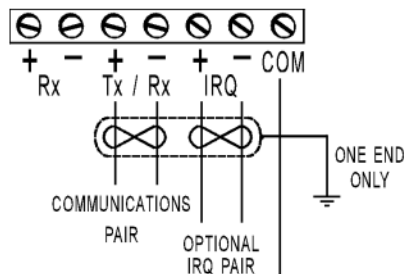
The following diagrams show recommended and alternate wiring for host 4-wire and 2-wire connections and for remote 2-wire connections.



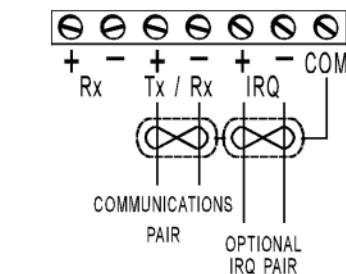
Recommended Host RS-485 4-Wire Connection



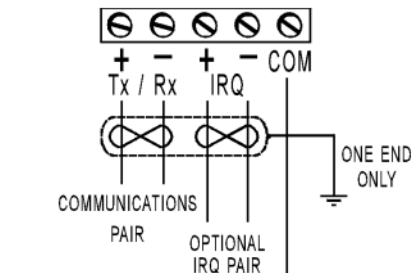
Alternate Host RS-485 4-Wire Connection



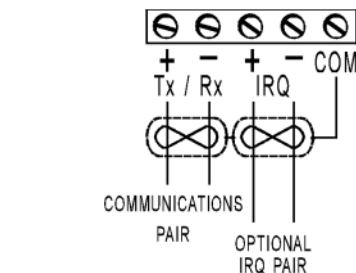
Recommended Host RS-485 2-Wire Connection



Alternate Host RS-485 2-Wire Connection



Recommended Remote RS-485 2-Wire Connection



Alternate Remote RS-485 2-Wire Connection

RS-232 CONNECTION

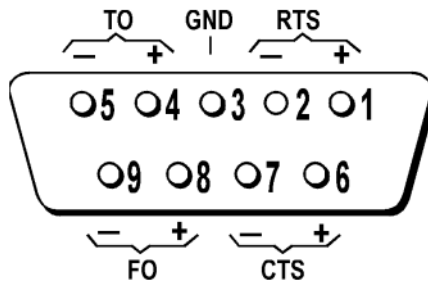
The AC38 has an RS-232 option for the host port which has been designed to connect directly to an IBM AT serial COM port. The RS-232 and RS-485 host port connections should not normally be used at the same time. Baud rates of 38,400 or less are compatible while using the RS-232 port. The pin assignments for the RS-232 DB-9 connector are:

Pins	
1	No Connection
2	RX/TX *
3	TX/RX *
4	N/C
5	Ground
6	No Connection
7	No Connection
8	CTS - Used as IRQ output from the AC38.
9	No Connection

* Using Jumper '2-3RVRS' to choose RX/TX

With the '2 - 3 RVRS' jumpers installed in the upper position, pin 2 of the DB-9 connector will be the transmit output from the AC38 and pin 3 will be the receive input to the AC38. This is the factory installed configuration.

With the '2 - 3 RVRS' jumpers installed in the lower position, pin 2 becomes the receive input to the AC38 and pin 3 becomes the transmit output from the AC38.



HOST RS-232 CONNECTOR FEMALE DB-9

RS-485 SERIAL LINE TERMINATION AND BIASING

Two groups of jumpers are provided which are used to connect terminating and biasing resistors. The group labeled H0 - H8 is used to configure the host RS-485 port while the group labeled R0 - R5 is used to configure the remote RS-485 port. The function of each jumper is as follows:

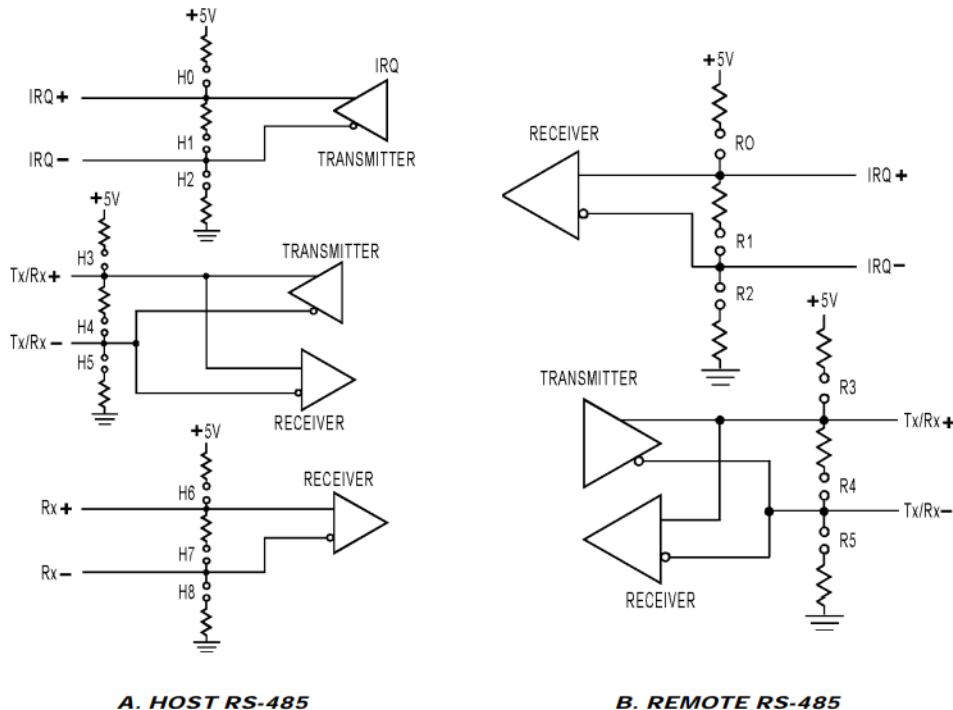
- | | |
|---|---|
| Jumper H0: Pull-up for host IRQ + line. | Jumper R0: Pull-up for remote IRQ + line. |
| Jumper H1: Terminator for host IRQ lines. | Jumper R1: Terminator for remote IRQ lines. |
| Jumper H2: Pull-down for host IRQ - line. | Jumper R2: Pull-down for remote IRQ - line. |
| Jumper H3: Pull-up for host TX/RX + line. | Jumper R3: Pull-up for remote TX/RX + line. |
| Jumper H4: Terminator for host TX/RX lines. | Jumper R4: Terminator for remote TX/RX lines. |
| Jumper H5: Pull-down for host TX/RX - line. | Jumper R5: Pull-down for remote TX/RX - line. |
| Jumper H6: Pull-up for host RX + line. | |
| Jumper H7: Terminator for host RX lines. | |
| Jumper H8: Pull-down for host RX - line. | |

RS-485 communication links must be terminated at both ends and biased at only one place. When using a G4LC32 RS-485 serial port, biasing is done automatically when terminators are installed.

When using the AC38 as a simple, 2-wire repeater located at the end of both RS-485 links, jumpers H0, H1, H2, H4, H6, H7, H8, and all remote port jumpers, R0 - R5, should be installed. If biasing is needed on the host link, jumpers H3 and H5 should be installed.

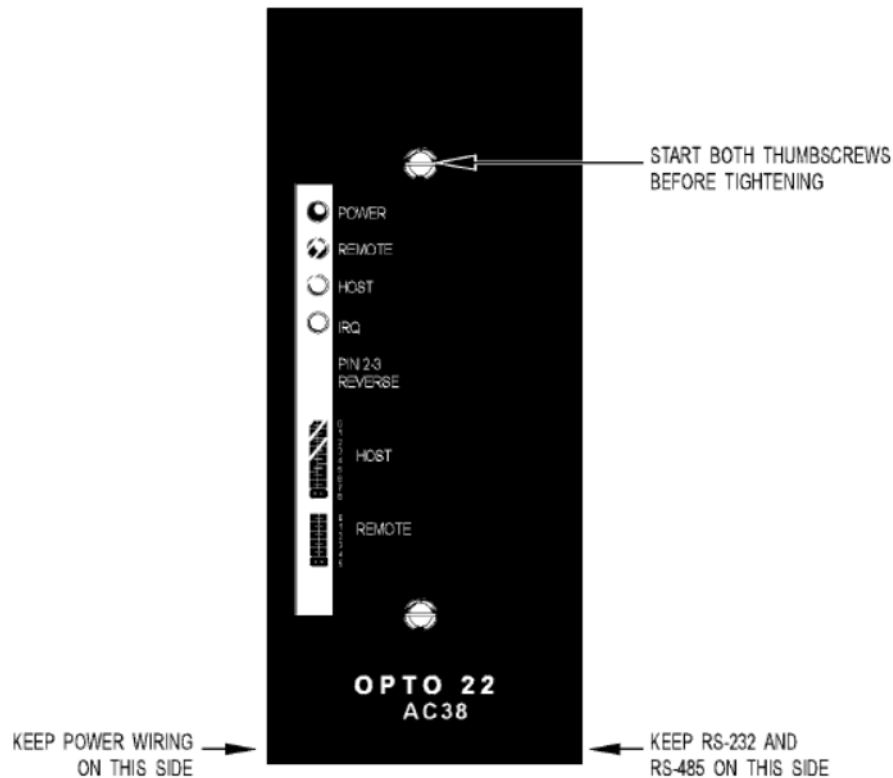
When using the AC38 as an RS-232 to RS-485 converter, all host and remote port jumpers should be installed.

When the AC38 is used anywhere except the end of a link, the appropriate jumpers should be removed to disconnect terminating and biasing resistors.



REASSEMBLY

After all connections and jumperings are complete, the AC38 can be reassembled. It is important all the wires are routed so they will not be pinched by the case top. After the 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

When power is applied to the AC38, the green LED labeled PWR should glow. If it does not, check voltage and hook up of input power.

When the LED labeled HOST is illuminated, data is being received from the host port and transmitted out the remote port.

When the LED labeled REMOTE is illuminated, data is being received from the remote port and transmitted out the host port.

When the LED labeled IRQ is illuminated, the remote port has activated the interrupt line.

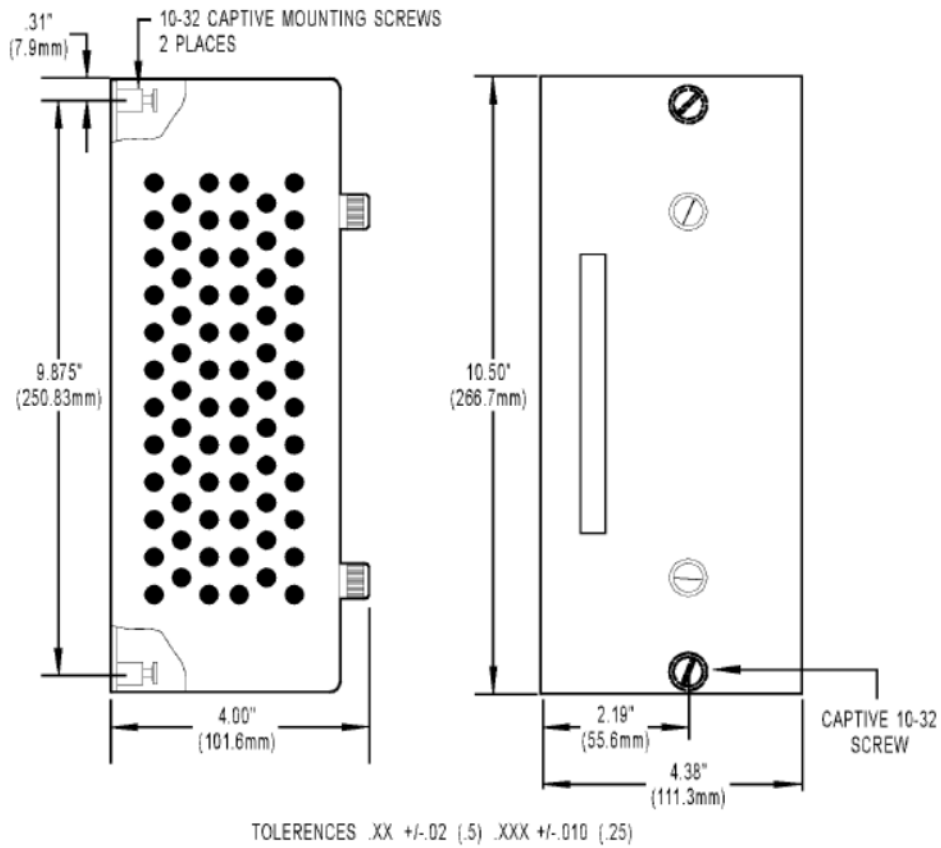
CABLES

RS-485 serial lines require twisted pair cable. Maximum cable length is 3,000 feet. The recommended cable type is 2 twisted pair of 24 gauge conductors with a shield. Nominal impedance is 100 ohms and capacitance is 12.5 picofarads per foot. Typical manufacturer part numbers are:

Manhattan Electric Cable - M3475

Belden Wire and Cable - 9729

DIMENSIONS



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](#).

PURCHASING OPTO 22 PRODUCTS

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.

