

WA982 Communication Driver

Driver for Serial Communication
with Watlow Controls Devices Series 981-984

Contents

INTRODUCTION2

GENERAL INFORMATION.....3

 DEVICE SPECIFICATIONS.....3

 NETWORK SPECIFICATIONS.....3

 DRIVER CHARACTERISTICS3

SELECTING THE DRIVER4

GENERAL INFORMATION.....5

CONFIGURING THE DRIVER5

 CONFIGURING THE COMMUNICATION SETTINGS5

 CONFIGURING THE DRIVER WORKSHEETS9

EXECUTING THE DRIVER 11

TROUBLESHOOTING 12

REVISION HISTORY..... 14

Introduction

The WA982 driver enables communication between the Studio system and some Watlow Controls devices (981-984 Series), according to the specifications discussed in this document.

This document will help you to select, configure and execute the WA982 driver, and it is organized as follows:

- **Introduction:** This section, which provides an overview of the document.
- **General Information:** Identifies all of the hardware and software components required to implement communication between the Studio system and the target device.
- **Selecting the Driver:** Explains how to select the WA982 driver in the Studio system.
- **Configuring the Device:** Describes how the target device must be configured to receive communication from the WA982 driver.
- **Configuring the Driver:** Explains how to configure the WA982 driver in the Studio system, including how to associate database tags with device commands.
- **Executing the Driver:** Explains how to execute the WA982 driver during application runtime.
- **Troubleshooting:** Lists the most common errors for this driver, their probable causes, and basic procedures to resolve them.
- **Revision History:** Provides a log of all changes made to the driver and this documentation.

Notes:

- This document assumes that you have read the “Development Environment” chapter in Studio’s *Technical Reference Manual*.
- This document also assumes that you are familiar with the Microsoft Windows NT/2000/XP environment. If you are not familiar with Windows, then we suggest using the **Help** feature (available from the Windows desktop **Start** menu) as you work through this guide.

General Information

This chapter identifies all of the hardware and software components required to implement serial communication between the WA982 driver in Studio and a target Watlow Controls device.

The information is organized into the following sections:

- Device Specifications
- Network Specifications
- Driver Characteristics
- Conformance Testing

Device Specifications

To establish communication, your target device must meet the following specifications:

- **Manufacturer:** Watlow Controls
- **Compatible Equipment:** 981-984 Series

Network Specifications

To establish communication, your device network must meet the following specifications:

- **Physical Protocol:** Serial

Driver Characteristics

The WA982 driver package consists of the following files, which are automatically installed in the `\DRV` subdirectory of Studio:

- **WA982.INI:** Internal driver file. *You must not modify this file.*
- **WA982.MSG:** Internal driver file containing error messages for each error code. *You must not modify this file.*
- **WA982.PDF:** This document, which provides detailed information about the WA982 driver.
- **WA982.DLL:** Compiled driver.

 **Note:**

You must use Adobe Acrobat® Reader™ to view the **WA982.PDF** document. You can install Acrobat Reader from the Studio installation CD, or you can download it from Adobe's Web site.

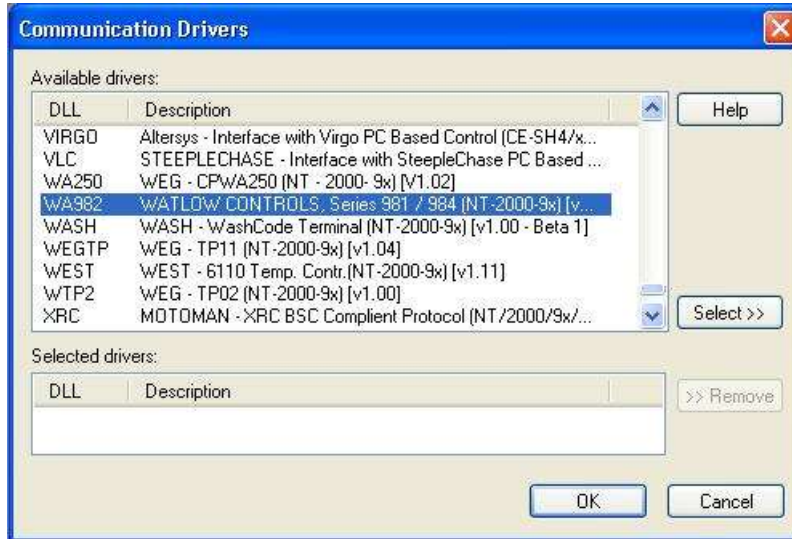
You can use the WA982 driver on the following operating systems:

- Windows NT/2000/XP
- Windows CE

Selecting the Driver

When you install Studio, all of the communication drivers are automatically installed in the \DRV subdirectory but they remain dormant until manually selected for specific applications. To select the WA982 driver for your Studio application:

1. From the main menu bar, select **Insert** → **Driver** to open the *Communication Drivers* dialog.
2. Select the **WA982** driver from the *Available Drivers* list, and then click the **Select** button.



Communication Drivers Dialog

3. When the **WA982** driver is displayed in the **Selected Drivers** list, click the **OK** button to close the dialog. The driver is added to the *Drivers* folder, in the *Comm* tab of the Workspace.

Note:

It is not necessary to install any other software on your computer to enable communication between Studio and your target device. However, this communication can only be used by the Studio application; it cannot be used to download control logic to the device. For more information, please consult the documentation provided by the device manufacturer.

Attention:

For safety reasons, you must take special precautions when installing any physical hardware. Please consult the manufacturer's documentation for specific instructions.

General Information

Consult your Watlow Controls documentation for information about configuring your device.

Configuring the Driver

Once you have selected the WA982 driver in Studio, you must properly configure it to communicate with your target device. First, you must set the driver's communication settings to match the parameters set on the device. Then, you must build driver worksheets to associate database tags in your Studio application with the appropriate addresses (registers) on the device.

Configuring the Communication Settings

The communication settings are described in detail in the "Communication" chapter of the Studio *Technical Reference Manual*, and the same general procedures are used for all drivers. Please review those procedures before continuing.

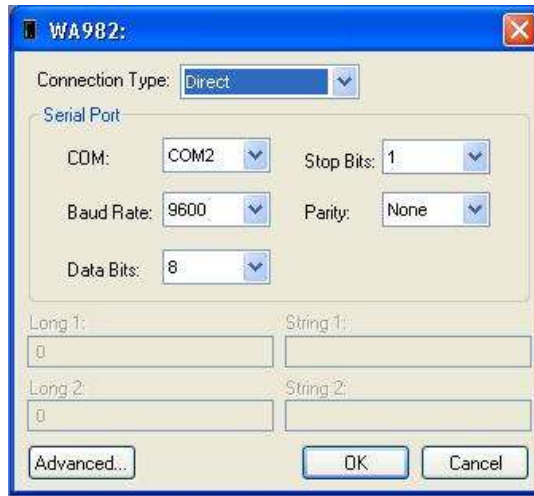
For the purposes of this document, only WA982 driver-specific settings and procedures will be discussed here. To configure the communication settings for the WA982 driver:

1. In the *Workspace* pane, select the *Comm* tab and then expand the *Drivers* folder. The WA982 driver is listed here as a subfolder.
2. Right-click on the WA982 subfolder and then select the **Settings** option from the pop-up menu:



Select Settings from the Pop-Up Menu

The WA982: Communication Settings dialog is displayed:



WA982: Communication Settings Dialog

3. In the *Communication Settings* dialog, configure the driver settings to enable communication with your target device. To ensure error-free communication, the driver settings must *exactly match* the corresponding settings on the device. Please consult the manufacturer’s documentation for instructions how to configure the device and for complete descriptions of the settings.

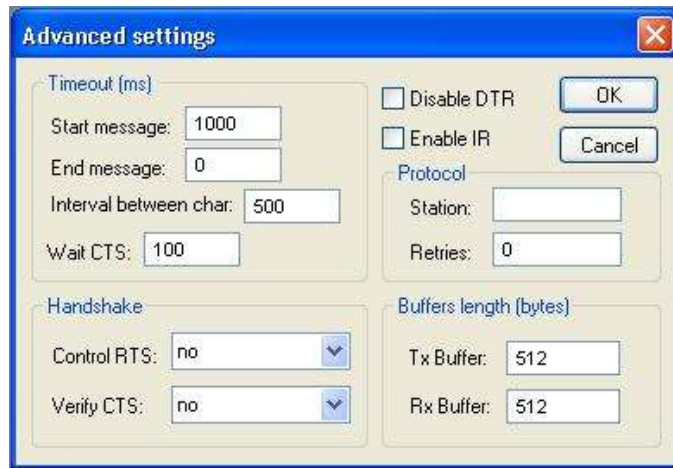
Depending on your circumstances, you may need to configure the driver *before* you have configured your target device. If this is the case, then take note of the driver settings and have them ready when you later configure the device.

➤ Attention:
 For safety reasons, you **must** take special precautions when connecting and configuring new equipment. Please consult the manufacturer’s documentation for specific instructions.

The communication settings and their possible values are described in the following table:

Parameters	Default Values	Recommended Values	Description
COM	COM2	COM2	Serial port of the PC used to communication with the device.
Baud Rate	9600	9600	Communication rate of data.
Data Bits	8	8 or 7	Number of data bits used in the protocol.
Stop Bits	1	1	Number of stop bits used in the protocol.
Parity	None	Even, None or Odd	Parity of the protocol.

4. If you are using a Data Communication Equipment (DCE) converter (e.g., 232/485) between your PC and your target device, then you must also adjust the **Control RTS** (Request to Send) setting to account for the converter. In the *Communication Settings* dialog, click the **Advanced** button to open the *Advanced Settings* dialog:



Advanced Settings Dialog

When the dialog is displayed, configure the **Control RTS** setting using the following information:

Setting	Default	Values	Description
Control RTS	no	no	Do not set the RTS (Request to Send) handshake signal. IMPORTANT: If you are using Windows 95/98 or Windows CE with the correct RS232/RS485 adapter (i.e. without RTS control), then you must select this option.
		yes	Set the RTS (Request to Send) handshake signal before communication. IMPORTANT: If you are using Windows NT and the Cutler-Hammer RS232/RS485 adapter, then you must select this option.
		yes+echo	Set the RTS (Request to Send) handshake signal before communication, and echo the signal received from the target device.

Attention:
If you incorrectly configure the **Control RTS** setting, then runtime communication will fail and the driver will generate a –15 error. See “Troubleshooting” for more information.

You do not need to change any other advanced settings at this time. You can consult the *Studio Technical Reference Manual* later for more information about configuring these settings.

5. Click **OK** to close the *Advanced Settings* dialog, and then click **OK** to close the *Communication Settings* dialog.

Configuring the Driver Worksheets

A selected driver includes one or more driver worksheets, which are used to associate database tags in Studio with registers on the target device. Each worksheet is triggered by specific application behavior, so that the tags / registers defined on that worksheet are scanned only when necessary – that is, only when the application is doing something that requires reading from or writing to those specific tags / registers. Doing this optimizes communication and improves system performance.

To insert a new driver worksheet:

1. In the *Comm* tab, open the *Drivers* folder and locate the *WA982* subfolder.
2. Right-click on the *WA982* subfolder, and then select **Insert** from the pop-up menu:



Inserting a New Worksheet

A new WA982 driver worksheet is inserted into the *WA982* subfolder, and the worksheet is opened for configuration:

 A screenshot of the 'WA982001.DRV' configuration dialog. The dialog is divided into two main sections: 'Header' and 'Body'.

Header Section:

- Description: [Text Field] Increase priority
- Read Trigger: [Text Field] Enable Read when Idle: [Text Field] Read Completed: [Text Field] Read Status: [Text Field]
- Write Trigger: [Text Field] Enable Write on Tag Change: [Text Field] Write Completed: [Text Field] Write Status: [Text Field]
- Station: [Text Field] Header: [Text Field] Min: [Text Field] Max: [Text Field]

Body Section:

	Tag Name	Address	Div	Add
*	[Text Field]			
*				
*				
*				
*				

WA982 Driver Worksheet

Note: Worksheets are numbered by default in order of creation, so the first worksheet is **WA982001.drv**.

That numeration may be changed by the user.

Most of the fields on this worksheet are standard for all drivers; see the “Communication” chapter of the *Technical Reference Manual* for more information on configuring these fields. However, the **Station**, **Header**, and **Address** fields use syntax that is specific to the WA982 driver.

3. Configure the **Station** and **Header** fields as follows:

- **Station** field: This field contains the remote station number (0 to 31).

You can also specify an indirect tag (e.g. {station}), but the tag that is referenced must follow the same syntax and contain a valid value.

- **Header** field: This field is not used.

4. The **Address** field contains the command to be executed in the device.

The following table contains some of the commands to be used in the **Address** field:

Sample of Commands to be used in the “Address” parameter		
Command	Command Name	Comment
IN1	Input 1	Select sensor type for input 1. This selection must match the sensor type connected to terminals 8, 9 and 10.
IN2	Input 2	Select sensor type for input 2. This selection must match the sensor type connected to terminals 18, 19 and 20.
CF	Celsius-Fahrenheit	Select which temperature scale the controller will use.
DE1	Output 1 Derivative	Tune the derivative to eliminate overshoot on startup or after the set point changes.
DE2	Output 2 Derivative	Tune the derivative to eliminate overshoot on startup or after the set point changes.
IT1	Output 1 Integral	Tune the control action to eliminate the offset or droop between the set point and the actual process value for PID output 1.
IT2	Output 2 Integral	Tune the control action to eliminate the offset or droop between the set point and the actual process value for PID output 2.
PB1	Output 1 Proportional Band	Select the proportional band for PID output 1.
PB2	Output 2 Proportional Band	Select the proportional band for PID output 2.
RA1	Output 1 Rate	Tune the rate to eliminate overshoot on startup or after the set point changes.
RA2	Output 2 Rate	Tune the rate to eliminate overshoot on startup or after the set point changes.
RE1	Output 1 Reset	Tune the control action to eliminate the offset or droop between the set point and the actual process value for PID output 1.
RE2	Output 2 Reset	Tune the control action to eliminate the offset or droop between the set point and the actual process value for PID output 2.
CT1	Output 1 Cycle Time	Select the time, in seconds, of a complete on/off cycle.
CT2	Output 2 Cycle Time	Select the time, in seconds, of a complete on/off cycle.
HUNT	Hunt	Set the deadband, as a percentage of output, to keep the valve from hunting.

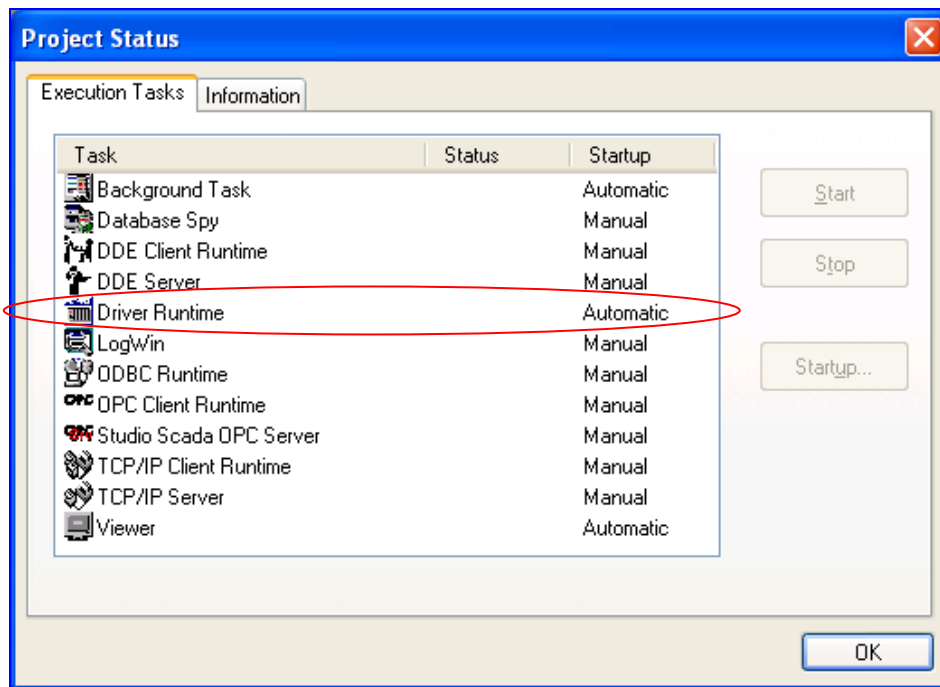
For more information about commands and addressing, please consult the manufacturer’s documentation.

Executing the Driver

By default, Studio will automatically execute your selected communication driver(s) during application runtime. However, you may verify your application's runtime execution settings by checking the *Project Status* dialog.

To verify that the communication driver(s) will execute correctly:

1. From the main menu bar, select **Project** → **Status**. The *Project Status* dialog displays:



Project Status Dialog

2. Verify that the *Driver Runtime* task is set to **Automatic**.
 - If the setting is correct, then proceed to step 3 below.
 - If the **Driver Runtime** task is set to **Manual**, then select the task and click the **Startup** button to toggle the task's *Startup* mode to **Automatic**.
3. Click **OK** to close the *Project Status* dialog.
4. Start the application to run the driver.

Troubleshooting

If the WA982 driver fails to communicate with the target device, then the database tag(s) that you configured for the **Read Status** or **Write Status** fields of the Main Driver Sheet 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	<ul style="list-style-type: none"> Communication without problems 	<ul style="list-style-type: none"> None
1	ERROR ESTABLISHING COMMUNICATION LINK	<ul style="list-style-type: none"> Disconnected cables PLC turned off, or in Stop or error mode Wrong Station number 	<ul style="list-style-type: none"> Check the cable wiring Check the PLC state (it must be RUN) Check the station number.
2	READ ERROR	<ul style="list-style-type: none"> The device sent a invalid message 	<ul style="list-style-type: none"> Check if the registry and address configured exist into the PLC.
-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. Review the Communication Parameters section for valid RTS/CTS configurations.
-17	Timeout between rx characters.	<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 configuration. Review the Communication Parameters section for valid RTS/CTS configurations.

⇒ Tip:

You can monitor communication status by establishing an event log in Studio's *Output* window (*LogWin* module). To establish a log for **Field Read Commands**, **Field Write Commands** and **Serial Communication**, right-click in the *Output* window and select the desired options from the pop-up menu.

You can also use the *LogWin* module (**Tools** → **LogWin**) to establish an event log on a remote unit that runs Windows CE. The log is saved on the unit in the `ce1og.txt` file, which can be downloaded later.

If you are unable to establish communication between Studio and the target device, then try instead to establish communication using the device's own programming software. Quite often, communication is interrupted by a hardware or cable problem or by a device configuration error. If you can successfully communicate using the programming software, then recheck the driver's communication settings in Studio.

To test communication between Studio and the device, 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**.
- **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	1.01	Luis F. M. Rodas	26-May-1998	Fixed bug with command STP.
B	1.02	Luis F. M. Rodas	28-May-1998	Fixed bug with command STP when send decimal values.
C	1.03	Luis F. M. Rodas	01-Jun-1998	Fixed bug with command STP when send negatives values.
D	1.04	Plínio M. Santana	15-Dec-2006	Made modifications to match with UNICODE requirements.
E	2.00.1-Beta	Plínio M. Santana	09-Jan-2007	Document corrections.
F	2.00	André Körbes	23-Sep-2010	Fixed document version.