# 3000-SS16
# SoftScreen®/Koyo/TI-405
# Driver

P/N99980-016A



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# SoftScreen/TI/Koyo Driver

This *SoftScreen* driver allows the Focal Point™ 3000 family of engines to communicate with TI/Koyo CPUs, either with the PLC directly using Koyo K-Sequence protocol or through the DCM using Modbus RTU protocol.

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

The TI/Koyo driver supports all TI/Koyo 405 series devices. With the TI/Koyo driver, any of these devices can communicate with any Xycom Focal Point 3000 engine.

## Installing the Driver

**Technical Note**

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

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

**To install the TI/Koyo 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 TI/Koyo 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 TI/Koyo 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 TI/Koyo 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 Supported Devices

This section describes the serial port configuration and the cabling pinouts for connecting a 3000 engine to a TI/Koyo CPU.

## Configuring the Port

A 3000 engine can communicate with a TI/Koyo CPU via RS-232C protocol, either directly to the PLC or indirectly through the DCM.

## Cabling

This section provides information on RS-232C cabling.

## 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.

## 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.

## Pinout for CPU Connection

Figure 1 shows the pinout to connect a 3000 engine to the TI/Koyo CPU using the top port of the PLC. You must use this connection to use K-Sequence protocol.

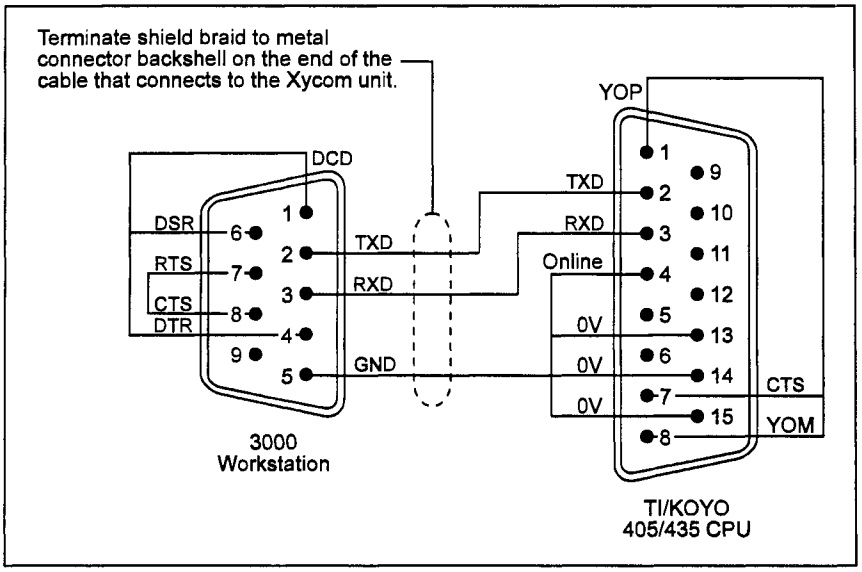


*Figure 1. Pinout for CPU Connection*

## Pinout for DCM Connection

Figure 2 shows the pinout to connect a 3000 engine to the DCM. You must use this connection to use the Modbus RTU protocol.

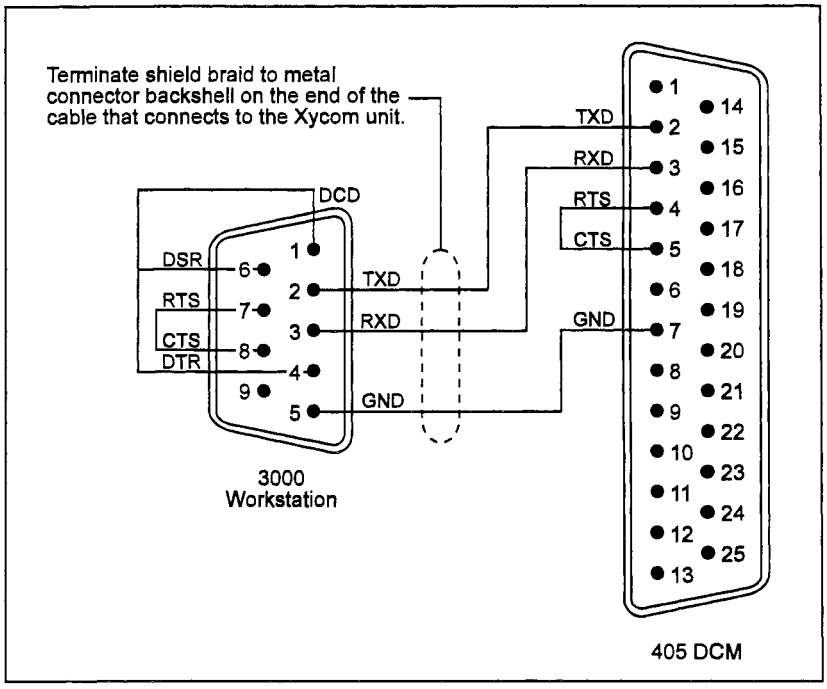


*Figure 2. Pinout for DCM Connection*

# 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.

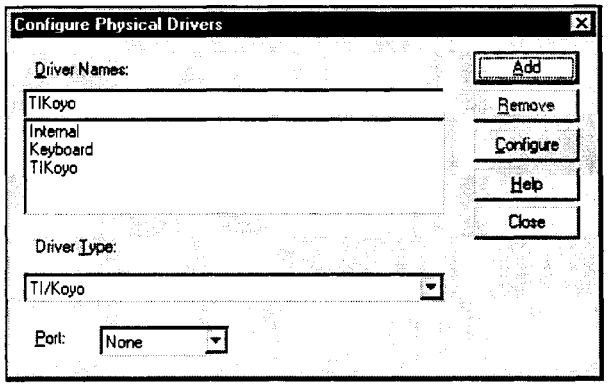


*Figure 3. Configure Physical Drivers Dialog Box*

3. Select TI/Koyo from the Driver Type drop-down list box.
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, COM2, and Special. 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. Then click on the Configure button.

   The TI/Koyo Configuration dialog box opens, as shown in Figure 4.

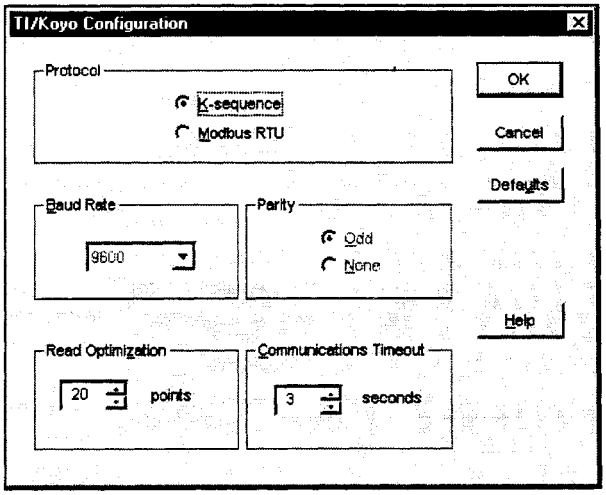


*Figure 4. TI/Koyo Configuration dialog box*

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

*Table 1. Fields in the TI/Koyo Driver Configuration Dialog Box*

| Field | Definition |
|---|---|
| Protocol | Sets the protocol to K-Sequence (direct communication with the PLC) or Modbus RTU (communication through the DCM). The default is K-Sequence. |
| Baud Rate | Sets the baud rate at which you will transfer data, from 300 to 19200. The default is 9600. This choice is available for Modbus RTU protocol only. It is automatically set to 9600 for K-Sequence protocol. |
| Parity | Sets error checking to None or Odd. The default is Odd. This choice is available for Modbus RTU protocol only. For K-Sequence protocol, it is automatically set to Odd. |

| Field | Definition |
|---|---|
| Read Optimization | Optimizes the number of data points read in a single command, from 1 to 64. 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 CPU 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 tags that address data points on supported devices.

# Addressing Supported Devices

*SoftScreen* uses tags to address data points on supported devices. 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 and defines expressions supported by the TI/Koyo protocol.

## Assigning Tag Names

**To assign a tag name to a data point on a supported 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 tags. The data point configuration form opens, as shown in Figure 5.

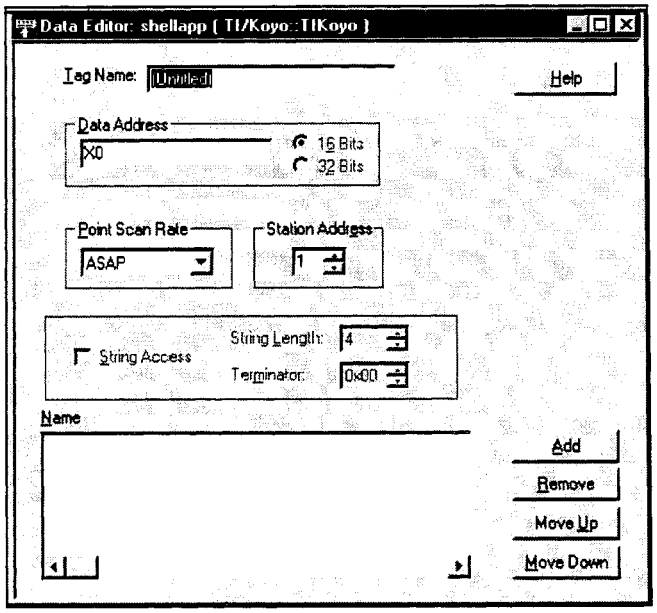


*Figure 5. TI/Koyo Data Point Configuration Form*

Table 2 defines the fields in this form.

*Table 2. Fields in the TI/Koyo Data Point Configuration Form*

| Field | Definition |
|---|---|
| Tag Name | Defines a unique tag name. |
| Data Address | Links the tag to a valid data point. Refer to the *Creating Valid Addresses* section for more information. The default is X0. V-Memory allows you to choose either 16-bit or 32-bit data. For all other data types, this value is preselected. |

| Field | Definition |
|---|---|
| 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. |
| Station Number | Specifies the address of the CPU on the multi-link network to which you will communicate, from 1 to 90 decimal. The default is 1. |
| 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 120 characters (the default is 4), and a string terminator character, from 0x00 to 0xFF (the default is 0x00). 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. This field will only be active for the V-Memory data type. |

3. Click Add to add the tag. Click Remove to delete the tag. Click Move Up or Move Down to change the order in which the tags are arranged in the list box.

## Creating Valid Addresses

Table 3 defines the valid data types and addressing ranges for K-sequence protocol. Table 4 defines the valid data types and addressing ranges for RTU protocol.

**Warning**

Do not attempt to read/write 32-bit integer values less than -16,777,216 or greater than +16,777,216. Doing so will cause unpredictable results.

*Table 3. TI/Koyo Valid Data Types and Addressing Ranges for K-Sequence Protocol*

| Description | Type | Valid Range | Data Format | Data Size | String Support | Bit Addressing | Word Access | Bit Access |
|---|---|---|---|---|---|---|---|---|
| Input | X | 0-1777 | Oct | Bit | No | No | N/A | R/W |
| Output | Y | 0-1777 | Oct | Bit | No | No | N/A | R/W |
| Remote I/O | GX<br>GY | 0-2777<br>0-2777 | Oct<br>Oct | Bit<br>Bit | No<br>No | No<br>No | N/A<br>N/A | R/W<br>R/W |
| Control Relay | C | 0-3777 | Oct | Bit | No | No | N/A | R/W |
| Stage Memory | S | 0-1777 | Oct | Bit | No | No | N/A | R/W |
| Timer Accumulator | TA | 0-377 | Oct | Word | No | No | R/W | N/A |
| Counter Accumulator | CTA | 0-377 | Oct | Word | No | No | R/W | N/A |
| Special Relay | SP | 0-777 | Oct | Bit | No | No | N/A | R |
| Timer Status Bits | T | 0-377 | Oct | Bit | No | No | N/A | R/W |
| Counter Status Bits | CT | 0-377 | Oct | Bit | No | No | N/A | R/W |
| V Memory | V | 0-41237 | Oct | Word | Yes | Yes | R/W | R |
| Scratch Pad Memory | SPD | 0-8FF | Hex | Byte | No | No | R/W | N/A |

*Table 4. TI/Koyo Valid Data Types and Addressing Ranges for Modbus RTU Protocol*

| Description | Type | Valid Range | Data Format | Data Size | String Support | Bit Addressing | Word Access | Bit Access |
|---|---|---|---|---|---|---|---|---|
| Input | X | 0-1777 | Oct | Bit | No | No | N/A | R |
| Output | Y | 0-1777 | Oct | Bit | No | No | N/A | R/W |
| Remote I/O | GX<br>GY | 0-2777<br>N/A | Oct<br>Oct | Bit<br>Bit | No<br>No | No<br>No | N/A<br>N/A | R<br>R/W |
| Control Relay | C | 0-3777 | Oct | Bit | No | No | N/A | R/W |
| Stage Memory | S | 0-1777 | Oct | Bit | No | No | N/A | R/W |
| Timer Accumulator | TA | 0-377 | Oct | Word | No | No | R/W | N/A |
| Counter Accumulator | CTA | 0-377 | Oct | Word | No | No | R/W | N/A |
| Special Relay | SP | 0-777 | Oct | Bit | No | No | N/A | R |
| Timer Status Bits | T | 0-377 | Oct | Bit | No | No | N/A | R/W |
| Counter Status Bits | CT | 0-377 | Oct | Bit | No | No | N/A | R/W |
| V Memory | V | 0-7777 | Oct | Word | Yes | Yes | R/W | R |
| Scratch Pad Memory | SPD | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

## Addressing Examples

Following are examples of tags that address TI/Koyo CPU data points. Example1 addresses input bit 310 at station number 10 ASAP.

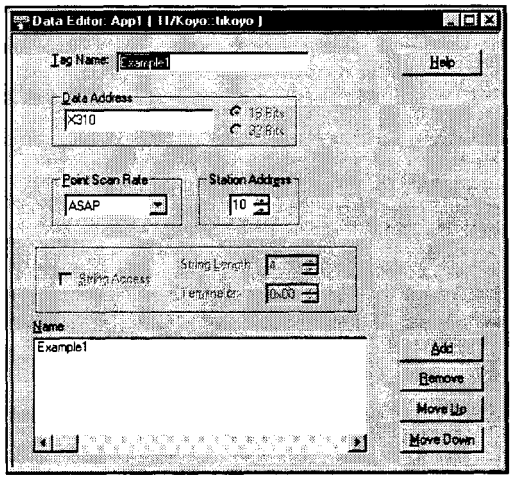


*Figure 6. TI/Koyo Addressing, Example1*

Example2 addresses control relay bit 600 at station number 31 every five seconds.

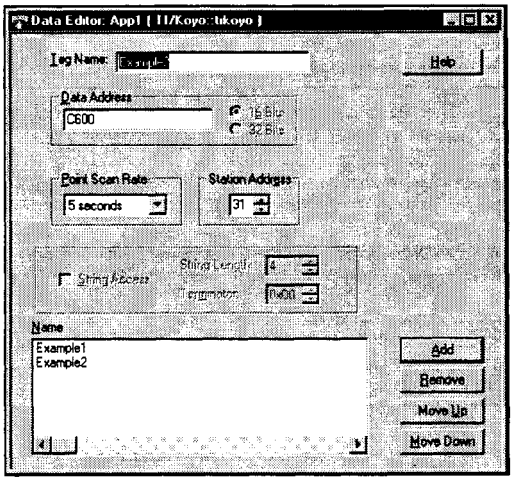


*Figure 7. TI/Koyo Addressing, Example2*

Example_3 addresses V-Memory register 3260 at station number 11 every 30 seconds. Note that 16/32-bit selection and string access are active for this data type.

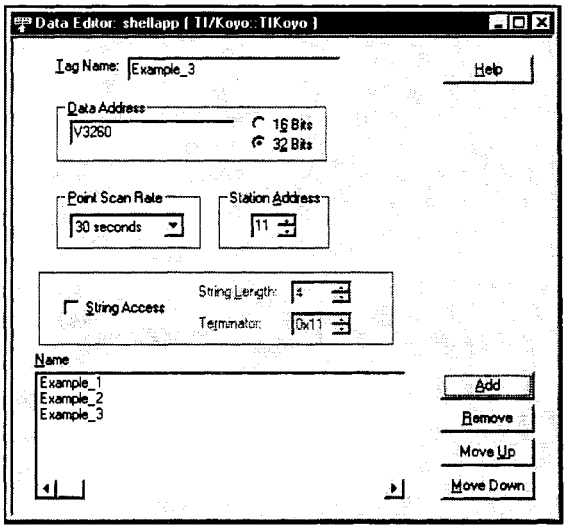


*Figure 8. TI/Koyo Addressing, Example_3*

## 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

*TIKoyoDriverID* returns the following null-terminated string identifying the driver running on the 3000 engine:

```
"TI/Koyo Driver"
```

## Driver Revision

*TIKoyoDriverRev* returns a string identifying the driver revision level, such as "1.3."

## Error Handling

*TIKoyoCommStatus* returns a number describing the current communication status of the driver. (See "TI/Koyo Communication Status Values" on page 18 for status value information.)

### Technical Note

There are no communication errors if the number is 0.

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. The number that indicates the type of error that occurred 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 *Soft-Screen 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:

```
"TI/Koyo:Communication Restored"
```

### Communication Status

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

### Scan Time

*TIKoyoScanTime* 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 provide you with the time period it took for this scan to read both the points.

## TI/Koyo Communication Status Values

Table 5 summarizes the errors that the TI/Koyo driver can detect and report. Some of the errors will be detected by the TI/Koyo driver itself. The others will come from the PLC(s) and will be mapped into the *TIKoyoCommStatus* and *TIKoyoCommString* data types.

*Table 5. TI/Koyo Communication Status Errors Detected by the Driver*

| Bit Number | Error | Description |
|---|---|---|
| 0 | Timeout | 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 response block contained invalid information (station number, header, or data). |
| 3 | CS error | The message received had an invalid checksum (CS). |
| 4-7 | N/A | Reserved. |

The remaining error codes are values returned from the PLC itself. They are listed in Table 6. These values will be mapped into bits 8-22 of the *TIKoyoCommStatus* internal register. For example, if the PLC returned a numeric error value of 1, it would appear in the *TIKoyoCommStatus* as

128. Another example, if the PLC returned a numeric error value of 1 and *TIKoyoCommStatus* was 4 (bit 2), the resulting error would be 132.

*Table 6. TI/Koyo Communication Status Values Returned from the PLC*

| Numeric Value | Error | Description |
|---|---|---|
| 001 | CPU FATAL ERROR | You may possibly clear the error by power cycling the CPU. If the error returns, replace the CPU. |
| 003 | SOFTWARE TIME-OUT | The program scan time exceeds the time allotted to the watchdog timer. SP51 will be on and the error code will be stored in V7755. To correct this problem, add RSTWT instructions in FOR NEXT loops and subroutines or use AUX55 to extend the time allotted to the watchdog timer. |
| 004 | INVALID INSTRUCTION (DL440 ONLY) | The application program has changed for some reason. SP44 will be on and the error code will be stored in V7755. This problem may possibly be due to electrical noise. Use AUX21 to check the program syntax and correct where necessary or clear the memory and redownload the program. Correct any grounding problems. If the error returns, replace the CPU. |
| 041 | CPU BATTERY LOW | The CPU battery is low and should be replaced. SP43 will be on and the error code will be stored in V7757. |
| 043 | MEMORY CARTRIDGE BATTERY LOW (DL440 ONLY) | The Memory Cartridge battery is low and should be replaced. SP43 will be on and the error code will be stored in V7757. |
| 099 | PROGRAM MEMORY EXCEEDED | The compiled program length exceeds the amount of available CPU RAM. SP52 will be on and the error code will be stored in V7755. Reduce the size of the application program. |
| 101 | CPU MC MISSING (DL440 ONLY) | The CPU Memory Cartridge has failed or is missing. SP44 will be on and the error code will be stored in V7755. Install or replace the Memory Cartridge. |
| 104 | WRITE FAILED (DL440 ONLY) | A write to the CPU Memory Cartridge was not successful. The Memory Cartridge may be write protected. Disassemble and check the jumper. If the error still occurs, replace the Memory Cartridge. |

| Numeric Value | Error | Description |
|---|---|---|
| 151 | INVALID COMMAND | A parity error has occurred in the application program. SP44 will be on and the error code will be stored in V7755. This problem may possibly be due to electrical noise. Clear the memory and re-download the program. Correct any grounding problems. If the error returns, replace the Memory Cartridge or CPU. |
| 155 | RAM FAILURE | A checksum error has occurred in the system RAM. SP44 will be on and the error code will be stored in V7755. This problem may possibly be due to a low battery, electrical noise, or a CPU RAM failure. Clear the memory and re-download the program. Correct any grounding problems. If the error returns, replace the CPU. |
| 201 | TERMINAL BLOCK MISSING | A terminal block is loose or missing from an I/O module. SP45 will be on and the error code will be stored in V7756. |
| 202 | MISSING I/O MODULE | An I/O module has failed to communicate with the CPU or is missing from the base. SP45 will be on and the error code will be stored in V7756. Run AUX42 to determine the slot and base location of the module reporting the error. |
| 203 | BLOWN FUSE | A fuse has blown in an I/O module. SP45 will be on and the error code will be stored in V7756. Run AUX42 to determine the slot and base location of the module reporting the error. |
| 206 | USER 24V POWER SUPPLY FAILURE | The 24VDC power supply being used to power output modules has failed. SP45 will be on and the error code will be stored in V7756. Run AUX42 to determine the slot and base location of the module reporting the error. |
| 250 | COMMUNICATION FAILURE IN THE I/O CHAIN | A failure has occurred in the local I/O system. The problem could be in the base, expansion cable, or I/O Expansion Unit power supply. Check all cabling between bases and replace faulty hardware if necessary. SP45 will be on and the error code will be stored in V7755. Run AUX42 to determine the base location reporting the error. |
| 251 | I/O PARITY ERROR | A communication parity error has occurred in the I/O communication chain. |

| Numeric Value | Error | Description |
|---|---|---|
| 252 | NEW I/O CFG | This error occurs when the auto configuration check is turned on in the CPU and the actual I/O configuration has changed, either by moving modues in a base or changing types of modules in a base. You can return the modules to the original position/types or run AUX45 to accept the new configuration. SP47 will be on and the error code will be stored in V7755. |
| 261 | I/O ADDRESS CONFLICT (DL440 ONLY) | Overlapping addresses have been assigned while manually configuring the I/O. Correct the address assignments using AUX46. SP45 will be on and the error code will be stored in V7755. |
| 262 | I/O OUT OF RANGE | An out of range I/O address has been encountered in the application program. Correct the invalid address in the program. SP45 will be on and the error code will be stored in V7755. |
| 263 | CONFIGURED I/O ADDRESS OUT OF RANGE (DL440 ONLY) | Out of range addresses have been assigned while manually configuring the I/O. Correct the address assignments using AUX46. SP45 will be on and the error code will be stored in V7755. |
| 264 | DUPLICATE I/O REFERENCE (DL440 ONLY) | Duplicate addresses have been assigned while manually configuring the I/O. Correct the address assignments using AUX46. |
| 311 | HP COMM ERROR 1 | A request from the handheld programmer could not be processed by the CPU. Clear the error and retry the request. If the error continues, replace the CPU. SP46 will be on and the error code will be stored in V7756. |
| 312 | HP COMM ERROR 2 | A data error was encountered during communications with the CPU. Clear the error and retry the request. If the error continues, first check the cabling between the two devices, then replace the handheld programmer, and then, if necessary, replace the CPU. SP46 will be on and the error code will be stored in V7756. |
| 313 | HP COMM ERROR 3 | An address error was encountered during communications with the CPU. Clear the error and retry the request. If the error continues, first check the cabling between the two devices, then replace the handheld programmer, and then, if necessary, replace the CPU. SP46 will be on and the error code will be stored in V7756. |

| Numeric Value | Error | Description |
|---|---|---|
| 316 | HP COMM ERROR 6 | A mode error was encountered during communications with the CPU. Clear the error and retry the request. If the error continues, first replace the handheld programmer, then replace the CPU if necessary. SP46 will be on and the error code will be stored in V7756. |
| 320 | HP COMM TIME-OUT | The CPU did not respond to the handheld programmer communication request. Check to insure cabling is correct and not defective. Power cycle the system and, if the error continues, replace the CPU first and then the handheld programmer if necessary. |
| 321 | COMM ERROR | A data error was encountered during communication with the CPU. Check to insure cabling is correct and not defective. Power cycle the system and, if the error continues, replace the CPU first and then the handheld programmer if necessary. |
| 360 | HP PERIPH-ERAL PORT TIME-OUT | The device connected to the peripheral port did not respond to the handheld programmer communication request. Check to insure cabling is correct and not defective. The peripheral device or handheld programmer could be defective. |
| 401 | MISSING END STATEMENT | All application programs must terminate with an END statement. Enter the END statement in an appropriate location in your program. SP52 will be on and the error code will be stored in V7755. |
| 402 | MISSING LBL (DL440 ONLY) | A GOTO, GTS, MOV MC or LD LBL instruction was used without the appropriate label. Refer to the programming section for details on these instructions. SP52 will be on and the error code will be stored in V7755. |
| 403 | MISSING RET (DL440 ONLY) | A subroutine in the program does not end with the RET instruction. SP52 will be on and the error code will be stored in V7755. |
| 404 | MISSING FOR (DL440 ONLY) | A NEXT instruction does not have the corresponding FOR instruction. SP52 will be on and the error code will be stored in V7755. |
| 405 | MISSING NEXT (DL440 ONLY) | A FOR instruction does not have the corresponding NEXT instruction. SP52 will be on and the error code will be stored in V7755. |

| Numeric Value | Error | Description |
|---|---|---|
| 406 | MISSING IRT | An interrupt routine in the program does not end with the IRT instruction. SP52 will be on and the error code will be stored in V7755. |
| 412 | SBR/LBL>64 (DL440 ONLY) | There are more than 64 SBR, LBL, or DLBL instructions in the program. This error is also returned if there are more than 128 GTS or GOTO instructions used in the program. SP52 will be on and the error code will be stored in V7755. |
| 413 | FOR/NEXT>64 (DL440 ONLY) | There are more than 64 FOR/NEXT loops in the application program. SP52 will be on and the error code will be stored in V7755. |
| 421 | DUPLICATE STAGE REFERENCE | Two or more SG or ISG labels exist in the application program with the same number. A unique number must be allowed for each Stage and Initial Stage. SP52 will be on and the error code will be stored in V7755. |
| 422 | DUPLICATE SBR/LBL REFERENCE (DL440 ONLY) | Two or more SBR or LBL instructions exist in the application program with the same number. A unique number must be allowed for each Subroutine and Label. SP52 will be on and the error code will be stored in V7755. |
| 423 | NESTED LOOPS (DL440 ONLY) | Nested loops (programming one FOR/NEXT loop inside of another) are not allowed in the DL440 series. SP52 will be on and the error code will be stored in V7755. |
| 431 | INVALID ISG/SG ADDRESS | An ISG or SG must not be programmed after the END statement, such as in a subroutine. SP52 will be on and the error code will be stored in V7755. |
| 432 | INVALID JUMP (GOTO) ADDRESS (DL440 ONLY) | An LBL that corresponds to a GOTO instruction must not be programmed after the END statement, such as in a subroutine. SP52 will be on and the error code will be stored in V7755. |
| 433 | INVALID SBR ADDRESS (DL440 ONLY) | An SBR must be programmed after the END statement, not in the main body of the program or in an interrupt routine. SP52 will be on and the error code will be stored in V7755. |
| 434 | INVALID RTC ADDRESS (DL440 ONLY) | An RTC must be programmed after the END statement, not in the main body of the program or in an interrupt routine. SP52 will be on and the error code will be stored in V7755. |

| Numeric Value | Error | Description |
|---|---|---|
| 435 | INVALID RT ADDRESS (DL440 ONLY) | An RT must be programmed after the END statement, not in the main body of the program or in an interrupt routine. SP52 will be on and the error code will be stored in V7755. |
| 436 | INVALID INT ADDRESS | An INT must be programmed after the END statement, not in the main body of the program. SP52 will be on and the error code will be stored in V7755. |
| 437 | INVALID IRTC ADDRESS | An IRTC must be programmed after the END statement, not in the main body of the program. SP52 will be on and the error code will be stored in V7755. |
| 438 | INVALID IRT ADDRESS | An IRT must be programmed after the END statement, not in the main body of the program. SP52 will be on and the error code will be stored in V7755. |
| 440 | INVALID DATA ADDRESS (DL440 ONLY) | Either the DLBL instruction has been programmed in the main program area (not after the END statement) or the DLBL instruction is on a rung containing input contact(s). |
| 441 | ACON/NCON (DL440 ONLY) | An ACON or NCON must be programmed after the END statement, not in the main body of the program. SP52 will be on and the error code will be stored in V7755. |
| 451 | BAD MLS/MLR | MLS instructions must be numbered in ascending order from top to bottom. |
| 452 | X AS COIL | An X data type is being used as a coil output. |
| 453 | MISSING T/C | A timer or counter contact is being used where the associated timer or counter does not exist. |
| 454 | BAD TMRA | One of the contacts is missing from a TMRA instruction. |
| 455 | BAD CNT | One of the contacts is missing from a CNT or UDC instruction. |
| 456 | BAD SR | One of the contacts is missing from the SR instruction. |
| 461 | STACK OVERFLOW | More than nine levels of logic have been stored on the stack. Check the use of AND STR and OR STR instructions. |
| 462 | STACK UNDERFLOW | An unmatched number of logic levels has been stored on the stack. Insure that the number of AND STR and OR STR instructions matches the number of STR instructions. |

| Numeric Value | Error | Description |
|---|---|---|
| 463 | LOGIC ERROR | An STR instruction was not used to begin a rung of ladder logic. |
| 464 | MISSING CKT | A rung of ladder logic is not terminated properly. |
| 471 | DUPLICATE COIL REFERENCE | Two or more OUT instructions reference the same I/O point. |
| 472 | DUPLICATE TMR REFERENCE | Two or more TMR instructions reference the same number. |
| 473 | DUPLICATE CNT REFERENCE | Two or more CNT instructions reference the same number. |
| 480 | INVALID CV ADDRESS (DL440 ONLY) | The CV instruction is used in a subroutine or program interrupt routine. The CV instruction may only be used in the main program area (before the END statement). |
| 481 | CONFLICTING INSTRUCTIONS (DL440 ONLY) | An instruction exists between convergence stages. |
| 482 | MAX CV INSTRUCTIONS EXCEEDED (DL440 ONLY) | Number of CV instructions exceeds 17. |
| 483 | INVALID CV JUMP ADDRESS (DL440 ONLY) | CV JMP has been used in a subroutine or a program interrupt routine. |
| 484 | MISSING CV INSTRUCTION (DL440 ONLY) | CV JMP is not preceded by the CV instruction. A CV JMP must immediately follow the CV instruction. |
| 485 | MISSING REQUIRED INSTRUCTION (DL440 ONLY) | A CV JMP instruction is not placed between the CV and the [SG, ISG, ST BLK, END BLK, END] instruction. |
| 486 | INVALID CALL BLK ADDRESS (DL440 ONLY) | CALL BLK is used in a subroutine or a program interrupt routine. The CALL BLK instruction may only be used in the main program area (before the END statement). |

| Numeric Value | Error | Description |
|---|---|---|
| 487 | MISSING ST BLK INSTRUC-TION (DL440 ONLY) | The CALL BLK instruction is not followed by a ST BLK instruction. |
| 488 | INVALID ST BLK ADDRESS (DL440 ONLY) | The ST BLK instruction is used in a subroutine or a program interrupt routine. Another ST BLK instruction is used between the CALL BLK and the END BLK instructions. |
| 489 | DUPLICATED CR REFER-ENCE (DL440 ONLY) | The control relay used for the ST BLK instruction is being used as an output elsewhere. |
| 490 | MISSING SG INSTRUCTION (DL440 ONLY) | The ST BLK instruction is not immediately followed by the SG instruction. |
| 491 | INVALID ISG INSTRUCTION ADDRESS (DL440 ONLY) | There is an ISG instruction between the ST BLK and END BLK instructions. |
| 492 | INVALID END BLK ADDRESS (DL440 ONLY) | The END BLK instruction is used in a subroutine or a program interrupt routine. The END BLK instruction is not followed by a ST BLK instruction. |
| 493 | MISSING REQUIRED INSTRUCTION (DL440 ONLY) | A [CV, SG, ISG, ST BLK, END] instruction must immediately follow the END BLK instruction. |
| 494 | MISSING END BLK INSTRUC-TION (DL440 ONLY) | The ST BLK instruction is not followed by an END BLK instruction. |
| 501 | BAD ENTRY | An invalid keystroke or series of keystrokes was entered into the handheld programmer. |
| 502 | BAD ADDRESS | An invalid or out of range address was entered into the handheld programmer. |
| 503 | BAD COMMAND | An invalid instruction was entered into the handheld programmer. |
| 504 | BAD REF/VAL | An invalid value or reference number was entered with an instruction. |

| Numeric Value | Error | Description |
|---|---|---|
| 505 | INVALID INSTRUCTION | An invalid instruction was entered into the handheld programmer. |
| 506 | INVALID OPERATION | An invalid operation was attempted by the handheld programmer. |
| 520 | BAD OP-RUN | An operation that is invalid in RUN mode was attempted by the handheld programmer. |
| 521 | BAD OP-TRUN | An operation that is invalid in TEST RUN mode was attempted by the handheld programmer. |
| 523 | BAD OP-TPGM | An operation that is invalid in TEST PROGRAM mode was attempted by the handheld programmer. |
| 524 | BAD OP-PGM | An operation that is invalid in PROGRAM mode was attempted by the handheld programmer. |
| 525 | KEYSWITCH | An operation was attempted by the handheld programmer while the CPU keyswitch was in a position other than the TERM position. |
| 526 | OFF LINE | The handheld programmer is in OFFLINE mode. Use AUX64 to change to ONLINE mode. |
| 540 | CPU LOCKED (DL440 ONLY) | The CPU has been password locked. Use AUX82 with the password to unlock the CPU. |
| 541 | WRONG PASSWORD (DL440 ONLY) | The password used with AUX82 to unlock the CPU was incorrect. |
| 542 | PASSWORD RESET (DL440 ONLY) | The CPU powered up with an invalid password and reset the password to 00000000. Use AUX81 to reenter the password. |
| 601 | MEMORY FULL | An attempt was made to enter an instruction which required more memory than is available in the CPU. |
| 602 | INSTRUCTION MISSING | A search function was performed and the instruction was not found. |
| 603 | DATA MISSING (DL440 ONLY) | A search function was performed and the data was not found. |
| 604 | REFERENCE MISSING | A search function was performed and the reference was not found. |
| 610 | BAD I/O TYPE | The application program has referenced an I/O module as the incorrect type of module. |

| Numeric Value | Error | Description |
|---|---|---|
| 620 | OUT OF MEMORY | An attempt was made to transfer more data between the CPU and the handheld programmer than the receiving device can hold. |
| 621 | MC NOT BLANK | An attempt was made to write to a non-blank Memory Cartridge. Erase the cartridge and then retry the write. |
| 622 | NO HP MC | A data transfer was attempted with no Memory Cartridge or possibly a faulty Memory Cartridge in the handheld programmer. |
| 623 | SYSTEM MC | A function was requested with a Memory Cartridge that contains system information only. |
| 624 | V-MEMORY ONLY | A function was requested with a Memory Cartridge that contains V-memory data only. |
| 625 | PROGRAM ONLY | A function was requested with a Memory Cartridge that contains program data only. |
| 626 | PROM MC | An attempt was made to transfer data from a tape to a UVPROM Memory Cartridge. This transfer must be made using a CMOS RAM Cartridge. |
| 627 | BAD WRITE | An attempt was made to write to a write-protected or faulty Memory Cartridge. Check the write-protect jumper inside the cartridge, then replace if necessary. |
| 640 | COMPARE ERROR | A compare between the Memory Cartridge and the source data was found to be in error. Erase the Memory Cartridge and retry the operation, then replace the Memory Cartridge if necessary. |
| 641 | VOLUME LEVEL | The volume level of the cassette player is not set properly. Adjust the volume and retry the operation. |
| 642 | CHECKSUM ERROR | An error was detected while data was being transferred to the handheld programmer's Memory Cartridge. Check the cabling and retry the operation. |
| 650 | HP SYSTEM ERROR | A system error has occurred in the handheld programmer. Power cycle the handheld programmer. If the error returns, replace the handheld programmer. |
| 651 | HP ROM ERROR | A ROM error has occurred in the handheld programmer. Power cycle the handheld programmer. If the error returns, replace the handheld programmer. |

| Numeric Value | Error | Description |
|---|---|---|
| 652 | HP RAM ERROR | A RAM error has occurred in the handheld programmer. Power cycle the handheld programmer. If the error returns, replace the handheld programmer. |
| 653 | MC BATTERY LOW | The battery in the CMOS RAM cartridge is low and should be replaced. |

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## U


# 3000-SS13
# SoftScreen®/Siemens S5 Driver

P/N99980-013A



Printed in U.S.A.

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***Part Number: 99980-013A***

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# Table of Contents

# SoftScreen/Siemens S5 Driver

This *SoftScreen* driver allows 3000 engines to communicate with Siemens S5 PLCs with 100 or 900 Series CPUs.

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 Siemens S5 CPUs:

- 100
- 102
- 103
- 921
- 922
- 928
- 94x
- 90U
- 95U

## 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 Siemens S5 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.

## 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..

**To install the Siemens S5 driver...**

1. Start Windows 95.
2. Insert the Siemens S5 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 Siemens S5 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 Siemens S5 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 when 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 Siemens PLC.

## Configuring the Port

You can connect a 3000 engine to a Siemens PLC via RS-422 through a serial port or through a 20 mA current loop adapter.

## Cabling

### 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.

### Technical Note

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.

The 3000 engine connects to a Siemens PLC via RS-422 using a 20 mA current loop adapter (or you can buy a converter cable from Siemens, P/N 6ES5734-1BD20). The loop adapter connects to the nine-pin serial port of a 3000 engine and to a 15-pin user fabricated cable.

Figure 1 illustrates how the other end of the user-fabricated cable then connects to the Siemens PLC.

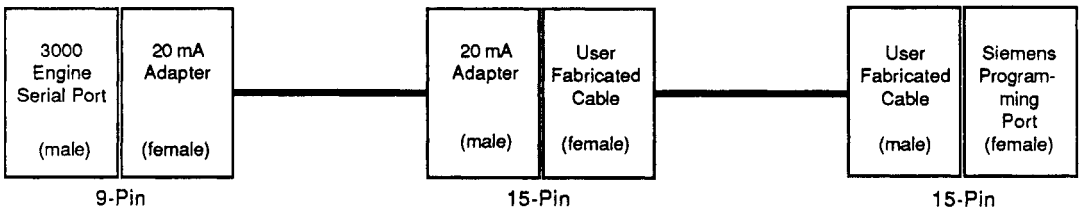



*Figure 1. RS-422 Connection Using a 20 mA Loop Adapter*

Figure 2 depicts the pinouts to connect the 20 mA adapter to the Siemens PLC.

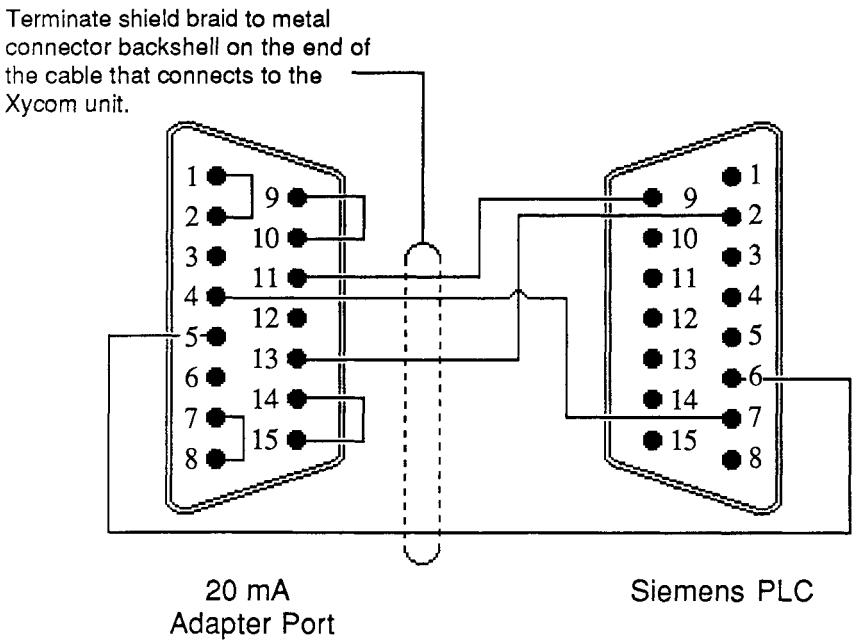



*Figure 2. RS-422 Pinouts*

# 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 Siemens S5 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.

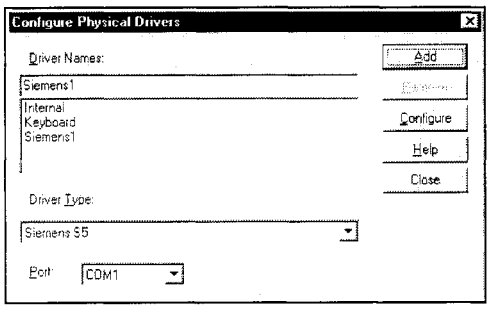



*Figure 3. Configure Physical Drivers Dialog Box*

3. Select Siemens S5 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 Siemens S5 Configuration dialog box opens, as shown in Figure 4.

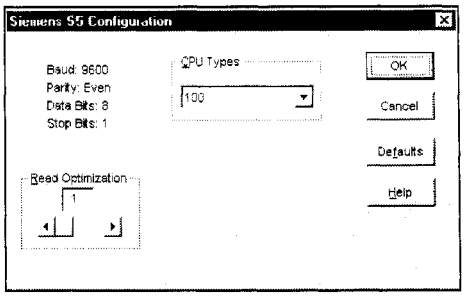



*Figure 4. Siemens S5 Configuration Dialog Box*

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

*Table 1. Fields in the Siemens S5 Driver Configuration Dialog Box*

| Field | Definition |
|---|---|
| Baud Rate | Sets the baud rate at which you will transfer data to 9600. This setting is not user configurable. |
| Parity | Sets error-checking to even. This setting is not user configurable. |
| Data Bits | Sets the number of bits used in transmission to 8. This setting is not user configurable. |
| Stop Bits | Sets the end of character stop bit to 1. This setting is not user configurable. |
| Read Optimization | Optimizes the number of data points read in a single command, from 1 to 63. The default is 1. This number can be changed to affect driver performance. |
| CPU Type | Specifies the CPU to which the driver will communicate. Choices are 100, 102, 103, 921, 922, 928, 94x, 90U, and 95U. The default is 100. |

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 Siemens S5 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, a space, or an underscore.

This section describes how to assign these tag names to data points on supported Siemens devices. It also defines valid Siemens S5 expressions.

## Assigning Tag Names

This section provides information on assigning tag names to data points on supported Siemens devices.

**To assign a tag name to a data point...**

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 Siemens S5 data point configuration form opens, as shown in Figure 5.

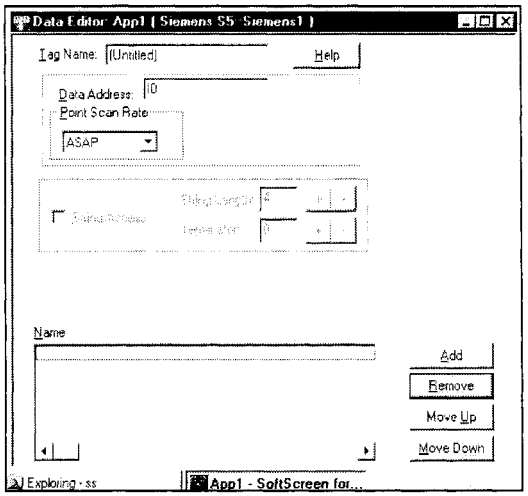



*Figure 5. Siemens S5 Data Point Configuration Form*

Table 2 defines the fields in this form.

*Table 2. Fields in the Siemens S5 Data Point Configuration Form*

| Field | Definition |
|---|---|
| Tag Name | Defines a unique tag name. |
| Data address | Links the tag to a valid data point. The default is I0. 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. |
| 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 23 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: String access is only available when you address an ASCII string data type (see tables 3-5).* |

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.

## Creating Valid Addresses

Tables 3 through 5 define the valid data types and address ranges for Siemens CPUs.

### Caution

Writing to the same data block from the PLC program and from SoftScreen may cause PLC lockups.

Do not use the Siemens Generate or Compress Data Block commands in ladder programs or on the programming panel while connected to any Xycom products. Because of the way Siemens processes information, memory in the PLC can be corrupted when these commands are executed while connected to a Xycom unit.

If you must use the commands, disconnect Xycom equipment, execute the commands, then reconnect and restart the Xycom equipment.

*Table 3. Siemens 100 Series CPU Addressing*

| Data Type | CPU 100 Address Range | CPU 102 Address Range | CPU 103 Address Range | Size | Bit Access* | R/W |
|---|---|---|---|---|---|---|
| Input (I) | 0-127 | 0-127 | 0-127 | Byte | 0-7 | R |
| Output (Q) | 0-127 | 0-127 | 0-127 | Byte | 0-7 | R/W |
| Flag (F) | 0-127 | 0-127 | 0-127 | Byte | 0-7 | R/W |
| Timer Status (TS) | 0-15 | 0-28 | 0-127 | Word | 0-15 | R |
| Timer Value (TV) | 0-15 | 0-28 | 0-127 | Word | 0-15 | R |
| Counter Status (CS) | 0-15 | 0-31 | 0-31 | Word | 0-15 | R |
| Counter Value (CV) | 0-15 | 0-31 | 0-31 | Word | 0-15 | R |
| Data Block (DB) | 2-63 | 2-63 | 2-255 | N/A | N/A | N/A |
| Word Right (DB-DR) | 0-2042 | 0-2042 | 0-2042 | Byte | 0-7 | R |
| Word Left (DB-DL) | 0-2042 | 0-2042 | 0-2042 | Byte | 0-7 | R |

| Data Type | CPU 100 Address Range | CPU 102 Address Range | CPU 103 Address Range | Size | Bit Access* | R/W |
|---|---|---|---|---|---|---|
| Word (DB-DW) | 0-2042 | 0-2042 | 0-2042 | Word | 0-15 | R/W |
| Float (DB-FP) | 0-2041 | 0-2041 | 0-2041 | Double Word | N/A | R/W |
| Bit (DB-BI) | 0-2042 | 0-2042 | 0-2042 | Bit | 0-15 | R |
| ASCII String (DB-AS) | 0-2042 | 0-2042 | 0-2042 | Word | N/A | R/W |

**Bit access is not allowed for write operations.*

*Table 4. Siemens 900 Series CPU Addressing*

| Data Type | CPU 921 Address Range | CPU 928 Address Range | CPU 94x Address Range | Size | Bit Access* | R/W |
|---|---|---|---|---|---|---|
| Input (I) | 0-127 | 0-127 | 0-127 | Byte | 0-7 | R |
| Output (Q) | 0-127 | 0-127 | 0-127 | Byte | 0-7 | R/W |
| Flag (F) | 0-255 | 0-255 | 0-255 | Byte | 0-7 | R/W |
| Timer Status (TS) | 0-127 | 0-255 | 0-127 | Word | 0-15 | R |
| Timer Value (TV) | 0-127 | 0-255 | 0-127 | Word | 0-15 | R |
| Counter Status (CS) | 0-127 | 0-255 | 0-127 | Word | 0-15 | R |
| Counter Value (CV) | 0-127 | 0-255 | 0-127 | Word | 0-15 | R |
| Data Block (DB) | 2-255 | 3-255 | 2-255 | N/A | N/A | N/A |
| Word Right (DB-DR) | 0-2042 | 0-2042 | 0-2042 | Byte | 0-7 | R |
| Word Left (DB-DL) | 0-2042 | 0-2042 | 0-2042 | Byte | 0-7 | R |
| Word (DB-DW) | 0-2042 | 0-2042 | 0-2042 | Word | 0-15 | R/W |
| Float (DB-FP) | 0-2041 | 0-2041 | 0-2041 | Double Word | N/A | R/W |
| Bit (DB-BI) | 0-2042 | 0-2042 | 0-2042 | Bit | 0-15 | R |
| ASCII String (DB-AS) | 0-2042 | 0-2042 | 0-2042 | Word | N/A | R/W |

**Bit access is not allowed for write operations.*

*Table 5. Siemens 900 Series CPU Addressing (continued)*

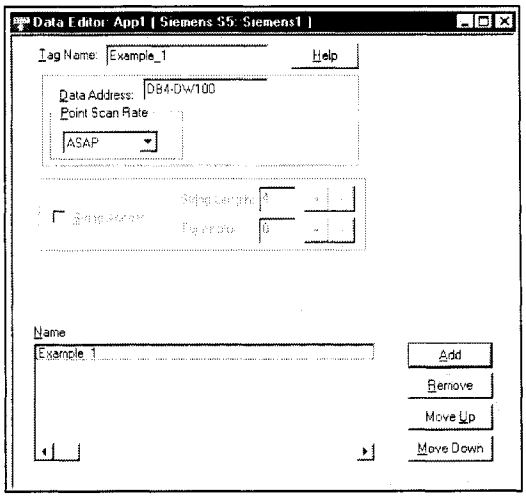
| Data Type | CPU 922 Address Range | CPU 90U Address Range | CPU 95U Address Range | Size | Bit Access* | R/W |
|---|---|---|---|---|---|---|
| Input (I) | 0-127 | 0-127 | 0-127 | Byte | 0-7 | R |
| Output (Q) | 0-127 | 0-127 | 0-127 | Byte | 0-7 | R/W |
| Flag (F) | 0-255 | 0-128 | 0-256 | Byte | 0-7 | R/W |
| Timer Status (TS) | 0-127 | 0-31 | 0-127 | Word | 0-15 | R |
| Timer Value (TV) | 0-127 | 0-31 | 0-127 | Word | 0-15 | R |
| Counter Status (CS) | 0-127 | 0-31 | 0-31 | Word | 0-15 | R |
| Counter Value (CV) | 0-127 | 0-31 | 0-31 | Word | 0-15 | R |
| Data Block (DB) | 2-255 | 2-127 | 2-255 | N/A | N/A | N/A |
| Word Right (DB-DR) | 0-2042 | 0-2042 | 0-2042 | Byte | 0-7 | R |
| Word Left (DB-DL) | 0-2042 | 0-2042 | 0-2042 | Byte | 0-7 | R |
| Word (DB-DW) | 0-2042 | 0-2042 | 0-2042 | Word | 0-15 | R/W |
| Float (DB-FP) | 0-2041 | 0-2041 | 0-2041 | Double Word | N/A | R/W |
| Bit (DB-BI) | 0-2042 | 0-2042 | 0-2042 | Bit | 0-15 | R |
| ASCII String (DB-AS) | 0-2042 | 0-2042 | 0-2042 | Word | N/A | R/W |

**Bit addressing is not allowed for write operations.*

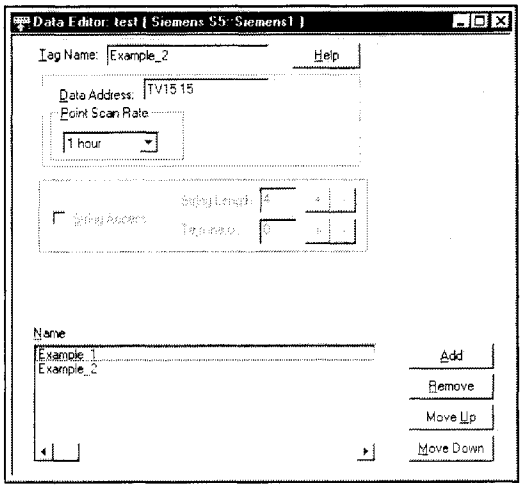
When accessing input or holding registers at the bit level, the address is expressed as <*Address*> <*Bit*>. Bit 12 of the register at address 400009 would be accessed as `400009 12`.

Following are examples of tags that address Siemens CPU data points.

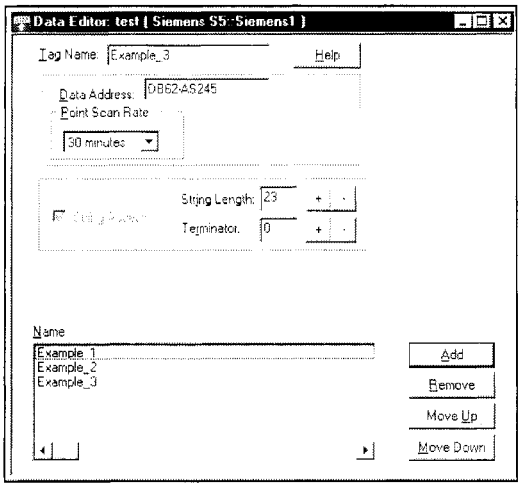
Example_1 reads data word 100 from data block 4 ASAP.




Example_2 reads bit 15 of timer value 15 every hour.



Example_3 reads ASCII string 245 from data word 62 every 30 minutes.




## 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

*S5DriverId* returns the following null-terminated string identifying the driver running on the 3000 engine: "Siemens S5 Driver"

### Driver Revision

*S5DriverRev* returns a string identifying the driver revision level, such as "1.2"

## Error Handling

*S5CommStatus* returns a number describing the current communication status of the driver. Table 6 defines these status bits.

### Technical Note

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

*Table 6. Siemens S5 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 CPU address had an error. |
| 3 | Not used. |
| 4-7 | Reserved. |
| 8 | Buffer overflow error–The number of data bytes returned by a read operation for the Siemens CPU was greater than the number of bytes expected by the driver. |
| 9 | Buffer underflow error–The number of data bytes returned by a read operation for the Siemens CPU was less than the number of bytes expected by the driver. |
| 10 | No block error–A data block operation was attempted, but failed because the data block being addressed does not exist inside the Siemens CPU. |
| 11 | Block length error–A data block operation was attempted, but failed because the number of bytes read or written will not fit inside the requested block at the address requested. |
| 12 | NAK error–An acknowledge was expected from the Siemens CPU, but a NAK was received instead. |
| 13 | Bit Write Error– An attempt was made to bit write to an address that does not allow bit write operations. |
| 14 | Write Error–An attempt was made to write to an address that does not allow write operations. |
| 15-22 | Unused. |

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:

```
"Siemens S5 Port:1 Addr:(R) F3 0"
```

This error occurred while reading address F3, bit 0 through COM 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:

```
"Siemens S5: Communication Restored"
```

## Communication Status

*S5CommString* returns a null-terminated string describing the current communication status of the driver.

## Scan Time

*S5ScanTime* 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.

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