RELIANCE ELECTRIC

Serial Converter Module

M/N MDCOMM-232

Instruction Manual D2-3502

Rockwell Automation

The information in this manual is subject to change without notice.

Throughout this manual, the following notes are used to alert you to safety considerations:

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

Important: Identifies information that is critical for successful application and understanding of the product.

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this manual in its entirety before proceeding. Failure to observe these precautions could result bodily injury and/or damage to equipment.

ATTENTION: If the Serial Converter is transmitting control I/O to the product (indicated by a steady green diamond LED on the Serial Converter), the product may fault when you remove or reset the Serial Converter. Determine how your product will respond before removing or resetting a connected Serial Converter. Failure to observe this precaution could result bodily injury and/or damage to equipment.

ATTENTION: The setting of Comm Flt Action (04) determines the action of the Serial Converter and connected product if DF1 serial communications are disrupted. By default, this parameter faults the product. You can set this parameter so that the product continues to run. Ensure that the setting of this parameter does not create a hazard. Failure to observe this precaution could result bodily injury and/or damage to equipment.

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CHAPTER 1

Introduction

The Serial Converter module (MDCOMM-232) provides an electronic communications interface between a computer and an MD60 AC drive. It uses the full-duplex, RS-232 DF1 protocol.

The Serial Converter receives power from the connection to the host product. An outside power source is not required.

This manual is intended for qualified electrical personnel.

1.1 Serial Converter Module Features

Features of the Serial Converter module include the following:

- Three status indicators (LEDs) report the operating status of the module.
- DF1 serial baud rates of 9600 bps, 19.2 Kbps, and 38.4 Kbps are supported. 9600 bps is the factory default.
- A number of configuration tools can be used to configure the module, such as VS Utilities (V3.01 or higher) or terminal emulation software.

1.2 Related Publications

Refer to the following related publications as necessary for more information:

- 1770-6.5.16 - DF1 Protocol and Command Set Reference Manual
- D2-3488 - VS Utilities Getting Results Manual

These publications are available from:
http://www.theautomationbookstore.com

1.3 Conventions Used in This Manual

The following conventions are used throughout this manual:

- Menu commands are shown in bold typeface and follow the format Menu > Command. For example, if you read "**Select File > Open**," you should click the File menu and then click the Open command.
- Parameters will be referenced by the parameter name followed by the parameter number as follows: Reset Module (05).

1.4 Getting Assistance from Rockwell Automation

If you have any questions or problems with the products described in this instruction manual, contact your local Rockwell Automation sales office. For technical assistance, call 1-800-726-8112.

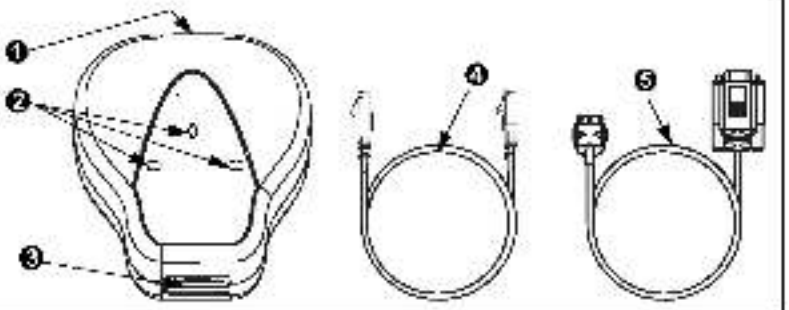
CHAPTER 2

Getting Started

This chapter provides:

- A description of the Serial Converter module components
- A list of equipment supplied with the module
- A list of user-supplied equipment required for installing and configuring the module
- An installation checklist

2.1 Serial Converter Components



#	Part	Description
1	RJ45 Connection	Standard RJ45 connector. The MDCBL-RJ45 cable (item 4) is plugged into this connector.
2	Status Indicators	LEDs that indicate module operation (data is being received from the computer, data is being sent to the computer). Refer to chapter 5, Troubleshooting the Serial Converter, for more information.
3	RS-232 Serial Port	Locking low-profile connector. The RCCBL-SFC serial cable (item 5) plugs into this connector.
4	MDCBL-RJ45 Cable	RJ45 cable (2 m (6.6 ft)) with male-to-male RJ45 connectors.
5	RCCBL-SFC Serial Cable	Serial cable (2 m (6.6 ft)) with a locking low-profile connector to connect to the Serial Converter and a 9-pin sub-miniature female D-connector to connect to a computer.

Figure 2-1 — Components of the Serial Converter

2.2 Required Equipment

Equipment Shipped with the Serial Converter

When you unpack the Serial Converter, verify that the package includes:

- ❑ One Serial Converter
- ❑ One RECBL-SFC serial cable
- ❑ One MDCBL-RJ45 cable
- ❑ One VS Utilities CD
- ❑ Serial Converter Module User Manual, D2-3502

User-Supplied Equipment

To configure the Serial Converter, you must use one of the following:

- VS Utilities software (V3.01 or higher)
- Terminal emulation software such as HyperTerminal
- VT-100 compatible terminal

2.3 Installation Checklist

This section is designed to help experienced users start using the Serial Converter. If you are unsure how to complete a step, refer to the referenced chapter.

Step	Action	Refer to
-	**Review the safety precautions for the Serial Converter.**	Throughout this manual.
2	**Install the Serial Converter.** Connect an MDCBL-RJ45 cable to the Serial Converter and the host. Then, connect a RECBL-SFC serial cable to the Serial Converter and a computer. Make sure that power has been applied to the host product. See figure 2.2 for an example of a serial connection to a personal computer.	Chapter 3, Installing the Serial Converter
3	**Configure the Serial Converter parameters.** Use one of the following to configure parameters in the Serial Converter: • VS Utilities (V3.01 or higher) • Terminal emulation software • VT-100 compatible terminal	Chapter 4, Configuring the Serial Converter

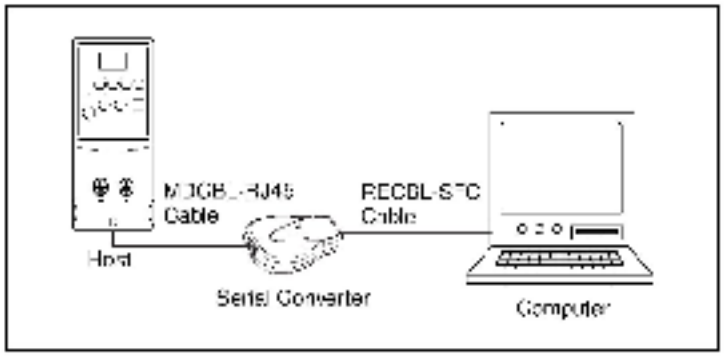


Figure 2.2 – Example of Serial Connection to a Personal Computer

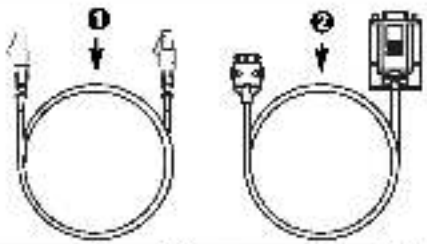
CHAPTER 3

Installing the Serial Converter

Chapter 3 provides instructions for installing and removing the Serial Converter.

3.1 Identifying the Supplied Cables

The following cables, supplied with the Serial Converter, are all you should need to connect the Serial Converter to a product and computer.



#	Description	Part Number
❶	Cable to connect the Serial Converter to a host product, (for example, an MD60 drive).	MDCBL-RJ45
❷	Serial cable to connect the Serial Converter to the computer.	RECBL-SFC

Figure 3.1 – Cables

Important: To provide proper termination of the serial cable shield, the computer chassis should be properly grounded. If it is not possible or practical to ground the computer chassis, then a ground wire should be connected to the serial cable shield at the shell of the 9-pin sub-miniature D-connector.

Important: The RJ45 cable shield must be properly grounded to provide EMC protection. On the MD60 drive, that means that pin 16 on the drive control terminal block must be connected to the drive earth ground terminal.

3.2 Installing the Serial Converter

Important: The Serial Converter module must not be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors, or dust. If the module is not going to be installed for a period of time, it must be stored in area where it will not be exposed to a corrosive atmosphere.

Use the following procedure to install the Serial Converter.

Step 1. Connect the Serial Converter to the drive using the MDCBL-RJ45 cable. See figure 3.2.

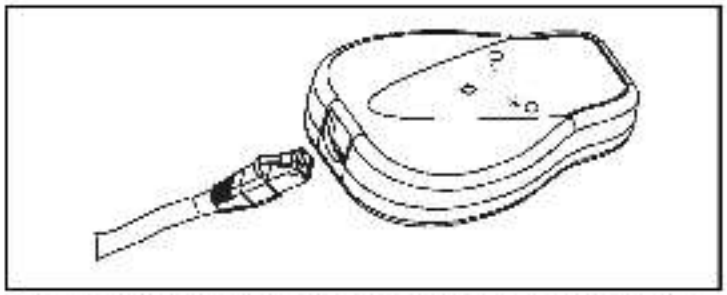


Figure 3.2 Connecting the MDCBL-RJ45 Cable to the Serial Converter

Step 2. Connect the Serial Converter to the computer serial port using the RECBL-SFC cable. See figure 3.3.

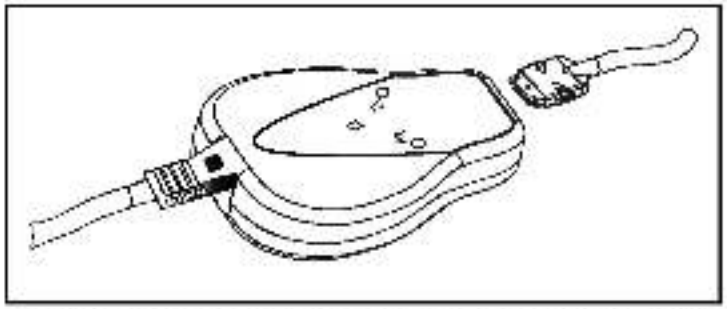


Figure 3.3 Connecting the RECBL-SFC Cable to the Serial Converter

Step 3. Verify that power is applied to the host. The Serial Converter receives power from the host. Therefore, the host must be powered before the Serial Converter will operate.

The diamond LED on the Serial Converter flashes green to indicate that the Serial Converter is properly installed and receiving power. If it is not green, refer to chapter 5, Troubleshooting.

3.3 Removing the Serial Converter

ATTENTION: If the Serial Converter is transmitting control I/O to the product (indicated by a steady green diamond LED on the Serial Converter), the product may fault when you remove or reset the Serial Converter. Determine how your product will respond before removing or resetting a connected Serial Converter. Failure to observe these precautions could result bodily injury and/or damage to equipment.

Use the following procedure to disconnect the Serial Converter.

Step 1. Disconnect the MDCBL-RJ45 cable from the host product and then from the Serial Converter. To disconnect it, press on the cable latch, and then pull it out.

Step 2. Disconnect the RECBL-SFC serial cable from the Serial Converter and then from the computer.

CHAPTER 4

Configuring the Serial Converter

This chapter provides information about configuring the Serial Converter.

For a list of parameters, refer to Appendix B, Serial Converter Parameters. For definitions of terms in this chapter, refer to the Glossary.

4.1 Configuration Tools

The Serial Converter stores parameters and other information in its own non-volatile storage (NVS). You must, therefore, access the Serial Converter to view and edit its parameters. Table 4.1 lists tools that you can use to access the Serial Converter and edit its parameters.

Table 4.1 – Configuration Tools

Tool	Refer to:
VS Utilities software (V3.01 or higher)	section 4.2 in this manual
Terminal emulation software	section 4.3 in this manual
VT100-compatible terminal	documentation for the terminal

Important: The RS-485 serial port on the MD60 AC drive does not need to be configured prior to using the Serial Converter.

4.2 Using VS Utilities

With VS Utilities software, you can edit parameters in both the Serial Converter and the connected drive. On an MD60 drive, you can also edit parameters in any of the attached peripherals.

Important: The parameter Adapter Cfg (01) must be set to Auto (default) for VS Utilities software to operate. HyperTerminal can be used if Adapter Cfg (01) needs to be changed. Refer to section 4.3, Using Terminal Emulation Software.

This section is designed to help users start using VS Utilities. If you are unsure how to complete a step, refer to the online help (select **Help > Help Topics**).

Use the following procedure to configure the Serial Converter using VS Utilities software:

Step 1. Select **Explore > Configure Communication**. Select the communications port and baud rate that you are using. Select either checksum and accept the default time for the time-out.

Step 2. Select **Explore > Connect > Local**. A node eventually appears under Devices.

Step 3. In the left pane, click the + signs to expand the tree. Click the product or Serial Converter to display parameters in the right pane. Double-click a parameter to edit it.

Figure 4-1 VS Utilities Screen

4.3 Using Terminal Emulation Software

This section provides detailed instructions on how to use terminal emulation software to access the Serial Converter so that you can view and edit Serial Converter parameters or view the Serial Converter event queue.

A variety of terminal emulation programs can be used to establish a serial connection between a computer and the Serial Converter. The following instructions describe how to establish the initial serial connection to the Serial Converter using a computer running HyperTerminal (terminal emulation software provided with most Windows 95/98/NT 4.0/2000/XP operating systems).

Important: The following instructions use screen captures from Windows 95 HyperTerminal. If you are using a different operating system, HyperTerminal screens may differ.

To use HyperTerminal to access the Serial Converter:

Step 1. Verify that the Serial Converter is installed correctly. Refer to chapter 3, Installing the Serial Converter.

Step 2. **For Windows 95,** click **Start** from the desktop, and then select **Programs > Accessories > HyperTerminal** to display the HyperTerminal dialog box (see figure 4.2). Your dialog box may look slightly different. Continue to step 3.

Figure 4.2 – HyperTerminal Dialog Box in List View

For Windows NT, click **Start** from the desktop, and then select **Programs > Accessories > HyperTerminal** to display the Connection dialog box (see figure 4.3). Then, go to step 4.

Step 3. Double-click **Hyperlrm.exe**.

The Connection Description dialog box appears in the HyperTerminal workspace. See figure 4.3.

Figure 4.3 – Connection Dialog Box

Step 4. In the Name window, type any name (for example, converter), and then select any icon in the Icon box.

Step 5. Click **OK** to display the Phone Number dialog box.

Step 6. In the Connect Using window, select the communications port that you intend to use (usually COM1 or COM2).

Step 7. Click **OK** to display the Properties dialog box.

Step 8. Select the settings shown in figure 4.4.

Important: If you have previously set the parameter DF1 Rate Cfg (08) to 19.2K or 38.4K, select that value in the Bits per second box.

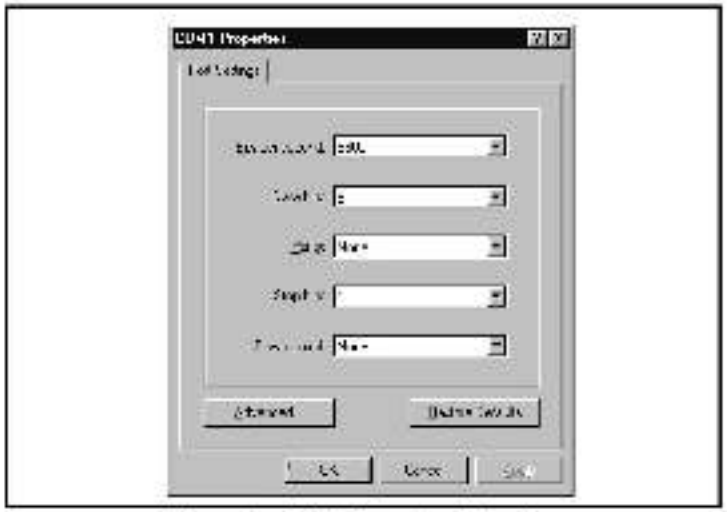


Figure 4.4 COM1 Properties Dialog Box

Step 9. Click **OK**. A blank HyperTerminal workspace appears.

Step 10. Select **File** > **Properties** to display the Properties dialog box.

Step 11. Click the **Settings** tab. See figure 4.5.

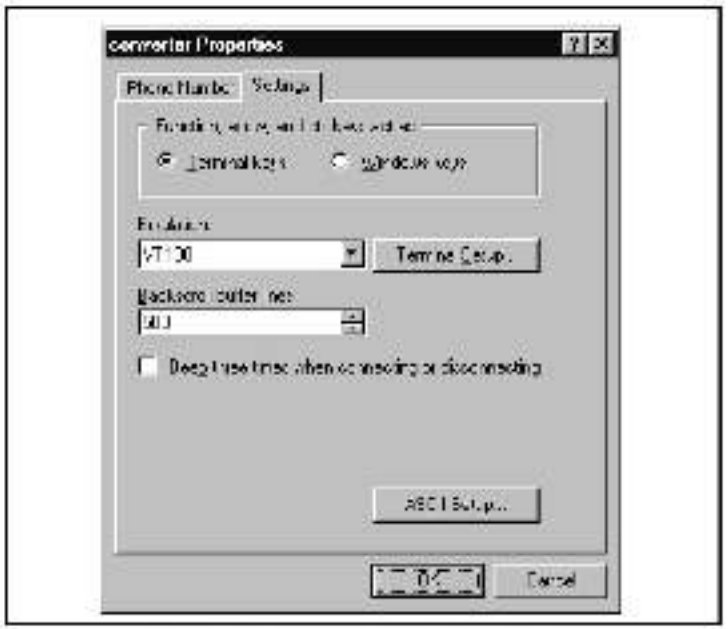


Figure 4.5 – Converter Properties Dialog Box

Step 12. Under the area labeled Function, arrow, and ctrl keys act as, select **Terminal keys**.

Step 13. In the Emulation box, select **VT100**.

Step 14. Click **OK** to display the HyperTerminal workspace.

TIP: Select **File** > **Save** to save the HyperTerminal configuration that you just created. In future connections, you can select the saved configuration and quickly connect to the Serial Converter.

Step 15. Press **Enter** until the main menu appears (see figure 4.6).

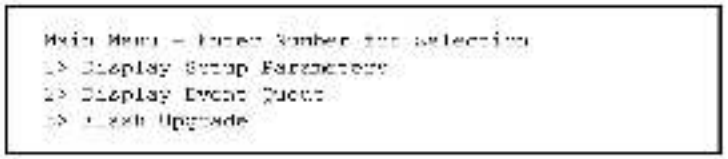


Figure 4.6 – Main Menu

To do this:	See section
Edit the serial port rate	4.4
Edit the fault action	4.5
View the event queue	5.3.1
View DF1 data	5.4
Update the firmware	C.1

If no text or meaningless text appears instead of the Main Menu, adjust the baud rate in your software. Refer to section 5.5 for detailed instructions.

Navigating in the Terminal Emulation Software

Table 4.2 describes the keys to used to navigate the terminal emulation software.

Table 4.2 – Key Descriptions

Key	Description
0 – 9	In the main menu, keys 1 – 3 select a menu option. In the parameter screen, keys 0 – 9 enter a value.
Esc	Display the main menu or abort changes to a parameter.
↑ or +	Scroll through parameters or events.
→ or ←	Scroll through the values for a parameter.
Enter	Save a value for a parameter.

4.4 Setting the RS-232 Serial Port Rate (DF1 Rate)

The serial port rate, sometimes called baud rate or DF1 rate, is the speed at which the computer and Serial Converter communicate over RS 232. You can select a serial port rate of 9600, 19.2K, or 38.4K with the Serial Converter. The factory default serial port rate is 9600.

Important: If you change the serial port rate in the Serial Converter, you must set your software to use the same serial port rate. The Serial Converter must be reset or power cycled before baud rate changes take effect.

To set the serial port rate:

Step 1. Set DF1 Rate Cfg (03) to the desired rate. Figure 4.7 shows a sample HyperTerminal screen.

```
Press the UP ARROW or DOWN ARROW key to scroll
through the parameter list. Press the LEFT ARROW or
RIGHT ARROW key to modify parameter values. Press
the ENTER key to save a new value.

>> DF1 Rate Cfg = 9600
```

Figure 4.7 DF1 Rate Cfg Parameter (03) in HyperTerminal

Step 2. Reset the Serial Converter. Refer to section 4.6.

Step 3. Set the serial port rate in your software to match the new serial port rate in the Serial Converter.

4.5 Setting the Fault Action

ATTENTION: The setting of Comm Flt Action (04) determines the action of the Serial Converter and connected product if DF1 serial communications are disrupted. By default, this parameter faults the product. You can set this parameter so that the product continues to run. Ensure that the setting of this parameter does not create a hazard. Failure to observe this precaution could result in bodily injury and/or damage to equipment.

By default, when DF1 serial communications are disrupted (for example, a serial cable is disconnected) and control I/O is being transmitted, the Serial Converter and connected product respond by faulting. You can set the actions listed in table 4.3.

Table 4.3 Selections for Product Response to Communication Fault

Action	Description
Fault	The product will fault (Default).
Stop	The product will stop and not fault (drive products only).
Zero data	The product is sent 0 for output data after a communications disruption. This does not command a stop.
Hold last	The product continues in its present state after a communications disruption.

To change the fault action, set the value of Comm Flt Action (04) to the desired fault action. Figure 4.8 shows a sample HyperTerminal screen.

```
Press the UP ARROW or DOWN ARROW key to scroll
through the parameter list. Press the LEFT ARROW or
RIGHT ARROW key to modify parameter values. Press
the ENTER key to save a new value.

>> Comm Flt Action = Fault
```

Figure 4.8 – Comm Flt Action Parameter (04) in HyperTerminal

Changes to this parameter take effect immediately. A reset is not required.

4.6 Resetting the Serial Converter

ATTENTION: If the Serial Converter is transmitting control I/O to the product (indicated by a steady green diamond LED on the Serial Converter), the product may fault when you remove or reset the Serial Converter. Determine how your product will respond before removing or resetting a connected Serial Converter. Failure to observe this precaution could result bodily injury and/or damage to equipment.

After you change some parameters, you must reset the Serial Converter for the new setting to take effect. You can reset it by removing and then reapplying power or by using Reset Module (05).

To reset the Serial Converter, set Reset Module (05) to either Reset Module or Set Defaults. **Reset Module** will reset the Serial Converter. **Set Defaults** will set all parameters in the Serial Converter to their factory-default values. Figure to figure 4.9 for a sample HyperTerminal screen.

```
Press the UP ARROW or DOWN ARROW key to scroll
through the parameter list. Press the LEFT ARROW or
RIGHT ARROW key to modify parameter values. Press
the ENTER key to save a new value.

>> Reset Module = Reset Module
```

Figure 4.9 Reset Module Parameter (05) in HyperTerminal

After you enter the Reset Module value, the Serial Converter will be reset. The value in Reset Module (05) will then return to Ready.

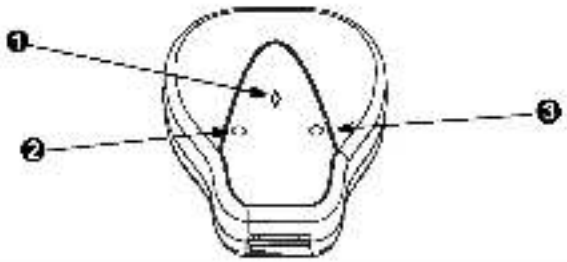
CHAPTER 5

Troubleshooting the Serial Converter

Chapter 5 provides information to troubleshoot the Serial Converter.

5.1 Understanding the Status Indicators (LEDs)

The Serial Converter reports its status using status indicators. See Figure 5.1.



#	Status Indicator	Description	Refer to Section
❶	Diamond	Serial Converter status	5.1.1
❷	RX	Serial Converter is receiving data	5.1.2
❸	TX	Serial Converter is transmitting data	5.1.3

Figure 5.1 – Status Indicators on the Serial Converter

Sections 5.1.1 through 5.1.3 describe what the state of each indicator means. Note that if all status indicators are off, the Serial Converter is not receiving power. Refer to chapter 3 for installation instructions.

5.1.1 Diamond Status Indicator

ATTENTION: If the Serial Converter is transmitting control I/O to the product (indicated by a steady green diamond LED on the Serial Converter), the product may fault when you remove or reset the Serial Converter. Determine how your product will respond before removing or resetting a Serial Converter. Failure to observe this precaution could result bodily injury and/or damage to equipment.

Table 5.1 – Diamond Status Indicator, State Definitions

State	Cause	Corrective Action
Off	Serial Converter is not powered or is in Flash programming mode.	• Securely connect cables. • Apply power to the product. • Wait while Flash is in progress.
Flashing Green	Serial Converter is operating and not transmitting control I/O.	No action required. Removing or resetting the Serial Converter will not cause a serial fault in the product.
Steady Green	Serial Converter is operating and is or was transmitting control I/O.	No action required. Removing or resetting the Serial Converter may cause a serial fault in the product.
Flashing Red	The product has not acknowledged the Serial Converter.	• Securely connect cables. • Make sure Adapter Cfg (01) is set to Auto.
Steady Red	Link failure.	• Securely connect cables. • Replace the cable. • Cycle power to the product.
Orange		Contact Rockwell Automation Technical Support.

5.1.2 RX Status Indicator

Table 5.2 – RX Status Indicator State Definitions

State	Cause	Corrective Action
Off	Serial Converter is not receiving data.	• Verify that the drive is configured to use the RS-485 port. • Securely connect cables. • Apply power to the product. • Configure the computer software to use the same serial port rate as the Serial Converter
Flashing Green	Serial Converter is receiving data from the computer.	No action required.

5.1.3 TX Status Indicator

Table 5.3 – TX Status Indicator State Definitions

State	Cause	Corrective Action
Off	Serial Converter is not transmitting data.	• Verify that data is being transmitted. • Securely connect cables. • Apply power to the product.
Flashing Green	Serial Converter is transmitting data to the computer.	No action required.

5.2 Module Diagnostic Items

Table 5.4 list module diagnostic items that can be accessed using VS Utilities.

Table 5.4 – Module Diagnostic Items

No.	Name	Description
1	Field Flash Cnt	Number of field flashes recorded.
2	Adapter Events	The number of events in the event queue.
3	Reference	Host's Reference Command.
4	Common Logic Cmd	Host's Common Logic Command.
5	Common Logic Sts	Host's Common Logic Status.
6	Feedback	Host's Feedback Status.

5.3 Viewing and Clearing the Event Queue

The module maintains an event queue that reports the history of its actions. You can view the event queue using VS Utilities or terminal emulation software (such as HyperTerminal).

Many events in the event queue occur under normal operation. If you encounter unexpected communications problems, the events may help you or Reliance Electric personnel troubleshoot the problem. Table 5.5 lists events that may appear in the event queue.

Table 5.5 – Event Descriptions

Event	Description
No Event	F0 – No Event Present
Adapter Reset	F1 – Adapter Entered Reset Condition
Slave Detected	F2 – Slave was Detected to be Present by Master
Slave Removed	F3 – Slave was Detected to be Removed by Master
Host Timeout	F4 – Timeout Condition on Msg to Host
Slave Timeout	F5 – Timeout Condition on Msg to Slave
Master Timeout	F6 – Timeout Condition on Msg to Master
Serial Timeout	F7 – Timeout on Serial 232 side (w/Control Enabled)
Control Enabled	F8 – Control Enabled to Host
Control Disabled	F9 – Control Disabled to Host
EEPROM Sum Flt	F10 – Checksum on EEPROM Issue

5.3.1 Viewing the Event Queue

To view the event queue:

Step 1. Access the event queue using a configuration tool. Refer to section 4.1.

Step 2. Scroll through events in the event queue. The most recent event can be found at **2R > Event Queue 1**. The R stands for Read Only. Figure 5.2 shows an example of the event queue in HyperTerminal.

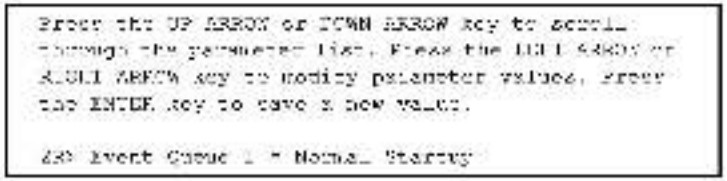


Figure 5.2 – Example of Event Queue in HyperTerminal

5.3.2 Clearing the Event Queue

To clear the event queue:

Step 1. Access the event queue using a configuration tool. Refer to section 4.1.

Step 2. Set the value of 1 > **Clr Event Queue** to **Enable**, and then press **Enter** to clear the event queue. Figure 5.3 illustrates clearing the event queue in HyperTerminal.

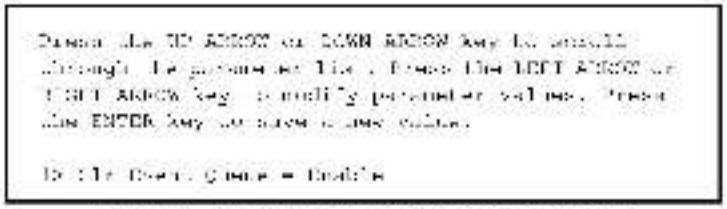


Figure 5.3 – Clearing the Event Queue in HyperTerminal

5.4 Viewing and Clearing DF1 (Serial Port) Communication Statistics

If you encounter unexpected communications problems or are creating an application that uses DF1 data, you can view the communications statistics in the Serial Converter. Parameters 06 through 17 store this data.

To view and clear DF1 data, you must access the main menu in the Serial Converter firmware. Refer to section 4.1.

5.4.1 Viewing DF1 Data

To view DF1 data:

Step 1. Access the parameters in the Serial Converter using a configuration tool. Refer to section 4.1.

Step 2. Scroll through the DF1 parameters. Parameters 06 through 17 contain DF1 data. For a description of each parameter, refer to Appendix B, Serial Converter Parameters. Figure 5.4 shows DF1 data viewed in HyperTerminal.

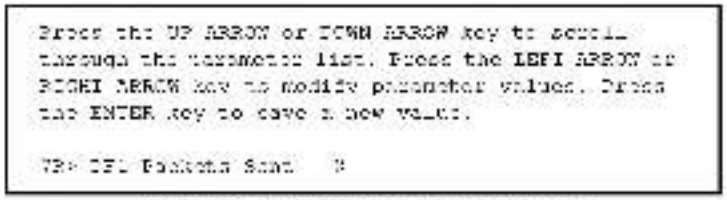


Figure 5.4 Viewing DF1 Data in HyperTerminal

5.4.2 Clearing DF1 Counters

To clear DF1 counters:

Step 1. Access the parameters in the Serial Converter using a configuration tool. Refer to section 4.1.

Step 2. Set the value of Clear DF1 Counts (06) to **Clear Counts**, and then press Enter to clear the DF1 data. Figure 5.5 shows DF1 counters cleared in HyperTerminal.

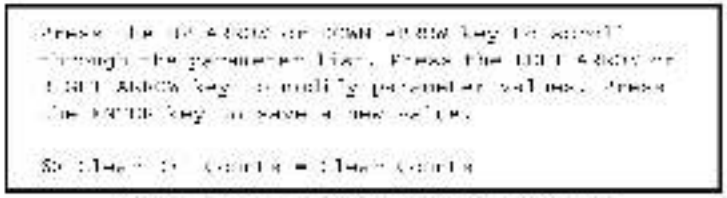


Figure 5.5 Clearing DF1 Counters in HyperTerminal

5.5 Troubleshooting Problems

Table 5.6 – Troubleshooting the Serial Converter

Problem	Corrective Action
You are unable to establish a connection between your computer and the Serial Converter.	• If the status indicators are off, connect the cables and apply power to the product. • Configure your software and Serial Converter to use the same COMM port and serial port rate (baud rate).
After changing the serial port rate, you are no longer able to communicate with the Serial Converter and connected product. For example, in HyperTerminal, meaningless text appears on the screen when you press Enter. In VS Utilities, parameter values are not updated.	Reset the serial port rate in the software. Instructions are included here for resetting the serial port rate in HyperTerminal and VS Utilities. If you are using a different configuration tool, refer to its user manual. **HyperTerminal** 1. Select **File** > **Properties**, and then click **Configure**. 2. Select the new baud rate, and then click **OK**. 3. Save and close HyperTerminal. 4. Double-click on your HyperTerminal file (*.ht) to restart HyperTerminal. 5. Press **Enter** until the main menu appears. **VS Utilities** 1. Select **Explore** > **Configure Communication**. 2. Select the new baud rate. VS Utilities should start updating values again. If it does not, restart VS Utilities.
You set a new serial port rate, but the Serial Converter is still using the old serial port rate.	Reset the module. Refer to chapter 4.
No communications to drive.	• Verify cable connections. • Make sure Adapter Cfg (01) is set to Auto.

APPENDIX A

Technical Specifications

Communications

RS-232 Side

Protocol	RS-232 Serial DF1, Full Duplex
Port Rate	9600, 19.2K, or 38.4K
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None
Error	CRC or BCC (Auto-Detected)

Host Side

Data Rates	19.2 K

Electrical

Consumption	170 mA at +5V DC The Serial Converter draws the required power from the connected product. An external power source is not required.

Mechanical

Dimensions	103.5 x 73.4 x 23.6 mm (4.08 x 2.89 x 0.93 in)
Weight	70.88 g (2.5 oz)

Regulatory Compliance

UL	508C and CUL
CE	EN-61800-3
CTick	AS/NZS 2064, Group 1, Class A

Important: For this product to be CE- and CTick-compliant, the shield of the serial cable and RJ45 cable must be terminated as described in section 2.1.

Environmental

Temperature	
Operating	0° to +60°C (32° to 122°F)
Storage	-40° to +85°C (-40° to 185°F)
Relative Humidity	5 to 95% non-condensing
Atmospheric	**Important:** Module must not be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors, or dust. If the module is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.
Vibration	
Operating	2.5 G @5 Hz-2 KHz
Non-Operating	5 G @5 Hz-2 KHz
Shock	
Operating	30 G peak acceleration, 11(+/-1)ms pulse width
Non-Operating	50 G peak acceleration, 11(+/-1)ms pulse width

APPENDIX B

Serial Converter Parameters

01 Adapter Cfg

Range:	0 – Auto 1 – Master 2 – Slave
Default:	0 – Auto
Type:	Read/Write
Reset Required:	Yes

Selects the module's mode of operation.

Important: Adapter Cfg (01) must be set to Auto (default) for VS Utilities to operate. HyperTerminal can be used if Adapter Cfg (01) needs to be changed.

02 DF1 Addr Cfg

Range:	0 to 254
Default:	1
Type:	Read/Write
Reset Required:	Yes

Selects the DF1 node address for the Serial Converter. This is a decimal value.

03 DF1 Rate Cfg

Range:	0 – 9600 1 – 19.2K 2 – 38.4K
Default:	0 – 9600
Type:	Read/Write
Reset Required:	Yes

Selects the serial port rate for the RS-232 DF1 serial port on the Serial Converter.

Important: If you change the serial port rate in the Serial Converter, you must set your software to use the same serial port rate. The Serial Converter must be reset or power cycled before baud rate changes take effect.

04 Comm Flt Action

Range:	0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last
Default:	0 = Fault
Type:	Read/Write
Reset Required:	No

Selects the action that the Serial Converter and product take if the Serial Converter detects that DF1 serial communications are disrupted. This setting is effective only if control I/O is transmitted through the Serial Converter.

ATTENTION: Comm Flt Action (04) lets you determine the action of the Serial Converter and connected product if communications are disrupted. By default, this parameter faults the product. You can set this parameter so that the product continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a hazard of injury or equipment damage. Failure to observe this precaution could result in bodily injury and/or damage to equipment.

05 Reset Module

Range:	0 = Ready (No action) 1 = Reset Module (Resets the Serial Converter) 2 = Set Defaults (Restores the Serial Converter to its factory-default settings.)
Default:	0
Type:	Read/Write
Reset Required:	No

This parameter is a command. The value will be set to Ready after a Reset Module command or Set Defaults command has been performed.

ATTENTION: If the Serial Converter is transmitting control I/O to the product (indicated by a steady green diamond LED on the Serial Converter), the product may fault when you remove or reset the Serial Converter. Determine how your product will respond before removing or resetting a connected Serial Converter. Failure to observe this precaution could result in bodily injury and/or damage to equipment.

06 Clear DF1 Counts

Range:	0 = Ready (No action) 1 = Clear Counts
Default:	0 = Ready (No action)
Type:	Read/Write
Reset Required	No

Resets the DF1 statistical parameters (numbers 07 to15) to 0 if set to Clear Counts. This parameter is a command. The value will be set to Ready after a Clear Counts command has been performed.

07 DF1 Packets Sent

Range:	0 to 4294967295
Default:	0
Type:	Read Only

Number of DF1 packets sent by the Serial Converter. The value of this parameter is normally approximately equal to the value of DF1 Packets Rcvd (08).

08 DF1 Packets Rcvd

Range:	0 to 4294967295
Default:	0
Type:	Read Only

Number of DF1 packets received by the Serial Converter. The value of this parameter is normally approximately equal to the value of DF1 Packets Sent (07).

09 Undelivered Msgs

Range:	0 to 65535
Default:	0
Type:	Read Only

Number of DF1 messages that were sent but not acknowledged.

This value is normally a low value. If it is continually incrementing and you are having communications problems, use a lower baud rate or replace the RECBL-SFC serial cable.

10 ENQs Sent

Range:	0 to 65535
Default:	0
Type:	Read Only

Number of ENQ (Enquiry) characters sent by the Serial Converter.

This value is normally a low value. If it is continually incrementing and you are having communications problems, use a lower baud rate or replace the RECBL-SFC serial cable.

11 ENQs Received

Range:	0 to 65535
Default:	0
Type:	Read Only

Number of ENQ (Enquiry) characters received by the Serial Converter.

This value is normally a low value. If it is continually incrementing and you are having communications problems, use a lower baud rate or replace the RECBL-SFC serial cable.

12 NAKs Received

Range:	0 to 65535
Default:	0
Type:	Read Only

Number of NAK (Negative Acknowledgement) characters received by the Serial Converter.

This value is normally a low value. If it is continually incrementing and you are having communications problems, use a lower baud rate or replace the RECBL-SFC serial cable.

13 NAK Bad Packet

Range:	0 to 65535
Default:	0
Type:	Read Only

Number of NAKs (Negative Acknowledgement(s) sent by the Serial Converter because of corrupt packets (improper protocol messages) as determined by the Serial Converter.

This value is normally a low value. If it is continually incrementing and you are having communications problems, use a lower baud rate or replace the RECBL-SFC serial cable.

14 NAK No Memory

Range:	0 to 65535
Default:	0
Type:	Read Only

Number of NAKs (Negative Acknowledgements) sent by the Serial Converter because it did not have sufficient memory to buffer the incoming messages. The Serial Converter runs out of memory if a command was not completed and there is no place to save the new commands.

This value is normally a low value. If it is continually incrementing and you are having communications problems, use a lower baud rate or replace the RECBL-SFC serial cable.

15 Duplicate Msgs

Range:	0 to 65535
Default:	0
Type:	Read Only

Number of duplicate messages sent by the Serial Converter. This value contains the total number of consecutive messages received by this device with the same TNS (Transaction Sequence) number.

This value is normally a low value. If it is continually incrementing and you are having communications problems, use a lower baud rate or replace the RECBL-SFC serial cable.

16 DF1 Addr Actual

Range:	0 to 254
Default:	0
Type:	Read Only

DF1 address actually used by the Serial Converter.

17 DF1 Rate Actual

Range:	0 – 9600 1 - 19.2 K 2 – 38.4 K
Default:	0 – 9600
Type:	Read Only

Serial port rate actually used for the DF1 serial port on the Serial Converter.

18	**Adapter Type**	
	Range:	0 = Master 1 = Slave
	Default:	0 = Master
	Type:	Read Only

The module's present mode of operation.

APPENDIX C

Flash Updates

Appendix C provides information on updating peripheral product firmware.

C.1 Preparing for a Flash Update

Please take the following precautions to ensure a successful Flash update:

- Obtain the new firmware version from Rockwell Automation. Save it to the hard drive of the computer. Do not attempt to perform a Flash procedure from a floppy disk or a network.
- Read all instructions supplied with the new firmware file.
- Use a computer running terminal emulation software that supports Xmodem transfers (for example, HyperTerminal).
- Record parameter values in the device that will be Flashed. Updates may reset parameters to their default settings.
- Ensure that the host product (MD6C AC drive) is stopped.
- Close all programs except the terminal emulation program that you are using to Flash the Serial Converter.
- Disable the screen saver and antivirus programs so that they do not start during the Flash process.
- If you are using a laptop computer, turn off the FIFO buffers in HyperTerminal. In HyperTerminal, select **File > Properties** to display the Properties dialog box. Click **Configure**, and then click **Advanced**. Ensure that a check mark does not appear next to Use FIFO buffers.

C.2 Performing a Flash Update with HyperTerminal

ATTENTION: When you perform a Flash update, the product will fault if it is receiving control I/O from the Serial Converter. Verify that the product has stopped safely before beginning a Flash update. Failure to observe this precaution could result bodily injury and/or damage to equipment.

ATTENTION: If you interrupt a Flash procedure that is updating boot code, the device may become inoperable. To prevent this damage, follow the instructions provided with the new firmware file and do not interrupt a Flash procedure while boot code is being Flashed. Failure to observe this precaution could result in damage to, or destruction of, equipment.

Step 1. In the main menu, press **3** to Update Flash program. The screen in figure C.1 will immediately appear.

```
To update the Flash memory, you need a terminal
program capable of downloading a binary file using
the XMODEM protocol and a Flash update file from
Rockwell Automation. When you press 'Y' to signal
that you are ready to proceed, the terminal program
will start displaying the letter 'C'. This signals
the XMODEM protocol that the download may proceed.
You then have one minute to start the transfer.
Press CTRL-X to cancel an update started by
mistake. Are you ready to proceed? (Y/N)
```

Figure C.1 – Flash Menu

Step 2. If the Flash can be completed safely, type **Y**. The letter 'C' repeatedly appears. It's the Xmodem prompt and continues to appear until you send a binary file.

Important: Press Ctrl – X to cancel a Flash update procedure.

Step 3. Select **Transfer** > **Send File** to display the Send File dialog box. See figure C.2.

Step 4. Click **Browse** and navigate to the Flash file.

Step 5. Double-click the file. Its name appears in the Filename box.

Step 6. In the Protocol box, select Xmodem.

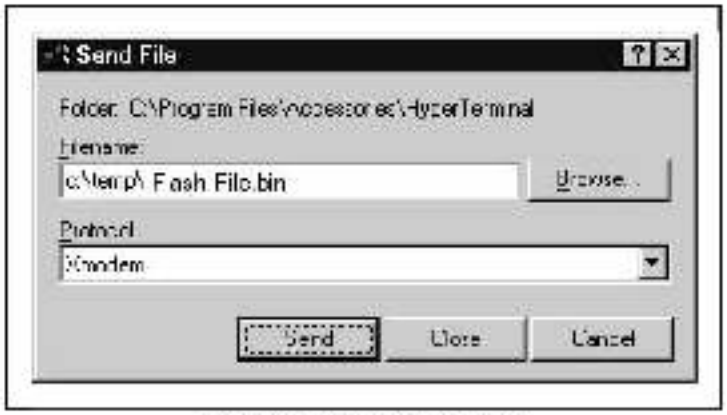


Figure C.2 – Send File Dialog Box

Step 7. Click **Send**. A dialog box appears and reports the progress of the download. When it is complete, the message 'Operation Complete' appears.

Important: Keep the device powered for 15 seconds after the operation has completed.

Step 8. Press Enter to return to the main menu.

C.3 Troubleshooting Potential Flash Problems

Table C.1 – Flash Troubleshooting

Problem Description	Corrective Action
"Transfer Cancelled by Remote System" message appears and the Flash is not completed.	• Restart HyperTerminal and repeat the Flash procedure. • If you are using Windows NT 4.0, install SP3 or later. Windows NT service packs are available from the Microsoft web site: http://www.microsoft.com. • Download a HyperTerminal Private Edition update from the Hilgrave web site: http://www.hilgrave.com. (Please note that there is a license requirement with this software.) Then, perform the Flash procedure again.
The "Xmodem File Send" for dialog box appears, but the Flash file is not transferred.	• Verify that you have selected the Xmodem protocol in the Send file dialog box. • Verify that the new file is on your hard disk. Do not attempt to Flash from a floppy disk or a network. • Verify that you are sending the file within 60 seconds of pressing Y to confirm that you want to perform the Flash.
After completing a Flash, you are unable to communicate with the Serial Converter. For example, meaningless text appears on the HyperTerminal screen.	• Set the serial port rate to 9600. If parameters are changed during a Flash update, all parameters are set to their default settings.

GLOSSARY

application code - Code that runs in the module after the boot code calls it. It performs the normal operations of the system.

block check character (BCC) - An error detection scheme where the 2's complement of the 8-bit sum (modulo 256 arithmetic sum) of all data bytes in a transmission block. It provides a means of checking the accuracy of each message transmission.

boot code - Code that runs when the module first receives power. It checks basic operations and then calls the application code.

cyclic redundancy check (CRC) - An error detection scheme where all of the characters in a message are treated as a string of bits representing a binary number. This number is divided by a predetermined binary number (a polynomial) and the remainder is appended to the message as a CRC character. A similar operation occurs at the receiving end to prove transmission integrity.

DF1 protocol - A peer-to-peer link layer protocol that combines features of ANSI X3.28-1976 specification subcategories D1 (data transparency) and F1 (two-way simultaneous transmission with embedded responses).

DF1 rate - A unit of signaling speed equal to the number of discrete conditions or signal events per second. It is also called baud rate or serial port rate.

EEPROM - *See* **non-volatile storage**.

Flash update - The process of updating firmware in a device.

hold last - When communications are disrupted (for example, a serial cable is disconnected), the converter and product can respond by holding last state. Hold last state results in the product receiving the last data received via the DF1 connection before the disruption. If the product was in RUN mode and using the reference from the converter, it will continue to run at the same reference.

non-volatile storage (NVS) - NVS is the permanent memory of a device. Devices such as the converter store parameters and other information in NVS so that they are not lost when the device loses power. NVS is sometimes called EEPROM.

programmable controller communications command (PCCC) - The protocol used by some controllers to communicate with devices on a network. Some software products (for example, VS Utilities) also use PCCC to communicate.

serial converter - A device that provides an electronic communications interface between an MD50 drive and a computer with an RS-232 port. The MDCOMM-232 Serial Converter uses a full-duplex RS-232 DF1 protocol.

status indicators - LEDs that are used to report the status of a device. There are three status indicators on the converter.

Type 0/Type 1/Type 2 Control - When transmitting I/O, the module can use different types of messages for control. The Type 0, Type 1, and Type 2 events help Reliance Electric personnel identify the type of messages that an module is using.

VS Utilities software - A Windows-based software tool for monitoring and configuring Reliance Electric products and modules.

Xmodem - Developed by Ward Christenson in 1978, Xmodem is a protocol used to transfer data. You can use the Xmodem protocol to Flash the firmware in the Serial Converter or a device connected to it.

zero data - When communications are disrupted (e.g., serial cable is disconnected), the converter and product can respond with zero data. Zero data results in the product receiving zero as values for command data. If the product was in RUN mode and using the reference from the converter, it will stay in run mode but at zero reference.

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