

SCI MODULE



RS232 / RS485 CONVERTOR



FEATURES

- Rugged design
- Simple to use
- Visible power, receive, transmit, and DTR LEDs
- Three possible mounting arrangements
- 120 VAC or 220 VAC plug-in adapter included
- Two interface cables provided
- Suitable for use with direct or modem communications

DESCRIPTION

The RS232/RS485 is a self-contained device for converting RS232 signals into RS485 signals. Its simple design makes it ideal for use with all Multilin products in direct and modem communications.

INSTALLATION

CONTROL VOLTAGE

The RS232/RS485 Convertor power pack should be plugged into a standard power outlet. The output end should be plugged into the jack labeled "POWER" on the convertor.

The AC power adapter comes in either 120 or 220 VAC input voltages. The input voltage must be specified when ordering.

The 120 VAC adapter has a standard North American plug, as shown in Figure 1.

The 220 VAC adapter has been designed for international markets where normal household voltage is 220 VAC. Its plug is also shown in Figure 1.

MOUNTING

The RS232/RS485 Convertor module should be mounted or positioned close to the serial communication port on your computer. It should be set up such that the four LEDs on the front of the unit are visible. Three different mounting arrangements are possible:

ADAPTER PLUGS

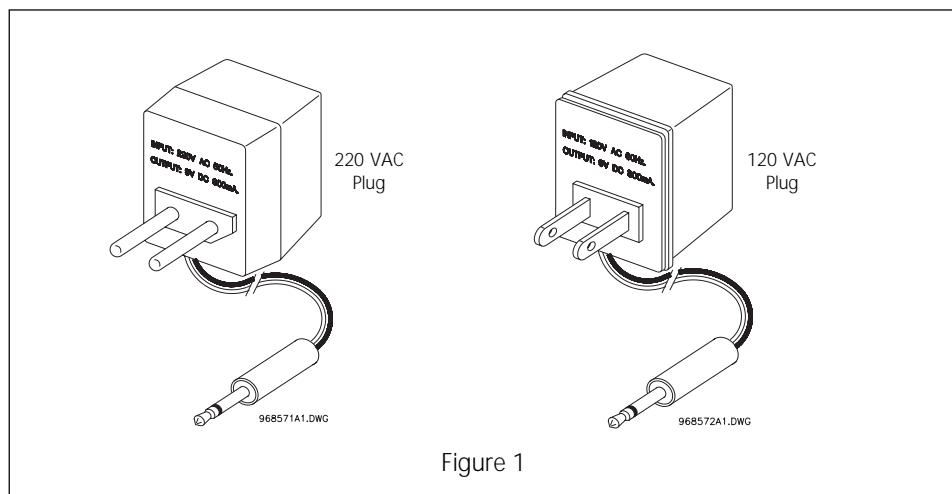


Figure 1

SCI MODULE



INSTALLATION

mounting angles for permanent attachment to a surface, dual sided adhesive material for attachment to the side of a computer or desk, and rubber feet for free standing mounting. These can be used as shown in Figure 2. Mounting details and physical dimensions are also shown in Figures 2 and 3.

DIRECT COMMUNICATIONS

The 9 pin male connector end of the interface cable must be plugged into the 9 pin female connector labeled "RS232" on the convertor. The other end of the interface cable will be a female connector with either 25 or 9 connections (both cables are included in the package). This end should be plugged into the serial port of your computer. Some computers have 9 pin serial ports and some have 25 pin serial ports. Use the cable appropriate to your computer. See Figure 4.

RS485 requires a shielded twisted pair of wires to be connected between each Multilin product and the RS232/RS485 convertor. Polarity is very important in RS485 connections. The "+" (or "A") terminals of all devices must be connected together; likewise with the "-" (or "B") terminals and the shield terminals. It is very important that the shield connection is grounded in one place only to prevent a difference in ground potential between relays. If a ground potential of greater than 10V exists between

relays, communication on the RS485 may become impossible. For this reason, the RS232/RS485 convertor has a terminal labeled "GND". This terminal is internally connected to the computer's ground. The shield may then be inserted in this terminal to bring all isolated relays on the link to a common ground with the computer. External grounding of the shield is not necessary if it is connected to the "GND" terminal. Up to 32 Multilin relays per serial port can be connected together in a daisy chain fashion as shown in Figure 5.

The RS232/RS485 convertor has terminals labeled "+" and "-".

Depending on the length of the RS485 wires and the level of electrical noise, two terminating resistor-capacitor networks may be required as shown in Figure 5. These resistor-capacitor networks prevent unwanted voltage signal reflection at each end of the communication link. They must be connected at each end of the communication link only, not on all of the devices on the link.

MODEM COMMUNICATIONS

To use a modem facility, a setup as in Figure 6 is required. One modem is connected directly to the computer. Another modem and a RS232/RS485 convertor module is required at the remote site. This is all the hardware that is required for one remote site. Another modem

and RS232/RS485 convertor are required for each additional site.

The local modem is under direct control of the computer. This setup is typically configured in the communications software used, such as Multilin's RelayCom. The remote modem operates completely independently, so it must be configured prior to installation. Configure it as follows:

1. DTR always asserted.
2. Autoanswer mode.
3. No handshaking/no flow control.
4. Error Control/ARQ disabled

For modem communications, the RS232/RS485 convertor's DIP switches SW1 and SW2 inside the case must be set as follows:

DIP SWITCHES	FOR MODEM
SW1-1	ON
SW1-2	OFF
SW1-3	ON
SW1-4	OFF
SW2-1	OFF
SW2-2	ON
SW2-3	OFF
SW2-4	ON

MOUNTING AND PHYSICAL DIMENSIONS

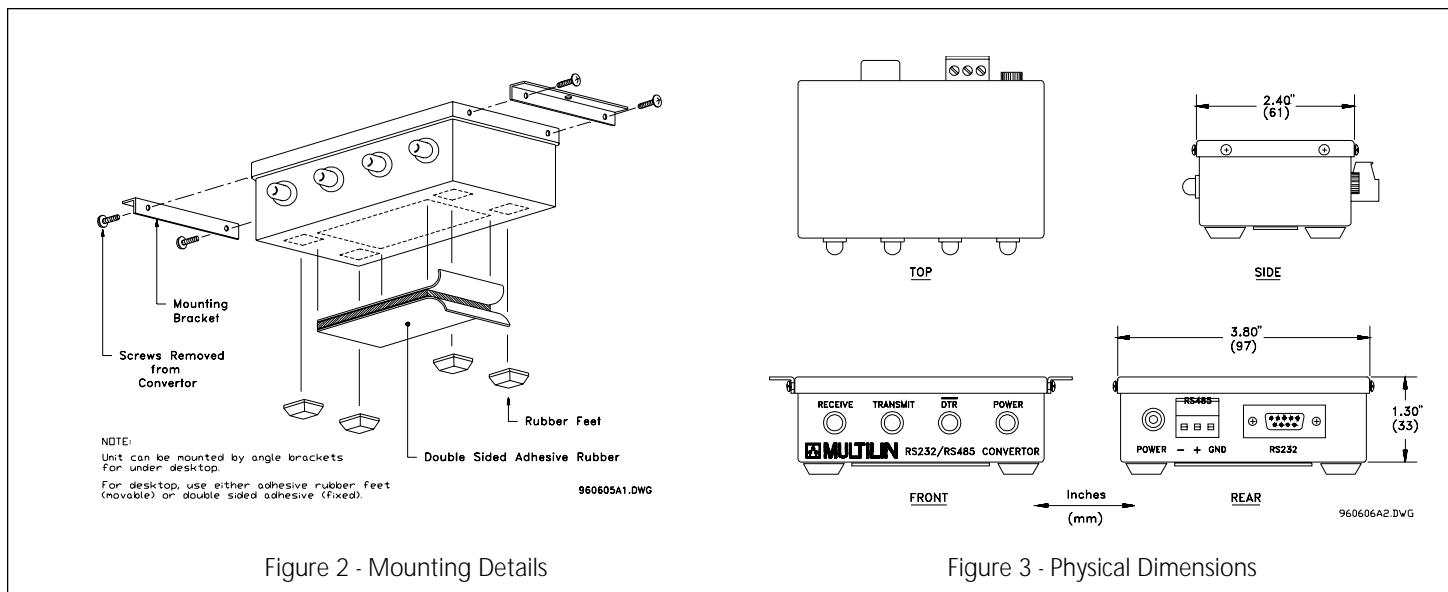


Figure 2 - Mounting Details

Figure 3 - Physical Dimensions

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COMMUNICATIONS

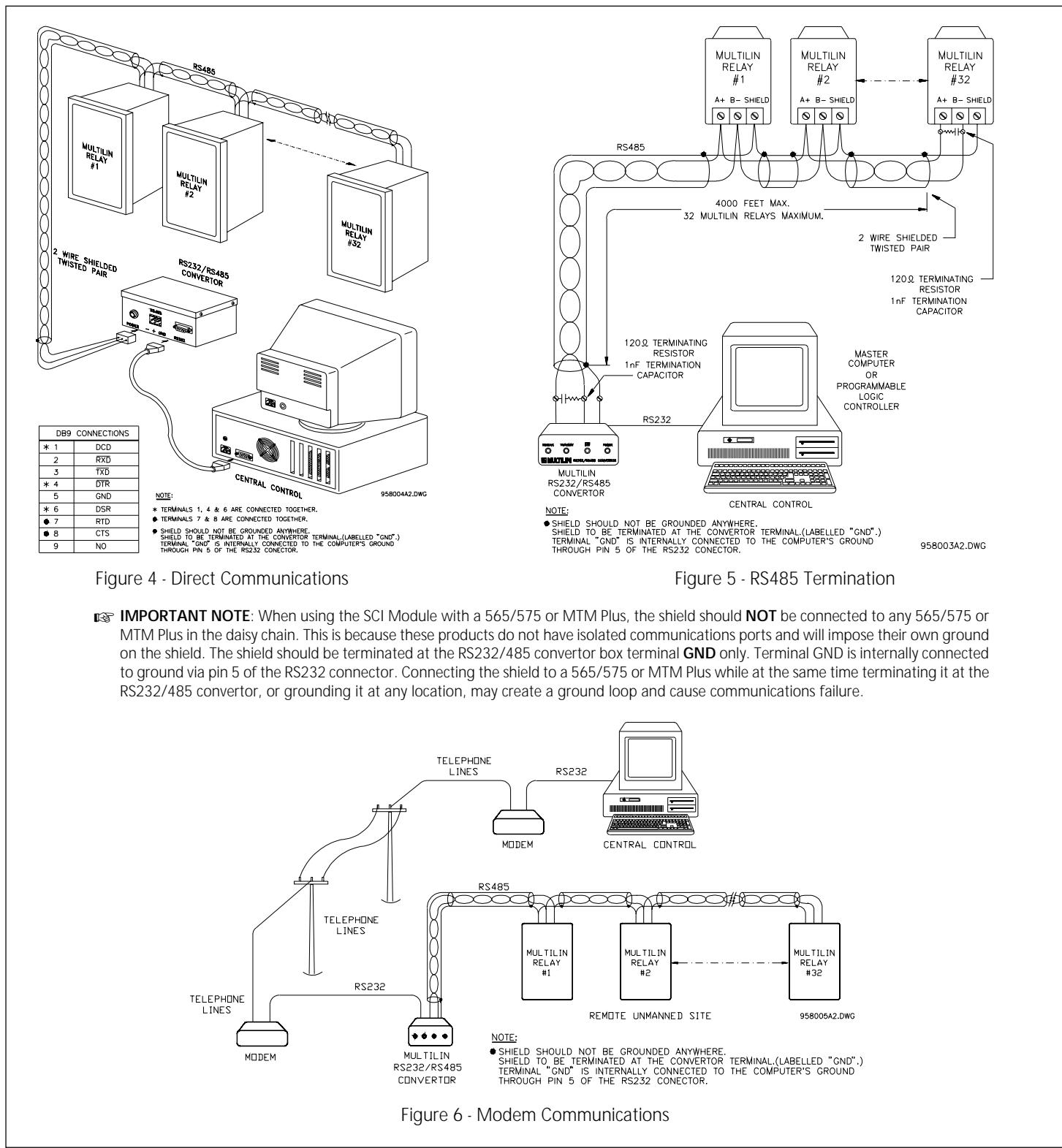


Figure 4 - Direct Communications

Figure 5 - RS485 Termination

IMPORTANT NOTE: When using the SCI Module with a 565/575 or MTM Plus, the shield should **NOT** be connected to any 565/575 or MTM Plus in the daisy chain. This is because these products do not have isolated communications ports and will impose their own ground on the shield. The shield should be terminated at the RS232/485 convertor box terminal **GND** only. Terminal GND is internally connected to ground via pin 5 of the RS232 connector. Connecting the shield to a 565/575 or MTM Plus while at the same time terminating it at the RS232/485 convertor, or grounding it at any location, may create a ground loop and cause communications failure.

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CONFIGURATION

The convertor box is configurable via three internal DIP switch banks which are accessible by removing the convertor box's cover.

DIRECTION CONTROL

Two-wire RS485 is by nature half duplex and requires a means for switching between a receive or transmit state. The means for doing this is configurable as either data-controlled or master-controlled via the DTR signal. Data-controlled requires no control signals from the master device (RS232 side) to switch transmission modes; in cases where the master (eg. PLC) is not easily programmed this will be the preferred method. DTR-controlled requires the master to toggle the DTR signal to switch modes (DTR low transmit; DTR high receive). DIP switch 1 (SW1) configures the direction control mode as indicated by the following table:

SW1	-1	-2	-3	-4
*Data Controlled	ON	OFF	ON	X
DTR Controlled	OFF	ON	OFF	X

* Factory Default

CONNECTION TYPE

The convertor may be set up for use with a direct connection to RS485 slave devices or with a connection via a modem. The modem setting simply reverses the transmit/receive data lines on the RS232 side. DIP switch 2 (SW2) configures the connection type as indicated by the following table:

SW2	-1	-2	-3	-4
*Direct	ON	OFF	ON	OFF
Modem	OFF	ON	OFF	ON

* Factory Default

BAUD RATE

The convertor may be used with devices communicating at baud rates 300, 1200, 2400, 4800, 9600, and 19.2k. DIP switch 3 (SW3) configures the baud rate by properly adjusting the Receive Enable delay signal as indicated by the following table. SW3 settings are only relevant when in data controlled mode. See Direction Control for details.

SW3	-1	-2	-3	-4	-5	-6
300	ON	OFF	OFF	OFF	OFF	OFF
1200	OFF	ON	OFF	OFF	OFF	OFF
*2400	OFF	OFF	ON	OFF	OFF	OFF
4800	OFF	OFF	OFF	ON	OFF	OFF
9600	OFF	OFF	OFF	OFF	ON	OFF
19200	OFF	OFF	OFF	OFF	OFF	ON

* Factory Default

DEBUGGING

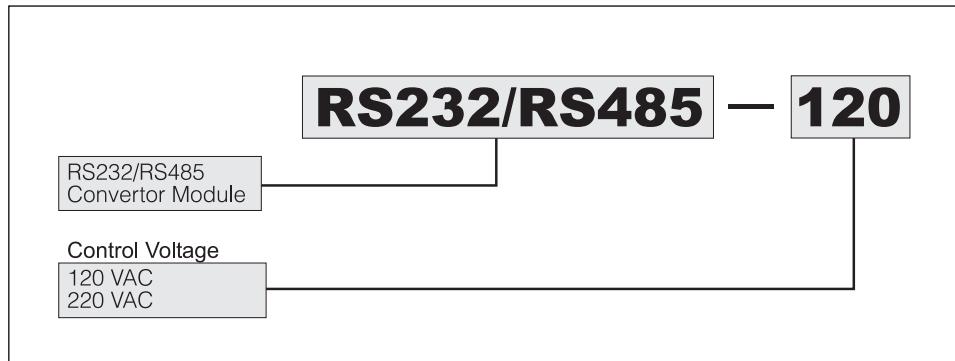
The four LEDs on the cover of the convertor (RECEIVE, TRANSMIT, DTR, and POWER) can be very useful for debugging RS485 communications. Under normal operations the following sequence should occur for the LEDs:

- | | |
|-----------------|--|
| 1. DTR ON | Convertor switched to transmit state from computer |
| 2. TRANSMIT ON | Data being transmitted from computer to relay(s) |
| 3. TRANSMIT OFF | Data transmission complete |
| 4. DTR OFF | Convertor switched to receive state from relay(s) |
| 5. RECEIVE ON | Data being received from relay(s) to computer |
| 6. RECEIVE OFF | Data reception complete |

At baud rates above 300 some of the steps appear to happen simultaneously; however, all three of the LEDs should be flashing on and off. If any of the LEDs do not come on the following suggestions might help:

- | | |
|-------------------------|--|
| 1. DTR remains ON/OFF | If you are using DTR-controlled switching then the master (computer) is not using DTR properly. If using data-controlled switching then the convertor is malfunctioning; contact Multilin. |
| 2. TRANSMIT remains OFF | The master (computer) is not transmitting any data or the RS232 connection may be faulty. |
| 3. RECEIVE remains ON | An RS485 slave device is biasing the line and preventing communications from occurring. Try removing all devices but one from the line. |
| 4. RECEIVE remains OFF | The RS485 slave device is not responding. This is the most common problem and may have several causes. Ensure that the correct data is being sent to the correct device address. Ensure that the polarity of the RS485 line is correct. Ensure that grounding of the RS485 devices is correct. |
| 5. POWER remains OFF | The convertor is malfunctioning; contact GE Power Management. |

ORDER CODE



1601-0063-A3