

**Communication Driver FLK**

Driver for TCP/IP communication with Fluke devices (2640A/2645A/2680A/2686A)

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# 1 Introduction

The FLK driver enables communication between the Studio system and a set of Fluke Data Acquisition devices using the TCP/IP protocol, if these components comply with the characteristics described in this document.

This document was designed to help you install, configure, and execute the FLK driver. The information is organized as follows:

- **Chapter 1 Introduction:** Provides an overview of the driver documentation.
- **Chapter 2 General Characteristics:** Describes all of the required hardware and software components you need to implement serial communication. This chapter also discusses global characteristics about the communication.
- **Chapter 3 Installing the Driver:** Explains how to install the hardware and software components required for the driver.
- **Chapter 4 Configuring the Driver:** Explains how to configure the communication driver, including the different permutations for configuration and the driver's default values.
- **Chapter 5 Configuring the Device:** Explains how to configure the devices.
- **Chapter 6 Executing the Driver:** Explains how to execute the driver to verify that you installed and configured the driver correctly.
- **Chapter 7 Troubleshooting:** Lists the most common error codes for this protocol and explains how to fix these errors.
- **Chapter 8 Using the Application Sample:** Provides a sample application, which you can use to test the driver configuration.
- **Chapter 9 Revision History:** Provides a log of all modifications made to the driver and the documentation.

 **Notes:** This document assumes that you have read the “Driver Configuration” chapter in the *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.

## 2 General Characteristics

This chapter discusses the characteristics of the hardware and software components used to implement TCP/IP communication between devices using Fluke proprietary protocol and the FLK driver. In addition, this chapter provides information about the equipment used for conformance testing.


The chapter is organized as follows:

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

### ***Device Characteristics***

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

- **Manufacturer:** Fluke
- **Compatible Equipment:**
  - 2640A
  - 2645A
  - 2680A
  - 2686A
- **Fluke Configuration Software:** Fluke DAQ Control Software

 **Tip:** Refer to the “Conformance Testing” section to review the equipment used in the standard conformance tests for this driver.

### ***Link Characteristics***

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

- **Device Communication Port:** Ethernet communication port
- **Physical Protocol:** Ethernet
- **Logic Protocol:** Fluke Proprietary
- **Device Runtime Software:** None
- **Specific PC Board:** Ethernet Card

## ***Driver Characteristics***

The FLK driver is composed of the following files:

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

🔗 **Notes:** You must place all of the preceding files in the /DRV subdirectory of the Studio installation directory. You must use Adobe Acrobat Reader (provided with the Studio installation package) to view the FLK.PDF document.

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

- Windows 9x
- Windows 2000
- Windows NT

👉 **Tip:** Refer to the “Conformance Testing” section to review the operating systems used in the conformance tests for this driver.

## ***Conformance Testing***

The following equipment was used for conformance testing:

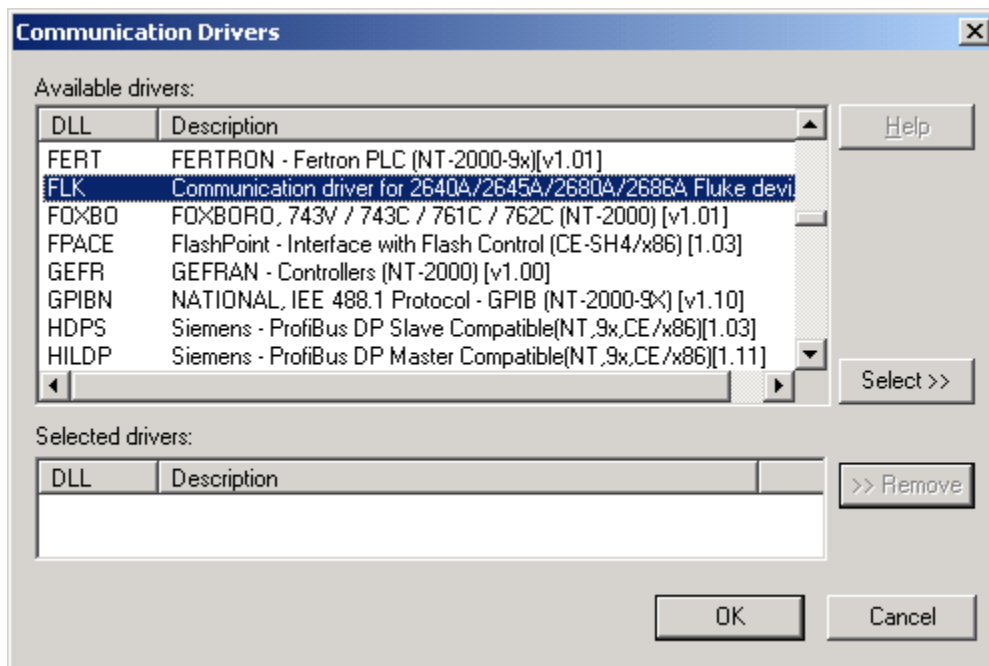
- **Equipment:** 2645A
- **Configuration:**
  - Base Channel Number: 1
  - Network Type: General
  - IP Address: 192.168.1.54
- **Operating System (development):** Windows XP
- **Operating System (target):** Windows XP
- **Studio Version:** 5.1
- **Driver Version:** 1.00

### 3 Installing the Driver

When you install the Studio v3.0 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. Execute Studio using one of the following methods:
  - Double-click the **Studio** shortcut icon from the desktop.
2. When the **Studio** screen opens, open the appropriate application from the Workspace pane.
3. From the main menubar, select the **Driver...** from the **Insert** menu to open the *Communication drivers* dialog box as shown in the following figure.



4. Select the **FLK** driver from the **Available Drivers** list and click the **Select>>** button.
5. When the **FLK** driver displays in the **Selected Drivers** list, click the **OK** button to close the dialog.

You are not required to install any other software on your computer to enable communication between Studio and the device. However, to download the custom program to the device, you must install a Fluke DAQ Control Software package. Consult the Fluke DAQ Control Software documentation to review the procedure for installing and using the software.

**Attention:** You must use special precautions when installing the physical hardware. Refer to the hardware manufacturer's documentation for detailed instructions.

## 4 Configuring the Device

Fluke devices compatible with this driver have basically two kinds of settings: Network settings and Channel configuration settings. Make sure that both settings are configured properly in both Studio and the Device. Before setting your own configuration it is recommended to use the sample application (see the section 8 using sample application).

## 5 Configuring the Driver

After you open Studio and installed the FLK driver (as described in Chapter 3), you should configure the driver.

You configure the driver in two stages:

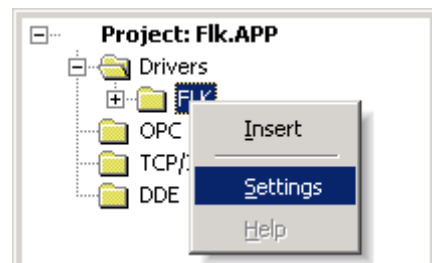
- You set the communication parameters (only one configuration for the whole driver).
- You define the communication tags by completing the communication tables or Driver Worksheets.

The following sections provide instructions for setting the parameters and completing the worksheets.

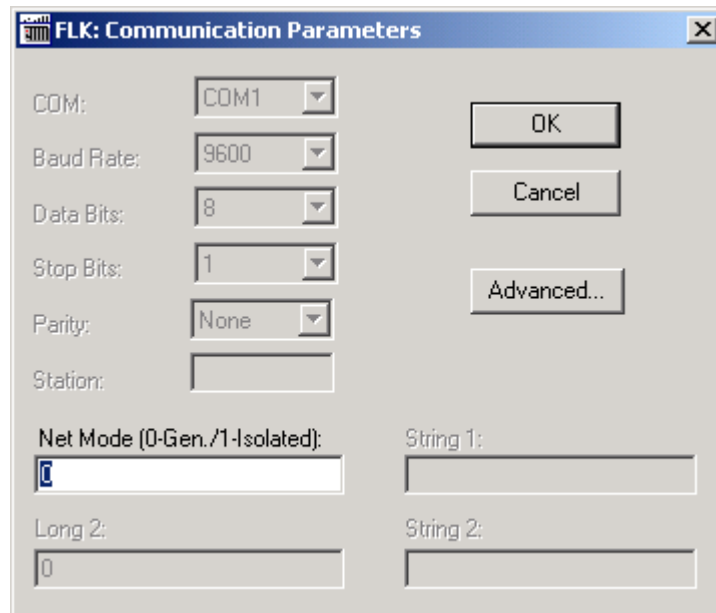
### ***Setting the Communication Parameters***

When you set the communication parameters, they are valid for all Driver Worksheets configured in the system. Use the following steps to configure the communication parameters for the driver:

1. From the *Studio* application screen, click the **Comm** tab located below the Workspace pane.
2. From the Workspace pane, expand the **Drivers** folder.
3. Right-click on the **FLK** subfolder and when the pop-up menu displays, (as shown in the following figure) select the **Settings** option.



The *Communication Parameters* dialog displays as follows:

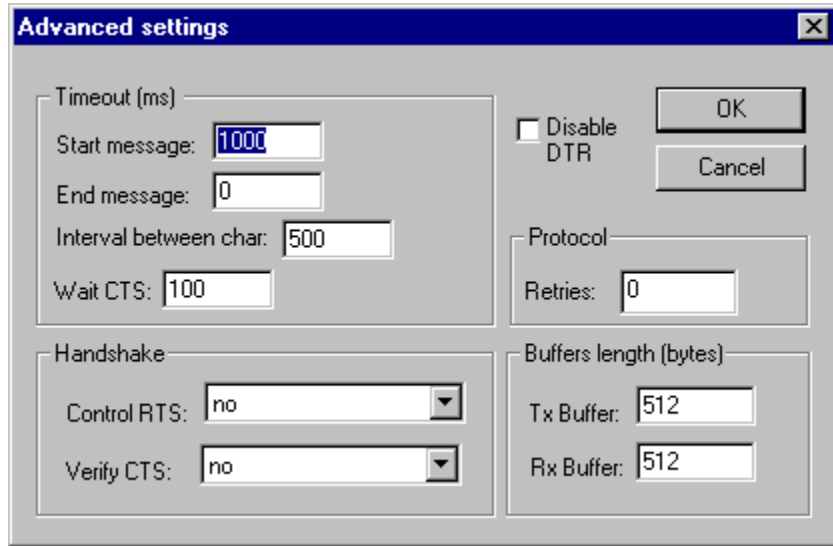


4. You must configure the following parameters:

Parameter	Default Value	Valid Values	Description
Network Mode	0	0 or 1	0 - General Network / 1 – Isolated Network

**Note:** You *must* configure the device with the *same* values defined for the FLK driver in the **Communication Parameters** dialog.

- Click on the **Advanced... button** in the **Communication Parameters** dialog to open the **Advanced settings** dialog (as shown in the following figure).



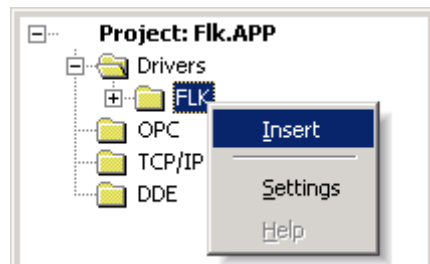
**Note:** The only value used for this driver is the Start message Timeout. The value depend on your Network traffic, if you are not sure about the configuration, keep the default.

### Configuring the Standard Driver Worksheet

This section explains how to configure a Standard Driver Worksheet (or communication table) to define communication tags. You can configure multiple Driver Worksheets; each of which is divided into a Header and Body.

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

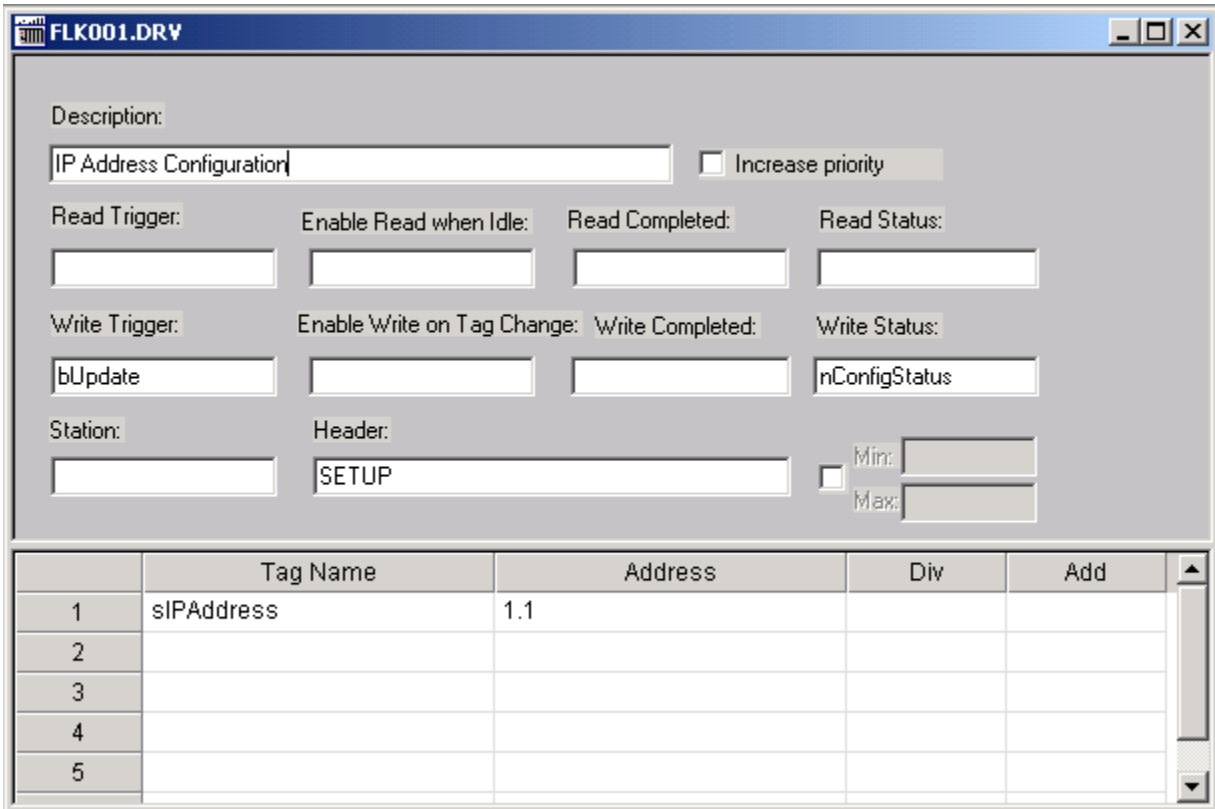
- From the *Studio* application screen, select the **Comm** tab, located below the **Workspace** pane.
- In the **Workspace** pane, expand the **Drivers** folder and right-click the **FLK** subfolder.
- When the pop-up menu displays (as shown in the following figure), select the **Insert** option.



**Tip:** To optimize communication and ensure better performance for the system, it is important to tie the tags in different driver sheets together according to the events that trigger communication between each group of tags and to the periodicity for which each group of tags must be written or read. In addition, we recommend configuring the communication addresses into sequential blocks.



The <drivenameXXX>.drv dialog box displays (similar to the following figure).



The fields on the Standard Driver Worksheet are standard for all communication drivers; except for the **Station**, **Header**, and **Address** fields. This document explains only the Station, Header, and Address fields because they are specific to each communication driver. For detailed information about the configuring the standard fields refer to the *Technical Reference Manual*.

Proceed to the next section for an explanation about configuring the **Station** and **Header** fields.

### Configuring the Station and Header Fields

This section explains the procedure for configuring the Station and Header fields. The following table describes the default and valid values for these two fields:

Parameter	Default Value	Valid Values	Description
Station	-	1-99	Device Base Channel Number (BCN) – Not used for SETUP Header
Header	SETUP	See next table	Defines if the worksheet is a configuration worksheet or a channel reading worksheet.

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

<Type>

Where:

- **Type** : Type of worksheet, one of the following: SETUP or CHANNEL.

If you type a Tag string between curly brackets {Tag} into this field, you must ensure that the **Tag** value and syntax are both correct or an Invalid Header error will result. The following table describes the proper syntax for both the field Type and Tag values.

Information About the Header Parameter	
Type	Comments
CHANNEL	Read channels from the device.
SETUP	Used to set up the Toolbox configuration file. It should be triggered to set up the configuration before starting the readings.

After specifying the **Station** and **Header** parameters, proceed to the next section for instructions about configuring the **Address** field.

### Configuring the Address Field

The address field has different meanings depending on the configured Header. If the Header field is configured as “CHANNEL” the body of the Driver Worksheet allows you to associate each tag to its respective channel in the device. In the **Tag Name** column, you must type the tag from your application database. This tag receives sends values from a channel. The address field must comply with the following syntax:

<BCN>.<CHANNEL> (for example: 10)

Where:

**BCN:** Device base channel number.

**CHANNEL:** Device channel number. If the device is a 268x device, the channel number should include the module number or 9 for computed channels.

If the header is configured for SETUP, each line of the Driver Worksheet stands for a device configuration. The tag in the **Tag Name** column must specify the device IP address. The address field must comply with the following syntax:


<BCN>.<MODEL> (for example: 10)

Where:

**BCN:** Device base channel number.

**MODEL:** The table below shows the values for each device model.

Device Model Specification	
Model in address field	Device Model
0	2645A
1	2640A
2	2680A
3	2686A

 **Note:** The SETUP worksheet is only for configuration. It must be triggered before starting any read operation. See the driver sample application (Section 8) for an example of how to set up the SETUP worksheet.

Addressing Configuration Sample		
Address on the Device	Header Field	Address Field
2640A BCN=1,Channel 1	CHANNEL	1.1
2640A BCN=2,Channel 13	CHANNEL	2.13
268x BCN=10, Module=2,Channel 5	CHANNEL	10.205
268x BCN=11, Computed channel 40	CHANNEL	10.940
Set up 2640A BCN=1 configuration	SETUP	1.1
Set up 2680A BCN=10 configuration	SETUP	10.2

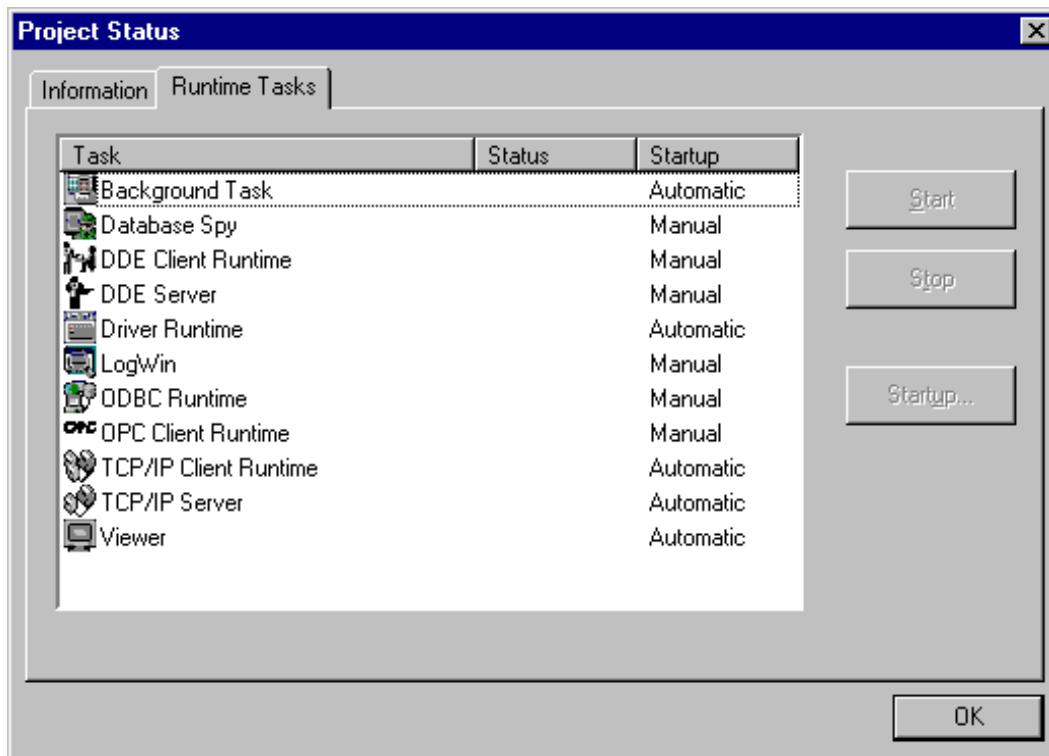
## 6 Executing the Driver

When you add the driver to a project, the system sets the driver to execute automatically when you start-up the Runtime Environment.

To verify that the driver is enabled and will start correctly,

1. Select **Project** from the main menubar, and then select the **Status...** option from the menu to verify the Driver Runtime task.

The *Project Status* dialog box displays.



If you click on (highlight) the **Driver Runtime** line, the **Startup...** button becomes active. Click on the **Startup...** button to toggle between the Automatic and Manual Startup modes.


2. Verify that the **Driver Runtime** task is selected (highlighted) and then click **OK** to close the dialog box.

## 7 Troubleshooting

If the FLK driver fails to communicate with the device, the tag you configured for the **Read Status** or **Write Status** fields receives an error message containing an error code. You can use the error code to identify what type of failure occurred.

The following table describes all of the error codes:

Error Code	Description	Possible Causes	Procedure to Solve
0	OK	Communication without problems	None required.
1	Invalid Header	Invalid Header typed in the Driver Worksheet	Type a valid Header.
2	Invalid Address	Invalid Address typed in the Driver Worksheet	Type a valid address.
3	Invalid Station	Invalid Station typed in the Driver Worksheet	Type a valid Station.
4	Invalid Network Type	Invalid Network typed in the Driver Settings	Type a valid number for network type.
22	Fail to allocate memory	System does not have enough memory available to run the driver.	Increase the system memory
26	Error connecting	Command invalid if the equipment is in use	Driver commands cannot generate this error.
27	Fail to initialize Toolbox library	Toolbox library is not in the BIN folder	Reinstall Studio
28	Invalid IP address	The IP address typed is not valid	Check if the tag in the SETUP worksheet has a valid IP address
-15	Timeout waiting to start a message.	<ul style="list-style-type: none"> <li>▪ Disconnected cables</li> <li>▪ PLC turned off, or in Stop or error mode</li> <li>▪ Wrong Station number</li> <li>▪ Wrong RTS/CTS control settings</li> </ul>	<ul style="list-style-type: none"> <li>▪ Check cable wiring.</li> <li>▪ Check PLC state (must be RUN)</li> <li>▪ Check station number.</li> <li>▪ Check configuration. Refer to the “Link Characteristics” section for valid RTS/CTS configurations.</li> </ul>

 **Tip:** You can verify the communication status using the Studio environment *Output* window or the **LogWin** module. To establish an event log for **Field Read Commands**, **Field Write Commands**, and **Serial Communication** right-click on the *Output* window. When the pop-up menu displays, select the option to set the log events. If you are testing under a Windows CE target, you can enable the log at the unit (**Tools/Logwin**) and verify the `celog.txt` file created at the target unit.

If you are unable to establish communication with the PLC, you must first 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 you successfully establish communication between the PLC Programming Software and the PLC, you can retest the supervisory driver.


When testing communication with Studio, you should first try using the application sample in Chapter 7 (if the sample is available for the driver), instead of using the new application that you are creating.

If you are unable to establish communication between the FLK driver and the devices, contact Technical Support.

## 8 Using the Application Sample

Studio provides a configured project that you can use to test the FLK driver. We *strongly* recommend that you perform some tests with this application sample before configuring a customized project, for the following reasons:

- To better understand the information covered in the “Configuring the Driver” chapter 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 satisfactory working condition before configuring the applications.


 **Note:** In the application folder there is a file called FlukeDAQSample.cfg. It is the Fluke DAQ Control software configuration file, use the Fluke DAQ software to send the configuration to the device before trying to communicate.

The Studio application sample is located on the Studio installation CD-ROM, in the following directory:

/COMMUNICATION EXAMPLES/<Driver Name>

Use the following steps to perform the test:

1. Configure the device communication parameters using the manufacturer’s programmer software.
2. Open the /COMMUNICATION EXAMPLES/<Driver Name> application.
3. Execute the application.
4. Display the application screen (which includes some information about the communication) by executing the **Viewer** module in Studio.

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

## 9 Revision History

Doc. Revision	Driver Version	Author	Date	Description of Changes
A	1.00	José L. Teodoro	Jul/16/2002	▪ First driver version
B	1.00	Andre Bastos	Mar/31/2010	▪ Modified documentation only. No changes in the driver