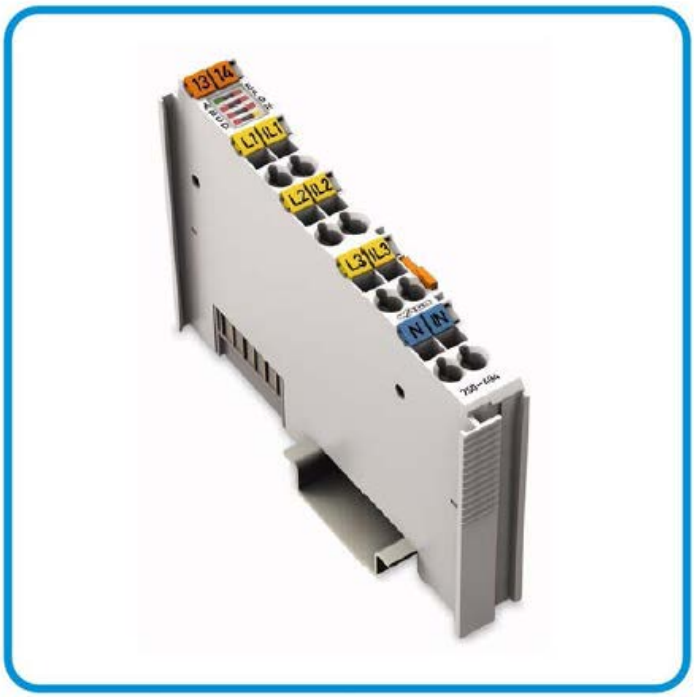
Application Note

AUTOMATION



# WAGO-I/O-SYSTEM 750

## 3-Phase Power Measurement Module

# 750-494

Version: 24.01.2014

WAGO®
INNOVATIVE CONNECTIONS

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Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

We wish to point out that the software and hardware terms, as well as the trademarks of companies used and/or mentioned in the present manual are generally protected by trademark or patent.

# Table of Contents

# 1 Important Notes

To ensure fast installation and start-up of the units, we strongly recommend that the following information and explanations are carefully read and adhered to.

## 1.1 Legal Principles

### 1.1.1 Subject to Change

WAGO Kontakttechnik GmbH & Co. KG reserves the right to make any alterations or modifications that serve to increase the efficiency of technical progress. WAGO Kontakttechnik GmbH & Co. KG owns all rights arising from the granting of patents or from the legal protection of utility patents. Third-party products are always mentioned without any reference to patent rights. Thus, the existence of such rights cannot be excluded.

### 1.1.2 Copyright



### 1.1.3 Personnel Qualification

The use of the product described in this document is exclusively geared to specialists having qualifications in PLC programming, electrical specialists or persons instructed by electrical specialists who are also familiar with the appropriate current standards. WAGO Kontakttechnik GmbH & Co. KG assumes no liability resulting from improper action and damage to WAGO products and third-party products due to non-observance of the information contained in this document.

### 1.1.4 Intended Use

For each individual application, the components are supplied from the factory with a dedicated hardware and software configuration. Modifications are only admitted within the framework of the possibilities documented in this document. All other changes to the hardware and/or software and the non-conforming use of the components entail the exclusion of liability on part of WAGO Kontakttechnik GmbH & Co. KG.

Please send your requests for modified and new hardware or software configurations directly to WAGO Kontakttechnik GmbH & Co. KG.

## 1.2 Scope of Applicability

This application note is based on the stated hardware and software from the specific manufacturer, as well as the associated documentation. This application note is therefore only valid for the described installation.
New hardware and software versions may need to be handled differently.

Please note the detailed description in the specific manuals.

## 1.3 Symbols

| | |
|---|---|
| **Attention**  | **Attention!**<br>Boundary conditions that must always be observed to ensure smooth operation. |
| **Note**  | **Important note!**<br>Routines or advice for efficient use of a device and software optimization. |
| **Information**  | **Additional information**<br>Refers to additional information which is not an integral part of this documentation (e.g., the Internet). |

# 2 Description

The aim is to show how the 3-Phase Power Measurement Module 750-494 of the WAGO-I/O-SYSTEM can be used to record power measurements. In addition, it will be shown how the power measurement module can be configured and how the current status of the measurement module is determined.

# 3 Components

## 3.1 Required Libraries

- **Table 1: Required libraries**

| Library | Description |
|---|---|
| PowerMeasurement_494_02.lib | Library for the 3-Phase Power Measurement Module 750-494 |

## 3.2 Hardware and Software

- **Table 2: Components**

| Supplier | Qty. | Description | Item No. |
|---|---|---|---|
| WAGO | 1 | PLC – Programmable Fieldbus Controller | 750-880 |
| WAGO | 1 | 3-Phase Power Measurement Module | 750-494 |
| WAGO | 1 | End module | 750-600 |
| WAGO | 1 | WAGO-I/O-PRO V2.3 | 759-333 |

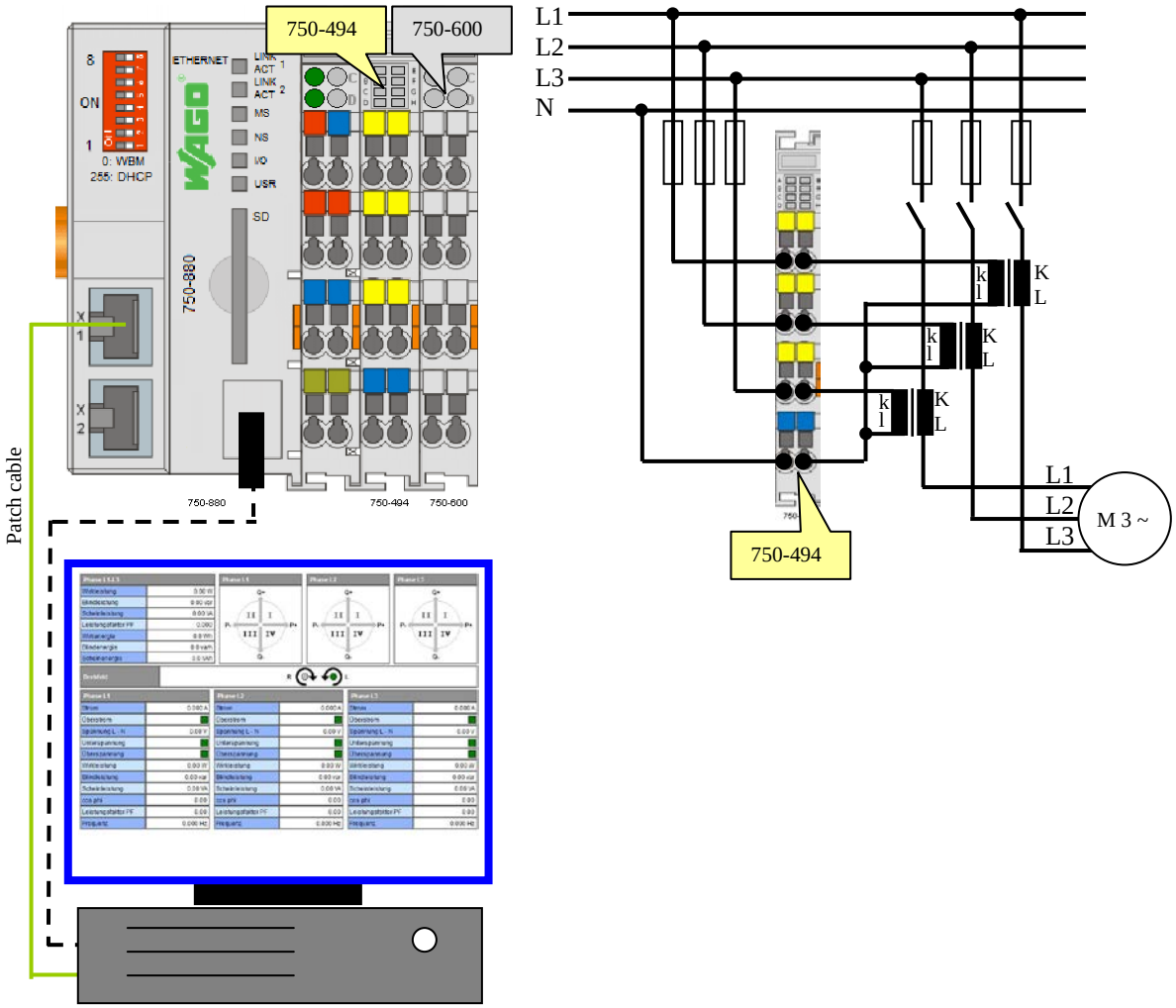
**Note**

**Node Configuration**
The node structure described is only an example as to how the measured values of the 3-Phase Power Measurement Module can be read out. The modules may be exchanged as required by the respective application.

**Information**

**Additional information**
The library and documentation used are available at www.wago.com/Service/Downloads.

# 4 Setup




- Figure1: Connecting plan WAGO-IO-SYSTEM / WAGO-I/O-PRO V2.3

# 5 Sample Program

## 5.1 Tasks

The sample program shows how the **PowerMeasurement_494_02.lib** can be used to read measured values from the 3-Phase Power Measurement Module. Two options are listed:

1. Reading the base values by calling the ***"Fb_750_494_AC_Compact_01"*** function block
2. Reading up to four measured values using the ***"Fb_750_494_AC_Values"*** function block

In addition to the measured values, the status of the individual measurement channels are also read cyclically.

There are two options for configuring the 3-Phase Power Measurement Module using a plug-in in the WAGO-I/O-CHECK 3 software (version 3.6.1.3 or higher) or using the visualization in WAGO-I/O-PRO V2.3.

## 5.2 Main Program

A function block for the status message, a function block for the configuration and several function blocks for reading the measured values from the 3-phase measurement module are called up in the main ***"PLC_PRG"*** program.

**Note**

**Access rights!**
To control access rights, the combination of ***"bToken"*** input variables is mandatory. For each 3-Phase Power Measurement Module 750-494 used, one variable must be defined and connected to the *"bToken"* function block inputs.

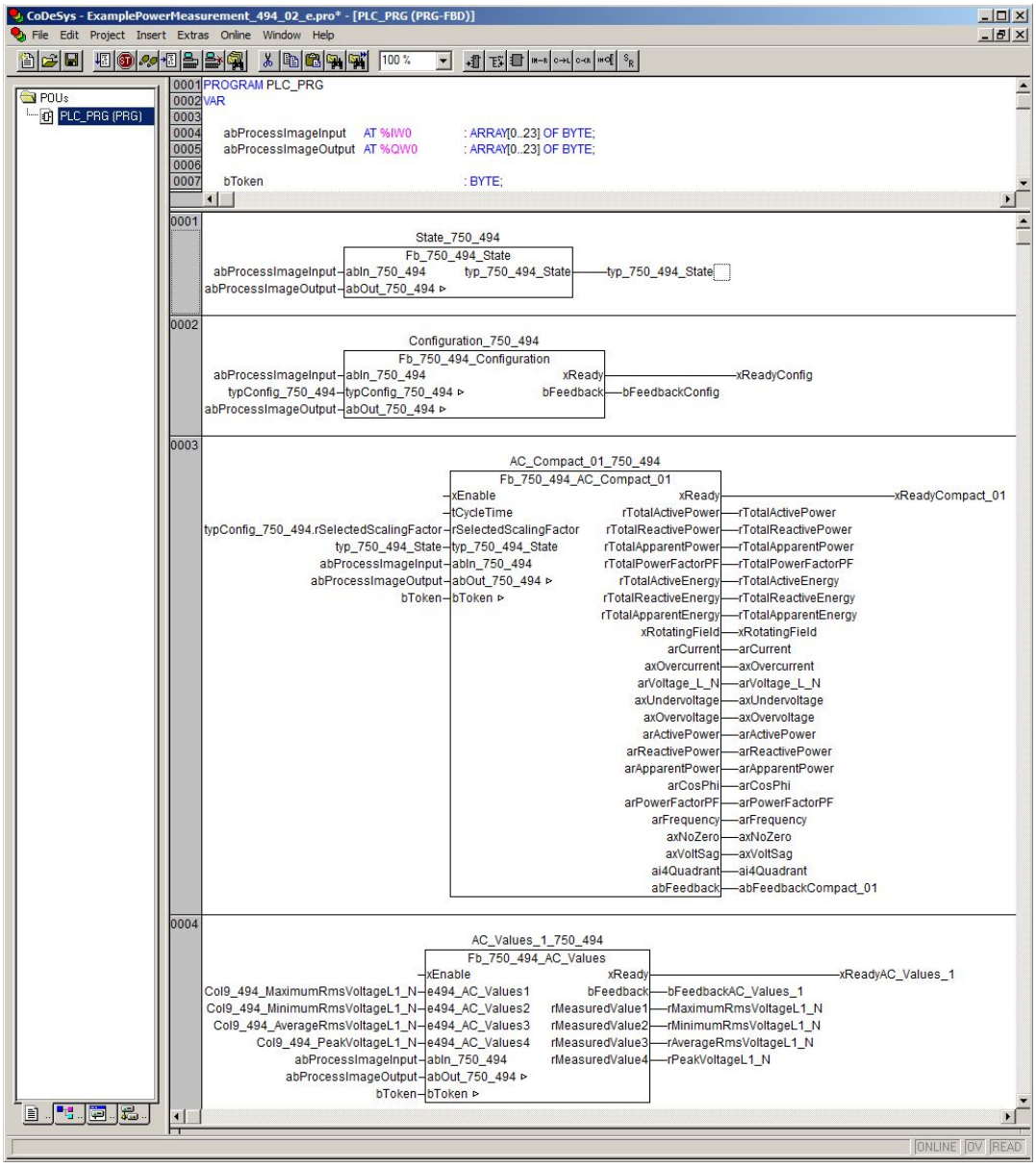



Figure 2: Main program PLC_PRG

## 5.2.1 Determining the Start Address in the Process Image

You can find the input and output addresses of the 3-Phase Power Measurement Module 750-494 used in the controller configuration of WAGO-I/O-PRO V2.3.

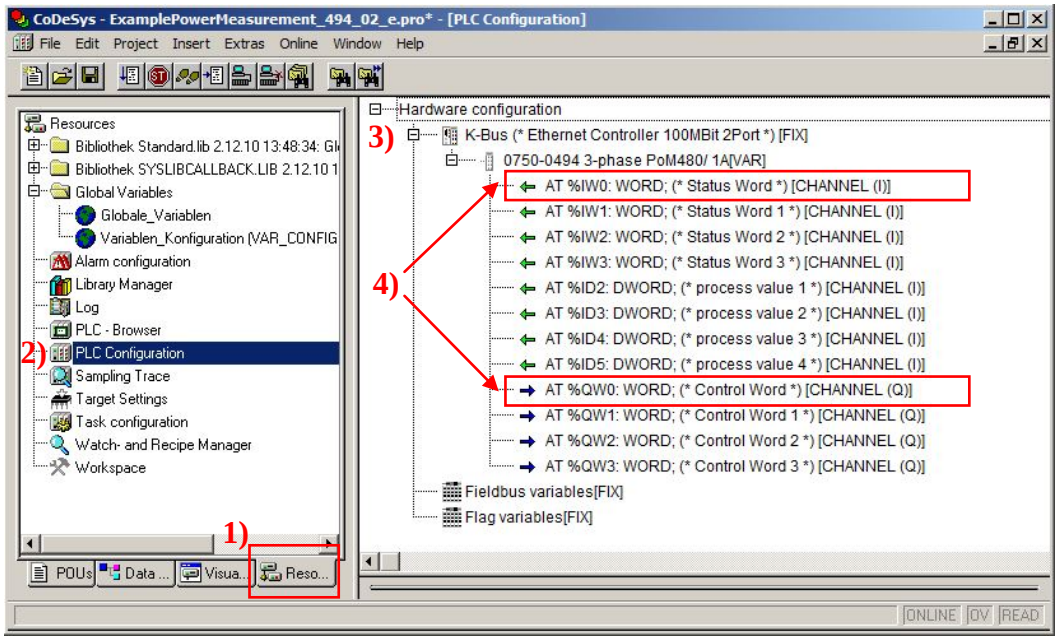



Figure 3: Controller configuration for determining the start addresses

**1)** The controller configuration is located in the ***"Resources"*** tab.

**2)** Click ***"PLC Configuration"*** to display the hardware configuration in the right window.

**3)** The power measurement modules attached to the controller are created under ***"Hardware configuration > K-Bus"***.

**4)** The address of the input array of the first attached power measurement module is located on (*Status Word*). The address is **%IW0**.
The address of the output array of the first attached power measurement module is located on (*Control Word*). The address is **%QW0**.

## 5.2.2 Reading the Status

The ***"Fb_750_494_State"*** function block is used to read detailed information about the state of the 3-Phase Power Measurement Module 750-494. The function block is linked to the process image of the power measurement module directly by the *"abProcessImageInput"* and *"abProcessImageOutput"* variables. The state of the power measurement module is displayed in the *"typ_750_494_State"* structure variable.

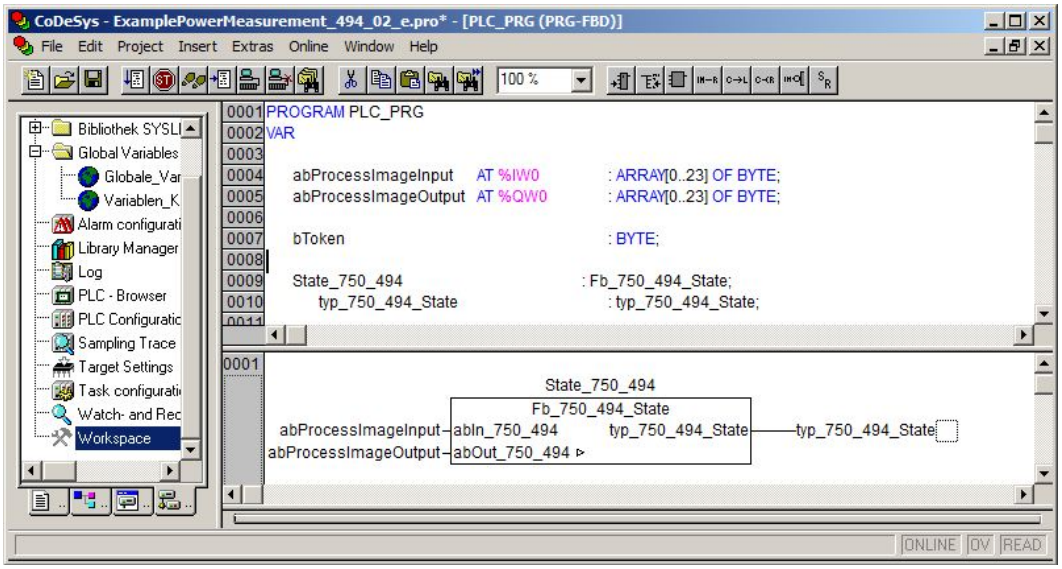



Figure 4: Reading the module status in the PLC_PRG

## 5.2.3 Visualization of the Status Messages

The *"Template"* folder in the *"ExamplePowerMeasurement_494_02_e.pro"* sample program contains a template for visualization of the status messages (*"Status_750_494"*).

This template is used on the ***"Status"*** visualization page and linked to the *"typ_750_494_State"* structure variable. Calling up the visualizations with placeholders is described in the appendix.

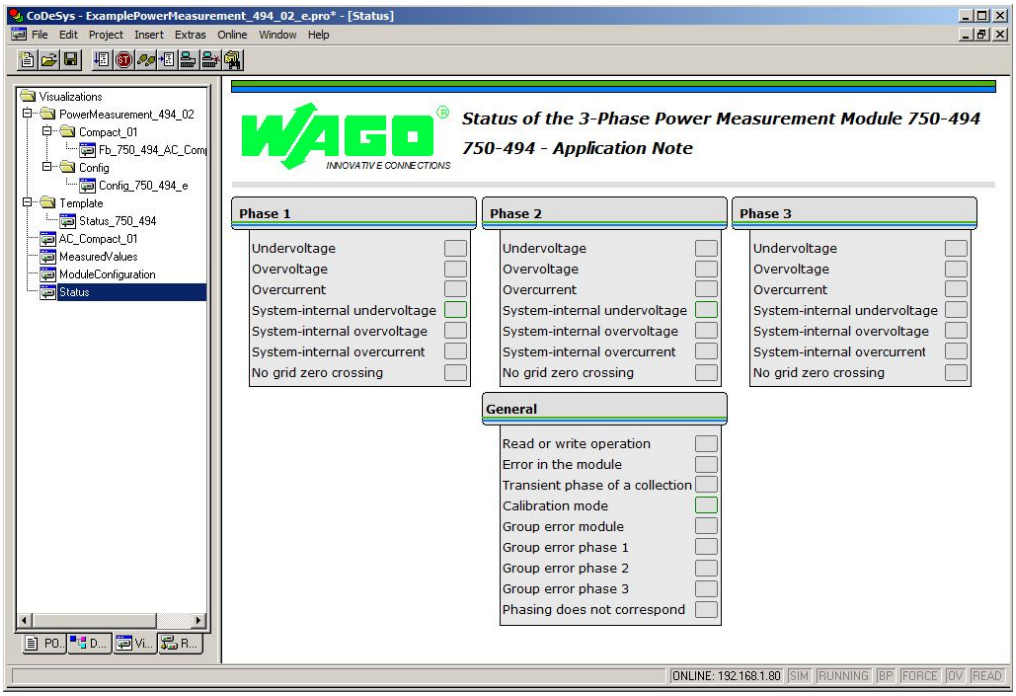



Figure 5: Interface for the status display

## 5.2.4 Configuration

The ***"Fb_750_494_Configuration"*** is used to read and write the module parameters. The function block is linked to the process image of the power measurement module directly by the *"abProcessImageInput"* and *"abProcessImageOutput"* variables. The *"typConfig_750_494"* structure variable contains the configuration parameters for the power measurement module.

**Note**

**Configuration parameters**
When launching the PLC program, the configuration parameters for the power measurement module are read automatically.

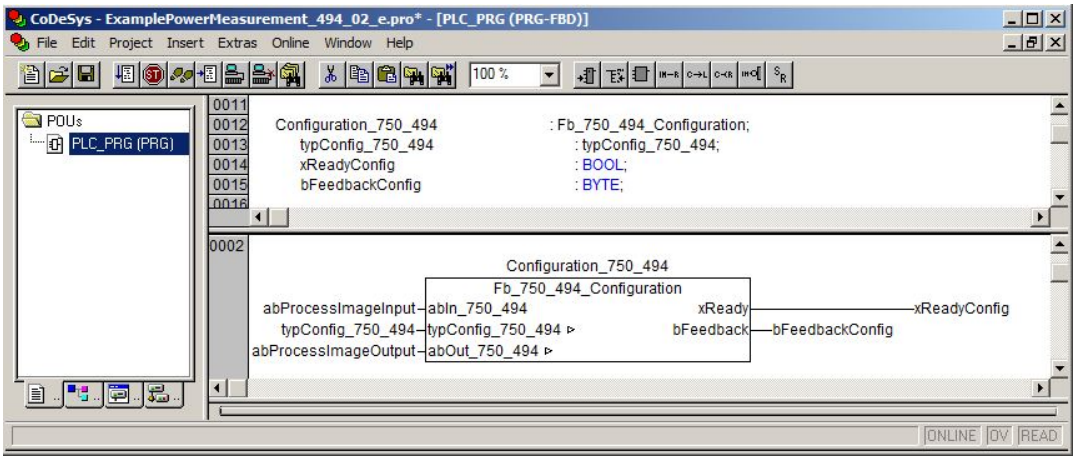



Figure 6: Configuration module in the PLC_PRG

## 5.2.5 Visualization of the Configuration Parameters

The configuration interface for the 3-Phase Power Measurement Module 750-494 is made available via the ***"CONFIG_750_494_E.EXP"*** export file. The *Project → Import* menu item in WAGO-I/O-PRO V2.3 can be used to import the configuration interface.

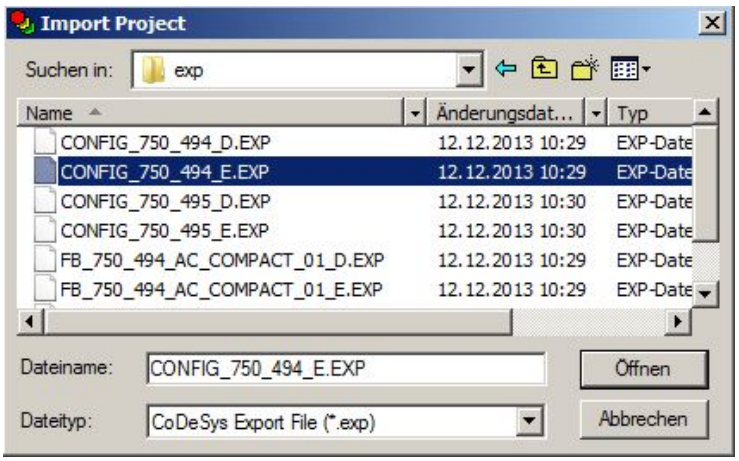



Figure 7: Template for importing the configuration interface

After importing *"CONFIG_750_494_E.EXP"*, the template for the configuration interface (*"Config_750_494_e"*) is located in the *"PowerMeasurement_494_02/Config"* folder. This template is used on the ***"Module Configuration"*** visualization page and linked to the *"typConfig_750_494"* structure variable. Calling up the visualizations with placeholders is described in the appendix.

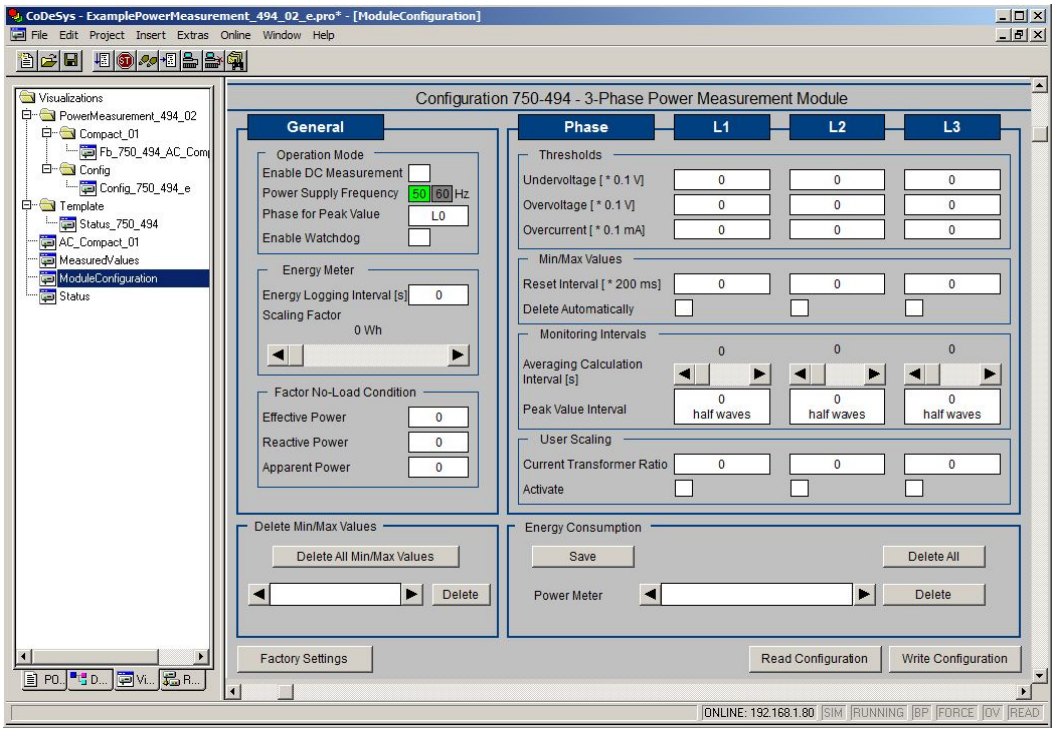



Figure 8: Configuration interface

## 5.2.6 Reading the Base Values and Status Information

The ***"FB_750_494_AC_Compact_01"*** function block is used to read the base values and status information.

**Note**

**rSelectedScalingFactor**

The *"rSelectedScalingFactor"* input should be connected to the *"typConfig_750_494.rSelectedScalingFactor"* parameter from the *"Fb_750_494_Configuration"* function block. The input makes sure that the energy values are output with the correct scaling.

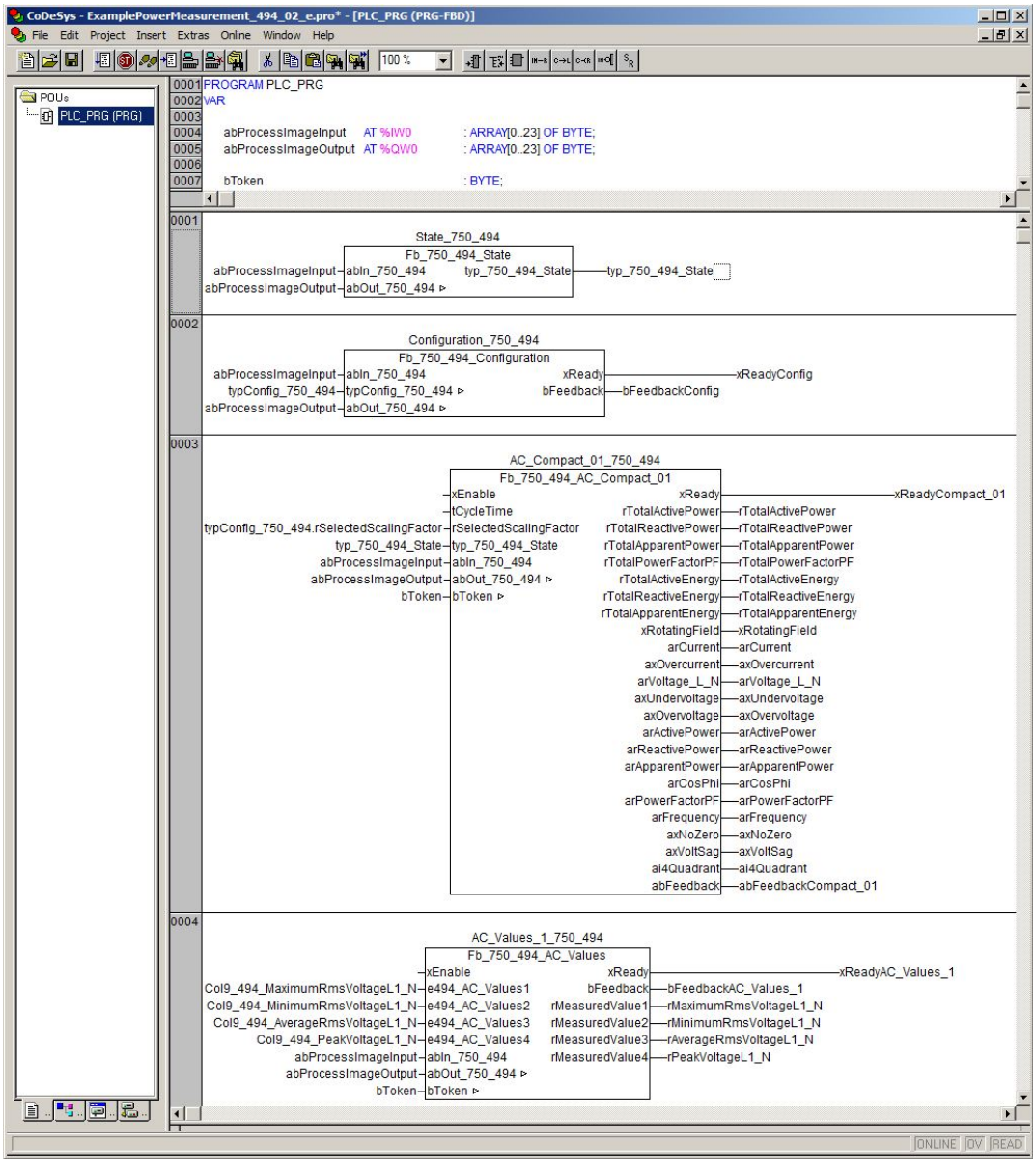



Figure 9: Using the "Fb_750_494_AC_Compact_01" function block in the PLC_PRG to read the measured values

## 5.2.7 Visualization of the Base Values and Status Information

The visualization interface for the base values is made available via the ***"Fb_750_494_AC_Compact_01_e.EXP"*** export file. The file can be imported as described in 5.2.5.

After importing *"Fb_750_494_AC_Compact_01_e.EXP"*, the template for the visualization interface (*"Fb_750_494_AC_Compact_01_e"*) is located in the *"PowerMeasurement_494_02/Compact_01"* folder. This template is used on the ***"AC_Compakt_01"*** visualization page and linked to the *"AC_Compact_01_750_494"* module. Calling up the visualizations with placeholders is described in the appendix.

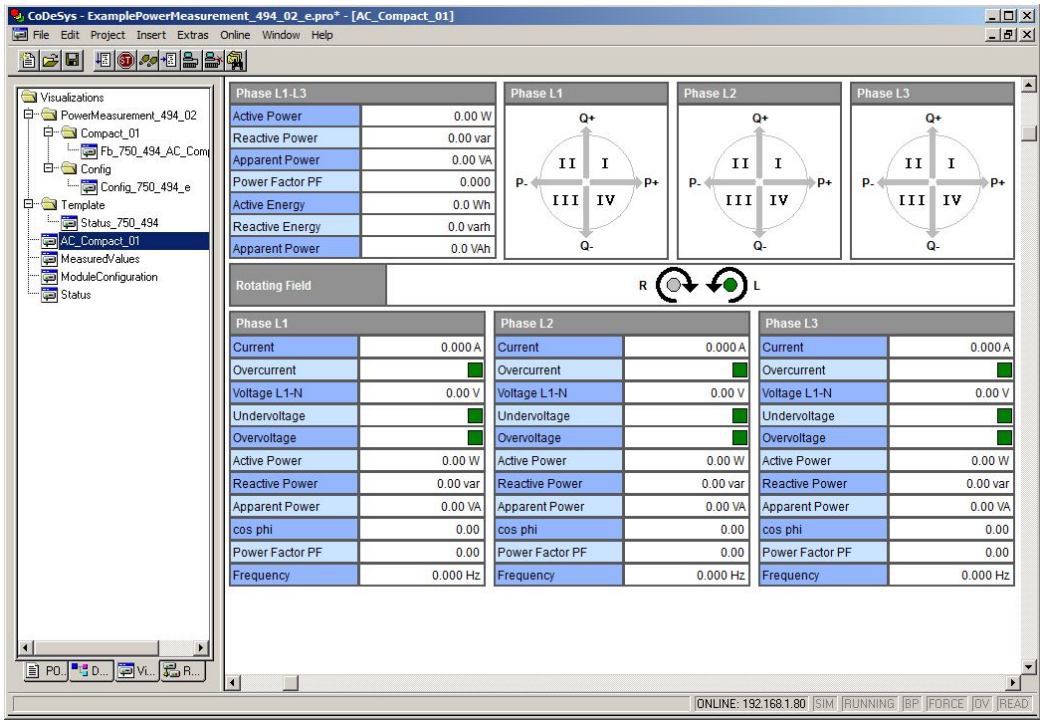



Figure 10: Interface for the measured values of the "Fb_750_494_AC_Compact_01" function block

## 5.2.8 Reading Sample Measured Values

The ***"Fb_750_494_AC_Values"*** function block is used to read AC measured values. The required measured values can be set on the *"e494_AC_ValuesX"* inputs based on the enumeration. The respective measured values are output on the *"rMeasuredValueX"* outputs. The *"Fb_750_494_AC_Values"* function block can be instantiated any number of times in the project. Reading the measured values is controlled by the *"bToken"* variable.

In the sample project, the enumerations of the measured values required are entered in network 4 and 5.

**Note**

**Measured value ID**
The appendix of the library description for PowerMeasurement_494_02.lib contains the meaning of the measured value IDs.

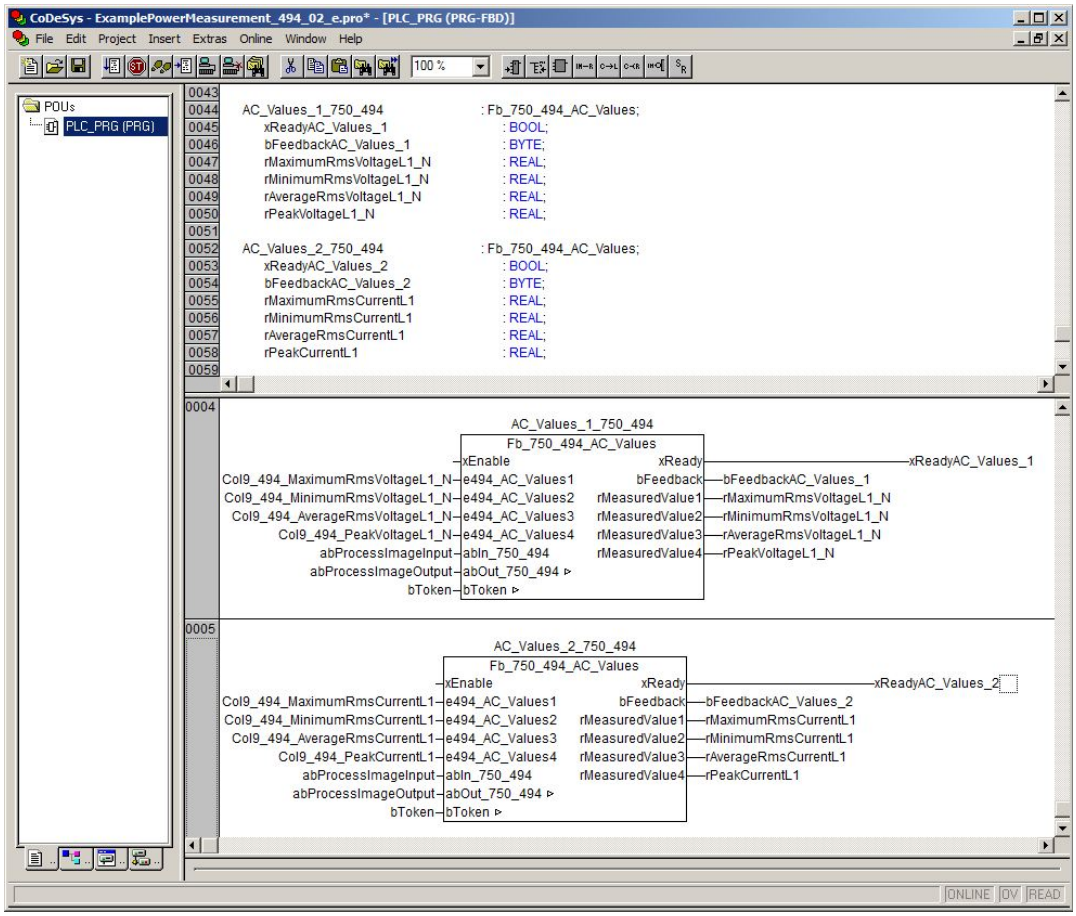



Figure 11: Using the "Fb_750_494_AC_Values" function block in the PLC_PRG to read the measured values

## 5.2.9 Visualization of the Sample Measured Values

The sample measured values of the two instances of the *"Fb_750_494_AC_Values"* are displayed on the **"*MeasuredValues*"** visualization page.

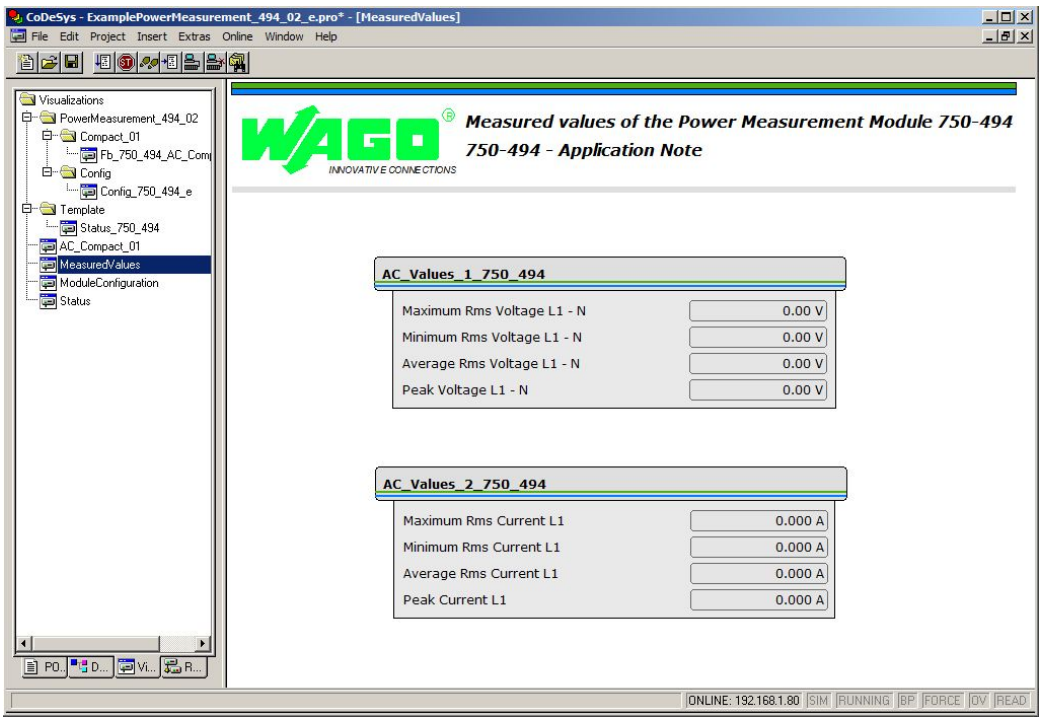



Figure 12: Interface for the sample measured values

# 6 Configuration via WAGO-I/O-CHECK 3

**Note**

**Configuration via WAGO-I/O-CHECK 3**

The 3-Phase Power Measurement Module can be configured via WAGO-I/O-CHECK from version 3.6.1.3 or higher. In addition, WAGO-I/O-CHECK allows the user to display the status and measured values.

## 6.1 Calling up the Plug-in

After reading the node configuration in WAGO-I/O-CHECK 3, the respective 3-Phase Power Measurement Module 750-494 can be selected and the plug-in started by right-clicking on *"Settings"*.

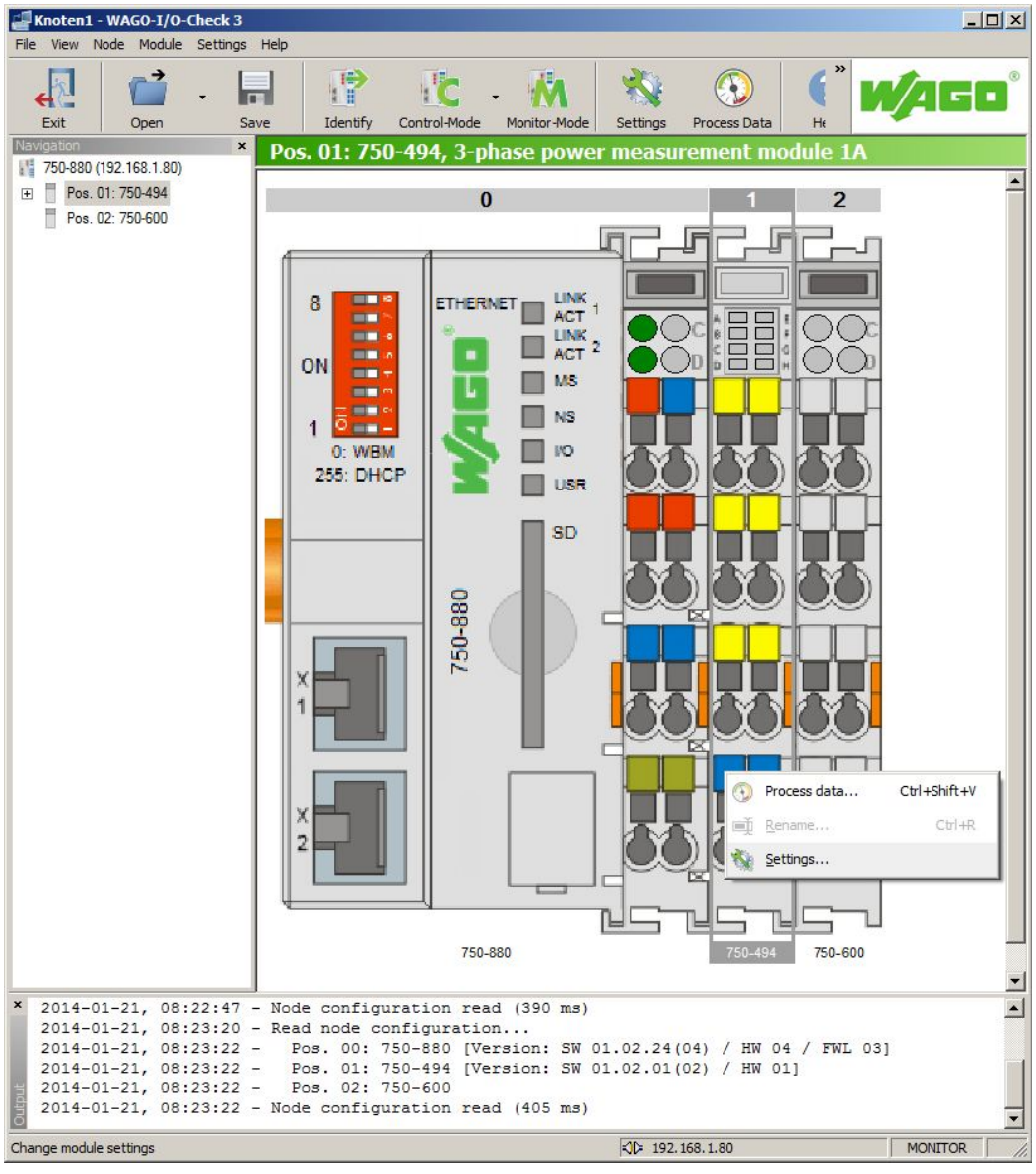



Figure 13: WAGO-I/O-CHECK 3

## 6.2 Plug-in for the Module 750-494

### 6.2.1 Measured values

The plug-in starts with the overview page of the measured values. The measured values are sorted by category on the left side. Depending on the category, the respective measured values are displayed.

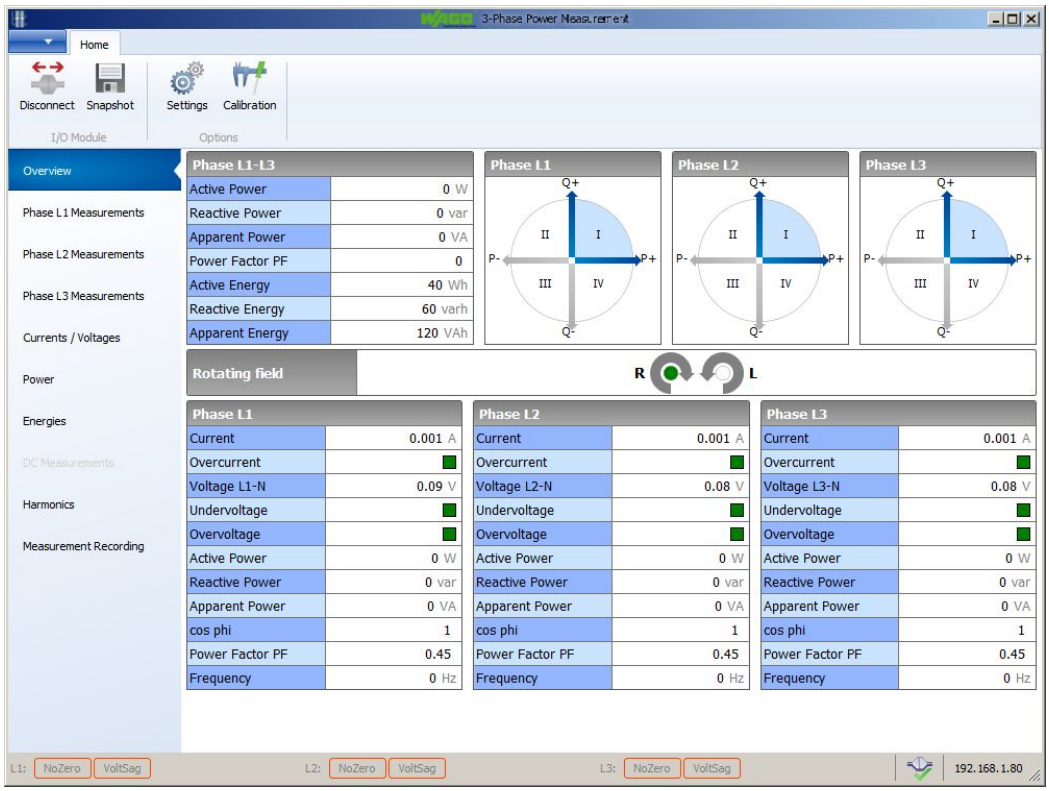



Figure 14: Plug-in for the module 750-494

## 6.2.2 Configuration

The *"Settings"* window (see Figure 12) is opened from the *"Settings"* menu item (see Figure 11). The settings are sorted by category on the left side. Depending on the category, the respective settings can be made in the module.

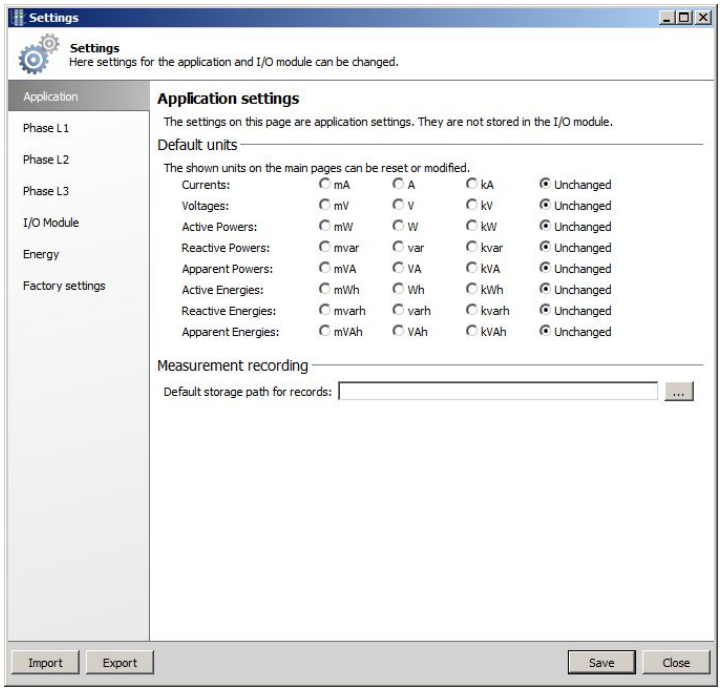



Figure 15: Module 750-494 settings

**Information**

**Additional information**

A detailed description of the plug-in for the 3-Phase Power Measurement Module 750-494 is available in the manual for the module.

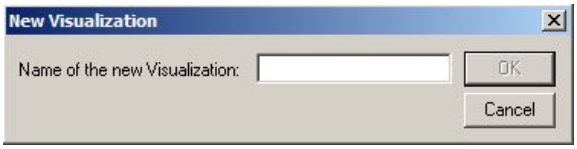
# Appendix

## Creating a Visualization Page

1) Clicking on the ***"Visualizations"*** index card 

(bottom left)
2) The folder 

appears at the top left
3) Right-click on the ***"Visualizations"*** folder.
4) Selection of the ***"Add Object..."*** option
5) Specify the name of the visualization and confirm with ***"OK"***




## Calling up a Visualization Template

1) Calling up the ***"Visualization"*** menu item
2) Specifying the frame for the visualization element
3) Selecting the respective visualization template from the ***"Select visualization"*** menu

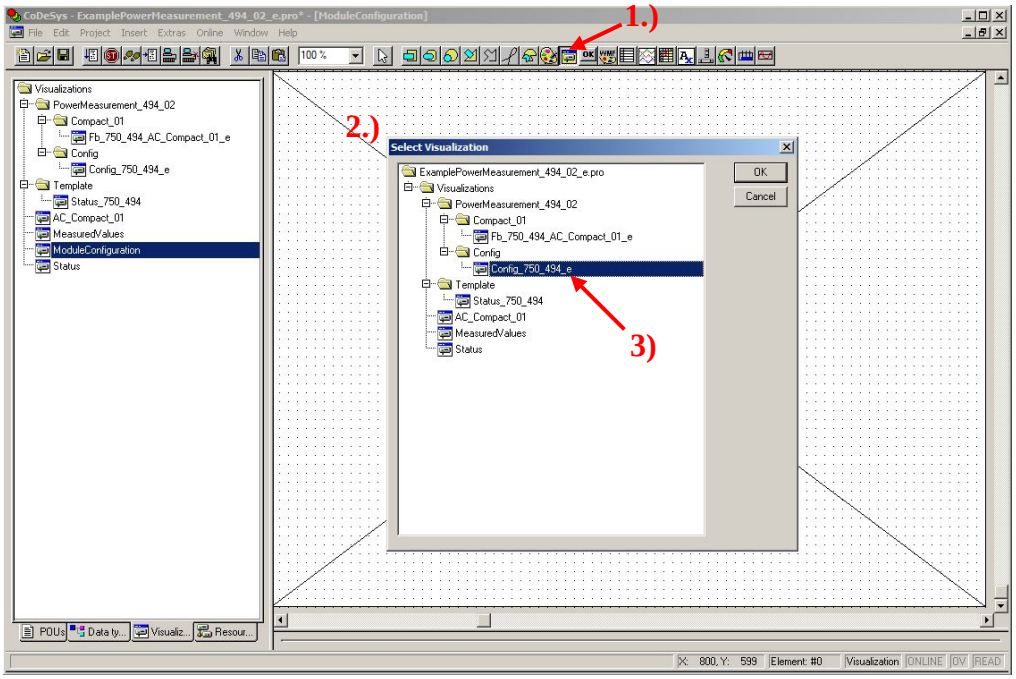



Figure 16: Selecting the visualization template

# Configuring a Visualization Element

1) Double-click on the visualization element
2) Select the ***"Visualization"*** category
3) Remove the tick for the ***"Draw"*** and ***"Clip"*** frames
4) Activate ***"Fixed"*** view
5) Click on the ***"Dummy..."*** button with the left mouse button (menu *"Replace dummy"* appears)

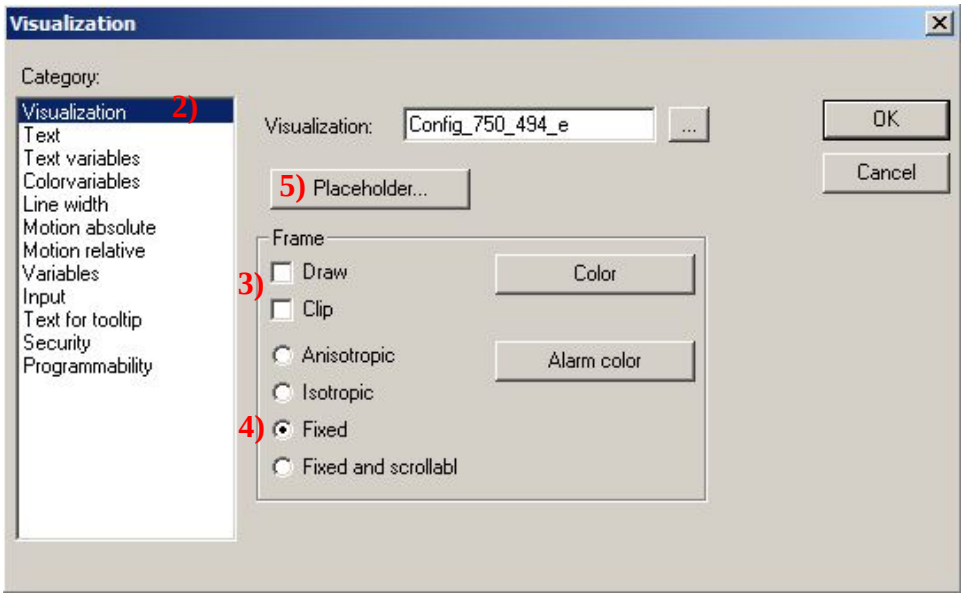



Figure 17: Configuring the visualization template

# Replace Dummy

1) Click into the empty *" **Replacement**"* field using the left mouse button
2) Use the *"**F2**"* function key to open *"**Input Assistance**"*
3) Select the *"typConfig_750_494 (typConfig_750_494)"* variable and confirm with *"**OK**"*
4) The *"PLC_PRG.typConfig_750_494"* link now appears in the *"**Replacement**"* field.
5) Click *"**OK**"* to confirm all entries.

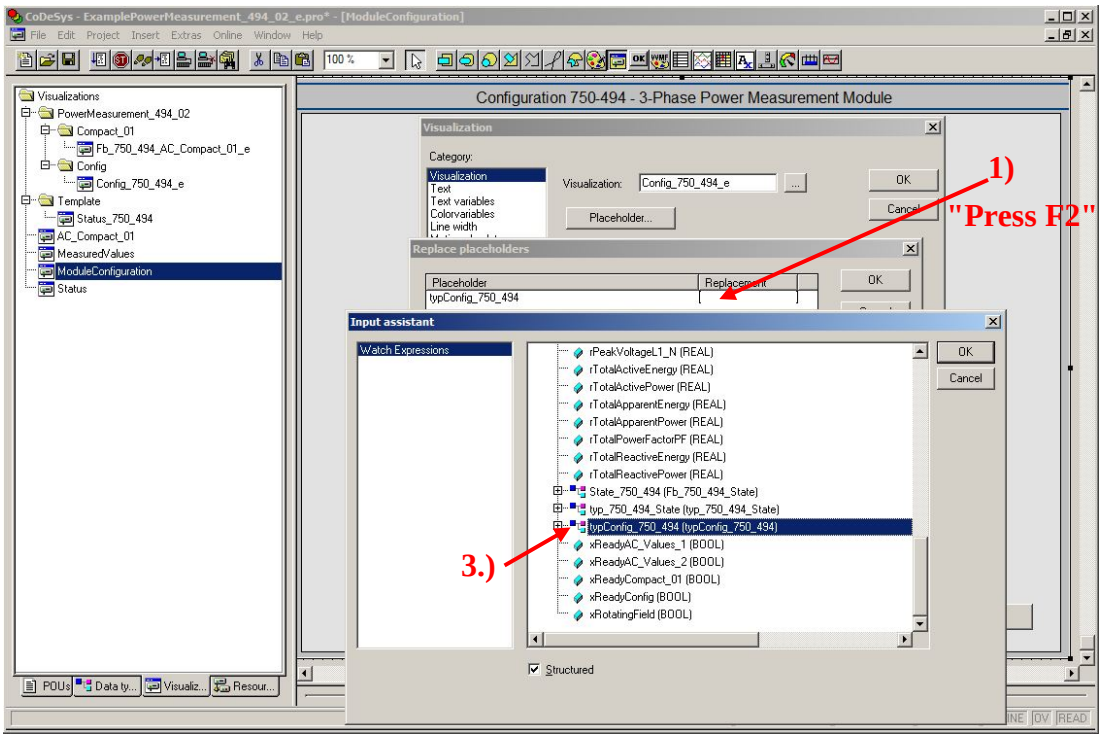



Figure 18: Dummy links

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