3000-SS07
SoftScreen® /Modicon Modbus Driver

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Table of Contents

SoftScreen/Modicon Modbus Driver

This *SoftScreen* driver allows 3000 engines to communicate with Modicon Modbus compatible programmable controllers (984 series) through any Modbus port.

The driver is installed separately from *SoftScreen*. However, once it is installed, it becomes a part of *SoftScreen* and is downloaded, along with an application, to the run-time engine.

Supported Devices

This driver supports the following devices:

- 984-12x
- 984-14x
- 984-38x
- 984-48x
- 984-68x
- 984-78x
- 2xx
- 1xx
- Quantum 213/04
- BM-85

Installing the Driver

Technical Note

You *must* install *SoftScreen* before you install the driver.

Because *SoftScreen* is a Windows* 95 program, you must install the Modicon Modbus driver in the Microsoft Windows 95 Operating System. If you have already installed this driver on your system, this installation will overwrite the current files.

To install the Modicon Modbus driver...

1. Start Windows 95.

> **Technical Note**
>
> *SoftScreen* must be closed when you install this driver. We also recommend you close all other Windows applications before you install this driver.

2. Insert the Modbus Driver Install disk in your local drive (usually drive A).
3. Click the Start button, and then select the Run command.
4. Type A:setup (or B:setup, depending on which local drive you use) in the Open text box, and then click OK or press ENTER to begin the installation.
5. Press the Next button to proceed to the next setup screen.
6. Follow the on-screen prompts to complete the installation.

   As files are being copied to your hard drive, three icons display on the left side of your workstation screen to indicate your progress.

   The far left icon indicates how much of an individual file has been transferred. The middle icon indicates how much of a floppy has been transferred. The far right icon represents the amount of space occupied on the system's hard drive before you install the driver.

Technical Note

To end the installation process at any time, select the Cancel button in the setup dialog boxes. A prompt will inform you that setup is not complete. Select the Exit Setup button if you still want to exit the installation program. If you wish to continue the installation, select the Resume button.

Uninstalling the Driver

To uninstall the Modicon Modbus driver...

1. From Windows 95, click the Start button. Select the Settings command, then Control Panel.
2. From the Control Panel, double-click on Add/Remove Programs.
3. Double-click on the Modbus Driver entry in the list of removable programs on the Install/Uninstall page.
4. Select Yes in the Confirm File Deletion dialog box.

You will be notified once the driver has been successfully uninstalled.

Connecting to the PLC

This section describes the serial port configuration and the cabling pinouts for connecting a 3000 engine to a Modbus PLC.

Configuring the Port

The Modbus controller connects to the 3000 engine's primary RS-232C serial port.

Cabling

Figures 1 and 2 show the pinouts to connect from a 3000 engine to a Modbus 984 via RS-232C.

Technical Note

When connecting via the RS-232C standard, the cable should be a Belden 9925 or equivalent, maximum length of 50 feet. Keep the cable away from high voltage and current-carrying cables. Refer to the EIA RS-232C specification for more details.

Electromagnetic Compatibility Warning

The connection of non-shielded equipment interface cables to the Focal Point workstations will invalidate FCC EMI and European Union EMC compliance and may result in interference and/or susceptibility levels which are in violation of relevant regulations. It is the responsibility of the system integrator and/or user to obtain and use shielded interface cables and equipment. If this equipment has more than one connector, do not leave cables connected to unused interfaces. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

All interface cables must include braid/foil type shields. Communication cable connectors must be metal, ideally zinc die-cast backsheet types, and provide 360° protection about the interface wires. The cable shield braid must be terminated directly to the metal connector shell; ground drain wires alone are not adequate.

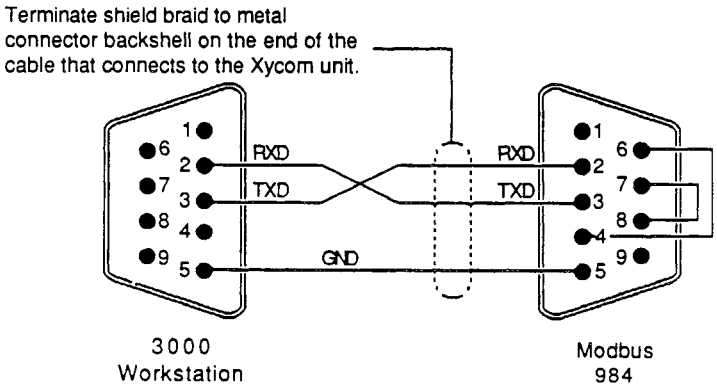

Figure 1. 9-pin Modbus 984 RS-232C Pinouts

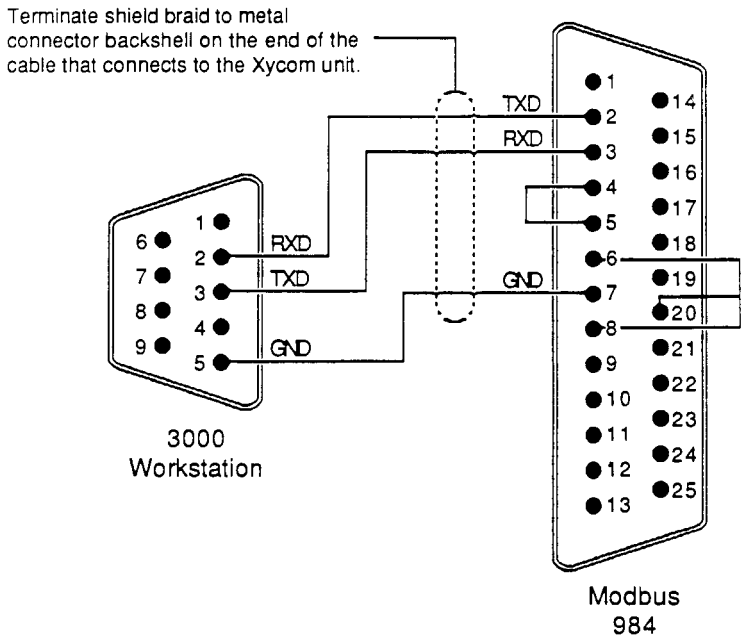

Figure 2. 25-pin Modbus 984 RS-232C Pinouts

Development System Configuration

Once you have installed the driver (refer to the *Installing the Driver* section at the beginning of this manual), you must configure it in the *SoftScreen* Development System.

To configure the driver...

1. Open an application in *SoftScreen*. See the *SoftScreen Development System for Windows User's Guide* for information on creating an application.
2. Select the Drivers command on the Configure menu in the Application Navigator. The Configure Physical Drivers dialog box opens, as shown in Figure 3.

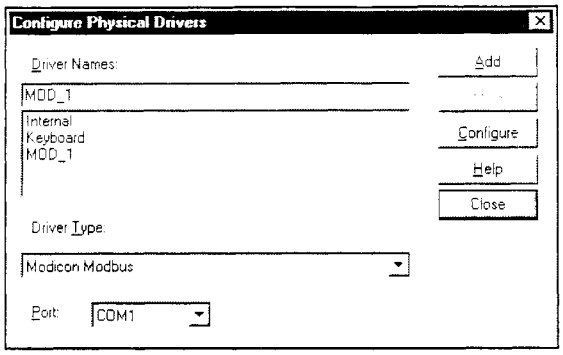

Figure 3. Configure Physical Drivers Dialog Box

3. Select Modicon Modbus from the Driver Type drop-down list box. This is the driver type.
4. Type a unique name in the Driver Names text box, using up to 32 characters. Tag names can begin with a character or a colon, and can contain alphanumeric characters, underscores, and colons. Tag names cannot begin with or contain a space.
5. Select the port to which you want to connect the PLC. Choices are None, COM1, and COM2. The default is None.
6. Click the Add button. The driver name is added to the Driver Names list box.
7. Highlight the name in the Driver Names list box, and then click on the Configure button.

   The Modicon Modbus Configuration dialog box opens, as shown in Figure 4.

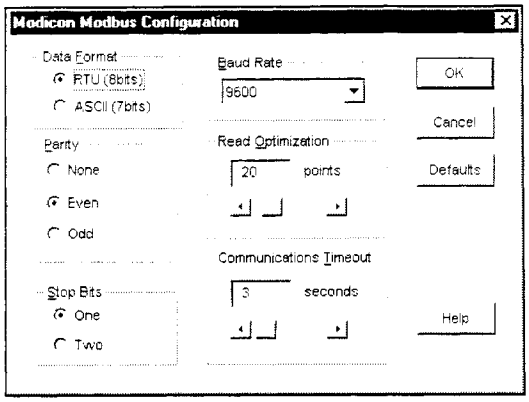

Figure 4. Modicon Modbus Configuration dialog box

This dialog box reflects the default settings. Table 1 defines the fields in this dialog box.

Table 1. Fields in the Modicon Modbus Driver Configuration Dialog Box

Field	Definition
Data Format	Sets the format in which data is transferred to RTU (8 bits) or ASCII (7 bits). The default is RTU.
Parity	Sets error-checking to none, even, or odd parity. The default is Even.
Stop Bits	Sets the end of character stop bit to 1 or 2. The default is 1.
Baud Rate	Sets the baud rate at which you will transfer data, from 300 to 19200. The default is 9600.
Read Optimization	Optimizes the number of data points read in a single command, from 1 to 100. The default is 20. This number can be changed to affect driver performance.
Communications Timeout	Sets the time period the engine will wait for a response from the PLC before timing out, from 1 to 30 seconds. The default is 3.

8. Click OK to accept the changes you have made to these settings. If you want to revert to the default settings, click Defaults. Click Cancel to cancel any changes you have made during the current use of the dialog box.

To change settings once you have configured the driver, double-click on the driver name in the Drivers configured list box on the Application Navigator form.

> **Technical Note**
>
> You cannot change the port setting from the Application Navigator form. You must use the Drivers command on the Configure menu in the Application Navigator to change this setting.

Once the driver is configured, you can create tag names that address Modbus data points.

Addressing the PLC

SoftScreen uses tag names to address PLC data points. Tag names can be up to 32 alphanumeric characters. Do not start tag names with a number or a space.

This section describes how to assign these tag names to data points on supported Modbus devices, and defines valid Modbus expressions.

Assigning Tag Names

To assign a tag name to a data point on a Modbus device...

1. Select Drivers from the Data drop-down list box on the Application Navigator form.
2. Double-click on the driver name for which you want to configure tag names. The Modicon Modbus data point configuration form opens, as shown in Figure 5.

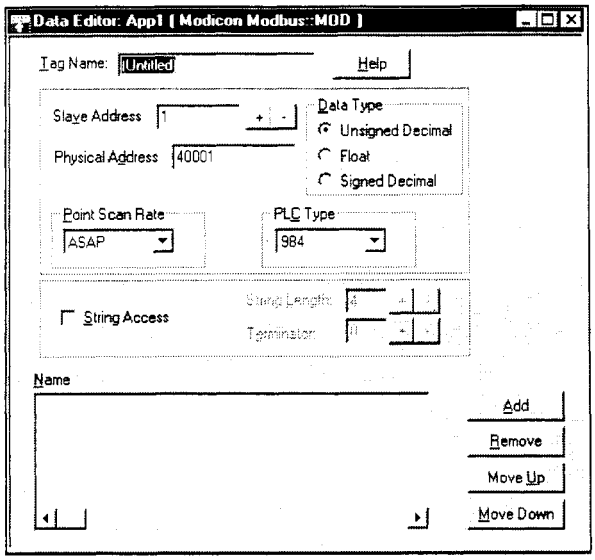

Figure 5. Modicon Modbus Data Point Configuration Form

Table 2 defines the fields in this form.

Table 2. Fields in the Modicon Modbus Data Point Configuration Form

Field	Definition
Tag Name	Defines a unique tag name.
Slave Address	Sets the address of the PLC to which you want to talk, from 0-247. The default is 1.
Physical address	Links the tag to a valid data point. The default is 40001. Refer to the *Creating Valid Addresses* section for more information
Point Scan Rate	Sets how often the run-time engine will read from the data point, from ASAP (as soon as possible) to once every eight hours. The default is ASAP.
PLC Type	Sets the type of Modicon PLC to which you will communicate. Choices are 984 and 984E. The default is 984.
Data Type	Sets how the 3000 and 4000 data should be interpreted. The default is unsigned decimal.

Field	Definition
String Access	When checked, indicates the data address you entered in the Data address field accesses strings. If this field is checked, you must select a string length, from 1 to 128 characters (the default is 4), and a string terminator character, from 0 to FF (the default is 0). When a string is read from the PLC, the driver will search for the specified terminator, replace it with a null and then store it in the run-time engine. When a string is written to the PLC, the driver will append the specified terminator at the end of the string, and then send it to the PLC. *Note: Refer to tables 3 and 4 for information on data types that acess strings.*

3. Click Add to add the tag to the Name list box. Click Remove to delete the tag. Click Move Up or Move Down if you want to change the order in which the tags are arranged in the list box, which will change the order in which they are written to or read from.

Creating Valid Addresses

Tables 3 and 4 define the valid data types and file ranges for Modicon Modbus PLCs. All Modbus PLC data types are configured decimally.

Table 3. Modbus 984 Valid Data Types and Addressing Ranges

Data Type	File Range	Size	Bit Access	String Support	R/W
Coil Status	00001-09999	Bit	N/A	No	R/W
Input Status	10001-19999	Bit	N/A	No	R
Input Register	30001-39999	Word	N/A	No	R
Holding Register	40001-49999	Word	0-15*	Yes	R/W

**The correct format for accessing a bit is address(space)bit (i.e., 40001 15).*

Table 4. Modbus 984-785E Valid Data Types and Addressing Ranges

Data Type	Valid File Range	Size	Bit Access	String Support	R/W
Coil Status	000001-065536	Bit	N/A	No	R/W
Input Status	100001-165536	Bit	N/A	No	R
Input Register	300001-365536	Word	N/A	No	R
Holding Register	400001-465536	Word	0-15*	Yes	R/W

**The correct format for accessing a bit is address(space)bit (i.e., 40001 15).*

Following are examples of tags that address Modicon Modbus data points.

Example1 addresses holding register data point 40001 every hour.

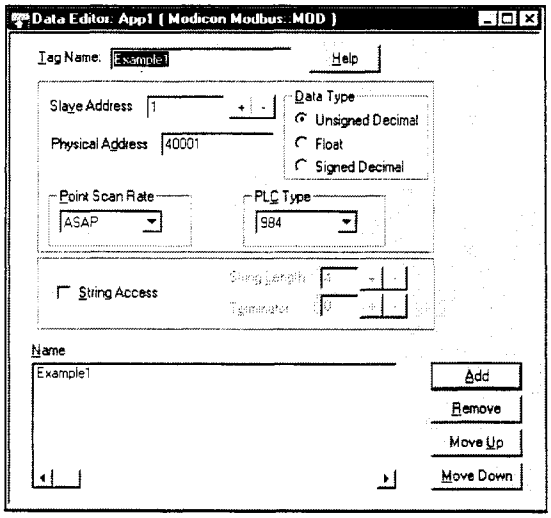

Figure 6. Modicon Modbus Addressing, Example 1

Example 2 addresses input status data point 1004 ASAP.

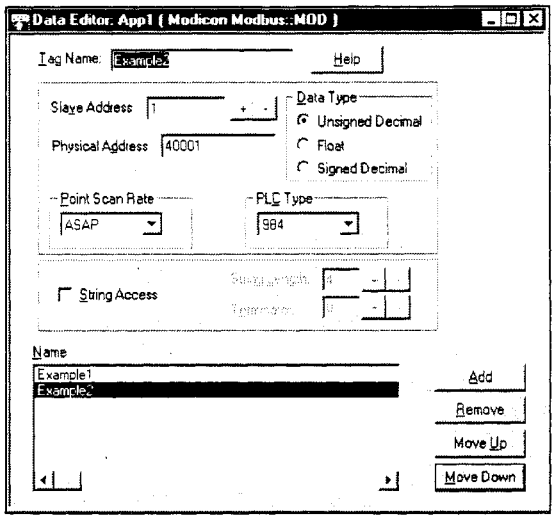

Figure 7. Modicon Modbus Addressing, Example 2

Retrieving Status Information

Use the strings described in this section to retrieve driver status information.

Technical Note

These strings are not case sensitive.

Driver ID

MbDriverId returns the following null-terminated string identifying the driver running on the 3000 engine: "Modbus Driver."

Driver Revision

MbDriverRev returns a string identifying the driver revision level, such as "01.01.01."

Error Handling

MbCommStatus returns a number describing the current communication status of the driver. Table 5 defines these status bits.

Technical Note

If the entire number is 0, there are no communication errors.

Table 5. Modbus Communication Status Errors

Bit	Description
0	Timeout–The PLC did not respond in the configured amount of time.
1	Transmit error–The initial part of the message (before the response data) had an error.
2	Receive error–The part of the message after the first ACK from the PLC had an error.
3	Checksum error–The message received an invalid checksum.
4-7	Reserved.
8-15	These bits will contain Modbus error codes. Refer to Modbus documentation for more information.
16-23	Reserved.

Communication Status

MbCommString returns a null-terminated string describing the current communication status of the driver.

Scan Time

MbScanTime returns a number (in msecs) describing the amount of time it takes the driver to read the current data points. For example, if all data points are set to ASAP, the system would track the time between the starting point of the scan and the ending point, and then would display the scan time based on these two numbers. However, if one data point is set to an ASAP scan rate, and another is set to an eight-hour scan rate, the system would continue to read the ASAP point until eight hours had passed, then it would read the ASAP point and the eight-hour point, and then provide you with the time period it took for this scan to read both the points.

Detecting Errors and Generating Alarms

Each of the data points assigned to the driver can have a different update rate, so on any given scan, some points will be scanned and some will not. When the driver detects an error (either read or write), it will post an alarm if it has not previously posted an alarm. The alarm will be posted at the bottom of the screen for three seconds. During any given scan, only the first error condition in the scan will be posted.

The alarm message that is posted will indicate the data point that caused the error, as shown below:

```
"Modbus Port:1 DEST:1 Addr:(R) 40001"
```

This error occurred while reading (R) 40001 from destination PLC address 1 on port 1.

The number that indicates the type of error that occurred (refer to the previous section on *Error Handling*) does not appear on screen. However, the number will be logged in the alarm summary along with the date and time of the alarm (refer to the *SoftScreen Development System for Windows User's Guide* for information on the alarm summary).

If the driver is optimizing points, it will read data points in optimized blocks, instead of one at a time. If an error occurs while the driver is reading the block, the alarm message will describe the data point that was at the beginning of the block.

For example, if the driver reads an optimized block of data points (a, b, and c), and an error occurs because data point "c" does not exist in the

target device, an alarm message is posted. This message will indicate that there was an error reading data point "a," not data point "c."

Once the driver completes a scan without any errors (after an error has occurred in a previous scan), then the driver will post the following message:

```
"Modbus: Communication Restored"
```

Index

R

S

T

U