

# **Operation manuales**

## **GridVis<sup>®</sup>**

### **UMG604, UMG96S, UMG103, UMG507**

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# GridVis

## Generals

## Application

The network visualization software GridVis is intended for the management of measuring devices and their measured values.

GridVis currently supports the following Janitza electronics GmbH measuring devices:

- UMG604
- UMG96S
- UMG510
- UMG103
- UMG507

## Important Function of GridVis

- Manage measuring devices.
- Present measuring devices in a topology.
- Program measuring devices.
- Directly display measured values from different measuring devices in graphic form.
- Read measured values stored in measuring devices and save them to a database.
- Read measured values saved in a database and present them in graphic form.
- Read measured values saved in a database and search for transients.
- Read measured values saved in a database and search for incidents.
- Programming of customer-specific applications.
- Update the firmware of measuring devices.

**Warning! Not all functions are available for each measuring device.**

## Operating System

The network visualization software GridVis can be installed on a computer/PC with the following operating systems:

- Windows XP® (from Service Pack X),
- Windows Vista® (from Service Pack X),
- MAC OS® or
- Linux

## License Management

There is a fee required for certain functions available for GridVis.

You will need a license for functions which require a fee.

Numerous functions can be unlocked with a single license.

Licenses are entered in the name of the license holder and project in our database.

You can install a license for a project as many times as is necessary.

We provide licenses as binary files.

You can receive the binary files per Email, on CD/DVD or on a USB stick.

You can work with licenses via *Extras/License Management* in GridVis.

Licenses which require a fee:

- Graphic Programming Module Modbus-Master (Product Number 5100117)  
The programming module Modbus-Master allows the graphical programming of the UMG604 as the Modbus-Master.
- Database driver for Microsoft SQL Server (Product Number 5100118)  
Allow data exchange between GridVis and a Microsoft SQL Server.
- Database driver for MySQL Server (Product Number 5100119)  
Allow data exchange between GridVis and a MySQL Server.

**Warning! Without a database driver, GridVis will use the *Derby Database* which was included in the delivery.**

## **UMG604**

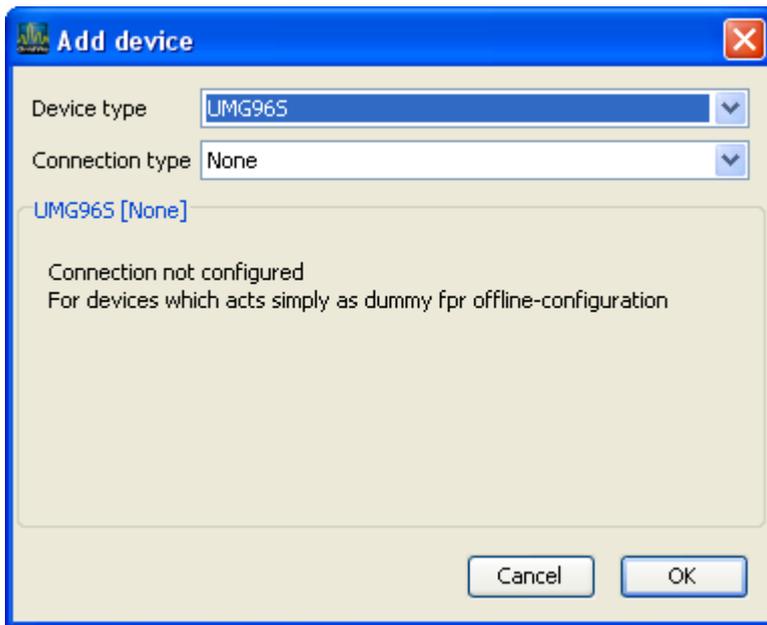
The network visualization software GridVis is included with the UMG604. GridVis includes the following additional functions for the UMG604:

- Read measured values saved in a database and search for transients.
- Read measured values saved in a database and search for incidents.
- Programming of customer-specific applications.

## First Steps

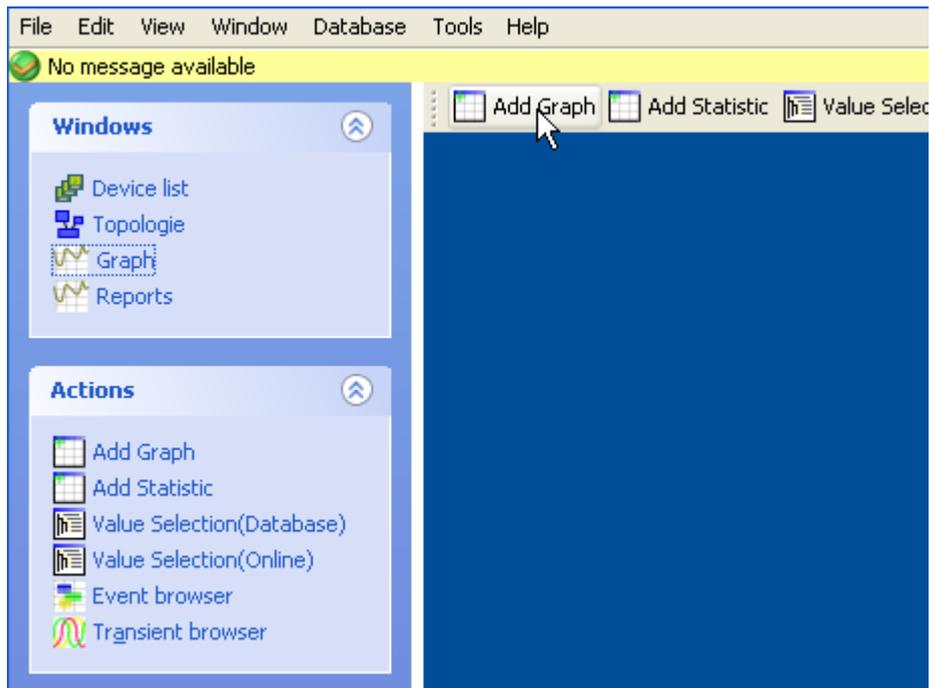
### Add Device

- Select *Add Device* from the symbol bar on the right.
- Select the device type.  
Various connection types are available based on the device type.
- Adding a UMG604 is described here.

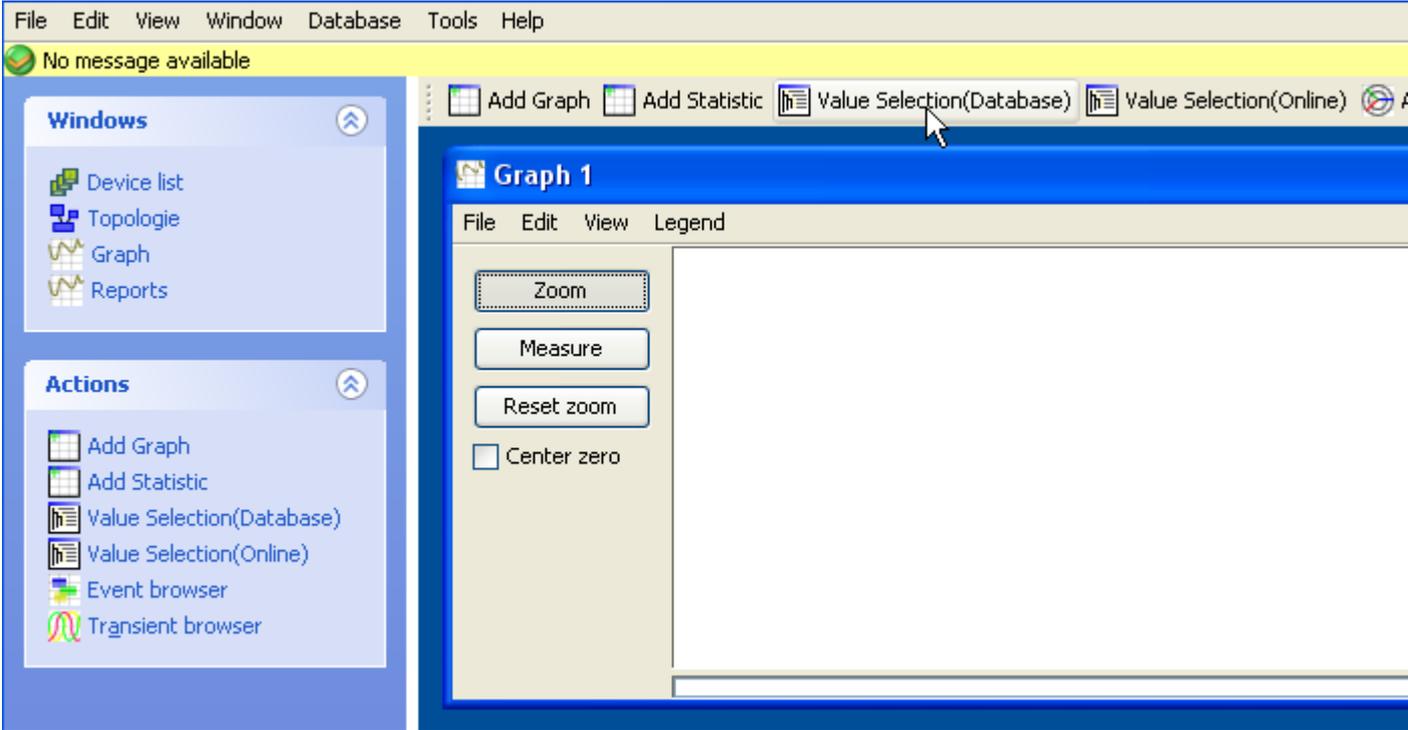


## Add Graph

- You can display the measured values from devices directly as a graph.
- You can display the measured values from different devices in a single graph.
- A maximum of two different types of measured values (e.g. current and voltage) can be displayed in a graph.



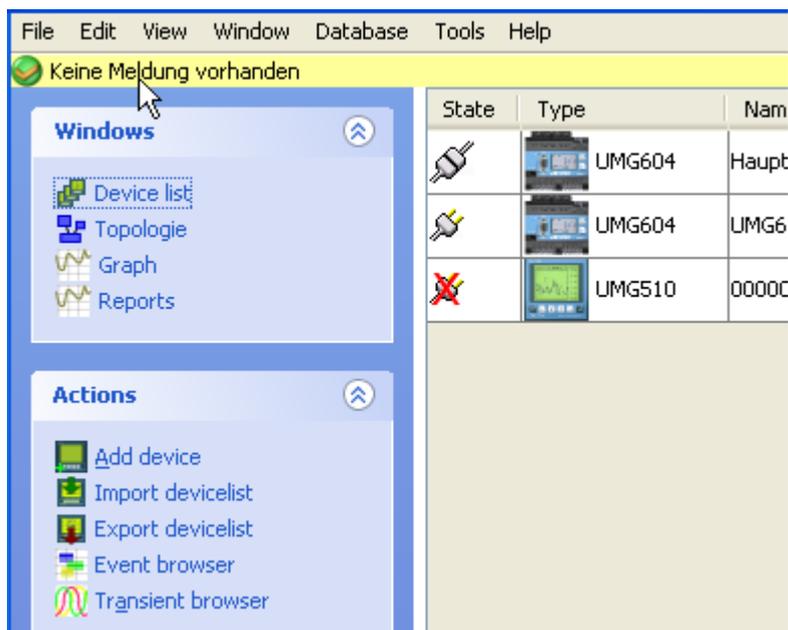
- Select the *Graphs* window and then *Add Graphs*.
- The *Graph 1* window will open.



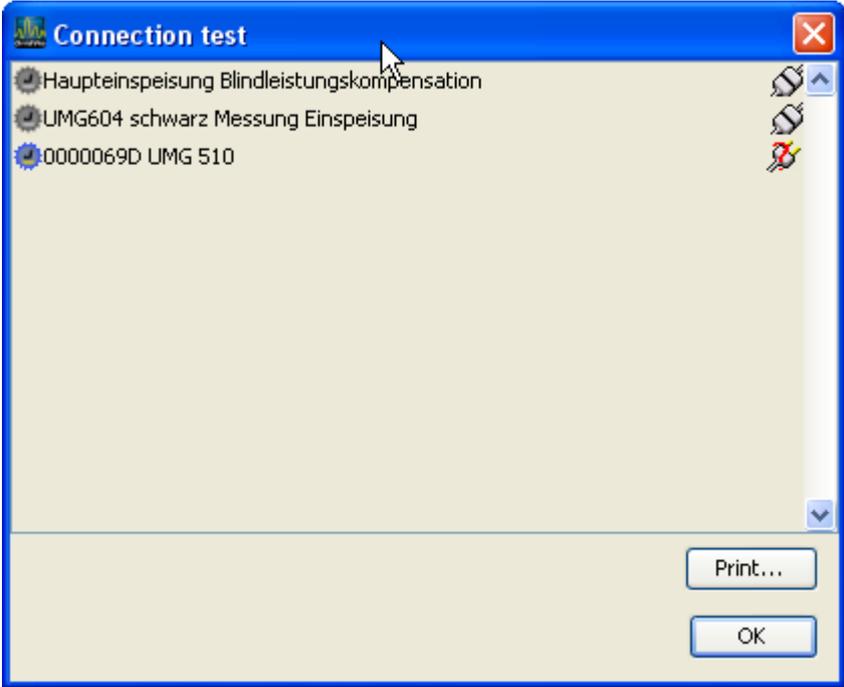
## Check Connection

The *status* of the connection to the devices will be displayed in the *Status* column.

-  No connection to this devices has ever been made.
-  A connection has been made to the corresponding device.
-  Datatransmission is achieved.
-  No connections could be made to the corresponding device.



You can check the connection to a device with the *Connection Test* button. The *Task List* window will open and displayed the progress during the test. The results will be displayed under *Status*.



## Create Project

- To do so, you will need a project name and a database.
- For small projects with a small number of devices and data, you can use the *Derby* database which was included in the delivery.
- The *Derby* database is based on a file structure.

### Warning!

- Access to data stored in the **Derby database** will be very slow if there are large amounts of data.
- We recommend the databases **Microsoft SQL-Server** or **MYSQL-Server**.
- You can obtain licenses for the fee-based **database drivers** for the Microsoft SQL-Server and MYSQL-Server databases from us.
- Select *File/Create New Project ...* from the menu bar
- Enter a project name.
- Enter a path for the database.

The screenshot shows a 'Project settings' dialog box with the following fields and controls:

- Project section:**
  - Project name: Text box containing 'Test'
  - Description: Large empty text area
- Database section:**
  - Databasetype: Dropdown menu showing 'Derby Database'
  - Hostname: Empty text box
  - Port: Empty text box
  - Database: Text box containing 'C:\Test' with a browse button ('...')
  - Username: Empty text box
  - Password: Empty text box
- Buttons:**
  - 'Create database' button (next to Databasetype)
  - 'Test Database' button (next to Hostname)
  - 'Cancel' button (bottom right)
  - 'OK' button (bottom right)

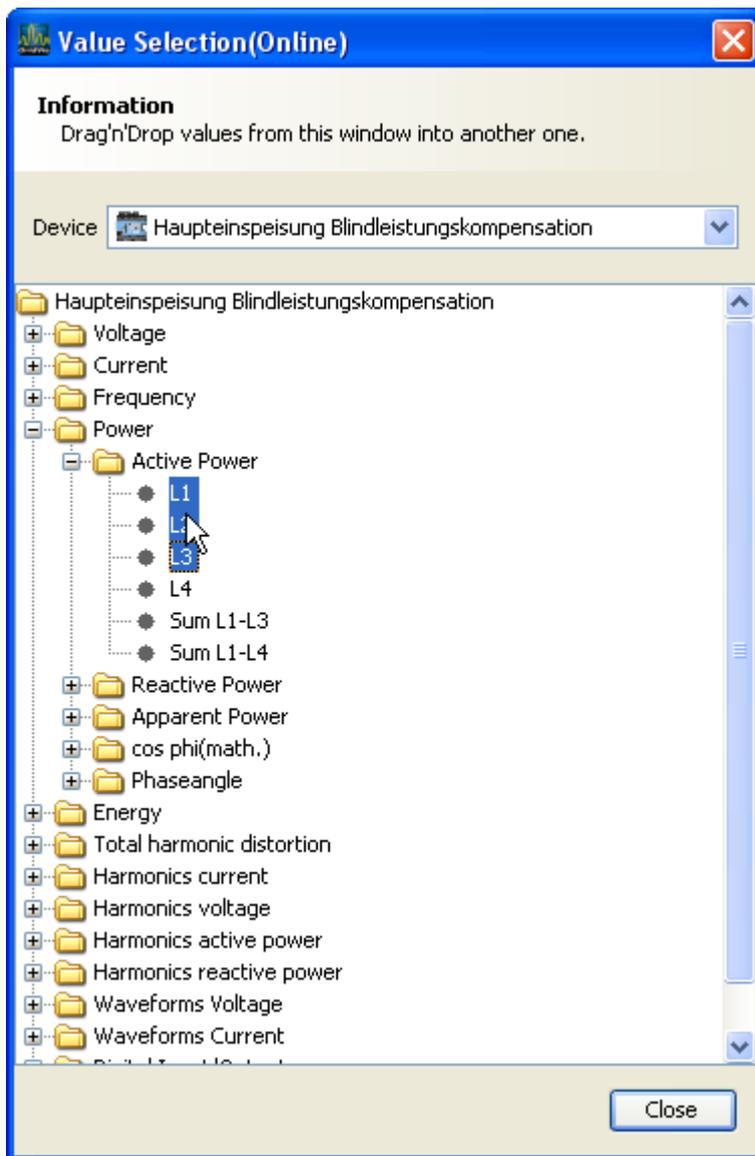
- Now select *Create Database*



- Confirm with *ok*.
- The database *Test* has been successfully created.
- Confirm the selection in the *Project Settings* window with *ok*.
- The project (in this example: *Test*) has now been created.

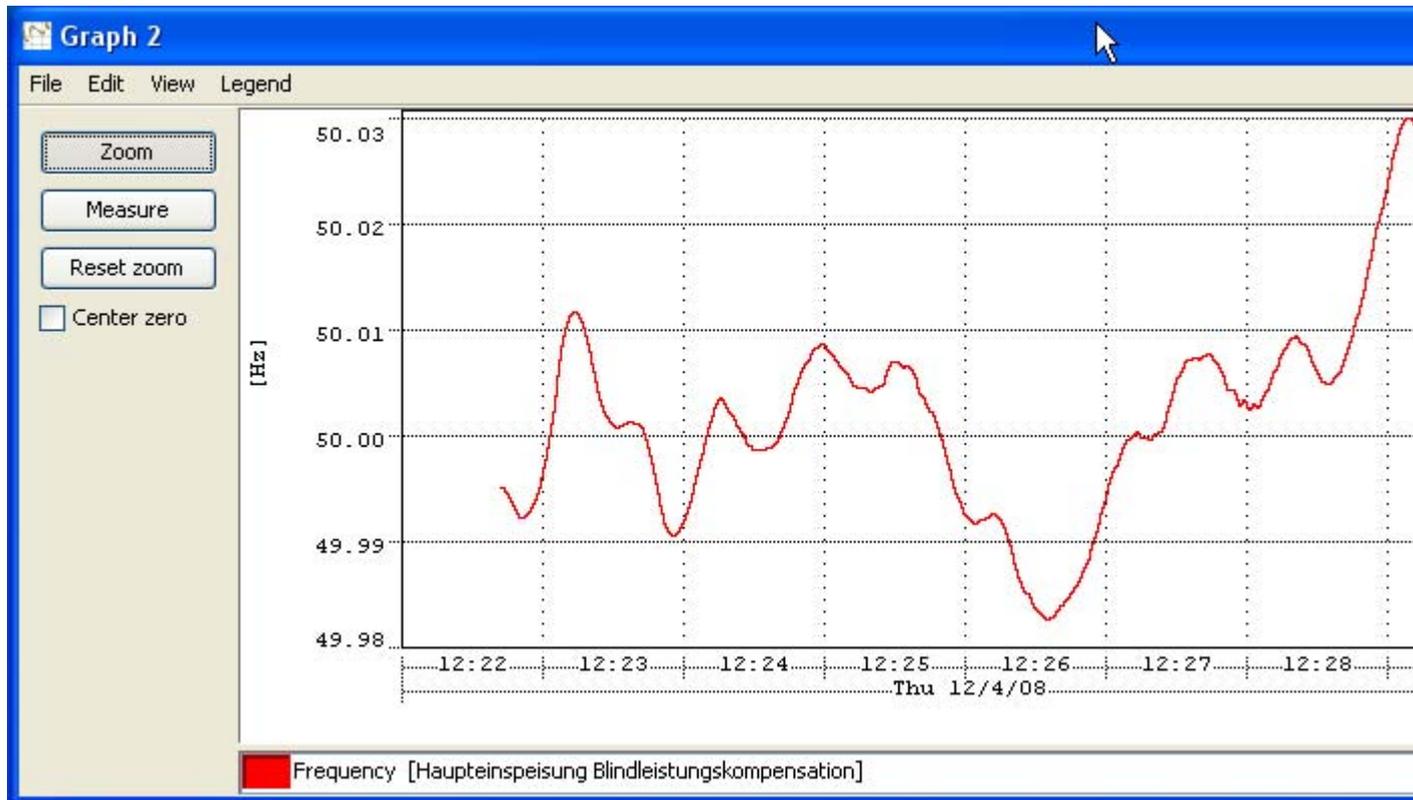
## Select Measured Value

- Select *Show Online Value Selection*.
- Select a device.
- Select and mark the measured value.
- Drag the measured value to the *Graph 1* window.



## Display Measured Values

- Select the measured value and drag it to the *Graph 1* window.
- GridVis will immediately begin read these measured values from the devices and presenting them as graphs.



## Functions

# Graphs

- A graph is a window in which the measured values are displayed graphically.
- The measured values can come from an online connection or from a database.
- The measured values can come from different devices.
- A maximum of two different types of measured values (e.g. current and voltage) can be displayed in a graph.
- Multiple graphs can be opened simultaneously.

### Zooming

- A section of a graph can be selected and enlarged. Selection is made by marking the desired section from the upper left to the lower right with the left mouse button and then releasing the left mouse button.
- The zoom can be reset with the *Reset Zoom* button.

### Measure

- Select the *Measure* function on the left side of the graph.
- Select an area in the graph to measure. Selection is made by marking the desired section from the upper left to the lower right with the left mouse button and then releasing the left mouse button.
- The time different and the amplitude difference will be displayed.

### Key

- Change the color of the measured values.
- Control the visibility of the measured values.
- Change the arrangement of the measured values.
- Delete measured values from the graph.

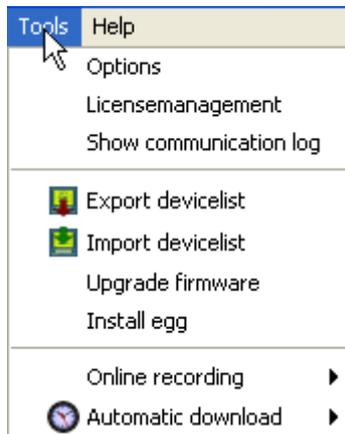
### Export

## GridVis-Hilfe\_en

- The measured values presented in the graphs can be exported in CSV format.

To do so, select the measured value in the key with the left mouse button.

## Extras



Description of the *Extras* menu in the GridVis toolbar.

- **Options** -
  - Graph - You can set the colors for the graphs here.
  - Logging - You can place various notifications in a file for trouble shooting.
    - File Logging - Errors and status information from GridVis will be saved in a file.
    - File Logging - Errors and status information from GridVis will be saved in a file.
    - Communications Logging - The communications between GridVis and the managed devices can be **saved** in a file for trouble shooting.
    - Project - You select the GridVis project that will open when the program is started here.
    - Language - You can select the language and time zone here.
- **License Management** - You can manage the licenses for fee-based functions here.
- **Show Communications Log** - The communication between GridVis and the managed devices can be **displayed** for trouble shooting purposes.
- **Export Device List** - Export all devices managed by GridVis.
- **Import Device List** - Import all devices managed by GridVis.
- **Update Device Firmware** - This allows you to update your devices with the current firmware.
- **Install Egg** - Function expansions for certain Janitza electronics GmbH devices.
- **Online Acquisition** - Measured values read and displayed by Gridvis from the measuring devices can also be saved in the database. This function is particularly advisable for devices without a storage function.

- **Automatic Reading** - You can configure the devices to be automatically read to ensure that the memory of a device does not "overflow" so that the data in the database is always current.

## Programming

### Recording

You can define individual measured values for recording. The measured values are saved in the device (e.g. UMG604).

- Values that are to be recorded must be numeric in type.
- You can read recordings with GridVis and save them in the database.
- You can use recording on the device homepage (e.g. UMG604).

You can choose between the following recording methods:

#### Mean Values

Mean values of the measured values of a selectable time period with the start and end point of the time period. You also have the option of recording the accompanying minimum and maximum value.

#### Measured Values

Record measured values with the accompanying start and end points.

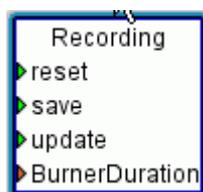
#### Connected Measured Values

Measured values with the accompanying end time of the measured value and the end time of the last measured value as the start time.

*Advantage: There will be no holes in the graphical presentation.*

**Note!** The selected recording method will apply to all value names place in the graphic symbol.

### Graphic Symbol for the Recording



*Example: Graphic Symbol for the Recording*

### Description of the Connections

#### update

The command *update* starts the calculation of the min, max and mean value of the measured values stored in the measured value cache.

#### reset

The content of the measured value cache is deleted with *reset*.

#### save

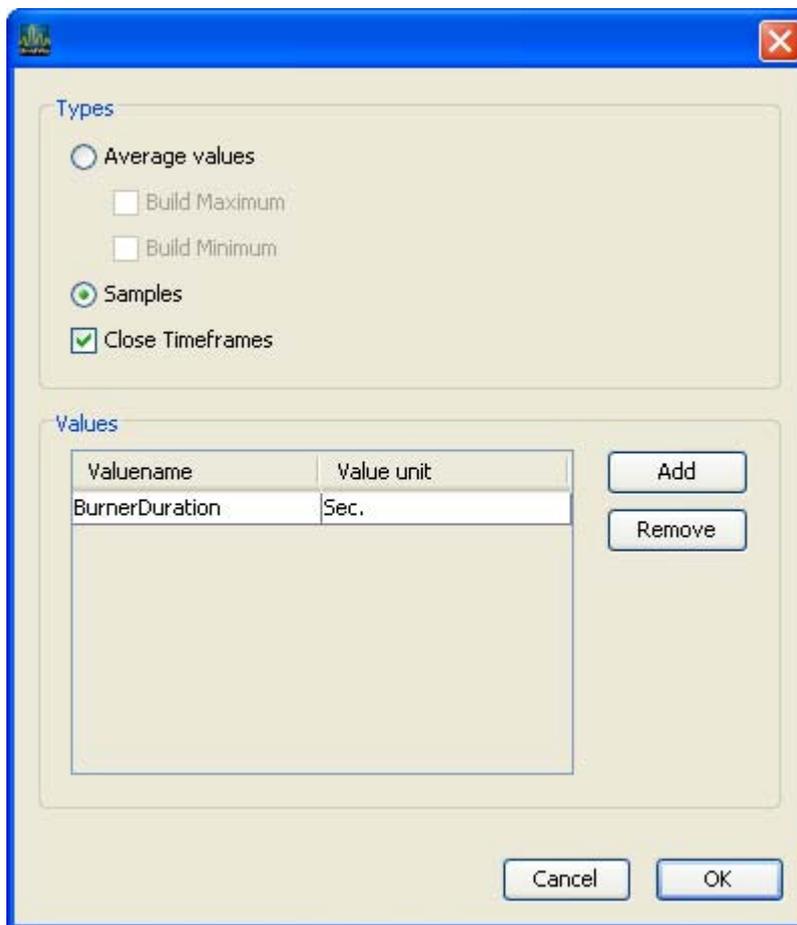
The *save* save all measured values (e.g. burner duration) in the accompanying measured value cache.

**"Value Name"**

You must create at least one value name (e.g. burner duration).

**Note!** You must at least connect the *save* command and a "Value Input".

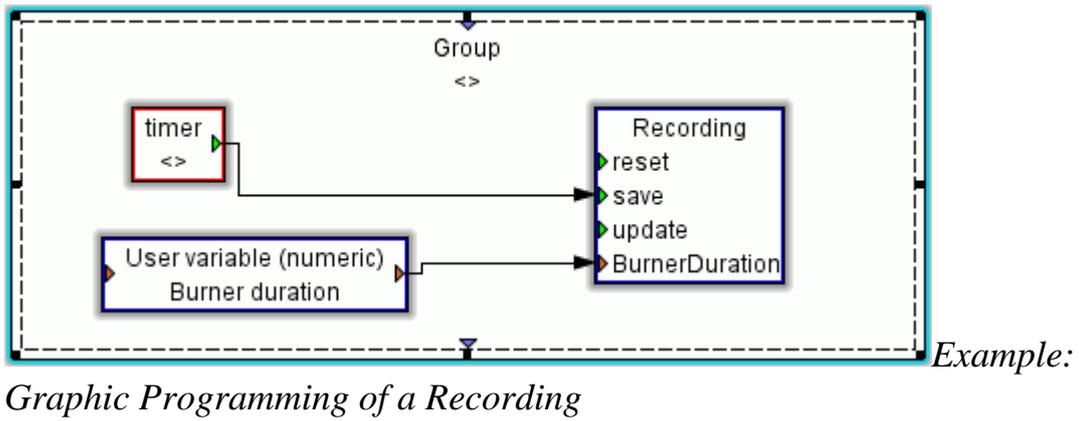
To select a recording method and create a value name, open the *Record* icon by double clicking on it.



*Example:*

*Programming a Recording*

The value names (e.g. burner duration) are displayed in the icon.



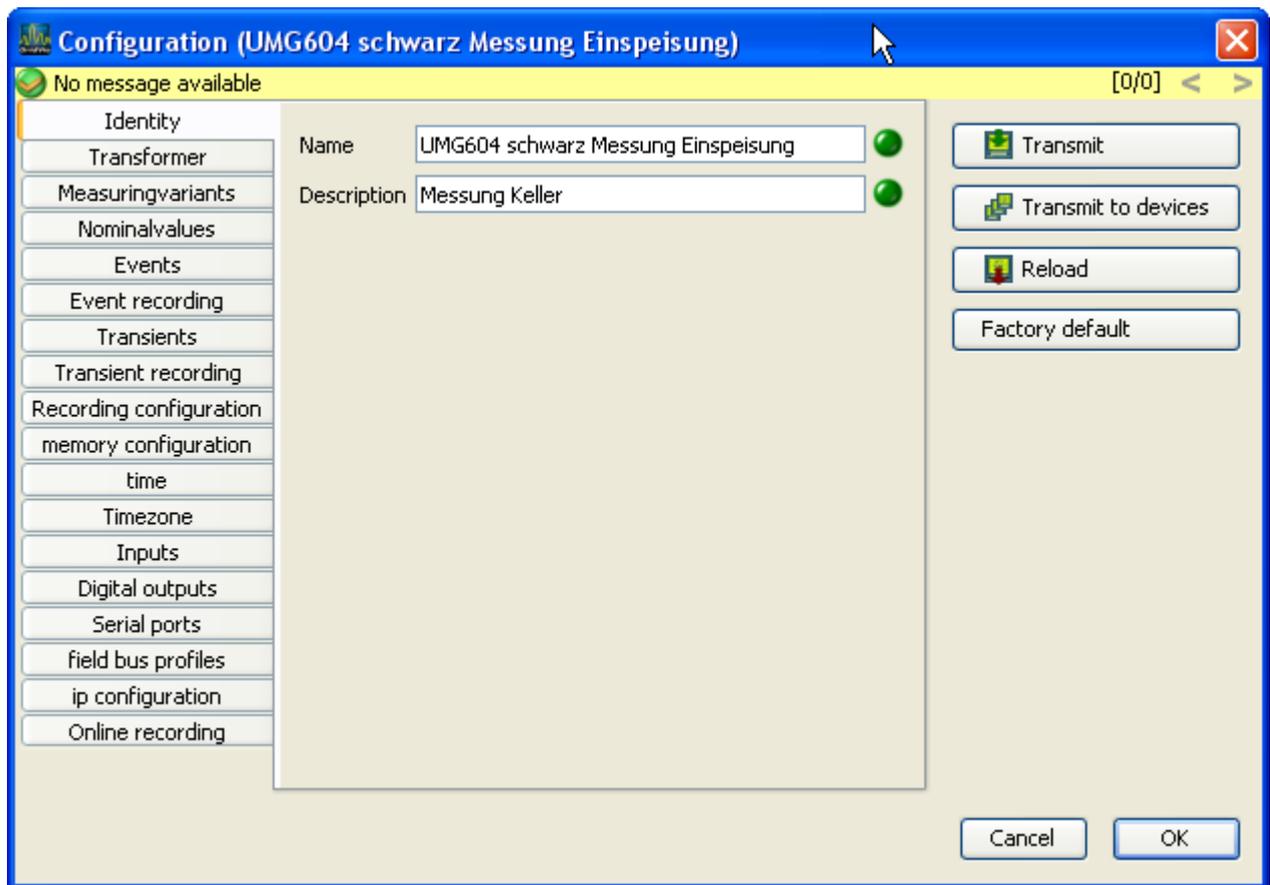
*Graphic Programming of a Recording*

# UMG604

## Configuration

### Identity

- The *Name* is displayed in the device list.
- You can add additional information about the device in *Description*.



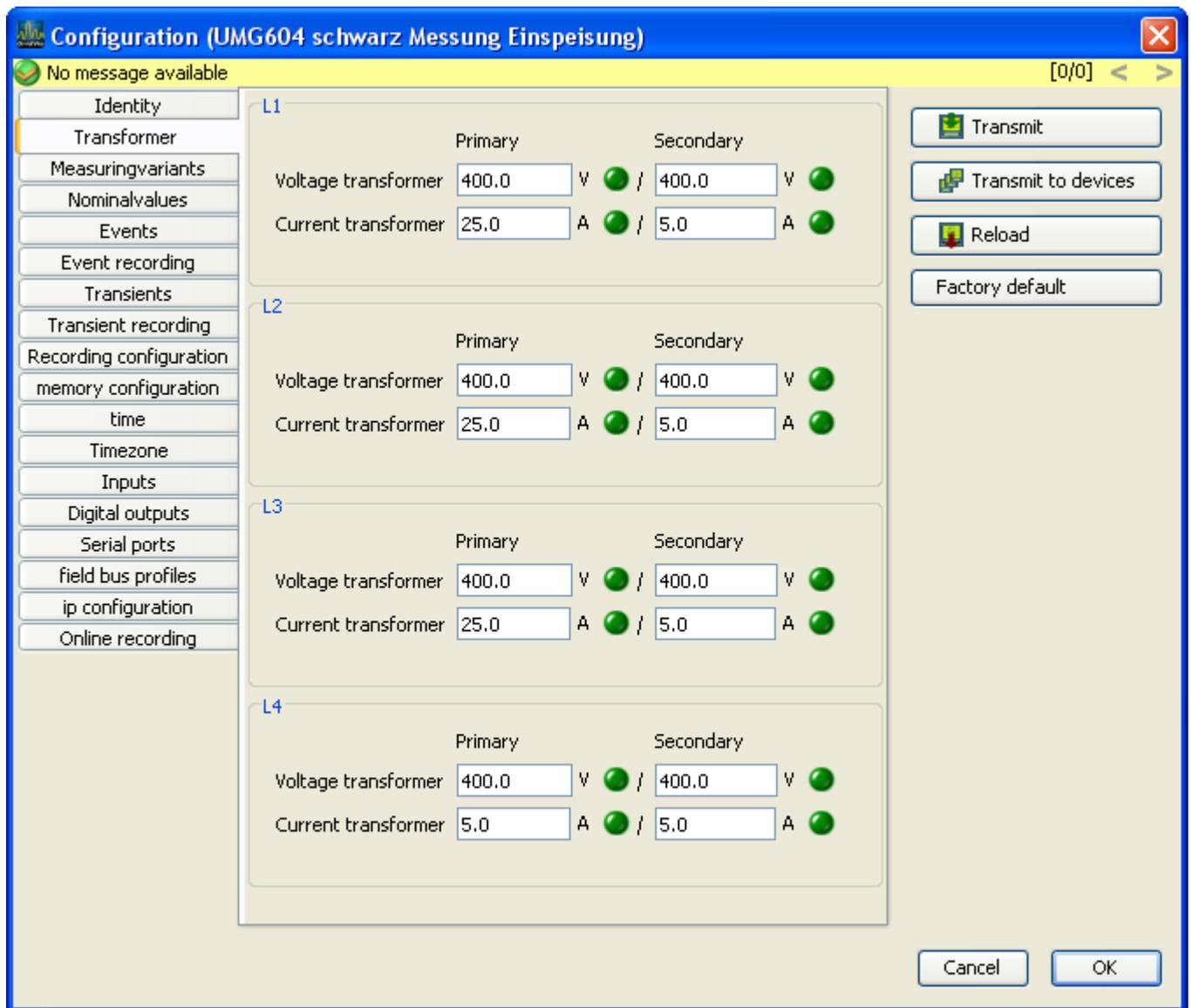
## Transformer

### Voltage Converter

- The voltage measurements inputs are designed for measurements in low voltages in which rated voltages (L-N/PE) up to 300V against ground can occur. A voltage converter is required for voltage measurements in grids with higher rated voltages.
- You must enter the phase voltage L-L for the primary voltage.
- Set the converter properties separately for each current measurement input.

### Current Converter

- Currents up to 5A can be directly measured by the UMG604. Please consult the installation instructions for more information.
- A current converter is used for measurements of currents larger than 5A.
- Set the converter properties separately for each current measurement input.



## Nominal Value

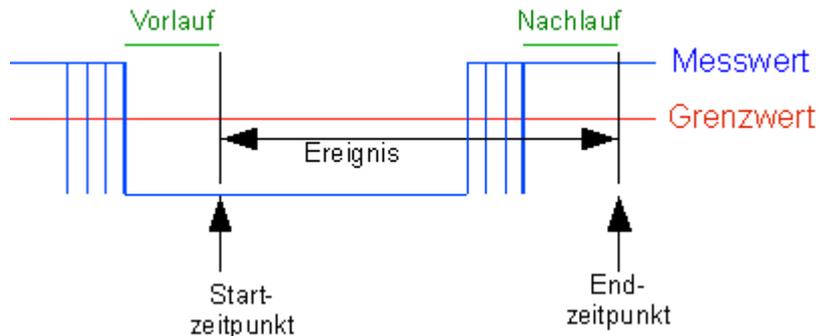
- The rated frequency applies to all 4 measurement channels.
- Select a network frequency according the existing network conditions.
- The nominal value is used as a reference to detect events (over/undervoltage and overcurrent).
- The nominal current of the transformer during feeding is required to calculate the K factor.

The screenshot shows the 'Configuration (UMG604 schwarz Messung Einspeisung)' window. The left sidebar contains a tree view with 'Nominalvalues' selected. The main area is divided into sections for 'General' and four measurement channels (L1, L2, L3, L4). Each channel has three input fields: 'Nominal voltage' (V), 'Nominal current' (A), and 'Nominal current for K-factor' (A). The 'Nominal frequency' is set to 'Auto'. On the right, there are buttons for 'Transmit', 'Transmit to devices', 'Reload', and 'Factory default'. At the bottom right are 'Cancel' and 'OK' buttons.

Channel	Nominal voltage (V)	Nominal current (A)	Nominal current for K-factor (A)
General	Auto	-	-
L1	230.0	5,000.0	1,000.0
L2	230.0	5,000.0	1,000.0
L3	230.0	5,000.0	1,000.0
L4	230.0	5,000.0	1,000.0

## Event

An event occurs when a set limit for current or voltage is violated.



- An event has an average, a minimum value and/or a maximum value, a start time and an end time.
- An event begins when a limit violation for a programmable number (*pre-trigger*) of full-waves exists continuously.
- An event ends when **no** limit violations for a programmable number (*post-trigger*) of full-waves exists continuously..
- Limits are programmed per measurement channel for overvoltage, undervoltage and overcurrent.
- Limits are set in percentages of Nominal Value.
- Adjustment range: Pre-trigger 0 .. 1000 full-waves
- Adjustment range: Post-trigger 0 .. 1000 full-waves
- You can turn off the limit monitoring (off/manual).
- If an event occurs, additional information can be saved in an Event Log.

**Configuration (UMG604 schwarz Messung Einspeisung)** [0/0] < >

No message available

- Identity
- Transformer
- Measuringvariants
- Nominalvalues
- Events**
- Event recording
- Transients
- Transient recording
- Recording configuration
- memory configuration
- time
- Timezone
- Inputs
- Digital outputs
- Serial ports
- field bus profiles
- ip configuration
- Online recording

**L1**

Over voltage: Manual  % ( 253.00V)

Under voltage: Manual  % ( 195.50V)

Over current: Manual  % ( 5500.00A)

**L2**

Over voltage: Manual  % ( 253.00V)

Under voltage: Manual  % ( 195.50V)

Over current: Manual  % ( 5500.00A)

**L3**

Over voltage: Manual  % ( 253.00V)

Under voltage: Manual  % ( 195.50V)

Over current: Manual  % ( 5500.00A)

**L4**

Over voltage: Manual  % ( 253.00V)

Under voltage: Manual  % ( 195.50V)

Over current: Manual  % ( 5500.00A)

**Run-in / After-run**

Run-in:  Full wave

After-run:  Full wave

Transmit

Transmit to devices

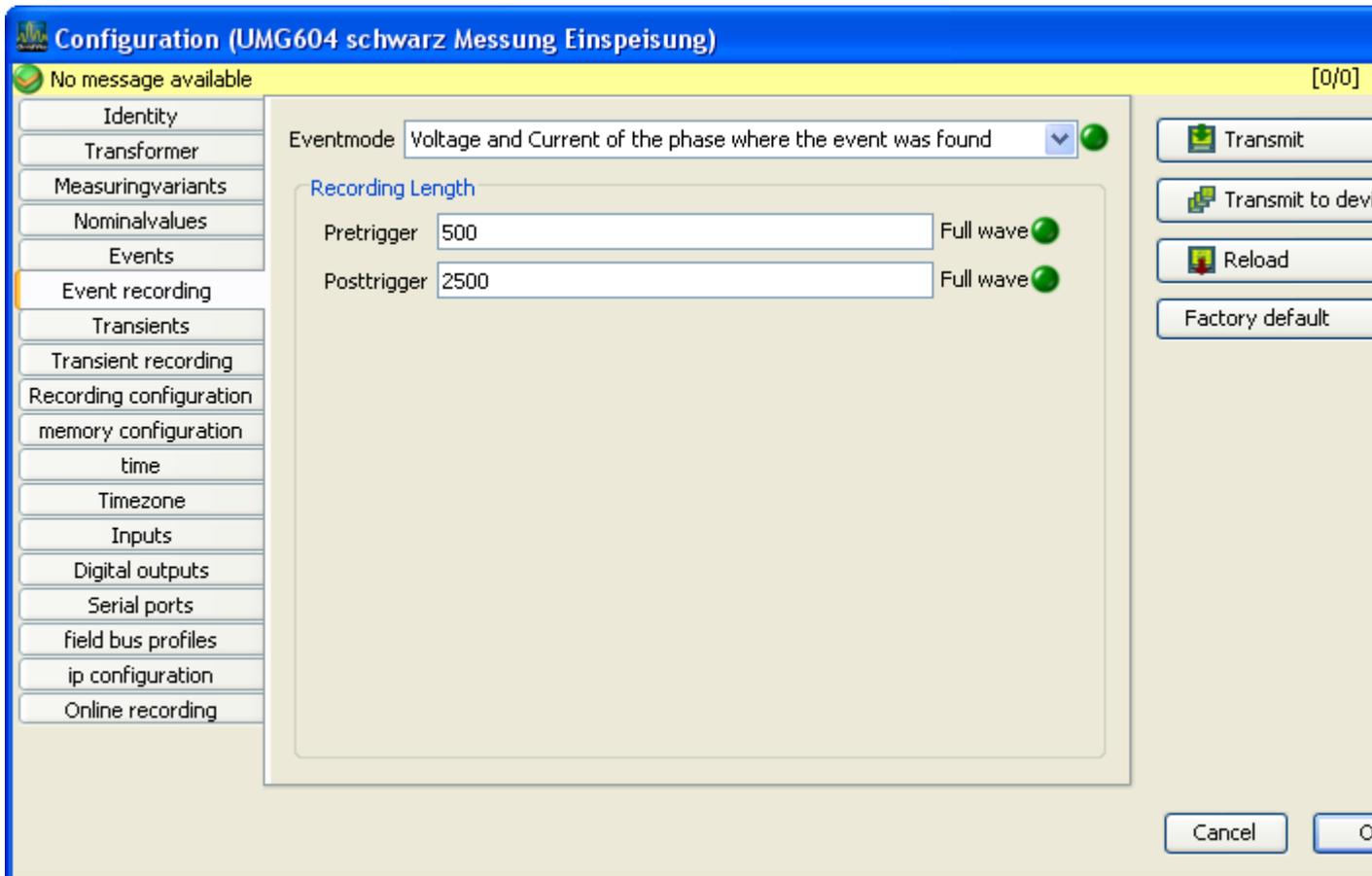
Reload

Factory default

Cancel OK

## Event recording

- If an Event occurs, additional information can be saved in an event log.
- The full-wave absolute values of current and voltage measured values are recorded in an event log.
- You can select between the following forms of information to be recorded in the event log:
  - Only the measured values from the measurement input with the event.
  - Only the voltage and current values from the phase in which the event occurred.
  - All measured values from the other current measurement inputs and/or all measured values from the other voltage measurement inputs.
  - All measured values from all current and voltage measurement inputs.
- The event log begins when an event occurs.
- The length of the event log is determined by the number of full-wave absolute values up to the beginning of the event designated here with pre-trigger and by the number of full-wave absolute values after the beginning of the event designated here with post-trigger.
- Adjustment range: Pre-trigger 64 .. 6144 full-waves
- Adjustment range: Post-trigger 64 .. 6144 full-waves



## Transients

- Transients are quick changes in voltage.
- The UMG604 detects transients that are longer than 50 us.
- You can only monitor the four voltage measurement inputs for transients.
- There are two independent criteria available to detect transients.

**Absolute:** If a sampled value exceeds the program limit, a transient will be detected.

**Off:** Turns off transient monitoring.

**Automatic:** The limit will be calculated automatically and amounts to 110% of the current 200ms absolute value.

**Manual:** The transient monitoring will use the programmed limit.

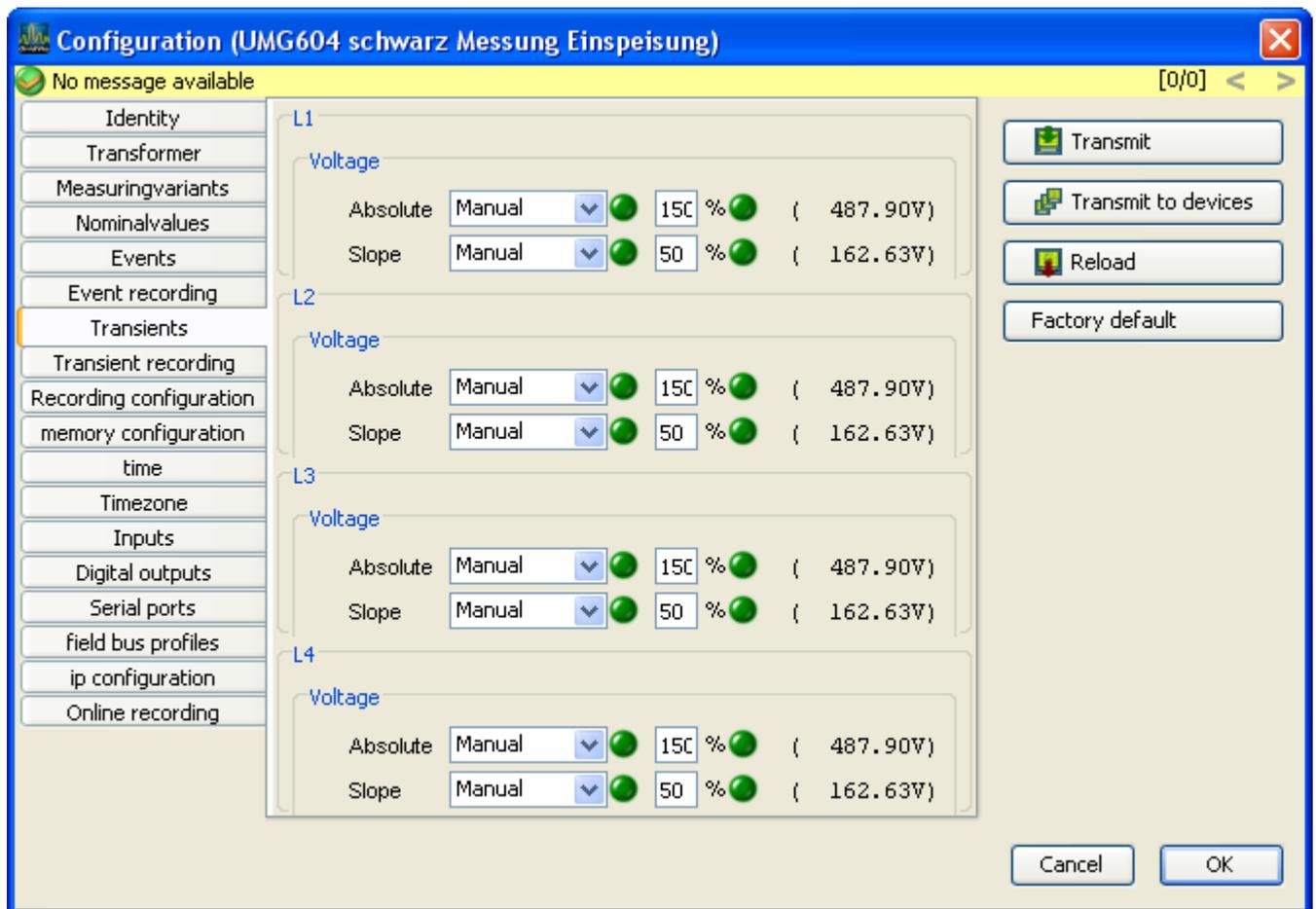
**Fast Increase:** A transient will be detected if the difference between two neighboring sample points exceeds the programmed limit.

**Off:** Turns off transient monitoring.

**Automatic:** The limit will be calculated automatically and amounts to 0.2175 of the current 200ms absolute value.

**Manual:** The transient monitoring will use the programmed limit.

- If a transient is detected, the limit will automatically be increased 20V in both **Automatic** and **Manual** mode. This automatic limit increase will subside within 10 minutes.
- If a transient is detected, the wave form will be saved in a Transient Log.
- If an additional transient is detected within the next 60 seconds, this transient will be logged with 512 points.



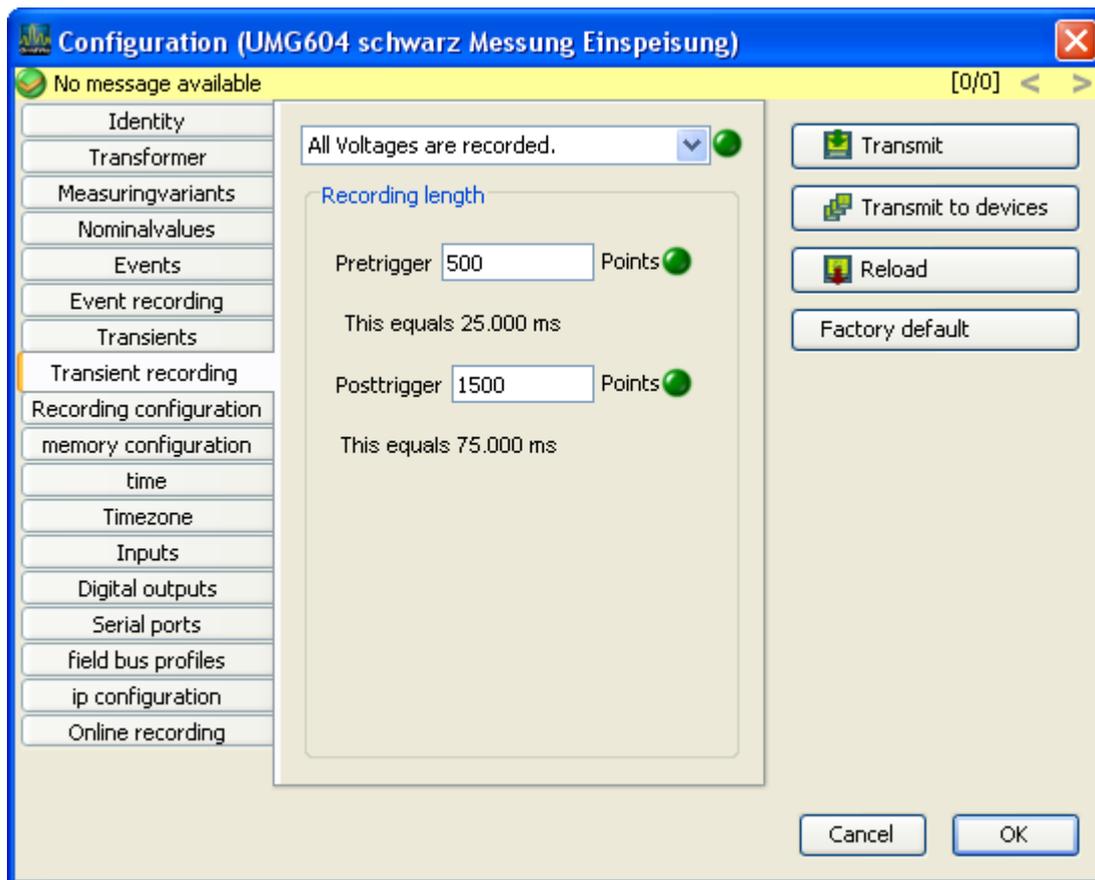
## Transient recording

- If a Transient occurs, the wave form with a programmable number of sample points before and after the transient can be saved in a transient log.
- The interval between two sample points is always 50us.
- You can select between the following measurement channels to be recorded in the transient log:
  - -Only the voltage measurement input will be recorded with the transient.
  - -Only the voltage measurement input and accompanying current measurement input will be recorded with the transient.
  - -All voltage measurement inputs will be recorded.
  - -All voltage measurement inputs and current measurement inputs will be recorded.

### Log Length

The number of sample points that should be recorded before the occurrence of the transient:

- Pre-trigger  
Adjustment range: 64 .. 6144 points
- Post-trigger  
Adjustment range: 64 .. 6144 points

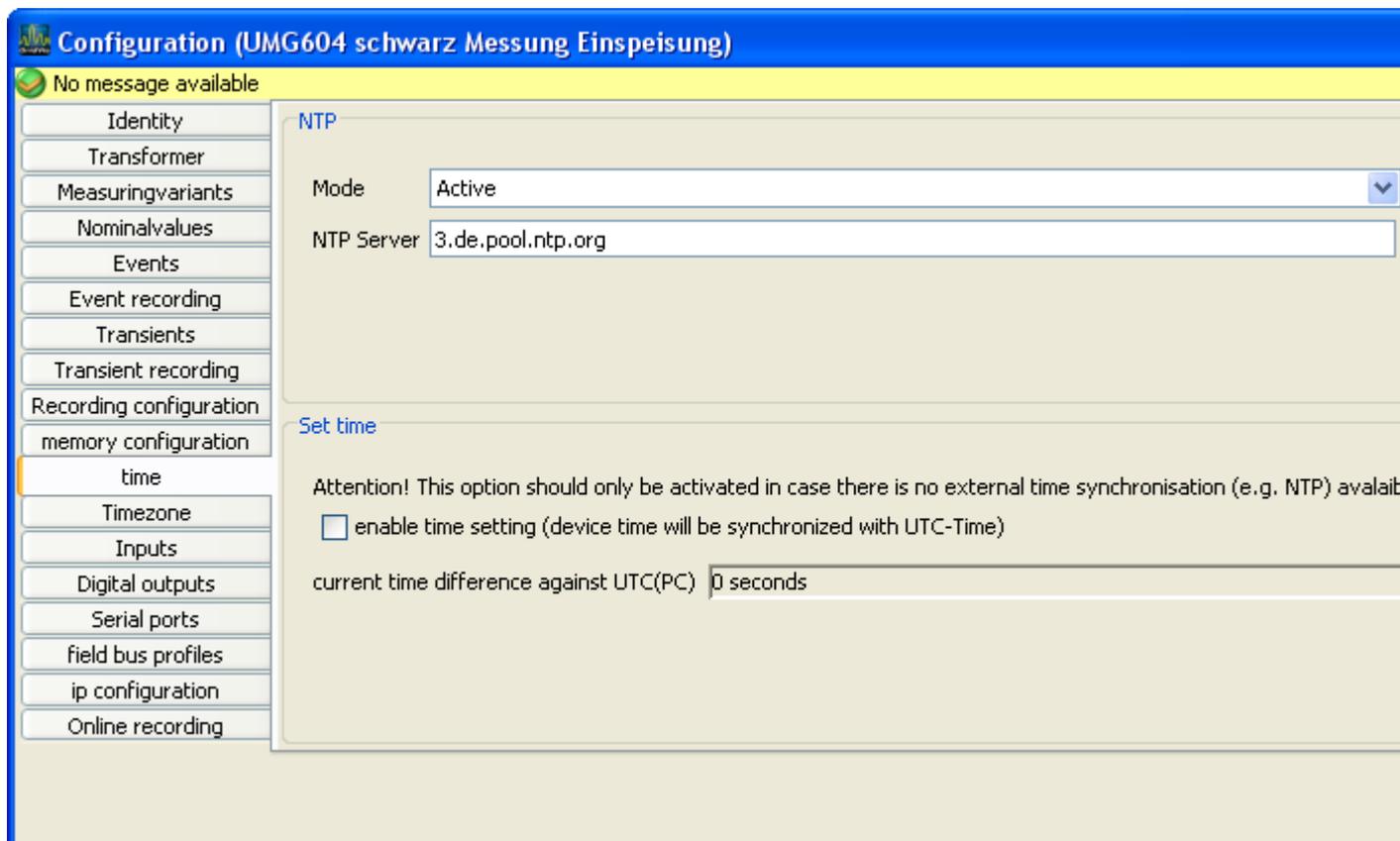


## Time

The UMG604 has a battery buffered clock. The rate of error of the clock crystal will be harmonized with the room temperature during production so that the clock will only have a variation of +/- 1 minute per month.

If you would like to compare the logging of transients and events with the logs of other measuring sites, we recommend comparing and tracking the clock of the UMG604 with a time server. To do so the UMG604 will require the Ethernet interface (optional). The **Network Time Protocol (NTP)** will be used for the synchronization.

- Mode
  - Off - The synchronization of the clock with the external time server is turned off.
  - List - The UMG604 will wait for time information from a time server.
  - Active - The UMG604 will request the time information.
- NTP Server - Enter the address of the time server here.



## Time Zone

- All time information for measured values, events and transients refers to *UTC* time (coordinated world time).
- The *UTC* time will be converted to central European time (*CET*) for the display of the measured results with GridVis.
- Central European time (*CET*) is the *time zone* which applies to central Europe and, among other countries, Germany.
- **Standard Time** - the *time offset* from central European standard time to *UTC* time is entered here.
- **Daylight Savings Time** - the *time offset* from central European daylight savings time to *UTC* time is entered here.
- **Beginning of Daylight Savings Time** - Enter the *Beginning of Daylight Savings Time* here.
- **End of Daylight Savings Time** - Enter the *End of Daylight Savings Time* here.

Configuration (UMG604 schwarz Messung Einspeisung)

No message available

		Time offset							
Identity									
Transformer									
Measuringvariants	Standard time	<input type="text" value="3600"/>	sec	<input type="checkbox"/>					
Nominalvalues	Daylight saving	<input type="text" value="7200"/>	sec	<input type="checkbox"/>					
Events									
Event recording									
Transients	Start day light saving	Month		Earliest day of month		Day of week		Hour	Minute
Transient recording		March	<input type="checkbox"/>	28	<input type="checkbox"/>	Saturday	<input type="checkbox"/>	2	0
Recording configuration	End day light saving	October	<input type="checkbox"/>	25	<input type="checkbox"/>	Sunday	<input type="checkbox"/>	3	0
memory configuration									
time									
Timezone									
Inputs									
Digital outputs									
Serial ports									
field bus profiles									
ip configuration									
Online recording									

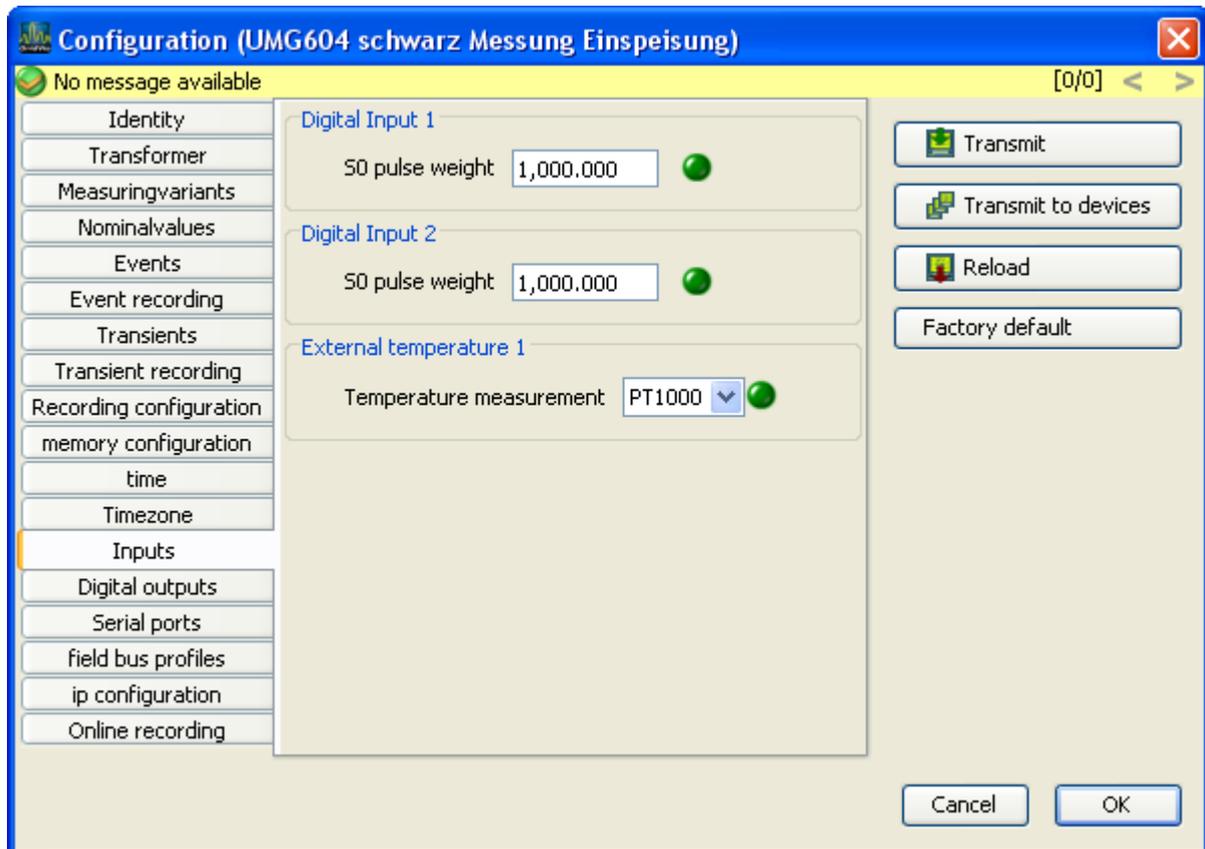
## Inputs

The UMG604 has two digital inputs and a temperature measurement input. The two digital inputs can be used as digital inputs and as impulse counting inputs.

Each impulse input can be assigned an impulse value.

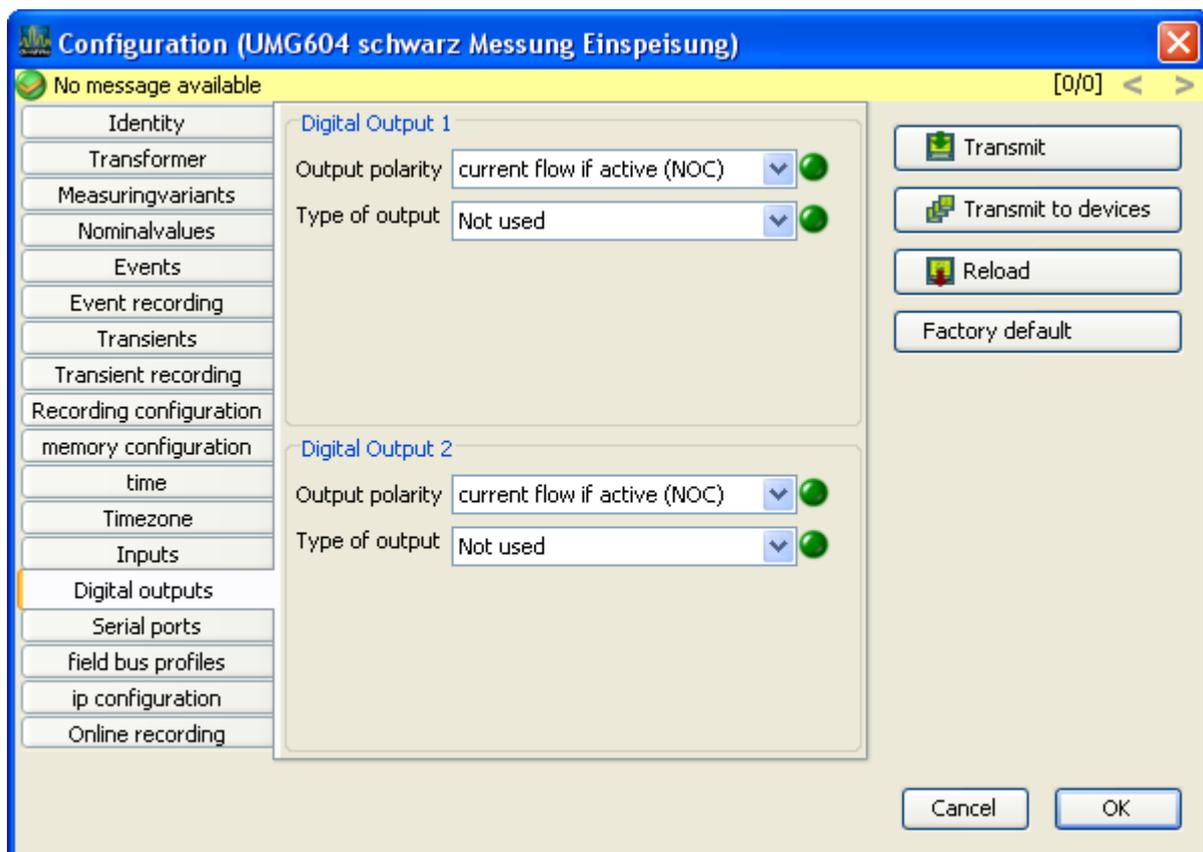
You can connect various temperature measurement sensors to the **Temperature Measurement Input**:

- PT100 - temperature range -55°C .. +175°C
- PT1000 - temperature range -40°C .. +300°C
- KTY83 - temperature range -99°C .. +500°C
- KTY84 - temperature range -99°C .. +500°C



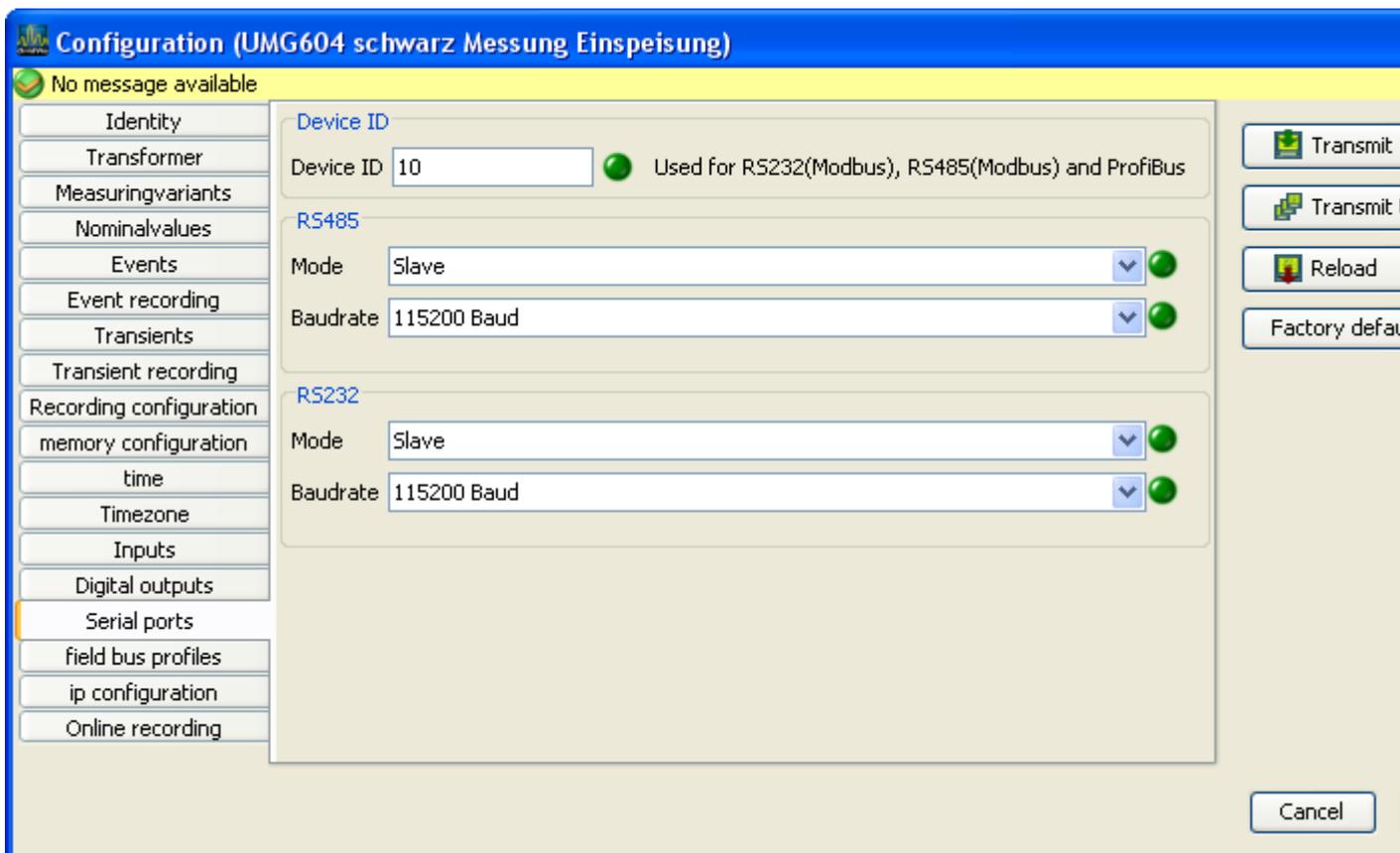
## Digital Outputs

- The UMG604 has two digital outputs.
- Each digital output can be programmed for event notifications or as an impulse output (S0 output).
- Each digital output can be programmed as an opener or a closer.
- If an output is programmed for event notification, one or more events can be assigned to it.
- If a selected event occurs, the event output will be activated.



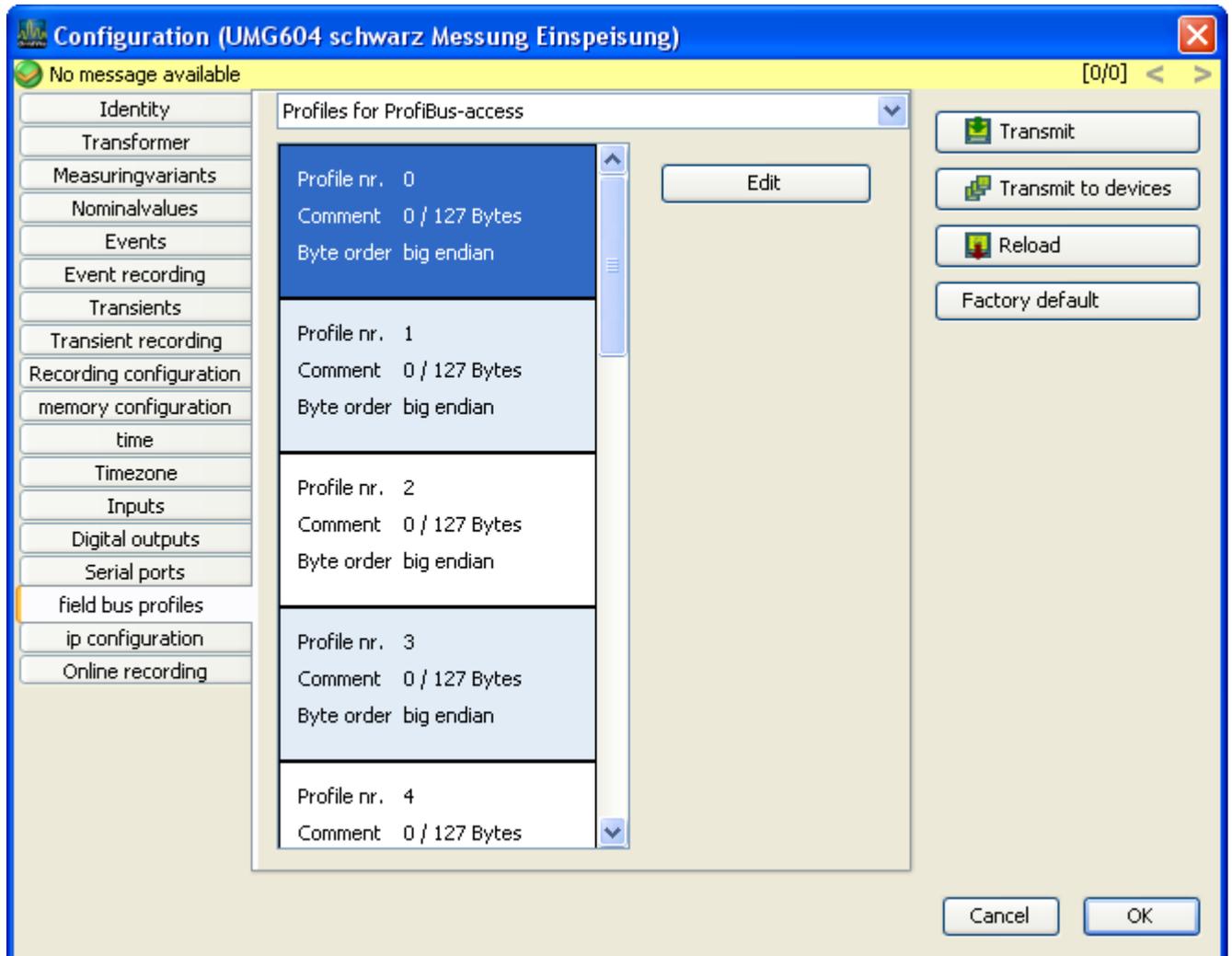
## Serial Ports

- **Device ID**  
The device ID (device address) is required for the Modbus communication and for Profibus.
- **RS485**  
You can choose between Modbus-Master or Modbus-Slave.  
You can choose between the following baud rates: 9600bps, 19200bps, 38400bps, 76800bps, 115200bps and 921600bps
- **RS232**  
You can choose between Modbus-Master or Modbus-Slave.  
You can choose between the following baud rates: 9600bps, 19200bps, 38400bps and 115200bps
- **Profibus (Optional)**  
Warning! Additional Profibus settings are made at Field Bus Profile.

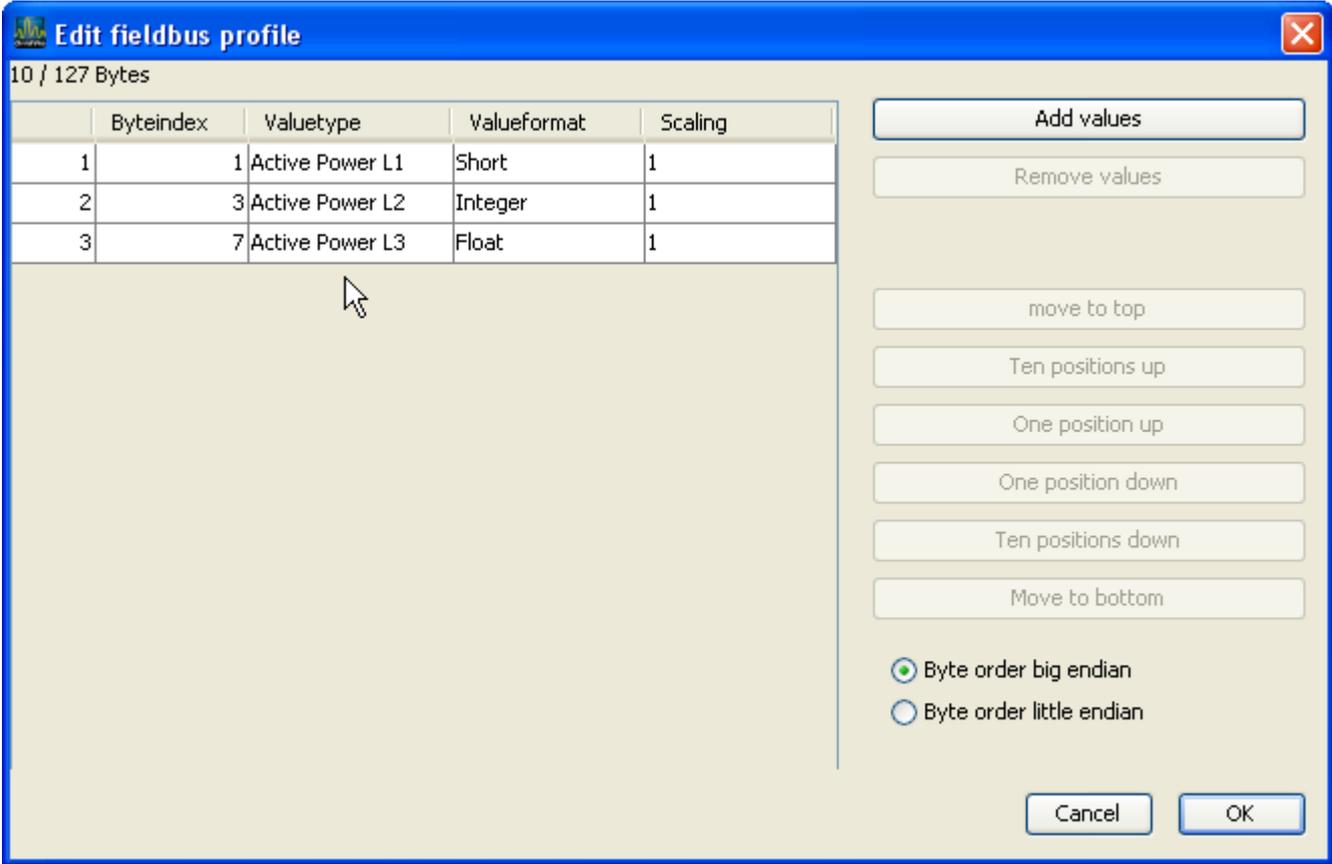


## Field Bus Profile

16 different profiles can be configured for accessing the measured values in the UMG604 via Profibus (optional).



Measured values can be assigned to a Profibus profile with *Edit*.



Example of a Profibus profile

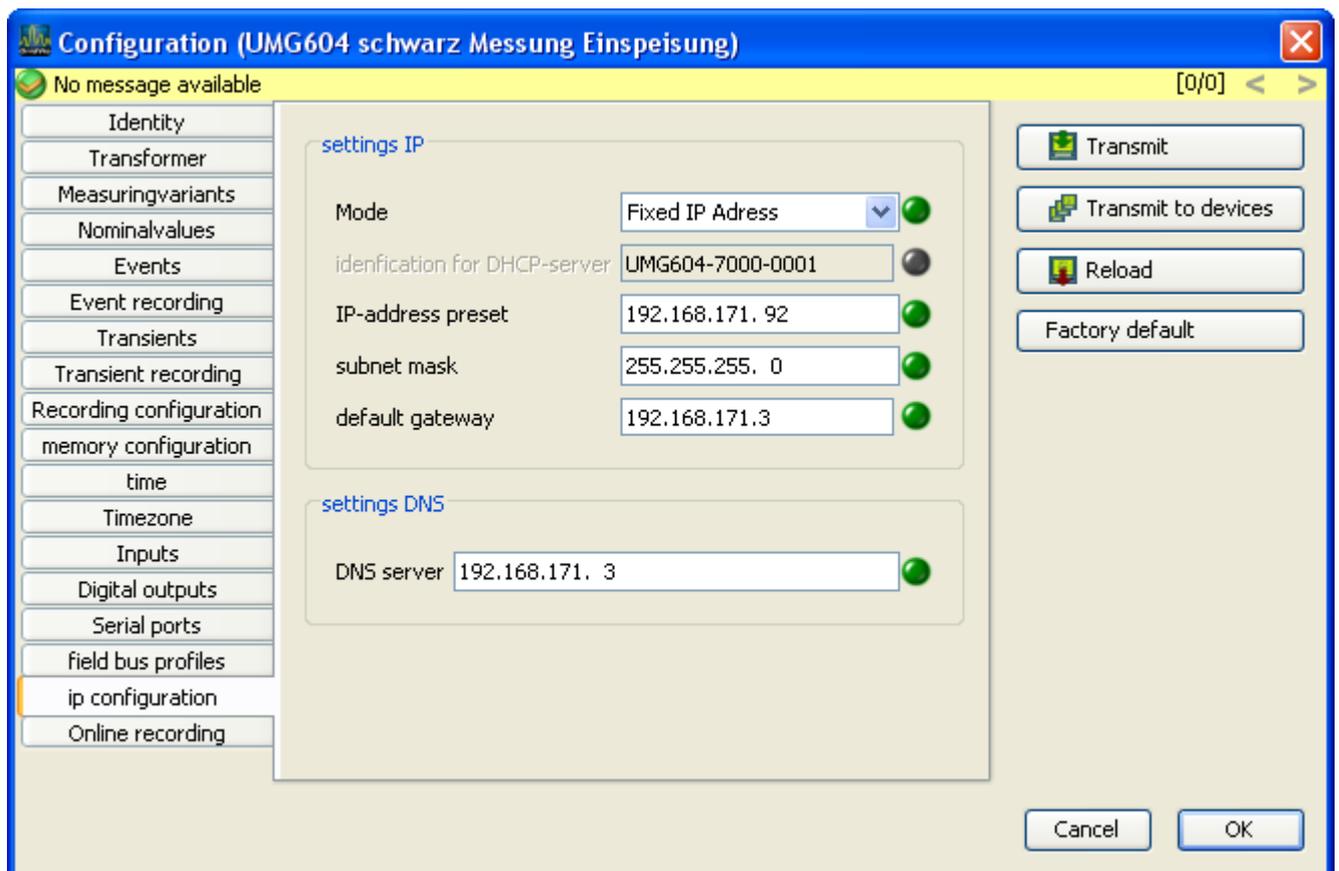
## IP Configuration

For devices with the *Ethernet* option, you must configure at least the *IP Address* and the *Subnet Mask*.

With the UMG604, you can choose between the variants *Used Default Setting*, *BootP* and *DHCP Mode*.

- **Used Default Setting**  
All settings are applied by the user.
- **BootP**  
BootP allows the automatic incorporation of a UMG604 into an existing network.
- **DHCP Mode**  
The UMG604 obtains all settings from a DHCP server during startup.

**Warning!** All configurations should only be made after checking with the **Administrator**.

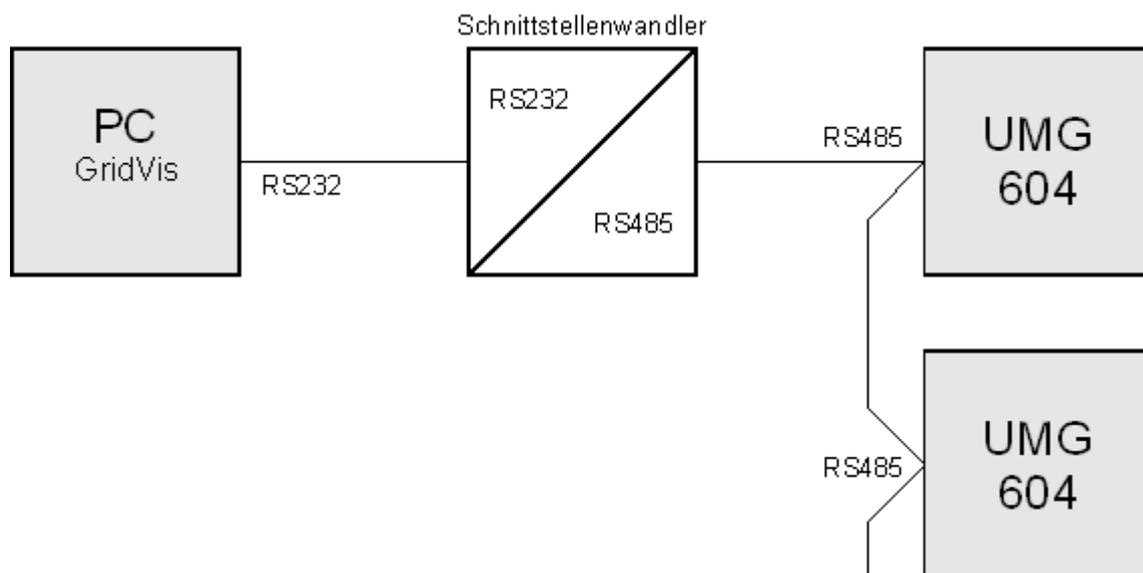


## **Serial Interfaces**

## Connection Diagrams

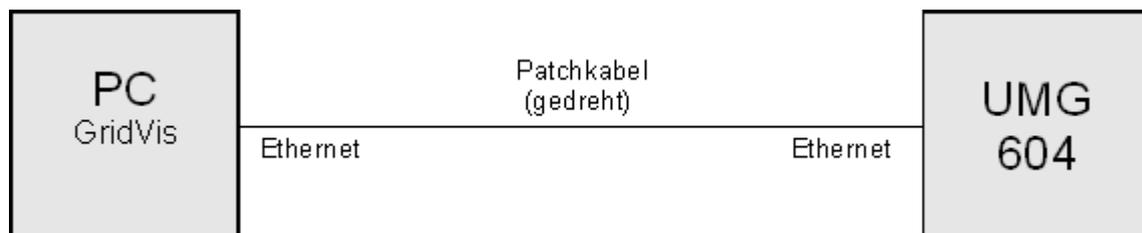
### PC - RS485 - UMG604 Connection

- The UMG604 has an RS485 interface and the PC has an RS232 interface.
- An interface converter is required.



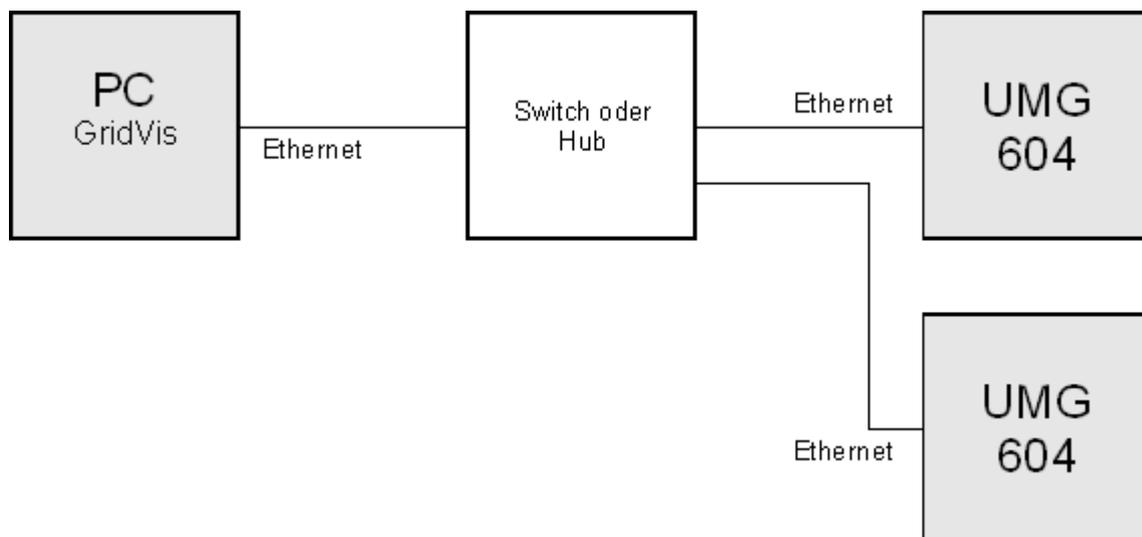
## PC - Ethernet - UMG604 Connection

- The UMG604 and the PC have an Ethernet interface.
- You can make a direct connection between the PC and UMG604 with a "cross-over" patch cable.



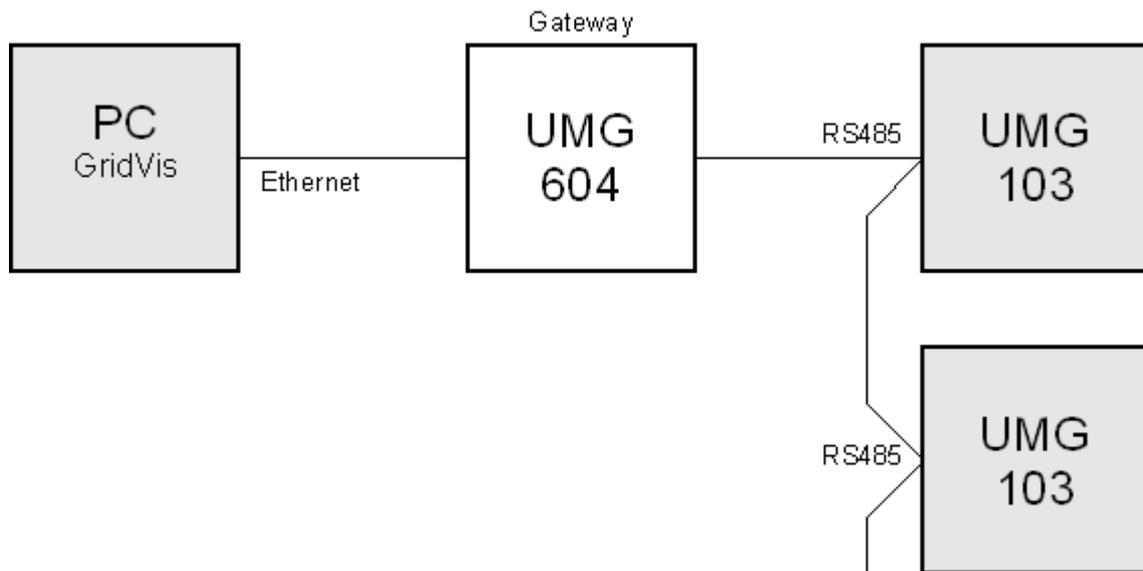
## PC - Ethernet (Switch) - UMG604 Connection

- The UMG604 has an Ethernet interface and the PC has an Ethernet interface.
- A switch or hub will be required.



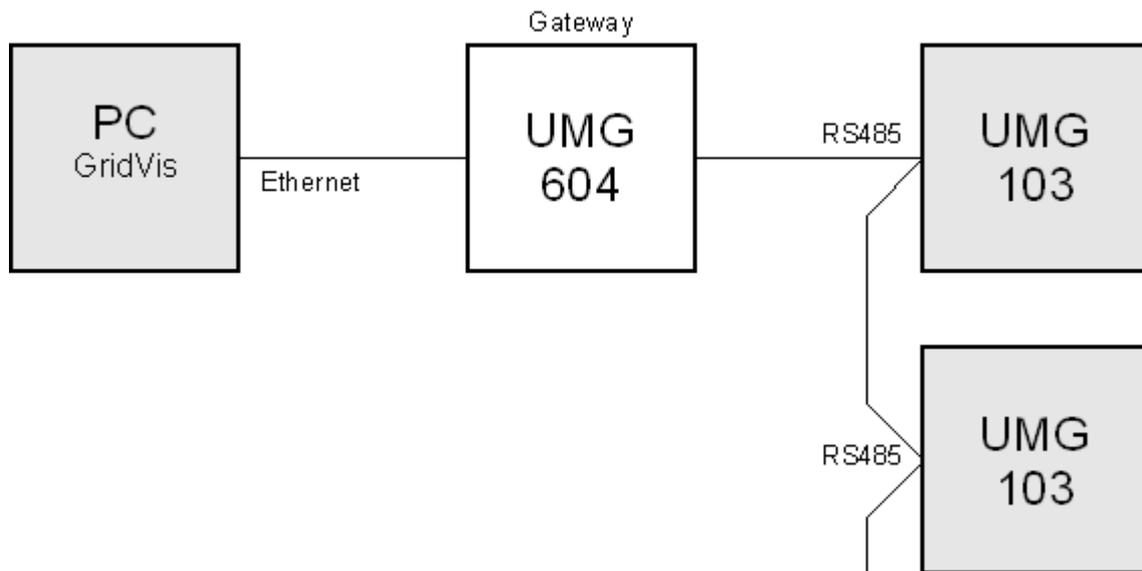
## UMG96S in BACnet with the UMG604 as Gateway

- The UMG604 has an Ethernet interface and an RS485 interface.
- The UMG96S has an RS485 interface.
- The UMG604 is the Modbus-Master (RS485) and the UMG96S is the Modbus-Slave.
- The UMG96S is presented as a virtual device by UMG604 in BACnet.
- A Jasic program in the UMG604 will query the measured values in the connected UMG96S and provide them to BACnet.



## UMG604 as Gateway Between GridVis and UMG96S

- The UMG604 has an Ethernet interface and an RS485 interface.
- The UMG96S has an RS485 interface.
- The UMG604 is the Modbus-Master (RS485) and the UMG96S is the Modbus-Slave.
- The baud rate of both devices must match.
- A Jasic program in the UMG604 will query the measured values in the connected UMG96S and provide them for further processing.



## Ethernet

### General Ethernet

The UMG604 requires an Ethernet address to be able to operate in the Ethernet. The UMG6-4 offers three options:

- **Fixed IP Address**
- **BootP**
- **DHCP Mode**

#### 1. Fixed IP Address

The network address must be entered directly into the UMG604 for networks without a DHCP server.

#### 2. BootP

BootP allows the automatic incorporation of a UMG604 into an existing network.

BootP is an older protocol and does not have the range of functions of DHCP.

#### 3. DHCP Mode

DHCP allows the automatic incorporation of a UMG604 into an existing network without additional configuration.

The UMG604 automatically obtains the IP address, network mask and gateway via the DHCP server upon startup.

You can program the corresponding setting under parameter address 205 in the UMG604.

0 = Fixed IP

1 = BootP

2 = DHCP

## UMG604

### Fixed IP Address

The network address must be entered directly into the UMG604 for networks without a DHCP server.

You must make the following settings on the UMG604:

1. Set the UMG604 to a *fixed IP*.
2. Configure the desired IP address, IP mask and IP gateway.

#### Address

300 = xxx --- --- --- (IP Address)

301 = --- xxx --- --- (IP Address)

302 = --- --- xxx --- (IP Address)

303 = --- --- --- xxx (IP Address)

304 = xxx --- --- --- (IP Mask)

305 = --- xxx --- --- (IP Mask)

306 = --- --- xxx --- (IP Mask)

307 = --- --- --- xxx (IP Mask)

310 = xxx --- --- --- (IP Gateway)

311 = --- xxx --- --- (IP Gateway)

312 = --- --- xxx --- (IP Gateway)

313 = --- --- --- xxx (IP Gateway)

## Settings of GridVis

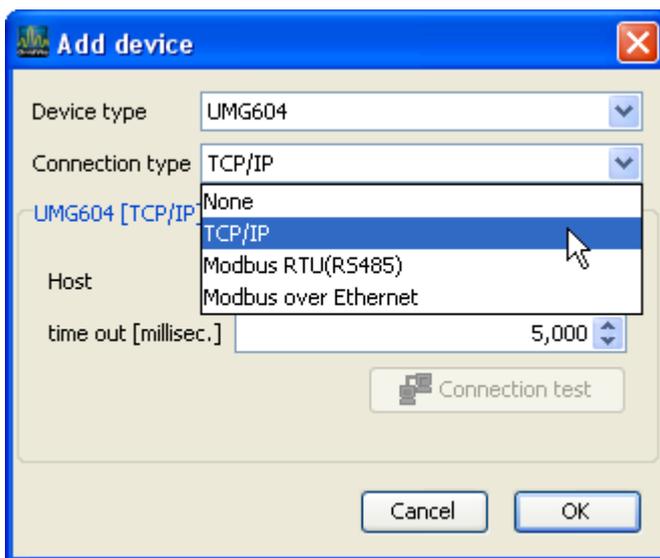
### Add UMG604

- You can connect the UMG604 to a PC via the Ethernet interface (optional), the RS485 interface or the RS232 interface. PCs without suitable interfaces will require an interface converter. See Connection Example.

1. Select *UMG604* as the device type.

2. Select the connection type.

- The *Connection Type* (protocol) must be appropriate for the interface in the device. See selection table.



**UMG604 - Selection Table for the Connection Type (Protocol)**

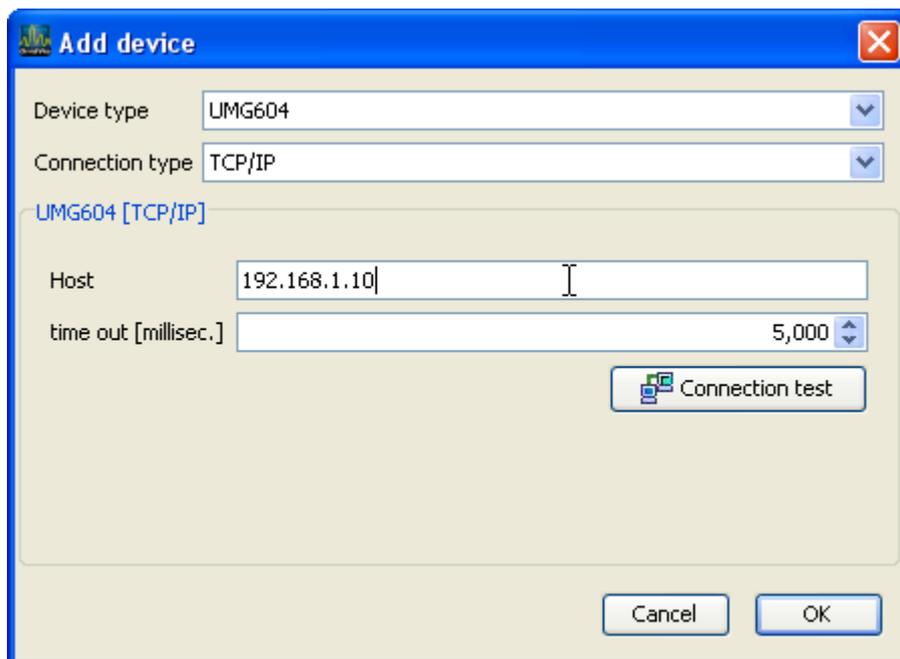
UMG604 Interface	TCP/IP	Modbus RTU (RS485)	Modbus via Ethernet	
			Modbus/TCP	Modbus

<b>Ethernet (Optional)</b>	x	x	x	x
<b>RS485</b>	-	x	-	-
<b>RS232</b>	-	-	-	-

## Connection type - TCP/IP

You want to establish a connection between the UMG604 and the PC with GridVis.

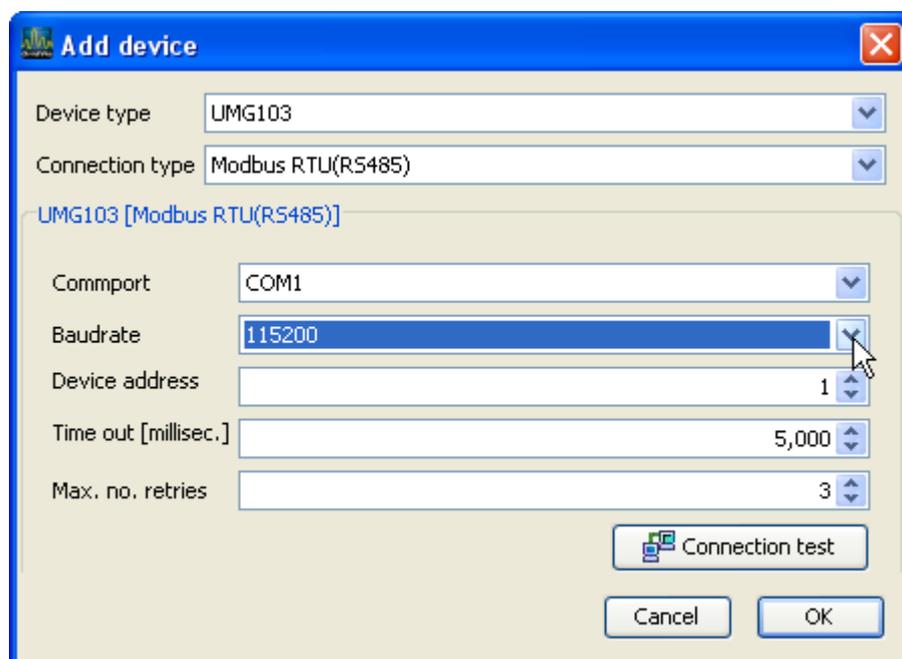
- The UMG604 must have an Ethernet interface.
- For a **direct** between the UMG604 and the PC you will need a "**cross-over**" patch cable.
- For connection via an existing network (hub/switch), you will require a **normal** patch cable.
- The address for the UMG604 can be obtained from a server via DHCP or you can directly enter a fixed address in the UMG604.
- The address can be entered in GridVis in numeric form or as a name.
- *Timeout* allows you to limit the number of connection attempts if no connection can be made.



## Connection Type - Modbus RTU (RS485)

You want to establish a connection between the UMG604 and the PC with GridVis.

- The UMG604 must have an RS485 interface.
- You require an interface converter from RS485 (UMG604) to RS232 (PC).
- For *Interface* configure the RS232 interface (e.g. *COM1*) on the PC.
- Connect this interface (e.g. *COM1*) to the interface converter.
- The baud rate is the speed at which the data is transferred between the PC, the interface converter and the UMG604.
- As multiple UMG604 devices can be connected to the interface converter, the device address on the UMG604 must be entered.
- If no connection to the UMG604 can be made, another attempt will be conducted after the specified *Timeout*.
- When attempting to read data from the UMG604, the number of connection attempts will be limited by the *Maximum Number of Attempts*.
- GridVis will always attempt to connect to the UMG604 for online measurements.



## **Modbus**

### **Modbus Address List**

A list of the measured values available in the UMG604 with the accompanying addresses and format exists in PDF format on the GridVis CD/DVD.

## Modbus Status Notifications, Exception Codes

The *Jasic* programming language Modbus functions *Write Modbus* and *Read Modbus* provide status notifications.



Status notifications can be written to a *Log* file. The log file of a *Jasic* program can be displayed in the accompanying programming window under the *Log* tab.

List of the Modbus status notifications and their meanings:

### 0 There are no errors.

### -1 Call improperly configured

A serious error has occurred.  
This should not occur in the graphic programming.

### -2 CRC Error

### -3 Device is not answering

The device is not connected.  
The baud rate is not properly configured.

### -4 Device in Modbus-Slave Mode

The RS485 interface of the UMG604 must be set to Modbus-Master for the Modbus functions *Write Modbus* and *Read Modbus* in the *Jasic* programming language.

### 1 ILLEGAL FUNCTION

The function code received in the query is not an allowable action for the slave.  
If a Poll Program Complete command was issued, this code indicates that no program function preceded it.

## **2 ILLEGAL DATA ADDRESS**

The data address received in the query is not an allowable address for the slave.

## **3 ILLEGAL DATA VALUE**

A value contained in the query data field is not an allowable value for the slave.

## **4 SLAVE DEVICE FAILURE**

An unrecoverable error occurred while the slave was attempting to perform the requested action.

## **5 ACKNOWLEDGE**

The slave has accepted the request and is processing it, but a long duration of time will be required to do so. This response is returned to prevent a timeout error from occurring in the master. The master can next issue a Poll Program Complete message to determine if processing is completed.

## **6 SLAVE DEVICE BUSY**

The slave is engaged in processing a long-duration program command. The master should retransmit the message later when the slave is free.

## **7 NEGATIVE ACKNOWLEDGE**

The slave cannot perform the program function received in the query. This code is returned for an unsuccessful programming request using function code 13 or 14 decimal. The master should request diagnostic or error information from the slave.

## **8 MEMORY PARITY ERROR**

The slave attempted to read extended memory, but detected a parity error in the memory. The master can retry the request, but service may be required on the slave device.

## Modbus Functions

Modbus functions supported by the UMG604:

- 03 Read Holding Registers  
*Reads the binary contents of holding registers (4X references) in the slave.*
- 04 Read Input Registers  
*Reads the binary contents of input registers (3X references) in the slave.*
- 16 (10Hex) Preset Multiple Registers  
*Presets values into a sequence of holding registers (4X references). When broadcast, the function presets the same register references in all attached slaves.*
- 23 (17Hex) Read/Write 4X Registers  
*Performs a combination of one read and one write operation in a single Modbus transaction. The function can write new contents to a group of 4XXXX registers, and then return the contents of another group of 4XXXX registers. Broadcast is not supported.*

**Warning! The UMG604 does not support the function 06 Preset Single Register.**

## BACnet

### BACnet

**BACnet = Building Automation and Control Networks** is a network protocol for building automation.

BACnet ensures the interoperability between devices made by different manufacturers when all partners involved in a project agree upon certain BIBBs defined by the norm. A BIBB (BACnet Interoperability Building Block) defines which services and procedures must be supported on the server-side and the client-side in order to realize a certain requirement of the system.

The UMG604 supports the **device type B-SA** with the BIBBs DS-RP-B and DS-WP-B.

The BIBBs DS-WP-B, DS-WPM-B, AE-N-B and AE-N-B are also supported.

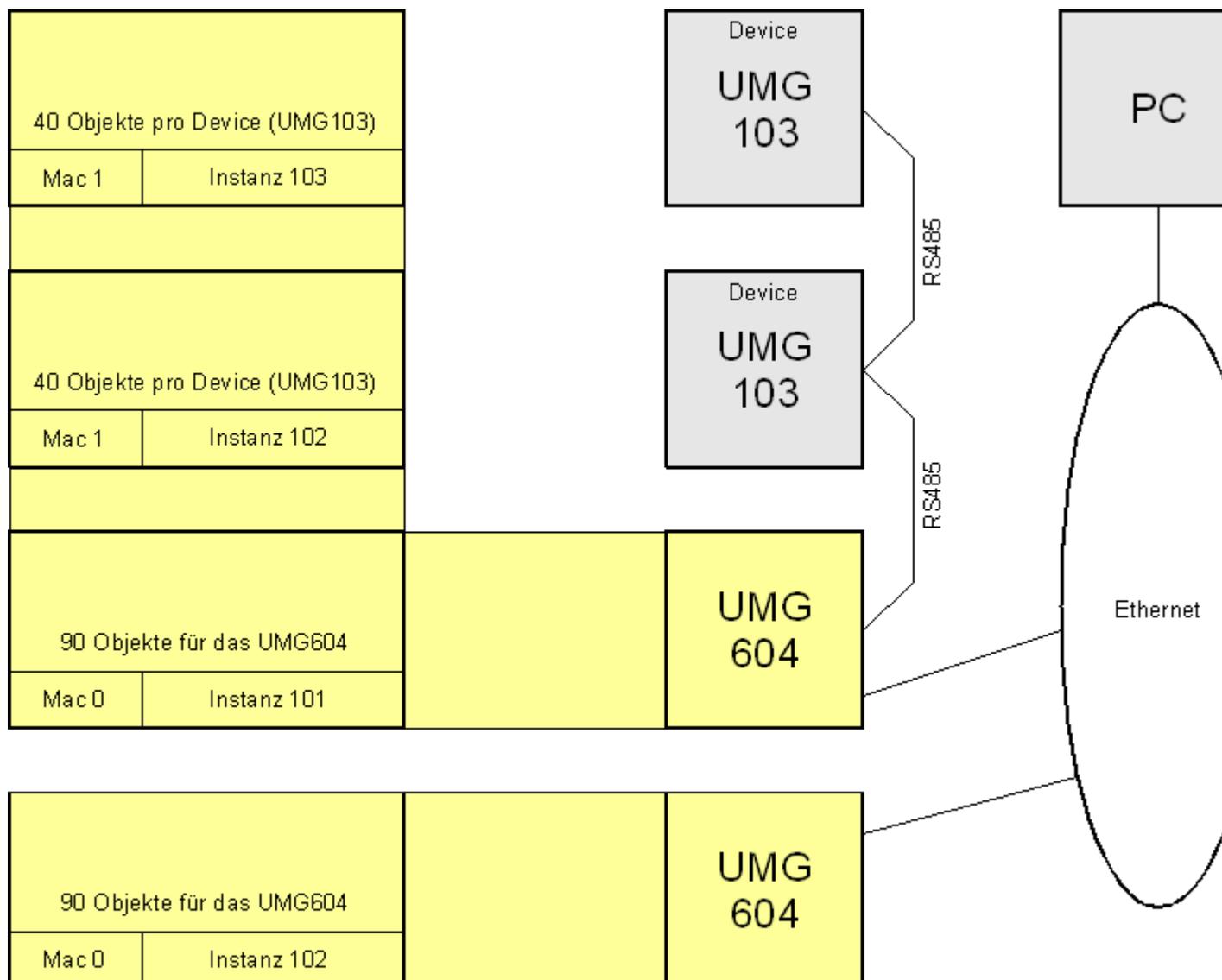
A Jasic program forms the interface between the BACnet protocol in the UMG604 and external devices (GLT, UMG96s, third party devices, et cetera).

- BACnet is a fee-based software expansion and must be unlocked.
- BACnet can only be unlocked directly from the device.
- The unlock code consists of two 4 digit numbers which must be entered in the device at addresses 520 and 521.
- The user can adapt the interface (Jasic programs).
- Jasic programs can be accessed and modified by the user.
- Basic programming knowledge is required to modify or write Jasic programs.
- BACnet knowledge is required to adapt the interface to BACnet using a Jasic program.
- Janitza electronics GmbH has the *BACnet Vendor Identification Number*: 316.

## UMG604 in BACnet

One PC and two UMG604s are connected to an Ethernet network. Two UMG103s are connected to a UMG604 via the RS485 interface.

- One UMG604 can manage a maximum of 90 objects.
- One UMG604 can manage a maximum of 40 objects per connected device (e.g. UMG103).
- Measured values are assigned to the corresponding object with a Jasic program.
- A maximum of 32 virtual devices, each with 40 objects, can be managed by a UMG604.
- A measured value in the UMG604 corresponds to the "analog input" in BACnet.
- All other floating values corresponds to the "analog values" in BACnet.



*Illustration: Example for operating 2 UMG604s and 2 UMG103s in BACnet.*

## **BACnet Jasic Example**

Program example (Jasic program) for data transfer from the UMG604 to BACnet.

```

REM strukturierte Variablen anlegen (Header für Bacnet)
record dev = (int,error) (string,name$)(string,desc$)(string,location$) (int,mac) (int,instance)

REM Struktur um Messwerte (Systemvariablen) erweitern
addrecord dev =(system_ulin[0..3]) (system_iln[0..3]) (system_pln[0..3]) (system_qln[0..3])

REM Struktur um Messwerte (Systemvariablen) erweitern
addrecord dev = (system_sln[0..3]) (system_freq)

REM strukturierte Variablen für ein Event anlegen
record event = (int,error)(int,dev_nr)(int,var_nr) (float,low_limit) (float,high_limit) (float,deadband) (int,time_delay) (int,limit_enable)
(int,nv_class)

REM strukturierte Variablen für ein COV_Event anlegen
record cov = (int,error)(int,dev_nr)(int,var_nr) (float,cov_increment)

REM Struktur füllen
REM mac = 0 -> lokales Netz
dev.mac = 0;

REM Instance / Name / Beschreibung / Ort angeben
dev.instance=201;
dev.name$="UMG604"
dev.desc$="Testgeraet"
dev.location$="auf dem Labortisch"

REM Struktur im System anmelden
call init_bacnet_device dev
REM nach den Anmeldung kann man die Struktur für weitere (Virtuelle) Devices verwenden

REM Eventstruktur füllen
REM das UMG604 ist in verschiedene Bacnetdevices aufgeteilt -> Nr.0 ist das lokale Device (oben angelegt)
REM alle weiteren Devices sind Devices im virtuellen Netz
event.dev_nr=0

REM die Var_Nr ist die N-te in der Struktur angelegte Variable (hier_ulin[0] "Spannung L1")
event.var_nr=0

REM Siehe Bacnet
event.low_limit = 200
event.high_limit = 250
event.deadband = 1
event.time_delay = 5
event.limit_enable = 3

REM Event Struktur im System Anmelden
call set_bacnet_event event
REM nach den Anmeldung kann man die Struktur für weitere Events verwenden

REM die Var_Nr ist die N-te in der Struktur angelegte Variable (hier_ulin[1] "Spannung L2")
event.var_nr=1
REM Event Struktur im System Anmelden
call set_bacnet_event event

REM COV-Struktur füllen
REM das UMG604 ist in verschiedene Bacnetdevices aufgeteilt -> Nr.0 ist das lokale Device (oben angelegt)
REM alle weiteren Devices sind Devices im virtuellen Netz
cov.dev_nr=0

REM die Var_Nr ist die N-te in der Struktur angelegte Variable (hier_ulin[0] "Spannung L1")
cov.var_nr=0

REM increment auf 1V setzen
cov.cov_increment = 1

REM COV Struktur im System Anmelden
call set_bacnet_cov cov
REM nach den Anmeldung kann man die Struktur für weitere COVs verwenden

REM die Var_Nr ist die N-te in der Struktur angelegte Variable (hier_ulin[2] "Spannung L3")
cov.var_nr=2
REM increment auf 0.5V setzen
cov.cov_increment = 0.5
call set_bacnet_cov cov

```



## Security

### Password

#### System Password

- The system password is required to administrate the devices.
- The system password allows the calibration values, serial numbers and MAC addresses of the devices to be changed.
- The users do not require the system password.
- The system password is not given to the users for security reasons.

#### FTP Password

- Allows access to all of the device values listed in the *Modbus Addresses List*.
- Allows access to all Jasic programs on the device.
- Allows the device homepage to be updated.
- The default FTP password is *Janitza*.

#### Homepage Password

- The homepage password (Modbus address 502) allows the device homepage to be administrated.
- The homepage password allows Jasic programs to be loaded and started on the device homepage.
- Password Mode (Modbus Address 502). The UMG604 has three different password modes for the homepage password:
  - 0 - The homepage password will not be asked for. (Default Setting)
  - 2 - Changes to the configuration and displaying measured values require the password to be entered once.
  - 128 - Every change to the configuration requires the password to be entered.
- The default homepage password setting is 0.
- The homepage password is 4 characters.
- The homepage password is asked for when the homepage is opened.
- The homepage password will be asked for again after 5 minutes of inactivity.

#### Display Password

- In order to make unintentional changes to the programming data directly on the device more difficult, you can configure a 4 character display password (Modbus Address 500) on the UMG604.
- The default setting is for no display password to be asked for.
- If you lose a modified display password, you can only delete the password via GridVis with the FTP password.

## GridVis-Hilfe\_en

- The display password is 4 characters.
- You can enter the display password directly into the UMG604.

### Warning!

- The communication between GridVis and the devices is unencrypted.
- The encryption between GridVis and the devices is under construction.

### GridVis and FTP Programs

- The FTP password is required.
- The FTP password is required for file transfer between GridVis and the devices via *Modbus-TCP*.
- The FTP password is required for file transfer between GridVis and the devices via *Modbus-RTU over Ethernet*.

### Modbus-TCP, Modbus-RTU

- No *password protection* is possible to the retrieval of measured values (Modbus Address Lists via the **Modbus-RTU protocol**).
- The FTP password is required for file transfer between GridVis and the devices via *Modbus-TCP*.
- The FTP password is required for file transfer between GridVis and the devices via *Modbus-RTU over Ethernet*.

### Profibus

- Profibus does not require a password.

## Encryption

- Files can be transferred encrypted between GridVis and the UMG604.
- Files can be AES encrypted.
- AES stands for advanced encryption standard. AES is a symmetric encryption technique.

## Egg

- An Egg is a software expansion which can be loaded from GridVis onto a device, e.g. the UMG604.
- The software expansion can include a Jasic program and an HTML file (homepage expansion).
- Typical examples of software expansions are the Eggs for EMAX, Power Factor Controller and cost center determination.

## EMAX

The EMAX function serves to maintain a given power average in terms of the electrical energy within a certain measuring time.

- The EMAX function is a fee-based software expansion and must be unlocked on the UMG604 and requires the installation of an Egg with GridVis.
- To unlock the EMAX function, an unlock code consisting of two 4 character codes must be entered in the device at addresses 510 and 511.
- The Egg of the EMAX function consists of a Jasic inline code and a homepage expansion.
- The selection of the power values for the EMAX calculations and the assignment of the inputs and outputs is done by a Jasic program.
- The display of the EMAX measured values takes place on the UMG604 homepage.
- The entry of target values, the measurement period duration and the consumer properties can be done on the UMG604 homepage.

## Cost Center Determination

The cost center determination function provides you with a quick overview of your energy use and the associated costs.

- The cost center determination is an approximate program. No guarantee is made.
- The cost center determination function is not fee-based and does not need to be unlocked.
- You can install the cost center determination function as an Egg with GridVis.
- You can load the Egg for the cost center determination function from the data carrier provided in the delivery.

## Power Factor Controller

The power factor controller functions serves together with other external components, like capacitor switching contactors and power capacitors to maintain a proscribed target CosPhi.

- The power factor controller function is a fee-based software expansion and must be unlocked on the UMG604 and requires the installation of an Egg with GridVis.
- To unlock the reactive power regulator function, an unlock code consisting of two 4 character codes must be entered in the device at addresses 510 and 511.
- The Egg of the power factor controller function consists of a Jasic inline code and a homepage expansion.
- The selection of the measured values for the power factor controller function and the assignment of the inputs and outputs is done by a Jasic program.
- The power factor controller function can be used in four instances.
- Each power factor controller function can switch up to 16 outputs.
- An output can be switched a maximum of 5 times per second.
- The display of the switching actions and the measured values takes place on the UMG604 homepage.
- The specification of the target CosPhi, the discharge times of the capacitors, the power capacitors, et cetera can be conducted via the UMG604 homepage.
- With the power factor controller function you can also:
  - Compensate for individual phases,
  - Compensate for "cross" loaded networks, so that all phases come closer to the Actual CosPhi.

## Measured Value

- A measured value (in the UMG604) is an absolute value formed over a period (measurement window) of 200 ms.
- A measurement window in the 50Hz network consists of 10 periods and of 12 periods in the 60Hz network.
- A measurement window has a start time and an end time.
- The resolution of the start time and end time amount to approximately 2ns.
- The exactitude of the start time and end time are dependent upon the accuracy of the internal clock. (Typical +/- 1 minute/month)
- To improve the accuracy of the internal clock, we recommended comparing and tracking the device clock with a time server. (Please see Time)

See also Full Wave Absolute Value.

## Full Wave Absolute Value

A full wave absolute value is a measured value which is formed over measurement period which corresponds to a full wave.

The measurement time amounts to 20 ms in a 50Hz network and to approximately 16.7 ms in a 60Hz network.

The UMG604 calculates the following full wave absolute values for all phases:

- Voltage
- Current
- Active Power
- Fundamental Wave-Reactive Power Compensation (This measured value has a measurement error due to a constant phase shift of  $1.5^\circ$  and a ripple of 0.1% to 0.2% )

Measuring Time:

- 20ms at 50Hz,
- 16.7ms at 60Hz

Processing Time:

- Typical 5ms,
- Maximum 10ms

Variables for the Processing Time:

- Number of runtime of the Jasic programs,
- Homepage accesses

Transfer

- Typical latency period 1 ms
- Maximum 7 ms

See also *Measured Value*.

## Init.jas

- The *init.jas* file is a text file located in the */sys/config/init.jas* directory of the UMG604.
- The *init.jas* file contains the configuration data for the UMG604.
- A section of the *init.jas* is described by GridVis.
- The *init.jas* file does not contain any configuration data for the EMAX program (optional).
- The *init.jas* file does not contain any configuration data for the logs.

Adobe Reader - [init.pdf]

Datei Bearbeiten Anzeige Dokument Werkzeuge Fenster Hilfe

```

init.jas
_CTPRIM[0]=25.000000
_CTPRIM[1]=25.000000
_CTPRIM[2]=25.000000
_CTPRIM[3]=5.000000
_CTSEC[0]=5.000000
_CTSEC[1]=5.000000
_CTSEC[2]=5.000000
_CTSEC[3]=5.000000
_VTPRIM[0]=400.000000
_VTPRIM[1]=400.000000
_VTPRIM[2]=400.000000
_VTPRIM[3]=400.000000
_VTSEC[0]=400.000000
_VTSEC[1]=400.000000
_VTSEC[2]=400.000000
_VTSEC[3]=400.000000
_IRATED[0]=1000.000000
_IRATED[1]=1000.000000
_IRATED[2]=1000.000000
_IRATED[3]=1000.000000
_DEV_NAME="Messung Bermo11"
_DEV_DESC="Janitza Universalmessgerät UMG604 für Hutschiennenmontage"
_LANGUAGE="de"
_MBUSADDR=20
_MODE485=0
_BAUD485=0
_BAUD232=4
_MODE232=0
_DHCPMODE=0
_CONTRAST=60
_THERMOELEMENT=1
_TIME_ZONE=3600
_STIME=3600
_SDAY=28
_SHOUR=2
_SMON=3
_SMIN=0
_SDOW=6
_EDAY=25
_EHOUR=3
_EMON=10
_EMIN=0
_EDOW=0
_NOMINAL_U[0]=230.000000
_NOMINAL_U[1]=230.000000
_NOMINAL_U[2]=230.000000
_NOMINAL_U[3]=230.000000
_NOMINAL_I[0]=5000.000000
_NOMINAL_I[1]=5000.000000
_NOMINAL_I[2]=5000.000000
_NOMINAL_I[3]=5000.000000
_NOMINAL_F=0.000000
_TRNS_DELTA[0]=50.000000
_TRNS_DELTA[1]=50.000000
_TRNS_DELTA[2]=50.000000
_TRNS_DELTA[3]=50.000000
_TRNS_ABS[0]=150.000000
_TRNS_ABS[1]=150.000000
_TRNS_ABS[2]=150.000000
_TRNS_ABS[3]=150.000000
_TRNS_PRE=500
_TRNS_POST=1500
_I_EVT_MAX[0]=110.000000
_I_EVT_MAX[1]=110.000000
_I_EVT_MAX[2]=110.000000
_I_EVT_MAX[3]=110.000000
_U_EVT_MAX[0]=110.000000
_U_EVT_MAX[1]=110.000000

```

Seite 1

```

_U_EVT_MAX
_U_EVT_MAX
_U_EVT_MIN
_U_EVT_MIN
_U_EVT_MIN
_U_EVT_MIN
_U_EVT_MIN
_U_EVT_VAL_F
_U_EVT_VAL_F
_U_EVT_CNT_F
_U_EVT_CNT_F
_TRNS_MODE
_TRNS_MODE
_EVT_MODE=
_ARON=0
_DREILEITE
_COLOR[0]=
_COLOR[1]=
_COLOR[2]=
_COLOR[3]=
_COLOR[4]=
_COLOR[5]=
_COLOR[6]=
_COLOR[7]=
_PULSWERT
_PULSWERT
_MAXSIZE_F
_MAXSIZE_F
_MAXSIZE_F
_MAXSIZE_F
_MAXSIZE_F
_TFTP_FILE
_TFTP_NEWF
_DIGOUTEVT
_DIGOUTEVT
_DIGOUTEVT
_DIGOUTEVT
_INVERT_D3
_INVERT_D3
_IP_ADDR_S
_IP_GATEWA
_IP_MASK_S
_NAMESRV_
_NTPSRV_I
_HOSTNAME=
_MODE_NTP=
_QUARZ_KOR
_TEMPERATU

```

## Ports Used by the UMG604

Devices with the *Ethernet* can use the following ports:

### UDP

- TFTP 1201
- Modbus/TCP 502
- DHCP 68
- NTP 123
- BaCnet 47808
- Nameservice 1200

### TCP

- HTTP 80 (can be modified in ini.jas)
- FTP command port 21, (data ports 1024, 1025, 1026, 1027)
- Modbus/TCP 502 (4 Ports)
- Modbus RTU via Ethernet 8000 (1 Port)

# UMG103

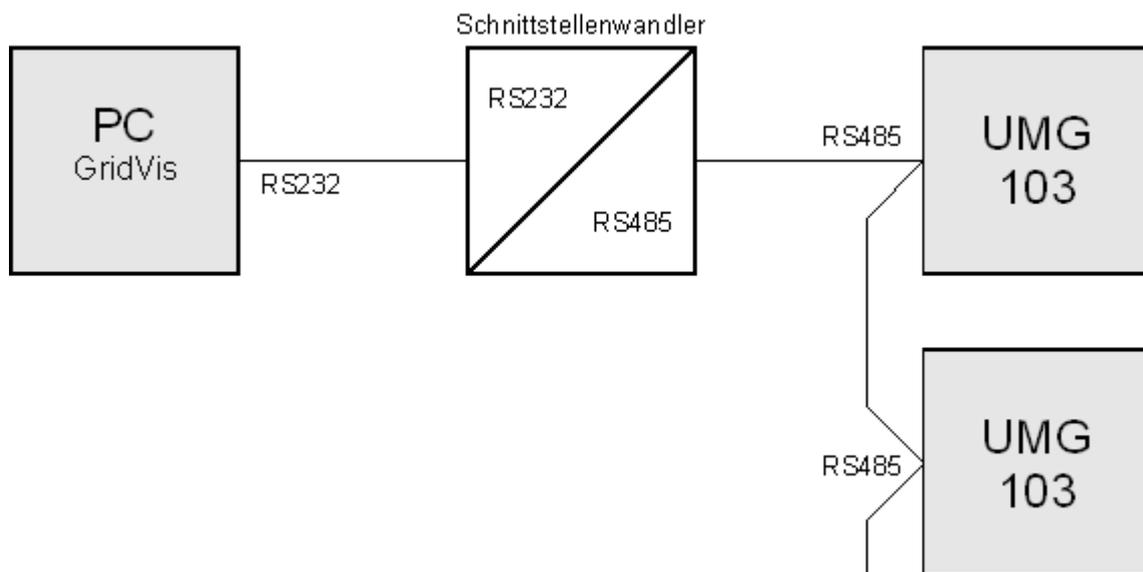
## Binding To GridVis

### UMG103 Connection

#### PC - UMG103 Connection

Example 1:

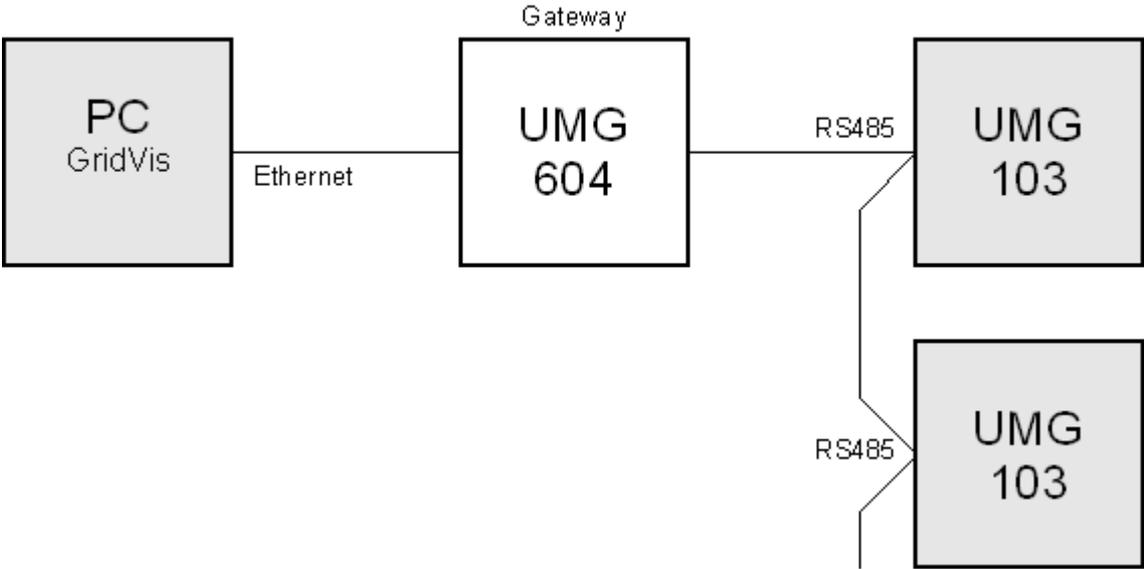
The UMG103 has an RS485 interface and the PC has an RS232 interface. An interface converter is required.



Example 2:

The UMG103 has an RS485 interface and the PC has an Ethernet interface. A gateway is required.

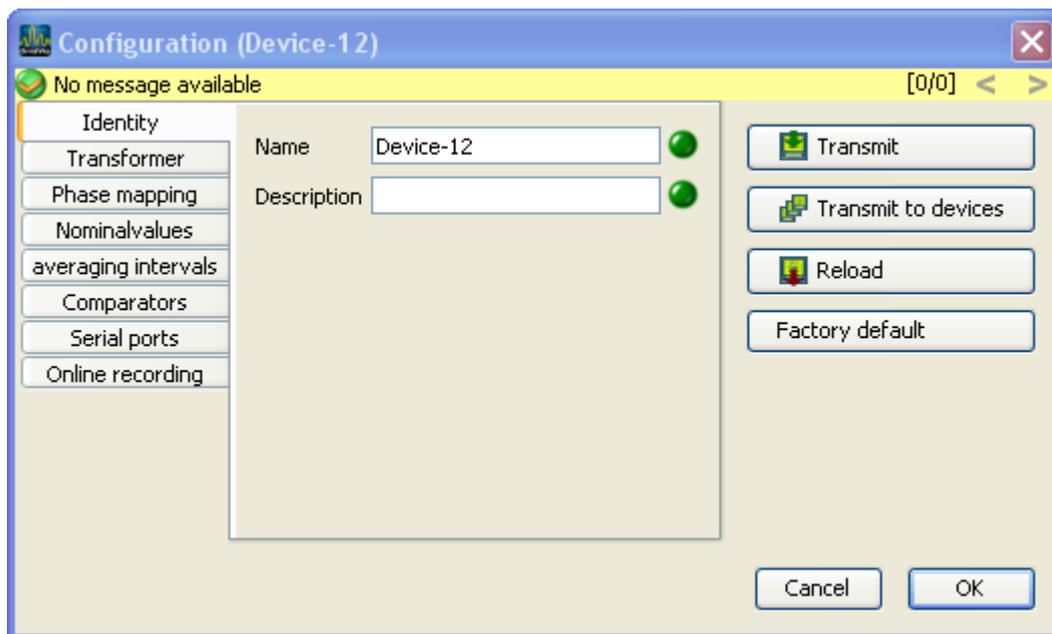
The UMG604, UMG507 and UMG510 can all be used as a gateway.



# Configuration

## Identity

- The *Name* is displayed in the device list.
- You can add additional information about the device in *Description*.



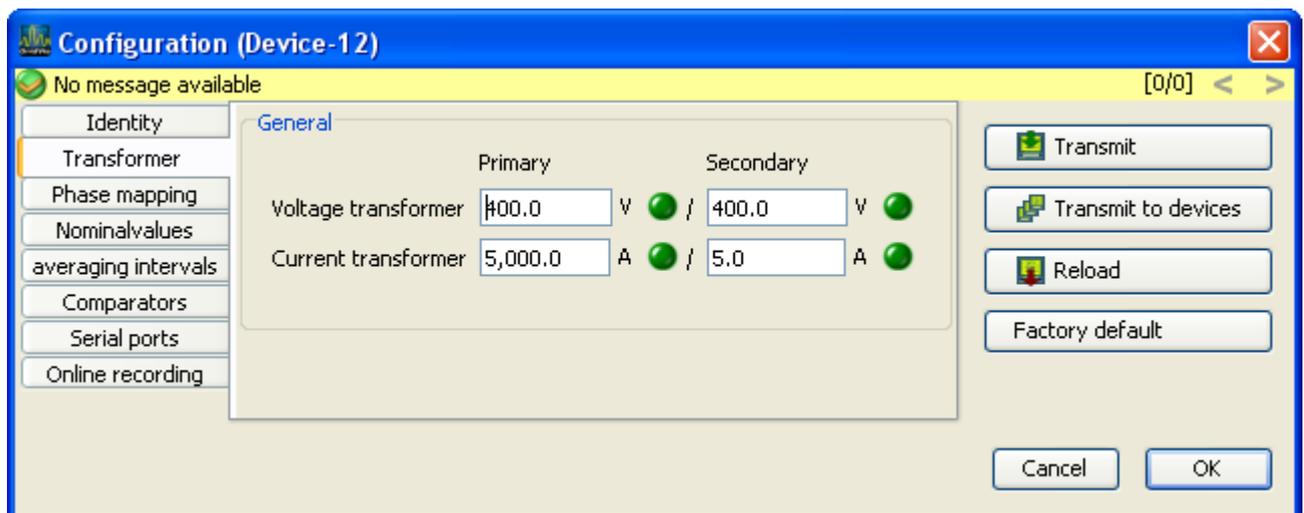
## Transformer

### Voltage Converter

- The voltage measurements inputs are designed for measurements in low voltages in which rated voltages (L-N/PE) up to 300V against ground can occur. A voltage converter is required for voltage measurements in grids with higher rated voltages.
- You must enter the phase voltage L-L for the primary voltage.
- Configure the converter properties for the voltage measurement inputs.

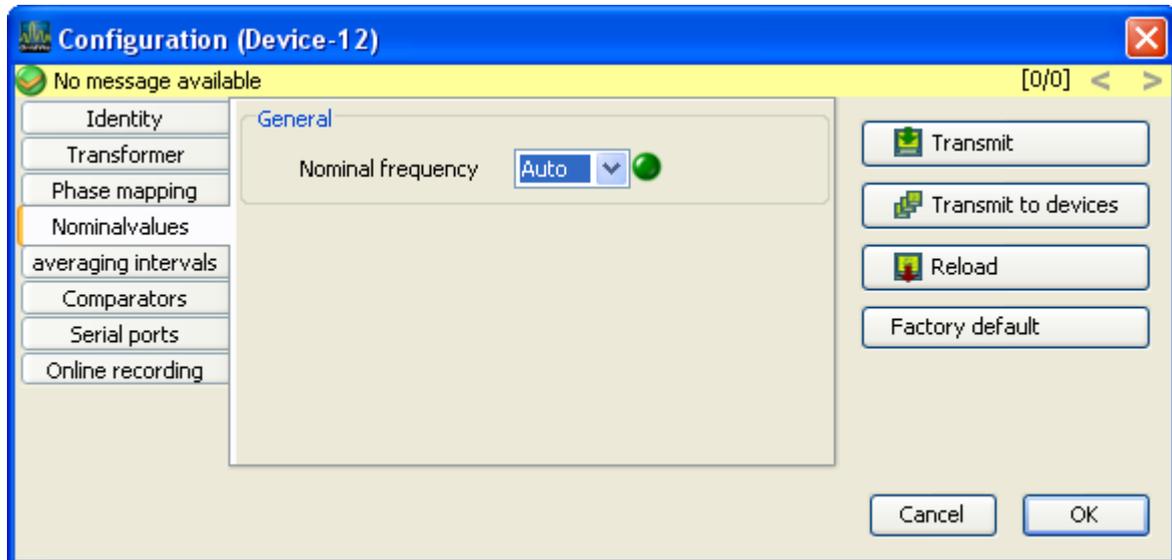
### Current Converter

- Currents up to 5A can be directly measured. Please consult the installation instructions for more information.
- A current converter is used for measurements of currents larger than 5A.
- Configure the converter properties for the current measurement input.



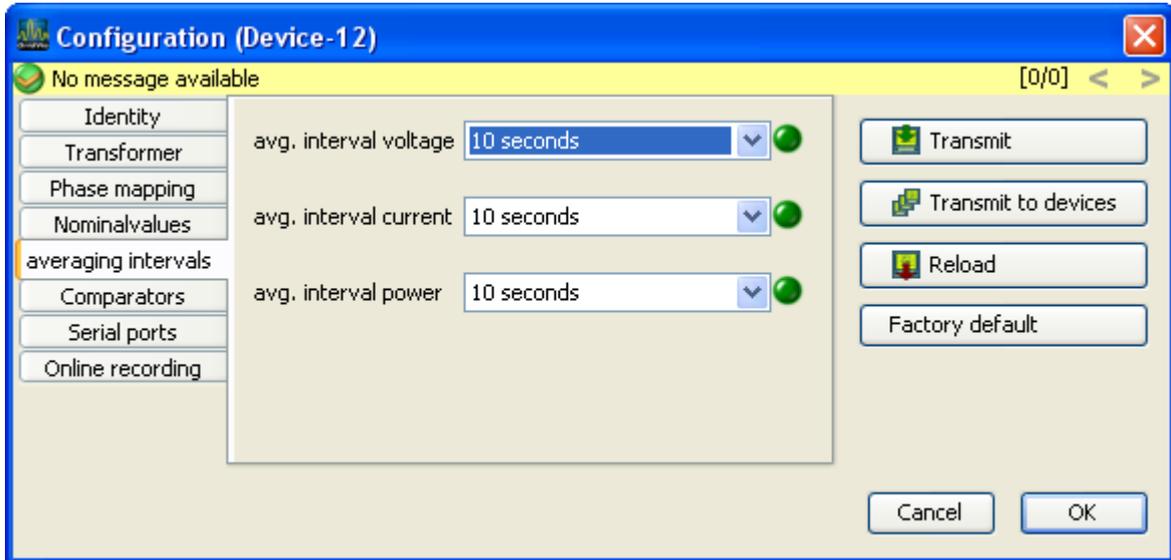
## Nominal Value

- The rated frequency applies to all 3 measurement channels.
- Select a network frequency according the existing network conditions.



## Averaging Times

- The exponential averaging method used obtains at least 95% of the measured value after the configured averaging time.
- An averaging time of 15 minutes is set by default.



## Comparator/Limit

- 2 comparator groups each with 3 comparators (A, B, C) are available to monitor limits.
- The results of the comparator can be AND or OR connected and the result can also be inverted.
- The entire logic operation result of comparator group 1 can be assigned to Digital Output 1 and the entire logic operation result of comparator group 2 can be assigned to Digital Output 2.

## Serial Ports

You want to establish a Connection between the UMG 103 and the PC with GridVis.

- The UMG103 has an RS485 interface.
- The UMG103 can only function as Modbus-Slave.
- You require an interface converter from RS485 (UMG604) to RS232 (PC).
- For *Interface* configure the RS232 interface (e.g. *COM1*) on the PC.
- Connect this interface (e.g. *COM1*) to the interface converter.
- The baud rate is the speed at which the data is transferred between the PC, the interface converter and the UMG604.
- You can change the baud rate after establishing a connection to the UMG103. If you select a fixed baud rate in the UMG103, you also have to set this baud rate in the counterpart station (PC, UMG604). The UMG103 will conduct a maximum of 8 attempts to determine the baud rate in the counterpart station with the *Autodetect* setting.

**9600 Baud**

**19200 Baud**

**38400 Baud**

**115200 Baud**

**Autodetect** (turned on by default)

- As multiple UMG103 devices can be connected to one interface converter, a device address must be entered for each UMG103.

Allowed device addresses: 1 .. 99

Device address 0 is only intended for servicing purposes.

Serial port



Device address

## **Modbus**

### **Modbus Functions**

Modbus functions supported by the UMG103:

- 03 Read Holding Registers
- 04 Read Input Registers
- 06 Preset Single Register
- 16 Preset Multiple Registers

# UMG96S

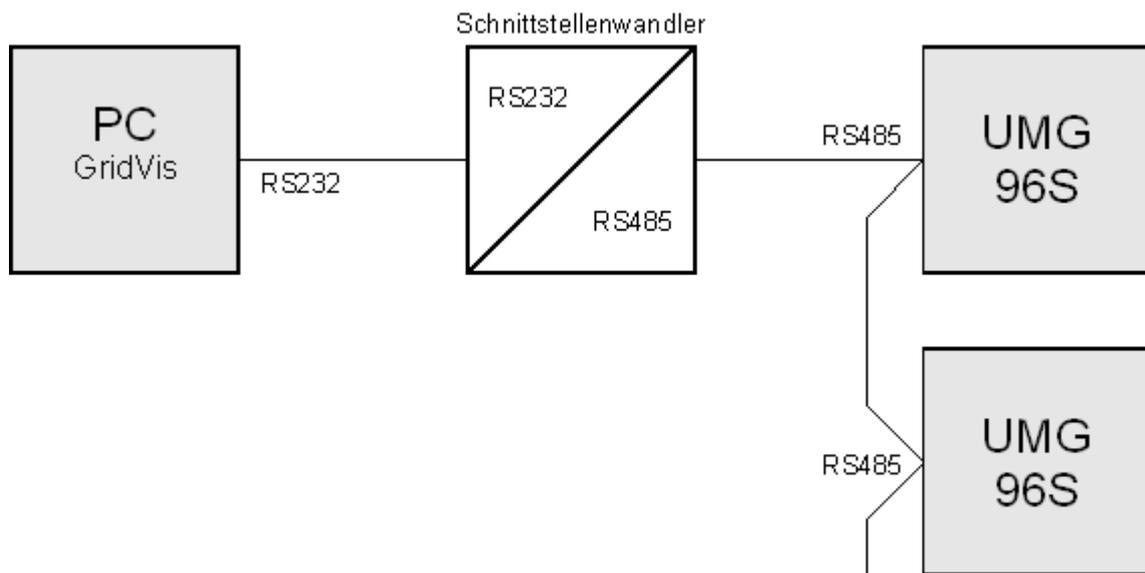
## Binding To GridVis

### UMG96S Connection

#### PC - UMG96S Connection

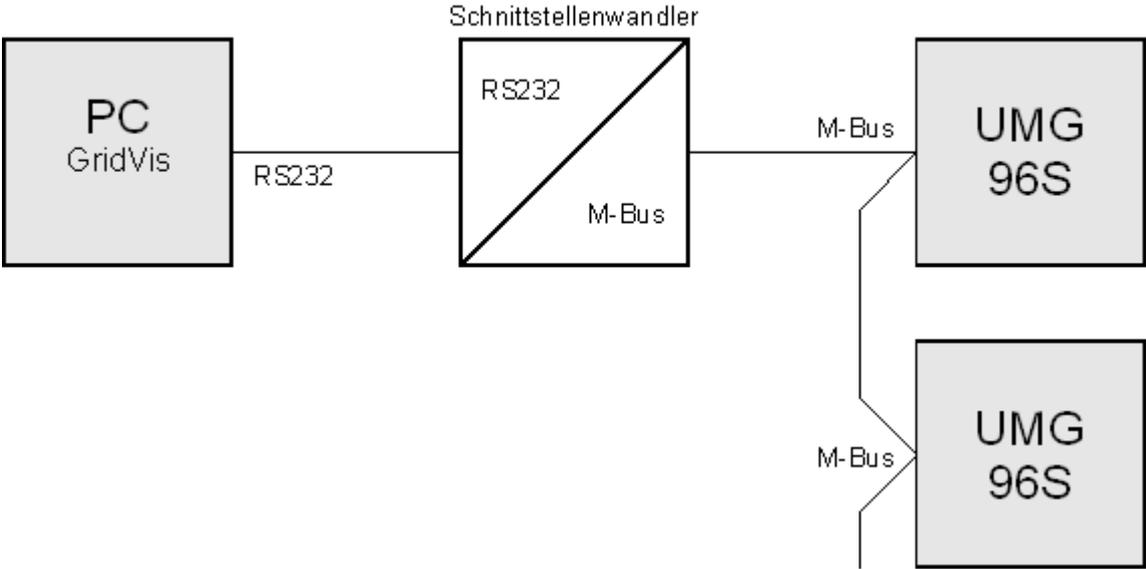
Example 1:

The UMG96S has an RS485 interface and the PC has an RS232 interface. An interface converter is required.

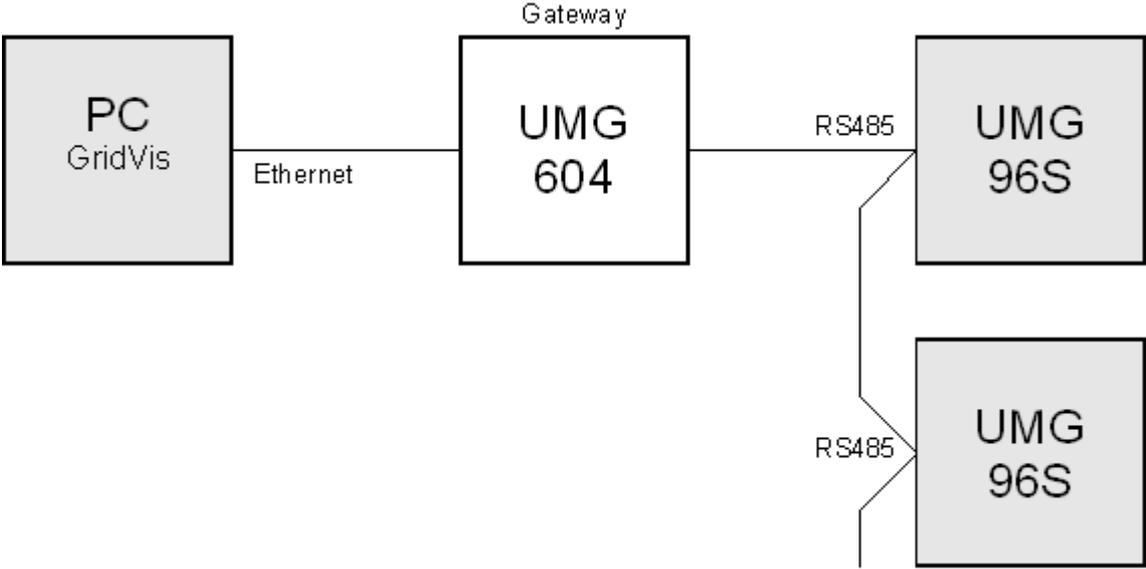


Example 2:

The UMG96S has an M-bus interface and the PC has an RS232 interface. An interface converter is required.



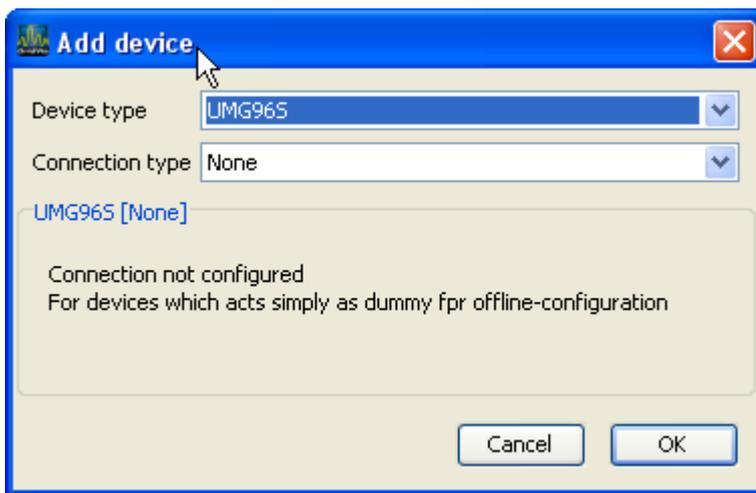
Example 3:  
The UMG96S has an RS485 interface and the PC has an Ethernet interface. A gateway is required.  
The UMG604, UMG507 and UMG510 can all be used as a gateway.



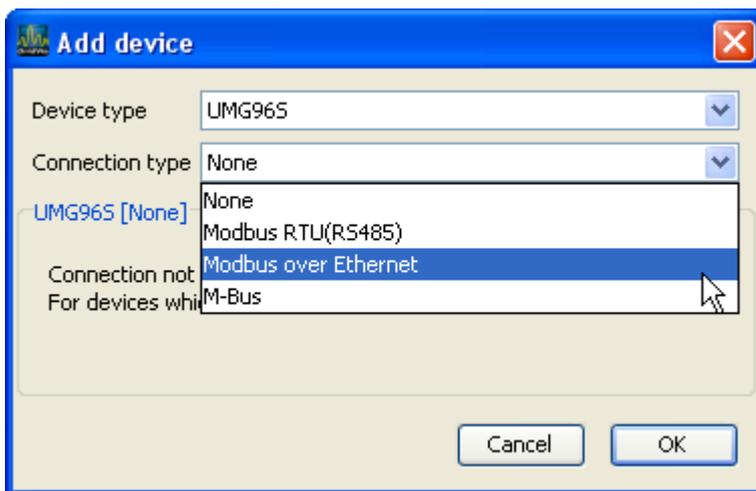
## Add UMG96S

- The UMG96S must be connected with the PC via a gateway (device type). See Connection Example.
- You can choose from different connection types (protocols) based upon the gateway used (device type).

1. Select *UMG96S* as the device type.



2. Select the connection type.



### UMG96S - Selection overview for the connection type

Device type/gateway	Modbus RTU	Modbus over Ethernet		M-Bus
		Modbus/TCP	Modbus	

	(RS485)			
<b>UMG604</b>	-	X	X	-
<b>UMG507</b>	-	-	X	-
<b>UMG510</b>	-	X	-	-
<b>Interface converter RS232/RS485</b>	X	-	-	-
<b>Interface converter RS232/M-Bus</b>	-	-	-	X

## Connection Type - Modbus-TCP

Data transfer to Modbus TCP is similar to Modbus RTU except that TCP/IP packets are used. TCP port 502 is reserved for Modbus TCP.

- You want to configure and read a UMG96S with GridVis.
- You want to connect a UMG96S to a PC via Ethernet.
- You cannot directly connect the UMG96S via Ethernet because the UMG96S has an RS485 interface.
- You require a gateway.
- The UMG96S must have an RS485 interface.
- The gateway must have an RS485 interface and an Ethernet interface.
- A UMG604 with the corresponding options can also be used as a gateway.
- As multiple UMG96S devices can be connected to a gateway, the device address on the UMG96S must be entered.
- If no connection to the UMG96S can be made, another attempt will be conducted after the specified *Timeout*.
- When attempting to read data from the UMG96S, the number of connection attempts will be limited by *Maximum Number of Attempts*.
- GridVis will always attempt to connect to the UMG96S for online measurements.

Modbus via Ethernet

Ethernet address of the gateway

Device address of the connected UMG96S

In this example device address = 1

## Connection Type - Modbus-RTU over Ethernet

- You want to configure and read a UMG96S with GridVis.
- You want to connect a UMG96S to a PC via Ethernet.
- You cannot directly connect the UMG96S via Ethernet because the UMG96S has an RS485 interface.
- You require a gateway.
- The UMG96S must have an RS485 interface.
- The gateway must have an RS485 interface and an Ethernet interface.
- A UMG604 with the corresponding options can also be used as a gateway.
- As multiple UMG96S devices can be connected to a gateway, the device address on the UMG96S must be entered.
- If no connection to the UMG96S can be made, another attempt will be conducted after the specified *Timeout*.
- When attempting to read data from the UMG96S, the number of connection attempts will be limited by *Maximum Number of Attempts*.
- GridVis will always attempt to connect to the UMG96S for online measurements.

The screenshot shows the 'Add device' dialog box with the following configuration:

- Device type: UMG96S
- Connection type: Modbus over Ethernet
- Host: 192.168.1.1
- Port: 8,000
- Device address: 1
- Time out [millisec.]: 5,000
- Max. no. retries: 3
- Selected protocol: Modbus-RTU (Ethernet encapsulated)

Ethernet address of the gateway

Device address of the connected UMG96S

In this example device address = 1

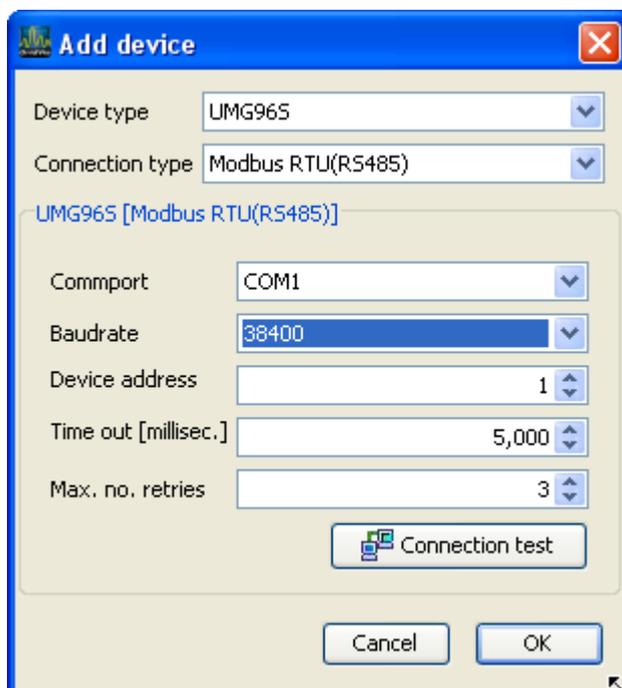
## Connection Type - Modbus RTU (RS485)

You want to configure and read a UMG96S with GridVis.

You want to connect the UMG96S to the RS232 interface of the PC.

You cannot directly connect the UMG96S via Ethernet because the UMG96S has an RS485 interface.

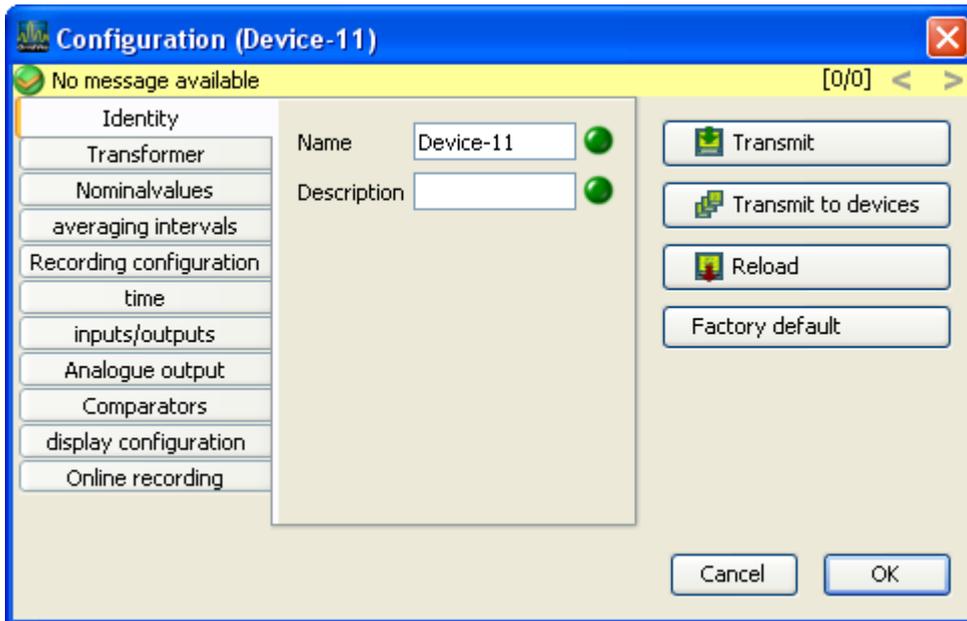
- The UMG96S must have an RS485 interface.
- You require an interface converter from RS485 (UMG96S) to RS232 (PC).
- For *Interface* configure the RS232 interface (e.g. *COM1*) on the PC.
- Connect this interface (e.g. *COM1*) to the interface converter.
- The baud rate is the speed at which the data is transferred between the PC, the interface converter and the UMG96S.
- As multiple UMG96S devices can be connected to the interface converter, the device address on the UMG96S must be entered.
- If no connection to the UMG96S can be made, another attempt will be conducted after the specified *Timeout*.
- When attempting to read data from the UMG96S, the number of connection attempts will be limited by *Maximum Number of Attempts*.
- GridVis will always attempt to connect to the UMG96S for online measurements.



## Configuration

### Identity

- The *Name* is displayed in the device list.
- You can add additional information about the device in *Description*.



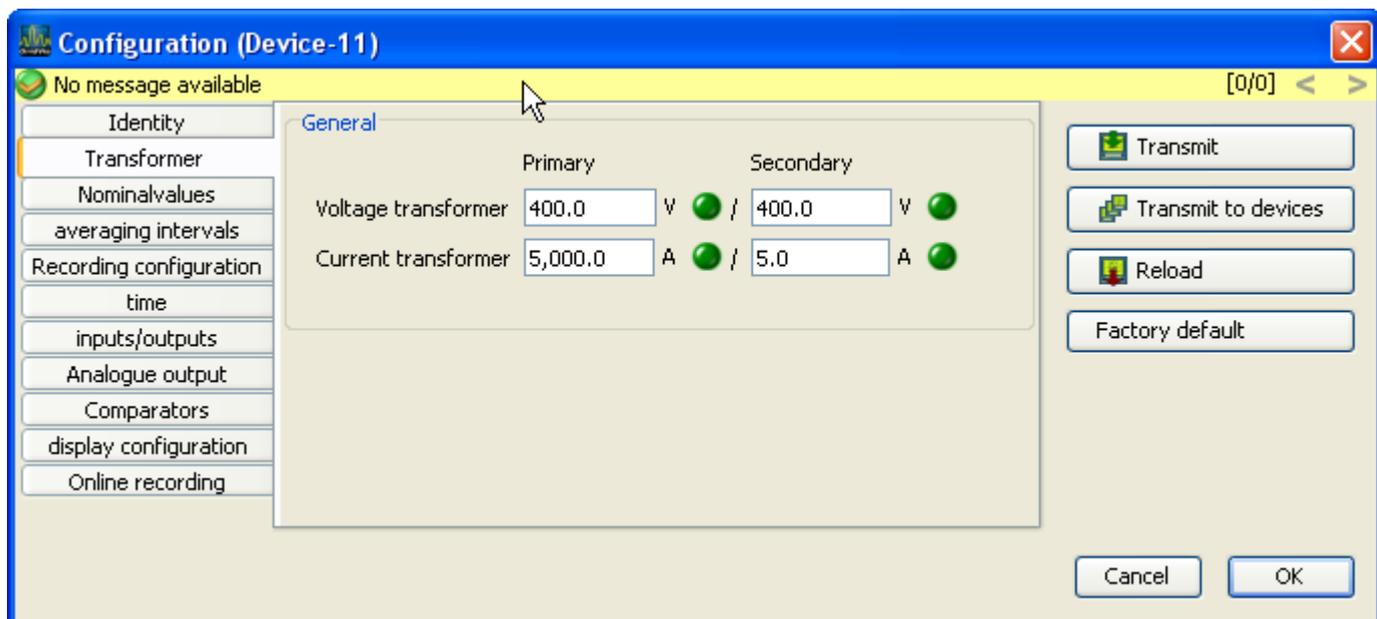
## Transformer

### Voltage Converter

- The voltage measurements inputs are designed for measurements in low voltages in which rated voltages (L-N/PE) up to 300V against ground can occur. A voltage converter is required for voltage measurements in grids with higher rated voltages.
- You must enter the phase voltage L-L for the primary voltage.
- Configure the converter properties for the voltage measurement inputs.

### Current Converter

- Currents up to 5A can be directly measured. Please consult the installation instructions for more information.
- A current converter is used for measurements of currents larger than 5A.
- Configure the converter properties for the current measurement input.



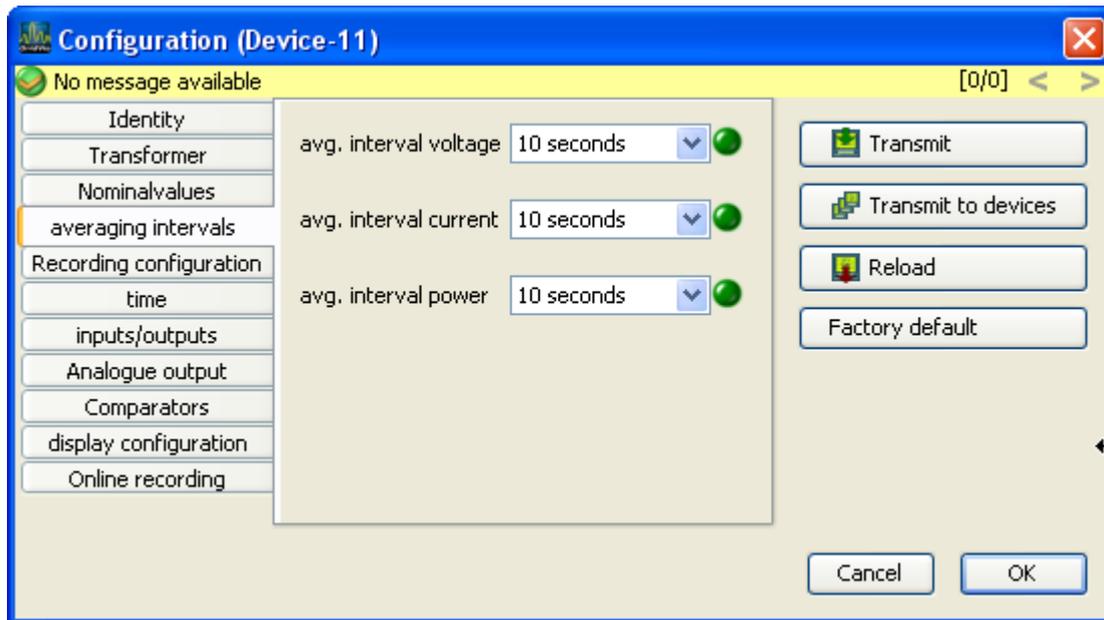
## Nominal Value

- The rated frequency applies to all 3 measurement channels.
- Select a network frequency according the existing network conditions.



## Averaging Times

- The exponential averaging method used obtains at least 95% of the measured value after the configured averaging time.
- An averaging time of 15 minutes is set by default.



## Recording Configuration

The UMG96S saves the configuration data, minimum and maximum values and measured values for the active power and the inductive reactive power in the EEPROM memory. Devices with flash memory (optional) can also record the averages for the current, voltage and power.

- The Averaging Times for current, voltage and power can be configured.
- The recording intervals correspond to the Averaging Times for the measured values of the current, voltage and power.
- All averages include the time of saving in UTC time as additional information.
- The real power and inductive reactive power can be saved every 60 minutes.
- A Limit Incident will be recorded when it occurs.
- If you allow Limit Incidents to be recorded, the maximum save time cannot be calculated.

The screenshot shows a software window titled "Configuration (Device-11)". On the left is a vertical menu with options: Identity, Transformer, Nominal values, averaging intervals, Recording configuration (highlighted), time, inputs/outputs, Analogue output, Comparators, display configuration, and Online recording. The main area displays a list of recording options, each with an unchecked checkbox, a description, a status indicator (a green circle), and a time interval. Some options also include a note about firmware requirements.

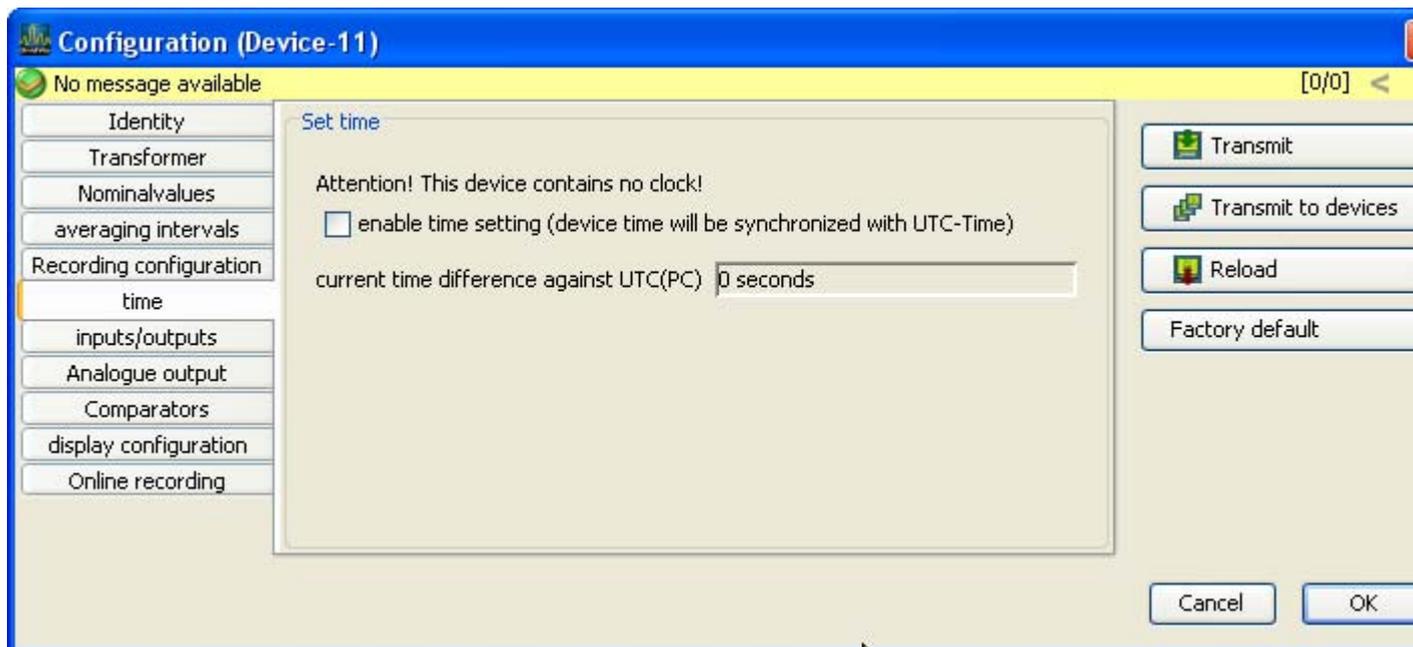
Option	Description	Status	Interval	Notes
<input type="checkbox"/>	P(L1..L3) / Q Sum / S Sum	●	10 seconds	
<input type="checkbox"/>	I(L1..L3) / I sum / cos phi sum	●	10 seconds	
<input type="checkbox"/>	U(L1-N,L2-N,L3-N) / P sum / Q sum	●	10 seconds	Only for firmware-release at least 1.09
<input type="checkbox"/>	U(L1-L2,L2-L3,L3-L1) / P sum / Q sum	●	10 seconds	Only for firmware-release at least 1.09
<input type="checkbox"/>	Active energy / reactive energy ind.	●	60 minutes	
<input type="checkbox"/>	Limit events	●		

max. storage time before overrun : no recording configured

## Time

The UMG96S can be delivered with a battery buffered clock (optional).

- The clock is pre-programmed to the local time during manufacturing.
- The clock can be tracked during configuration by acquiring the UTC time from the connected PC.



## Inputs/Outputs

The UMG96S has two configurable connections. Different configurations of the connections are possible.

- Connection terminal 11/12
  - Impulse Output Reductive Power* - Impulse Output for the Applied Active Power
  - Comparator 1* - Output Comparator 1
  - Analog Output 1* - Output 1 as Analog Output (Optional)
  - Profibus Remote Out 1* - Profibus Output 1 (Optional)
  - HT/NT Real Power Switch* - High tariff/low tariff switching for the real power.
  - HT/NT Reactive Power Switch* - High tariff/low tariff switching for the reactive power.
  - HT/NT Real and Reactive Power Switch* - High tariff/low tariff switching for the real power and the reactive power.
- Connection terminal 11/13
  - Impulse Output Reductive Power* - Impulse Output for the Inductive Reactive Power
  - Comparator 2* - Output Comparator 2
  - Analog Output 2* - Output 2 as Analog Output (Optional)
  - Profibus Remote Out 2* - Profibus Output 2 (Optional)
  - HT/NT Real Power Switch* - High tariff/low tariff switching for the real power.
  - HT/NT Reactive Power Switch* - High tariff/low tariff switching for the reactive power.
  - HT/NT Real and Reactive Power Switch* - High tariff/low tariff switching for the real power and the reactive power.

If a connection is used as an impulse output, the impulse value (Wh/Impulse) can the minimum impulse width can be programmed.

**Configuration (Device-11)**

No message available [0/0]

- Identity
- Transformer
- Nominal values
- averaging intervals
- Recording configuration
- time
- inputs/outputs**
- Analogue output
- Comparators
- display configuration
- Online recording

**pulse out 1**  
pulse valence  ● Wh/pulse

**pulse out 2**  
pulse valence  ● Varh/pulse

**all pulse outputs**  
pulse width  ● x10 msec.

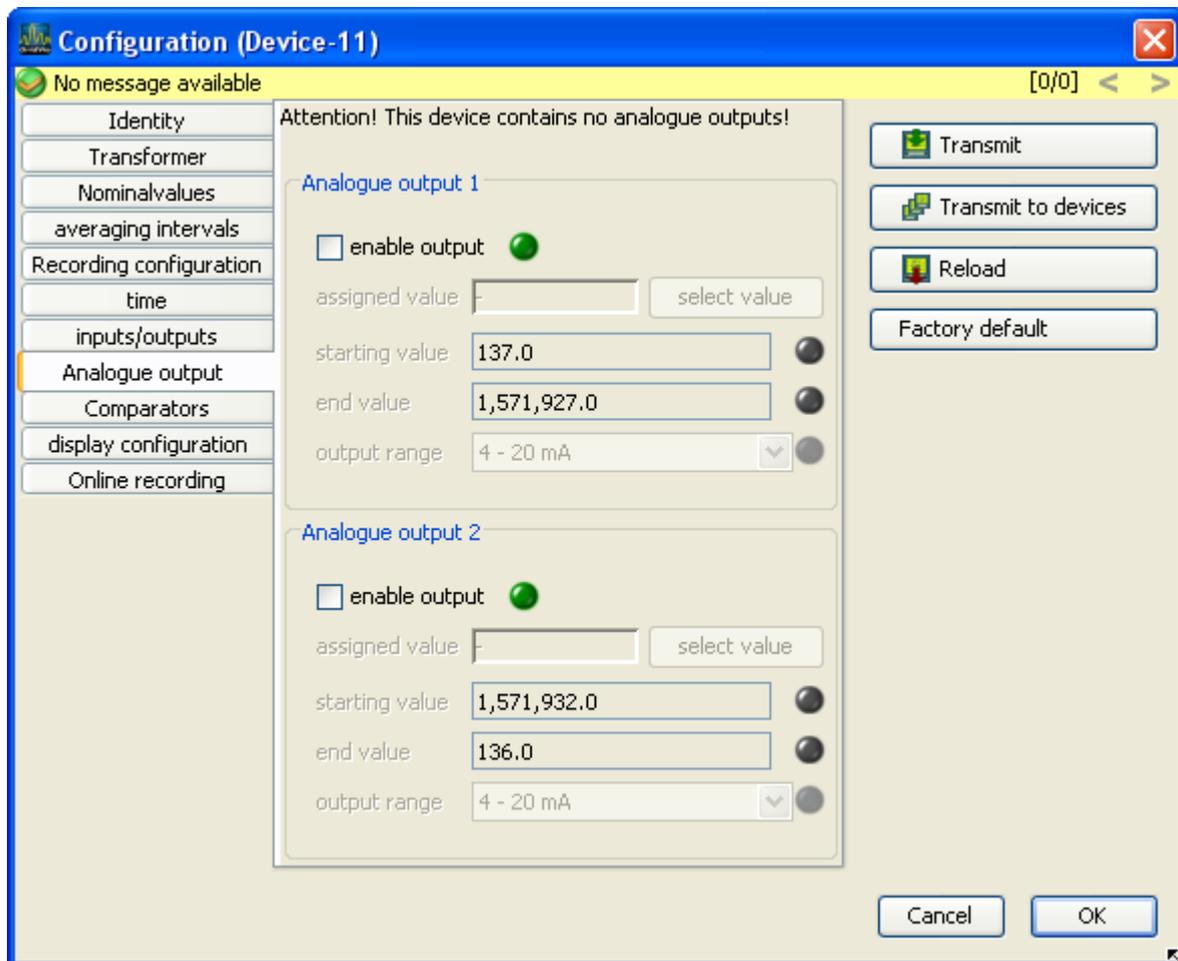
**Terminal 11/12**  
terminal assignment  ● Not for this device:  
This device has no Profibus

**Terminal 11/13**  
terminal assignment  ●

Transmit  
Transmit to o  
Reload  
Factory default

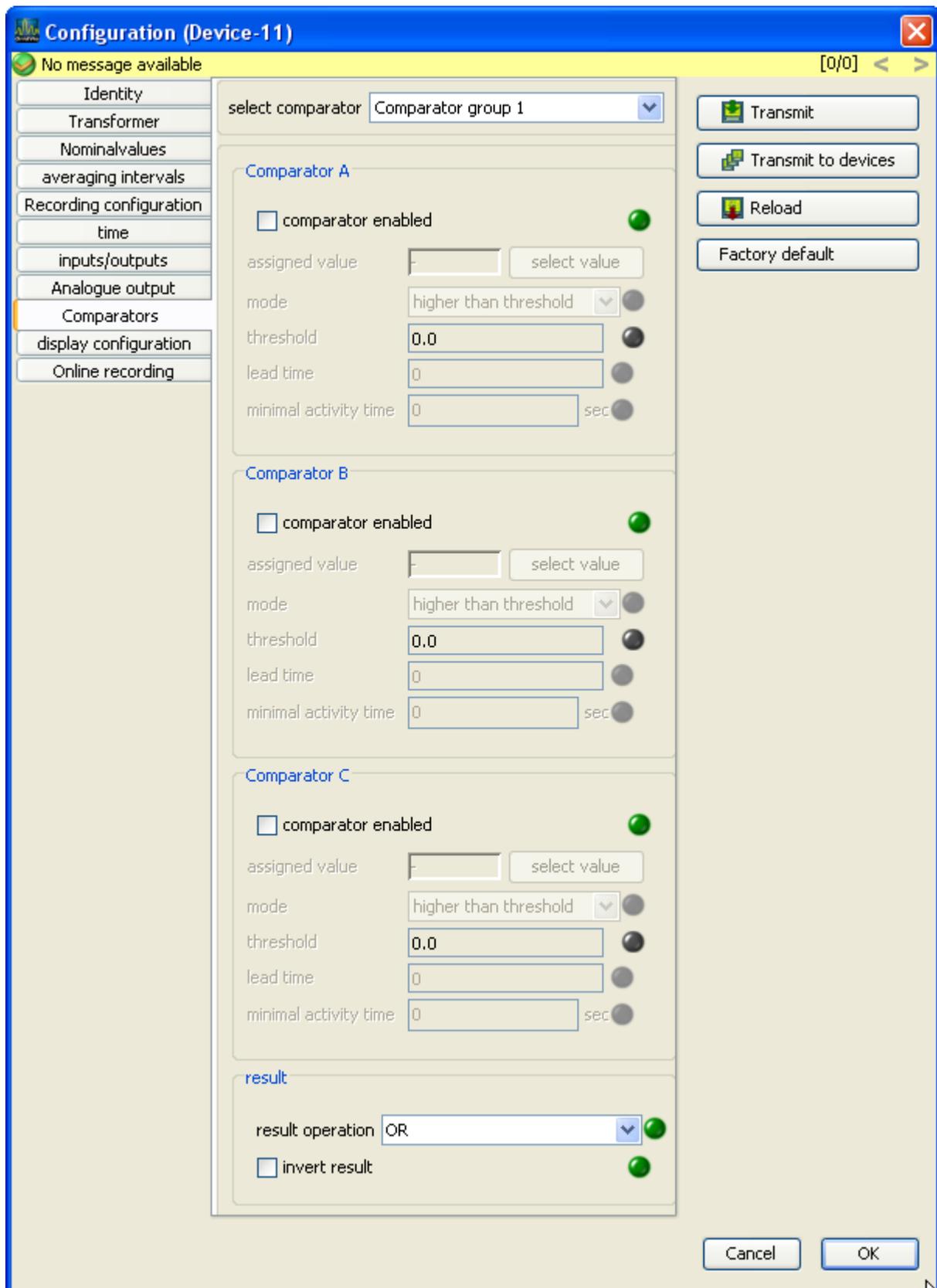
Cancel

## Analog Outputs (Optional)



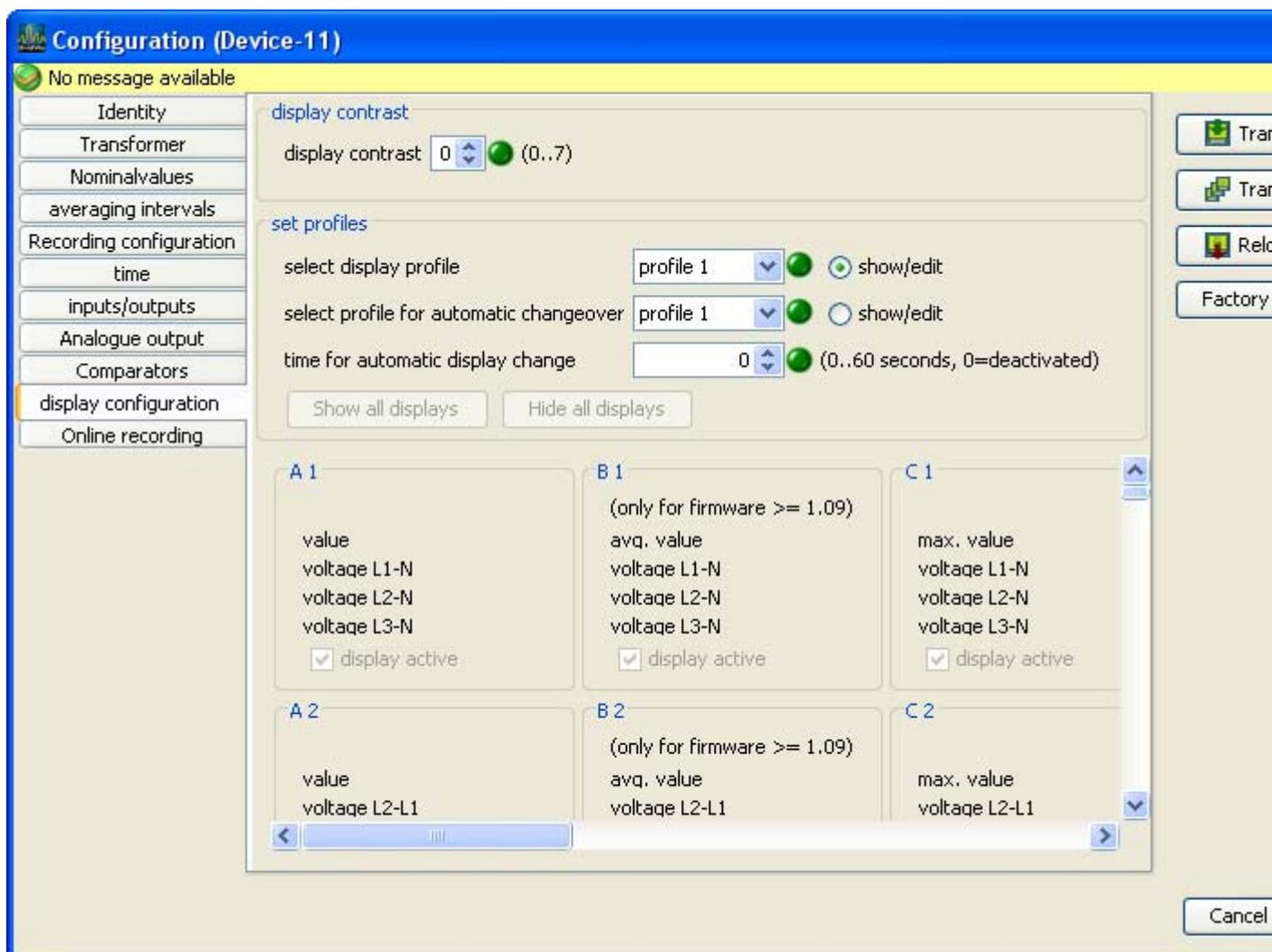
## Comparator/Limit

- 2 comparator groups each with 3 comparators (A, B, C) are available to monitor limits.
- The results of the comparator can be AND or OR connected and the result can also be inverted.
- The entire logic operation result of comparator group 1 can be assigned to Digital Output 1 and the entire logic operation result of comparator group 2 can be assigned to Digital Output 2.



## Display Configuration

- The UMG96S displays the first table of measured values from the current display profile after power has been restored.
- In order to keep the selection clear, only a portion of the available measured values have been pre-programmed to be retrieved in the measured value display.
- If other measured values are desired for the UMG96S display, you can select a different display profile.
- 3 default display profiles and one customer-specific display profile are available.
  - Profile 1, default
  - Profile 2, default
  - Profile 3, default
  - User defined, customer-specific



## **Modbus**

### **Modbus Functions**

Modbus functions supported by the UMG96S:

- 03 Read Holding Registers
- 06 Preset Single Register
- 16 Preset Multiple Registers

# UMG507

## Modbus

### Modbus Functions

Modbus functions supported by the UMG507 on the RS485 interface:

- 03 Read Holding Registers
- 04 Read Input Registers
- 16 Preset Multiple Registers

Modbus functions supported by the UMG507 on the RS232 interface:

- 03 Read Holding Registers
- 16 Preset Multiple Registers

**Warning!** The UMG507 does not support the function *06 Preset Single Register*.

## Read Data

- New files will be created in the UMG507 measured values in the UMG507 are read.
- The UMG507 can manage a maximum of 800 files.
- The oldest file will be deleted if an attempt is made to store a larger number of files.

# FAQ

## A Measured Value is Only Partially Displayed in the Online Graph

- This problem can occur when at least two measured values from different devices are displayed on the online graph.
- This can occur because the measured values are provided from devices with different chronological resolutions. The number of measured values per time unit that are to be displayed in the graph are of different sizes.

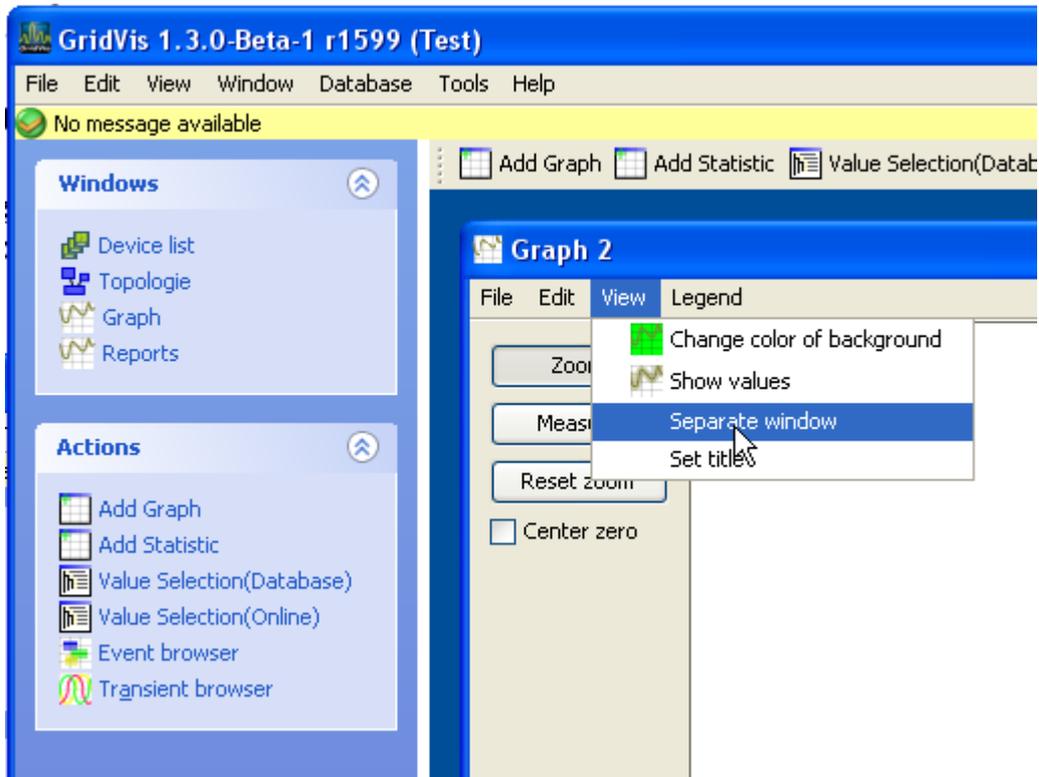
The default setting for the presentation of the **X axis** in the graph is set to **2,000 points (measured value)**.

The X axis presents the time in the graph. If a device, for example an UMG96S, only delivers two values per second, values for 1,000 seconds will be displayed in the X axis. If a value with 5 measured values per second from the UMG604 is then added to the graph, only 400 seconds ( $2000=400*5$ ) of the values can be displayed in the graph.

# Separate Measured Value Window

Graphs are integrated with the GridVis program interface.

If a graph is to be individual copied or moved to a second monitor, the graph must be separated from GridVis via the "Separate View/Window" command.

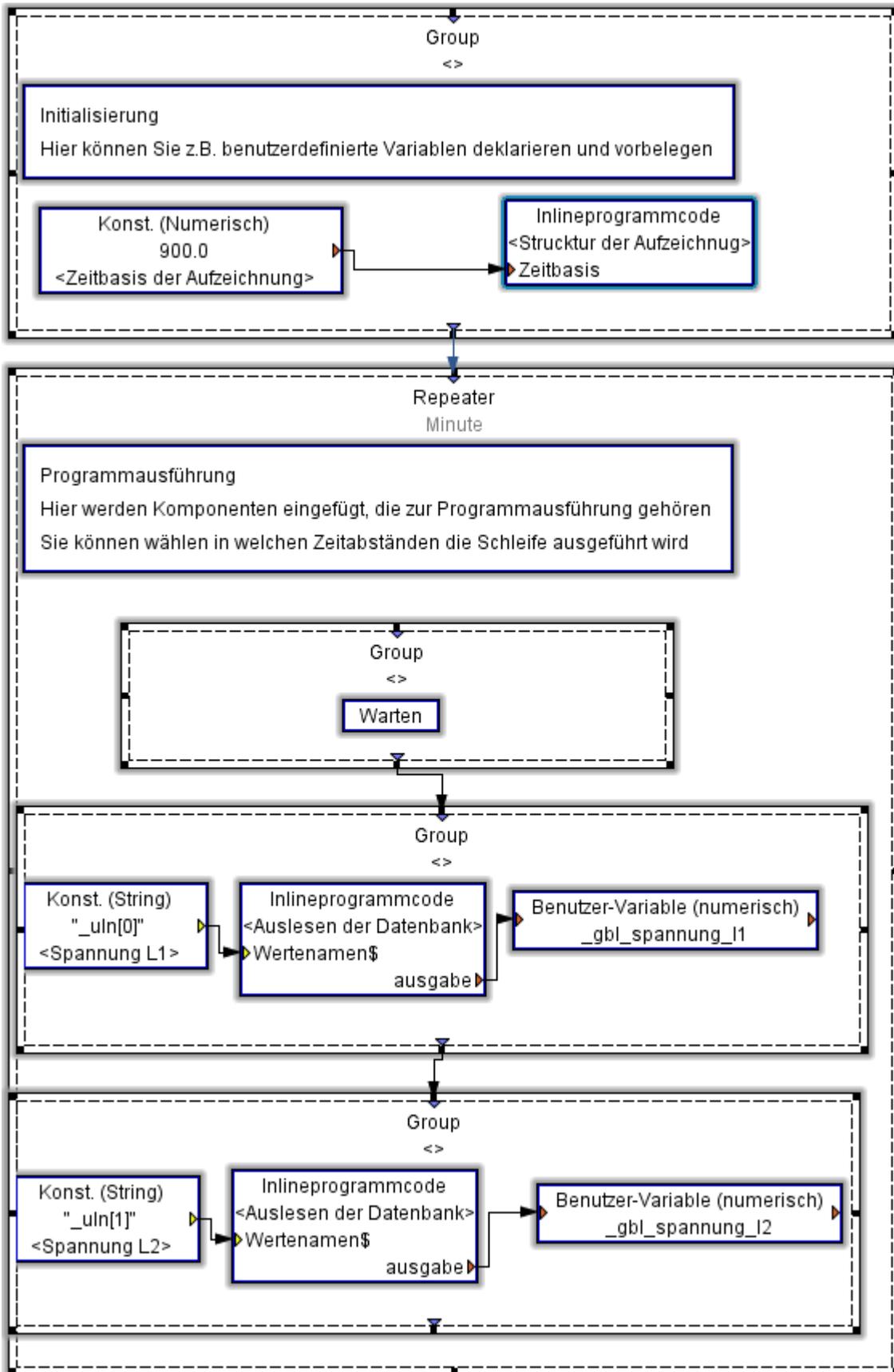


## Read Measured Values from Recordings

The UMG604 saves fixed *measured values* under fixed addresses (Modbus Address List) in the firmware. *Recordings* can also be configured for the UMG604 with the GridVis. Multiple *measured values* with the same averaging time can be collected in recordings.

the evaluation and display of *recordings* generally takes place with the GridVis. You can use a Jasic program to make the *measured values* from *recordings* available for other applications.

Example for reading measured values from recordings.



## CosPhi

The following applies to sinoidal constants as per DIN 401110 section 1 (May 1994):

$$\cos(\varphi) = \frac{P}{S}$$

We use the principal oscillation of P and S for the calculation of CosPhi. As apparent power S does not have sign, the CosPhi will take the sign of real power P.

Real power sign - (negative) = supply

Real power sign + (positive) = demand

The CosPhi is often presented with the sign of the reactive power in the industry.

Reactive power sign - (negative) = capacitive

Reactive power sign + (positive) = inductive

## Lambda

The power factor (displacement factor) Lambda is calculated as follows per DIN 40110 section 1 (May 1994):

$$\lambda = \frac{|P|}{S}$$

P and S do not receive their principle oscillation for the calculation of Lambda but do receive all other harmonic oscillations.

As apparent power S does not have a sign and only the amount of the real power is used, the power factor Lambda does not have a sign.

## **Can the UMG604 Homepage Be Accessed via Modbus**

The UMG604 is delivered with a default homepage example. You can correspondingly configure the homepage to your needs. A quick guide can be found on the device homepage under *Help/Configure\_Webpage*.

Configuring the homepage is not part of the scope of delivery!

All measured values available via Modbus, are listed with their system names in the UMG604 address list and can also be used on the homepage. New values can be created/calculated using a Jasic program. These values are also available via Modbus and can also be presented on the homepage.

## **Can I Measure the Operating Hours of Consumers**

Yes, an operating hours meter can be easily realized as Jasic program.

## **Can I Use Signal Packets for the EMAX Program**

We do not recommend the use of signal packets as input for the actual value! Signal packets do not present the existing load variations. In order to reduce the erroneous load variations caused by the signal packets, the measured values calculated from the signal packets can be averaged. An averaging causes the reaction to the deactivation of a consumer to first be detected by the program after the averaging time. This means that the time between two switch operations must at least correspond to the averaging time.

## **No Connections to Device (UMG103) Via the UMG604**

All Ports in UMG604 are occupied.

- Four 502 ports can be opened simultaneously.
- Only one 8000 port can be opened at a time.

## **Clear Meter**

How can I clear the active and reactive current meters in UMG604?

*The active and passive current meters in UMG604 can only be cleared via a Jasic program with the command "Reset".*

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