

**MEMP Communication Driver**

Driver for Serial Communication  
with Cemig Devices

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## Introduction

The MEMP driver enables serial communication between the Studio system and remote devices using the MEMPs protocol, according to the specifications discussed in this document.

This document will help you to select, configure and execute the MEMP 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 MEMP driver in the Studio system.
- **Configuring the Device:** Describes how the target device must be configured to receive communication from the MEMP driver.
- **Configuring the Driver:** Explains how to configure the MEMP driver in the Studio system, including how to associate database tags with device registers.
- **Executing the Driver:** Explains how to execute the MEMP driver during application runtime.
- **Troubleshooting:** Lists the most common errors for this driver, their probable causes, and basic procedures to resolve them.
- **Sample Application:** Explains how to use a sample application to test the MEMP driver configuration
- **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 MEMP driver in Studio and remote devices using the MEMPs protocol.

The information is organized into the following sections:

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

### Device Specifications

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

- **Manufacturer:** CEMIG
- **Device Runtime Software:** None

### Network Specifications

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

- **Device Communication Port:** Serial COM Port
- **Device Runtime Software:** None
- **Specific PC Board:** None

### Driver Characteristics

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

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

 **Note:**

You must use Adobe Acrobat® Reader™ to view the **MEMP.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 MEMP driver on the following operating systems:

- Windows NT/2000/XP

## **Conformance Testing**

The following hardware/software was used for conformance testing:

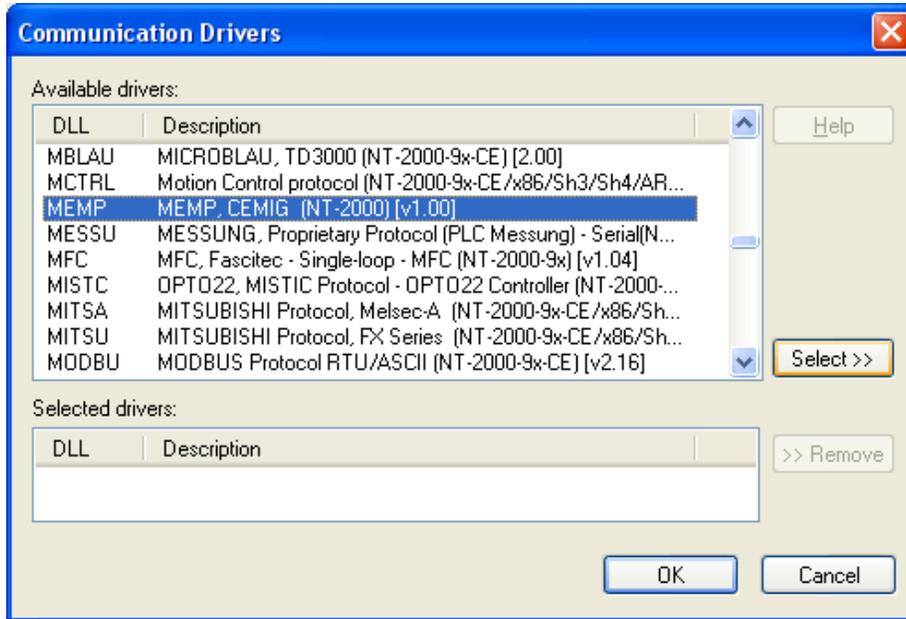
- **Configuration:**
  - **MEMPs Port:** 1
  - **Baud Rate:** 9600
  - **Protocol:** RTU
  - **Data Bits:** 8
  - **Stop Bits:** 1
  - **Com Port:** COM1

| Driver Version | Studio Version | Operating System (development) | Operating System (target) |
|----------------|----------------|--------------------------------|---------------------------|
| 2.21           | 6.1            | Windows XP                     | Windows XP                |

## 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 MEMP driver for your Studio application:

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



*Communication Drivers Dialog*

3. When the **MEMP** 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.

**Attention:**

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

## Configuring the Device

Because there are several brands of equipment that use the MEMPs protocol, it is impossible to define a standard device configuration. Therefore, we suggest using the following default configuration:

- **Protocol:** RTU
- **Baud Rate:** 9600
- **Data Bits:** 8
- **Stop Bits:** 1
- **Parity:** None

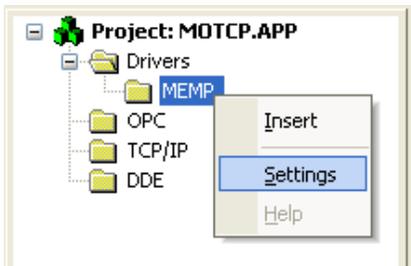
## Configuring the Driver

Once you have selected the MEMP 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.

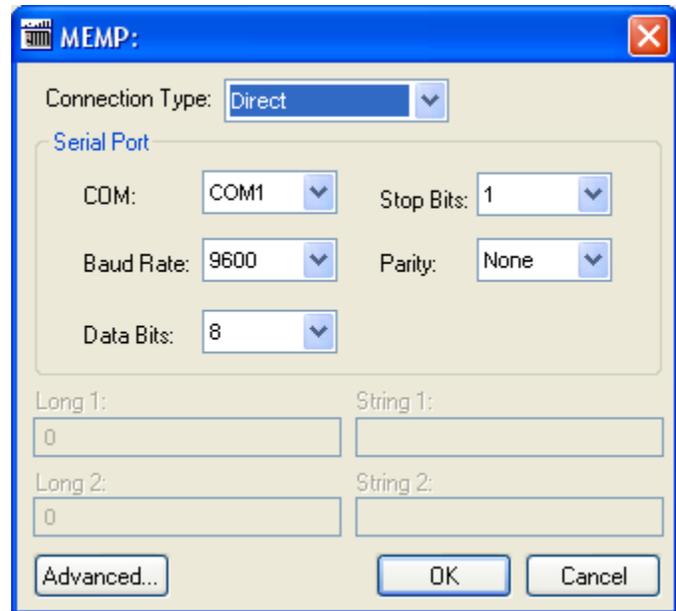
### Configuring the Communication Settings

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 MEMP driver-specific settings and procedures will be discussed here. To configure the communication settings for the MEMP driver:

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

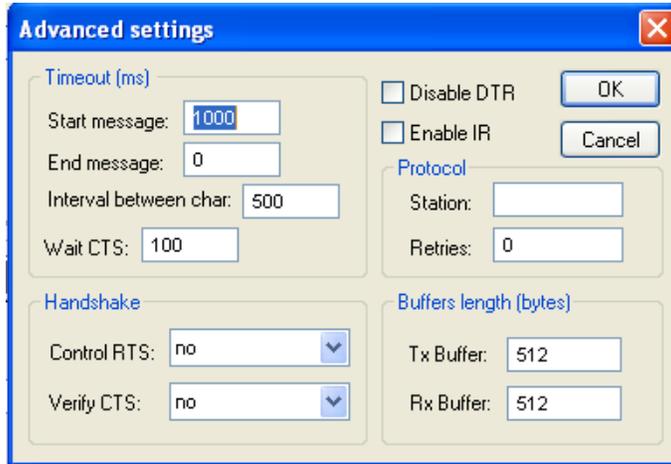


Select Settings from the Pop-Up Menu



MEMP: Communication Parameters Dialog

- Verify the *Serial Port* settings, and change them if necessary.
- 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  |
|--------------------|---------|----------|--|
| <b>Control RTS</b> | no      | no       | Do not set the RTS (Request to Send) handshake signal. <b>IMPORTANT:</b> 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. <b>IMPORTANT:</b> 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.

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

## Configuring the Driver Worksheets

Each selected driver includes a Main Driver Sheet and one or more Standard Driver Worksheets. The Main Driver Sheet is used to define tag/register associations and driver parameters that are in effect at all times, regardless of application behavior. In contrast, Standard Driver Worksheets can be inserted to define additional tag/register associations that are triggered by specific application behaviors.

The configuration of these worksheets is 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 MEMP driver-specific parameters and procedures are discussed here.

### MAIN DRIVER SHEET

The MEMP driver only uses Standard Driver Sheet for a while.

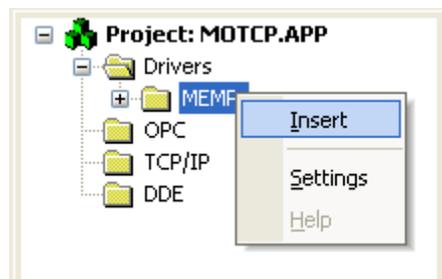
### STANDARD DRIVER WORKSHEET

When you select the MEMP driver and add it to your application, it has only a Main Driver Sheet by default (see previous section). However, you may insert additional Standard Driver Worksheets to define tag/register associations that are triggered by specific application behaviors. Doing this will optimize communication and improve system performance by ensuring that tags/registers are scanned only when necessary – that is, only when the application is performing an action that requires reading or writing to those specific tags/registers.

**Note:**  
We recommend configuring device registers in sequential blocks in order to maximize performance.

To insert a new Standard Driver Worksheet:

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



**Inserting a New Worksheet**

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

**MEMP001.DRV**

Description:   Increase priority

Read Trigger:  Enable Read when Idle:  Read Completed:  Read Status:

Write Trigger:  Enable Write on Tag Change:  Write Completed:  Write Status:

Station:  Header:   Min:   
 Max:

|   | Tag Name | Address | Div | Add |
|---|----------|---------|-----|-----|
| * |          |         |     |     |
| * |          |         |     |     |
| * |          |         |     |     |

**MEMP Driver Worksheet**

**Note:**  
 Worksheets are numbered in order of creation, so the first worksheet is **MEMP001.drv**.

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 **Header** field uses syntax that is specific to the MEMP driver.

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

**Header** field: The only value accepted by the header field is “MEMP”.

4. **Address** field:

The Address field doesn’t need any configuration. Each tag has the following meanings:

| Tag Position | Meaning                          |
|--------------|----------------------------------|
| First Tag    | Number of seconds                |
| Second Tag   | Tax indicator                    |
| Third Tag    | Reactive gap indicator           |
| Fourth Tag   | Calculation of capacitive energy |
| Fifth Tag    | Calculation of reactive energy   |
| Sixth Tag    | Second (hour – annual).          |
| Seventh Tag  | Kind of tax                      |
| Eighth Tag   | Tax of reactive ones actuated    |
| Ninth Tag    | Active energy                    |
| Tenth Tag    | Reactive energy                  |

First Tag – Number of seconds.

Second Tag – Tax indicator.

Third Tag – Reactive gap indicator.

Fourth Tag – Calculation of capacitive energy.

Fifth Tag – Calculation of reactive energy.

Sixth Tag – Second (hour – annual).

Seventh Tag – Kind of tax.

Eighth Tag – Tax of reactive ones actuated.

Ninth Tag – Active energy.

Tenth Tag – Reactive energy.



**Note:**

You should create the maximum of 10 tags in each Worksheet to receive the data from the CEMIG device.

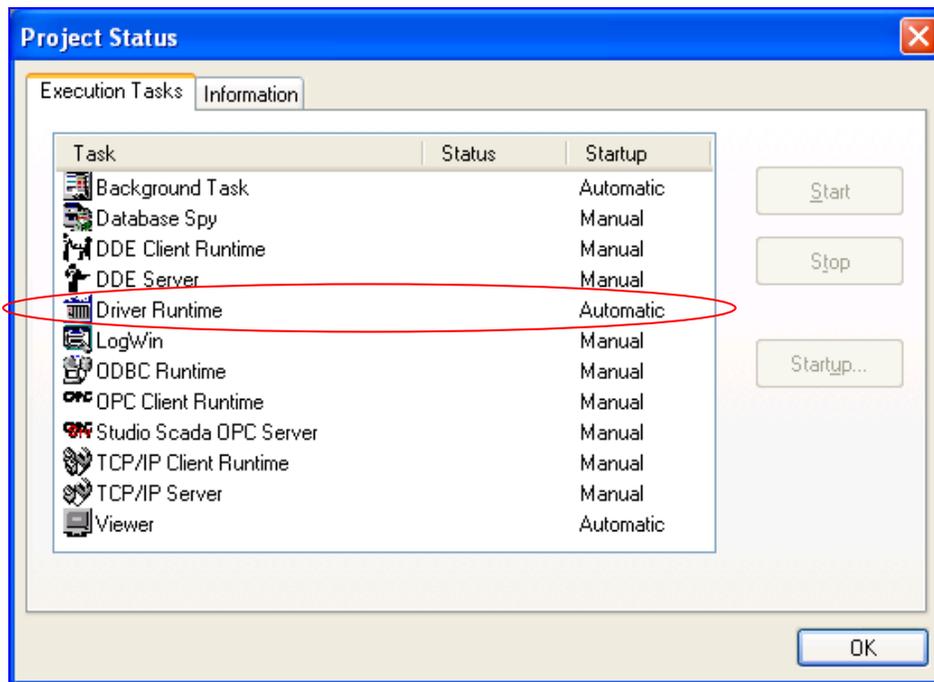
For more information about the device registers and addressing, please consult the manufacturer's documentation.

## 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 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

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   |
| 2          | Invalid Header                 | Invalid header typed in Driver worksheet                                      | Type MEMP in the header field.  |
| 3          | Invalid Address field          | Invalid Address   | <ul style="list-style-type: none"> <li>▪ Check the initial address in the <i>Driver</i> worksheet.</li> <li>▪ Check the Holding register in the <i>Driver</i> worksheet with bit configuration. This parameter cannot execute write triggers—it executes “Write on Tag Change” only.</li> <li>▪ Retype the address in the <i>Driver</i> worksheet.</li> </ul> |
| 4          | Invalid Block size             | Offset is greater than the maximum allowed. The maximum offset is usually 64. | Specify a valid offset or create a new <i>Driver</i> worksheet.   |
| 5          | Protocol Error                 | The driver is not following the protocol standards.                           | Check the protocol documentation and the buffers sent to the devices.   |
| 6          | Checksum Error                 | The driver is receiving buffers with wrong sizes.                             | Check the protocol documentation and the buffers received from the devices.   |
| 7          | Answer Error                   | The driver is receiving buffers with wrong sizes.                             | Check the protocol documentation and the buffers sent and received from the devices.  |
| 8          | Maximum Line on Address Field. | Maximum lines available in TAG NAME for communication sheet                   | Create another sheet and reduce the tags amount from the current sheet.   |

⇒ **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.

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.

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.

## Sample Application

A sample application that employs the MEMP driver is provided on the Studio installation CD. We strongly recommend that you use this sample application to test the driver *before* you develop your own applications, for the following reasons:

- To better understand the information and instructions provided in this document;
- To verify that your driver configuration is working satisfactorily with the target device; and
- To ensure that the all of hardware used in the test (i.e. the device, adapter, cable, and PC) is functioning safely and correctly.

 **Note:**

The following instructions assume that you are familiar with developing project applications in Studio. If you are not, then please review the relevant chapters of the Studio *Technical Reference Manual* before proceeding.

To use the sample application:

1. Configure the device's communication settings according to the manufacturer's documentation.
2. Run Studio.
3. From the main menu bar, select **File → Open Project**.
4. Insert the Studio installation CD and browse it to find the sample application. It should be located in the directory `\COMMUNICATION EXAMPLES\MEMP`.
5. Select and open the sample application.
6. Configure and test the driver, as described in the rest of this document.

When you have thoroughly tested the driver with your target device, you may proceed with developing your own Studio application projects.

 **Tip:**

You can use the sample application screen as the maintenance screen for your own applications.

## Revision History

| Doc. Revision | Driver Version | Author            | Date        | Description of Changes          |
|---------------|----------------|-------------------|-------------|---------------------------------|
| A             | 1.00           | Plinio M. Santana | Oct/03/2007 | Document created.               |
| B             | 1.00           | Plinio M. Santana | Oct/08/2007 | Table of tags meaning included. |