

PROT1 Communication Driver

Driver for Serial Communication Between
Studio and Toshiba Prosec T1 PLC

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Introduction

The PROT1 driver enables communication between Studio system and the Toshiba Prosec T1 PLC using Serial Communication, according to the specifications discussed in this publication.

This publication was designed to help you install, configure, and execute the PROT1 driver to enable communication with the Toshiba devices. The information in this publication is organized as follows:

- **Introduction:** Provides an overview of the PROT1 driver documentation.
- **General Information:** Provides information needed to identify all the required components (hardware and software) used to implement communication between Studio and the PROT1 driver.
- **Installing the Driver:** Explains how to install the PROT1 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.
- **Sample Application:** Explains how to use a sample application to test the driver configuration.
- **Revision History:** Provides a log of all modifications made to the driver and the documentation.

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| <p> Notes:</p> <ul style="list-style-type: none">• This document assumes that you have read the “Development Environment” chapter in the product’s <i>Technical Reference Manual</i>.• 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. |
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General Information

This chapter explains how to identify all the hardware and software components used to implement communication between the PROT1 driver and Toshiba devices.

The information is organized into the following sections:

- Device Characteristics
- Link Characteristics
- Driver Characteristics
- Conformance Testing

Device Characteristics

This driver has been tested successfully with the following devices:

- **Manufacturer:** Toshiba
- **Compatible Equipment:** Any Toshiba Prosec T1 PLC communicating via Serial interface

Link Characteristics

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

- **Physical Protocol:** RS232
- **Logic Protocol:** Computer Link
- **Device Runtime Software:** None
- **Specific PC Board:** None

Driver Characteristics

The PROT1 driver is composed of the following files:

- **PROT1 . INI:** Internal driver file. *You must not modify this file.*
- **PROT1 . MSG:** Internal driver file containing error messages for each error code. *You must not modify this file.*
- **PROT1 . PDF:** Document providing detailed information about the PROT1 driver.
- **PROT1 . 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 `PROT1 . PDF` document.

You can use the PROT1 driver on the following operating systems:

- Windows NT/2K/XP
- Windows CE

Conformance Testing

The following hardware/software was used for conformance testing:

Driver Configuration:

- **COM:** COM1
- **Baud Rate:** 9600
- **Data Bits:** 8
- **Stop Bits:** 1
- **Parity:** ODD

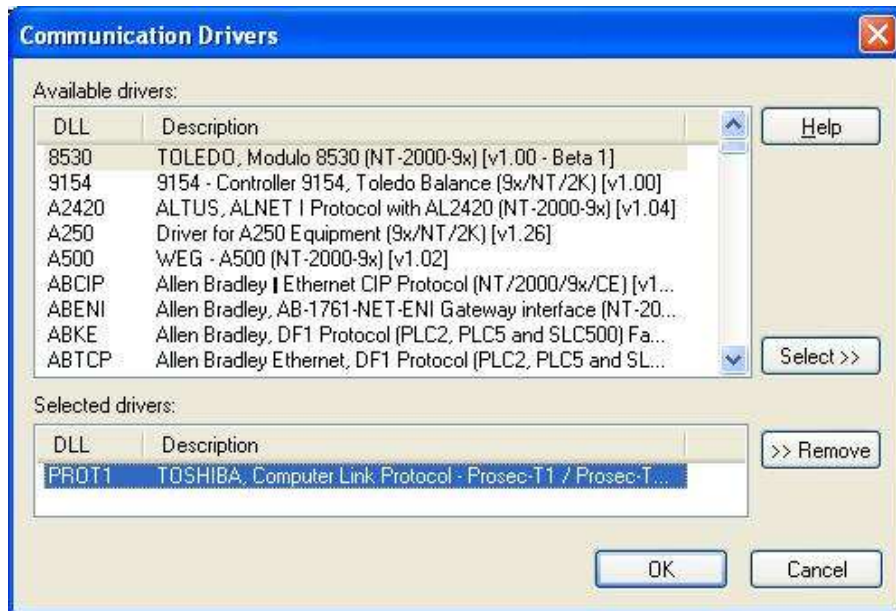
| Driver Version | Studio Version | Operating System | Equipment |
|----------------|----------------|------------------|------------|
| 2.00 | 2.4 | Windows NT | Prosec-T2E |

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 **PROT1** driver from the *Available Drivers* list, and then click the **Select** button:



Communication Drivers Dialog

5. When the **PROT1** driver displays in the *Selected Drivers* list, click the **OK** button to close the dialog.

Attention:

For safety reasons, you must take precautions when installing the physical hardware. Consult the hardware manufacturer's documentation for specific installation instructions.

Configuring the Driver

After opening Studio and selecting the PROT1 driver, you must configure the driver. Configuring the PROT1 driver is done in two parts:

- Specifying communication parameters
- Defining communication tags and controls in the Communication tables or *Driver* worksheet

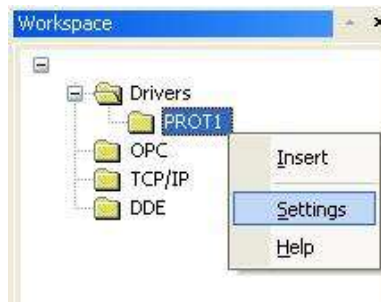
Worksheets are divided into two sections, a *Header* and a *Body*. The fields contained in these two sections are standard for all communications drivers — except the **Station**, **Header** and **Address** fields, which are driver-specific. This document explains how to configure the **Station**, **Header**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

Notes:
For a detailed description of the Studio *Standard 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 *PROT1* subfolder, and when the pop-up menu displays, select the **Settings** option:



Select Settings from the Pop-Up Menu

The *PROT1: Communication Parameters* dialog displays:



PROT1: Communication Parameters Dialog

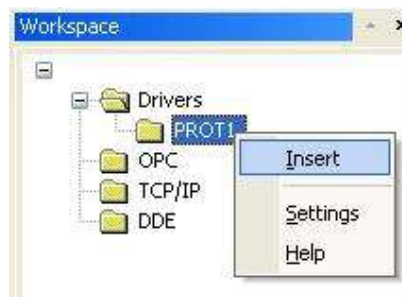
4. This driver does not have custom parameters. Specify the parameters as noted in the following table. Click **OK** to close the dialog.

Configuring the 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 a *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 *PROT1* subfolder.
3. When the pop-up menu displays, select the **Insert** option:



Inserting a New Worksheet

Note:
 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 *PROT1.drv* dialog displays (similar to the following figure):

The screenshot shows a dialog box titled "PROT1001.DRV". It contains several input fields and a table. The fields include:

- Description: [Empty text box] Increase priority
- Read Trigger: [Empty text box]
- Enable Read when Idle: [1]
- Read Completed: [Empty text box]
- Read Status: [Empty text box]
- Write Trigger: [Empty text box]
- Enable Write on Tag Change: [1]
- Write Completed: [Empty text box]
- Write Status: [Empty text box]
- Station: [1]
- Header: [RW:20] Min: [Empty text box]
- Max: [Empty text box]

 Below the fields is a table with the following data:

| | Tag Name | Address | Div | Add |
|---|----------|---------|-----|-----|
| 1 | TagA | 0 | | |
| 2 | TagB | 1 | | |
| 3 | TagC | 2 | | |
| 4 | TagD | 3 | | |
| 5 | TagE | 4 | | |
| * | | | | |

PROT1 Driver Worksheet

In general, all parameters on the *Driver* worksheet (except the **Station**, **Header** and **Address** fields) are standard for all communication drivers, and they will not be discussed in this publication. For detailed information about configuring the standard parameters, consult the *Studio Technical Reference Manual*.

4. Use the following information to complete the **Station**, **Header**, and **Address** fields on this worksheet:
 - **Station** field: Use this field to specify the PLC ID. This field accepts values 1 to 32. If this field is in blank, the driver will assume the ID 1.
 Syntax:
 <PLC ID>
 - **Header** field: Use the information in the following table to define the type of variables that will be read from or written to the device and a reference to the initial address.
 These variables must comply with the following syntax:

<Type> : <AddressReference> (for example: RW : 1)

Where:

- **<Type>** can be the register type. (XW, YW, SW, RW, T, C and D) or device type (X, Y, S and R)
 - **<AddressReference>** is the initial address (reference) of the configured group. This number *always* refers to the *Byte address number* (see the following table).
- **Address field:** Use the information provided in the following table to associate each tag to its respective device address.
- Type the tag from your application database into the **Tag Name** column. This tag will receive values from or send values to an address on the device. The address must comply with the following syntax:

<AddressOffset>.<Bit> (for example: 10.2)

Where:

- ❑ **<AddressOffset>** is a parameter added to the **AddressReference** parameter (configured in the **Header** field) to compose the group address configured in the **Header** field.
- ❑ **<Bit>** is the bit number (from 0 – 32) from the **word** address. This parameter is optional.

| Sample Address Configuration | | |
|------------------------------|--------------|---------------|
| Address on the Device | Header Field | Address Field |
| XW (Word 5) | XW:0 | 5 |
| | XW:5 | 0 |
| | XW:3 | 2 |
| RW (Word 6) | RW:0 | 5 |
| | RW:5 | 0 |
| | RW:1 | 4 |
| T (Word 33) | T:0 | 33 |
| | T:30 | 3 |
| | T:33 | 0 |

➡ **Attention:**
 You must not configure a range of addresses in the same worksheet that is greater than the maximum block size (data buffer length) supported by the protocol. The maximum data buffer length for this driver is **61 register** in each *Standard Driver* worksheet.

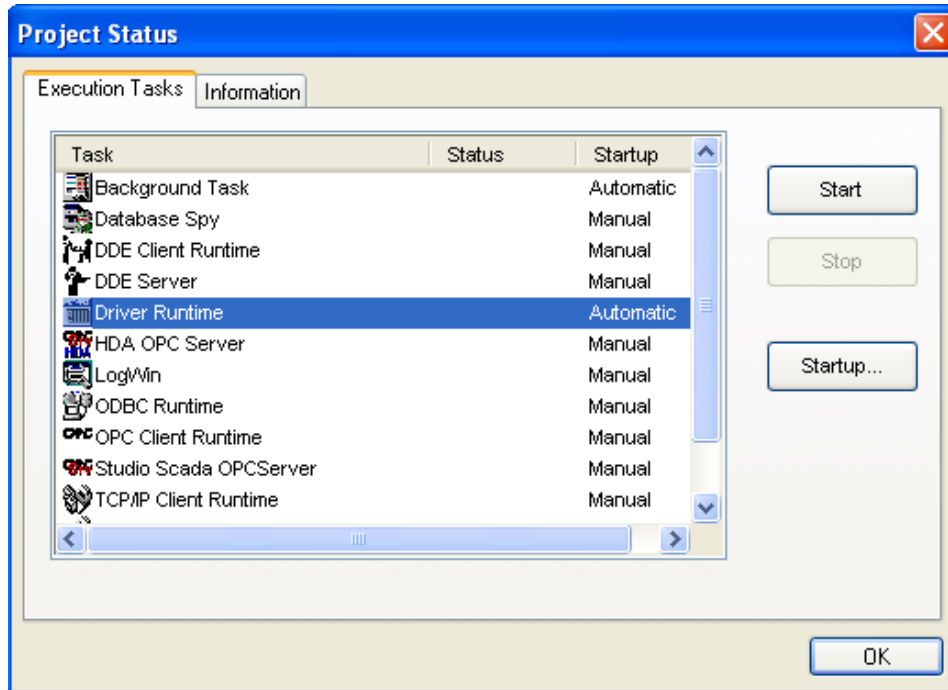
Executing the Driver

After adding the PROT1 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:

1. 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 PROT1 driver fails to communicate with the device, the tag you 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 | None required |
| 1 | ERROR PROTOCOL | Invalid received message | Check driver Communication Parameters. |
| 2 | ERROR BLOCKSIZE | Block Size is higher that 61 operands | Divide the operands in two worksheets. |
| 3 | ERROR INVALID CR | Invalid received message | Check driver Communication Parameters. |
| 4 | ERROR INVALID STATION | PLC ID is higher that 32 | Check the Station field. Put a valid value (1 to 32). |
| 6 | ERROR CHECKSUM | Invalid CheckSun received | Check driver Communication Parameters. |
| 20 | ERROR INVALID ADDRESS | Address is higher than 65535 | Check the Address field. Put a valid value (0 to 65535) |
| 30 | ERROR INVALID HEADER | The header value is not valid. | Check the Header field. |
| 40 | ERROR COMMAND | Register does not exist into PLC | Check if the register exists into PLC. |
| 41 | ERROR FORMAT | The received message is wrong format. | Check driver Communication Parameters. |
| 42 | ERROR COMMUNICATION BUSY | Error because the communication is busy | Check driver Communication Parameters. |
| 43 | ERROR PASSWORD PROTECT | Invalid Password Protect | Check what the right password into the PLC is. |
| 44 | ERROR MODE MISMATCH | PLC is in wrong mode | Check the PLC state – it must be RUN. |
| 45 | ERROR REGISTER ADDRESS SIZE | Invalid Register Size | Check if the registers are valid into PLC. |
| 46 | ERROR ON WRITING | Invalid Write Command | Check if the Register accepts write command |
| 47 | ERROR T1 NOT RUNNING | PLC is not running | Check the PLC state – it must be RUN. |
| -15 | Timeout Start Message | Disconnected cables PLC is turned off, in stop mode, or in error mode Wrong station number Wrong RTS/CTS control settings | Check cable wiring. Check the PLC state – it must be RUN. Check the station number. Check the RTS/CTS configuration (see Studio <i>Technical Reference Manual</i> for valid configurations). |
| -17 | Timeout between rx char | PLC in stop mode or in error mode Wrong station number Wrong parity Wrong RTS/CTS configuration settings | Check cable wiring. Check the PLC state – it must be RUN. Check the station number. Check the RTS/CTS configuration (see " Error! Reference source not found. " for valid RTS/CTS configurations). |

⇒ **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 `ce1og.txt` file created at the target unit.

If you are unable to 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.

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.

Revision History

| Doc. Revision | Driver Version | Author | Date | Description of Changes |
|---------------|----------------|-------------------|-----------|--|
| A | 1.00 | Roberto V. Junior | 03 Mar 99 | First version |
| B | 1.01 | Roberto V. Junior | 05 Mar 99 | Fixed bugs in the first tests with equipments |
| C | 1.02 | Roberto V. Junior | 16 Mar 99 | Modified the treatment of the X and Y registers |
| D | 2.00 | Roberto V. Junior | 29 Nov 99 | Driver available for Windows CE |
| E | 2.01 | Paulo Balbino | 23 Sep 10 | Driver supports setting the IP on each driver sheet on the station field if using serial encapsulation for TCP/IP or UDP/IP. |