YOF3 Communication Driver

Driver for Serial Communication with
Yokogawa Devices Using Serial Link or Ethernet

Contents

Introduction

The YOF3 driver enables communication between Studio and Yokogawa devices using the Yokogawa Host proprietary protocol. This document explains how to enable that communication.

The information in this document is organized as follows:

➢ **Introduction**: Provides an overview of the driver documentation.

➢ **General Information**: Identifies all the required components (hardware and software) you need to implement communication between Studio and the Yokogawa devices. This section also describes general characteristics of the communication.

➢ **Installing the Driver**: Explains the procedure for installing the software and hardware required to configure the communication.

➢ **Configuring the Driver**: Explains how to configure the communication driver, including different permutations and default values for the configuration.

➢ **Executing the Driver**: Explains how to test the driver to verify that you installed and configured it correctly.

➢ **Troubleshooting**: Lists the most common error codes for this protocol and provides the procedures to fix the errors.

➢ **Revision History**: Provides a log of all the modifications made to the driver and driver documentation.

☞ **Note**: This document assumes that you have read the "Driver Configuration" chapter in the *Studio Technical Reference Manual*.

General Information

This section identifies all the hardware and software components and characteristics used to implement communication between Studio and a Yokogawa device.

The information is organized into the following sections:

- Device Characteristics
- Link Characteristics
- Driver Characteristics

Device Characteristics

This driver has been tested with the following devices:

- **Manufacturer**: Yokogawa
- **Compatible Equipment**:
    – F3LC11, F3LC12, F3LE01, F3GB01
    – F3SP (05,21,25,28,35,38,53,58)
- **Yokogawa PLC programmer software**: WideField.

☞ **Note**: See "Conformance Testing" for information about the equipment used for the standard conformance tests of this driver.

Link Characteristics

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

- **Physical protocol**: Serial RS232 and Ethernet
- **Specific PC Board**: None

Driver Characteristics

The YOF3 driver is composed of the following files:

- **YOF3.INI**: Internal driver file (*Do not* modify this file.)
- **YOF3.MSG**: Internal driver file containing error messages for each error code. (*Do not* modify this file.)
- **YOF3.PDF**: Document providing detailed information about the driver.
- **YOF3.DLL**: Compiled library for the driver.

You can use the YOF3 driver on the following operating systems:

- Windows NT
- Windows XP
- Windows 7

✍ **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 YOF3.PDF document.

Conformance Testing

The following configuration parameters and equipment were used for the conformance testing:

- **Serial Configuration**:

    – PLC Program: WideField
    – 1-Serial Configuration:
    – Baud Rate: 9600
    – Data Bits: 8
    – Stop Bits: 1
    – Parity: Even
    – COM port: COM2

- **Ethernet Configuration**:

    – PLC Program: WideField
    – Port: 3001

- **Operating System (Development)**: Windows XP
- **Studio version**: 7.0
- **YOF3 Driver version**: 1.01

Installing the Driver

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

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

1. .Select **Insert → Driver** from the main menu bar to open the *Communication drivers* dialog (as shown in the following figure).
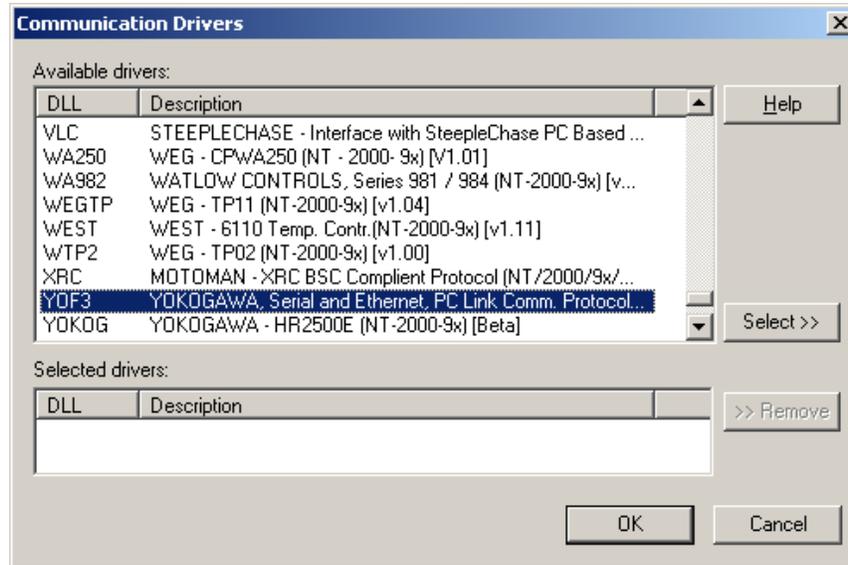
2. Select the YOF3 driver in the **Available Drivers** list, and then click the **Select** button.

3. When the **YOF3** driver displays in the **Selected Drivers** list, click the **OK** button to close the dialog.

It is not necessary to install any other software on your PC to enable communication between the host and the device. However, to download a custom program to the device, you must install one of the Yokogawa software programs (such as WideField). Consult your Yokogawa documentation for the installation procedure.

☞ **Note**: You must take special precautions when installing the physical hardware.
Refer to the hardware manufacturer's documentation for specific instructions.

Configuring the Driver

After installing and selecting the driver in Studio, you can configure the driver.
You configure a driver in two stages:

- **Set the communication parameters** (only one configuration for the entire driver)
- **Configure communication tables or Driver Worksheets** (define communication tags and configure communication control)

Setting Communication Parameters

When you specify 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 development environment, click the *Comm* tab located below the *Workspace* pane.
2. From the *Workspace* pane, expand the *Drivers* folder.
3. Right-click on the *YOF3* subfolder and when the pop-up menu displays, (as shown in the following figure) select the **Settings** option.
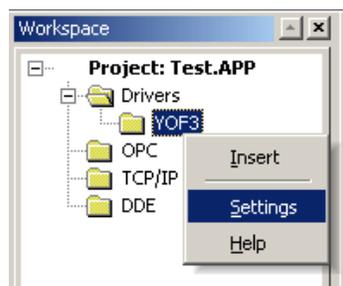
The *YOF3: Communication Parameters* dialog displays as follows:
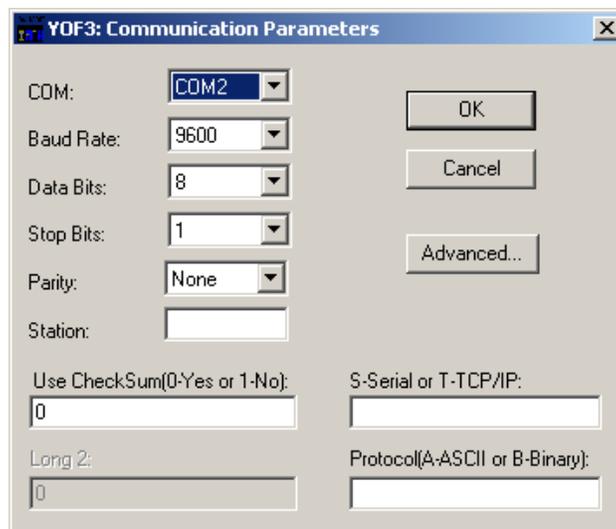
4. Configure the following parameters on the *YOF3: Communications Parameters* dialog:

Parameters	Default Values	Valid Values	Description
COM	COM2	COM1 to COM8	PC serial port used to communicate with the device
Baud Rate	9600	110 to 57600bps	Communication data rate
Data Bits	8	5 to 8	Number of data bits used in the protocol
Stop Bits	1	1or 2	Number of stop bits used in the protocol
Parity	None	even, odd, none, space or mark	Protocol parity
Station	0	0 to 31	Computer ID number
Checksum	0	0 or 1	▪ **0**: Use Checksum ▪ **1**: Do not use Checksum
Communication	-	S or T	▪ **S**: Use serial communication between Studio and the device ▪ **T**: Use Ethernet communication between Studio and the device
Protocol	-	A or B	▪ **A**: Bytes in ASCII format ▪ **B**: Bytes in Binary format

☞ **Note**: These communication parameters must be the same as those configured for the Yokogawa device.

5. Click the **Advanced** button in the *YOF3: Communication Parameters* dialog, to open the *Advanced settings* dialog.
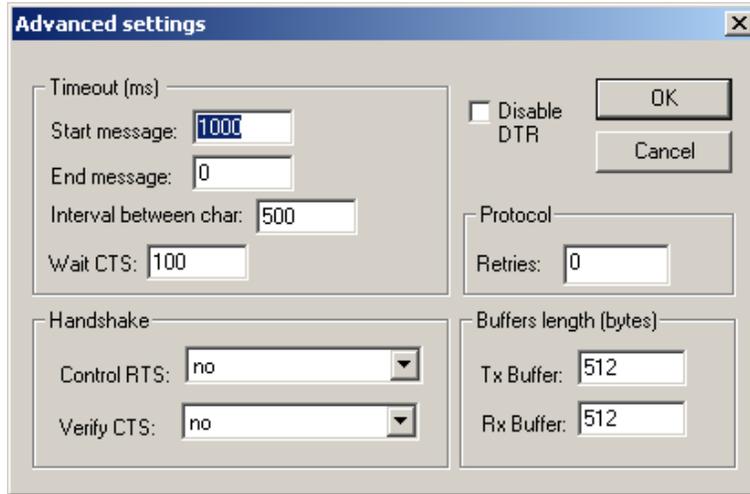
6. Select a value for the **Control RTS** field using the information in the following table:

Parameter	Default Value	Valid Values	Description
Control RTS	**no**	▪ **no** ▪ **yes** ▪ **yes + echo**	Define if the RTS (*Request to Send*) handshake signal is set before communication and if there is an echo in the communication.

> 🖎 **Important:**
> * Using the wrong settings for this field will prevent the driver from working and cause **Timeout** error messages.
> * Although you can configure other serial communication parameters from this dialog, ***do not*** change any of the default parameters at this time except **Control RTS**.
> * For additional information about parameters on the *Advanced settings* dialog, refer to the *Studio Technical Reference Manual*.

7. Click the **OK** button to close the dialog box.

Configuring a Driver Worksheet

You can configure multiple driver worksheets. Each worksheet contains a Header 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 *YOF3* subfolder.
3. When the pop-up menu displays (as shown in the following figure), select the **Insert** option.
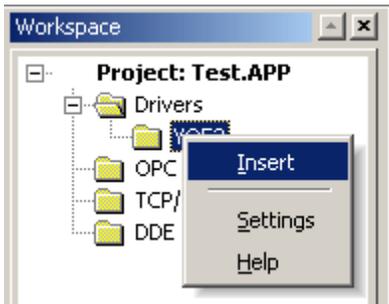
☞ **Note**: To optimize communication and ensure better system performance, you must associate the tags in different driver sheets to the events used to trigger the communication between each tag group and the periodicity for which each tag group must be written or read. Also, we recommend configuring communication addresses into sequential blocks.

The *<drivername>.drv* dialog box displays (similar to the following figure).
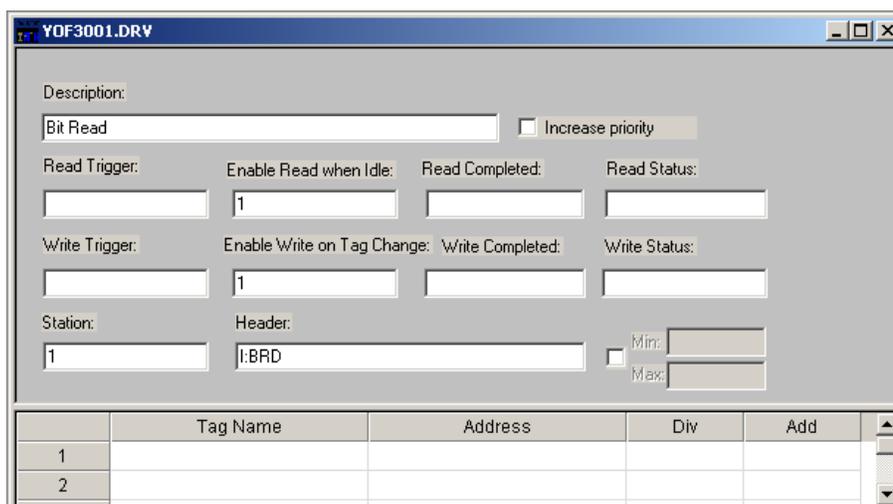
The fields on a Standard Driver Worksheet are standard for all communications drivers — except the **Station**, **Header**, and **Address** fields, which are driver-specific. Consequently, this document just explains how to configure the **Station**, **Header,** and **Address** fields.

For information about the configuring the standard fields review the *Studio Technical Reference Manual*.

Configuring the Station and Header Fields

The **Station** field specifies the IP address of the target device, and the **Header** field specifies the type(s) of commands will be sent to the device.

Parameter	Default Value	Valid Values	Description
Station	-		- For serial communication, specify the PLC Address (PLC ID). For example: 2. - For TCP/IP communication, specify: **<PLC IP>:<Communication Port>:<Station>** For example: 192.168.1.200:3001:1
Header	-	(See next table)	Specify the types of variables to be read to or written from the device and which commands will be used by the driver, using the following syntax: **<Data Type>:<Command>** After you edit the **Header** field, the system will verify the **Header's** validity.

☞ **Note**: You can type a Tag between curly brackets **{ }** into this field, but you must be certain that the Tag value is correct and uses the correct syntax, or an **Invalid Header** error will result.

Data Type	Syntax Example	Valid Address Ranges per Worksheet
Input Relays	X	256
Output Relays	Y	256
Internal Relays	I	256
Special Relays	M	256
Timer Relays	T	256
Data Registers	D	64
File Registers	B	64
Special Registers	Z	64
Shared Registers	R	64
Long Data Registers	L	32

Command	Syntax Example	Valid Address Range
Bit Read	BRD	256
Bit Write	BWR	256
Word Read	WRD	256
Word Write	WWR	256

☞ **Note**: The **Long Data Registers** value reads and writes two-word data in Data Registers.

Configuring the Address Field

You can use the body of a Standard Driver Worksheet to associate each tag to its respective device address. Type a tag from your application database into the **Tag Name** column to receive values from or send values to an address on the device.

The value you enter into the **Address** field in the Worksheet should be the number you want to reach in the device.

Header	Address	Device Address
I:BRD	1	I00001
D:WWR	1500	D01500
B:WRD	350	B00350
Y:BWR	220	Y00220

☞ **Notes**:

▪ Remember, you cannot specify a data bit range larger than 256 within the same Worksheet. For word data cases the maximum data bit range is 64, and for long data the maximum is 32.

▪ There are several ways to specify the same variable on the device because the variable value is defined by the sum of the *initial address reference* defined in the **Header** field, and the *offset* defined in the **Address** field.

Executing the Driver

After you add the YOF3 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.
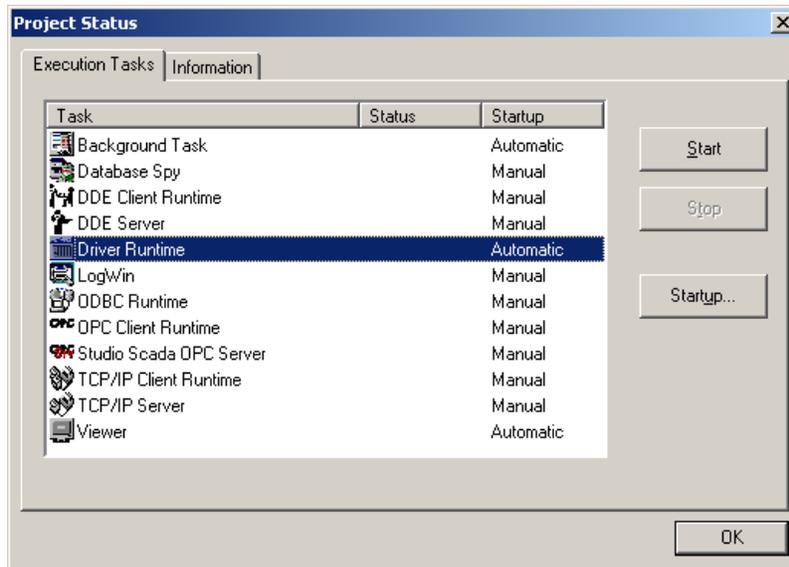
2. Verify that the **Driver Runtime** *Startup* task is set to **Automatic**.
    -   If the setting is correct, click **OK** to close the dialog box.
    -   If the **Driver runtime** task is not set to **Automatic**, select the **Driver Runtime** line and when the **Startup** button becomes active, click the button (a toggle) to set the *Startup* mode to **Automatic**.

3. Start the application to run the driver.

Troubleshooting

If the YOF3 driver fails to communicate with the device, the tag you configured for the **Read Status** or **Write Status** fields will receive an error code. You can use this error code to identify the type of failure that occurred.

The following table describes the error codes for this driver:

Error Code	Description	Possible Causes	Solving the Problem
0	OK	Communicating without problems	
1	Invalid Address	Typed an invalid address in the Driver Configuration Worksheet	Specify a valid address
2	Invalid Header	Typed an invalid header in the Driver Configuration Worksheet	Specify a valid header, with data type and command. *<Data Type>:<Command>*
3	Invalid Command	Typed a nonexistent command in Header field	Select **BRD**, **BWR**, **WRD**, or **WWR**
6	Setpoint Error	Specified start point exceeds the address range	Specify a start address within the device's limits
7	Data out of Range	Specified bit (or word) count exceeds the specification range	Specify a start address within the device's limits
9	Communication Error	▪ Disconnected cables ▪ PLC stopped, turned off, or is in error state ▪ Wrong RTS/CTS configuration settings	▪ Verify that all cables are connected. ▪ Verify that the device is not in fail state. ▪ Verify that there is no interference.
10	Timeout Receiving Char	▪ Disconnected cables ▪ PLC stopped, turned off, or is in error state ▪ Wrong RTS/CTS configuration settings	▪ Verify that the device is turned on. ▪ Verify that there is no interference. ▪ Check the cable wiring ▪ Verify the Station number
11	Timeout	▪ Disconnected cables ▪ PLC stopped, turned off, or is in error state ▪ Wrong RTS/CTS configuration settings	▪ Verify that the device is turned on. ▪ Verify that there is no interference. ▪ Check the cable wiring ▪ Verify the Station number
12	Invalid Communication	Typed wrong value in Communication Settings	Specify **S** for Serial or **T** for TCP/IP
15	Invalid Command	Typed wrong value in	Specify **A** for ASCII or **B** for Binary

	Type	Communication Settings	
16	Connect Error	- Disconnected cables - PLC stopped - Wrong RTS/CTS configuration settings	- Check the cable wiring - Check the entire driver and PLC configuration. - Check for an invalid IP or station
17	Invalid Station	Typed wrong station in the Driver Communication worksheet	- Specify a valid station - For serial cases: Type the PLC Station number only. - For TCP/IP cases: Type the `<PLC IP>:<Port>:<Station>`
18	Can't Write	Impossible to WRITE with specified command	Use this command for READ only

☞ **Note**: You can verify communication results from the *Output* window of the Studio development environment. To configure an event log of Field Read commands, Field Write commands, and serial communications right-click on the *Output* window, select the **Setting** option from the pop-up menu, and select these log events. When testing for a Windows CE target, you can enable an event log from the CE unit (**Tools → Logwin**) and verify the `celog.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 first. Frequently, communication problems are due to a hardware or cable problem, or because you have an error or lack of configuration at the PLC. When the communication between the PLC Programming Software and the PLC is working, you can test the supervisory again.

When you are ready to test communication with Studio, you should first use the application sample provided, instead of using the new application you are creating.

If you must contact technical support, please have the following information available:

- **Operating system** (type and version): Select **Tools → System Information** from the main menu bar.
- **Project information**: Select Project → **Status** from the main menu bar.
- **Driver version and communication log**: Displays in the Studio *Output* window when you run the driver.
- **Device model and boards**: Refer to hardware manufacturer's documentation.

Revision History

Version	By	Date	Description of Changes
1.00	Rafael Tavares	02-October-2002	Initial version
1.00	Andre Bastos	31-March-2010	Changes in the documentation only. No modifications in the driver
1.01	Paulo Balbino	30-June-2011	Implemented Header validation
1.2	Eduardo Castro	28-November-2016	Adjustment in INI configuration file