

SRTP Communication Driver

Communication Driver (with Specific Hosts
from GE FANUC Manufacturer) using SRTP Protocol

Contents

INTRODUCTION 2

GENERAL INFORMATION..... 3

 DEVICE CHARACTERISTICS 3

 LINK CHARACTERISTICS 3

 DRIVER CHARACTERISTICS 3

 CONFORMANCE TESTING 4

INSTALLING THE DRIVER 5

 OTHER SOFTWARE REQUIREMENTS 5

CONFIGURING THE DRIVER 6

 SETTING THE COMMUNICATION PARAMETERS 6

 CONFIGURING THE DRIVER WORKSHEETS 8

CONFIGURING THE DEVICE 13

EXECUTING THE DRIVER..... 13

TROUBLESHOOTING 14

SAMPLE APPLICATION 16

REVISION HISTORY..... 17

Introduction

The SRTP driver enables communication between the Studio system (version 5.1 or higher) and some specific devices, manufactured by the GE FANUC Company, that implement the SRTP protocol according to the specifications discussed in this document.

This document was designed to help you install, configure, and execute the SRTP driver to enable communication with Studio and the GE FANUC devices that implement the SRTP protocol. The information in this document is organized as follows:

- **Introduction:** Provides an overview of the SRTP driver documentation.
- **General Information:** Provides information needed to identify all the required components (hardware and software) used to implement communication between Studio and the SRTP driver.
- **Installing the Driver:** Explains how to install the SRTP driver.
- **Configuring the Driver:** Explains how to configure the communication driver.
- **Executing the Driver:** Explains how to execute the driver to verify that you installed and configured the driver correctly.
- **Troubleshooting:** Lists the most common error codes for this protocol and explains how to fix these errors.
- **Sample Application:** Explains how to use a sample application to test the driver configuration.

Notes:

- This document assumes that you have read the “Development Environment” chapter in the product’s *Technical Reference Manual*.
- This document also assumes that you are familiar with the Windows NT/2000/XP environment. If you are unfamiliar with Windows NT/2000/XP, we suggest using the **Help** feature (available from the Windows desktop **Start** menu) as you work through this guide.

General Information

This section explains how to identify all the hardware and software components used to implement communication between the SRTP driver, Studio, and other devices using the SRTP protocol.

The information is organized into the following sections:

- Device Characteristics
- Link Characteristics
- Driver Characteristics

Device Characteristics

This driver was tested successfully with the following devices:

- **Manufacturer:** GE FANUC
- **Compatible Equipment:** Series 90 PLC
- **Programming Software:** LogicMaster 90 Programmer Controller Software

For a list of the devices used for conformance testing, see “Conformance Testing” on page 4.

Link Characteristics

To establish communication, you must use links with the following specifications:

- **Host Communication Port:** SRTP port
- **Physical Protocol:** Ethernet
- **Logic Protocol:** SRTP
- **Host Runtime Software:** None
- **Specific PC Board:** Ethernet board
- **Link Cable Scheme:** Ethernet cable

Driver Characteristics

The SRTP driver is composed of the following files:

- **SRTP.INI:** Internal driver file. *You must not modify this file.*
- **SRTP.MSG:** Internal driver file containing error messages for each error code. *You must not modify this file.*
- **SRTP.PDF:** Document providing detailed information about the SRTP driver.
- **SRTP.DLL:** Compiled driver.



Notes:

- All of the preceding files are installed in the `/DRV` subdirectory of the Studio installation directory.
- You must use Adobe Acrobat® Reader™ (provided on the Studio installation CD-ROM) to view the `SRTP.PDF` document.

You can use the SRTP driver on the following operating systems:

- Windows 9x
- Windows 2000
- Windows NT
- Windows CE (x86, SH3, SH4, MIPs, ARM, or PPC)

For a list of the operating systems used for conformance testing, see “Conformance Testing” on page 4.

The SRTP driver supports the following registers:

Register Type	Length	Write	Read	Bit	Integer	Float
%I (Discrete Input)	1 Bit	–	•	•	–	–
%Q (Discrete Output)	1 Bit	•	•	•	–	–
%M (Discrete Internal)	1 Bit	•	•	•	–	–
%T (Discrete Temporary)	1 Bit	•	•	•	–	–
%AI (Analog Input)	1 Byte	–	•	•	•	•
%AQ (Analog Output)	1 Byte	•	•	•	•	•
%R (Internal Registers)	1 Byte	•	•	•	•	•
%G (Global Genius Data)	1 Bit	•	•	•	–	–

⚠ Caution:
 You can read bit values from the %AI, %AQ, and %R registers, but you cannot write bit values to these registers.

Conformance Testing

The following hardware/software was used for conformance testing:

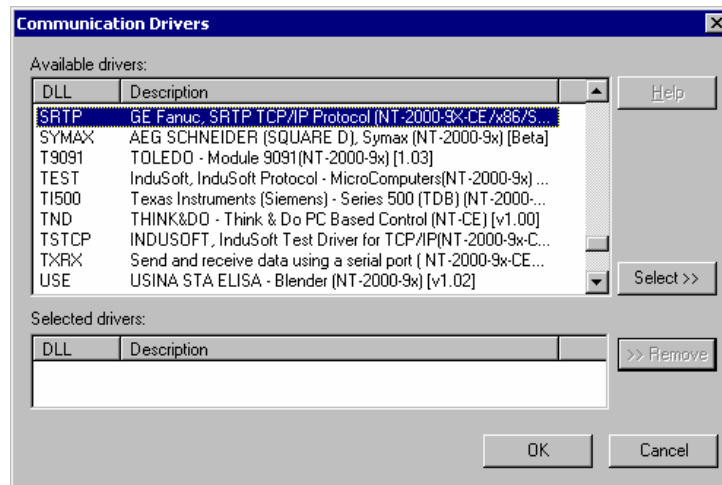
- **Equipment:** PLC GE FANUC 90/30 CPU 350 with CMM 321 Ethernet Interface
- **Cable:** Ethernet cable
- **Operating System (development):** Windows 2000 + Service Pack 2
- **Operating System (target):** Windows 2000 + Service Pack 2, Windows CE v3.00
- **Studio Version:** 5.1
- **Driver Version:** 1.00

Installing the Driver

When you install Studio version 5.1 or higher, all of the communication drivers are installed automatically. You must select the driver that is appropriate for the application you are using.

Perform the following steps to select the driver from within the application:

1. Open Studio from the **Start** menu.
2. From the Studio main menu bar, select **File** → **Open Project** to open your application.
3. Select **Insert** → **Driver** from the main menu bar to open the *Communication Drivers* dialog.
4. Select the **SRTP** driver from the *Available Drivers* list, and then click the **Select** button:



Communication Drivers Dialog

5. When the **SRTP** driver displays in the **Selected Drivers** list, click the **OK** button to close the dialog.

Other Software Requirements

You are not required to install any other software on your computer to enable communication between Studio and the host. However, to download the custom program to the host, you must install the LogicMaster 90 programming software from GE FANUC. (For installation instructions, consult the documentation provided with the GE FANUC LogicMaster 90 software.)

⚠ Caution:

We strongly recommend using caution when you install the physical hardware. Consult your hardware manufacturer's documentation for special instructions.

Configuring the Driver

After opening Studio and selecting the SRTP driver, you must configure the driver. Configuring the SRTP driver is done in two parts:

- Specifying the Communication Parameters
- Defining communication tags and controls in the Communication tables or Driver Worksheet

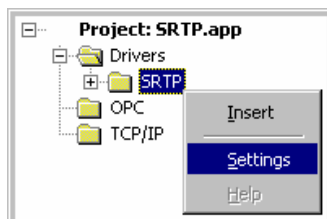
Worksheets are divided into two sections, a *Header* and a *Body*. The fields contained in these two sections are standard for all communications drivers — except the **Station**, **Header**, and **Address** fields, which are driver-specific. This document explains how to configure the **Station**, **Header**, and **Address** fields only.

Note:
For a detailed description of the Studio Standard and Main Driver Worksheets, and information about configuring the standard fields, review the product's *Technical Reference Manual*.

Setting the Communication Parameters

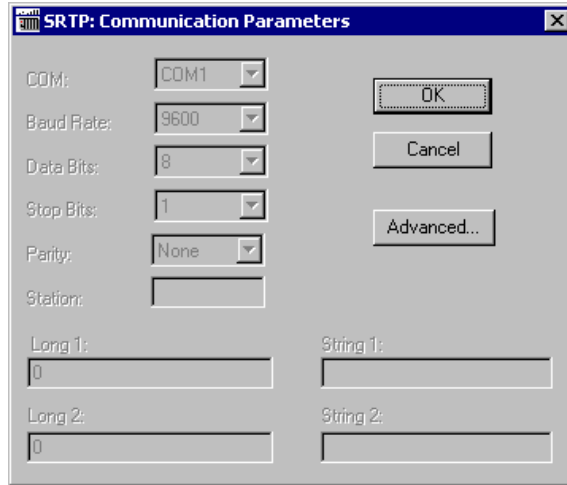
Use the following steps to configure the communication parameters, which are valid for all driver worksheets configured in the system:

1. From the Studio development environment, select the **Comm** tab located below the *Workspace*.
2. Click on the *Drivers* folder in the *Workspace* to expand the folder.
3. Right-click on the *SRTP* subfolder and when the pop-up menu displays, select the **Settings** option:



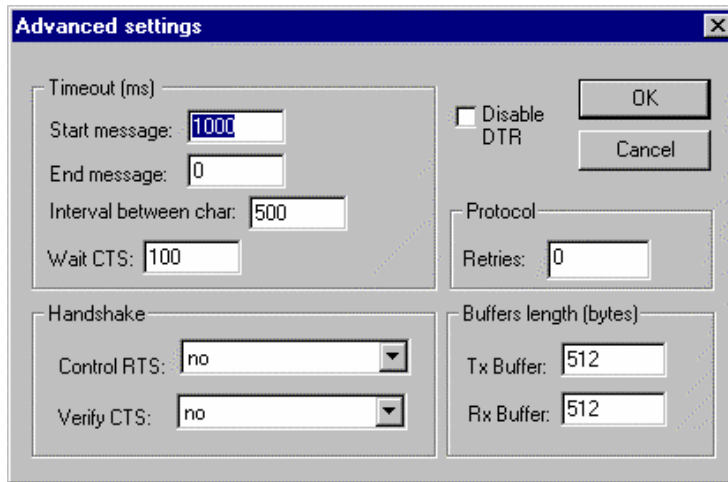
Select Settings from the Pop-Up Menu

The *SRTP: Communications Parameters* dialog displays:



SRTP: Communication Parameters Dialog

4. Click the **Advanced** button to open the *Advanced settings* dialog:



Advanced Settings Dialog

Configure the parameters on this dialog as appropriate for your worksite. Consult the *Studio Technical Reference Manual* for instructions about configuring this dialog.

Configuring the Driver Worksheets

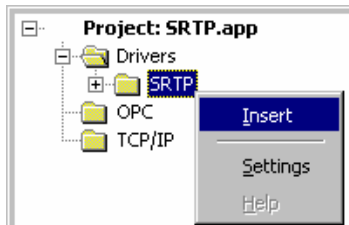
This section explains how to configure the communication tags in the STANDARD and MAIN Driver Worksheets.

Configuring the Standard Driver Worksheet

This section explains how to configure a *Standard Driver Worksheet* (or communication table) to associate application tags with the PLC addresses. You can configure multiple Driver Worksheets — each of which is divided into a *Header* section and *Body* section.

Use the following steps to create a new Standard Driver Worksheet:

1. From the Studio development environment, select the **Comm** tab, located below the *Workspace* pane.
2. In the *Workspace* pane, expand the *Drivers* folder and right-click the *SRTP* subfolder.
3. When the pop-up menu displays, select the **Insert** option:

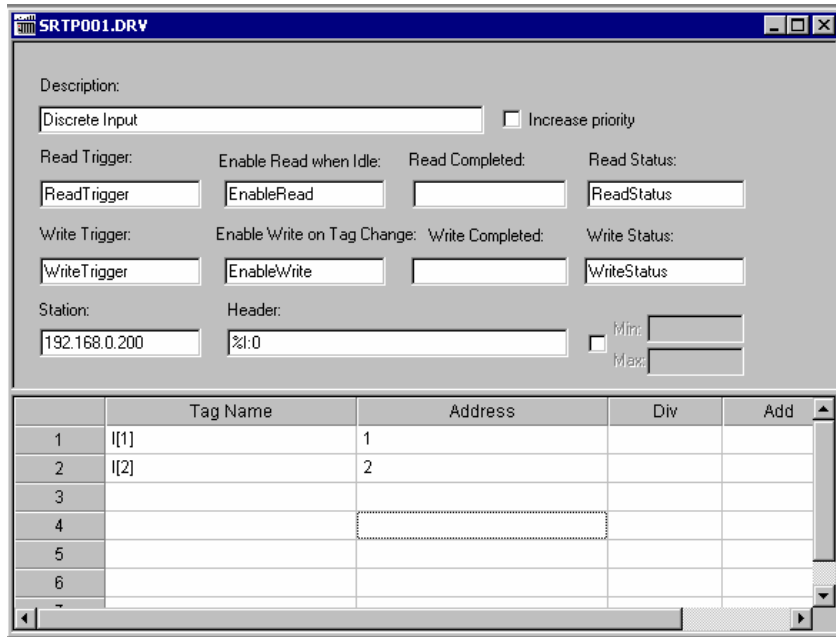


Inserting a New Worksheet

⇒ **Tip:**

To optimize communication and ensure better system performance, you must tie the tags in different driver worksheets to the events that trigger communication between each tag group and the period in which each tag group must be read or written. Also, we recommend configuring the communication addresses in sequential blocks to improve performance.

The <drivename>.drv dialog displays (similar to the following figure):



SRTP Driver Worksheet

4. Use the following information to complete the **Station**, **Header**, and **Address** fields on this worksheet.

Note:
 This publication explains how to configure the **Station**, **Header**, and **Address** fields. All of the other parameters on the *Driver* worksheet are standard for all communication drivers. Consult the product's *Technical Reference Manual* for information about configuring these standard entries.

- **Station** field: Use this field to specify the PLC IP Address. Valid values are any string or tag (*no default*).
- **Header** field (Default value is %I): Use this field to define
 - The type of variable that can be read from or written to the host
 - A reference to the initial address

The **Header** parameter must comply with the following syntax:

<Type> (for example, %R)

Where <Type> is the register type (%I=Discrete Input, %Q=Discrete Output, %M=Discrete Internal, %T=Discrete Temporary, %AI=Analog Input, %AQ=Analog Output, %R=Internal Registers, %G=Global Genius Data).

After you edit the **Header** field, Studio verifies whether the syntax is valid. If the syntax is incorrect, Studio automatically puts the %I default value in the field.

The following table lists all of the data types and address ranges that are valid for the **Header** field:

Header Field Information			
Data Types	Syntax Samples	Valid Range of Initial Addresses	Comments
%I	%I	1 to 512	Discrete Input
%Q	%Q	1 to 512	Discrete Output
%M	%M	1 to 1024	Discrete Internal
%T	%T	1 to 256	Discrete Temporary
%AI	%AI	1 to 1024	Analog Input
%AQ	%AQ	1 to 256	Analog Output
%R	%R	1 to 9999	Internal Registers
%G	%G	1 to 1280	Global Genius Data (Boolean)

- **Address field:** Use this field to associate each tag in the worksheet to its address in the device. You type the tag's name into the **Tag Name** column and the tag's device address into the **Address** column, to enable the tag to read from and write to an address on the device. (See the following table for the valid Address configuration information.)

Address Configuration Sample		
Variable on the Host	Header Field	Address Field
%I0001	%I	1
%I0010	%I	10
%I0512	%I	512
%Q0512	%Q	512
%M1020	%M	1020
%T200	%T	200
%AI060	%AI	60
%AI060 (bit 0)	%AI	60.0
%AQ080	%AQ	80
%AQ080 (bit 3)	%AQ	80.3
%R0100	%R	100
%R0100 (bit 7)	%R	100.7
%R09900	%R	9900
%G0500	%G	500
%G0001	%G	1

Entries in **Address** field must comply with the following syntax:

- For **Discrete Input, Discrete Output, Discrete Internal, Discrete Temporary, and Global Genius Data**:
<Address>
- For **Analog Input, Analog Output, and Internal Registers**:
<Format><Address>.<Bit>

Where:

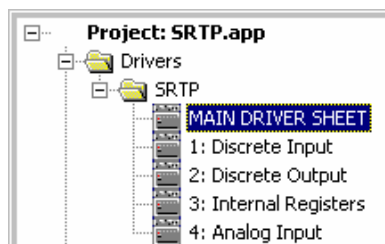
- * **Format** is the data format of the value to be read from/written to the device (*optional parameter*).
Type:
F to treat the values as Floats (double words) (for example, **F5**)
None to treat the values as Integer (for example, **3**)
- * **Address** is the address of the value to be read from/written to the device (for example, **25**).
- * **Bit** is the bit number (from 0–15) from the Word address (for example, **10.2**). This parameter is *optional*.

⚠ Caution:

- You must not configure a range of addresses that is greater than the maximum block size (data buffer length) supported by each PLC (64 bytes per driver worksheet) within the same worksheet.
- You can read bit values from the %AI, %AQ, and %R registers, but you cannot write bit values to these registers.

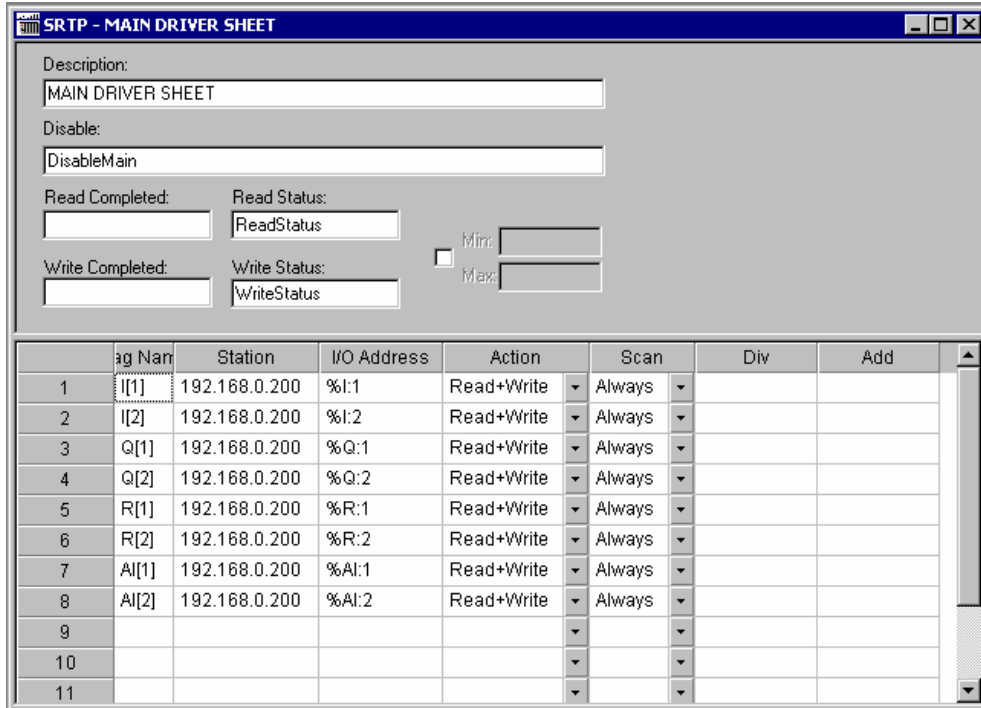
Configuring the MAIN Driver Worksheet

When you add the SRTP driver to your application, Studio automatically adds a MAIN DRIVER SHEET to the driver folder, as shown:



MAIN Driver Worksheet

The MAIN Driver Worksheet (similar to the following figure) enables you to easily associate Studio tags to addresses in the PLC:



SRTP MAIN Driver Worksheet

Most of the MAIN DRIVER SHEET parameters are standard for all drivers. Instructions for configuring these standard parameters are provided in the Studio *Technical Reference Manual*. This section provides instructions for configuring the **Station** and **I/O Address** parameters, which are specific to this driver:

- **Station:** Type the PLC Address (ID number).
- **I/O Address:** Type the address of each register in the PLC using the following syntax:
 - For **Discrete Input, Discrete Output, Discrete Internal, Discrete Temporary, and Global Genius Data:**
 <Type>:<Address>
 - For **Analog Input, Analog Output, and Internal Registers:**
 <Type>:<Format><Address>.<Bit>

Where:

- * **Type** is the register type (%I=Discrete Input, %Q=Discrete Output, %M=Discrete Internal, %T=Discrete Temporary, %AI=Analog Input, %AQ=Analog Output, %R=Internal Registers, %G=Global Genius Data).
- * **Format** is the data format of the value to be read from/written to the device (*optional parameter*).
 Type:
 F to treat the values as Floats (double words) (for example, %R:F20)
 None to treat the values as Integer (for example, R:15)
- * **Address** is the address of the value to be read from/written to the device. (For example, %R:100)
- * **Bit** is the bit number (from 0–15) from the Word address (for example, %R:10.2)
 This parameter is *optional*.

Configuring the Device

To configure the PLC device, you must set the PLC IP Address using the PLC programming tools.

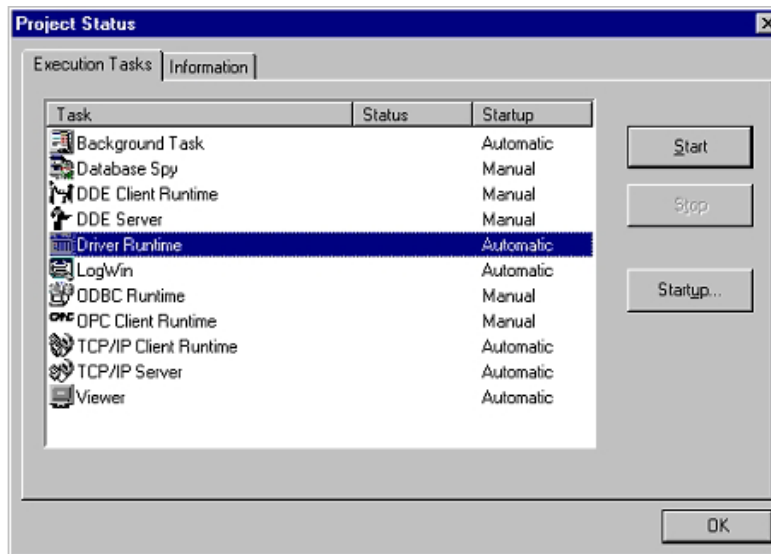
Executing the Driver

After adding the SRTP driver to a project, Studio sets the project to execute the driver automatically when you start the run-time environment.

To verify that the driver run-time task is enabled and will start correctly, perform the following steps:

- Select **Project** → **Status** from the main menu bar.

The *Project Status* dialog displays:



Project Status Dialog

2. Verify that the *Driver Runtime* task is set to **Automatic**.
 - If the setting is correct, click **OK** to close the dialog.
 - If the **Driver Runtime** task is set to **Manual**, select the **Driver Runtime** line. When the **Startup** button becomes active, click the button to toggle the *Startup* mode to **Automatic**.
3. Click **OK** to close the *Project Status* dialog.
4. Start the application to run the driver.

Troubleshooting

If the SRTP driver fails to communicate with the device, the tags configured for the **Read Status** or **Write Status** fields will receive an error code. Use this error code and the following table to identify what kind of failure occurred.

Error Code	Description	Possible Causes	Procedure to Solve
0	OK	Communication without problems	Not Required.
1	Invalid Header	Invalid Header provided in the worksheet Header field	Type a valid header into the Header field (see page 8 for configuration instructions).
2	Invalid Address	Invalid Address provided in the worksheet Address field	<ul style="list-style-type: none"> ▪ If you used a tag in the Header field, verify that the tag value is valid for the configured addresses. ▪ If you are not using tags, and you changed the Header after configuring the addresses, the addresses may be invalid for the new Header.
3	Invalid Station	Invalid Station provided in the worksheet Station field	Type a valid station into the Station field (see page 8 for configuration instructions).
20	Invalid Command	Received answer with invalid command code	Check the connection to be sure the device communicates using the SRTP protocol.
21	Invalid Block Size	Offset specified in worksheet is too big and the message cannot be framed.	Change the offsets or create a new worksheet.
22	Failed to allocate memory	Insufficient memory for driver buffers	<ul style="list-style-type: none"> ▪ Check the buffer configuration and try to reduce the buffer size (see page 6). ▪ Increase the computer or HMI memory.
23	Invalid Answer	Problems with communication medium	Check all cables, hubs, and routers.
24	Invalid unsolicited message	Received an unsolicited message, not supported by the driver	Check all devices connected on the network to ensure there are no devices sending messages using a different protocol from the same port.
26	Error connecting	Cannot establish a TCP/IP connection to the device	<ul style="list-style-type: none"> ▪ Check the device to be sure it is connected to the network. ▪ Check the IP Address specified in the worksheet Station field to be sure it matches the device's IP Address.
-15	Timeout waiting to start a message	<ul style="list-style-type: none"> ▪ Disconnected cables ▪ PLC turned off, or in stop or error mode ▪ Wrong station number ▪ Wrong RTS/CTS configuration settings 	<ul style="list-style-type: none"> ▪ Check the cable wiring. ▪ Check the PLC state; it must be RUN. ▪ Check the station number. ▪ Check the configuration. See the <i>Studio Technical Reference Manual</i> for valid RTS/CTS settings.
-17	Timeout between rx chars	<ul style="list-style-type: none"> ▪ PLC in stop or error mode ▪ Wrong station number ▪ Wrong parity ▪ Wrong RTS/CTS configuration settings 	<ul style="list-style-type: none"> ▪ Check the PLC state; it must be RUN. ▪ Check the station number. ▪ Check the configuration. ▪ Check the configuration. See the <i>Studio Technical Reference Manual</i> for valid RTS/CTS settings.

⇒ **Tip:**

You can verify communication status using the Studio development environment *Output* window (*LogWin* module). To establish an event log for **Field Read Commands**, **Field Write Commands**, and **Serial Communication** right-click in the *Output* window. When the pop-up menu displays, select the option to set the log events.

If you are testing a Windows CE target, you can enable the log at the unit (**Tools** → **LogWin**) and verify the `celog.txt` file was created at the target unit.

If you cannot establish communication with the PLC, try to establish communication between the PLC Programming Tool and the PLC. Quite frequently, communication is not possible because you have a hardware or cable problem, or a PLC configuration error. After successfully establishing communication between the device's Programming Tool and the PLC, you can retest the supervisory driver.

To test communication with Studio, we recommend using the sample application provided rather than your new application.


If you must contact us for Technical Support, please have the following information available:

- **Operating System** (*type* and *version*): To find this information, select **Tools** → **System Information**.
- **Project Information**: To find this information, select **Project** → **Status**.
- **Driver Version** and **Communication Log**: Displays in the Studio *Output* window when the driver is running.
- **Device Model** and **Boards**: Consult the hardware manufacturer's documentation for this information.

Sample Application


You will find a sample application in the `/COMMUNICATION EXAMPLES/S RTP` directory. We *strongly* recommend that you use this sample application to test the SRTP driver before configuring your own customized application, for the following reasons:

- To better understand the information provided in the section of this document.
- To verify that your configuration is working satisfactorily.
- To certify that the hardware used in the test (device, adapter, cable, and PC) is working satisfactorily before you start configuring your own, customized applications.

 **Note:**
This application sample is not available for all drivers.

Use the following procedure to perform the test:

1. Configure the device's communication parameters using the manufacturer's documentation.
2. Open and execute the sample application.
3. Execute the *Viewer* module in Studio to display information about the driver communication.

 **Tip:**
You can use the sample application screen as the maintenance screen for your custom applications.

Revision History

Version	By	Date	Description of changes
1.00	José L. Teodoro	16-Jan-2002	First driver version
1.01	Eric Vigiani	22-Apr-2003	Modified maximum block size for the MAIN DRIVER SHEET Fixed bug when reading bits.
1.02	Eric Vigiani	26-Nov-2003	Included the data format to %AI, %AQ and %R