

Communication Driver ADAM2

Driver for serial communication (RS-232) with ADAM modules from families 4000 and 5000 devices

Index

1 INTRODUCTION..... 2

2 GENERAL CHARACTERISTICS 3

2.1 DEVICE CHARACTERISTICS 3

2.2 LINK CHARACTERISTICS..... 3

2.3 DRIVER CHARACTERISTICS 4

2.4 INFORMATION ABOUT CONFORMANCE TESTING..... 4

3 INSTALLATION 5

3.1 INSTALLING THE DRIVER 5

3.2 OTHER SOFTWARE REQUIREMENTS 5

4 DRIVER CONFIGURATION 6

4.1 SETTINGS - COMMUNICATION PARAMETERS..... 6

4.2 DRIVER WORKSHEET..... 9

4.3 STATION AND HEADER CONFIGURATION..... 10

4.4 ADDRESS CONFIGURATION 10

4.5 DEVICE CONFIGURATION 12

5 EXECUTION 13

6 TROUBLESHOOTING..... 14

7 APPLICATION SAMPLE..... 16

8 HISTORY OF VERSIONS..... 17

1 Introduction

The ADAM2 driver enables communication between Studio system ADAM modules from families 4000 and 5000, in accordance with the characteristics covered in this document.

This document contains 8 parts, as follow:

- Introduction: Provides an overview of the driver documentation.
 - General characteristics: Provides information necessary to identify all the required components (hardware and software) necessary to implement the communication and global characteristics about the communication.
 - Installation: Explains the procedures that must be followed to install the software and hardware required for the communication.
 - Driver configuration: Provides the required information to configure the communication driver such as the different permutations for configuration and its default values.
 - Execution: Explain the steps to test whether the driver was correctly installed and configured.
 - Troubleshooting: Supplies a list of the most common error codes for this protocol and the procedures to fix them.
 - Application Sample: Provides a sample application for testing the configuration the driver.
 - History of versions: Provides a log of all the modifications done in driver.
- ☞ Note: This document presumes that the user has read the chapter *Driver Configuration* of the Studio's Technical reference manual.

2 General Characteristics

2.1 Device Characteristics

- Manufacturer: Advantech
- Compatible Equipment
 - ADAM modules from families 4000 and 5000

☞ Note: Please refer to section 2.4 to see the Equipment used in the standard conformance tests for this driver.

☞ Note: Analog modules must be configured to engineering units. Frequency/Counter modules (5080 for example) must be configured to decimal.

2.2 Link Characteristics

- Device communication port: RS232 port
- Physical protocol: RS232/RS485
- Logic protocol: ASCII (Proprietary)
- Device Runtime software: None
- Specific PC Board: None
- Adapters / Converters:
- Cable Wiring:

2.3 Driver Characteristics

- Operating System:
 - Windows 9x
 - Windows 2000
 - Windows NT
 - Windows CE

☞ Note: Please refer to section 2.4 to see the Operating System used in the conformance tests for this driver.

The driver is composed of the following files:

- ADAM2.INI: Internal file of the driver, it should not be modified by the user.
- ADAM2.MSG: This file contains the error messages for each error code. It is an internal file of the driver, the user should not modify it.
- ADAM2.PDF: This document provides detailed documentation about the driver.
- ADAM2.DLL: This is the compiled library for the driver.

☞ Note: All the files above must to be in the subdirectory /DRV of the Studio's installation directory.

2.4 Information about conformance testing

- Equipment:

Family 4000: 4011, 4014D, 4021, 4050 and 4520.

Family 5000: 5024, 5051, 5056 and 5018.

Configuration:

PLC program:

Baud Rate: 9600

Protocol: ASCII (Proprietary)

Data Bits: 8

Stop Bits: 1

Parity: None

COM port: 1

- Cable:
- Operating System (development): NT
- Operating System (target): NT / CE
- Studio Version: 3.0
- Driver version: 1.0

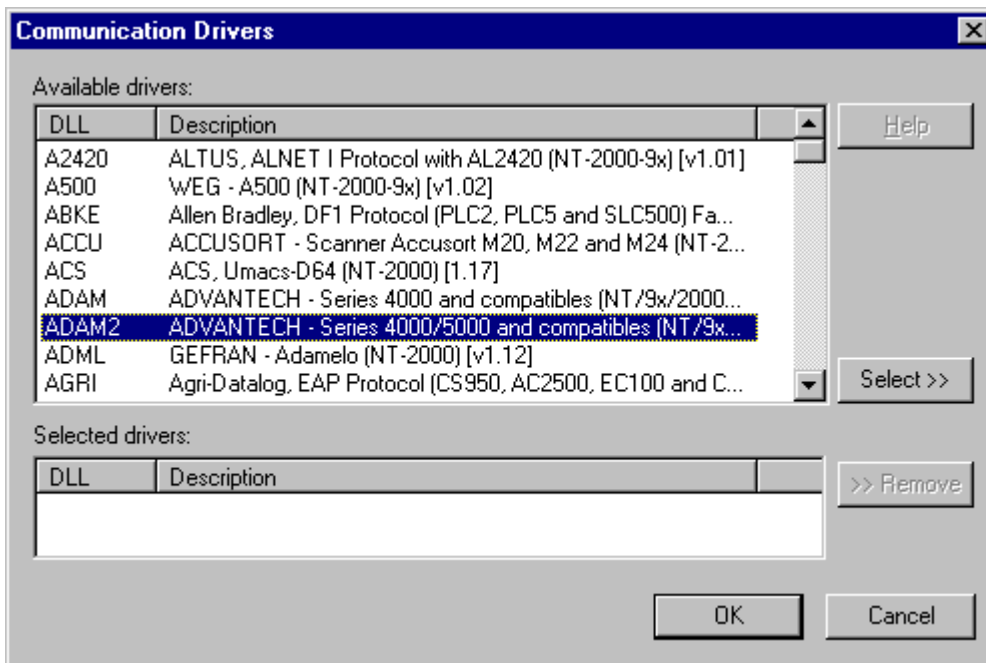
Installation

2.5 Installing the Driver

When you install the Studio v3.0 or higher, the communication drivers are already installed. You need now to select the driver at the applications where it will be used.

The steps to select the driver inside an application are:

1. Execute the Studio and select the proper application.
2. Select the menu *Insert + Driver...*
3. In the column **Available Drivers**, select the **ADAM2 Driver** and push the button **Select >>** (the driver ADAM2 must appear in the column **Selected Drivers**).
4. Press **OK**.



2.6 Other software requirements

It is not necessary to install any other software in the PC to enable the communication between the host and the Device.

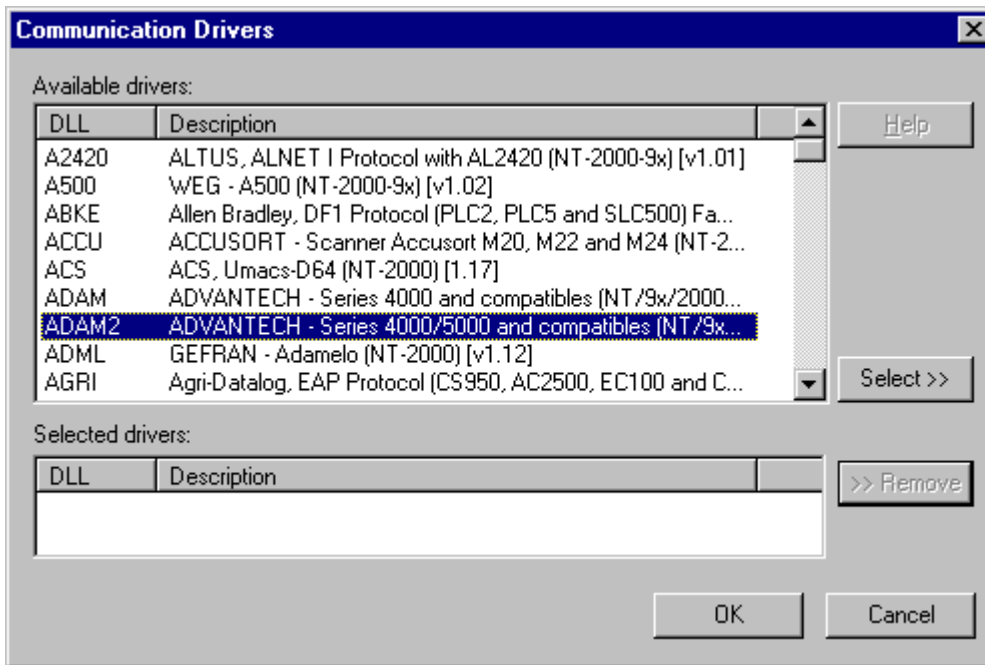
☞ Note: Special cautions must be taken when installing the physical hardware. Refer to the hardware manufacturer documentation for specific instructions in this area.

3 Driver Configuration

After the driver is installed and selected in the Studio (see section 3.1), you should proceed to the driver configuration.

The driver configuration is two parts:

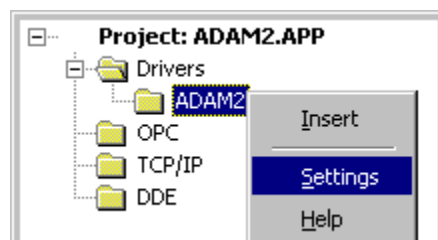
The Settings or Communication parameters, it is only one configuration to the whole driver, then you have the communication tables or Driver Worksheets, where the communication tags are defined.



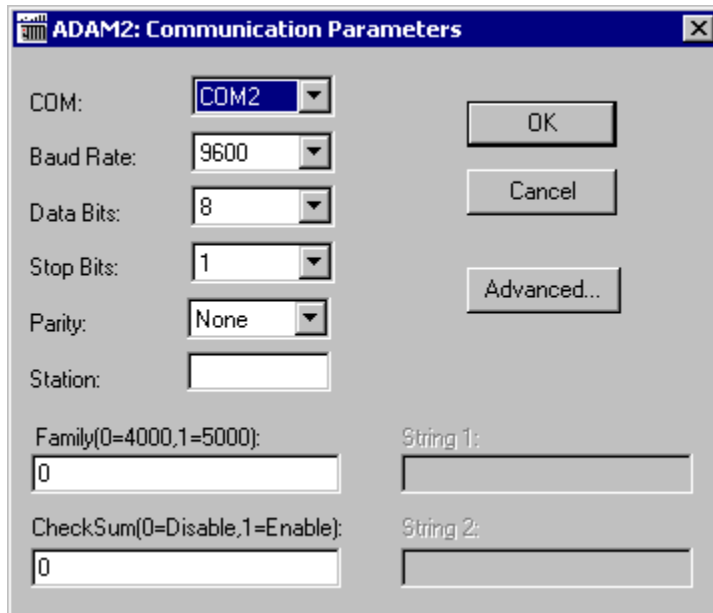
3.1 Settings - Communication Parameters

These parameters are valid for all driver worksheets configured in the system. To open the window for configuring the **Communication parameters**, follow these steps:

1. In the **Workspace** of the Studio environment, select the **Comm** table.
2. Expand the folder **Drivers** and select the subfolder **ADAM2**.
3. Right click on the **ADAM2** subfolder and select the option **S**ettings.



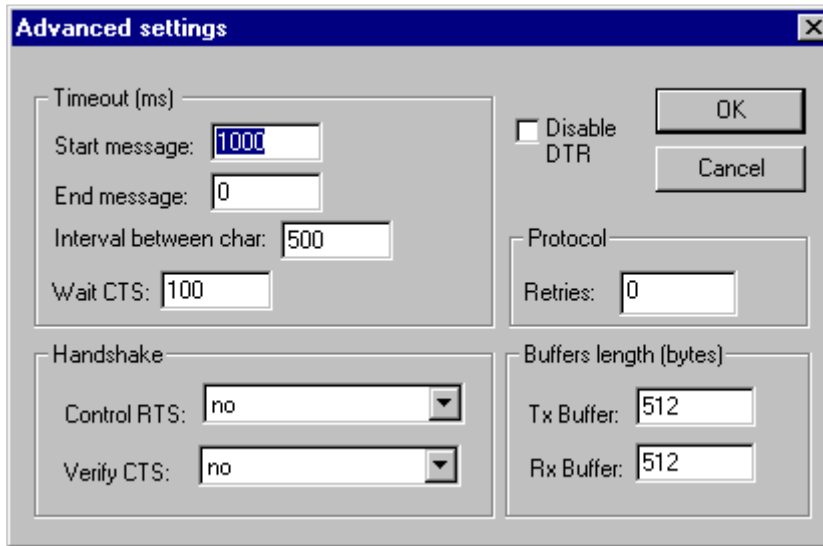
When selecting the Settings, there is the following dialog to configure:



Parameter	Default Value	Valid values	Description
COM	COM2	COM1 to COM8	Serial port of the PC used to communication with the device
Baud Rate	9600	110 to 57600bps	Communication rate of data
Data Bits	8	5 to 8	Number of data bits used in the protocol
Stop Bits	1	1 or 2	Number of stop bits used in the protocol
Parity	None	even, odd, none, space or mark	Parity of the protocol
Station	0	0	Not used for the driver
Family	0	0 or 1	0- Communication with 4000 family 1- Communication with 5000 family
Checksum	0	0 or 1	0- Disable the checksum 1- Enable the checksum

Note: These Parameters must be just the same as the configured on the ADAM device.

By clicking on the button **Advanced...** in the window **Communication Parameters**, you open additional communication parameters.



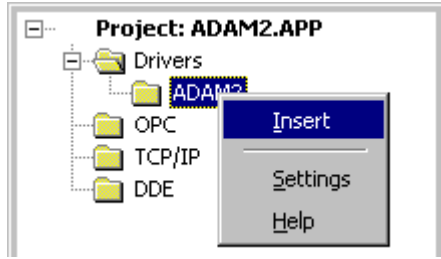
The Advanced setting parameters are explained at the Studio Technical Reference Manual, and you should keep the default values to all fields. Only the field described at the next table should be configured:

Parameter	Default Value	Valid values	Description
Control RTS	No	no, yes or yes + echo	Define if the handshake signal of RTS (Request to Send) is set before communication and if there is an echo in the communication. If we are using Windows 95 or CE with the right RS 232 – RS 485 Converter (without RTS Control), choose the option “no”. But, if we are under Windows NT and if the RS232 – 485 adapter is used, the choice must be “yes”. Important: Wrong settings on this field will not let the driver work, having the Timeout waiting start a message error.

3.2 Driver Worksheet

It is possible to configure many driver worksheets, each one will be composed of a Header and Body. To create a new driver worksheet, follow these steps:

1. In the **Workspace** of the Studio environment, select the table **Comm**.
2. Expand the folder **Drivers** and select the subfolder **ADAM2**.
3. Right click on the **ADAM2** subfolder and select the option **I**nsert.



Note: To optimize communication and ensure better performance for the system, it is important to tie the tags in different driver sheets according to the events that must trigger the communication of each group of tags and the periodicity for which each group of tags must be written or read. In addition, it is recommended to configure the addresses of communication in sequential blocks.

When creating a communication table, you have the following window:

Tag Name	Address	Div	Add
1	DigitalValue_1	0.0	
2	DigitalValue_2	1.0	
3	DigitalValue_3	0.1	
4			

All entries at the Driver Worksheet, exception by the **Station**, **Header** and **Address** are standard to all communication drivers. You should refer to Studio Communication Driver documentation about the configuration of the standard fields. This document describes the Station, Header and Address fields, which are specific to each communication driver.

3.3 Station and Header configuration

Parameter	Default Value	Valid values	Description
Station	-	1 to 255	For Family 5000, this field must be configured with the PLC address. For the Family 4000, this field is not used and should be left in blank.
Header	DI:8	Vide next table	Defines the type of variable to be read or written from or to the device.

The **Header** field defines the type of variables that will be read or written from or to the device. It complies with the syntax: <Module's Type>:<number of bits in the digital input module>. After editing the field **Header**, the system will check if it is valid or not. If the syntax was incorrect, the default value (DI:8) will be automatically placed in this field.

You can type Tag between curly brackets into this field, but be sure that the Tag's value is correct, with the right syntax, or you will get the Invalid Header error. The right syntax, both for the field typing and Tag value is described bellow:

- **Module's Type:** choose between DI (Digital Input), DO (Digital Output), AI (Analog Input) or AO (Analog Output).
- **Number of Bits in the digital input module:** Only used for digital input modules (DI) to indicate the amount of digital points from each card. Only two values are valid: 8 or 16.

☞ Note: The terms Input /Output used in Module's type specify just if the driver will write or read data. If you are using a digital output module and want to read the output values you must create a sheet with DI in Header field.

Information regarding the parameter "Header"			
Type	Sample of syntax	Valid range of initial Address	Comment
Read Digital Input / Output	DI:8	Any	The number after colon specify the amount of module's bits
Write Digital Output	DO	Any	-
Read Analog Input	AI	Any	The ADAM device channel must be configured to engineering units
Write Analog Output	AO	Any	The ADAM device channel must be configured to engineering units
Counter / Frequency	CF	Any	The ADAM device channel must be configured to engineering units

☞ Note: Always creates two different driver worksheets to read Inputs and Outputs if the Modules that are being read have not the same amount of bits.

3.4 Address Configuration

The body of the driver worksheet allows you to associate each tag to its respective module and channel. In the column **Tag Name**, you must type the tag from your application database. This tag will receive or send values from or to an address on the device.

The address cells complies to the following syntax:

For 4000 Family:

<Type><Module's Address>.<Channel>

Type: Used only of Counters/ Frequency (Header = "CF"). The values can be "W" for 16 bits and "D" for 32 bits.

Module's Address: Module's Address in the network

Channel: Channel's Number to be read or written from the module.

Sample of Addressing Configuration		
Address on the Device	Header Field	Address Field
Read 16 bits module (4050) Address 4 channel 2 (input)	DI:16	4.2
Read 16 bits module (4050) Address 4 channel 0 (output)	DI:16	4.0
Read 8 bits module (4052) Address 4 channel 2	DI:8	4.2
Read 16 bits module (4053) Address 1 channel 15	DI:16	1.15
Read 8 bits module (4060) Address 1 channel 3	DI:8	1.3
Write digital output (4060) Address 1 channel 3	DO	1.3
Read analog input (4011, 4011D, 4012, 4013, 4014D, 4016, 4017, 4018) Address 5 channel 1	AI	5.1
Write 4021 Address 1	AO	1.0

For 5000 Family:

<Module's Slot>.<Channel>

Module's Slot: Module's Slot hanging on the rack.

Channel: Channel's Number to be read or written from the module.

Sample of Addressing Configuration		
Address on the Device	Header Field	Address Field
Read channel 1 from 8 bits module in slot 3	DI:8	3.1
Read channel 1 from 16 bits module in slot 2	DI:16	2.1
Write channel 1 to output module in slot 2	DO	2.1
Read channel 3 from input analog module in slot 2	AI	2.3
Write channel 1 to output analog module in the slot 3	AO	3.1
Read channel 1 from input counter module in the slot 3 (5080) – 16 bits value	CF	W3.1
Read channel 1 from input counter module in the slot 3 (5080) – 32 bits value	CF	D3.1

☞ Note: When using the 5080 module with input range configured to frequency, the DIV field in the driver worksheet should be configured with the value 100.

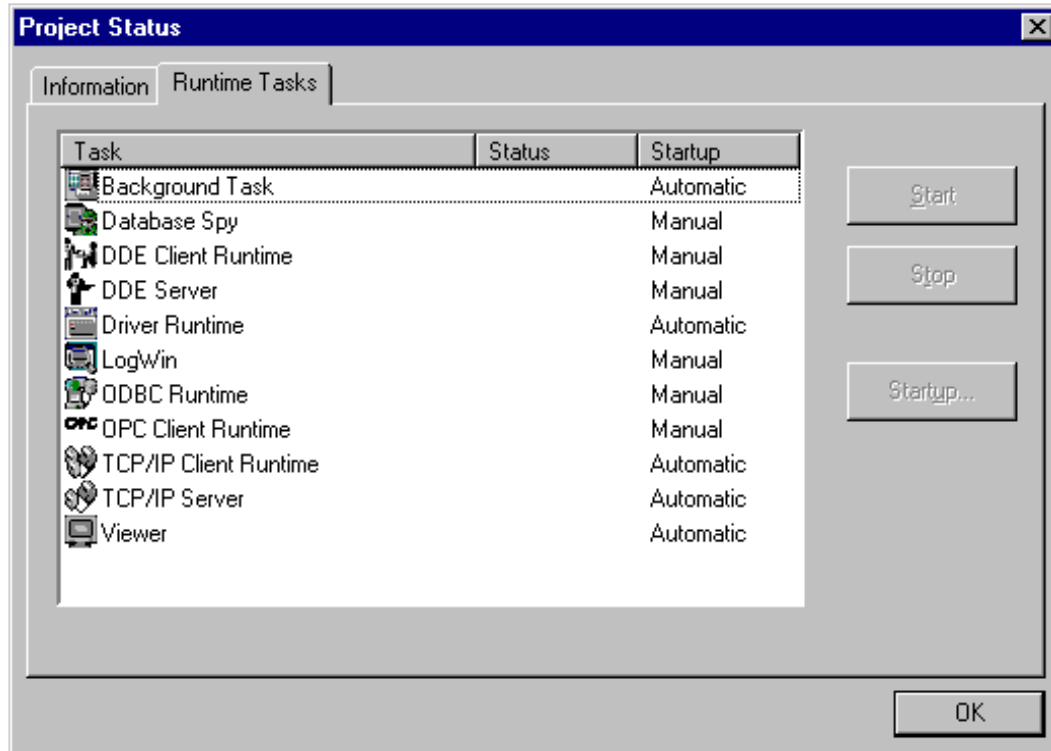
☞ Note: There are two ways to set address information: one for 4000 family and another for 5000 family. For 4000 family the address is specified in the address field, in other words, each line in the sheet must have its own module address, so, more than one module can be read or written in just one sheet. For 5000 family the PLC address must be specified in the station field. The slot's addresses are configured in the Address column from the driver worksheet.

3.5 Device Configuration

The device parameters (baud rate, stop bits, etc) must match with the settings configured in the Communication Parameters from the ADAM2 driver.

4 Execution

- When installing the driver, it is automatically selected to execute when you start-up the Runtime Environment. To verify the if the driver is correctly enabled to start, use the menu option **Project + Status...**, and verify the task Driver Runtime



5 Troubleshooting

After each attempt to communicate using this driver, the tag configured in the field **Read Status** or **Write Status** will receive the error code regarding the kind of failure that occurred. The error messages are:

Error Code	Description (*)	Possible causes	Procedure to solve
0	OK	Communication without problems	-
2	Invalid Header	An invalid Header has been typed or the tag that is inside this field has an invalid configuration.	Type a valid Header either on the header field or on the tag value. A lot of different valid headers are shown on the section 4.2
3	Invalid Address	An invalid Address has been typed or the tag that is inside this field has an invalid configuration.	Type a valid Address either on the address field or on the tag value. The address' valid values are show on the section 4.4
4	Invalid command	Addressed module don't accept the sent command	Verify the module and be sure that you are not trying to write in the input module for example.
5	Error to allocate memory	There is no memory to allocate I/O buffers and control buffers	Reduce the size buffers on advanced settings. For details see item 4.1
6	Response Error	A invalid response was received from module	Check the serial communication configuration. Verify if the settings on the Communication Parameters and on the device are the same.
7	Fail to read analog data	Data read is not valid	Check the serial communication configuration. Verify if the settings on the Communication Parameters and on the device are the same.
8	Fail to write analog data	Write confirmation was not received	Check the serial communication configuration. Verify if the settings on the Communication Parameters and on the device are the same.
10	Invalid Checksum	The checksum received from the device is invalid	Check the connection and be sure that it is protected against external interference.
-15	Timeout waiting 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 control 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 right configuration. See on the section 2.2 the different RTS/CTS valid configurations.
-17	Timeout between rx char.	<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 cable wiring - Check the PLC state. It must be RUN - Check the station number. - Check the right configuration. See on the section 2.2 the different RTS/CTS valid configurations.

Note: The results of the communication may be verified in the **output** Window of the Studio's environment. To set a log of events for **Field Read Commands**, **Field Write Commands** and **Serial Communication** click with the right button of the mouse on the output window and chose the option setting to select these log events. When testing under a Windows CE target, you can enable the log at the unit (Tools/Logwin) and verify the file clog.txt created at the target unit.

When you are not able to establish the communication with the PLC, you should first of all establish the communication between the PLC Programming Tool and the PLC. Very frequently the communication it is not

possible due to a hardware or cable problem, or due an error or lack of configuration at the PLC. Only after the communication between the PLC Programming Software and the PLC is working fine, you can test again the supervisory.

When testing the communication with the Studio, you should first use the application sample described at item 7, instead of the new application that you are creating.

If is required to contact technical support, please have the following information available:

- Operating System (type and version): To find this information use the Tools/System Information option
- Project information: It is displayed using the option Project/Status from the Studio menu
- Driver version and communication log: Available from Studio Output when running the driver
- Device model and boards: please refer to hardware manufacture's documentation

6 Application Sample

The Studio contains a configured project to test the driver. It is strongly recommended to do some tests with this application before beginning the configuration of the customized project, for the follow reasons:

- To understand better the information covered in section 4 of this document.
- To verify that your configuration is working.
- To certify that the hardware used in the test (device + adapter + cable + PC) is in working conditions before beginning the configuration of the applications.

☞ Note: The Application Sample is not available for all drivers.

The Studio application is in the directory:

To perform the test, you need to follow these steps:

- Configure the device communication parameters using manufacturer programmer software.
- Open the application
- Execute the application
- To display the following screen with some information about the communication, please execute the Viewer module in the Studio.

☞ Note: The application for testing may be used like a maintenance screen for the custom application.

7 History of Versions

Version	By	Date	Description of changes
1.00	Lourenco	19-Sep-00	▪ First driver version
1.01	Lourenco	18-Oct-00	▪ Fixed bug with read commands
1.02	Lourenco	20-Oct-00	▪ Fixed bug to read Analog Modules that do not send the delimiter character
1.03	Lourenco	11-Jan-01	▪ Implemented command to read Frequency/Counter modules
1.04	Lourenco	16-Jan-02	▪ Implemented the check sum