

## MODEL RS485MS-2W COMMUNICATIONS MODULE



II-RS485MS-2W-C

## DANGER!



HAZARDOUS VOLTAGES MAY BE PRESENT DURING INSTALLATION.

Electrical shock can cause death or serious injury.

Installation should be done by qualified personnel following all national, state and local electrical codes.



**BE SURE POWER IS DISCONNECTED PRIOR TO INSTALLATION!  
FOLLOW NATIONAL, STATE AND LOCAL CODES.  
READ THESE INSTRUCTIONS ENTIRELY BEFORE INSTALLATION.**

SymCom's Communications Module Model RS485MS-2W serves two very important functions. From a communication network view, it's primary purpose is to electrically isolate the communications network from the high voltages present in SymCom's units and to convert the communications signals from the microprocessor's 5-volt levels into RS-485 levels. The second function of the RS485MS-2W is to provide power to the RM-1000 remote monitor.

**NOTE: If needed, the Control Power for the communication modules is to be provided by an isolated 12VDC source with 4 Amp maximum overcurrent protection.**

SymCom's units are connected to high AC voltages with a floating ground circuit. As long as there are three balanced line voltages present, the resulting ground level will often be near case ground. However, if one phase is lost or if the line voltages become unbalanced, the floating ground may be as much as 480 volts above the case ground. The RS485MS-2W has two high speed optical isolation chips on the transmit/receive pins and a low speed opto-isolator on the transmit/receive pin to isolate the communication network from the AC line voltages.

The signals from the microprocessor go through resistors to provide current limiting before connecting to the 9-pin external connector. Therefore, the 9-pin SUB-D connector on the SymCom unit provides un-isolated CMOS signals and is NOT RS-232 or TTL compatible. The RS485MS-2W does not have support for four-wire communications systems.

**NOTE: Do not plug a modem or any other PC compatible device directly into the 9-pin SUB-D connector on SymCom's units.**

### RS-485 Networking

To utilize SymCom's RS-485 network, three key components are required:

1. **Modbus Slave Device** – SymCom's model series 601, 77C, or 777-P2 with the Model RS485MS-2W communications module.
2. **18 to 24 AWG shielded twisted-pair cable** - The twisting of the wires helps minimize the effect of noise on the data signal.
3. **Modbus Master Device** – RM-1000, RM-2000, PLC, or PC. On a PC, PC compatible device, and on a PLC without an RS-485 port, an RS-485 to RS-232 converter is required. Another option available is to use an RS-485 to RS-232 converter in conjunction with an RS-232 to USB adapter for PC use.

## **WIRING**

### **Slave Side:**

The terminals of the RS485MS-2W are marked as follows:

<b>Terminal</b>	<b>Function</b>
A	RS-485 A Connection
B	RS-485 B Connection
S	Shield Connection
V+	Positive power connection for the RM-1000
V-	Negative power connection for the RM-1000
R	External reset connection
R	External reset connection
G	Reserved, do not use
P	Reserved, do not use

### **Master Side:**

#### **RS-485 to RS-232 converter:**

The converter is a port-powered device that changes TD and RD RS-232 lines to balanced half-duplex, two-wire RS-485 signals. Send Data Control automatically enables the RS-485 driver when data is present on the RS-232 side. The converter has a DB-9 female connector on the RS-232 side and on the RS-485 side terminal blocks for signal and DC power supply connections. An optional power supply may be required for laptops or other computers with low power serial ports.

The converter will work with only a few RS-485 devices attached within a few hundred feet. This configuration normally will not require terminating resistors on the RS-485 network. If you have very many RS-485 devices or the network must span several hundred feet or more, you may need to connect a 12-volt DC external power supply to the converter. Terminating resistors may also be required; one set of 120-ohm resistors should be placed at the two extreme ends of the network across the A and B terminals. Only two terminating resistors are permitted on each twisted pair of wires in the network. If the converter is being used along with 120-ohm terminating resistors, external power will be required (see Figure 2.).

When connecting more than one SymCom unit on an RS-485 network, only one unit is connected to the RS-485 to RS-232 converter with A to RD (B) and B to RD (A). All remaining units are wired with terminals labeled A connected together and terminals labeled B connected together.

## **TROUBLESHOOTING COMMUNICATIONS PROBLEMS**

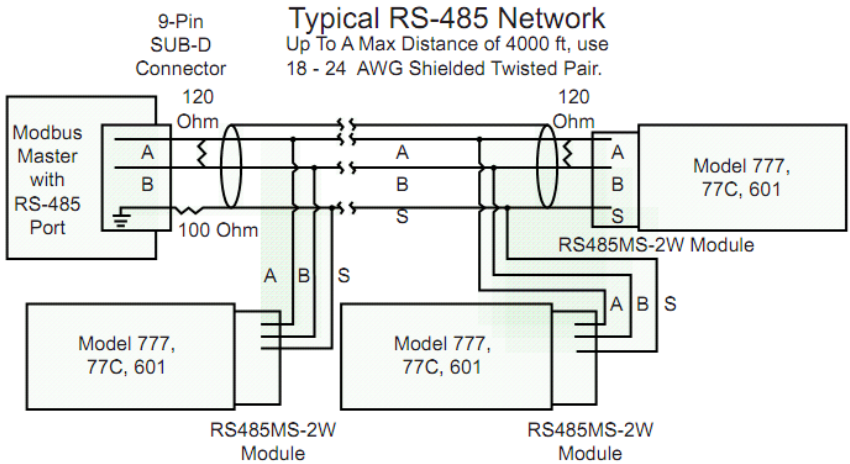
NOTE: In this section, "Model 777" refers to any SymCom RS-485 compatible unit.

If there are no communications, check the following:

1. Visually check that the wires are physically connected to the network adapters. If the connections are OK, check the network wires. If possible, use an Ohmmeter to verify the continuity of each wire.
2. Verify the network connections and jumpers with the wiring schematic. If your installation does not use the RS-485 to RS-232 converter and the wiring diagram in figure 2 does not apply; try switching the polarity of the wires. In other words, switch the connections at the A and B terminals of the RS485MS-2W module. If possible, send a START or STOP command from the Modbus Master device to the Model 777, since the START and STOP commands will be executed whether or not the Model 777 returns an acknowledgement.
3. If a PC is used as the Master device, check the serial port on the PC. You will need a voltage meter to measure voltages on the connectors of the converter and the RS485MS-2W module. The voltages are measured in the DC 10 volt range between case ground on the computer or the metal sheath of the DB-9 converter to the RD(B) connection of the converter module or to the (A) or (B) connections on the RS485MS-2W module. Close the COMM port by shutting down the Modbus Master program. Leave the converter module plugged into the COMM port on your computer, but unplug the RS485MS-2W module from the Model 777. The COMM port should not be open so there should be no voltage at connections A and B on the RS485MS-2W module. Measure the voltage with the voltage meter's positive probe touching the (A) terminal of the RS485MS-2W module and the

voltage meter's negative probe touching the PC's case. If the case is not metal, such as a laptop computer, you can use the metal shell of the DB-9 connector of the RS-485 to RS-232 converter for a ground. If there is a voltage present, there may be another program using the RS-232 port on the PC. Next, open the COMM port by starting the master program. When the RS-232 port is opened. You should be able to measure around 4 volts at the RD (B) connection of the RS-485 to RS-232 converter. You should also be able to measure 4 volts on the (A) connection of the RS485MS-2W module that plugs into the Model 777. You should measure 0 volts on the (B) connection. If the voltages are switched at (A) and (B), the polarity is not correct and the two wires should be switched. If you do not measure 4 volts on the (A) connections of the RS485MS-2W module, the RS-232 port may not be opened correctly and Modbus Master Program will not be able to talk to the Model 777.

If you continue to have problems, please contact SymCom, Inc. at 800-843-8848 or 605-348-5580.



**Figure 1: Typical RS-485 Network**

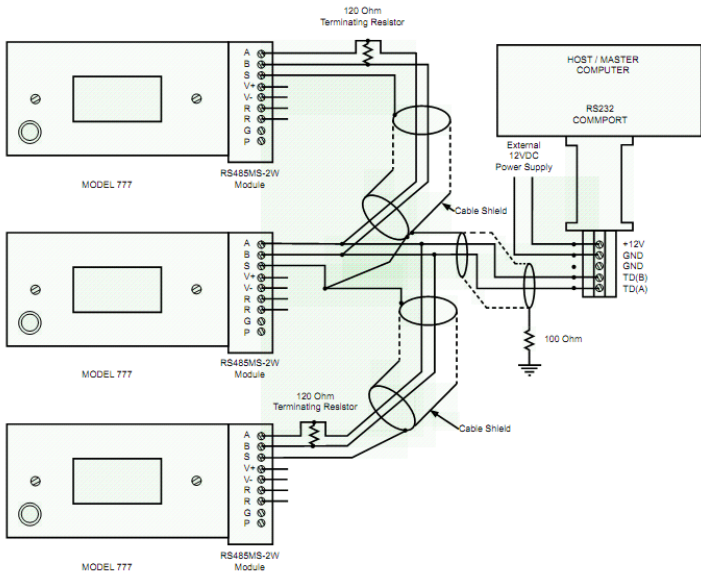


Figure 2: Basic Extended Network Diagram

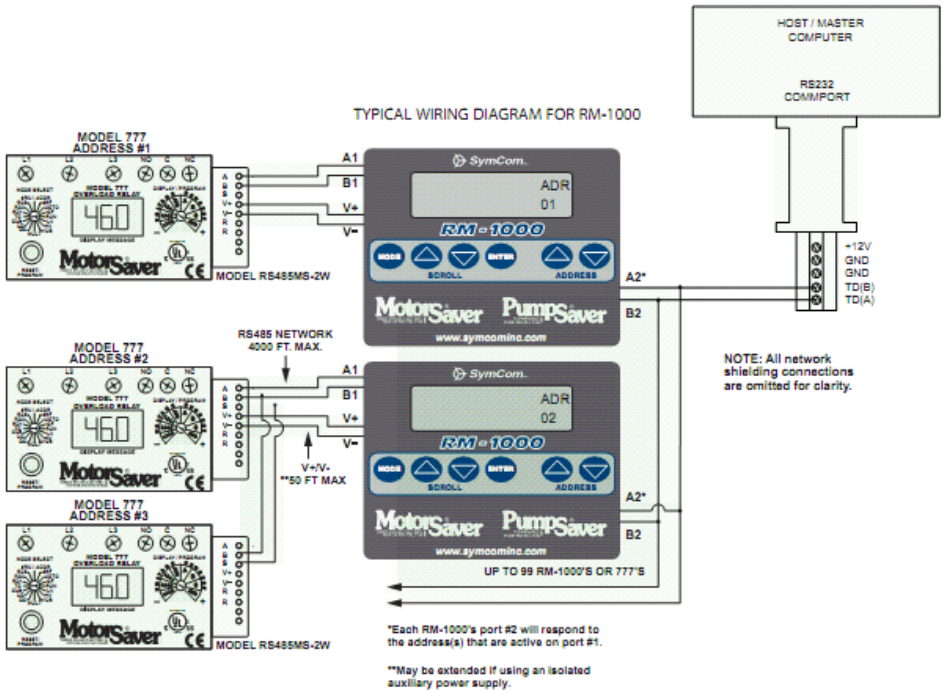
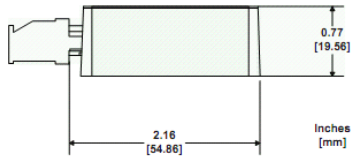
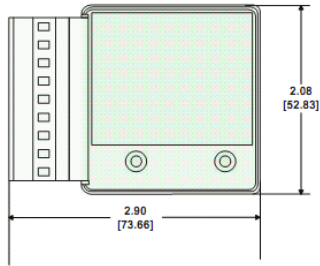


Figure 3: Basic RM-1000 Network

## DIMENSIONS



## **MODEL RS485MS-2W SPECIFICATIONS**

<b>Functional Characteristics</b>	
Remote Reset	Optional normally open pushbutton switch rated 24VDC, 10mA (min.)
<b>General Characteristics</b>	
Operating Temperature	
Ambient Operating	-20° to 50°C (-4° to 122°F)
Terminal (depluggable terminal block)	
Torque	3 in.-lbs. (max)
Wire AWG	18 - 24 AWG
Class of Protection	IP20
Relative Humidity	10 – 95%, non-condensing per IEC 68-2-3
Standards Passed	
Electrostatic Discharge (ESD)	IEC 61000-4-2, Level 3, 6kV contact, 8kV air
Radio Frequency Immunity, Radiated	150MHz, 10V/m
Fast Transient Burst	IEC 61000-4-4, Level 3, 4kV input power
Hi-Potential Test	Meets UL508 (2 x rated V + 1000V for 1 minute)
Surge	
Input Power	IEC 61000-4-5, Level 1
Inputs/Data Lines	IEC 61000-4-5, Level 2
Safety Marks	
UL	UL508 (#E68520)
CE	IEC 60947
Enclosure	Polycarbonate
Dimensions	2.08" H x 2.90" W x 0.77" D (52.83 x 73.66 x 19.56 mm)
Weight	0.26 lb. (4.16 oz, 117.93 g)
Mounting Method	9-pin SUB-D connector on the side of a 777-Series

For warranty information, please see **Terms and Conditions** at  
[www.symcom.com](http://www.symcom.com)

Visit us at [www.symcom.com](http://www.symcom.com) to see  
our complete product listing!

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800-843-8848