GFLUX Communication Driver

Driver for Serial Communication
with Gammaflux TTC Devices

Contents

Introduction

The GFLUX driver enables communication between the Studio system and Gammaflux TTC devices using the Gammaflux TTC Auxiliary protocol communicating over Serial, according to the specifications discussed in this document.

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

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

Notes:

- This document assumes that you have read the “Development Environment” chapter in the Studio *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 chapter explains how to identify all the hardware and software components used to implement communication between the Studio GFLUX driver and the Gammaflux TTC devices.

The information is organized into the following sections:

- Device Characteristics
- Link Characteristics
- Driver Characteristics

Device Characteristics

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

- **Manufacturer**: Gammaflux
- **Compatible Equipment**:
  – TTC family
- **Programming Software**: None
- **Device Runtime Software**: None

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

Link Characteristics

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

- **Device Communication Port**: Serial
- **Physical Protocol**: Serial RS232
- **Logic Protocol**: Gammaflux TTC Auxiliary

Driver Characteristics

The GFLUX driver is composed of the following files:

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

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

- Windows NT/2K/XP
- Windows CE

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

The GFLUX driver supports the following registers:

Register Type	Length	Write	Read	Bit	Integer
ALL (Process Temperature Value, Active % Output, Load Current, Load Volts and Alarm Status)	5 Words	–	•	•	•
TEMP (Process Temperature value)	1 Word	–	•	•	•
ACTOUT (Active % Output)	1 Word	–	•	•	•
LDCURR (Load Current)	1 Word	–	•	•	•
LDVLT (Load Volts)	1 Word	–	•	•	•
ALRST (Alarm Status)	1 Word	–	•	•	•
MODE (Manual Mode)	1 Word	•	•	•	•
CYCLE (Cycle Time)	1 Word	•	•	•	•
PROCSETP (Process Setpoint)	1 Word	•	•	•	•
PWRSETP (Manual % Power Setpoint)	1 Word	•	•	•	•
ZONEST (Zone On/Off)	1 Word	•	•	•	•

Conformance Testing

The following hardware/software was used for conformance testing:

- **Driver Configuration**:
  - **Baud Rate**: 57600
  - **Data Bits**: 8
  - **Stop Bits**: 1
  - **Parity**: None
  - **COM Port**: COM1
- **Cable**: Serial RS232

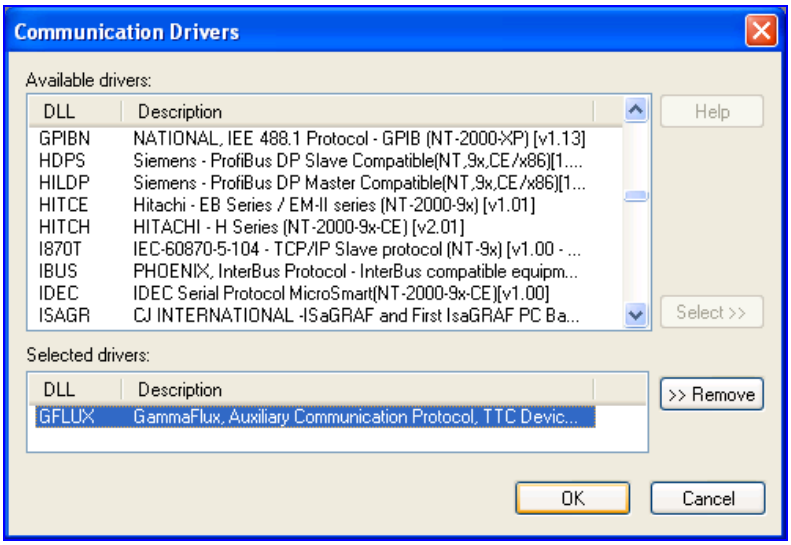
Driver Version	Studio Version	Operating System	Equipment
1.00	6.0	WinXP	Gammaflux TTC 2100 device

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 **GFLUX** driver from the *Available Drivers* list (as shown in the following figure), and then click the **Select** button.



Communication Drivers Dialog Box

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

> **Note:**
> It is not necessary to install any other software on your computer to enable communication between the host and the device.

> **Attention:**
> For safety reasons, you must use special precautions when installing the physical hardware. Consult the hardware manufacturer's documentation for specific instructions in this area.

Configuring the Driver

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

- Specifying communication parameters
- Defining tags and controls in the *STANDARD DRIVER SHEET*s (or Communication tables)

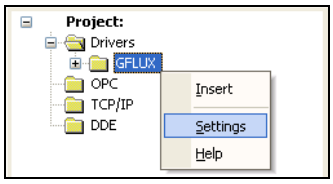
Worksheets are divided into two sections, a *Header* and a *Body*. The fields contained in these two sections are standard for all communications drivers — except the **Station**, **Header**, and **Address** fields, which are driver-specific. This document explains how to configure the **Station**, **Header**,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

> **Note:**
> For a detailed description of the Studio *STANDARD DRIVER SHEET*s, and information about configuring the standard fields, review the product's *Technical Reference Manual*.

Setting the Communication Parameters

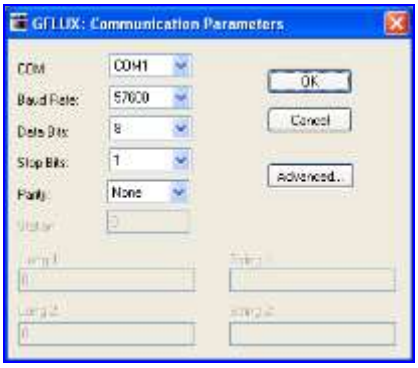
Use the following steps to configure the communication parameters, which are valid for all driver worksheets configured in the system:

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 GFLUX subfolder and when the pop-up menu displays (as shown in the following figure), select the **Settings** option.



Select Settings from the Pop-Up Menu

The *GFLUX: Communications Parameters* dialog displays (as follows).



Communication Parameters Dialog

This Driver does not have custom parameters.

4. Click the **Advanced** button on the *Communication Parameters* dialog to open the *Advanced Settings* dialog and configure the settings that are necessary.

> **Notes:**
>
> - Do not change any of the other *Advanced* parameters at this time. You can consult the Studio *Technical Reference Manual* for information about configuring these parameters for future reference.
> - Generally, you must change the *Advanced* parameter settings if you are using a DCE (Data Communication Equipment) converter (232/485 for example), modem, and so forth between the PC, driver, and the host. You must be familiar with the DCE specifications before adjusting these configuration parameters.

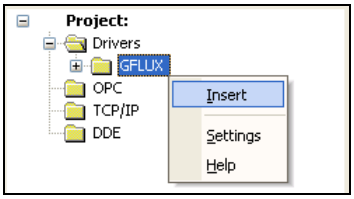
Configuring the Driver Worksheets

This section explains how to configure the *STANDARD DRIVER SHEETs* (or communication tables) to associate application tags with the device addresses. You can configure multiple Driver Worksheets — each of which is divided into a *Header* section and *Body* section.

Configuring the *STANDARD DRIVER SHEET*

Use the following steps to create a new *STANDARD DRIVER SHEET*:

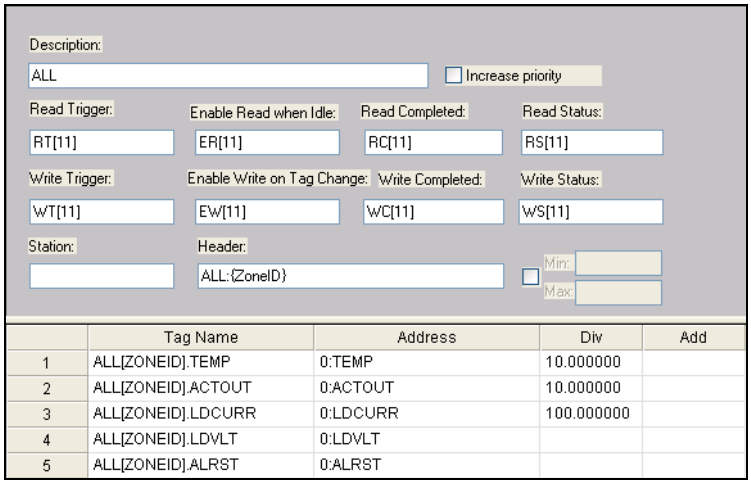
1. From the Studio development environment, select the *Comm* tab, located below the *Workspace* pane.
2. In the *Workspace* pane, expand the *Drivers* folder and right-click the <*Driver Name*> subfolder.
3. When the pop-up menu displays (as shown in the following figure), select the **Insert** option.



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 *STANDARD DRIVER SHEET* displays (similar to the following figure).



	Tag Name	Address	Div	Add
1	ALL[ZONEID].TEMP	0:TEMP	10.000000	
2	ALL[ZONEID].ACTOUT	0:ACTOUT	10.000000	
3	ALL[ZONEID].LDCURR	0:LDCURR	100.000000	
4	ALL[ZONEID].LDVLT	0:LDVLT		
5	ALL[ZONEID].ALRST	0:ALRST		

STANDARD DRIVER SHEET

In general, all parameters on the Driver Worksheet (except the **Station**, **Header**, and **Address** fields) are standard for all communication drivers, but they will not be discussed in this document. 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: Specify the device using the following syntax:

     <PLC ID>

     Where:

     – **PLC ID** is the PLC identification number.

   - **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. (Default value is *ALL:0*)

   - These variables must comply with the following syntax:

     <Command>:<Zone>:[Volatile] (For example: *ALL:10*)

     Where:

     – **Command** is the register type. (**ALL, TEMP, ACTOUT, LDCURR, LDVLT, ALRST, MODE, CYCLE, PROCSET, PWRSET or ZONE**)
     – **Zone** is the Zone Number.
     – **Volatile** is for Write operations in Volatile Memory

   After you edit the **Header** field, Studio checks the syntax to determine if it is valid. If the syntax is incorrect, Studio automatically inserts the default value in the **Header** field.

   Also, you can type a tag string in brackets **{Tag}** into the **Header** field, but you must be certain that the tag's value is correct and that you are using the correct syntax, or you will get an invalid Header error.

The following table lists all of the data types and address ranges that are valid for the GFLUX driver.

Header Field Information			
Data Types	**Sample Syntax**	**Valid Range of Initial Addresses per Worksheet**	**Comments**
ALL	ALL:12	Varies according to the equipment	Set of five predefined values: Process Temperature Value, Active % Output, Load Current, Load Volts and Alarm Status.
TEMP	TEMP:0	Varies according to the equipment	Process Temperature value (.1º F)
ACTOUT	ACTOUT:3	Varies according to the equipment	Active % Output (.1%)
LDCURR	LDCURR:6	Varies according to the equipment	Load Current (.01A)
LDVLT	LDVLT:11	Varies according to the equipment	Load Volts (1V)
ALRST	ALRST:1	Varies according to the equipment	Alarm Status • Bit 0: Thermocouple open • Bit 1: Thermocouple Reversed • Bit 2: Uncontrolled Output • Bit 3: Heater Shorted • Bit 4: Heater Open • Bit 5: Open Fuse • Bit 6: Local Deviation High • Bit 7: Local Deviation Low • Bit 8: Thermocouple Shorted • Bit 9: Undefined • Bit 10: Zone Off • Bit 11: Manual Mode • Bit 12: Auto Standby • Bit 13: Control Inhibit • Bit 14: Power Up Reset • Bit 15: General Error
MODE	MODE:25	Varies according to the equipment	Manual Mode (True/False)
CYCLE	CYCLE:0	Varies according to the equipment	Cycle Time (.1 Sec)
PROCSET	PROCSET:1	Varies according to the equipment	Process Setpoint (.1ºF)
PWRSET	PWRSET:8	Varies according to the equipment	Manual % Power Setpoint (.1%)
ZONE	ZONE:5	Varies according to the equipment	Zone On/Off (True/False)

- **Address** field: Use this field 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:

- **`<Zone`*`Offset`*`>:<Type>.[`*`Bit`*`]`** for "ALL" Headers (For example: *ALL:LDCURR*) and
- **`<Zone`*`Offset`*`>.[`*`Bit`*`]`** for any other Header (For example: *10*, *20*, *40*, *10.5*).

  Where:

  – **ZoneOffset** is a parameter added to the **Zone** parameter (configured in the **Header** field) to compose the group address configured in the **Header** field.

  – **Type** is used only with "ALL" Header. Used to specify the value/Setpoint of Zone to be read (TEMP, ACTOUT, LDCURR, LDVLT or ALRST)

– **Bit** (*optional parameter*) is the bit number to be read from the device.

> **Attention:**
> This driver supports bit reading only; it cannot execute bit writing.

Address Configuration Sample		
Device Address	**Header Field**	**Address Field**
Zone 1: Temp	TEMP:0	1
Zone 1: Temp	TEMP:1	0
Zone 1:Temp	ALL:0	1:TEMP
Zone 10: Cycle	CYCLE:5	5
Zone 10: Cycle	CYCLE:0	10
Zone 12: Alarm Status (Control Inhibit)	ALRST:12	0.13
Zone 12: Alarm Status (Heater Open)	ALRST:0	12.4
Zone 12: Alarm Status (Heater Open)	ALL:5	5:ALRST.4
Zone 5: Process Setpoint	PROCSET:2	3

> **Attention:**
> You must not configure a range of addresses greater than the maximum block size (date buffer length) supported by each PLC within the same worksheet. The maximum data buffer length for this driver is 16 zones per *STANDARD DRIVER SHEET*.

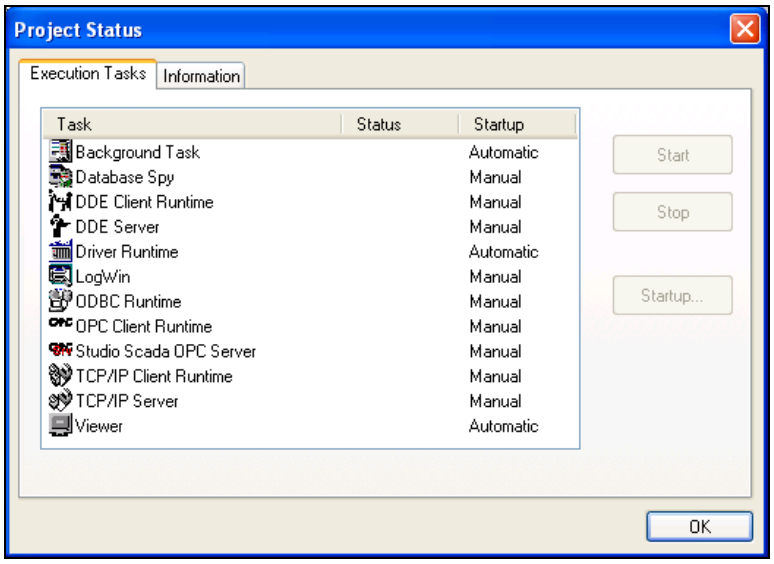
Executing the Driver

After adding the GFLUX 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 box displays, as follows.



Project Status Dialog Box

2. Verify that the *Driver Runtime* task is set to **Automatic**.
   - If the setting is correct, click OK to close the dialog box.
   - 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 GFLUX 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	PROTOCOL ERROR	Protocol error	Contact your Studio technical support representative.
2	CHECK SUM	Check Sum error	Contact your Studio technical support representative.
3	INVALID COMMAND	Try Write "ALL" register type	Cannot write "ALL" register type.
4	BIT WRITE	Try bit Write	Cannot write bits.
-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 configuration. See *Studio Technical Reference Manual* for information about valid RTS/CTS 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 configuration. See *Studio Technical Reference Manual* for information about 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 use the Remote LogWin of Studio (**Tools** → **Remote Logwin**) to get the log events from the target unit remotely.

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.

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**.
- **Studio version**: To find this information, select **Help** → **About.**

- **Driver Version**: To find this information, read the full description of the driver on the **Communication Drivers** Dialog Box.
- **Communication Log**: Displays in the Studio *Output* window (or *LogWin* window) when the driver is running. Be sure to enable the **Field Read Commands**, **Field Write Commands**, and **Serial Communication** for the LogWin window.
- **Device Model** and **Boards**: Consult the hardware manufacturer's documentation for this information.

Sample Application

You will find a sample application for drivers in the **/COMMUNICATION EXAMPLES/<*Driver Name*>** directory. We strongly recommend that you check if there is a sample application for this driver and use it to test the driver before configuring your own customized application, for the following reasons:

- To better understand the information provided in each 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.

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

Revision History

Doc. Revision	Driver Version	Author	Date	Description of changes
A	1.00	Fábio H.Y.Komura	Jun/23/2004	Initial version