1 GridVis documentation 4.0

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2 Applications

Applications

The visualisation software GridVis is designed for the management of measurement devices and the measurement values they capture.

GridVis currently supports the following measurement devices made by Janitza electronics GmbH:

- UMG 96S
- UMG 96RM
- UMG 103
- UMG 104
- UMG 503
- UMG 505
- UMG 507
- UMG 508
- UMG 510
- UMG 511
- UMG 604
- UMG 605
- UMG 605US
- ProData
- Prophi
- EM series energy meters

What GridVis can do

- Manage measurement devices.
- Map measurement devices in a topology.
- Program measurement devices.
- Provide direct graphic representation of measurement values from different measurement devices.
- Read out measurement values saved in measurement devices and save these to a database.
- Read out measurement values saved in a database and display these graphically.
- Read out measurement values saved in a database and search these for transients.
- Read out measurement values saved in a database and search these for events.
- Program customer-specific applications.
- Update measurement device firmware.

Please note: Some of the listed functions are not available for every measurement device!

3 Operating systems

Supported operating systems

The visualisation software GridVis can be installed on computers/PCs with a minimum resolution of 1280 x 960 pixels and with the following operating systems:

- Windows XP® (from Service Pack 3)
- Windows Vista® (from Service Pack 1)
- Windows 7® (32Bit, 64Bit)
- Windows 8® (32Bit, 64Bit)
- Windows Server® (from Version 2003 R1)
- MAC OS_X® (from Version 10.5)
- Linux (x86, x64) from Java 7

4 Minimum requirements

Firmware update / GridVis 3.0.0 minimum requirements for device firmware:

Dated February 28, 2012

Device	Firmware required	Notes
UMG604	1.293 or later	The devices with a firmware older than 1.048 should be technically (HW) upgraded (Atmel updated)
UMG605	1.293 or later	
UMG104	1.268 or later	
UMG511	1.293 or later	
UMG508	1.293 or later	
UMG103	No restrictions	
UMG96	No restrictions	
UMG96S	1.20 or later	
UMG503	3.102 or later	Devices up to HW version 0.40 (firmware version 2.004) should be replaced.
UMG505	No restrictions	Series 2 and 3
UMG507	0.993	Not verified by the GridVis software
UMG 510	1.037	
UMG96RM	0.50 or later	Not verified by the GridVis software
Prophi	No restrictions	

5 Software editions - GridVis license model

Designation	Basic	Professional	Enterprise	Service
Installations (desktop)	1	3	5	5
Installations (service / WEB)	0	0	0	2
Number of devices	5	not limited	not limited	not limited
Update period	not limited	1 year	1 year	1 year
Phone support	not limited	not limited	not limited	not limited
Graphs	x	x	x	x$^{(1)}$
JanDB / Derby database	x	x	x	x
Manual reports	x	x	x	x$^{(1)}$
Graphic programming	x	x	x	x$^{(1)}$
Topology	x	x	x	x$^{(1)}$
MS SQL / MySQL	-	x	x	x
Automatic reading	-	x	x	x
Virtual device	-	x	x	x
Automatic CSV export	-	-	x$^{(2)}$	x$^{(2)}$
Generic ModBus	-	-	x	x
Graphic programming module (write / read Modbus)	-	-	x	x$^{(1)}$
Cost centers	-	-	x	x
Automatic reports	-	-	x	x$^{(1)}$
Online recording	-	-	-	x
Service	-	-	-	x

(1) This feature is only available if the GridVis software is installed on the desktop.
(2) Use Create Groovy Scripts service (art. no. 51.01.015) to export CSV files automatically.

Number of devices:

The maximum number of devices loaded simultaneously (e.g. within the Basic version: a project with 5 devices or 5 projects with a device).

Update period:
A time period when new free versions can be installed.

Automatic reading:
Device reading according to freely configurable schedules.

Online recording:
The measurement data provided by the devices not equipped with their own memory are averaged in the GridVis software.

Automatic CSV export:
Automatic reading allows an automatic CSV export.

Service:
The GridVis software runs in the background and starts automatically without user logon to the computer and stores the data of the devices. GridVis Enterprise is included in the package and is required for configuration and data processing.

6 Migrate project database in GridVis

Migrating older project databases into GridVis 4

GridVis 4 utilises a new database structure in the management of your project data. Therefore reading in projects from older versions of GridVis requires the existing databases to be migrated.

The migration process can take several hours or days depending on the size of the databases and this will create a high workload for the computer system. For this reason please inform your administrator and create a backup of the database and ensure that you have at least 20% free space on the hard drive before starting with the conversion process!

Migrating the database:

- Inform your administrator before the migration and create a safety copy of the respective database.
- Start the GridVis 4 software.
- If the installation of GridVis 4 is an updating of an existing GridVis installation, then the projects created will be shown marked in the project window. Projects that are loaded subsequently and which require to be migrated will be similarly identified..
- Log in for the migration process for databases (cf. "Login" or "User administration"). To do so you must be a member of the "Admin", "Project admin" or "DB admin" group (role) (cf."Rolls and rights").
- If the project window and/or overview window are closed, open the project window and the overview window at the start of the migration.
- Use the mouse to select a project marked in red (migration required) and start the assistant via the "*Migrate database*" link in the overview window.
- After reading the information, start the migration of the database via the "*Start*" button in the "Migration information" dialogue window. The progress of the migration is shown in the status bar in the GridVis main window - the migration can take several hours depending on the database.

  If the dialogue window is closed prematurely with "Close" then the migration of the database continues in the background. Premature closing of the GridVis software or, for example, a power failure will result in the migration having to be started anew.
- The completion of the migration is indicated with a green tick in the "Migration information" dialogue window. After the migration is complete close the assistant with the "Close" button.
  The marking of the selected projects in the project window is removed and the project is identified as "Ready".
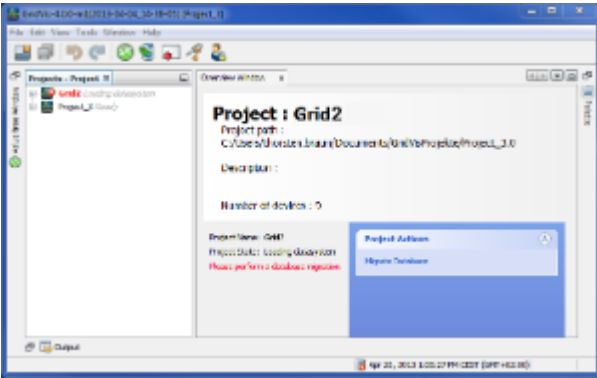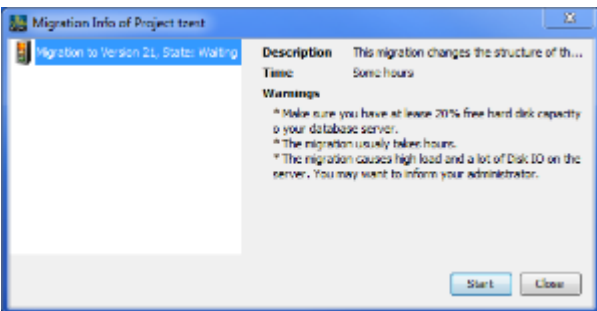
Fig.: Marked migration projects

Fig.: Migration information for the selected project.
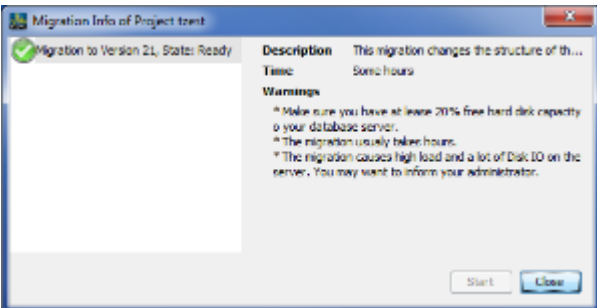
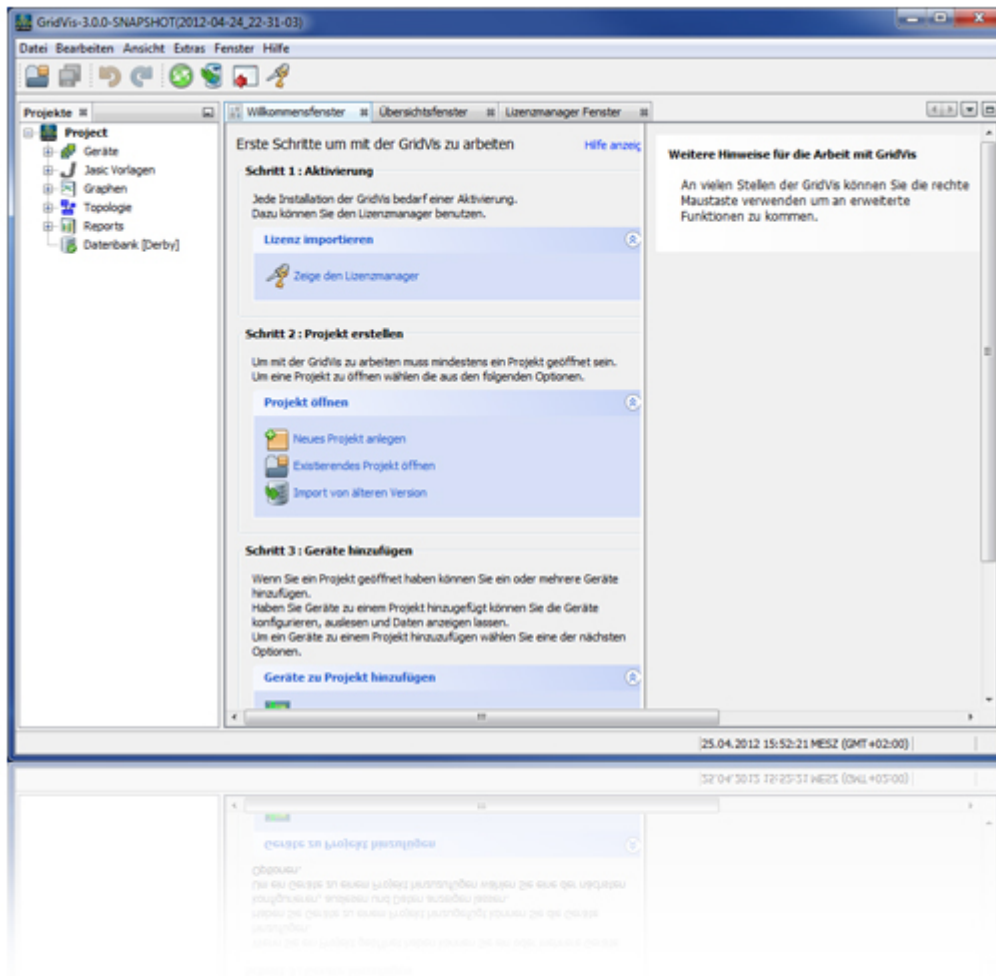The migration of the database is implemented with "*Start*".

Fig.: Migration successful

7 GridVis Installation and Activation

7.1 Installation and Activation of the GridVis Desktop Software

7.2 Installation of the GridVis visualization software

The Setup wizard will guide you step by step through the installation of the GridVis network visualization software.

- Close all open programs before installing the GridVis software.
- Start the installation program and follow the instructions of the wizard.
- Read the license agreement and accept the appropriate terms and conditions for the use of the GridVis software. Click *Next* to continue the installation process.
- Use the *Browse* button to select the target folder for the installation files or confirm the default path. Click *Next* to confirm the selection.
- Select the location for the start link in the Windows start menu or confirm the GridVis default path. Click *Next* to continue.
- Click *Finish* to close the wizard.
- After starting the GridVis network visualization software you should first activate the GridVis version. Follow the instructions in **Login and Activation of the GridVis Software.**
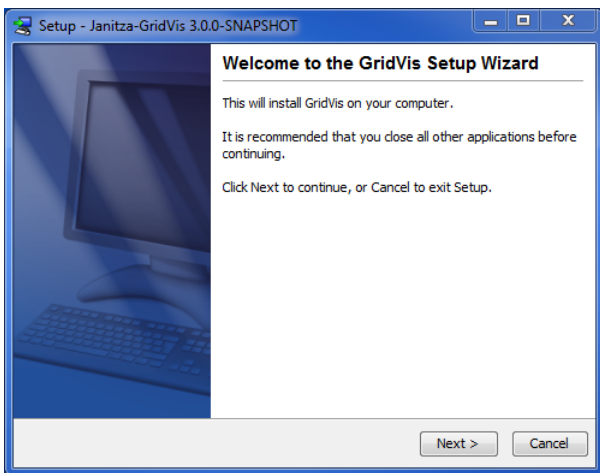
Fig. Setup wizard in the GridVis installation
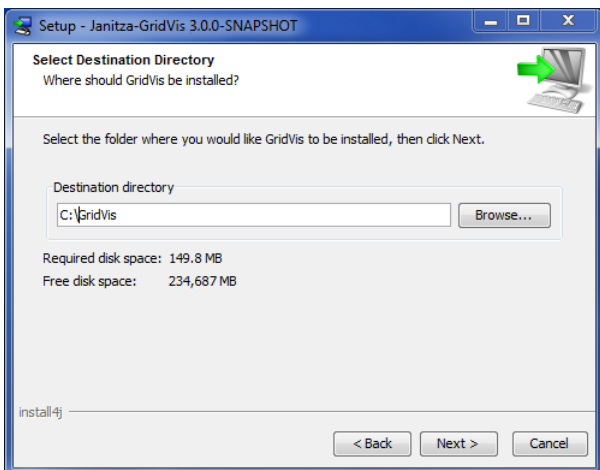
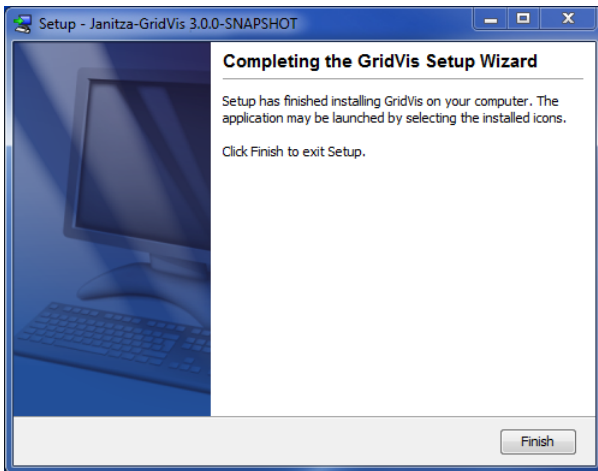Fig. Setup wizard, select target location

Fig. Close the Setup wizard

7.3 First Step - Login and Activation of the GridVis Software

Activate the GridVis version after you start the network visualization software.

The Welcome window can be opened under the menu item *Window/Welcome* and provides support to initial steps when working with GridVis.

Since the installation of the GridVis software should be followed by its activation, use the License manager to initiate the *Activation* process (cf. *Step 1: Activation* in the Welcome window of the GridVis software).

- Open the *License manager* through the link *Show the license manager* in the *Welcome window* or use the menu *Tools/License manager*.
- Create a license request file using the *Create a request file* button.
- Give the request file in the *Create a request file* window a unique name and click Next.
- Using the "..." button, select the location for the request file (e.g. Desktop) or confirm the default folder.
- Click *Finish* to close the wizard.
- If the computer has an Internet connection, you can start the browser by going to link *http://license.janitza.de* to access the *License server* directly. If the browser does not start, invoke the Internet browser using the interface of the operating system and open the homepage of the *License server* by going to *http://license.janitza.de*.
- If the computer is NOT connected to the Internet, the newly created file (*Request file*) can be copied to an external storage device (such as a USB flash drive) and sent to the *License server* via another computer with the Internet access. The activation file (see below) sent from the server via mail must be copied back to the computer with the GridVis software (e.g. using a USB flash drive).

- If you do not have an online customer account, you should first create an account by clicking the *Sign up* button.
    - Click *Sign up*.
    - Complete the *Register account* form. The fields marked with * are mandatory and thus must be filled in. Click *Next* to confirm the information entered.
    - Read the *Terms and Conditions* and accept them for a successful registration.
    - For safety reasons, you will be asked to enter a code in the final step of the registration, which is provided as an image above the input field. Please enter the characters shown in the input field. Click *Finish sign up* to complete the Registration process.
    - The *GridVis License server* will send a verification e-mail to the specified e-mail address to complete a successful registration by going to the link provided in the e-mail, which returns you to the *License server*.
    - Click *Activate Installation* to activate the GridVis software.
- If you already have an online customer account, please enter your e-mail address and password once you have clicked *Login*.
    - Click *Activate Installation* to activate your software.

Once you have successfully registered on the *GridVis License server* , you can activate various GridVis editions via the menu item *Activate Installation*, and the *Use purchased edition, Use Basic edition, Select from your list of editions* buttons.

Use Basic Edition

- When using the GridVis software Basic version, you can activate it by clicking the *Use basic edition* button on the *GridVis License server*.
- Select the request file (see the *Create a request file* section above) created using the GridVis software by pressing the *Browse* button, and then click *Next*.
- The window below provides a brief overview of the selected license that you can activate by clicking the *Activate* button. The *License server* then sends an e-mail with the required activation file to the specified e-mail address.
- Open your e-mail client and save the attached activation file on your computer (e.g. on the desktop).
- Select within the GridVis software in the License manager window (e.g. via the link *Show the License manager* in the *Welcome window* or using the menu *Tools / License manager*).
- Import the previously saved activation file via the *Import the activation file* option.
- The license will be activated and displayed in the License manager window on the right.

Use Purchased Edition

- When you use a newly purchased edition of the GridVis software (e.g. Professional or Enterprise edition), you must also have a serial number, which is located on the CD cover or on the product delivery note.
- Select *Use purchased edition* on the *Activate Installation* page and paste your serial number in the form field. Click *Next* to confirm.
- Select the request file (see *Create a request file*) generated using the GridVis software by pressing the Browse button, and click *Next*.

- The window below provides a brief overview of the selected license that you can activate by clicking the *Activate* button. The *License server* then sends an e-mail with the required activation file to the specified e-mail address.
- Open your e-mail client and save the attached activation file on your computer (e.g. on the desktop).
- Select within the GridVis software in the License manager window (e.g. via the link *Show the License manager* in the *Welcome window* or using the menu *Tools / License manager*).
- Import the previously saved activation file via the *Import the activation file* option.
- The license will be activated and displayed in the License manager window on the right.

Select from your list of editions

- This button is used to activate further GridVis software installations of an already available edition (see Software versions). Thereby, the installation for an edition with an available number of versions is integrated with free installations.
- Create a request file in the GridVis software as described above.
- Click *Select from your list of editions* after you log in to the *License server*.
- Select a required license from a list of already activated licenses and click *Next* to confirm your selection.
- Select the request file (see the Create a request file section above) created using the GridVis software by pressing the Browse button, and then click *Next*.
- The window below provides a brief overview of the selected license that you can activate by clicking the *Activate* button. The *License server* then sends an e-mail with the required activation file to the specified e-mail address.
- Open your e-mail client and save the attached activation file on your computer (e.g. on the desktop).
- Select within the GridVis software in the License manager window (e.g. via the link Show the License manager in the Welcome window or using the menu *Tools / License manager*).
- Import the previously saved activation file via the *Import the activation file* option.
- The license will be activated and displayed in the *License manager* window on the right.
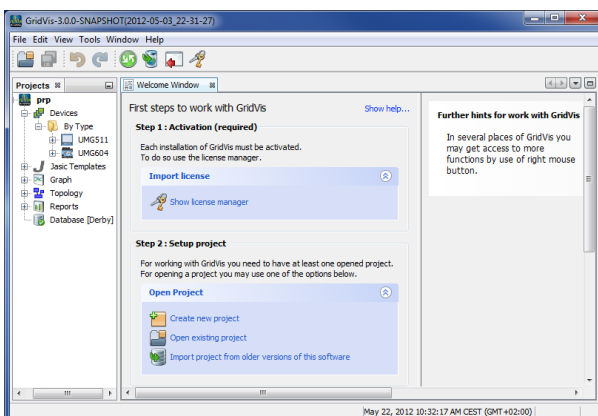

Fig. Welcome window with the License manager

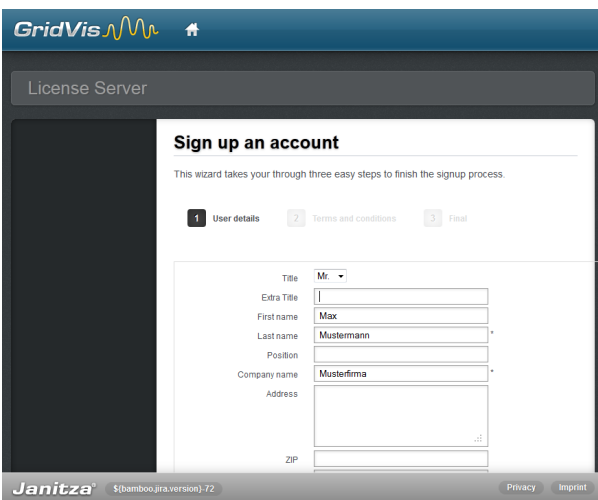Fig. GridVis License server (homepage)

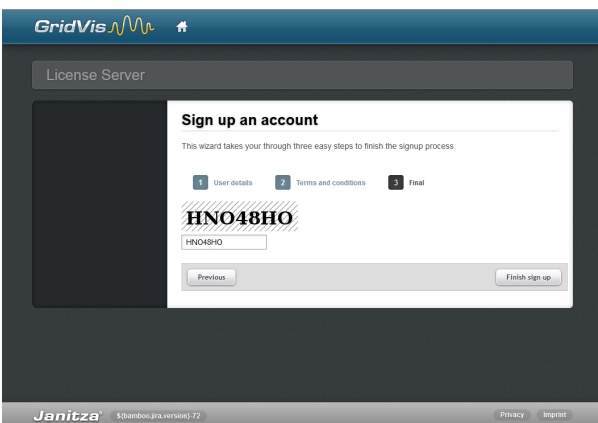Fig. GridVis License server (User re-login)

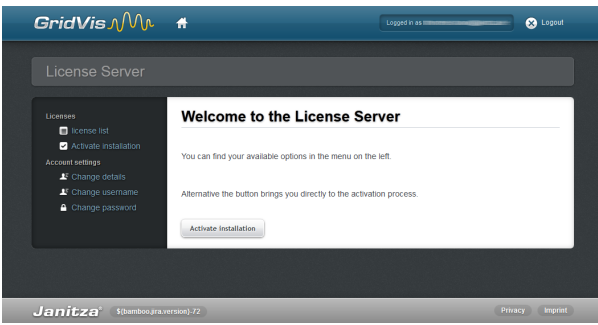Fig. GridVis License server (create an account)
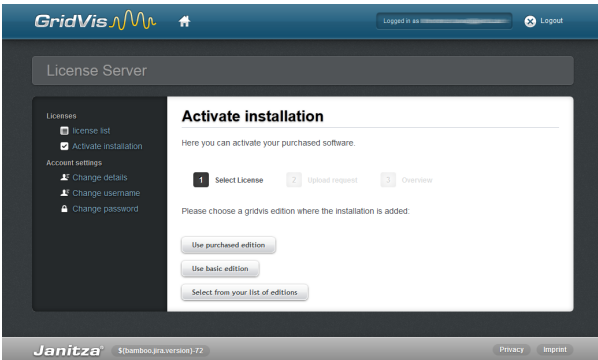
Fig. GridVis License server (activate installation)

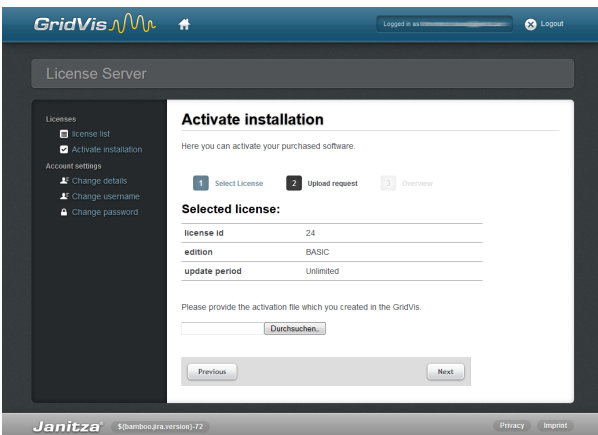Fig. GridVis License server (select the activation)

Fig. GridVis License server (load the request file)
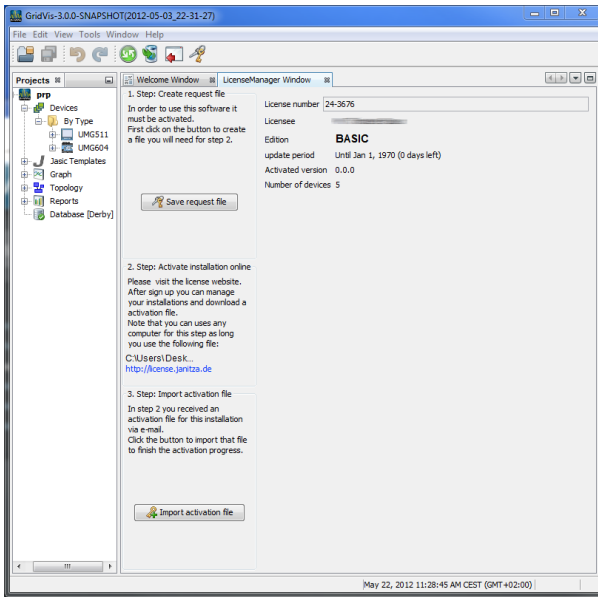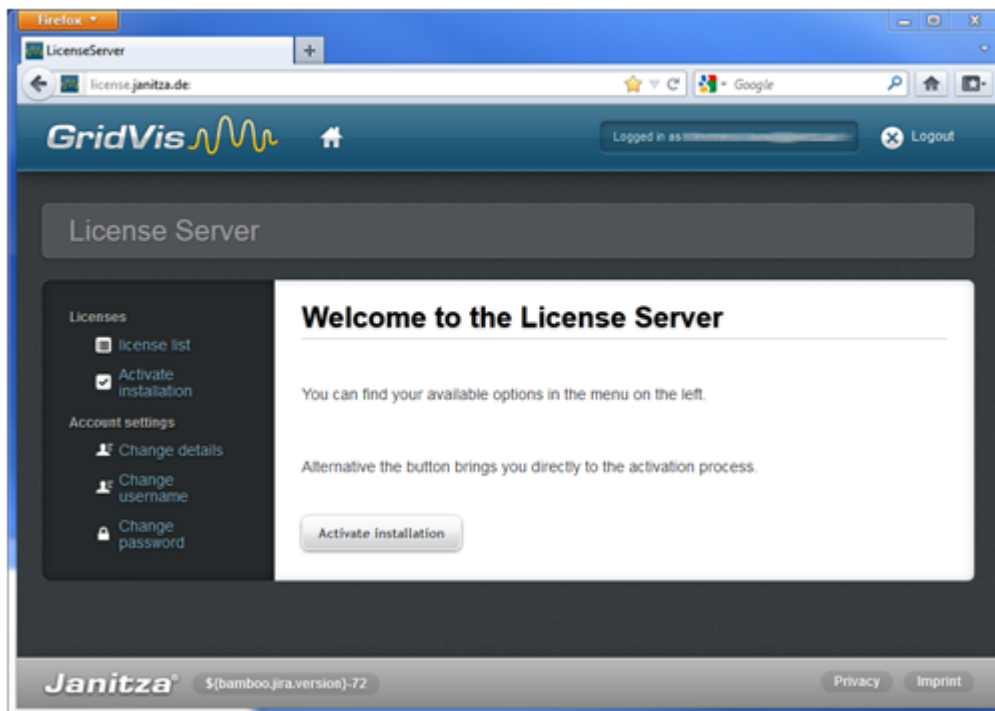
Fig. GridVis license server (select the edition)

Fig. GridVis License manager window

8 GridVis License Server

8.1 GridVis License Server

8.2 GridVis License Server

The License server is used to manage the licenses and editions required for the GridVis visualization software.

- Open an Internet browser on an Web-connected computer and go to https://license.janitza.de.

- If you do not have an online customer account, you should first create an account by clicking the *Sign up* button.
  - Click *Sign up*.
  - Complete the *Register account* form. The fields marked with * are mandatory and thus must be filled in. Click *Next* to confirm the information entered.
  - Read the *Terms and Conditions* and accept them for a successful registration.
  - For safety reasons, you will be asked to enter a code in the final step of the registration, which is provided as an image above the input field. Please enter the characters shown in the input field. Click *Login* to quit the Registration.
  - The *GridVis License server* will send a verification e-mail to the specified e-mail address to complete a successful registration by going to the link provided in the e-mail, which returns you to the *License server*.
  - Click *Register product* or *Activate installation* to activate the GridVis software.
- If you already have an online customer account, please enter your e-mail address and password once you have clicked *Login*.
- For further information on the activation of an GridVis edition see Login and Activation of the GridVis Software
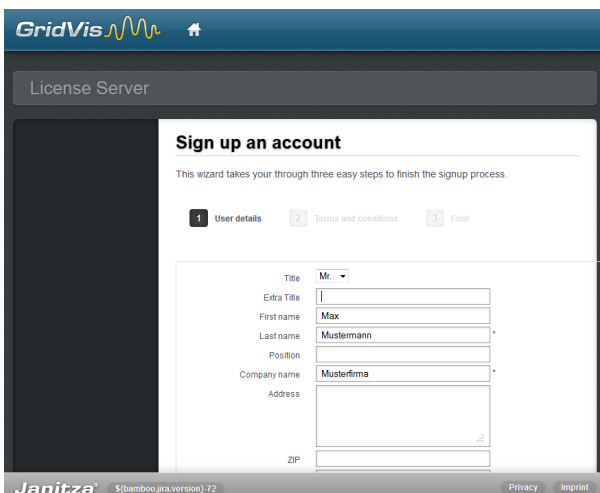

Fig. GridVis License manager (homepage)

Fig. GridVis License server (log into account)

8.3 License Overview Menu

8.3.1 License Overview Menu

The *License list* menu is a listing of all registered licenses for the respective GridVis editions. This menu can be further enhanced by an *Upgrade* (later edition of the existing licence) and *License extension* options. The License extension specifies the update period for an existing license, i.e. the period of time when new free versions can be installed.

Upgrade your license

Add Installation

Extend your license

Resend activation files
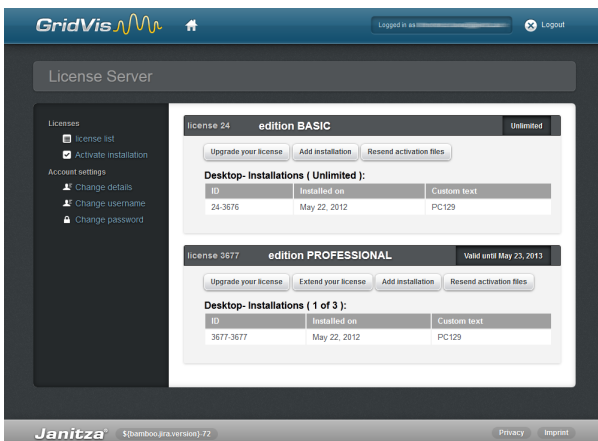
Fig. GridVis License server (license overview)

8.3.2 Add installation

Use this button to activate new GridVis installations on the *License server* (linking an installation to a license).

- Select the request file (see Login and Activation of the GridVis Software) created using the GridVis software by pressing the *Browse* button, and then click *Next*.
- The window below provides a brief overview of the selected license that you can activate by clicking the *Activate* button. The License server then sends an e-mail with the required activation file to the specified e-mail address.

- Open your e-mail client and save the attached activation file on your computer (e.g. on the desktop). Note: If you need to upload the activation file to another computer that has no Internet access, save the file on a USB flash drive.
- Select within the GridVis software in the *License manager window* (e.g. via the link *Show the License manager* in the *Welcome window* or using the menu *Tools / License manager*).
- Import the previously saved activation file using the *Import activation file* option.
- The license will be activated and displayed in the *License manager window* on the right.
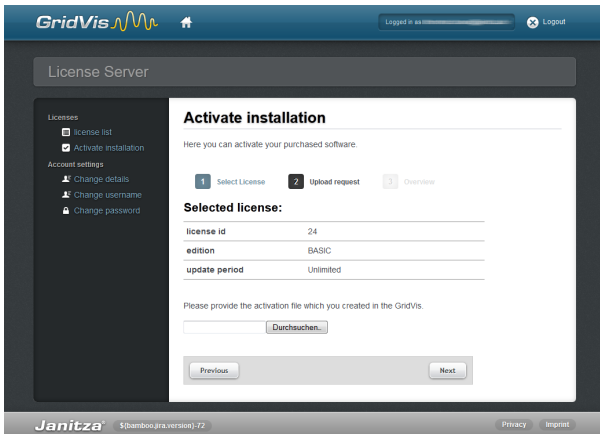
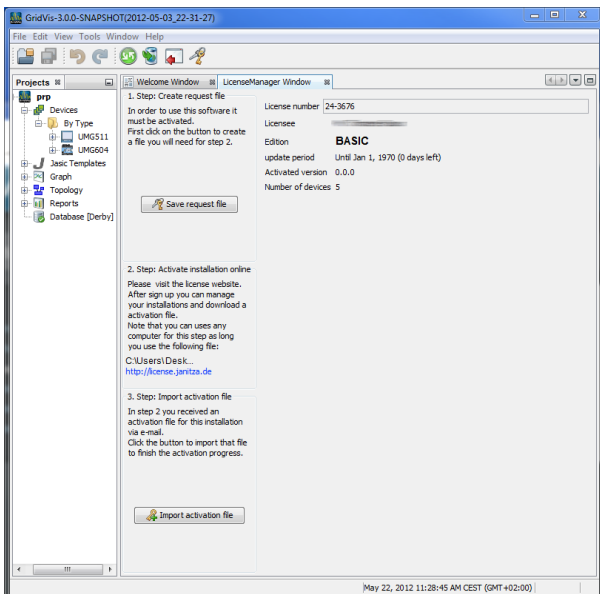Fig. GridVis License manager (download request file)

Fig. GridVis License window

8.3.3 Upgrade GridVis Edition (License Upgrade)

To upgrade the installed GridVis software, you need to have a serial number.

- If the computer has an Internet connection, you can start the browser and go to https://license.janitza.de to access the *GridVis License server* directly.

- Enter your personal access data (e-mail address and password) and log in by clicking the *Login* button.
- Select the *License list* menu item.
- Start the wizard by clicking the *Upgrade your license* button to upgrade the license.
- Enter the newly purchased serial number into the form field and click *Next* to confirm.
- Use the License Upgrade button in the Overview window to activate the Upgrade. Click *Upgrade license* to forward the required activation file to the specified e-mail address.
- Open your e-mail client and save the attached activation file on your computer (e.g. on the desktop).
- Select within the GridVis software in the *License manager window* (e.g. via the link *Show the License manager* in the Welcome window or use the menu *Tools / License manager*).
- Import the previously saved activation file using the *Import the activation file* option.
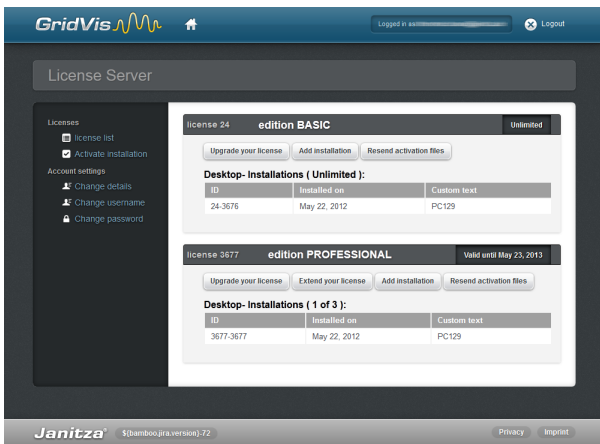- The license will be activated and displayed in the License manager window on the right.

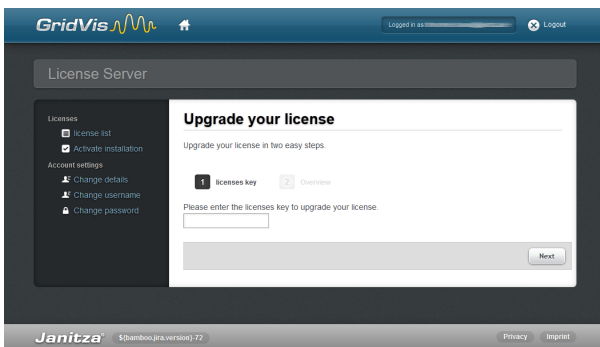Fig. GridVis License server (License Overview)
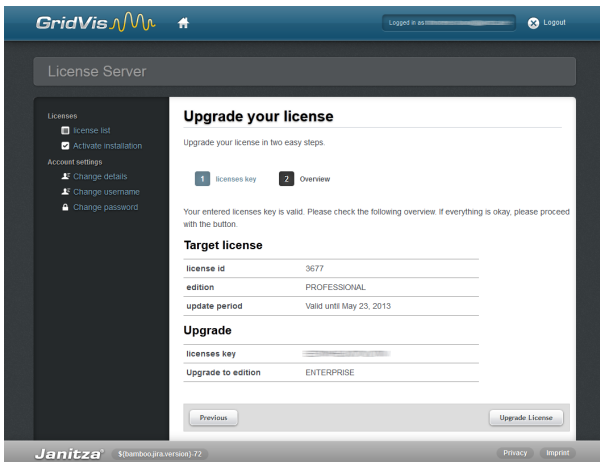

Fig. GridVis License server (License Upgrade)

Fig. GridVis License server (License Overview)

8.3.4 GridVis License Extension

The period of time when new free versions (updates) may be installed can be extended via the GridVis License server.

- If the computer has an Internet connection, you can start the browser and go to https://license.janitza.de to access the GridVis License server directly.
- Enter your personal access data (e-mail address and password) and log in by clicking the *Login* button.
- Select the *License list* menu item.
- Start the wizard by clicking the *Extend your license* button to review the license.
- Enter the new serial number into the form field and click *Next* to confirm.
- Click *Extend license* on the Overrview page to complete the process.
- Click *Resend activation files* (*License list* menu) to forward the required activation file to the specified e-mail address.
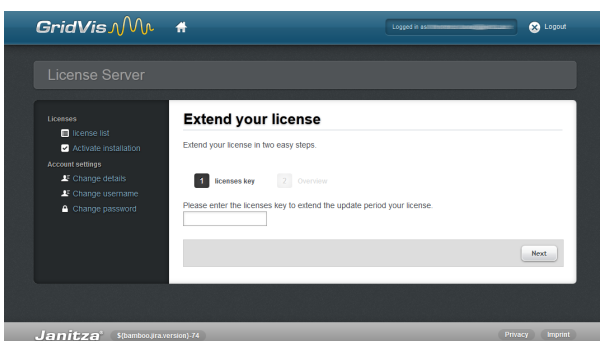

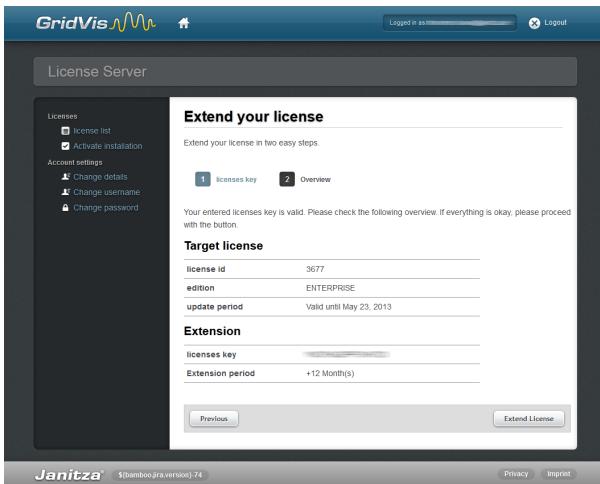Fig. GridVis License server (License Extension)

Fig. GridVis License server (License Extension)

8.3.5 Send New Activation Files

Click Res*end activation files* to forward the required activation file to the specified e-mail address.

- Start up a browser on an internet-connected computer and call up the *GridVis License Server* at https://license.janitza.de.
- Complete your login details (e-mail address and password) and login by pressing the *login* button.
- Select the "*License list*" menu item under licences.
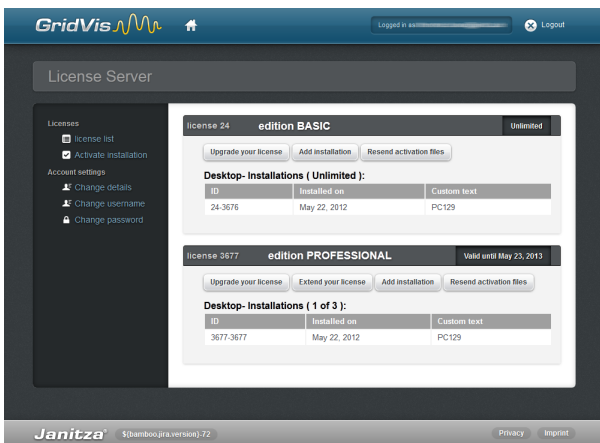- Start the process by pressing the "*Resend activation files*" button.

Fig. GridVis License server (License Overview)

8.4 Activate Installation Menu

8.4.1 Activate Installation

Use this menu item to activate various editions on the License server. The activation (linking an installation to a license) of the GridVis software on the License server - depending on the edition - enhances functionality.

Use Purchased Edition

Use Basic Edition

Select from your list of edition

Further information about activating a GridVis-Edition can be found at GridVis Installation and Activation.

Fig. GridVis License server (Selection and Activation)

8.4.2 Use Already Available Edition (select from your list of edition)

This button is used to activate further GridVis software installations of an already available edition (see Software versions). Thereby, the installation for an edition with an available number of versions should be integrated with free installations (see Figure on the right).

- Select the required edition (with an available number of installations) and click *Next* to continue.
- Select the request file (see Login and Activation of the GridVis Software) created using the GridVis software by pressing the *Browse* button, and then click *Next*.
- The window below provides a brief overview of the selected license that you can activate by clicking the *Activate* button. The *License server* then sends an e-mail with the required activation file to the specified e-mail address.
- Open your e-mail client and save the attached activation file on your computer (e.g. on the desktop). Note: If you need to upload the activation file to another computer that has no Internet access, save the file on a USB flash drive.
- Select within the GridVis software in the *License manager window* (e.g. via the link *Show the License manager* in the *Welcome window* or using the menu *Tools / License manager*).
- Import the previously saved activation file using the *Import the activation file* option.

- The license will be activated and displayed in the *License manager window* on the right.

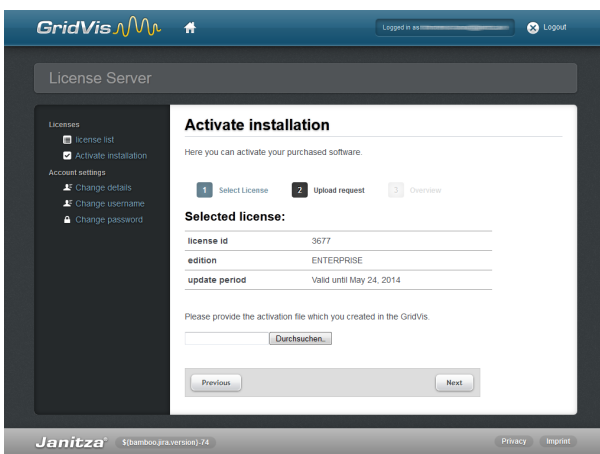Fig. GridVis License server (select an edition)
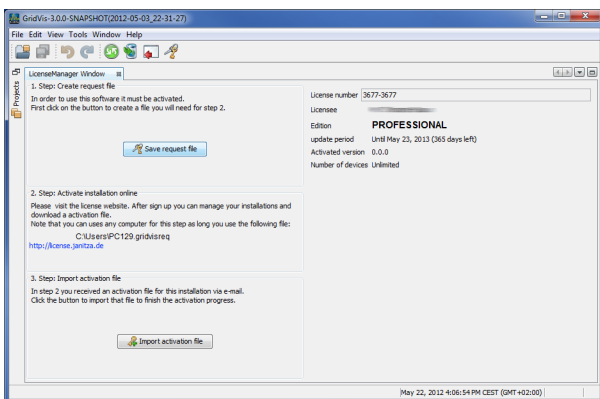

Fig. GridVis License Server (upload the request file)

Fig. GridVis software (License manager window)

8.4.3 Use Basic Edition

You need to activate this version before you can use it.

- Select the request file (see Login and Activation of GridVis) created using the GridVis software by pressing the *Browse* button, and then click *Next*.
- This window provides a brief overview of the selected license that you can activate by clicking the *Activate* button. The *License server* then sends an e-mail with the required activation file to the specified e-mail address.
- Open your e-mail client and save the attached activation file on your computer (e.g. on the desktop). Note: If you need to upload the activation file to another computer that has no Internet access, save the file on a USB flash drive.
- Start the GridVis software and select in the *License manager window* (e.g. via the link *Show the License manager* in the *Welcome window* or using the menu *Tools / License manager*).
- Import the previously saved activation file using the *Import the activation file* option.
- The license will be activated and displayed in the *License manager* window on the right.
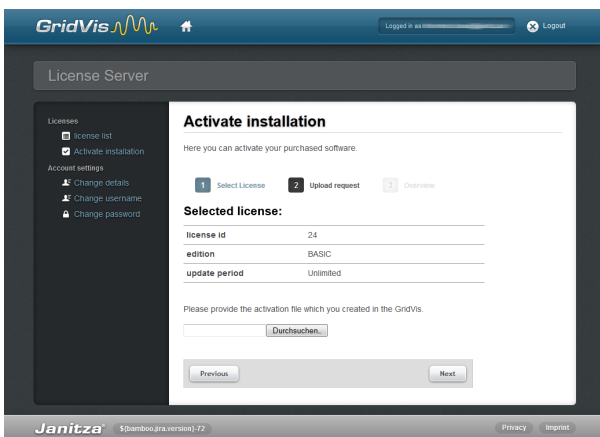

Fig. GridVis License server (download the request file)

8.4.4 Use Purchased Edition

When you use a newly purchased edition of the GridVis software (e.g. Professional or Enterprise edition etc.), you must also have a serial number, which is located on the CD cover or on the product delivery note.

- Select *Use Purchased Edition* on the *Activate Installation* page and paste your serial number in the form field. Click *Next* to confirm.
- Select the request file (see Login and Activation of the GridVis Software) generated using the GridVis software by pressing the *Browse* button, and then click *Next*.
- The window below provides a brief overview of the selected license that you can activate by clicking the *Activate* button. The *License server* then sends an e-mail with the required activation file to the specified e-mail address.
- Open your e-mail client and save the attached activation file on your computer (e.g. on the desktop). Note: If you need to upload the activation file to another computer that has no Internet access, save the file on a USB flash drive.
- Start the GridVis software and select in the *License manager window* (e.g. via the link *Show the License manager* in the *Welcome window* or using the menu *Tools / License manager*).
- Import the previously saved activation file using the *Import the activation file* option.
- The license will be activated and displayed in the *License manager* window on the right.
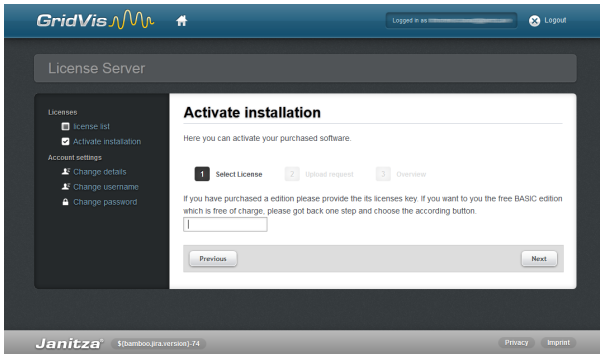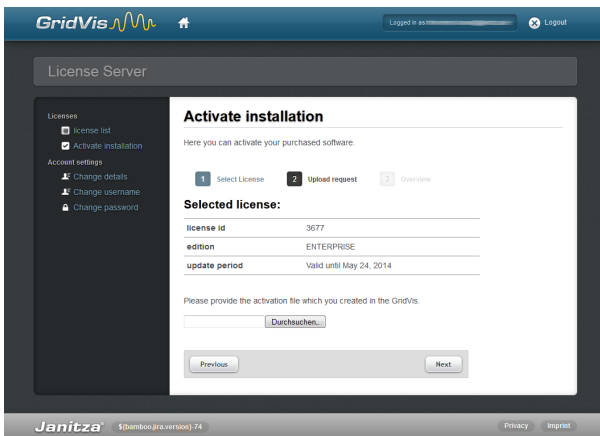
Fig. GridVis License server (serial number input)

Fig. GridVis License server (upload the request file)

8.5 Account Settings Menu

Account Settings

Use the account settings to change the e-mail or password required for Login.
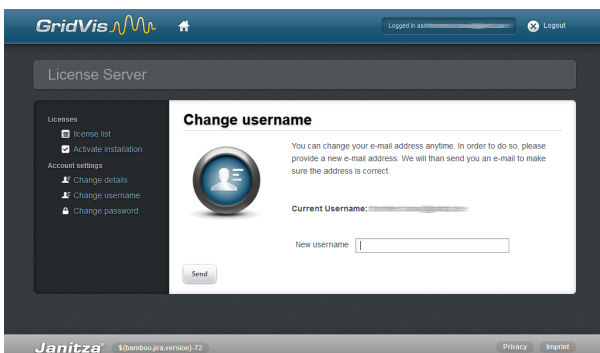
Change E-mail

Change Password

Fig. GridVis License server (account settings)

8.5.1 Change E-mail

Use the *Change E-mail* account settings to change the e-mail address required for Login. Once you have entered your new e-mail address, click *Send* to receive an e-mail confirmation from the GridVis License server.

Fig. GridVis License server (changing your e-mail address)

8.5.2 Change Password

Use the *Change password* account settings to change the password required for Login. The new password must be at least 6 characters long with a desired combination of letters and numbers. Click *Change Password* to apply changes.
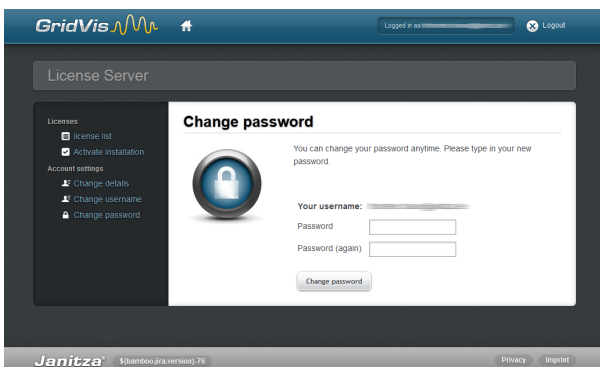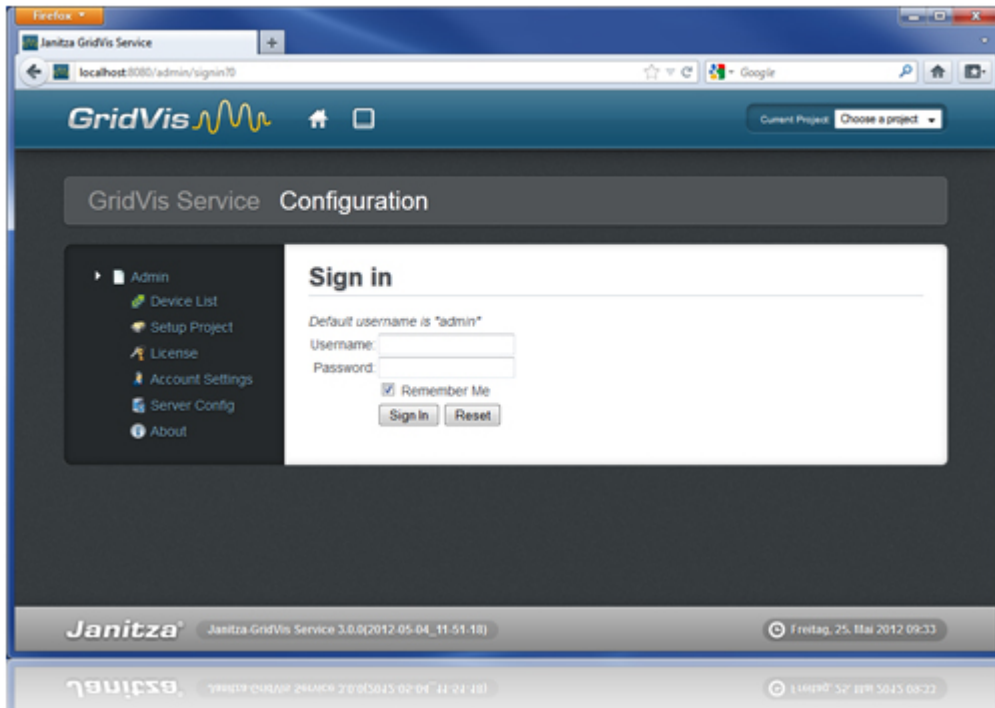

Fig. GridVis License server (changing password)

9 GridVis Service

9.1 GridVis Service

9.2 Requirements

The following basic requirements must be met to use the GridVis Service software:

- A license for the GridVis Service module
- A Windows Server (2003, 2008, 2008r2) or a Windows PC (Windows XP, Vista, Windows 7)

- At least 8 GB of storage (RAM)
- A MySQL/MSSQL server

9.3 GridVis Service Installation

The Setup wizard will guide you step by step through the installation of the GridVis Services.

- Close all open programs before installing the GridVis software.
- Start the installation program and follow the instructions of the wizard.
- Read the license agreement and accept the appropriate terms and conditions for a successful installation.
- Use the *Browse* button to select the target folder for the installation files or confirm the default path. Click *Next* to confirm the selection.
- Select the location folder by clicking the *Browse* button or confirm the default path. Click *Next* to continue.
- Determine the port for communication (internal HTTP server) or accept the default port number. Click *Next* to continue the installation.
- Prior to the completion of the installation, the wizard displays the link in blue font for the web interface (see Fig. GridVis Service (complete the installation)).

  Please note this link down since you will need it later to access the Web interface!
- Click *Finish* to complete the installation.
- Start the edition as descibed in "Start GridVis Service and Login".

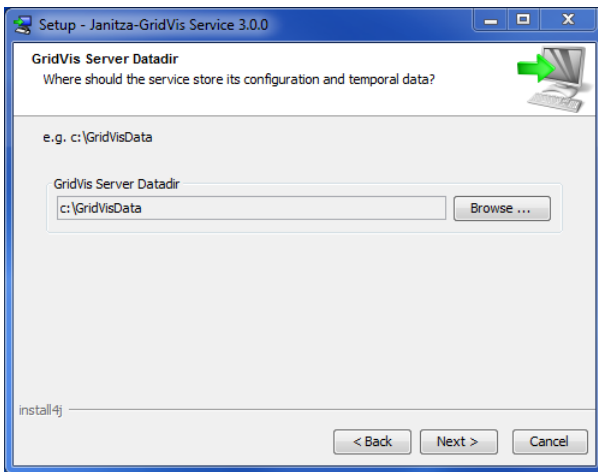Fig. GridVis Service (Installation Wizard)
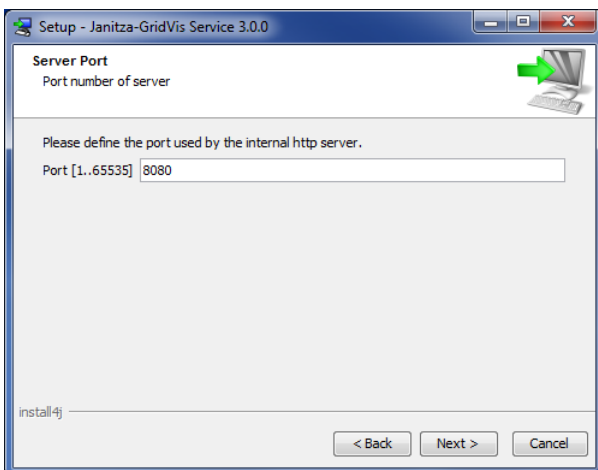

Fig. GridVis Service (specify installation path)
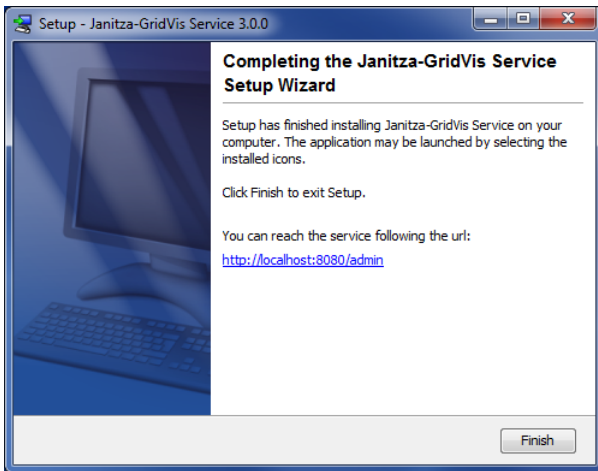

Fig. GridVis Service (select port number)

Fig. GridVis Service (finish installation)

9.4 Start GridVis Service and Login

- Start and Internet browser and enter the web address (URL) *http://localhost* followed by a colon and the port number assigned during installation.
  If you followed the instructions of of the installation wizard, the Web interface will start at *http://localhost:8080*.
- Enter your personal access data (username and password) to login.
  When you **log on for the first time** (e.g. after installation), enter **admin** as a user name and **Janitza** as a password. Please note that the system is case-sensitive.
- Click *Login* to log on to the GridVis Service software interface.
- Follow the instructions to activate the GridVis Service Edition (see Activate Edition).
- Enter a server name, if you have not done it before (see Server Configuration Menu).
- Download a Project generated using the GridVis Basic, Professional or Enterprise editions (see Setup Project Menu).
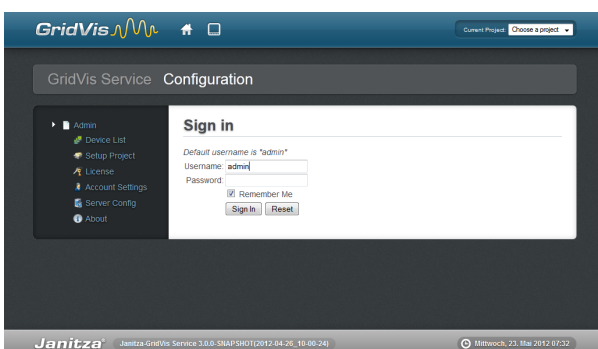

Fig. GridVis Service (Login)

9.5 Activate Service Edition

The installation of the GridVis Service software is activated through a wizard by selecting a request and activation file within the License overview.

- Create a request file as described in Step 1. Assign a unique file name and save it by clicking the *Download request file* on your computer.

  If the computer is NOT connected to the Internet, the newly created file (Request file) can be copied to an external storage device (such as a USB flash drive) and sent to the License server via another computer with an Internet access.
- If the computer has an Internet connection, you can start the browser by going to http://license.janitza.de to access the License server directly.
- If you do not have an online customer account, you should first create an account by clicking the *Sign up* button.
    - Click *Sign up*.
    - Complete the *Register account* form. The fields marked with * are mandatory and thus must be filled in. Click *Next* to confirm the information entered is correct.
    - Read the *Terms and Conditions* and accept them for a successful registration.
    - For safety reasons, you will be asked to enter a code in the final step of the registration, which is provided as an image above the input field. Please enter the characters shown in the input field. Click *Finish sign up* to complete the Registration process.
    - The GridVis License server will send a verification e-mail to the specified e-mail address to complete a successful registration by going to the link provided in the e-mail, which returns you to the *License server*.
    - Click *Activate Installation* to activate the GridVis software.
- If you already have an online customer account, please enter your e-mail address and password once you have clicked *Login*.
    - Click *Activate Installation* to activate your software.

- Click *Use Newly Purchased Edition* to start the *Acivate Installation* wizard.
- Enter the serial number located on the CD cover or the product delivery note into the form field. Click *Next* to confirm.
- Select the request file (see Download request file) created using the GridVis software by pressing the *Browse* button, and then click *Next*.
- The window below provides a brief overview of the selected license that you can activate by clicking the *Activate* button. The *License server* then sends an e-mail with the required activation file to the specified e-mail address.
- Open your e-mail client and save the attached activation file on your computer (e.g. on the desktop or an USB flash drive).
- If the GridVis Service interface was closed, restart it by going to localhost (e.g. *http://localhost:8080*) and log on.
- Select the activation file you have received by pressing the *Browse* button. Click *Open* or *Upload* activation file to confirm your selection.

- Assign a server name after successful activation (Server Configuration Menu).
- Note: It is recommended that you change your password after the installation to ensure safety (Account Settings Menu (Password)).

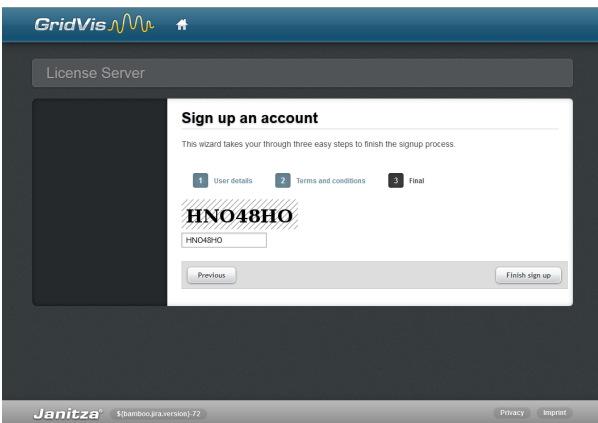Fig. GridVis Service (license configuration)

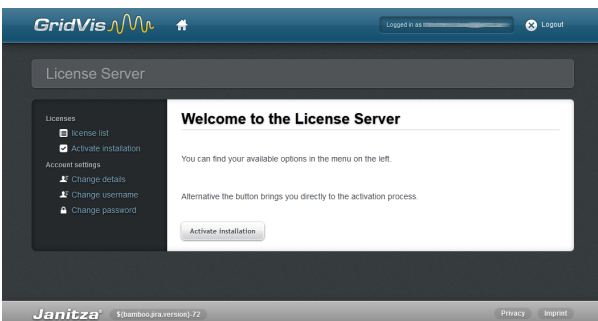Fig. GridVis License server (logging into account)
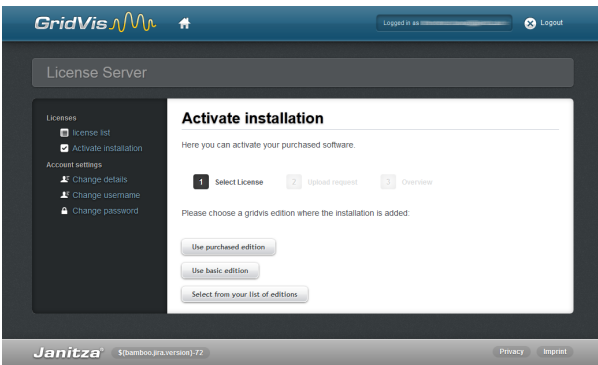

Fig. GridVis License server

Fig. GridVis License server (starting the wizard)

Fig. GridVis License server
(brief overview of the licenses for activation)

9.6 Server Configuration

The Server Configuration menu should be assigned a unique server name. The server name is used within the GridVis software to uniquely identify the service.

- Enter a unique server name and click *Set server name* to confirm the entry.
  This process can take several minutes. Please wait until the process is finished.
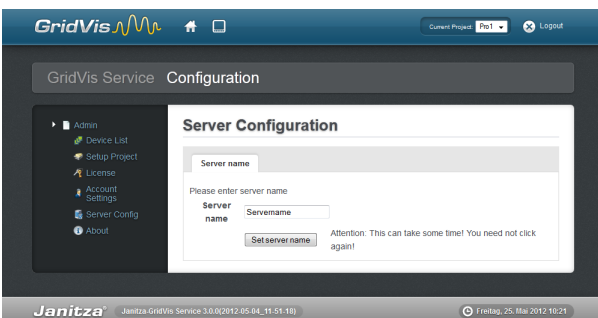
Fig. GridVis Service (set server name)

9.7 Account Settings

Generate a new password for the GridVis Service under this menu item. For safety reasons, you will be prompted to enter the old password and then input the new one.

- Enter the old password which is still active under *Current password*. When the sofware is installed for the first time, the password is **Janitza.**
- Enter the desired password under *New Password* and confirm it by entering your password again in the *Repeat new password* input field.
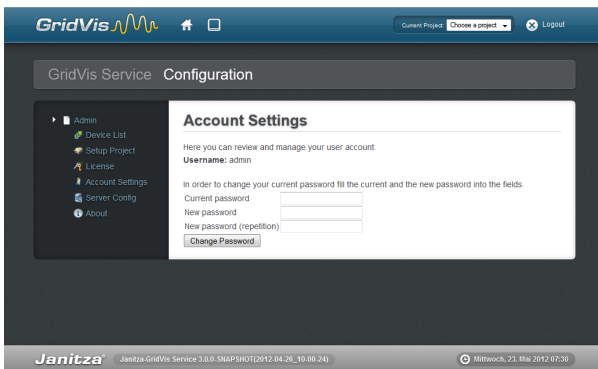- Click *Change password* to confirm your entry.

Fig. GridVis Service (change password)

9.8 Project Setup

The projects that have been created in the GridVis software (Basic Edition, Professional or Enterprise) should be integrated into project settings. In this case, these projects require access to MySQL or MSSQL database. If the project was created using a Derby database, the project cannot be integrated into the GridVis Service software.

- Set the path, including the name of the project created in the GridVis software.
  If a project named *Pro1* was created in the *C:\Temp*, the *C:\Temp\Pro1* path should be entered under *Project settings* in the GridVis Service software.

  Please note: UNC-paths or paths with mapped network drives to the projects are not supported. The project has to be located on the server.

  The entire path of the project created in the GridVis software (Basic, Professional or Enterprise) can be read out in the respective edition. Therefore:
  - Open the GridVis software (Basic, Professional or Enterprise).
  - Download or create an appropriate project.

- Click the top node of the respective project tree in the project window.
  (if the dialog does not appear, it can be displayed under Dialog/projects).
- The Overview window provides an overview of the information on the project with the project directory.
  (if the dialog does not appear, it can be displayed under Dialog/projects).
- Click *Load Project* to download a preset project. An overview of the devices integrated in the project will be displayed when you open the project (see Device List Menu).

Please note that the GridVis software does not support Derby databases, i.e. you can not download the projects accessible via a Derby database!

If you select a project from the Project listing by clicking the left mouse button, you can configure the pop-up menu settings so that the selected project can not be downloaded the next time you start the server.

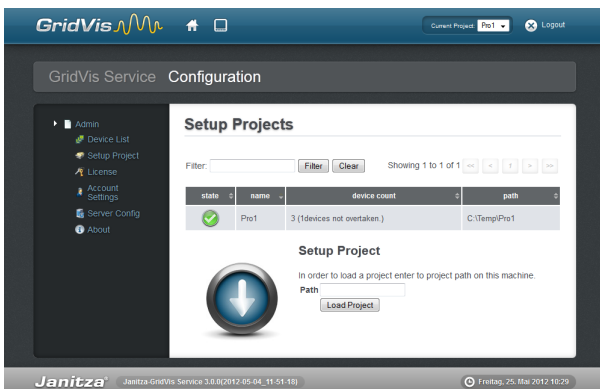Use Windows management tools if you need to restart the GridVis software.

Fig. GridVis Service (project setup)

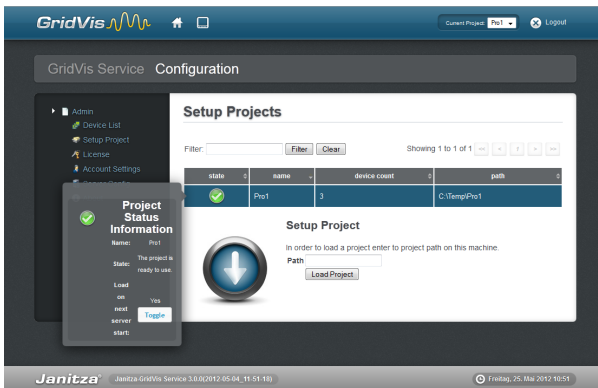Fig. GridVis Service (project device list)

Fig. GridVis Service (project status information)

9.9 Display Device List

The device list provides an overview of the devices integrated in the project.

- If you select a device by clicking the mouse, use the pop-up menu to perform a connection test. If the computer is Web-connected, the selected device is highlighted in green.
- Use the (">", ">>", "<", "<<") buttons to switch between pages if more than one device is displayed.
- Use the *Filter* text input field to display a specific selection of devices. The devices are filtered accordingly and displayed once the filter input has been matched with the type, name, description, and connection data.
- Click *Overtake all* to confirm and manage the devices selected for the project.
  - The devices added for the project in the GridVis software (Basic, Professional, Enterprise) are saved in GridVis and managed by the Basic, Professional or Enterprise software editions (e.g.automatic synchronization, time synchronization, online records and watchdog).
  - When you install the GridVis Service software, you should also set a priority (responsibility) between two versions of the software by clicking the *Overtake all* button. Use the respective software to make any subsequent changes.
  - If the device priority (responsibility) is set for the Basic, Professional or Enterprise editions, a warning message will appear in the device list of GridVis Service (see figure on the right). Click the *Overtake all* button to accept the priority.
  - A message indicating the lack of priority ("This application does not have the priority rights for one or more devices") occurs when you start Basic, Professional or Enterprise editions which have access to project set up in the GridVis software. Click OK to confirm.
  - If you wish to transfer the priority (responsibility) of the devices to the Basic, Professional or Enterprise editions, you should make changes within these editions. To do this, open the project dialog with the corresponding project tree and highlight the device by clicking the right mouse button. Then select the *Takeover device* option in the pop-up menu.
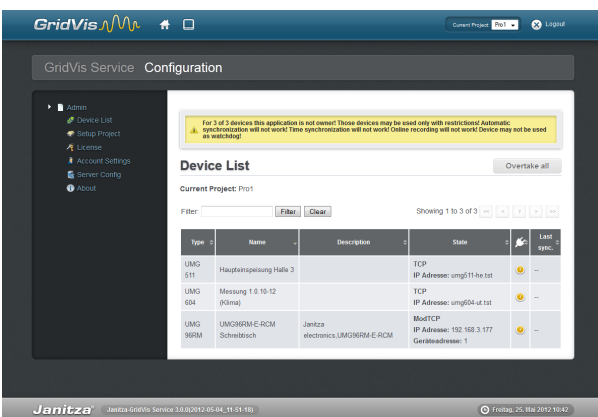
Fig. GridVis Service (project device list)

Fig. GridVis Service (device list with control message)

9.10 GridVis Service Software Information

This menu item displays more information about the GridVis Service software, such as software versions and build IDs. Click *Common*, *Application Log* or *Device Sync Log* to access the so-called log files (logs).
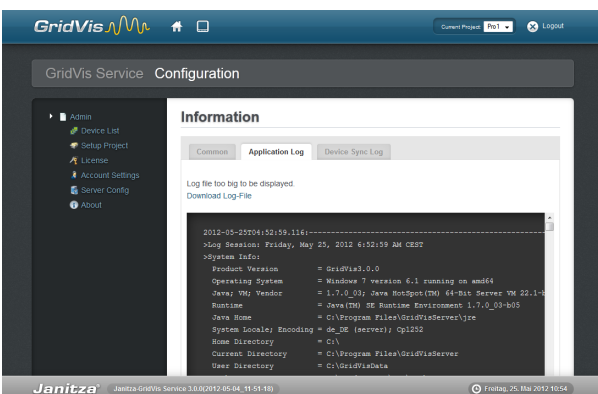

Fig. GridVis Service (Information)

9.11 Activate GridVis Service Installation

Use a request and activation file to activate the GridVis Service software through a wizard within the License Overview.

In the current version of the GridVis Service software, the activation should only be done once after the installation as described in Activate Service Edition.

Fig. GridVis Service (license configuration)

9.12 Troubleshooting

- It may sometimes happen that the connection to the GridVis Service fails or the Service does not reply. Use the Windows management tools to close the GridVis Service.
    - Start the Windows Computer Management (*Administrative Tools*) via System Control.
    - Start Service Management via *Services*.
    - Browse GridVis Service and re-start it by clicking the appropriate button.
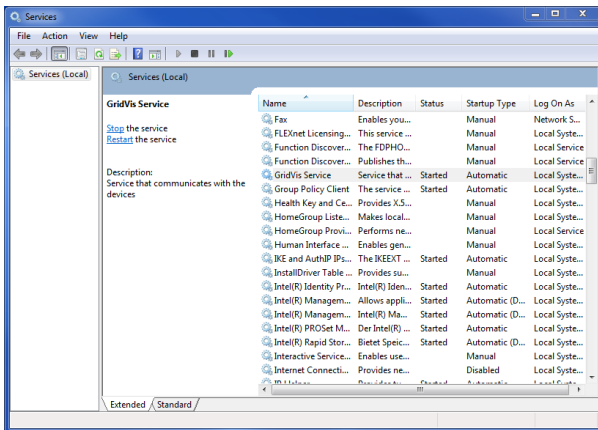   - Open an Internet browser and start the GridVis Service interface.

Fig. Windows Management Service

9.13 WEB REST API

Version: 3.1.0

This is the reference document for the REST API and resources provided by SERVICE/WEB. The REST APIs are for developers who want to integrate SERVICE/WEB with other standalone or web applications and for administrators who want to script interactions with the SERVICE/WEB server.

9.13.1 Getting started

As the REST API is based on open standards, any web development language can be used to access the API.

9.13.2 Structure of the REST URIs

SERVICE/WEB's REST APIs provide access to resources (data entities) via URI paths. Using a REST API, the application will make a HTTP request and parse the response. The SERVICE/WEB REST API uses XML, JSON and JSONP as its communication format as well as standard HTTP methods like `GET`, `PUT`, `POST` and `DELETE` (see API descriptions below to know which methods are available for each resource). URIs for SERVICE/WEB's REST API resources have the following structure:

`http://host:port/rest/api-version/resource-name`

The current API version is `1`.

There is a WADL document containing the documentation for each resource in the SERVICE/WEB REST API. It is available here.

9.13.3 Content negotiation

The Service can consume and produce XML, JSON and JSONP. The content type is defined by the HTTP header value "Accept". However, especially for AJAX requests from the browser, it is not always possible to set the header values. In this case, the desired content type can be suffixed to the url, but it has to be set in front of any query parameters.

Example

```
Auto:   http://localhost:8080/1/projects/
XML:    http://localhost:8080/1/projects/.xml
JSON:   http://localhost:8080/1/projects/.json

Auto:   http://localhost:8080/1/projects/?someParam=value
XML:    http://localhost:8080/1/projects/.xml?someParam=value
JSON:   http://localhost:8080/1/projects/.json?someParam=value
```

JSONP

Accessing the REST APIs from a different domain via AJAX violates the same origin policy. Therefore, the JSONP technique must be used. To enable JSONP, choose the content type json and provide the query parameter "callback" within your callback function.

9.13.4 Authentication

Any authentication working against SERVICE/WEB will also work against the REST API. **The prefered authentication methods are HTTP Basic (when using SSL).**

9.13.5 Date and Time

All time values are returned in nano seconds by this REST service. To define a date or a timerange, a variety of methods can be chosen. Most rest function need a timerange which is defined by the two query parameter "start" and "end".

Example: This will return the energy used between a defined point in time and the current day.

```
1/projects/{pname}/devices/{devid}/hist/energy?start=UTC_34235345&end=NAMED_Today
```

Prefix	Description	Exam
UTC	A UTC timestamp in milli seconds. *Optional timezone is ignored*	UTC_
UTCSEC	A UTC timestamp in seconds. *Optional timezone is ignored*	UTCS
UTCNANO		UTCN

Prefix	Description	Exam
	A UTC timestamp in nano seconds. This is the format used by this REST API's reponses. *Optional timezone is ignored*	
ISO8601	An ISO8601 date. Too see the documentation visit the joda time homepage. *When called without time information the day's beginning is used. Day's end is used only if the parameter is explicitly set to a timespan's end (e. g.paramater "end").*	ISO8
EUROPEAN	European format, either with time or without.	start= end= end=
US	MM/DD/YYYY	US_0 US_0 US_0
NAMED	This allows you to use named timespans (e. g. last month). Supported values: • Today • Yesterday • ThisWeek • LastWeek • ThisMonth • LastMonth • ThisQuarter • LastQuarter • ThisYear • LastYear These values are calculated relative to the current server time. But this anchor in time can be changed by the "anchor" query parameter. The anchor accepts any time method, especially RELATIVE.	start= start= will re
RELATIVE	This allows you to use relative timespans like minus 3 month +50 minutes. Supported format: • change := amount+ • amount:= sign? amount type • sign := '+' | '-' • amount := 0-9* • type := YEAR|MONTH|WEEK_OF_YEAR|WEEK_OF_MONTH|DATE|DAY_OF_YEAR DAY_OF_WEEK| DAY_OF_WEEK_IN_MONTH| HOUR| HOUR_OF_DAY| MINUTE| SECOND For further documentation use the java calendar object documentation.	start= start= days. start=

Timezone

The timezone default is the server installation's default timezone. To change the timezone, the "timezone" query parameter can be used. Possible values can be found here

9.13.6 Index

The WEB REST API allows access to projects, devices and their data.

Die WEB REST API erlaubt den Zugriff auf Projekte, Geräte und Daten.

- Resources
    - http://example.com:8080/rest/1/projects [GET, PUT]
    - http://example.com:8080/rest/1/projects/{pname} [GET, DELETE]
        - http://example.com:8080/rest/1/projects/{pname}/devices [GET]
    - http://example.com:8080/rest/1/projects/{pname}/devices/{devid} [GET]
    - http://example.com:8080/rest/1/projects/{pname}/devices/{devid}/hist/energy
        - http://example.com:8080/rest/1/projects/{pname}/devices/{devid}/hist/energy/{value}/{type} [GET]
    - http://example.com:8080/rest/1/projects/{pname}/devices/{devid}/hist/events [GET]
    - http://example.com:8080/rest/1/projects/{pname}/devices/{devid}/hist/flags [GET]
    - http://example.com:8080/rest/1/projects/{pname}/devices/{devid}/hist/sequences
        - http://example.com:8080/rest/1/projects/{pname}/devices/{devid}/hist/sequences/{sequen} [GET]
    - http://example.com:8080/rest/1/projects/{pname}/devices/{devid}/hist/transients [GET]
    - http://example.com:8080/rest/1/projects/{pname}/devices/{devid}/hist/values [GET]
        - http://example.com:8080/rest/1/projects/{pname}/devices/{devid}/hist/values/{value}/{type} [GET]
    - http://example.com:8080/rest/common/info
        - http://example.com:8080/rest/common/info/version/full [GET]

9.13.7 Resources

/rest/1/projects

Methods

GET
Get all loaded projects.

available response representations:

- 200 - application/json (projects) [*collapse*] Example

    [{ "name": "ProjName", "path": "/var/projects/aproj", "numberOfDevices": 3

Returns a list of all loaded projects.

PUT

Load a project into the server.

acceptable request representations:

- text/plain (http body as a file path on the server's file system) [*collapse*] Example

  ```
  "/projects/MyProject"
  ```

available response representations:

- 200 - application/json [*collapse*]
  The project was loaded successfully.
- 400 [*collapse*]
  The path could not be found or is not a gridvis project. Also licence may be missing.
- 403 [*collapse*]
  You do not have the necessary permission.

/rest/1/projects/{pname}

Methods

GET

Retrieve information about a loaded project.

available response representations:

- 200 - application/json (project) [*collapse*] Example

  ```
  { "name": "ProjName", "path": "/var/projects/aproj", "numberOfDevices": 32
  ```

  Returns a full representation of a project.
- 404 [*collapse*]
  project name not found.

DELETE

Mark a project not to be loaded on next server restart.

available response representations:

- 204 [*collapse*]
  ok, removed on next restart
- 404 [*collapse*]
  project name not found.

/rest/1/projects/{pname}/devices

Methods

GET

Retrieve information about all devices.

available response representations:

- 200 - application/json (DeviceEnt) [*collapse*] Example

  ```
  { "name": "UMG508 Main Supply", "id": 33, "type": "JanitzaUMG508", "connect
  ```

  Returns a representation of all devices.
- 404 [*collapse*]
  project name not found.

/rest/1/projects/{pname}/devices/{devid}

resource-wide template parameters

parameter	value	description
devid	*int*	the numeric device id, check GET /devices
pname	*string*	project name

Methods

GET

Retrieve information about a device.

available response representations:

- 200 - application/json (DeviceEnt) [*collapse*] Example

  ```
  { "name": "UMG508 Main Supply", "id": 33, "type": "JanitzaUMG508", "connect
  ```

  Returns a full representation of a device.
- 404 [*collapse*]
  project name not found.

/rest/1/projects/{pname}/devices/{devid}/hist/energy/{value}/{type}

resource-wide template parameters

parameter	value	description
value	*string*	a value name, check /hist/values
type	*string*	a type, e.g. L1, L2, L3, L4, L5, L2L1, L3L2, L1L3, SUM13, SUM14 and others.

Methods

GET

Get energy consume for given value and type from Device within given timespan. This method supports the timespan parameters, see documentation.

available response representations:

- 200 (EnergyEnt) [*collapse*] Example

  ```
  { "valueType": { "value": "ActiveEnergy", "typeName": "L1", "type": "L1", "
  ```

  Returns the sum of all found values.
- 204 [*collapse*]
  no content for the requested timespan

/rest/1/projects/{pname}/devices/{devid}/hist/events

Methods

GET

/rest/1/projects/{pname}/devices/{devid}/hist/events ?type
Returns events for a given timespan. This method supports the timespan parameters, see documentation.

request query parameters

parameter	value	description
type	*string*	Repeatable. A list of event types. Current list: VoltageOver, VoltageUnder, VoltageOutage, VoltageFastChange, CurrentOver, PowerFailure, PowerRecovery, DigitalInputActivated, DigitalInputDeactivated, ComparatorOutputActivated, ComparatorOutputDeactivated, TariffActivated, EmaxChannelActivated, EmaxChannelDeactivated **Example:**: events?type=VoltageOutage&type=VoltageOver

available response representations:

- 200 (EventEnt) [*collapse*] Example

  ```
  [ { "input": "L3", "startTime": 342344, "endTime": 24235256, "min": 224, "a
  ```

  Returns a list of all found events.
- 204 [*collapse*]

  no content for the requested timespan
- 400 [*collapse*]

  bad request, e.g. no query param(s) for "type"

/rest/1/projects/{pname}/devices/{devid}/hist/flags

Methods

GET

Get Flags from the device. This method supports the timespan parameters, see documentation.

available response representations:

- 200 - application/json (FlagEnt) [*collapse*] Example

  ```
  [ { "startTime": 123456789, "endTime": 234567890, "flagType": [ "LostWindow
  ```

  Returns a list of all found flags.
- 204 [*collapse*]

  no content for the requested timespan

/rest/1/projects/{pname}/devices/{devid}/hist/sequences/{sequenceType}

resource-wide template parameters

parameter	value	description
sequenceType	*string*	a SequenceType, either Waveform or EffectiveValues

Methods

GET

Get sequence data. This method supports the timespan parameters, see documentation.

available response representations:

- 200 - application/json (SequenceEnt) [*collapse*] Example

  ```
  [ { "type": "EffectiveValues", "reason": "Event", "valueType": { "value": "
  ```

  Returns a list of all found sequences.
- 204 [*collapse*]

  no content for the requested timespan

/rest/1/projects/{pname}/devices/{devid}/hist/transients

Methods

GET

Get transient data. This method supports the timespan parameters, see documentation.

available response representations:

- 200 - application/json (TransientEnt) [*collapse*] Example

  ```
  [ { "type": "Slope", "valueType": { "value": "U_Effective", "typeName": "L1
  ```

  Returns a list of all found transients.
- 204 [*collapse*]
  no content for the requested timespan

/rest/1/projects/{pname}/devices/{devid}/hist/values

Methods

GET

Retrieve list of all historical values.

available response representations:

- 200 - application/json (ValueDescriptionEnt) [*collapse*] Example

  ```
  [ { "id": 34, "valueType": { "value": "U_Effective", "typeName": "L1", "type
  ```

  Returns a full representation of a values entity.
- 404 [*collapse*]
  project name not found.

/rest/1/projects/{pname}/devices/{devid}/hist/values/{value}/{type}/{timeb

resource-wide template parameters

parameter	value	description
value	*string*	a value name, check /hist/values
type	*string*	a type, e.g. Overall, L1, L2, L3, L4, L5, L2L1, L3L2, L1L3, SUM13, SUM14, Main, Aux and others.
timebase	*int*	The timebase in seconds of the recording, in most cases 900.

Methods

GET

/rest/1/projects/{pname}/devices/{devid}/hist/values/{value}/{type}/{timebase} ?online

Get historical data. This method supports the timespan parameters, see documentation.

request query parameters

parameter	value	description
online	*boolean* Default: false	Whether the value was recorded online.

available response representations:

- 200 (ValueListEnt) [*collapse*] Example

  `{ "valueType": { "value": "U_Effective", "typeName": "L1-L3", "type": "L1L3`

  Returns a list of all found values.
- 204 [*collapse*]
  no content for the requested timespan

/rest/common/info/version/full

Methods

GET

Retrieve information about the server version

available response representations:

- 200 - application/json [*collapse*]
  Returns the version string.

10 GridVis - Working with the GridVis

10.1 Working with the desktop software GridVis
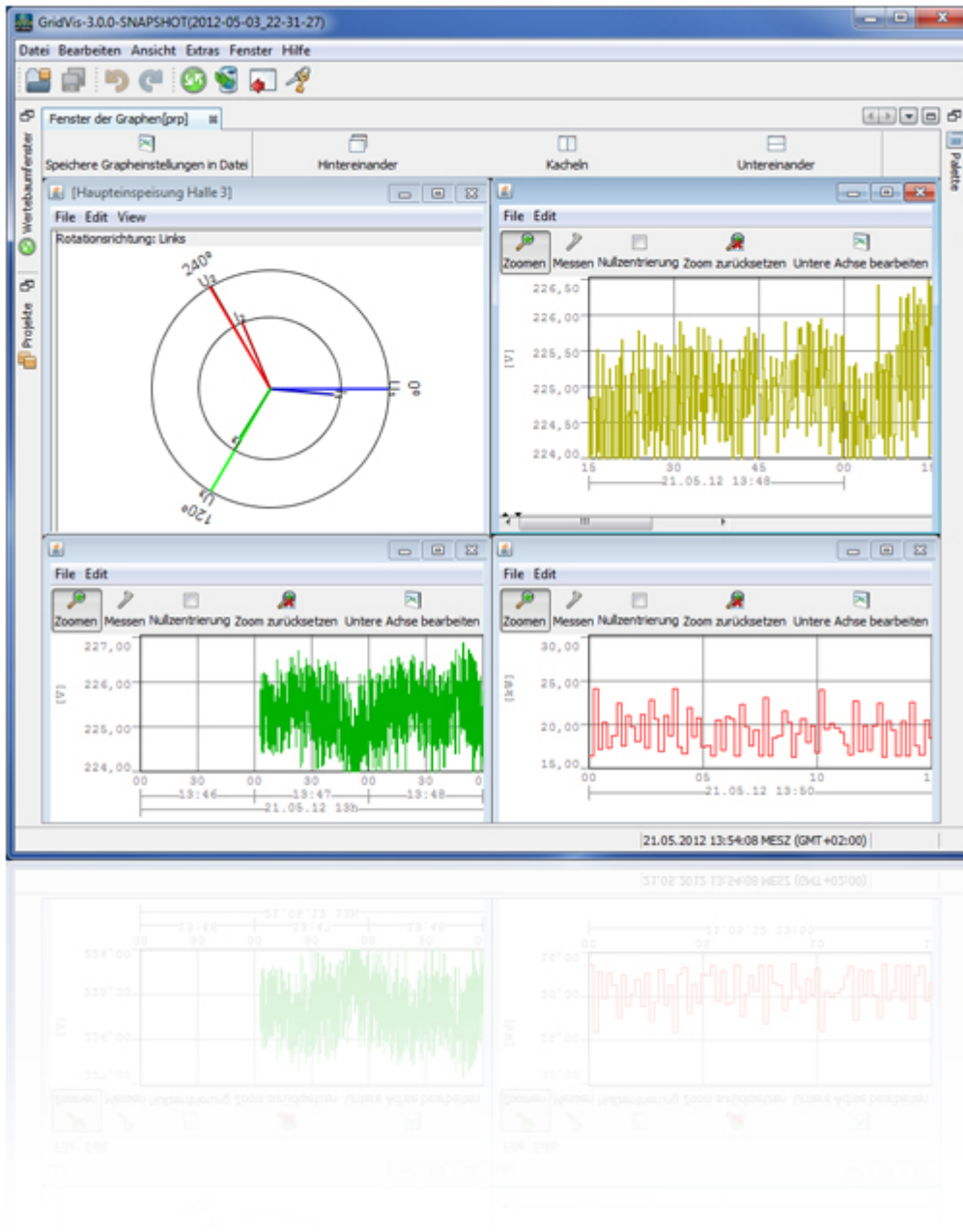
10.2 First steps

10.2.1 First steps with GridVis

10.2.2 Welcome window

Welcome window

The Welcome window can be opened under the menu item *Window/Welcome* and provides support to initial steps when working with GridVis.

Activiation

Each installation of GridVis software requires activation. To do this, the licence manager can be created via a request file and an online activation performed with this.

- Show the license manager

Creating a project

To be able to work with GridVis, at least one project must be open.

- Create new project
- Open existing project
- Import of older versions

Adding devices

One or more devices can be added once a project has been opened.

- Create new device
- Import a device list from a CSV file

If the Welcome window does not appear when starting, it can be opened using the menu item *Window/Welcome*.

10.2.3 Licence manager window

The request file for the subsequent process is created via the license manager of the software activation. If the software has already been activated, additional information about the activated license appears.
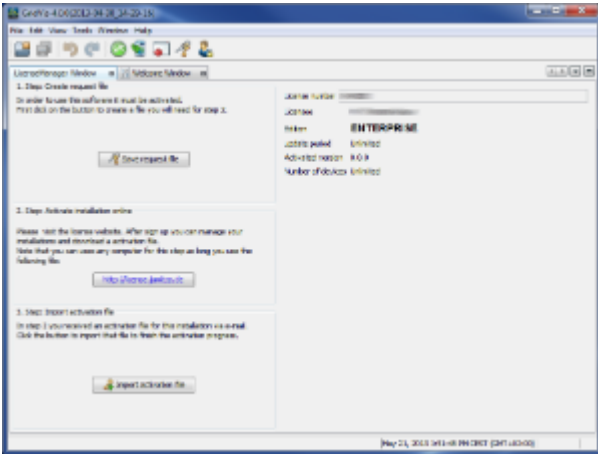
Fig.: License manager window

10.2.4 Creating a new project

- New projects are created under the menu item *File/New project or via the "Welcome window"*.
- Set the selection to "*Database project*" in the "*Projects*" pane and confirm the selection with "*Next*".

Fig.: New project

- Give the project a name and identify the location it is to be saved to. The "*Browse*" button can also be used to find and specify the location the project is to be saved to.
- For smaller projects with only a few devices and little data, you can use the *Derby* database included in the scope of delivery. When using the standard database (Derby DB), clicking on "*Finish*" saves the project.
- It the use of an SQL database is required, the option "*Use the standard database (Derby DB)*" should be deactivated and the database configuration should be called up via "*Next*". Enter the required information and confirm it with the "*Finish*" button.

Fig.: Project memory location

NOTE

- For larger quantities of data, access to the data stored in the **Derby database** is very slow.
- We recommend **Microsoft SQL Server** or **MySQL Server** databases for this reason.
- Licences for the Microsoft SQL Server and MySQL Server **database drivers** can be purchased from us.

10.2.5 Opening project

- Use the menu item "*File/Open project*" to select and open an existing GridVis project (projects from Version 2.x).
- Select the desired project in the selection window and open it by clicking on the "*Open project*" button.
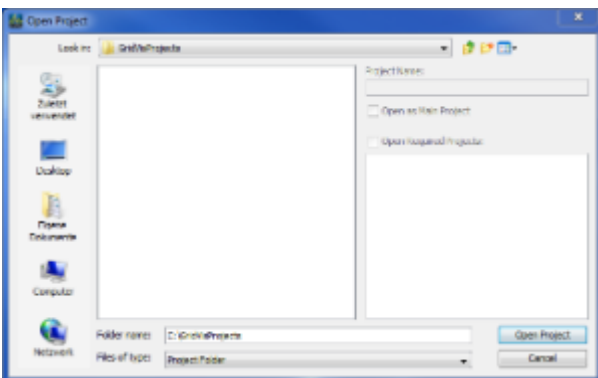
Fig.: Project directory

10.2.6 New device

- If a project has been created, a device can be added for example using the menu item "*File/New file*".
- Select the type of device, listed under the device category, and confirm the selection with "*Next*".

Fig.: Device selection

- Different types of connections will be offered depending on the type of device.
  Depending on the type of connection, once the appropriate connection has been selected and any
  address inputs have been entered, communication with the device can be tested using the "
  Connection test" button.

  The following connection types are available for selection, according to device type:
    - Without connection
    - Ethernet TCP/IP
    - Modbus RTU (RS485/RS232)
    - Ethernet gateway (e.g. for devices connected to the RS485)
    - Secured TCP/IP
    - USB

Fig.: Ethernet connection configuration

- Connection type "*No connection*"
  Devices can be installed without a connection type - e.g. for a pre-configuration of the GridVis
  software.
  With this connection type, measurements of voltages, currents etc. are not possible.
- Connection type "*Modbus RTU*"
  Devices, which should communicate via Modbus, can be activated via this connection. Interface, baud

rate and device address must be known.

Note: The baud rate should be the same in the bus and the device address should be unique.
- Connection type "*Ethernet TCP/IP*"
  Devices with an Ethernet interface and known Ethernet address can be integrated via the connection type "*Ethernet*" in GridVis.
  The TCP / IP device address must be known for this purpose.
- Connection type "*Ethernet gateway (e.g. for devices on the RS485)*"
  Devices that are connected via the RS485 as slave to a master device are activated via this connection type.
  In the process the TCP/IP address of the master and the device address of the slave device are to be transferred to the settings. For longer master/slave communication paths, the timeout setting is to be increased.
- Connection type "secured TCP/IP"
  Via a secured connection to the device, the homepage and configuration, for example, can be protected via a password.
  To this end, the user and password should be entered when encryption is activated.
  When a connection is successfully established, an additional "Passwords" button appears with which rights can be set.

  Note: If a password has been assigned on the device, then the password can be reset via a secured GridVis-device connection.
- Connection type "*USB*"

Via this connection type, communication is established with devices, which have a USB interface.
To this end the interface operated by the drivers (COM1, COM2...) must be known.

Fig.: Modbus connection configuration

10.2.7 Importing a project from older GridVis versions

- Older GridVis projects (up to Version 2) can be imported using the menu item "*Import file/GridVis 1.6 project*".
- Projects are selected in the "*Import project*" window via the choice box "*Project name*".
  Note: As paths for older GridVis projects cannot be changed, project directories cannot be selected!
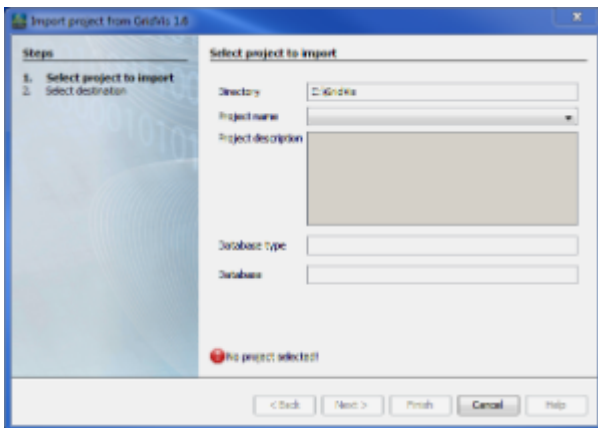- The location at which the project is entered after the project has been selected.

Fig.: Importing projects

- Give the project a name and identify the location it is to be saved to. The "*Browse*" button can also be used to find and specify the location the project is to be saved to.
- For smaller projects with only a few devices and little data, you can use the *Derby* database included in the scope of delivery. When using the standard database (Derby DB), clicking on "*Finish*" saves the project.
- It the use of an SQL database is required, the option "*Use the standard database (Derby DB)*" should be deactivated and the database configuration should be called up via "*Next*". Enter the required information and confirm it with the "*Finish*" button.
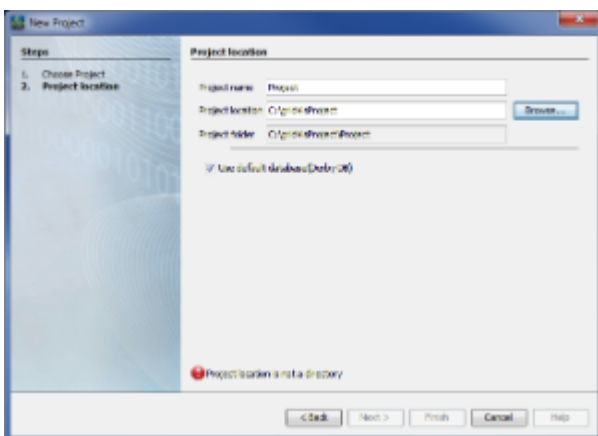
Fig.: Project location
NOTE

- For larger quantities of data, access to the data stored in the **Derby database** is very slow.
- We recommend **Microsoft SQL Server** or **MySQL Server** databases for this reason.

Licences for the Microsoft SQL Server and MySQL Server **database drivers** can be purchased from us.

10.2.8 Overview window

Overview window

The overview window provides a clearly organised overview of the most important device actions and information about the devices organised by the types of devices/device groups selected in the project window.

- To open the navigation window, select the menu item "*Window/Navigation*".
- To open the project window, select the menu item "*Window/Projects*".
- Directly selecting a device in the project window facilitates displaying and changing the information in the overview window.

- Selecting the group " *By Type* " displays an overview of all of the devices incl. their current status

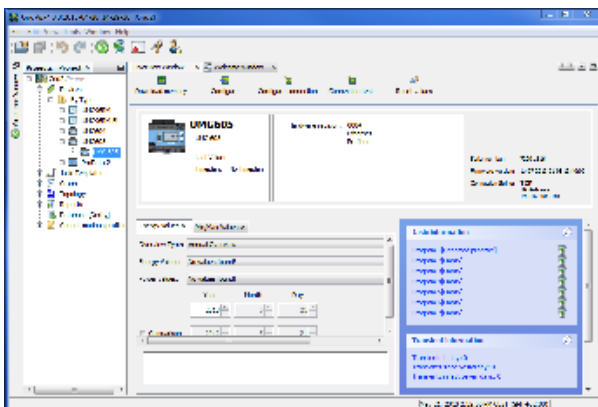| Connection states	
🟢	A connection to the device exists
✖	No connection can be established to the device
❓	No connection test has been performed yet

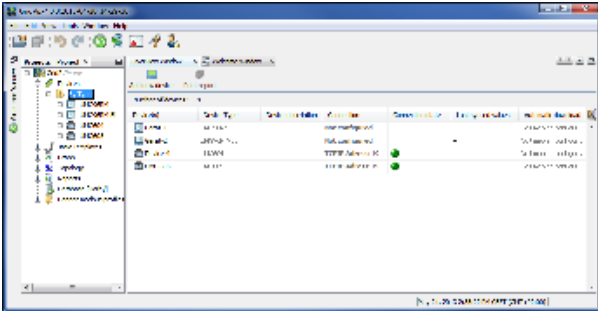Fig.: Overview window (device information)

Fig.: Overview window (device type view)

10.2.9 Displaying graphs

Displaying graphs

Selected measurement values can be visualised in a graph window by selecting "*Graphs*" in the project window.

- Measurement values from devices can be displayed directly in a graph.
- Measurement values from different devices can be displayed in a single graph.
- No more than two different kinds of measured value types (e.g. current and voltage) can be displayed in a single graph.
- To open the project window, select the menu item "*Window/Projects*".
- To open the navigation window, select the menu item "*Window/Value tree*".
- Select the item Graphs in the project window.
- Then select the item Devices in the project window to select the device.
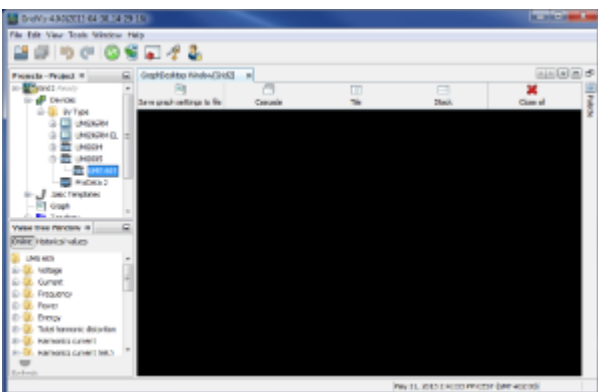
Fig.: Project window, value tree and graph window

- Using Open groups in the value tree window, select the desired measurement values.
  (holding the <Ctrl> key down allows the selection of more than one measurement value).
- Using the mouse, drag the selected measurement values into the graph window.
- GridVis imports the measurement values directly from the device and displays these in a graph.

- The button Save graph setting to a file saves the current view which can be opened again under Graphs in the project window.
- To display the historical values (in the value tree window under "*Historical values*"), the respective device must first have been read out.
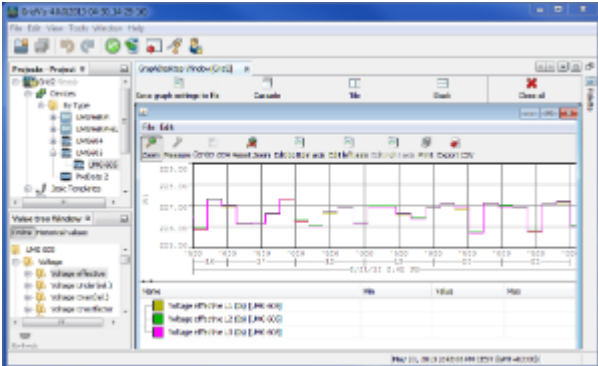

Fig.: Graph display

10.2.10 Adding topology

Topology

A new topology page, used to visualise devices and measurements, can be created by selecting and right clicking on Topology in the Projects window.

- Devices, online measurements, links, texts and images can be incorporated in a single topology page.
- To open the project window, select the menu item "*Window/Projects*".
- To open the value tree, select the menu item "*Window/Value tree*".
- Right click "*Topology*" in the project window to create a new topology page, then click on the Edit button to activate the edit mode.
- For example, select: a device and drag the device from the project window to the topology window. Pulling the object's corner in or out makes it smaller or larger.
- Select a device, for example, in the project window. Select one or more online measurements in the value tree window and drag these to the topology window.

  Note: holding the <Ctrl> key down allows the selection of more than one measurement value. An area is selected with the <Shift> key and a start and end mouse click.
- You can find other elements in the palette window. To display the elements within the topology, the elements should be dragged out of the palette window into the topology window with the mouse.
- Individual elements can be shifted, deleted and configured with the mouse:
  - To shift an element, click it with the mouse and drag it with the mousekey pressed down.
  - Delete the element by clicking it with the mousekey and then deleting it with the "Remove" key or use the entry "Remove value" or "Remove device" in the right mousekey flyout menu (clicking the corresponding element).

- Value, text, link and active image elements can be individually adjusted via the menu item "*Configuration*" of the flyout menu (right mousekey on the element) (e.g. colours, frame display, colour/image change or boundary value input).
- Displayed values for a device element can be deleted via the menu item "*Delete values from display*".
- Work and power values of all displayed devices can be scaled via the menu item "Edit scaling".
- The "*Change background*" button can be used to place a background image (e.g. a building plan in JPG format) into the window background.
- Use the Display button to switch into display mode.
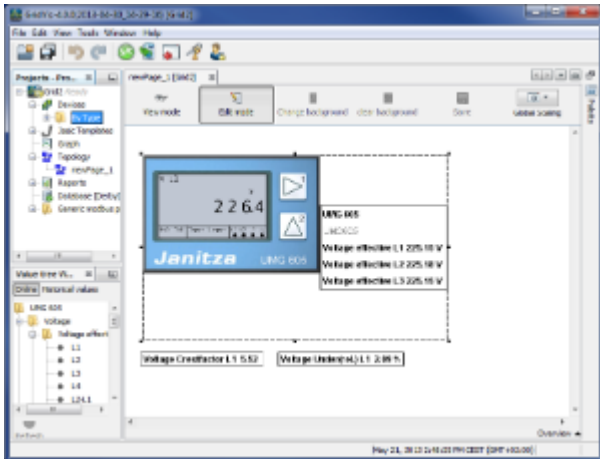
Fig.: Topology window

10.3 GridVis menu

10.3.1 The GridVis menu
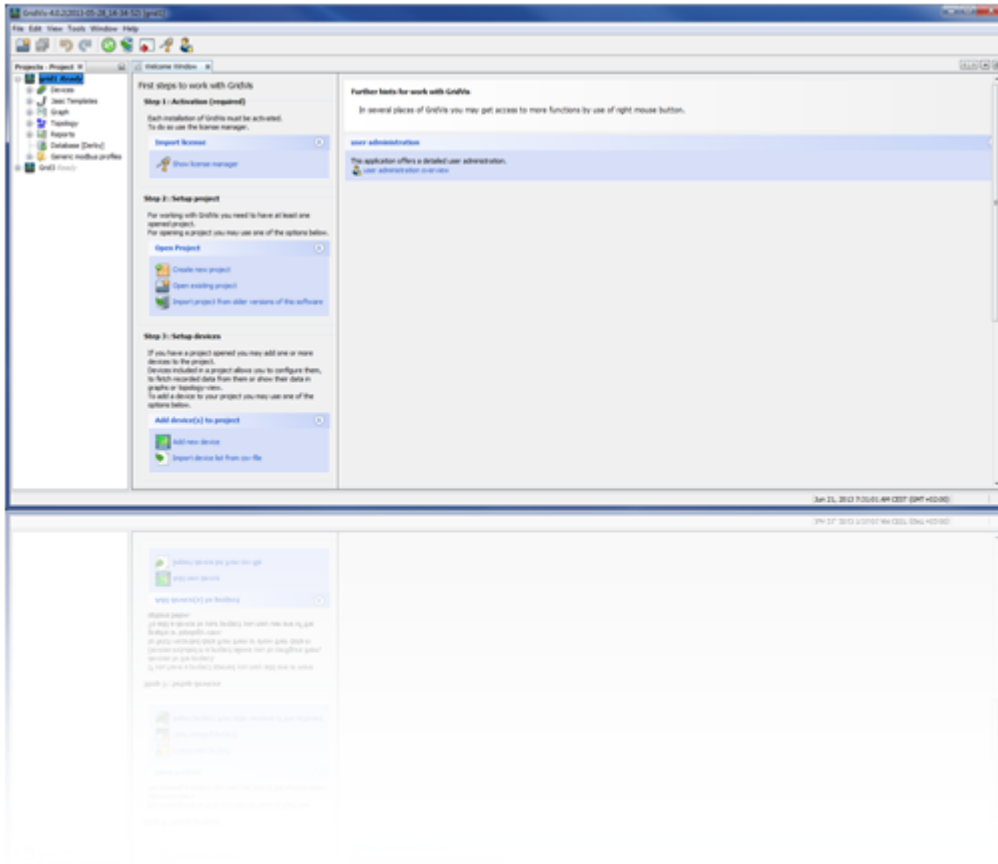
10.3.2 File menu

File menu

Creating a new project

- New projects are created under the menu item *File/New project or via the "Welcome window"*.
- Set the selection to "*Database project*" in the "*Projects*" pane and confirm the selection with "*Next*".
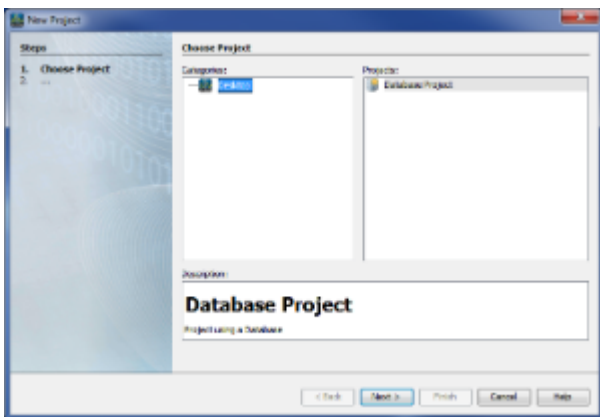

Fig.: New project

- Give the project a name and identify the location it is to be saved to. The "*Browse*" button can also be used to find and specify the location the project is to be saved to.
- For smaller projects with only a few devices and little data, you can use the *Derby* database included in the scope of delivery. When using the standard database (Derby DB), clicking on "*Finish*" saves the project.

- It the use of an SQL database is required, the option "*Use the standard database (Derby DB)*" should be deactivated and the database configuration should be called up via "*Next*". Enter the required information and confirm it with the "*Finish*" button.
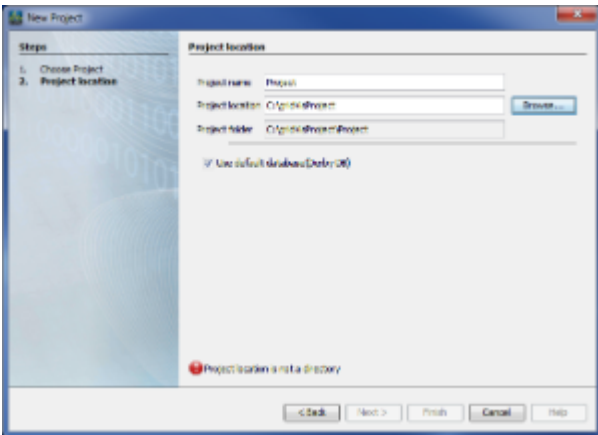

Fig.: Project memory location

NOTE

- For larger quantities of data, access to the data stored in the **Derby database** is very slow.
- We recommend **Microsoft SQL Server** or **MySQL Server** databases for this reason.
- Licences for the Microsoft SQL Server and MySQL Server **database drivers** can be purchased from us.

New device

- If a project has been created, a device can be added for example using the menu item "*File/New file*".
- Select the type of device, listed under the device category, and confirm the selection with "*Next*".
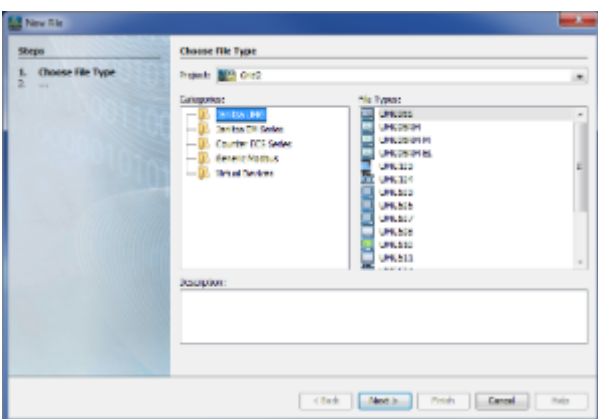

Fig.: Device selection

- Different types of connections will be offered depending on the type of device.
  Depending on the type of connection, once the appropriate connection has been selected and any address inputs have been entered, communication with the device can be tested using the "

Connection test" button.

The following connection types are available for selection, according to device type:
- Without connection
- Ethernet TCP/IP
- Modbus RTU (RS485/RS232)
- Ethernet gateway (e.g. for devices connected to the RS485)
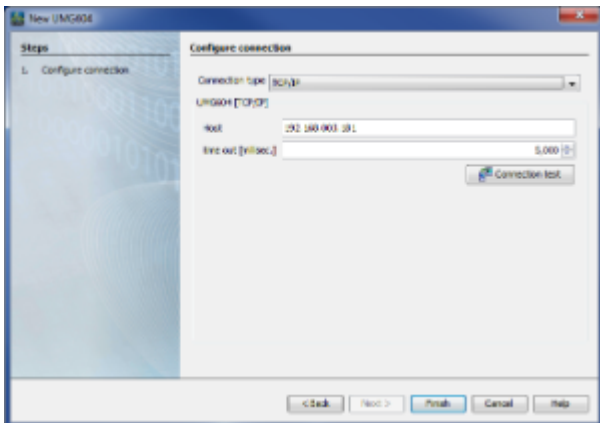- Secured TCP/IP
- USB

Fig.: Ethernet connection configuration

- Connection type "*No connection*"
  Devices can be installed without a connection type - e.g. for a pre-configuration of the GridVis software.
  With this connection type, measurements of voltages, currents etc. are not possible.
- Connection type "*Modbus RTU*"
  Devices, which should communicate via Modbus, can be activated via this connection. Interface, baud rate and device address must be known.

  Note: The baud rate should be the same in the bus and the device address should be unique.
- Connection type "*Ethernet TCP/IP*"
  Devices with an Ethernet interface and known Ethernet address can be integrated via the connection type "*Ethernet*" in GridVis.
  The TCP / IP device address must be known for this purpose.
- Connection type "*Ethernet gateway (e.g. for devices on the RS485)*"
  Devices that are connected via the RS485 as slave to a master device are activated via this connection type.
  In the process the TCP/IP address of the master and the device address of the slave device are to be transferred to the settings. For longer master/slave communication paths, the timeout setting is to be increased.
- Connection type "secured TCP/IP"
  Via a secured connection to the device, the homepage and configuration, for example, can be protected via a password.
  To this end, the user and password should be entered when encryption is activated.

When a connection is successfully established, an additional "Passwords" button appears with which rights can be set.

Note: If a password has been assigned on the device, then the password can be reset via a secured GridVis-device connection.

- Connection type "*USB*"

Via this connection type, communication is established with devices, which have a USB interface.
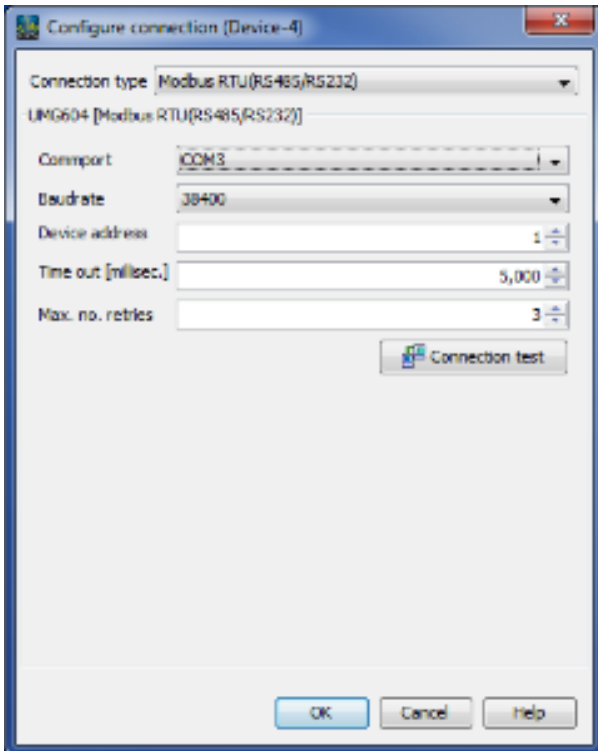To this end the interface operated by the drivers (COM1, COM2...) must be known.

Fig.: Modbus connection configuration

Opening project

Opening project

- Use the menu item "*File/Open project*" to select and open an existing GridVis project (projects from Version 2.x).
- Select the desired project in the selection window and open it by clicking on the "*Open project*" button.
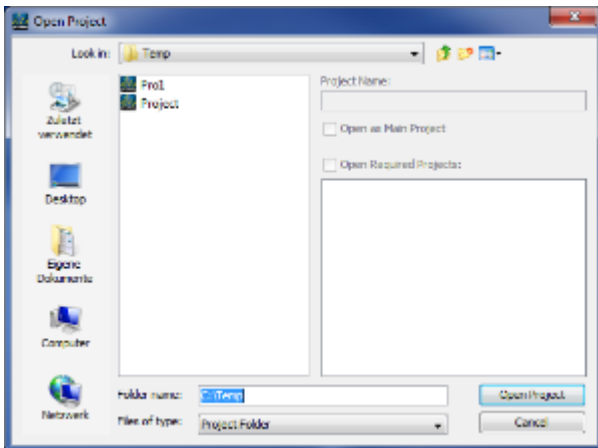
Fig.: "*Open project*" option window

Recent projects window

"*Recent projects*" menu

- The most recently used projects can be directly accessed via this menu item. In the process, the selected project is also listed in the *Projects window*.
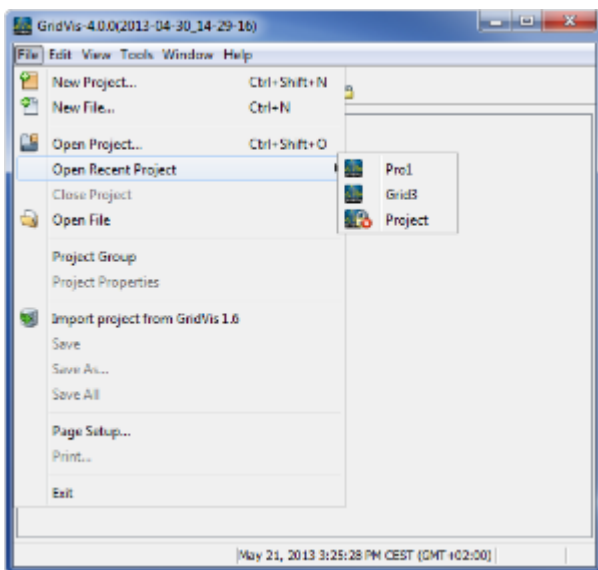

Fig.: "Open Recent Projects" window

Closing project

"Close project (name)" menu

- The project selected in the projects window is closed via this menu selection. If several projects are selected in the projects window, these will all be closed.

  Several projects can be selected by:

- the <Ctrl> followed by a mouse-click (individual selection) or
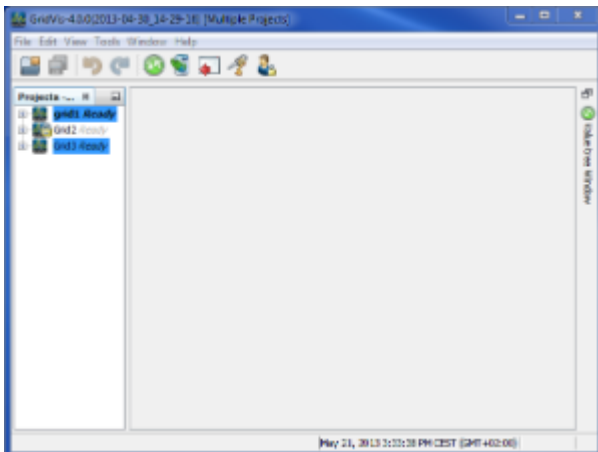- via the shift key followed by a mouse-click (marking a range, indicating start and finish)

Fig.: Selection of several projects in the projects window

Opening file

"*Open file*" menu

- Opens a selectable file in the integrierten text editor.
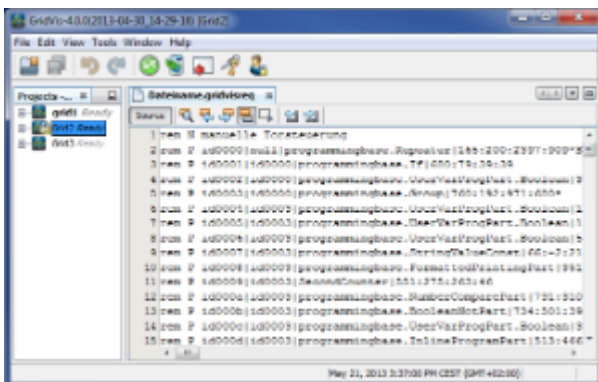

Fig.: Display of file contents in text editor

Project group

"*Project group*" menu

- A project group is a combination of several projects that can be presented together in GridVis. Project groups can be managed under the menu item "*File/Project group*".

- To create a new group, select "*New group...*"
- Give the new project group a name.
- Select from among the available options with:

- *Free Group*

  Includes any project.
- *Project and All Required Projects*

  Contains the primary project and all projects associated with the latter.

  By selecting this option and using Browse a primary project can be selected.

  The group integrates the primary project and all of the projects that are related to it.
- *Folder of Projects*

  Includes all projects found in a given directory.

  By selecting this option and using Browse, a directory can be selected.

  The group integrates all of the projects in this directory.
- Confirm the selection with Create group.

- The name of the group can be edited via the menu "*File/Project Group/Project Group Properties*".

- The current group can be deleted under the menu item "*File/Project Group/Delete Group*".
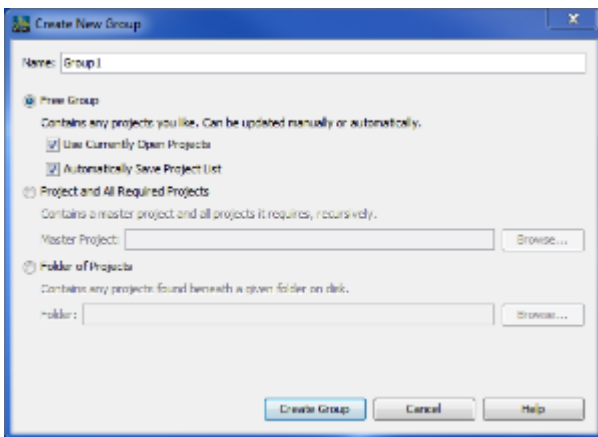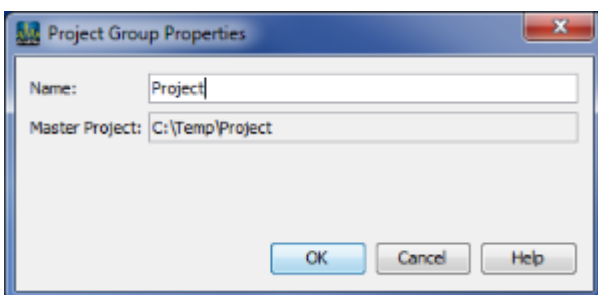

Fig.: *Create New Group*

Fig.: *Project Group Properties*

Project group properties

Project properties

- Specific project-related properties can be defined via the menu "*File/Project Properties*":

- *Project Description*

  Enables the current project to be individually described.
- *Password*

  Enables assignment of an individual password or activates user management for the current project.
    - Under Category, select "*Password*".
    - Then select the desired method to protect the project (project password or user management)

      If the project is to be protected via a project password, then a password must be assigned.
- *Project startup*

  Enables a device and connection test at the project start.

  Connection test:

  When a project is started, all connections of devices that are integrated in this project are tested and presented in a list.

  Under Categories, select "*Project's startup* " and check the appropriate option.

  Device test:

  Devices can be managed by other services, which do not run in the background (e.g. GridVis Service). In this case, the local application is no longer responsible for the device.

  A device test informs you about device management when the project starts (see screenshot).

  Under Categories, select "*Project's startup* " and check the appropriate option.
- *Device synchronization*

  Enables the maximum number of simultaneously readable devices. If the device number is set too high, this may result in system bottlenecks.

  Under the category "*Device synchronization* ", select the required input box and define the maximum number.
- *Scheduling*

  Certain events can be set and planned via this category.

Schedules

Reports, for example, can be prepared at regular intervals by creating schedules to manage them.

Device read out

To ensure that a device's memory does not "overflow" and that the data in the database is always current, the device can be set up to be read out automatically.

Online recording

Measurement values read from GridVis can also be saved to the database (useful for devices not equipped with their own memory).

Set time

Activating this option is recommended to facilitate comparing certain events from different measurement locations.

Watchdog

This function enables other JASIC-compatible devices (with a separately installed extension) to monitor GridVis.

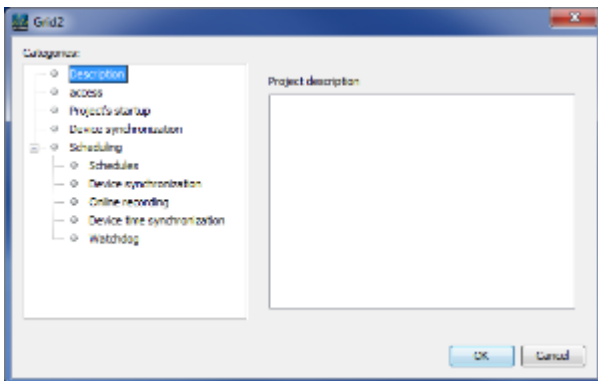A schedule for the watchdog event and the device must be selected in this case.

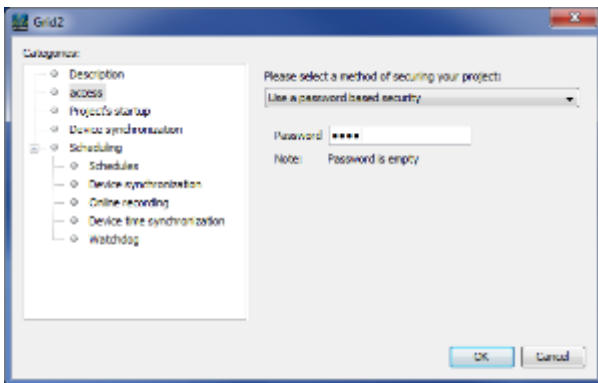

Fig.: Project properties / Description
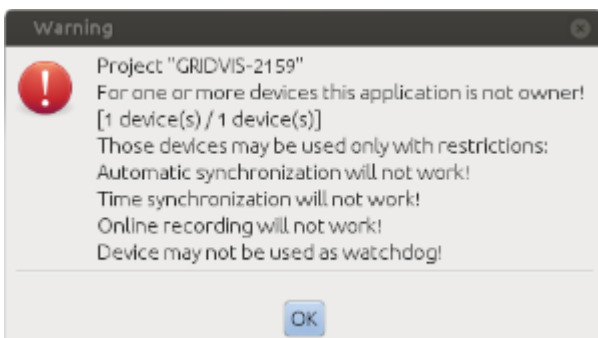

Fig.: Project properties / Password

Fig.: Device test at project start

Schedules

Subcategory "*Schedules*"

- Schedules can be added, changed and deleted via "*Project properties*" under the "*File*" menu.
- *Adding a schedule*
    - Give the schedule a unique name.

- Using the default buttons, select a profile or set up a custom time profile by entering the weekdays, hours and minutes.
- Confirm the configuration with OK.
- *Changing a schedule*
    - Select a schedule and change it as explained under Adding a schedule.
- *Deleting a schedule*
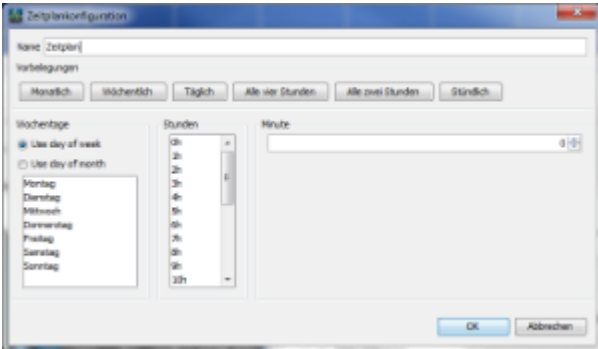   - Select a schedule and delete it using Delete schedule.

Fig.: *Schedule configuration*

Importing project

Importing GridVis 1.6 project

- Older GridVis projects (Version 1.6) can be imported via this option.
- Projects are selected in the "*Import project*" window via the choice box "*Project name*".
  Note: As paths for older GridVis projects cannot be changed, project directories cannot be selected!
- Identifying the location to which the project is to be saved follows once the project has been selected

Note: If the GridVis program is not responsible for the device, then responsibility should be transferred to GridVis (see "Accepting device", "Assigning device").
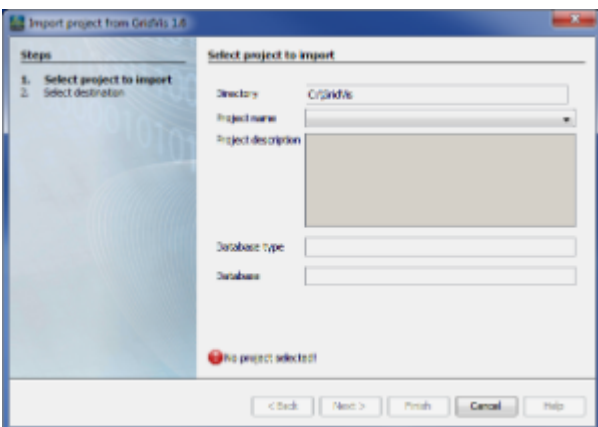

Fig.: "*Import project*" window

Saving

Save - Save as - Save all

- These functions enable the saving of JASIC files or topology views, for example.
- The "Save as" function also enables a file name to be entered (e.g. for JASIC files).
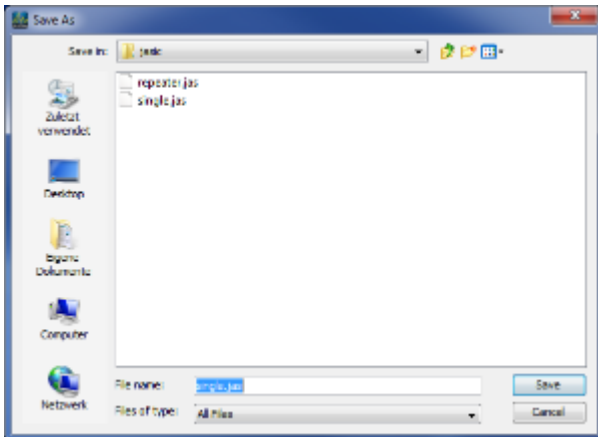

Fig.: Saving a JASIC file via "*Save as*"

Setting up print page

Set up page

- Enables a printer page to be configured in terms of paper, alignment and borders. More information can be found in your printer's documents.
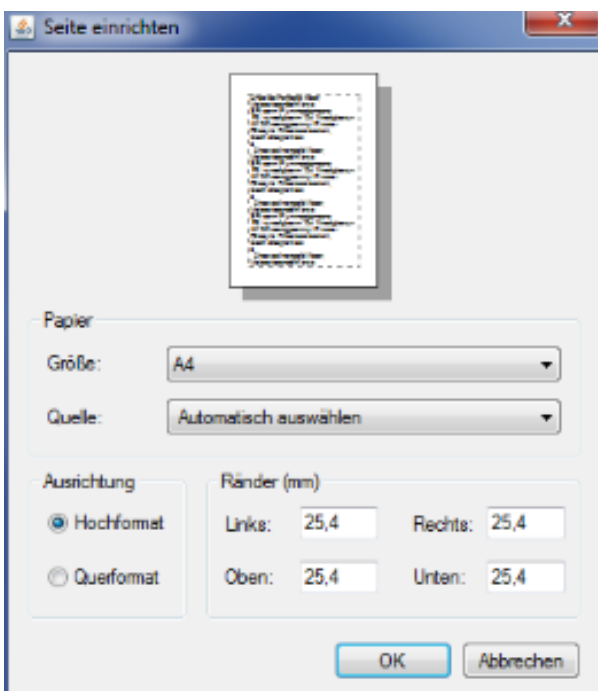
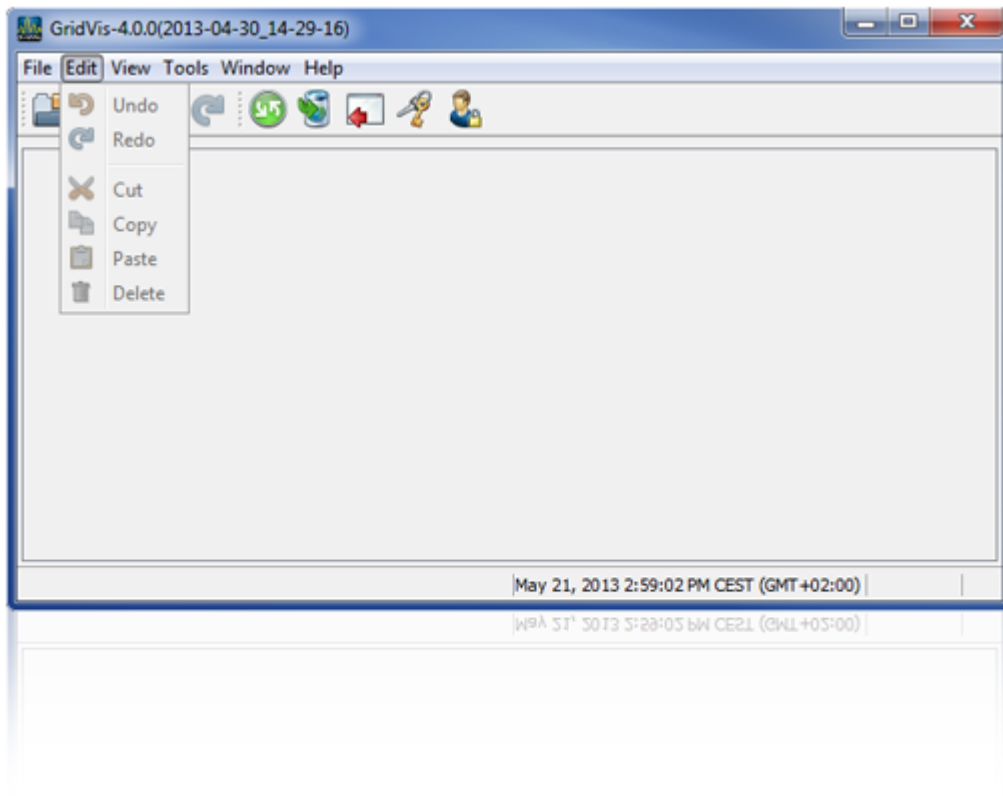Fig.: Setting up pages for printer

Quitting

Quitting GridVis

- GridVis is closed via this menu item.
  If there are unsaved JASIC files or topology views, a prompt will appear

10.3.3 Edit menu

Edit menu

Editing

Edit menu

- "*Undo*" menu

  Last action is reversed.
- "*Repeat*" menu

  Last action is repeated.
- "*Cut*" menu

  Move highlighted texts, objects, etc. to the clipboard
- "*Copy*" menu

  Copy highlighted texts, objects, etc. to the clipboard
- "*Paste*" menu

  Move highlighted texts, objects, etc. out of the clipboard

- "*Delete*" menu
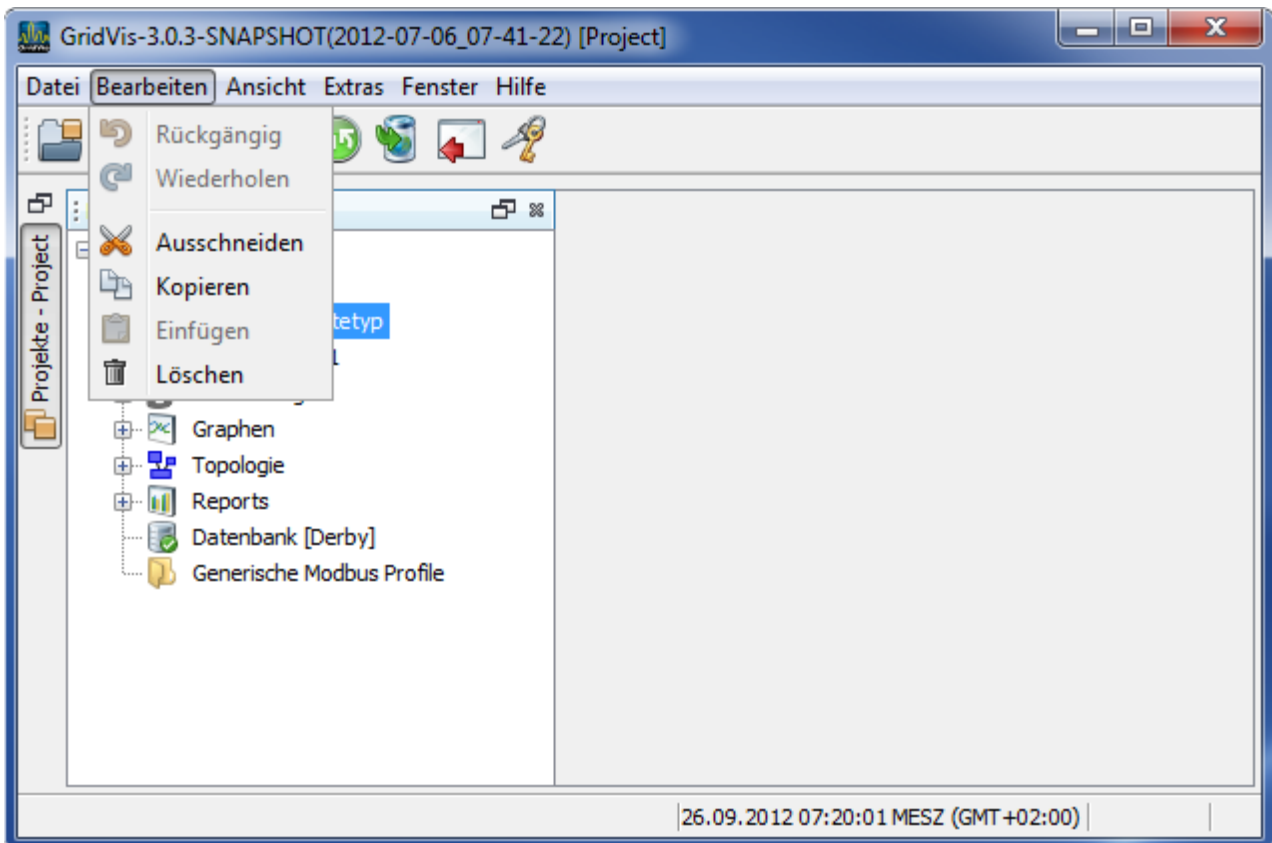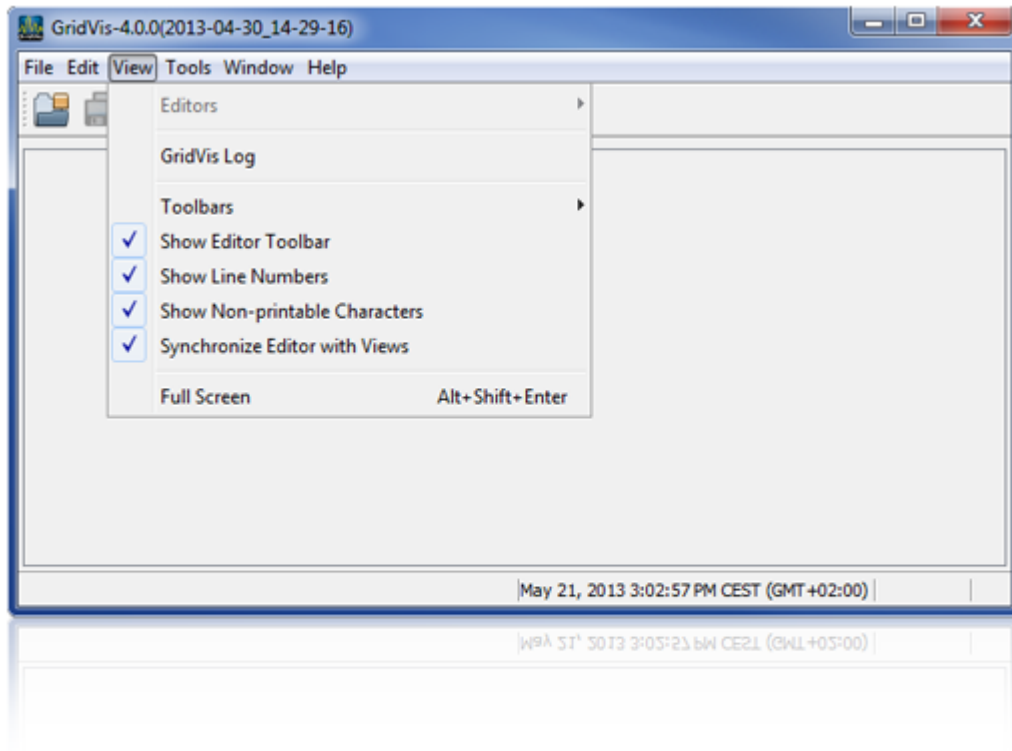
Delete selected texts, objects, etc.

Fig.: "*Edit*" menu

10.3.4 View menu

View menu

View

View menu

- "*Editors*" menu
  Toggling between the graphic and editor views in the Jasic environment.
- "*GridVis Log*" menu
  Opens the GridVis log window.
- "*Toolbars*" menu
  For adjusting the toolbar.
- "*Show editor-toolbars*" menu
  Hides/shows the editor toolbar in the Jasic environment.
- "*Show line number*s" menu"
  Shows the line numbers in the editor in the Jasic environment
- "*Show unprintable characters*" menu
  Shows the control characters (e.g. hard return) in the editor in the Jasic environment
- "*Full screen*" menu
  Full screen GridVis display
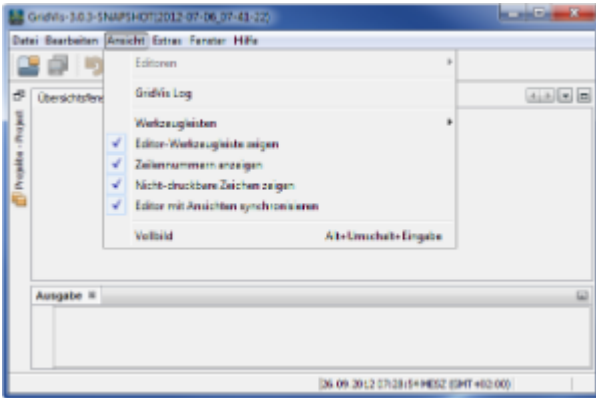
Fig.: "*Edit*" menu

10.3.5 Extras menu

Extras menu
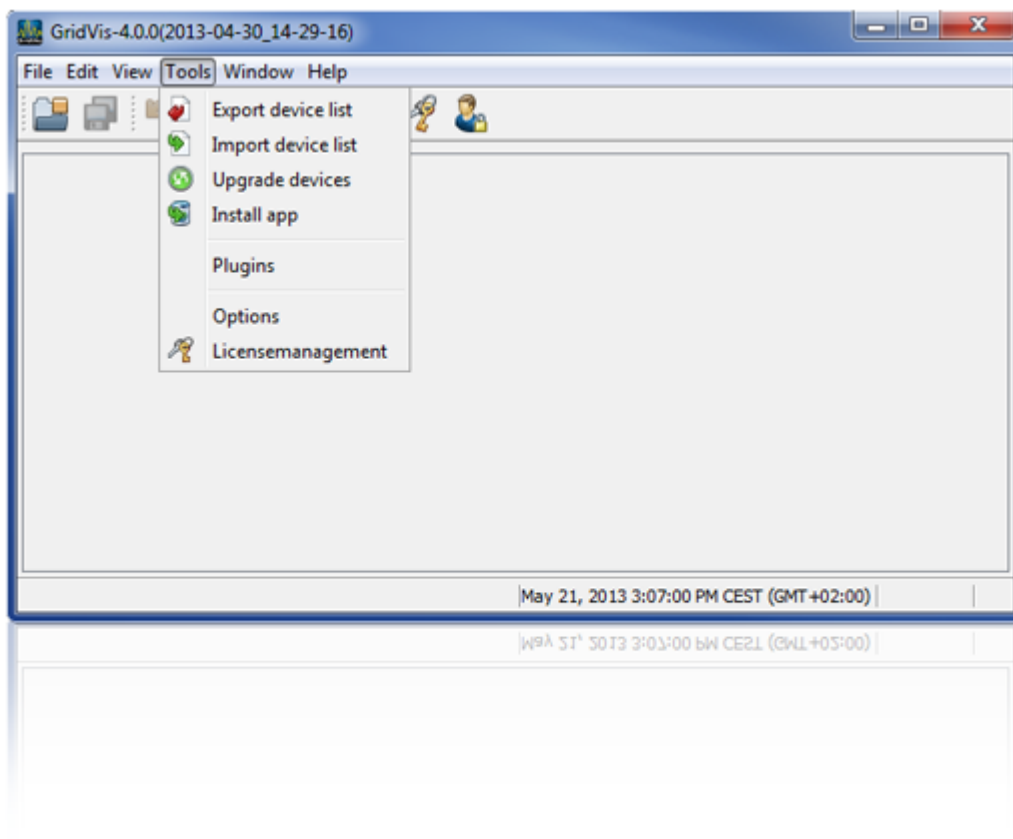
Updating devices

Update devices menu

Project devices can be updated with new firmware by selecting "*Update devices*" in the "*Extras*" menu.

- A path and filename for the update file can be entered by selecting "...".
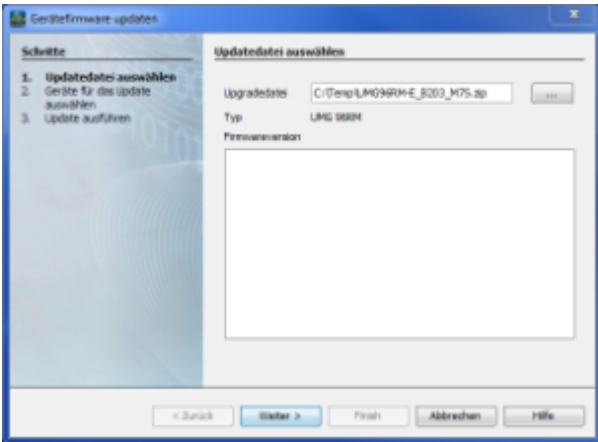- Then select the devices to be updated with firmware and define the update areas.

Fig.: Selecting update file
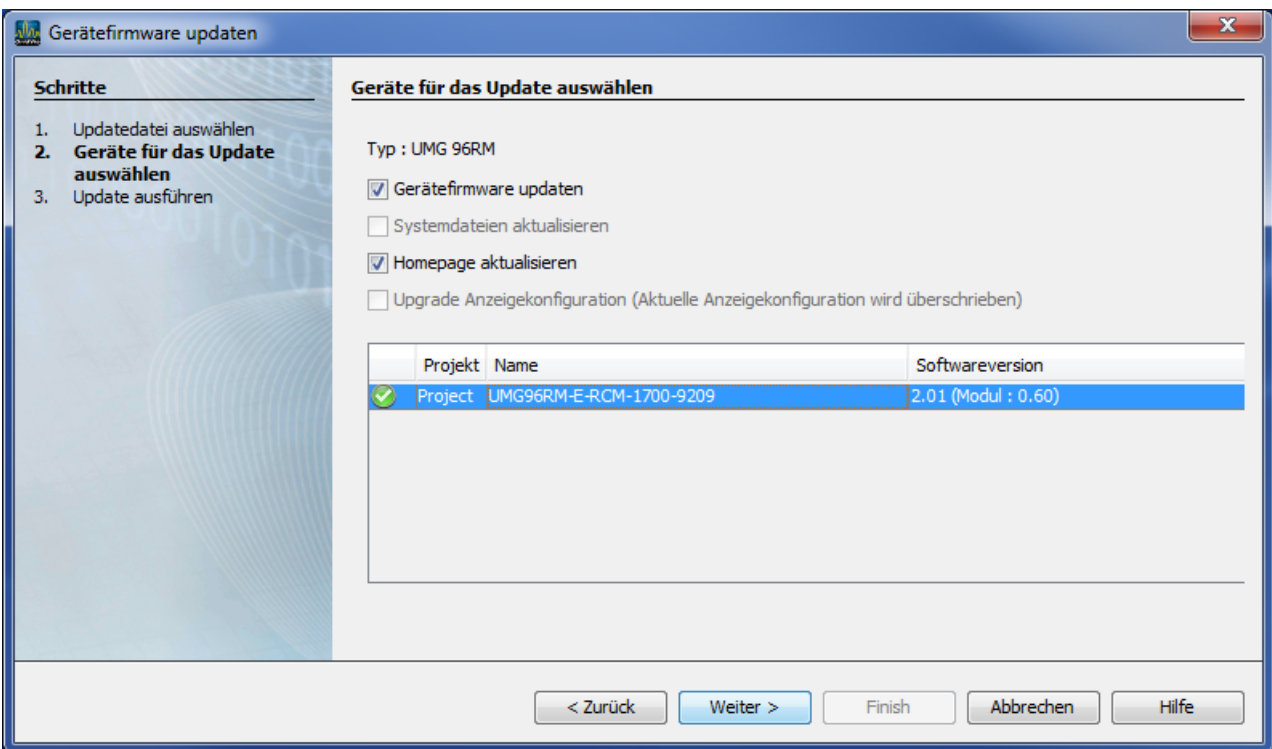
Fig.: Selecting device and area for update
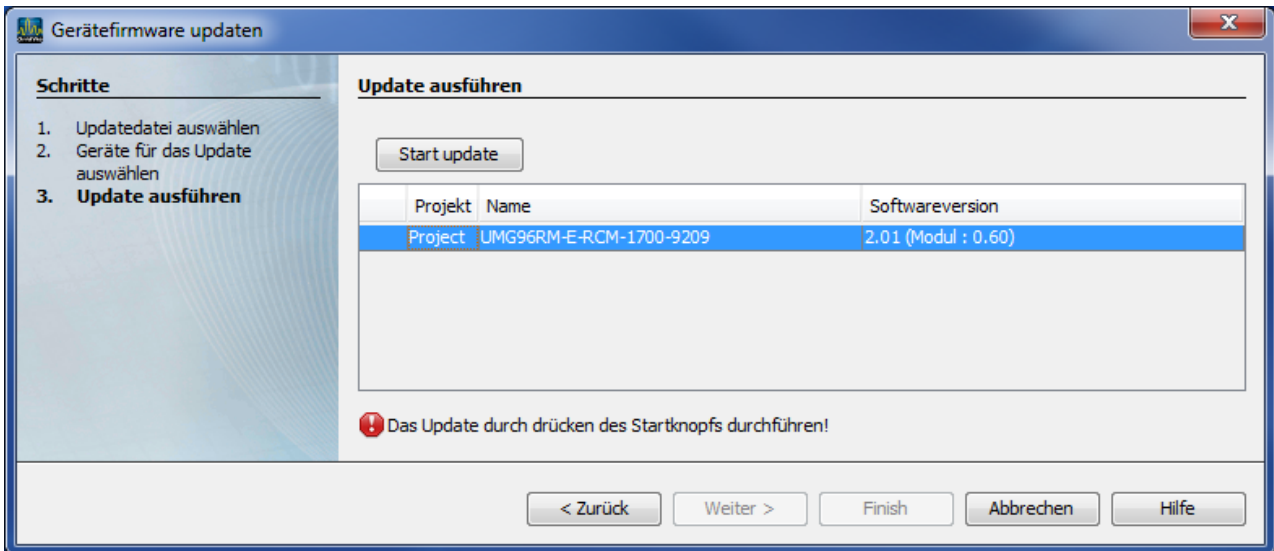
Fig.: Update start

Exporting device list

Exporting the device list

Project devices with their addresses etc. can be exported to a text file by selecting "*Export device list*" in the "*Extras*" menu.
Using Import device list, this device file can be integrated into other projects. It can also be imported into other programs.

- To export the device list, select the menu item Extras/Export device list.
- Select the source project in the selection field.
- The path and filename can be entered by selecting "...".

- Give the file a unique name and select a file type.
- Save returns you to the previous window.
- Finish the action with Finish.
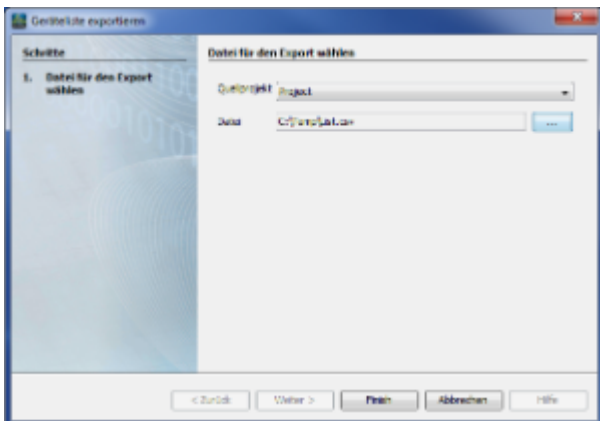
Fig.: "*Export device list*" menu
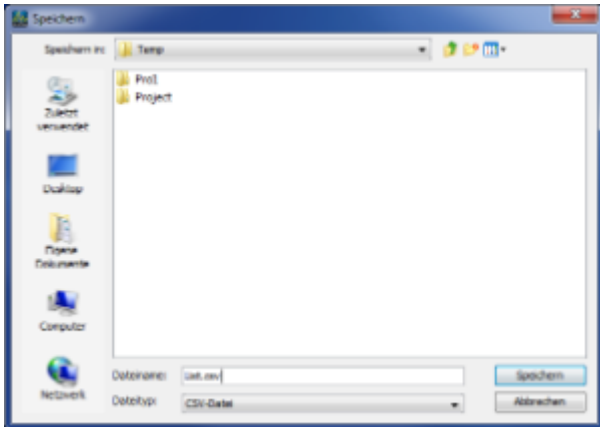
Fig.: "*Path and file name*" selection

Importing device list

Importing device list menu

A project device list can be added by selecting "*Import device list*" under the "*Extras*" menu.

- To import the device list, select the menu item "*Extras/Import device list*".
- In the selection field, select the project in which the device is to be integrated.
- The path and the filename for the device list to be opened can be entered under "...".
- Select an existing device list.
- Clicking Open returns you to the previous window.

Selecting Finish starts the importing of the device list.
A message window shows how much of the list has been imported and notifies you about possible errors, warnings and information you should be aware of.
You can find more information under Show me
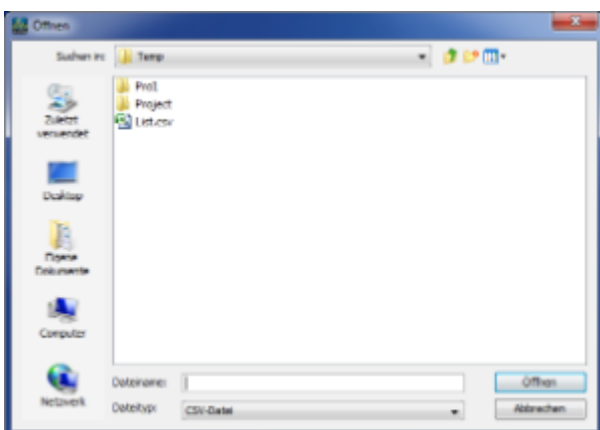
Fig.: Selecting device list
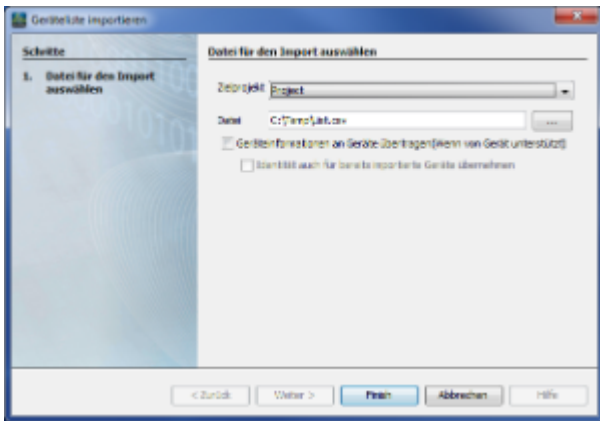
Fig.: Importing device list
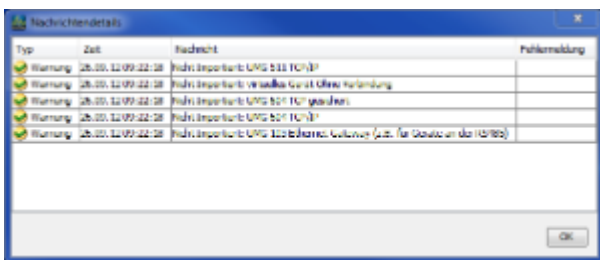
Fig.: List of import messages

Installing Apps

Installing App menu

An add-on that adds functions for certain devices made by Janitza electronics GmbH.

This software add-on can be included in a Jasic module or in an HTML file (homepage extension) and is transferred by GridVis to the device (e.g. UMG 604). Typical add-ons are the apps used for EMAX, for the reactive power controller and for cost centre accounting.

- To apps (extensions), select the menu item "*Extras/Import device list*".
- Using the "..." button, select and open the desired app.
- By clicking the "*Next*" one or more devices can be selected and confirm this selection with "*Next*".
- Select a free Jasic task (device program location).
- End the app installation with the "*Finish*" button.
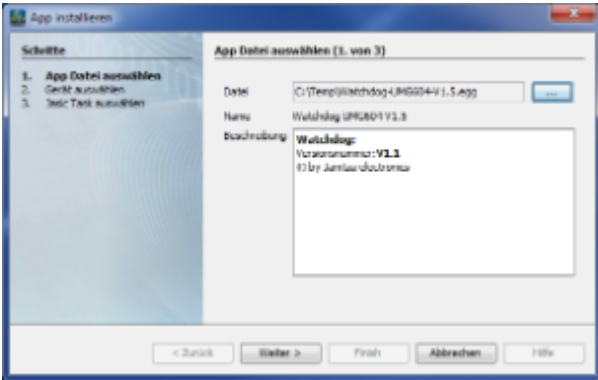
Fig.: App selection
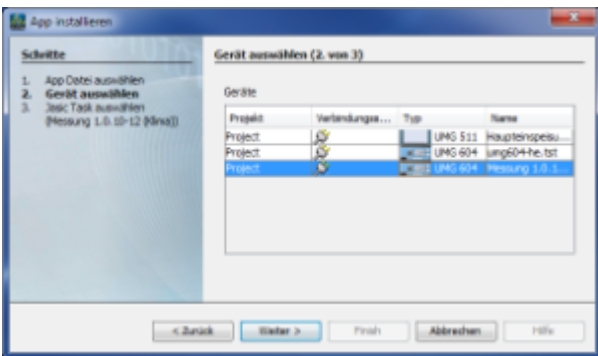
Fig.: Device selection
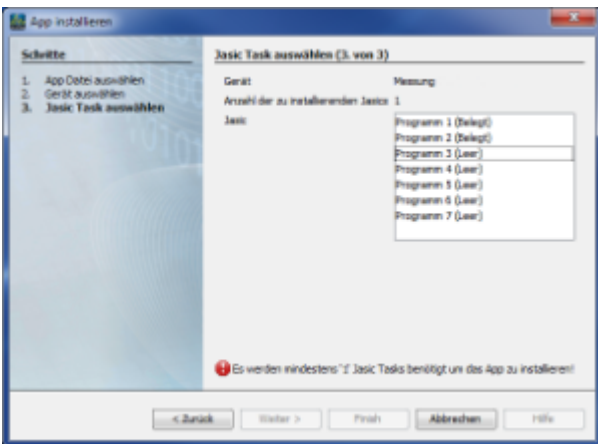
Fig.: Jasic task selection

Plugins

Plugins menu

This additional extension module provides further functions in GridVis and can be managed by selecting Plug-ins under the Extras menu.

- *Reloads*

  Using the "*Reload catalogue*" button, a current list of the plug-ins to be updated can be loaded.
- *Available plugins*

  Using the "*Load new catalogue*" button, a current list of the plug-ins to be updated can be loaded.

  Selecting a plug-in in the list and then selecting "*Install*" installs the plug-in.
- *Download*

  Using Add plug-in, saved plug-ins can be added to GridVis. Using the displayed list and Install, these can be integrated.
- *Installed* (x)

  Plug-ins integrated into GridVis can be activated, deactivated or deinstalled in the list.

  NOTE: Only deinstall plug-ins if your are sure that they are no longer required!

- *Settings*

  For the automatic updating of plug-ins, new update providers can be added, edited and deleted. The "*test interval*" at which the availability of updates is checked and "*Installation in common directories*" can be customised.
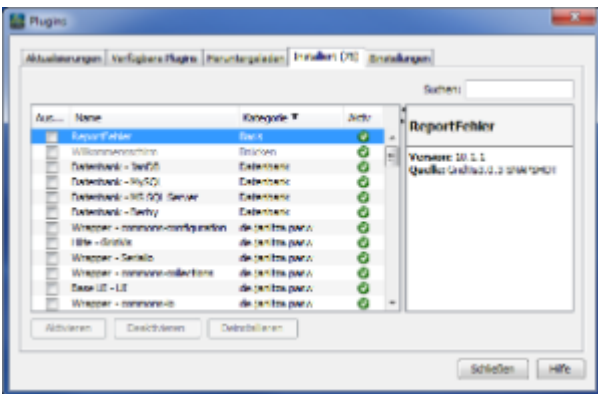
Fig.: Installed plugins
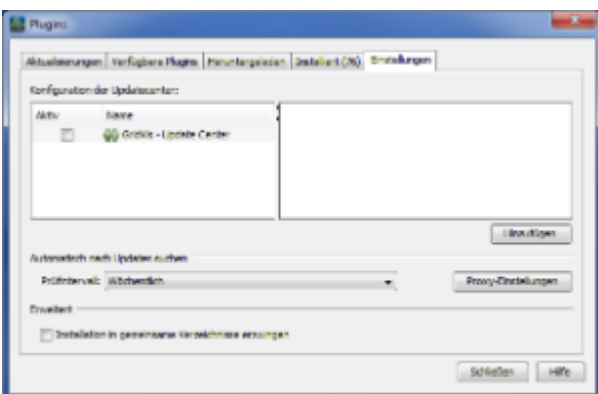
Fig.: Plugin settings

Options

Options menu

- *General*
  Enables configuration of proxy settings for special internet access.
- *Miscellaneous*
  Enables settings of the internal assignment of file name extensions, import/export of GridVis-settings and general display settings.
- File assignments
  Note: The internal assignment of extensions should only be modified if the person responsible has sufficient expertise!
- Export/Import function
  With these buttons GridVis settings (e.g. toolbars, graph colours, templates) can be exported/imported.
  For this purpose, the data is saved in a ZIP file that can be imported to other GridVis versions.

  Note: Exported settings may contain saved passwords!
- Appearance
  Enables various settings determining the appearance of windows.
- *Graphs*
  Graph properties settings for memory depth, background and graph colour.
  - Background colours for graphs can be selected in the colour palette using the "*Change colour*" button.
  - The colour can be customised by selecting a graph in the node structure and then selecting the corresponding colour field with "*Click to change colour*" colour panel.
    The changes will not appear until a new graph is added.
- *Topology*
  Basic value scale settings with an optional view of the device screen in the topology window..
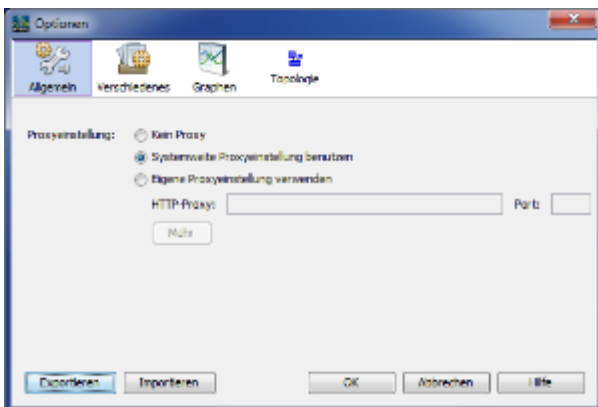
Fig.: Internet access settings
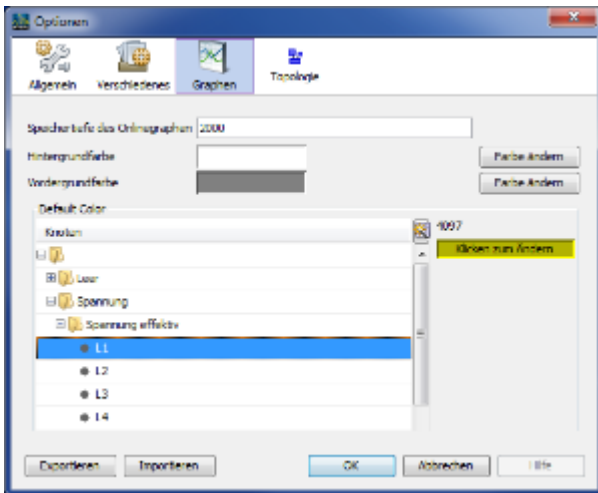
Fig.: Colour selection for graphs
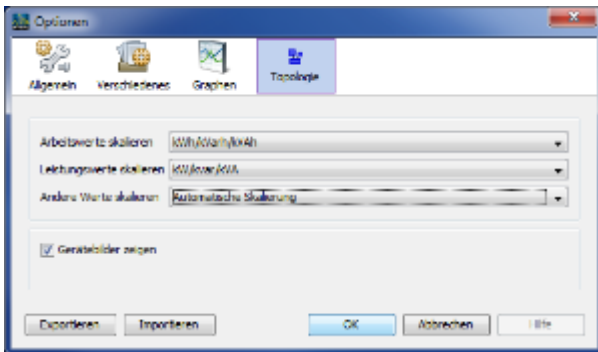
Fig.: Topology settings

License administration

License administration menu (licence manager window)

The registration and activation of the GridVis version is managed via the license administration. Registration is via a request file that is transmitted to the license server. The activation file created and sent out by the license server activates GridVis (see "Login and Activation of the GridVis Software"). Information about the current license is displayed by the license administration.
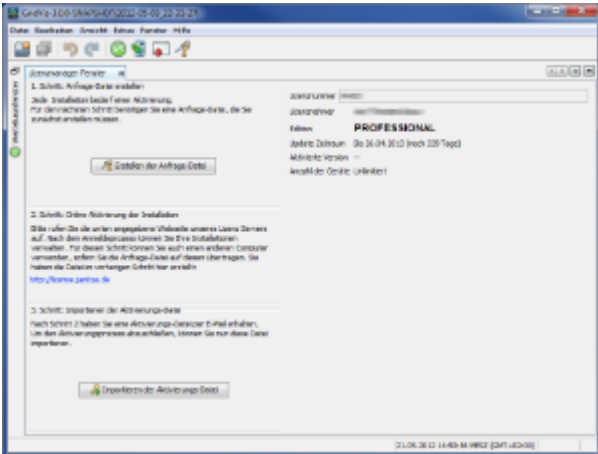
Fig.: License manager

10.3.6 Window menu

Window menu
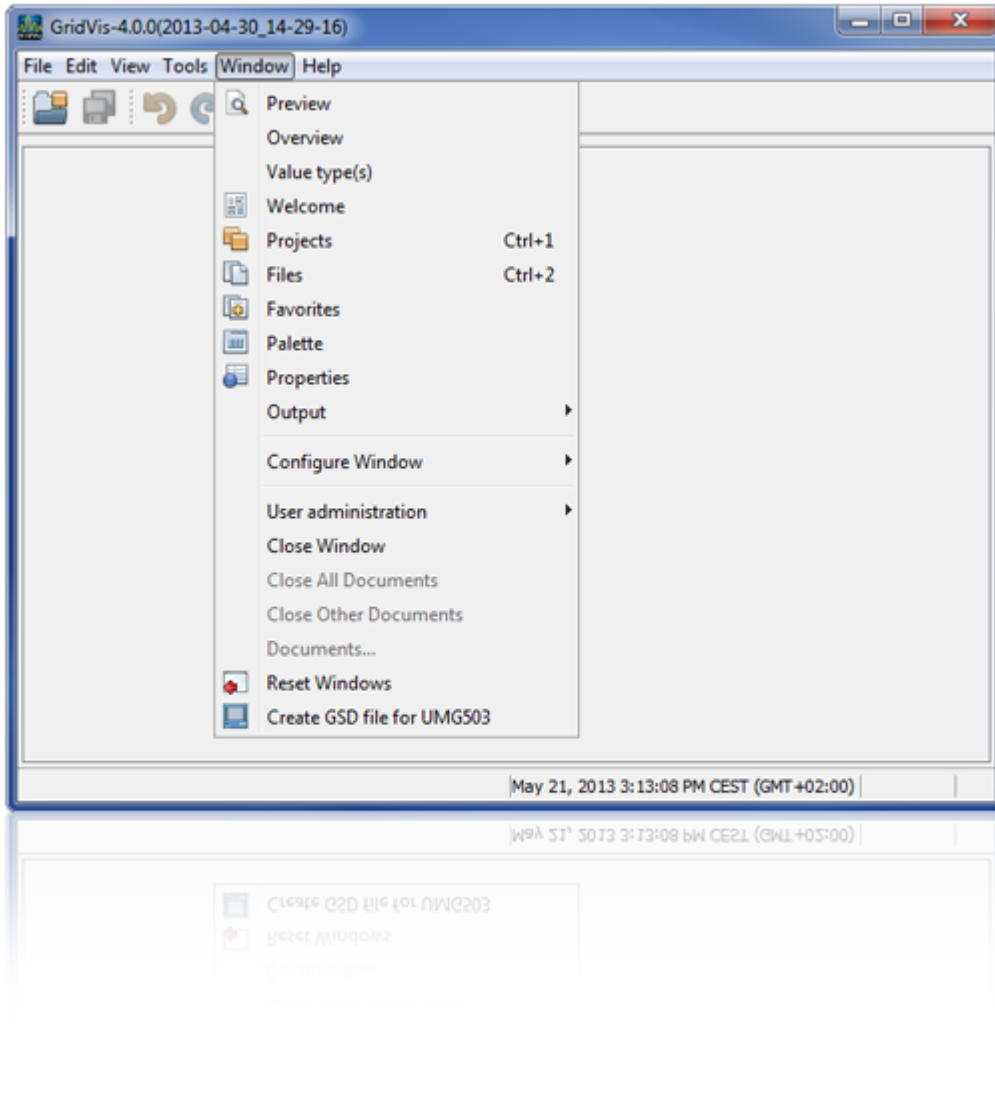
Window

Window menu

- "*Overview*" menu
  Opens the navigation window and provides specific information relevant to the selected device group or device.

  Devices can be added, deleted, synchronised, configured and their links tested in the navigation window.
- "*Value tree window*"
  Opens the value tree window with the value graph options relevant to the respective devices.
  Via the buttons "Online values" or "Historical values" it is possible to toggle between the current measurement values and those saved by the device.
  Note: The device must be previously read out for historical data!
- "*Welcome window*" menu
  Opens a support window that provides an introduction to working with GridVis.

- "*Projects*" menu
  Opens the project window in which projects with all categories are shown in a tree structure.
- "*Files*" menu
  Opens a window with the project-specific file structure.
- "*Favourites*" menu
  Opens a window with the saved favourites.
- "*Palette*" menu
  Opens a window with the Jasic component palette.
- "*Properties*" window
  Displays additional information according to selection in the projects window (device, Jasic template or topology page).

  Example: Opens an information window in the project window relevant to the selected device.
- "*Task*" menu
  Opens the GridVis log window.
- "*Configure window*" menu
  The current and opened windows are configured via this menu item.
- "*Maximise window*" and "*Minimise window*":
  Maximises or minimises the view of the current window.
- "*Float window*" and "*Dock window*"
  The "*Float*" / "*Dock*" commands pin or unpin the current window to or from the main GridVis window. Floated windows can be moved on the Windows desktop as desired.
- "*Float Group*" and "*Dock Group*"
  The current window group is undocked from GridVis or redocked (see "*Float window*" and "*Dock window*").

Create tabulator for new document group ("*New Document Tab Group*") and delete it ("*Collapse Document Tab Group*"):
Creation of document groups (window group), each of which is displayed in a lower level area.
If several document windows (e.g. navigation windows with several graphs and topology windows) are displayed, then a generic tab group (window group) can be created via the "*New Document Tab Group*" function. Via the "*Collapse Document Tab Group*" function, the window group is recombined.

- "*Close Window*" menu
  Closes all of the document windows except for the current window.
- "*Close all documents*" menu
  Closes all of the document windows such as the navigation window and the graphic and topology windows.

- "*Close other Documents*" menu
  Closes all of the document windows except for the current window.

- "*Documents*" menu
  Opens the document window manager used to administer the document windows.
- "*Reset Windows*" menu
  Resets the window configuration to an original position.

- "*Generate GSD file for UMG503*" menu

  Generates a GSD file for the UMG 503 device for connection to the Profibus.
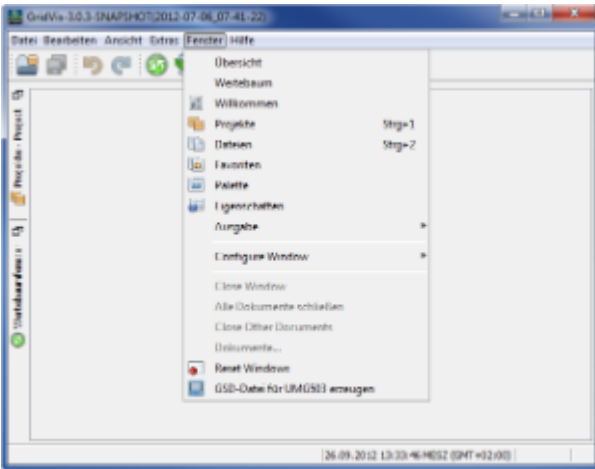
Fig.: "*Window*" menu
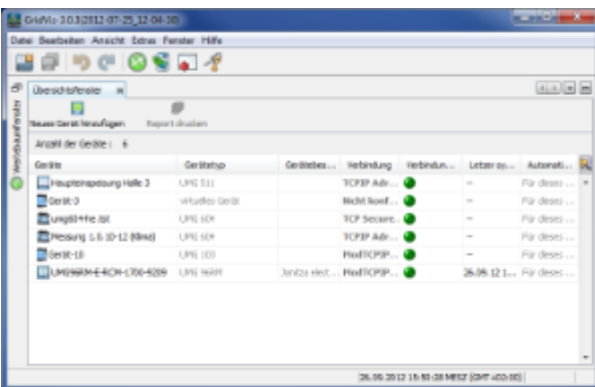
Fig.: Navigation window
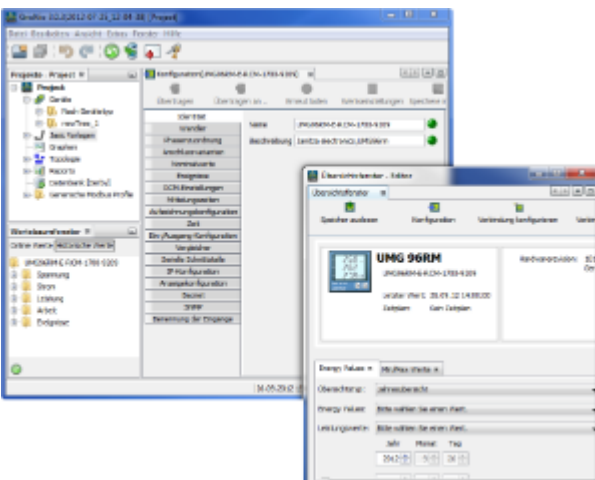
Fig.: GridVis with floating window
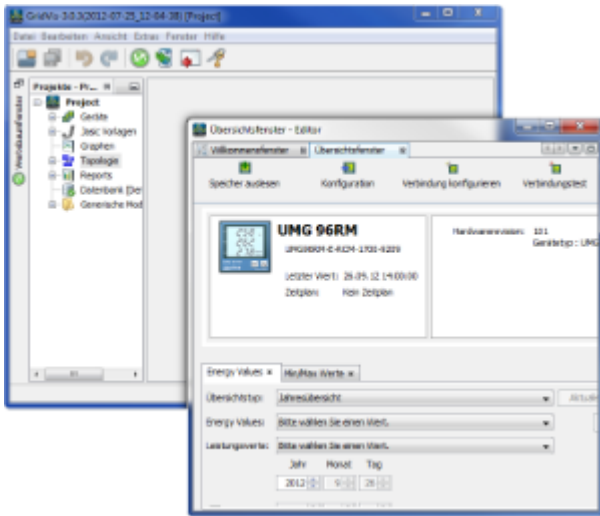
Fig.: GridVis with floating window group

10.3.7 Help menu

Help menu
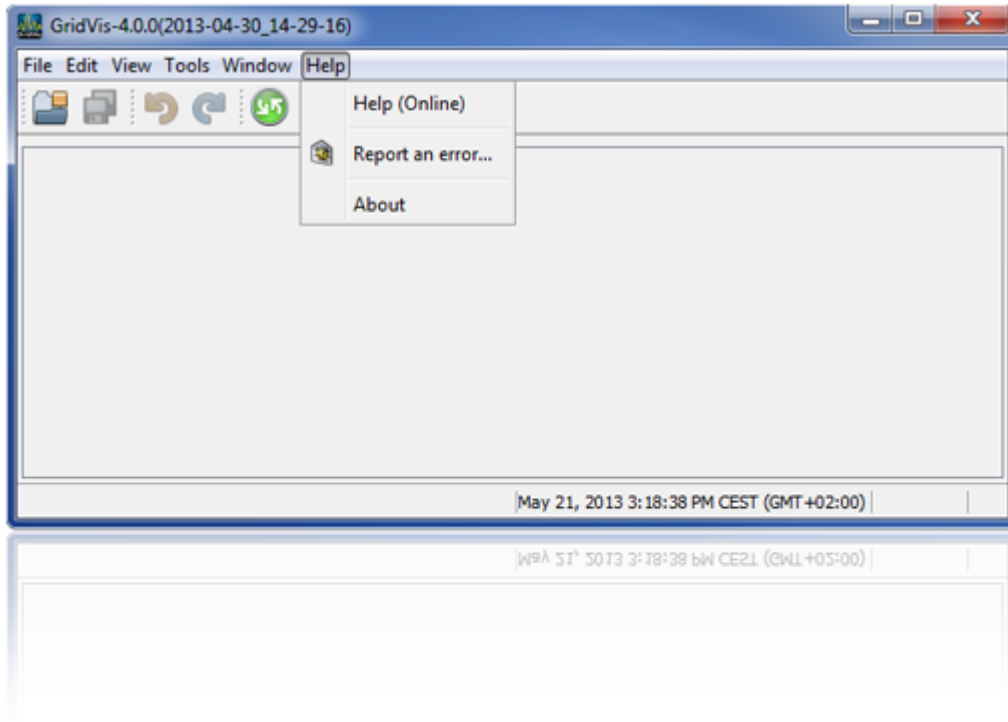
Help

Help menu

- "*Help*" menu
  Calls up the help function.
- "*Report an Error*" menu
  Enables transmission of a report to the software development team in the event of a software error.
  - To report an error, fill out the e-mail address and error description boxes and confirm your entries via the "Next" button.
  - Several files will be sent to process the error. If you want the files to be sent, confirm the confirmation on the processing of your data and start transmission with the "Next" button.
- "*Check for updates*" menu
  The software and installed plug-ins are checked for updates.
- "*Info*" menu
  Shows system and software information.
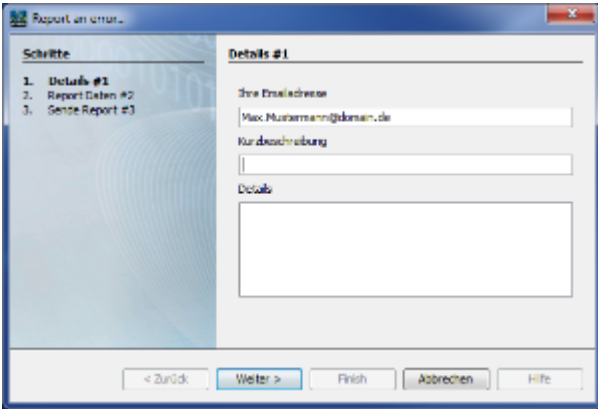
Fig.: Input of error message
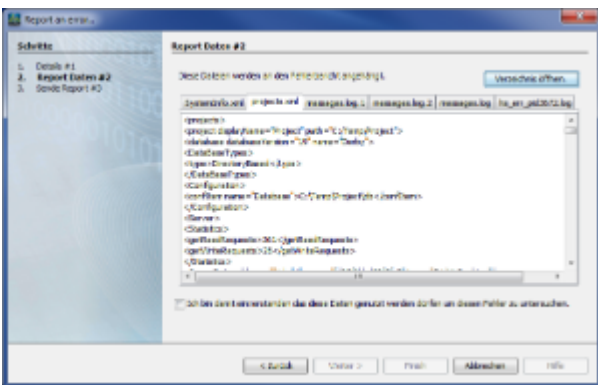
Fig.: Details for protocol transmission

10.4 GridVis windows

10.4.1 The GridVis windows
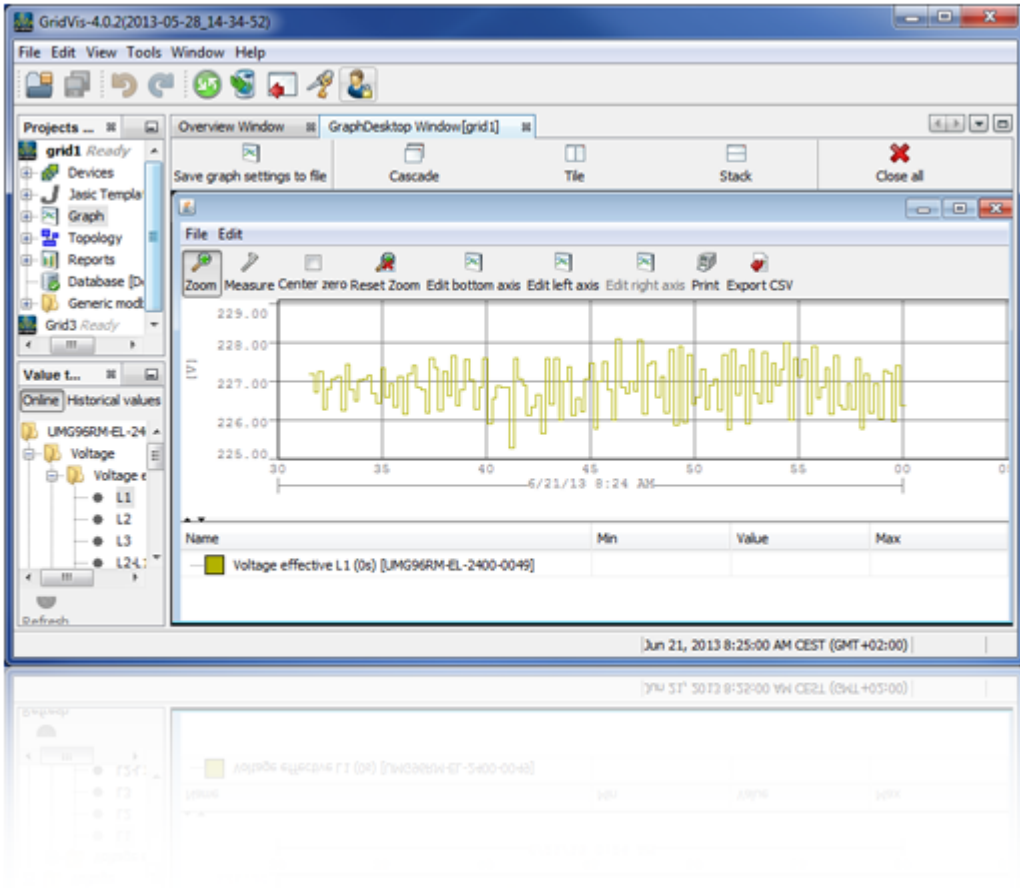
10.4.2 Window management

Window management in GridVis

Control window   Documents navigation bar   Documents window control
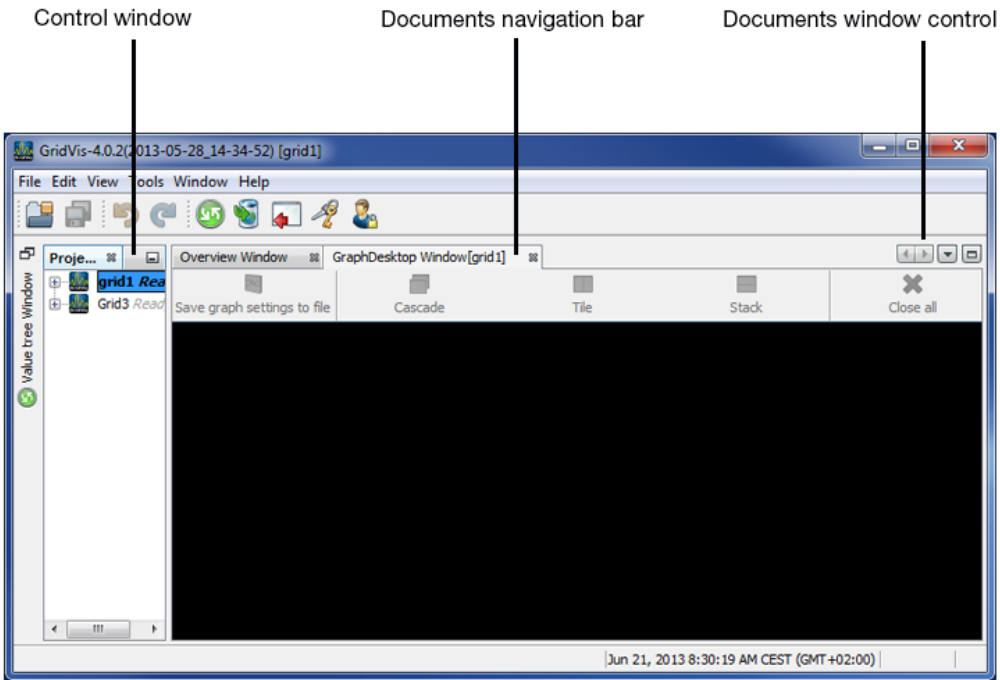
Window control

▬	Minimize window
✖	Close window
▭	Maximize window
▾	List view of all open group windows

Document window control

◄ ►	Scroll document tab to right/left
✖	Close window
▭	Maximize window
▾	List view of all open group windows
⧉	Regenerate previous document window view

The current window in the GridVis user interface can be unpinned using the menu item Window/Unpin window or by dragging the window to the Windows desktop (unpinning). Unpinned windows can be moved on the Windows desktop as desired.

If active, unpinned windows can be reintegrated in the GridVis user interface using the menu item Window/Pin window.

10.4.3 "Welcome" window

Welcome window

The Welcome window can be opened under the menu item *Window/Welcome* and provides support to initial steps when working with GridVis.

Activiation

Each installation of GridVis software requires activation. To do this, the licence manager can be created via a request file and an online activation performed with this.

- Show the license manager

Creating a project

To be able to work with GridVis, at least one project must be open.

- Create new project
- Open existing project
- Import of older versions

Adding devices

One or more devices can be added once a project has been opened.

- Create new device
- Import a device list from a CSV file

If the Welcome window does not appear when starting, it can be opened using the menu item *Window/Welcome*.

10.4.4 Projects window

Projects window

Display of the open projects incl. the corresponding tree structure.

- Devices
  List of all devices used in the project. Further devices can be added to the project (Creating new device) via the menu item "*File/New file*".
  Double-clicking on a subnode opens the document navigation window with additional information.
- Jasic templates
  List of all Jasic programs integrated in the project. New Jasic files can be added to the project by right-clicking.
  Jasic templates can be edited by double-clicking on the Jasic file nodes.
- Graphs
  Selecting graphic document windows opens them. Using the values tree window, the measurement values for the active device can be displayed in this window (Adding graphs).
  Saved views are visible as subnodes in the graphic nodes.
- Topology
  The graphic representation of devices and measurement values in a project must be created using the node topology. Saved topology pages appear as subnodes (Topology view).
- Reports
  Quality control and cost reports are prepared via this node. Saved reports are visible as subnodes and can be managed via Schedules.
- Database
  Configuration, administration and optimisation of the connected database.
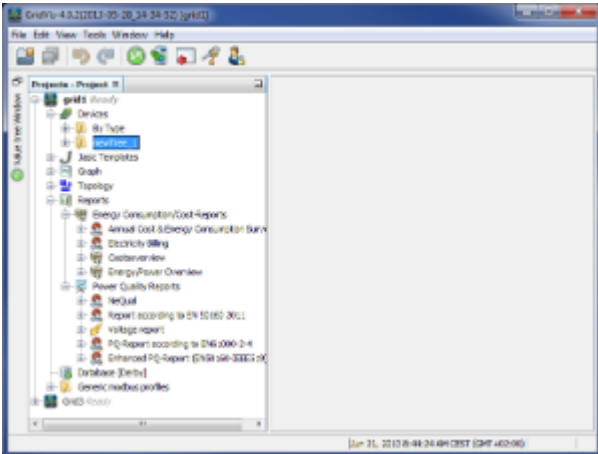
Fig.: Projects window

10.4.5 Value tree window

Value tree window

Display in a tree structure of possible measurement values for the current device. By opening a branch, measurement values can be highlighted using the mouse and dragged, for example, to a graph or topology window for visualisation (Adding graphs, Topology view).

- "*Online values*"
  Presentation of all current measurement values in a tree structure.
- "*Historical values*"
  Presentation of all measurement values saved in the device in a tree structure (records).
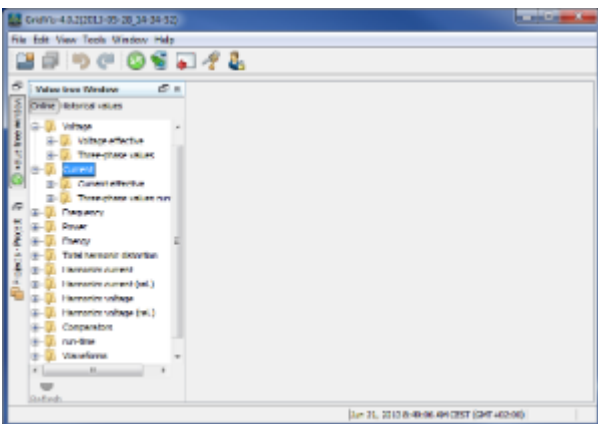
Fig.: Value tree window

10.4.6 Navigation window

Overview window

View of the most important device actions/information, depending on the types of devices/device groups selected in the projects window (First steps).

- Adding a new device
- Reading out memory
- Configuring device
- Configuring connection
- Connection test
- Resetting (resetting device values)
- Printing report
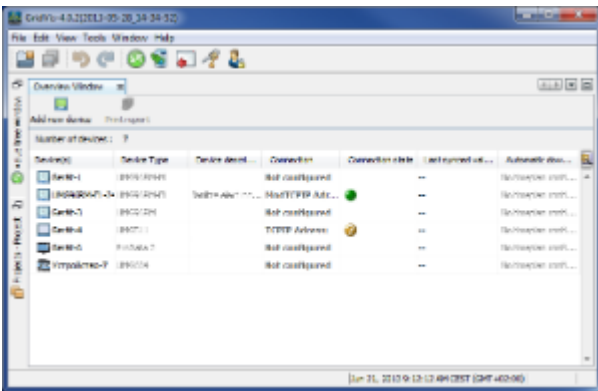
Fig.: Device group (device type) navigation window
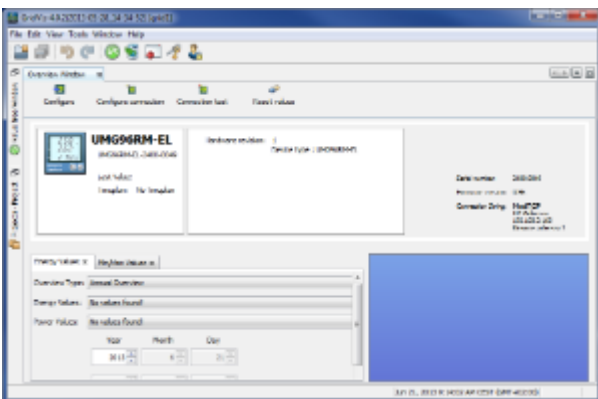
Fig.: Device navigation window

10.4.7 Files window

Files window

The file window shows the project-specific file structure in a tree structure. A file can, for example, be opened, renamed or deleted by right-clicking it.
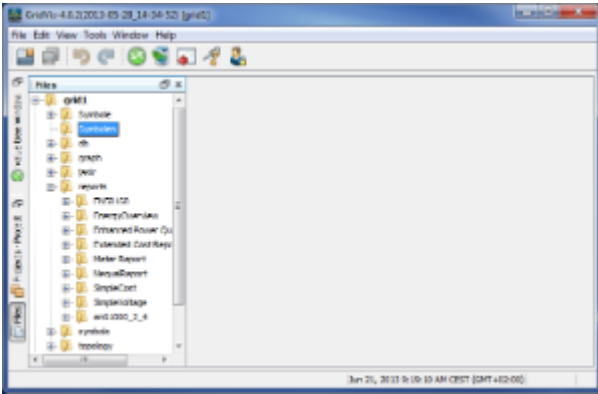
Fig.: Files window

10.4.8 Favourites window

Favourites window

Favourites are links to folders, saved graphs and to Jasic and topology pages. Favourites are selected and managed (right click) in the Favourites window (Add to favourites)

- Saving file-folder as favourite
  A file-folder is saved as a favourite by clicking in the favourites window with the right mousekey. A folder is selected via the pop-up menu "*Add to favourites*".
- Saving graphs, Jasic or topology pages as favourites
  In order to define saved graphs, Jasic and topology pages as favourites, the page must be selected in the projects window and then saved as a favourite in the "*Tools*" menu under "*Add to favourites*".
  Note: The menu item "*Add to favourites*" does not appear until the corresponding page has been selected in the projects window.
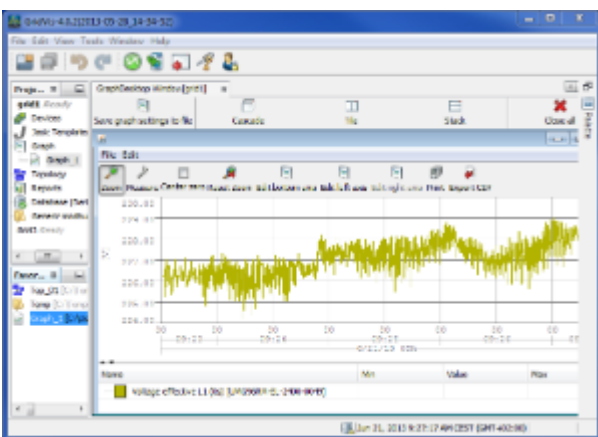
Fig.: Projects, favourites and graphs windows

10.4.9 Palettes window

Palettes window

Providing for additional functions (e.g. within the graphic view or in the Jasic programming).

The palette functions can be used by selecting a function module and then by dragging the icon onto the graphic or Jasic interface.
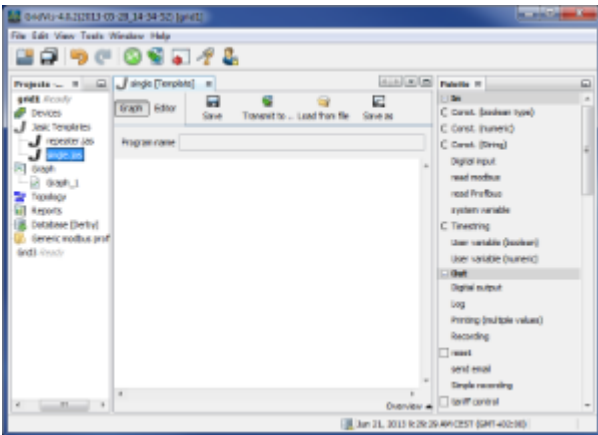
Fig.: Projects, Jasic and palettes windows
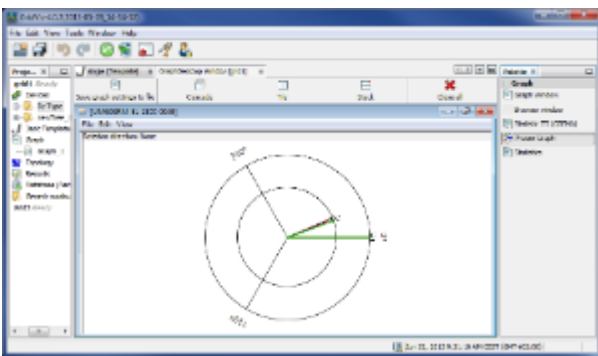
Fig.: Projects, graphs and palettes windows

10.4.10 Properties window

Properties window

Display of selected object properties (e.g. the device properties) as a function of the selection made in a project window (e.g. of a device).

Properties for a device selection with display of:

- Device type
- Device name
- Device description

- Instance management
- Supported device standards
- Device connection
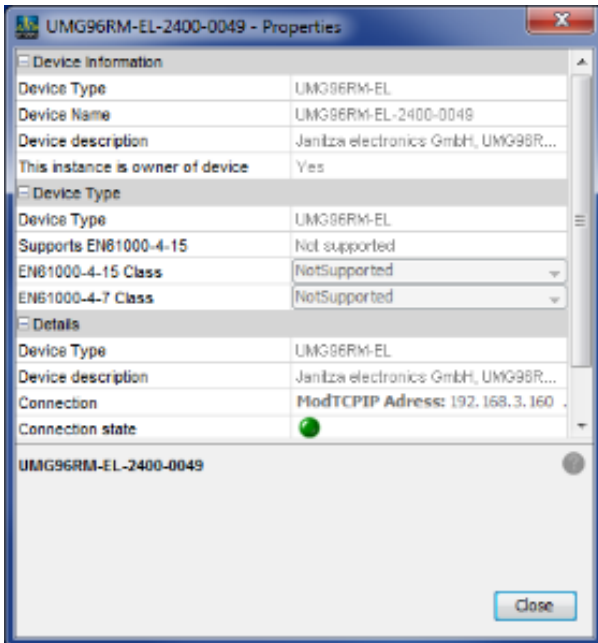
Fig.: Device properties window

10.4.11 Configuration window

Configuration window

Device configuration overview, e.g. IP configuration and device name.

- Via the pop-up menu

  - Select a device in the projects window.
  - Right-click the device to open the pop-up menu and select "*Configuration*".

- Via the navigation window

  - Select a device in the projects window.
  - Via the menu "*Windows/Overview*", open the overview window and then click the "*Configuration*" button.
    Note: Double-clicking a device in the projects window, directly opens the navigation window.

The device is configured via the corresponding buttons and can be processed via the following prompts:

- *Transfer*
  Set configuration is transferred to the active device.

- *Transfer to..*

  The set configuration has been transferred to several devices.
- *Reload*

  Read out the device configuration from the device.
- *Works settings*

  Reset the configuration to standard values.
- *Save in file*

  Save the set configuration to a file.
- *Load from file*

  Load the saved configuration file to GridVis.
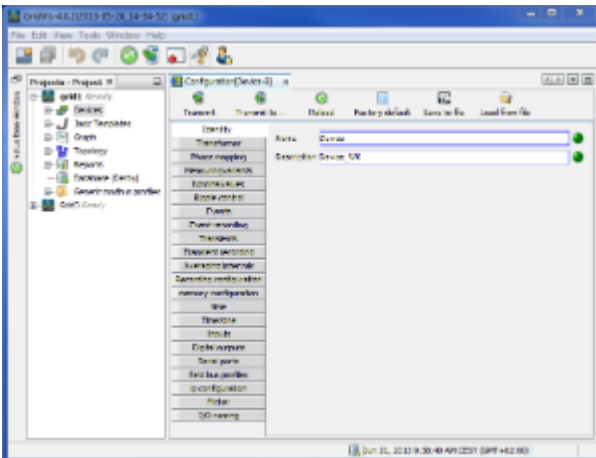
Fig.: Device configuration window

10.4.12 Jasic environment window

Jasic templates

View of the Jasic environment used to program and manage Jasic templates. Jasic is similar to the programming language Basic and is supported by various devices. Programs can be programmed in GridVis in text mode or graphically.

- *Graph / Editor view*

  Graphic or editor-based view of the Jasic environment.
- *Save* (in file)

  Saves the current Jasic template
- *Transmit to..* (transfer to device(s)

  Transfer of current Jasic template to one or more devices.
- *Load from file*

  Load the saved configuration file to GridVis.
- Save as

  Save the current Jasic template to a file.

Objects in the graphic programming interface can be moved with the mouse and set by double-clicking. Using the palette window, commands, actions and variables can be selected and, using the mouse, integrated in the graphic interface.
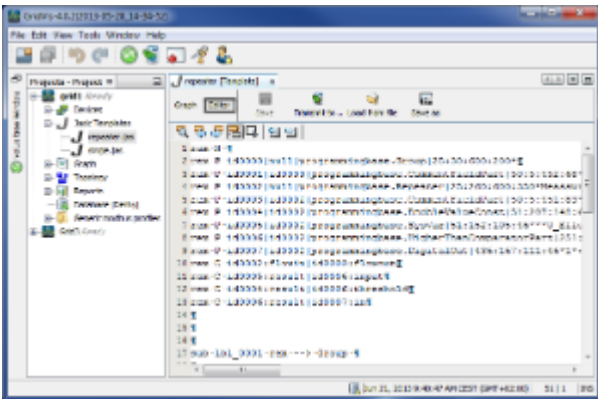
Fig.: Jasic environment

10.4.13 Graphs window

The graph window

Displays measurement values that were retrieved via an online connection or from a database in a graph (Adding graphs). *Save graph settings to a file* saves the created views and lists them as an additional node under Graphs.

- The measurement values can be derived from different devices.
- No more than two different kinds of measured value types (e.g. current and voltage) can be displayed in a single graph.
- More than one graph can be opened at a time.

Graphs bar

- *Zoom*
  Enlarges a selected area of the graph.
  Select the area by holding the left mouse button and pulling the mouse from the upper left to the lower right to highlight the area. Shrink a selected area by proceeding as explained above but in reverse (by holding the left mouse button and pulling the mouse from the lower right to the upper left).
- *Measure*
  Measures time and amplitude spectrum differences.
  Using the left mouse button, highlight an area within the graph. This displays the measured amplitude spectrum difference relative to the time difference in the highlighted area.
- *Center zero*
  Alignment of the amplitude spectrum centre with a centred zero baseline within the graphs.
- *Reset zoom*
  Resets the zoomed graph display.

- *Edit bottom axis*

  Sets the visible time interval on the x axis.
- *Edit left axis*

  Sets the amplitude spectrum display using a minimum and a maximum value.
- *Edit right axis*

  Using two different measurement value types, the view of the right axis can be controlled using a minimum and a maximum value.
- *Print*

  Prints the selected graph window.

Legend

Changing advanced graph properties is performed by right-clicking on the name of the graph

- Change the graph colour
- Show or hide the graph
- Move the graph into the foreground or into the background
- Remove the graphs from the window
- Adjust time scale of a graph
- Display graphs using different graph types (e.g. line or bar chart)
- Switch between minimum and maximum display
- Restore graphs (restart)
- Graph displaying the time based mean value within the graph window
- Export the graphed measurement values to a CSV file
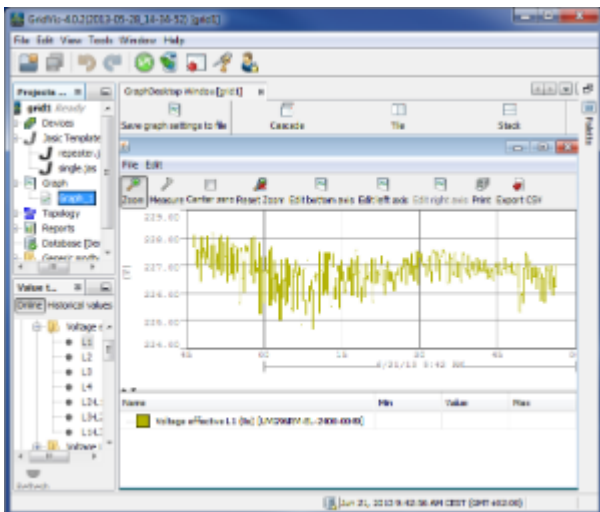
Fig.: Graphs window (display of voltage)
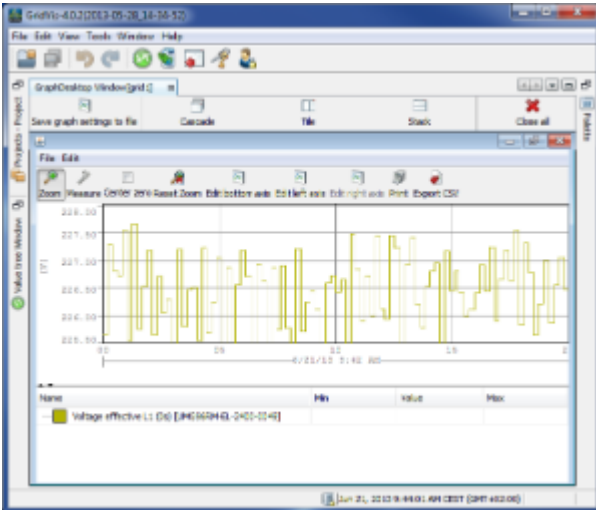
Fig.: Graphs window (zoomed)
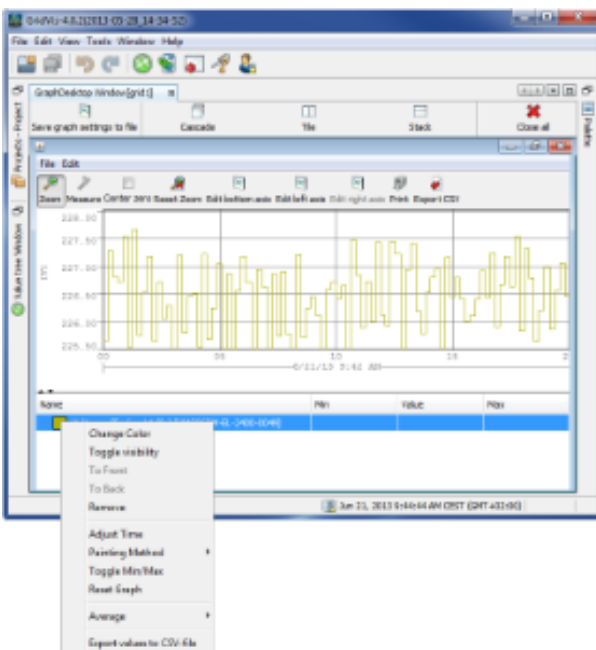
Fig.: Graphs window (legend with pop-up window)

10.4.14 Report overview window

Report overview

Representation of saved tasks used in the preparation of reports. Reports can be prepared, saved and planned in the project window with the selection of a report group.

- *Execute report*
  A report preparation assistant starts after a quality control or cost report is selected in the project window using "Execute". The report is displayed in a preview window.

- *Save report*
  A report preparation assistant starts after a quality control or cost report is selected in the project window using Saving a report. The task is then saved under any chosen name and appears under the report group in the project window.
- *Schedule report*
  Saved report tasks can be automated using a time plan with the "*Schedule*" button (schedules).

Note: Saved reports can be viewed using the File window in the "*Reports*" folder.
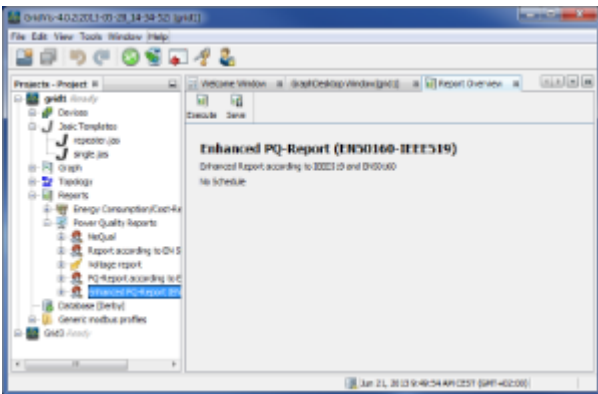
Fig.: Report overview
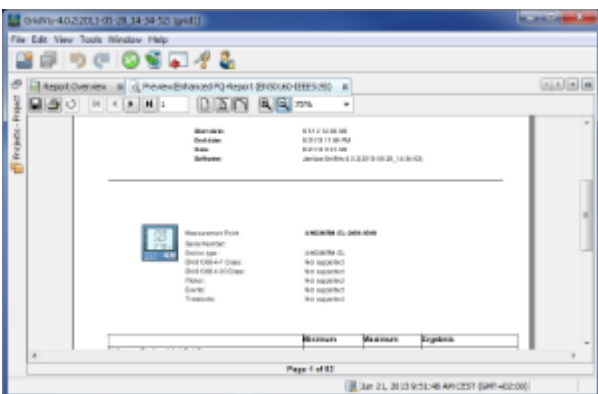
Fig.: Display of report

10.4.15 Topology window

Topology window

Representation of topology structures.
Added (Adding topology) and saved topology views appear as additional nodes below Topology in the project window.
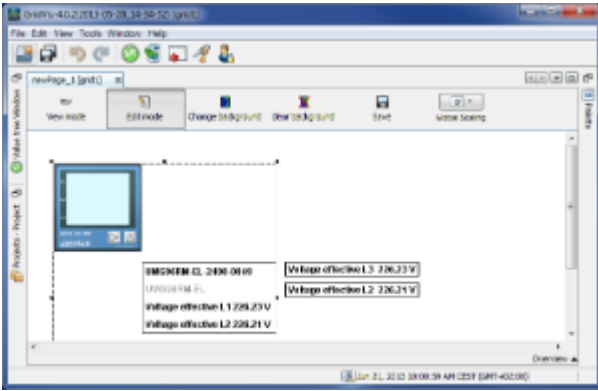
Fig.: Topology window

10.5 Graphic programming

10.5.1 Graphic programming
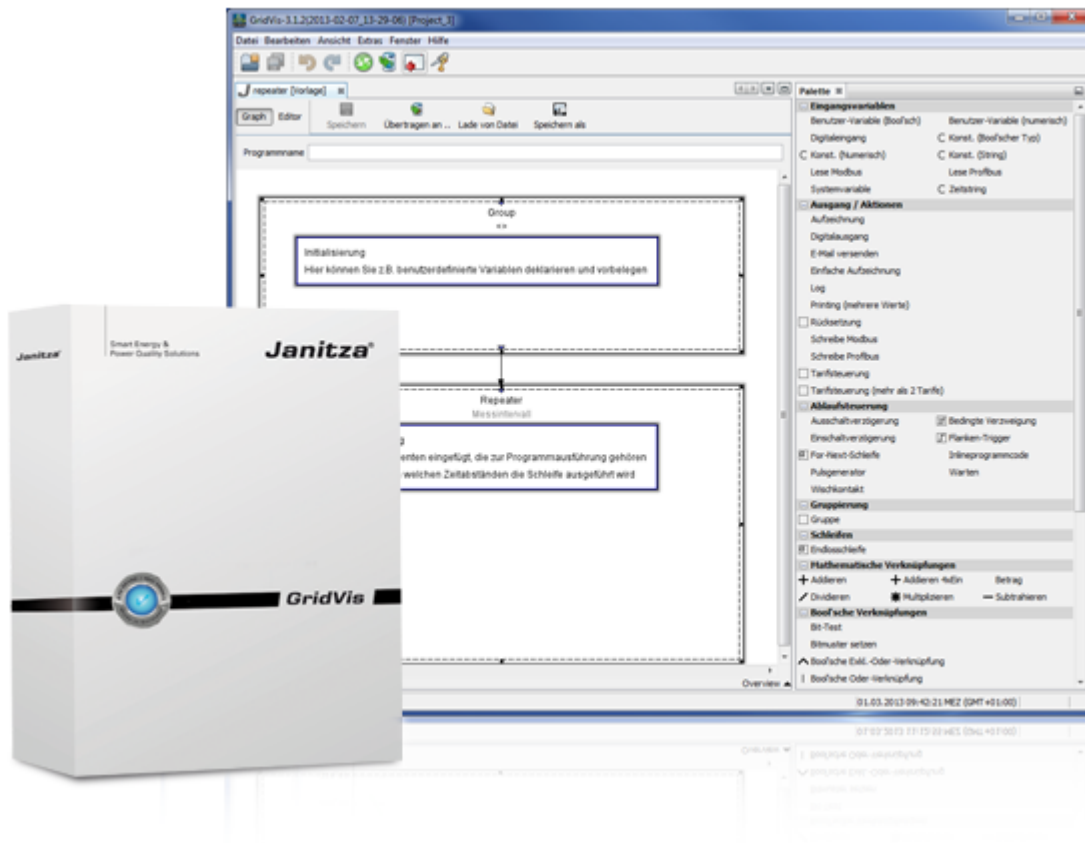
10.5.2 Jasic start

Starting JASIC

The Jasic environment provides the interface for the programming and administration of Jasic templates.

- Jasic is similar to the program language Basic. Jasic code can be processed by various devices made by Janitza electronics GmbH.
- Jasic templates are programmed either graphically or with text in GridVis.
- The Graph or Editor buttons in the Jasic environment are used to switch between the views.

How:

- Select the "*Jasic templates*" node in the project window.
- Right-click on "*Jasic templates*" and select "*Add new Jasic file*" then select the sub items "single.jas", "repeater.jas" or "*Comparator.jas*".
- Give the file a name.

Using the menu item Window/Palette, open the "Palette window".
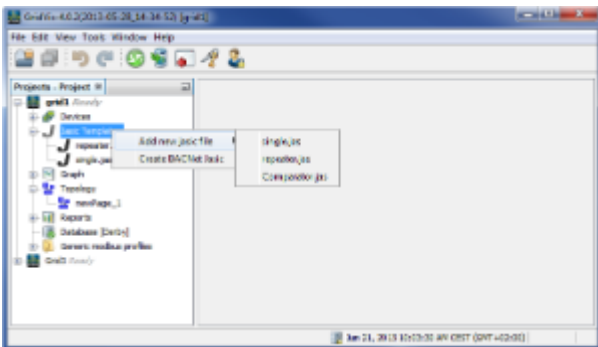
Graphic programming basics:

- Jasic programs are assembled by "dragging" the Jasic modules from the Palette window to the graphic programming window.
- Two components are linked by clicking the coloured triangle of a module, keeping the mouse key pressed down and "Drag with the mouse to the triangle of another module until the link perceptibly "snaps in". The type of connection (colour of triangle) and the direction in which the connection is made must be taken into account.
- Additional parameters can be set by double-clicking on a module.
- Components can be copied or removed by right-clicking on them.
- Connecting lines can be deleted via the corresponding mouse context menu.
- Brief information appears when the mouse cursor is briefly held on a component.

Establishing a connection
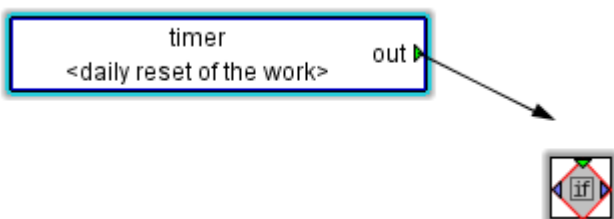
Brief information:
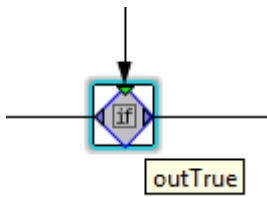
10.5.3 Repeater / Single template

Repeater

The repeater provides the framework for the Jasic program, i.e. once the delay has run its course, the repeater's program code (combination of function modules) is executed and further processed. Program modules external to the repeater are executed only once. Repeaters cannot be interconnected and may be used a max. of once in the program.
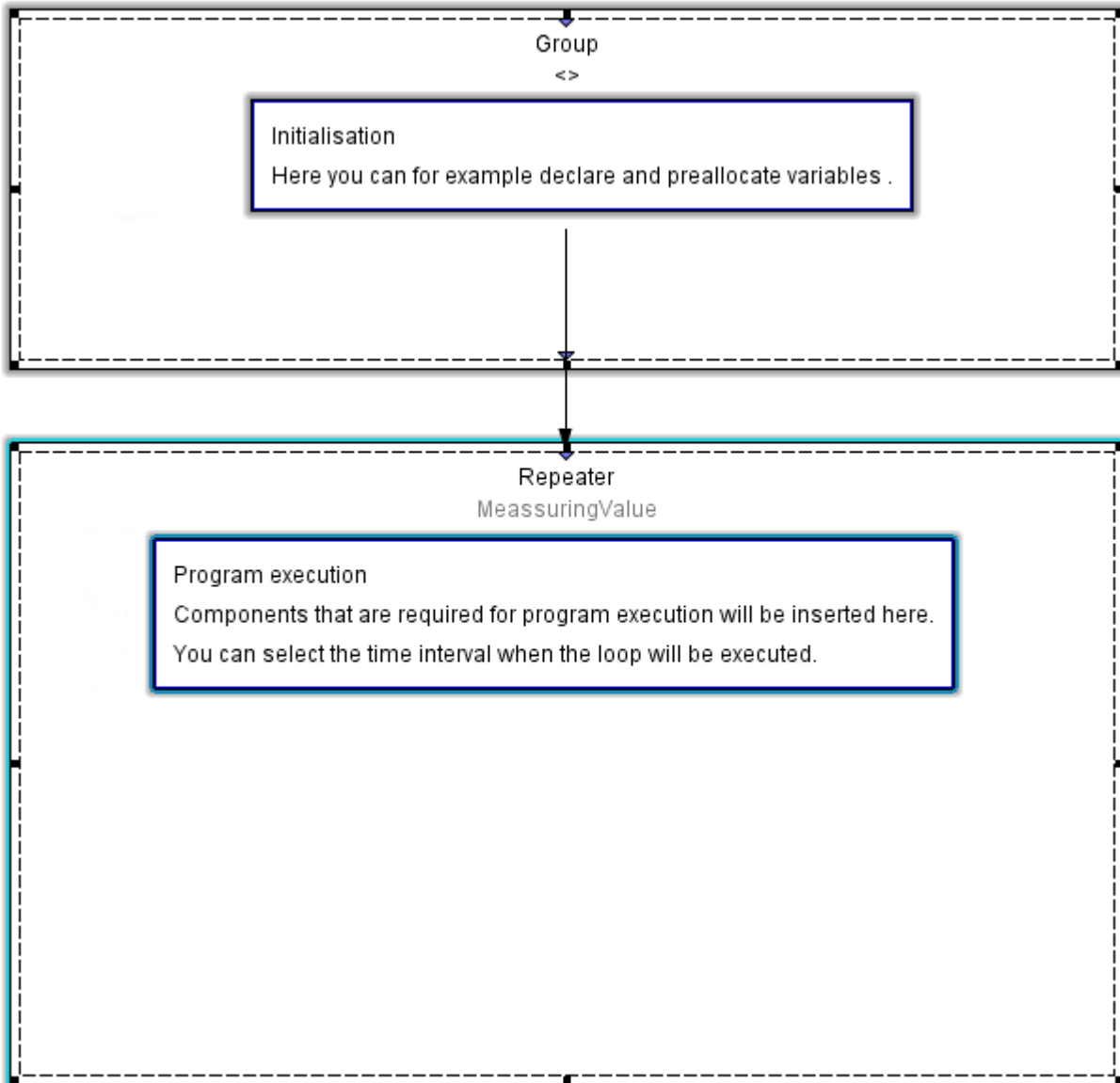
Single (Group)

The Single forms another frame for the Jasic program. In this case the program code (functional modules) is executed only once - in contrast to the repeater.

The Group module ensures that all contained modules are executed before the subsequent module connected with it is executed. Connected modules within the Group module are executed in sequence. The sequence of execution of non-connected moudles within a Group module is undefined. Some program execution structures (such as if, for example) do not allow any elements that are neither within a repeater nor within a Group module--> program code that should only be executed 1x must in this case be part of a Group module and cannot be alone outside a repeater.
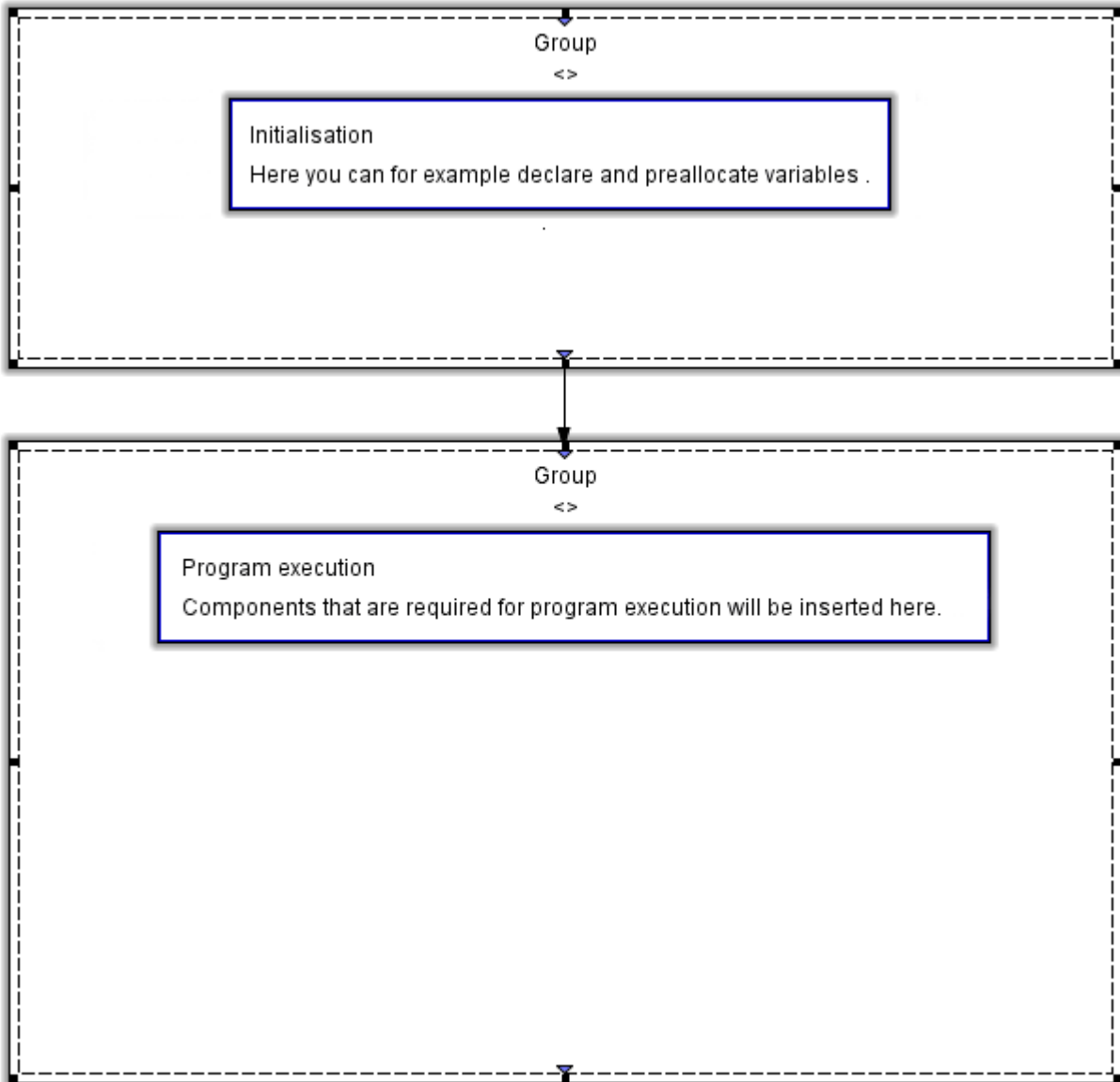
10.5.4 Comparator template

Comparator template

The Jasic example comparator creates a Jasic framework in order, for example, to compare measured values with a boundary value. If the boundary value is exceeded, the system switches to the digital output 1.

You will require the following modules for this: "Sys-Var", "Const. (Numeric)", Comparator "Above threshold value" and "Digital output". The various modules are configured by double-clicking the respective module.

Example:

- Open the properties of the module "*SysVar*", "Const. (numeric)", by double clicking it.
- Click the button "*Select values*".
- Select a measured value within the tree structure and confirm it with "*OK*"

- Open the properties of the module "Const. (numeric)", by double clicking it.
- Enter the value of the constants (e.g. a boundary value).
- Open the properties for the Comparator module "Above threshold value" and set the desired hysteresis width, pre-run and after-run time.
- Open the module properties of the "Digital output" and set an output.
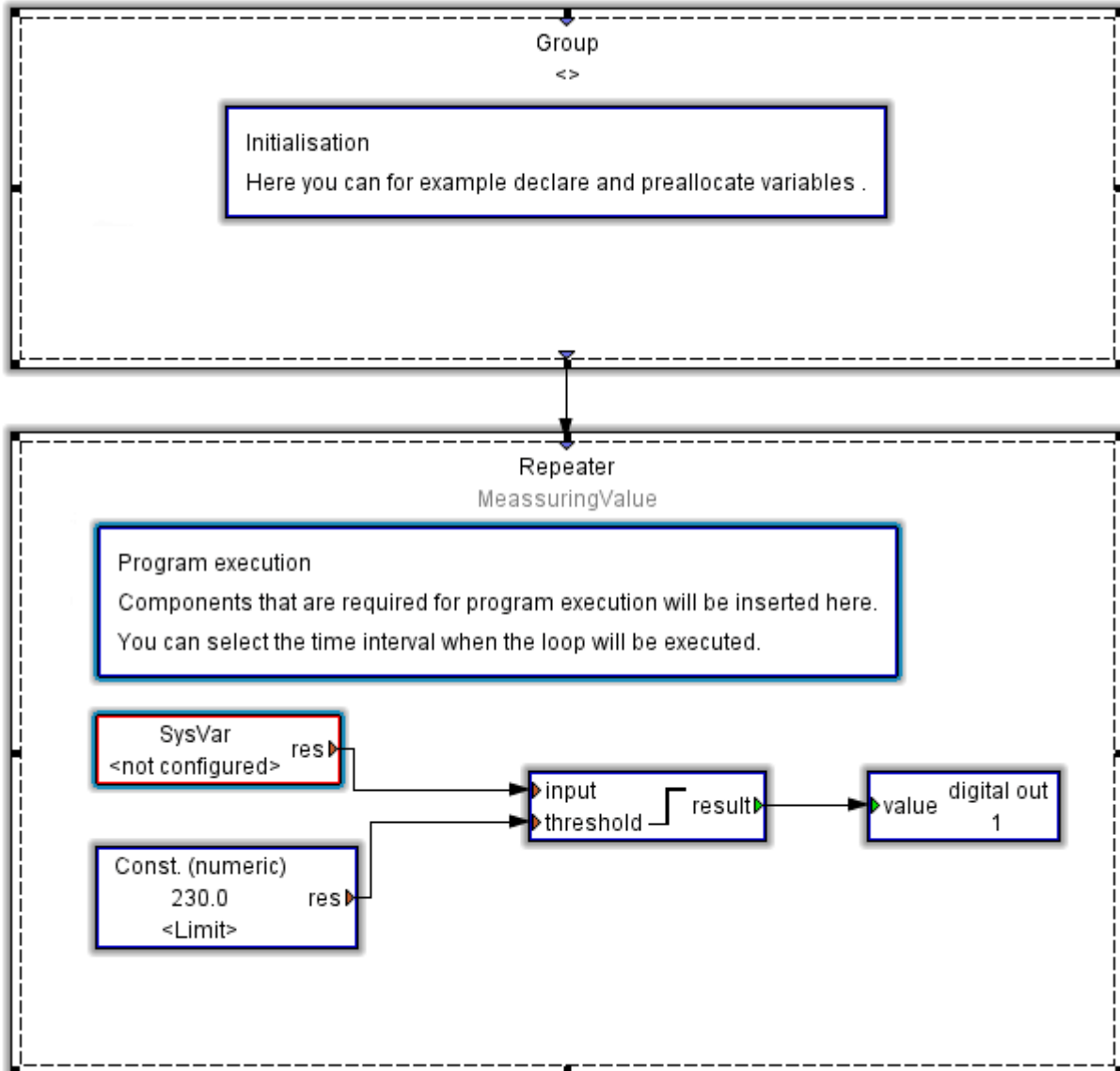
10.5.5 Group

Group

A group identifies a module with which programming can be managed more easily. A group module has only one input and one output. It ensures that all its inner components have been executed before the module that is downstream of it is run.

- Repeaters have two group modules which are processed one after the other.
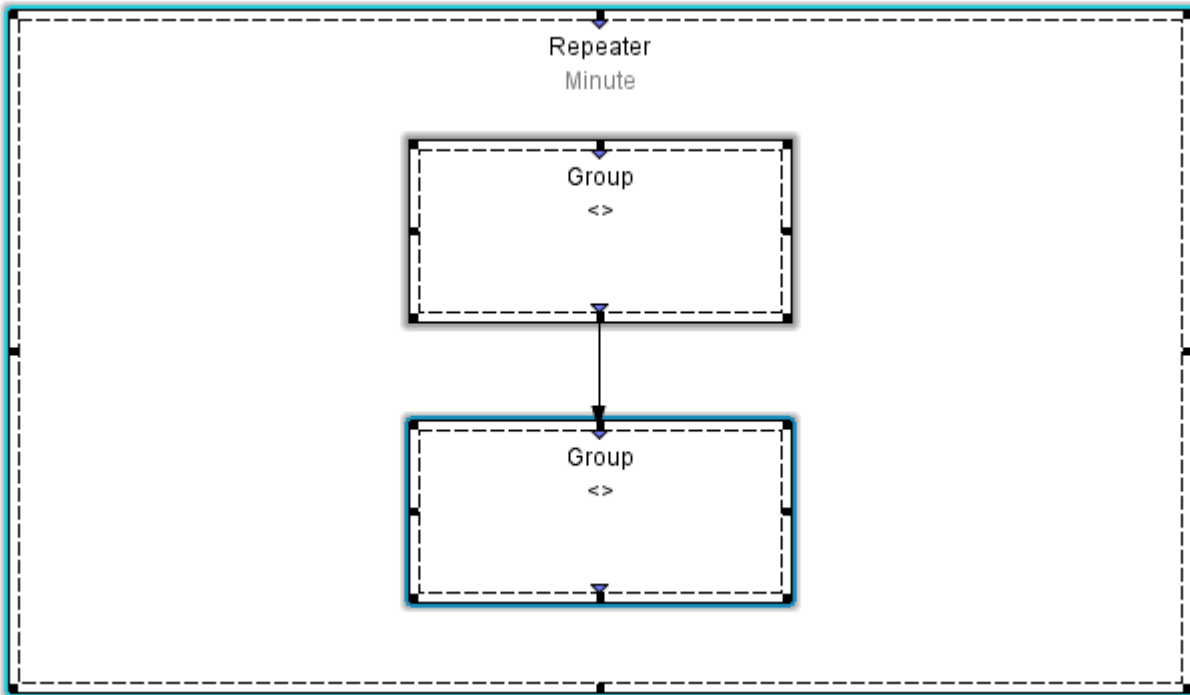
- Repeaters have two group modules of which only one is processed, as a function of the status of the digital input 1.
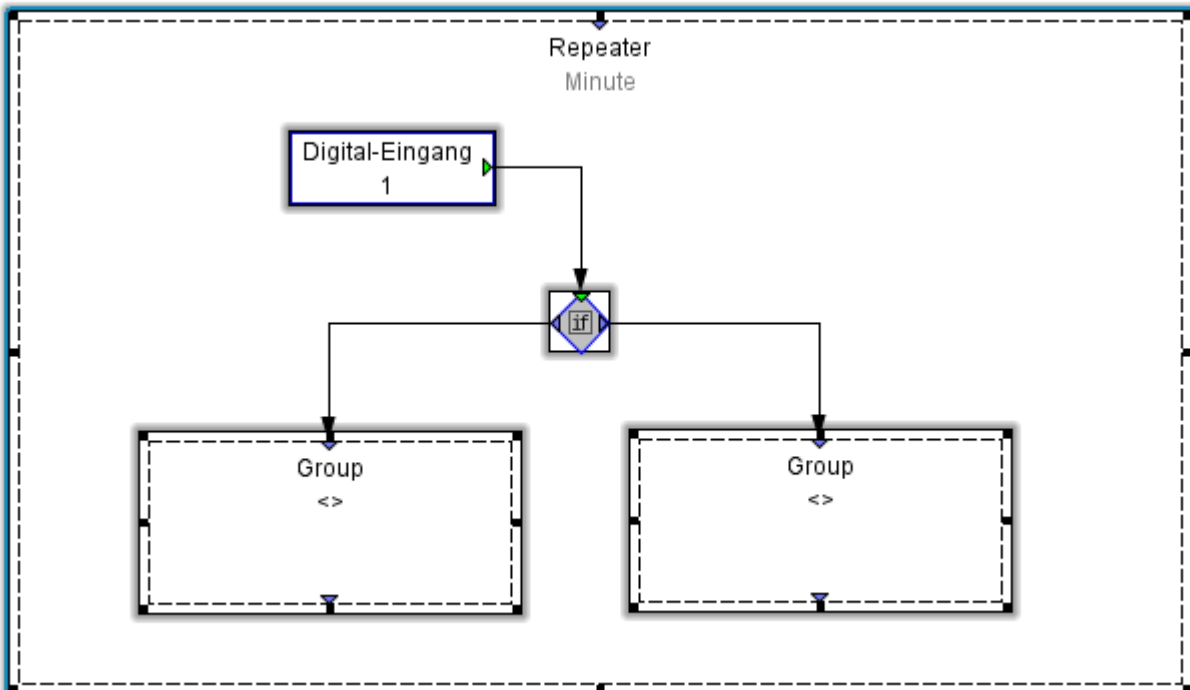
10.5.6 Variables

Variables

Three groups of variables are available for programming: The user variables (global or local), the constants (Boolean, numeric) and the system variables (measurement values).

- User variables:

User variables are variables which are personally set up and can be maintained locally or globally. A local variable is only retrievable again in the program in which it was defined and can therefore only be used locally. If a variable has been declared a global variable, it can also be retrieved in another program code and can also be read out or written using the Modbus register. The auto save function saves the value if a power failure occurs (persistence). User variables can be set up as Boolean variables (digital 1/0) or as numeric variables.

- Constants:

Constants are fixed values with which it is possible to work in program code. Double-clicking (left mouse key) the variable box opens the configuration level, whether the fixed value can be assigned. Here too, variables can be set up as Boolean variables or as numeric values. The exception is the string variable: A text can be saved with this.

- System variables:

System variables are measurement values provided by the device. All measurement data and calculated values, such as consumption, can be retrieved with these variables and can be processed in the program code.
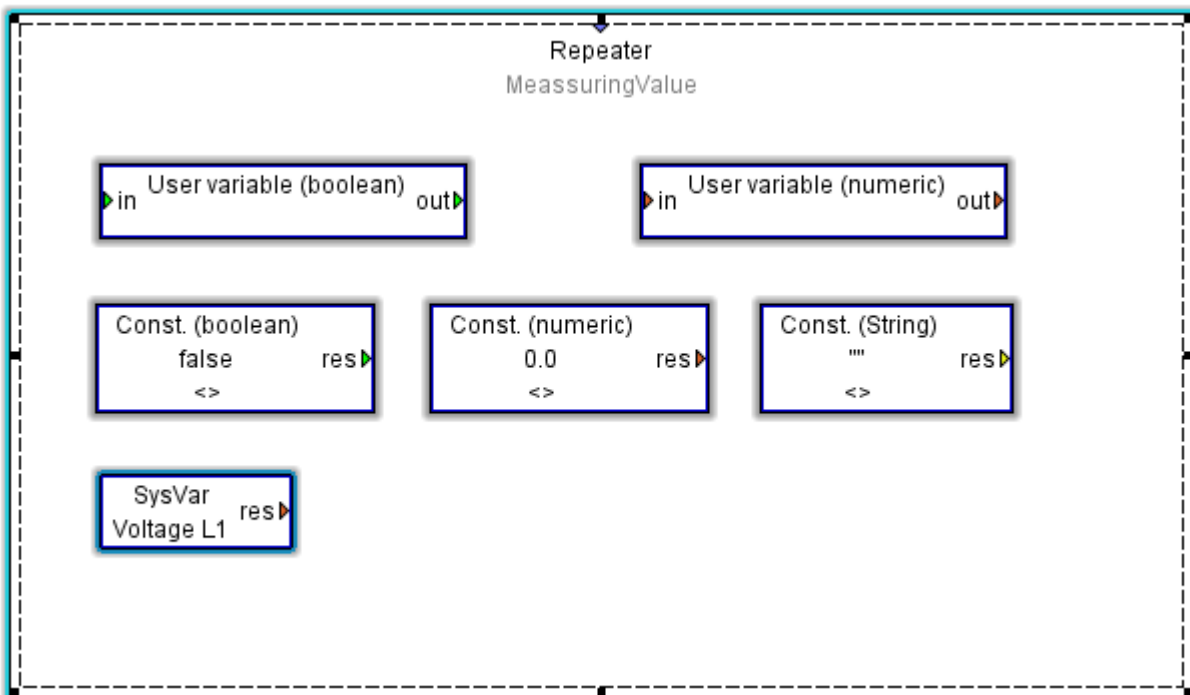
10.5.7 Processing time

Repeater processing time

The following processing times (repetitions) can be set by double-clicking on a free area in the repeater module:

- No delay (default setting)
- Measurement interval (200ms)
- Second
- Minute
- Hour
- Day
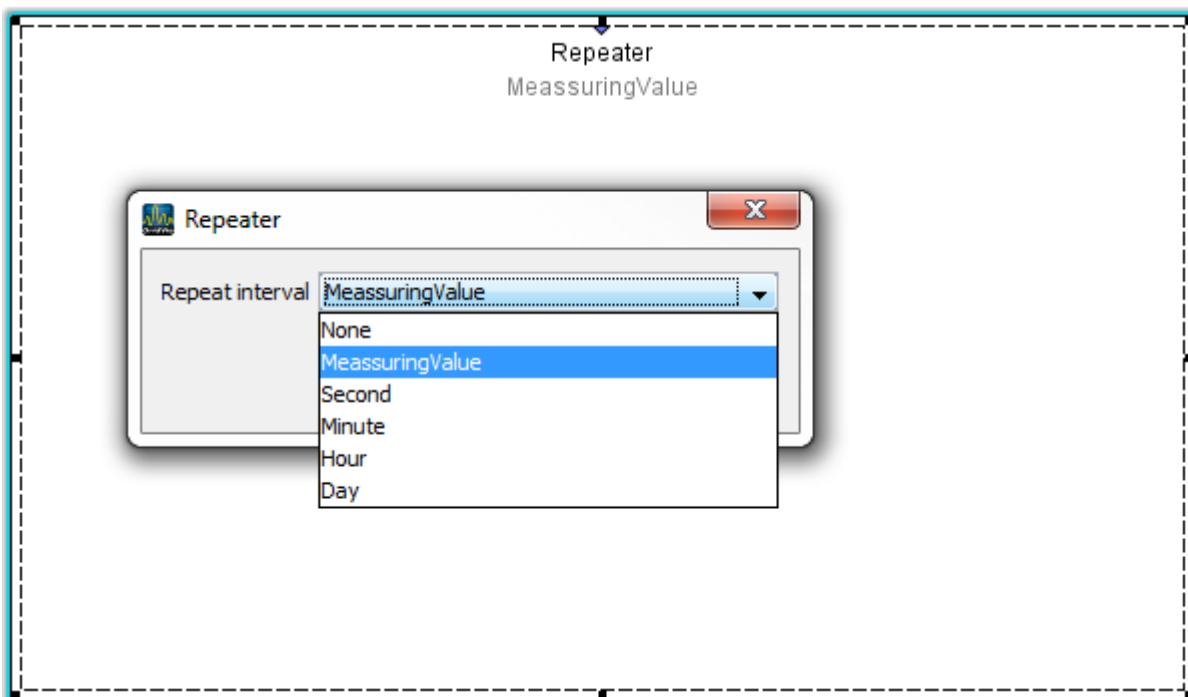
10.5.8 Colour definition

Colour definition

Colours have the following meanings when used in the graphic programming (e.g. module inputs/outputs):

- red - numeric type,
- green - Boolean type,
- yellow - string type,
- black - numeric, Boolean or string type,
- blue - program flows.

10.5.9 Log function

Log function

The log function can be used for:

- Error searches
- Commissioning programs

Program example: The result at digital input 1 is to be output in a log file.
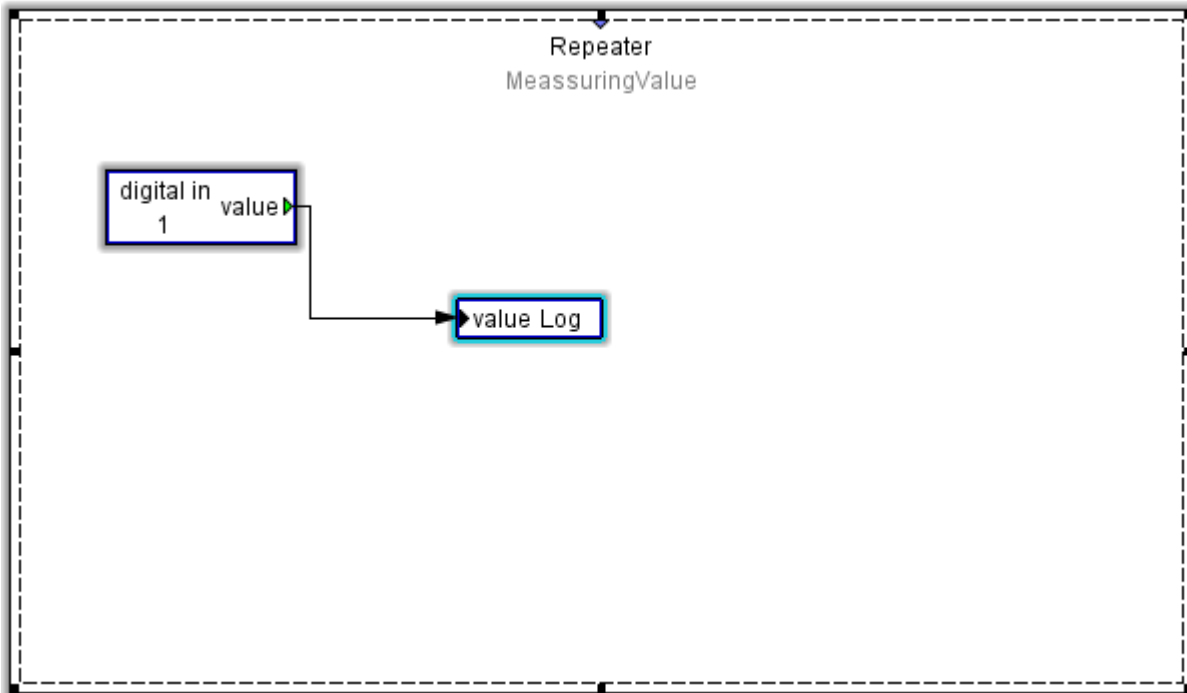
The log target can be set by double-clicking on the log module and can, for example, be checked in the Debug log.
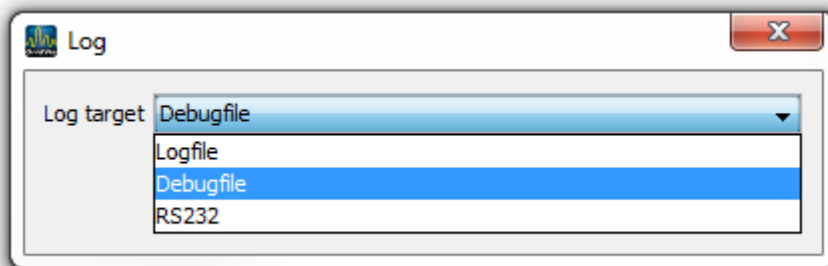
10.5.10 Debug log

Debug log

In debug mode, a Jasic program which has been transferred to a device can record and output debugging information, using the log function for example.

Example:

- Create a program in the graphic Jasic environment using Log function.
- Transfer the program in the Jasic environment using the "*Transmit to...*" button.
- Select an active device and an available location in the program and end the action with "*Finish*".
- Open the Overview window and select the device in the Projects window.

Selecting the program just transferred, under "*Jasic information*", loads the program to GridVis and displays it in another program window.
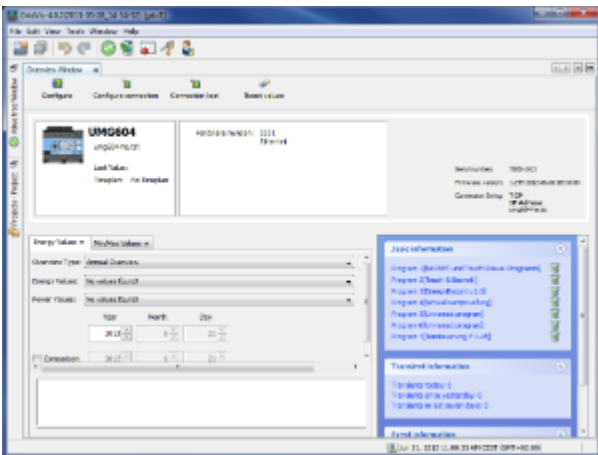
- Select the "*Debug log*" button in the program window and start the debugging information by clicking the "*Enable debug log*" button.
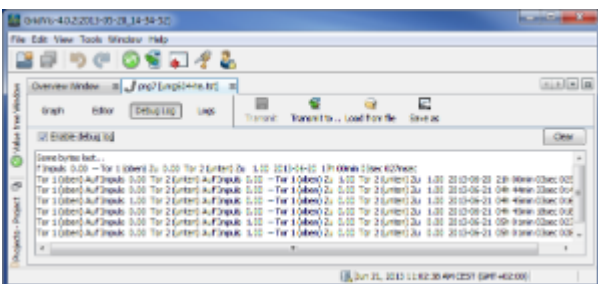
Debug buttons

- *Empty*: This deletes the contents of the Debug window.

Enable debug log: The debugging information is displayed or disabled via this button.

10.5.11 Time-controlled starting of procedures

Switching on/off delay, pulse generator and slip contact

- Scheduled starting of procedures

Activation delay

A switch in accordance with the set switch on delay occurs once the scheduled delay time has expired - which in turn changes the status. Using Start or End, additional procedures can be initiated when starting or when finishing a switching event. If the input is switched off during the delay (T), the active delay will be deleted.
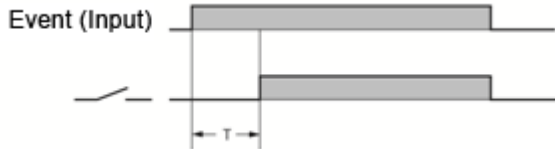
Example: Switch on delay control
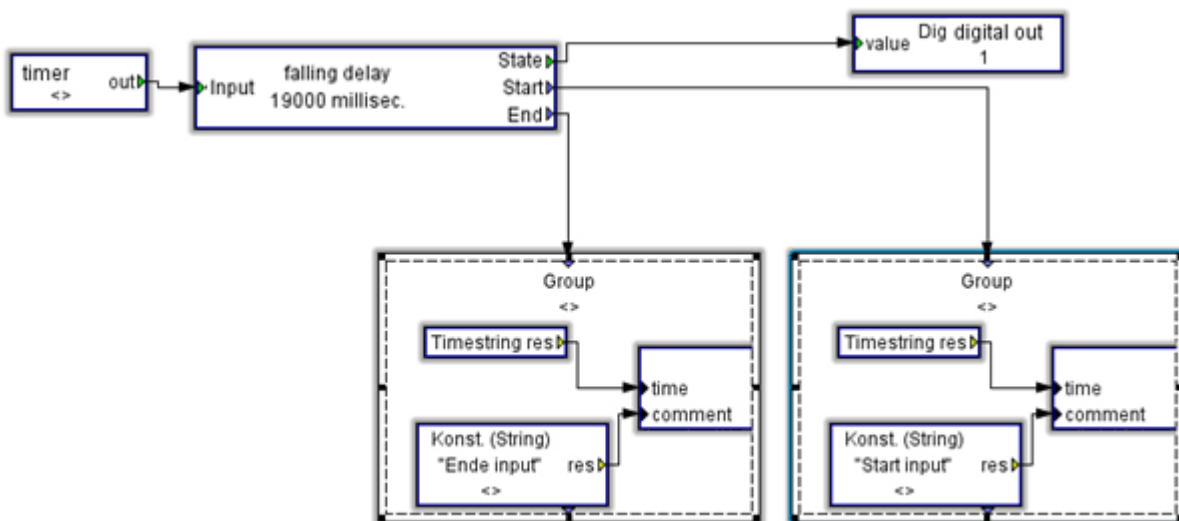
- **Shutdown delay**
  A switch to the Status and Start outputs occurs when an input event starts. Once the input event has finished, the set delay starts and switches the Status and End outputs on expiry of the delay period. If the input is switched again during the delay, the active delay will be deleted and started again.
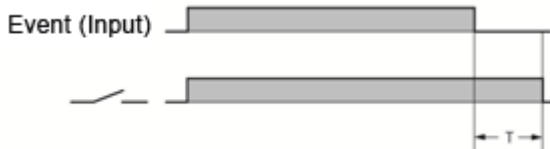
- **Pulse generator**
  An output switch occurs when an input event starts. Once the pulse time (T1) has lapsed, a switch occurs again and the preset time for the length of the pause (T2) starts. The outputs switch again once the duration set for the pause has lapsed. The pulse activity continues for as long as the input is present.
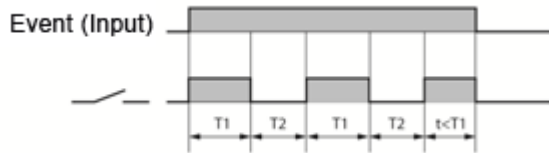
- **Slip contact**
  The outputs are switched when an input event starts. If there is an input event, the outputs will be switched again once the preset time for the slip contact has lapsed.
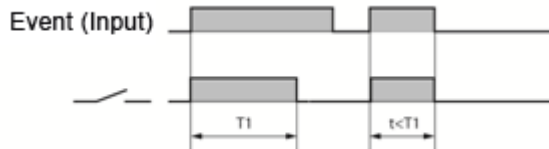
10.5.12 Example: Deleting work

Example: Deleting work

Deleting the effective and the apparent consumption meters using the time switch.
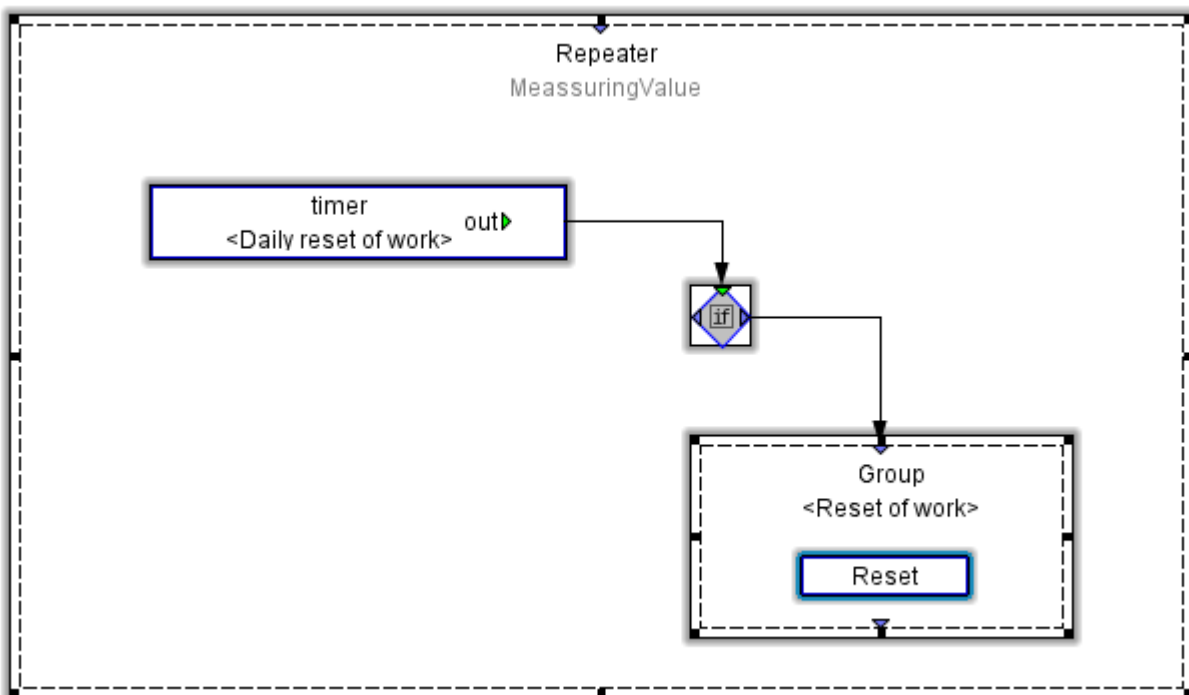
The "Reset" function provides the following selections, for example for a UMG604:

- Resetting all effective and apparent consumption meters.
- Resetting all reactive consumption meters.
- Resetting all minimum and maximum values.
- Resetting the measurement period for EMAX.
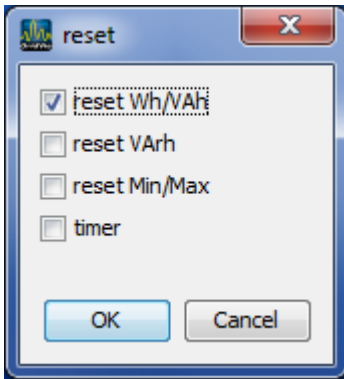
10.5.13 Example: Sending e-mail

Example: Sending an email with the UMG 604

Sending an email in the event of an undervoltage of< 200V in phases L1, L2 or L3.

Recipient's address : martin.musterman@server.de
Sender address: umg604@gmx.de
Additional information: Voltage values from the 3 phases at the time of the undervoltage

- Create the Jasic program as shown in below graphic (see Jasic start).

-
  - Required components provided in the Palette window:
    - Repeater, group, system variables, constants (numeric), comparator above the threshold value, Boolean OR links 4xOn, flank trigger sequence control and email outbox.
    - Assign the respective voltages to the system variables and assign desired value to the constants (in this case 200V).
    - Establish the connections between the components.
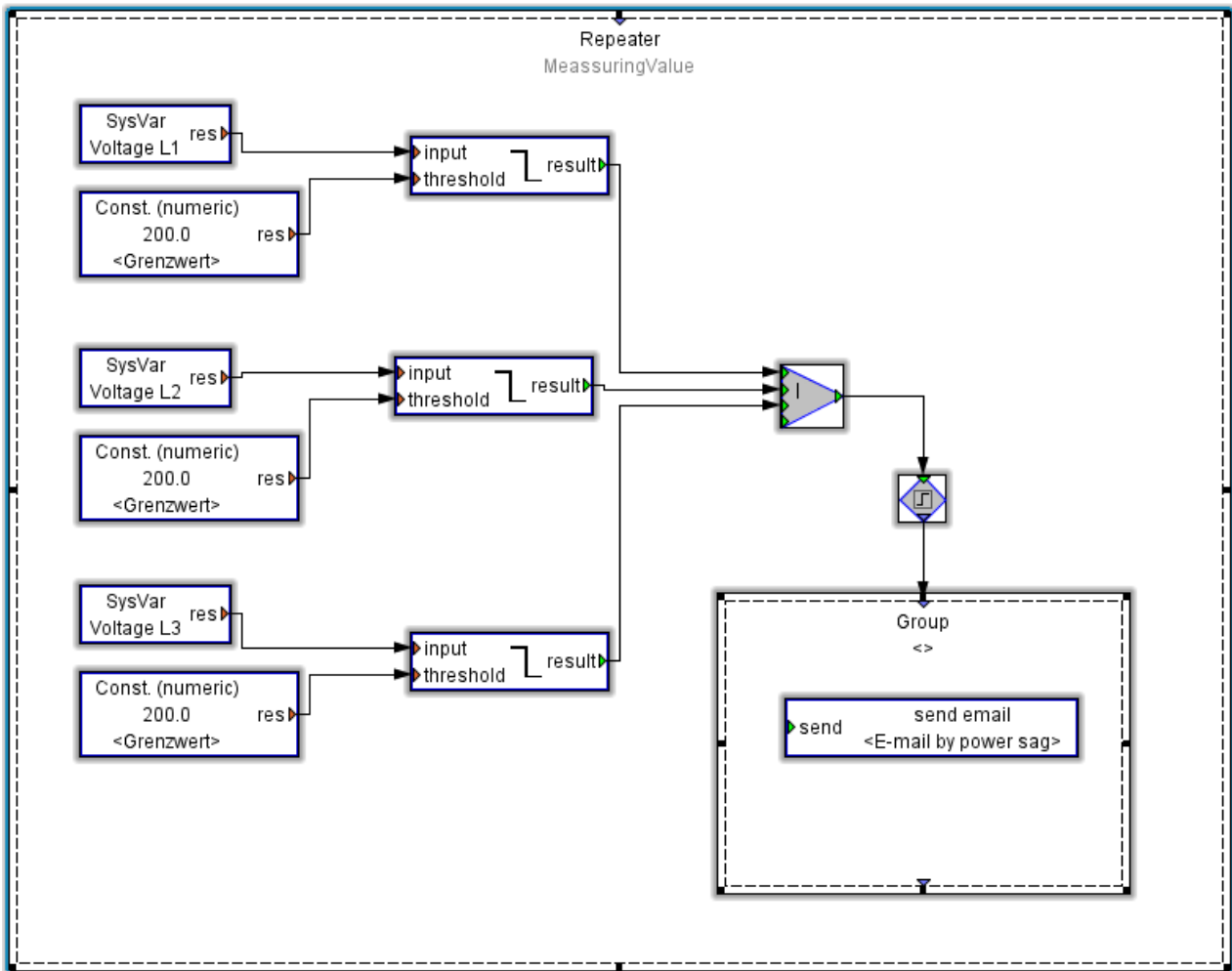
Fig.: Jasic program for sending e-mail in event of undervoltage

- - Open the "*Send email*" module by double-clicking and configure this with:
    - information about your outgoing mail server (server, authentification mode, user and password). Ask your administrator about this!
    - with the recipient's e-mail
    - With the sender address, the subject line and the content of the respective e-mail.
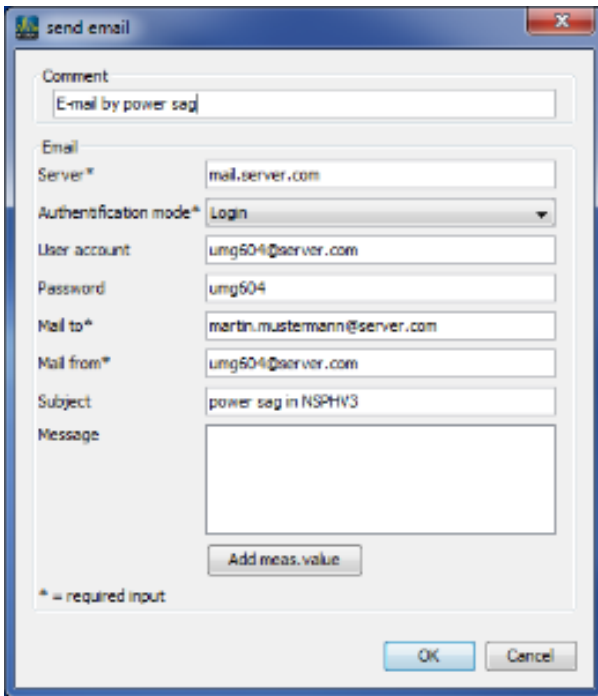
- • • Using the "*Add measurement values*" button, select the voltages L1, L2 and L3 for the email attachment.
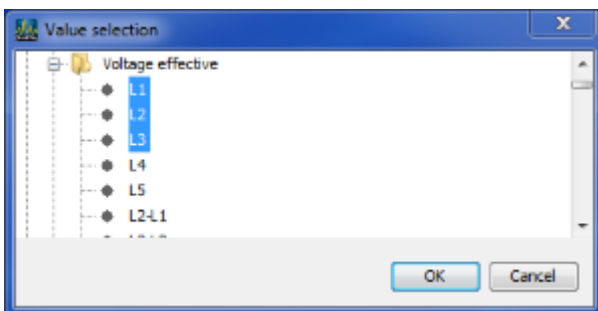
- • • Drag the selected measurement values to the email messages field.
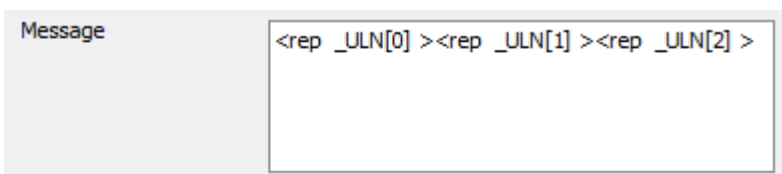
- You can now insert further text in the message.
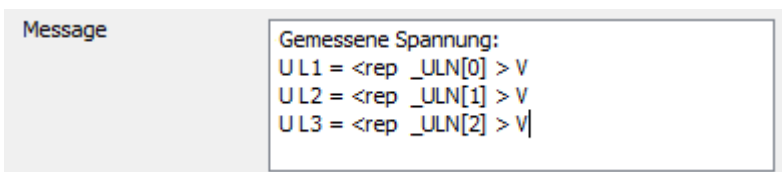
- Save the program on the UMG604 via the button "*Transmit*" or "*Transmit to..*".
- Save the program with "S*ave as*" as a Jasic template or "Save under" as a file on your computer.

- Note:

  Information about your outgoing mail server and the authentication mode can be obtained from your mail provider or by your system administrator.

10.5.14 Example: Reading out Modbus slave

Example: Reading out the Modbus slave

Reading out from a UMG 103 using a UMG 604 with GridVis.
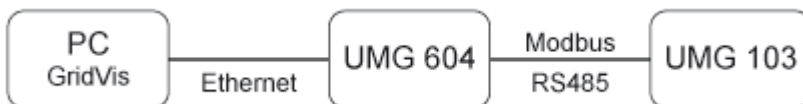
ATTENTION: The "Communication programming element" module is required for the graphic programming of Modbus devices. This includes the elements Read/write Modbus or Profibus.

- Create the Jasic program (see Starting Jasic start). Required components provided in the Palette window: Repeater, group, read Modbus, user variable (numeric).
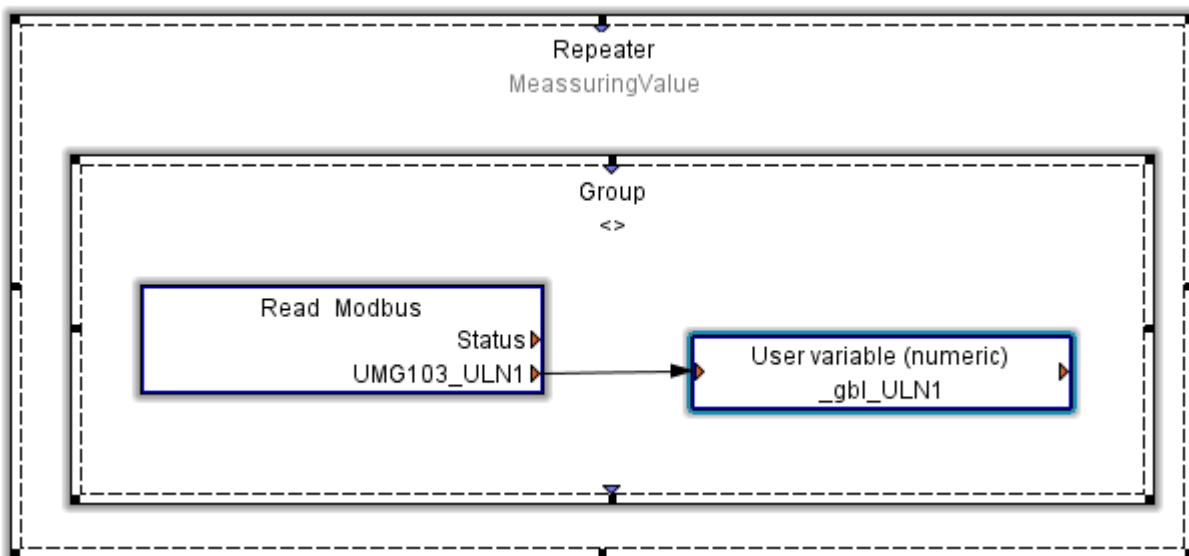
- - Configuration of the "read Modbus" function.
  - Modbus function

    We use the Modbus function "Read holding registers (fc=3)" to read a value.
  - Slave address

    Device address of slave. Here is the UMG103 address.
  - Modbus address

    Every measurement value has a corresponding Modbus address in the Modbus address list for the UMG103.
  - Variables

    Add a variable via the "Add value" button.

Assign the variable a name and select a format for the variable in accordance with the Modbus address list.

Expand the variable list accordingly if other required variables follow the selected Modbus address directly.

A new "*read Modbus*" function has to be added and configured for variables that do not come directly after the following variable addresses.

- **Caution! The Modbus functions used must be supported by both devices!**
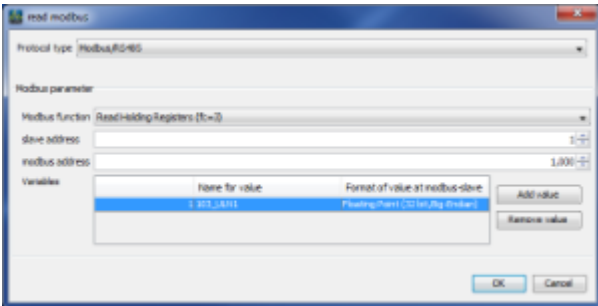
-
  - Configuration of the "User variable" function.
    - Variable name
      The variable name must start with "_gbl" if this variable is to be used as a "Global variable".
    - Variable type
      The variable must be a "Global variable" type, in order to facilitate its access by other programs.
    - Available for Modbus
      In the UMG604, the Modbus address range 20000-32000 is reserved for user-defined variables.
      We have assigned the variable _gbl_ULN1 used in our example to the available address 20000.
      The next free address is 2004.
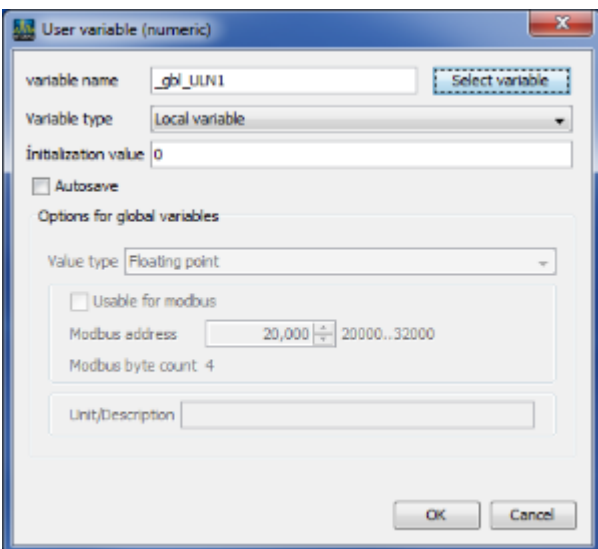
10.6 Functions

10.6.1 Functions
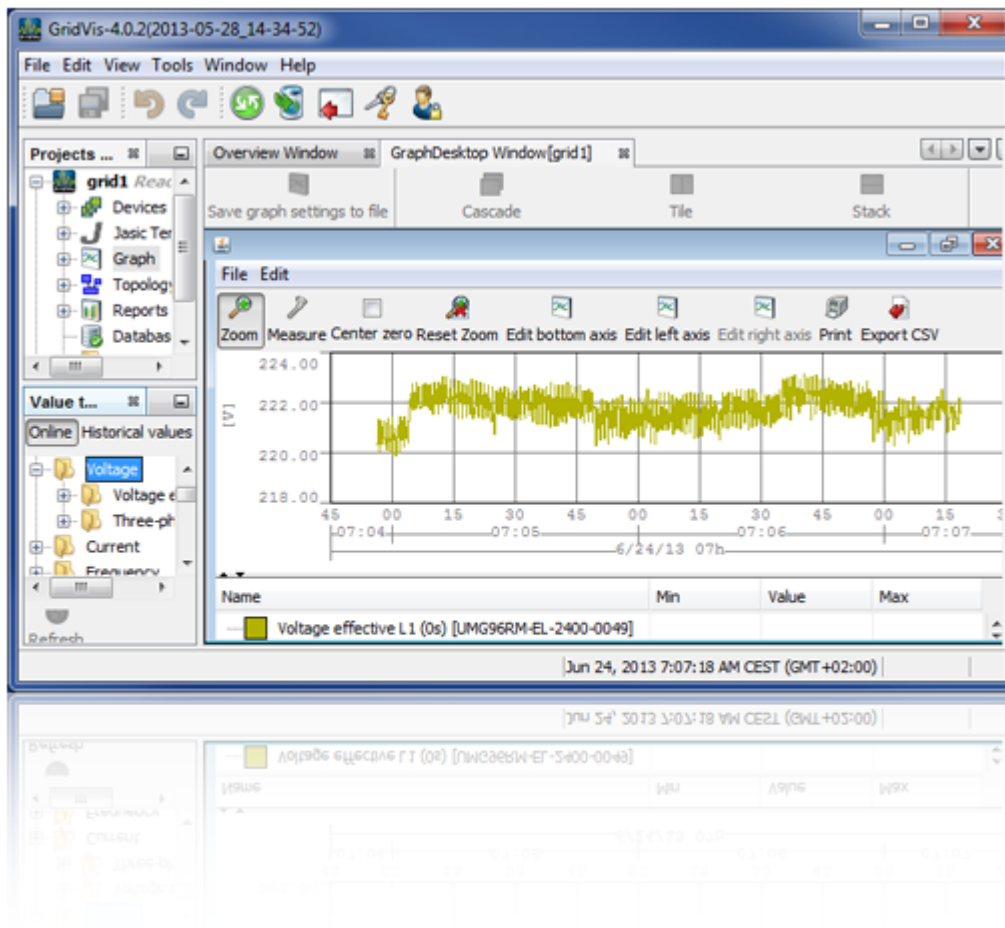
10.6.2 Configuring automatic read-out

Automatic device read-out

How:

- With a device selected in the project window, right click on "*Configure automatic reading*" in the pop-up menu.
- With a device group selected in the project window and selection of at least one device in the navigation window, right click on "*Configure automatic reading*" in the pop-up menu.
- By pressing the <Ctrl> key or the <Shift> key, the mouse can be used to select more than one device at a time in the navigation window.

Brief description:

- Depending on the type of device (with device memory), measurement data is loaded from the device memory to GridVis in accordance with a set schedule.

Steps:

- Select a device group in the project window.
- Select at least one device in the navigation window.
- Select "*Configure automatic reading*" by right-clicking on the pop-up menu.
- If a schedule does not yet exist, this can be configured by selecting "*Add a schedule*" (see Schedules).
- Select a schedule and confirm the time setting with OK.
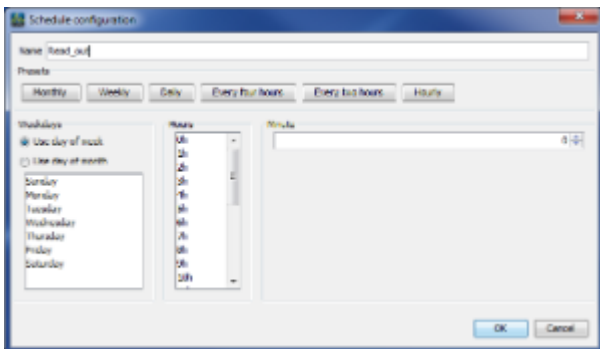
Fig. Configuring automatic reading

10.6.3 Deleting user-defined tree

Deleting user-defined tree

How:

- When a user-created tree via the right context menu

Brief description:

- Deletes the user-created tree with all elements underneath the tree.

Steps:

- Select a user-created tree in the projects window, right click to open the pop-up menu and select " *Delete tree*".
- In the following prompt is acknowledged with "Yes", the tree is deleted.
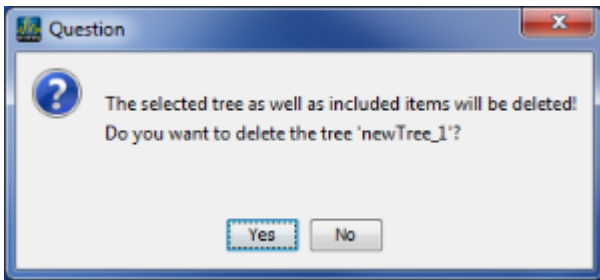
Fig. Deleting tree

10.6.4 Database properties

Database properties

How:

- On selection of the element "Database" in the projects window and "*Properties*" in the pop-up menu

Brief description:

- Shows additional information (database type, host, port, name, user and password) on the current database.

Steps:

- Select the entry "Database" in the projects window, right click to open the pop-up menu and select "*Properties*".
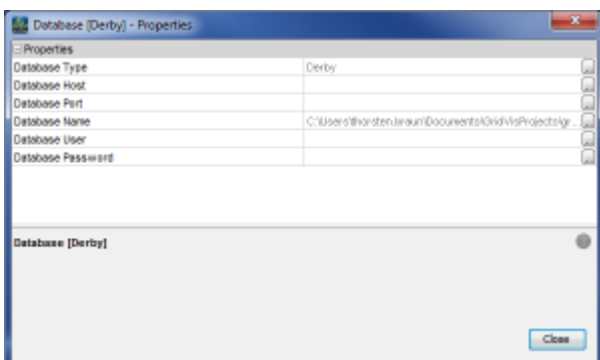
Fig. Database properties

10.6.5 Configuring the database

Configuring the database

How:

- On selection of the element "Database" in the projects window and "*Configure database*" in the pop-up menu

Brief description:

- Enables a change to the database configuration by providing database type, address, port, username, password and path to the database or database name.

Steps:

- Select the entry "Database" in the projects window, right click to open the pop-up menu and select "*Configure database*".
- Set the parameters according to the database system, change the settings as required and complete by clicking the "*Finish*" button.
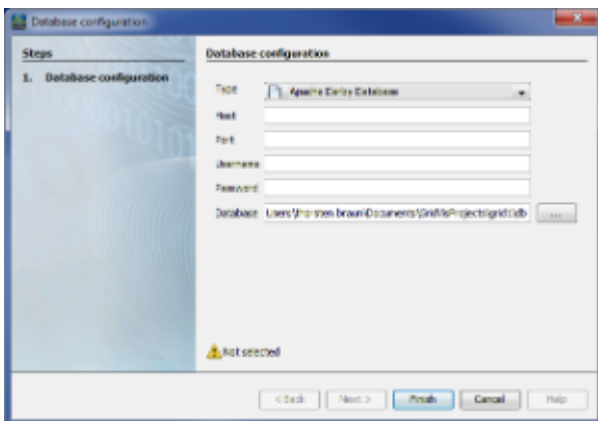
Fig. Database configuration

10.6.6 Optimising database

Database optimisation

How:

- On selection of the element "Database" in the projects window and "*Optimize database*" in the pop-up menu

Brief description:

- Enables optimisation of the database in order to improve its performance for example, for example.

Steps:

- Select the entry "*Database*" in the projects window, right click to open the pop-up menu and select "*Optimize database*".

- Depending on the database system, a message either appears, stating that a database optimisation for the database system is not support or asking for confirmation that an optimisation should really be started.
- Depending on the system and on the database, this process can take several hours to complete and will affect the performance of your system.
  In the second case, confirm the prompt with "Yes" if you want to start the optimisation immediately or reject it with "No" if you want to perform the optimisation later.
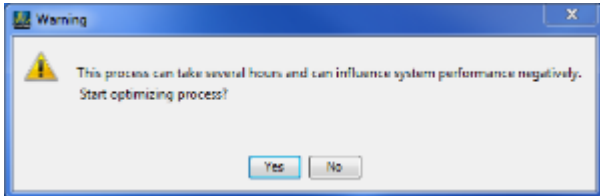
Fig. Prompt for database optimisation

10.6.7 Manage data

Administering the device database

How:

- On selection of the element "Database" in the projects window and "*Manage data...*" in the pop-up menu

Brief description:

- Deletes certain data (e.g. devices selected for deletion along with their measurement values) permanently from the database and by doing so improves performance by optimising the database.

Steps:

- Select the entry "Database" in the projects window, right click to open the pop-up menu and select "*Manage data...*".
- The following deletion options are available:

Tip for selecting devices in the assistant: By pressing the <Ctrl> key, the mouse can be used to select more than one device at a time. With the <Shift> key an area can be selected.

- - "*Delete devices*"
    Enables the deletion of devices and their measurement values from the database.
    Via the button "*All deleted from...*" in the assistant, all devices are preselected, which have the status "marked as deleted" (see "Delete device").
    If other devices and their measurement values should be deleted from the database, then these are selected with the mouse.
  - "*Delete all values from all devices from a given time range*"
    Enables deletion of all measurement values within a time range. The time range should be

selected in the assistant, within which all measurements for all devices in the database are to be removed.

- "*Delete all values from the selected devices from a given time range*"
  Enables the device-based deletion of all measurement values within a time range. The corresponding devices should be selected via the assistant and then the time range should be set.
- "*Delete all values from selected devices and types from a given time range*"
  Enables device-based deletion of certain measurement values within a time range. The corresponding devices should be selected via the assistant and then measurement values to be deleted and the time range should be set.
- "*Delete too long data*"
  Enables the deletion of data that is too long. The time tolerance range for data deletion should be defined in the assistant. All data outside this tolerance range will be deleted from the database. This means that data with widely separated start and end points can be deleted.
- Select the desired option and follow the instructions via the "*Next*" button.
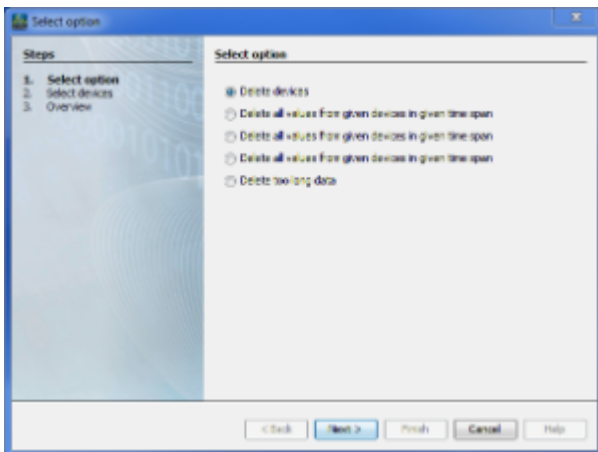
Fig. Database administration wizard

10.6.8 Properties

Properties

How:

- Right-click to select a device in the projects window.
- Using the menu item Windows --> Properties (Properties window).

Brief description:

- Presentation of additional information on the device (device type, name, description, connection ...)

Steps:

- Select a device in the projects window and right-click to open the pop-up menu. Select the menu time "Properties".
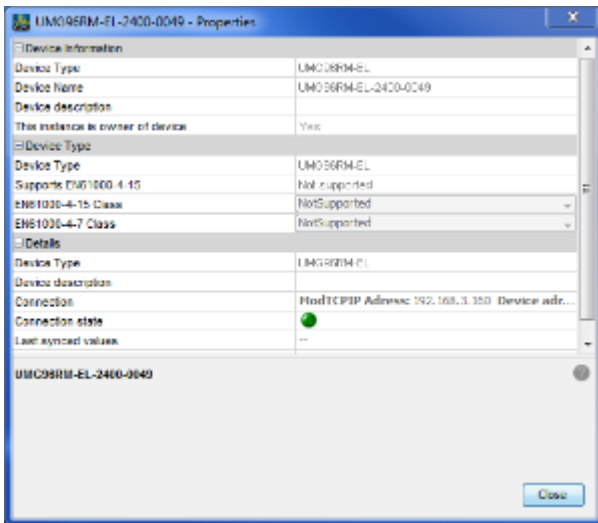
Fig. Device properties

10.6.9 Deleting device

Deleting device

How:

- Right-click to select a device in the projects window.
- Select a device in the project window and choose the menu item "*Edit --> Delete*".

Brief description:

- If the selected device is under the tree"*By device type*", it will be marked in the database as deleted (see "Manage data").
- If the device (link) is below a tree created by the user, then the link to the device is deleted. The actual device remains in the group "*By device type*"!

Steps:

- Select a device under the "*By device type*" tree right-clicking on it in the project window and select "*Delete device*" in the pop-up menu.
- If the following prompt is confirmed with "Yes", then the device will be marked as deleted in the database:
    - The device will no longer appear in the overview.
    - However, the device and the cumulative data remain in the database.
    - The device and its measurement values are to be removed from the database, then the device should be selected via "Delete device" and deleted via "Manage data".

Fig.: The device is marked in the database as deleted.

- If in the project window, a device (link)is selected below a user-created tree and deleted via the pop-up menu, then after the prompt only the deletion of the link occurs. The actual device is retained (below the node "*By device type)*"!
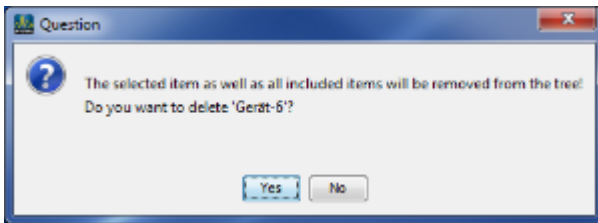
Fig.: Element (device link) is deleted

10.6.10 Takeover device

Takeover device

How:

- Right-click to select a device in the projects window.

Brief description:

- Assignment of responsibility for the selected device from a service running in the background to the local GridVis application (see "Transfer device"). After acceptance, the local GridVis application is again responsible for the device - the background service hands over responsibiltiy for the device to the appliation (for reading measurement data, for example).
- If the application/a service is not the device owner, it cannot use all device functionalities. All automatic processes that also run under the GridVis service are owner-independent: Online data entry, automatic read-out and time synchronisation.

Steps:

- Select a device in the projects window by right-clicking it and select "*Takeover device*" in the pop-up menu.

10.6.11 Transfer device

Transfer device

How:

- Right-click to select a device in the projects window.

Brief description:

- Assignment of the selected device running on a background service (see "GridVis Service / Device menu list"). After assignment, this service is again responsible for the device - the background service hands over responsibility for the device to the application (for reading measurement data, for example) (see "Takeover device").
- Attention:
  If the application/a service is not the device owner, it cannot use all device functionalities. All automatic processes that also run under the GridVis service are owner-independent: Online data entry, automatic read-out and time synchronisation. Note that you can no longer use these functionalities, if you surrender responsibility for the device!

Steps:

- Select a device in the projects window by right-clicking it and select "*Assign device*" in the pop-up menu. Read the following warning prompt and confirm it.

10.6.12 Editing graph axes

Editing lower, left and right axes of a graph diagram

How:

- For display of a graph via the corresponding buttons in the toolbar in Graph window.

Brief description:

- "*Edit bottum axis*": Sets the visible time interval on the x axis.
- "*Edit left axis*": Sets the amplitude spectrum display using a minimum and a maximum value.
- "*Edit right axis*": Sets the right axis using a minimum and a maximum value (only with two different measurement value types).

Steps:

- Create a graph (Creating graph).
- Select the corresponding buttons in the graph window toolbar to edit the axes and set the axis values.

Fig. Editing the axis

10.6.13 Exporting graphs as CSV values

Exporting graph values in a CSV file

How:

- When displaying a graph via the button "*Export CSV*" in Graphs window.

Brief description:

- Enables export of the measurement values required for the graph display in a CSV file, which is readable by other programs.

Steps:

- Create a graph (Create graphs).
- Use the "*Export CSV*" and assign a file name to the export file. Confirm the dialogue with "*Save*" or "OK".

Note:

If several graphs are displayed in the diagram, all graphed values are exported to a CSV file. To export values of only graph, the CSV export function in the pop-up menu of the legend for the required graph (see Changing graph properties).
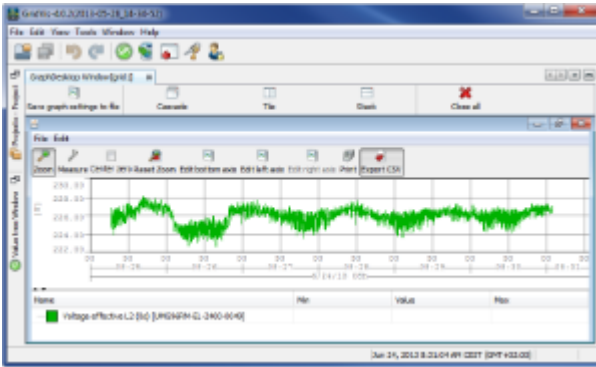
Fig. Exporting graph values in a CSV file

10.6.14 Changing graph properties

Changing graph properties

How:

- By right-clicking on the respective graph legend to show a graph in the graph window.

Brief description:

- This function changes various graph and diagram properties
- Enables the saving of graphed values from the selected graphs to a CSV file.

Steps:

- Create a graph (Creating graphs).
- Select a graph in the legend and right-click to open the pop-up menu.
- Select one of the following graph functions.

Graph properties:

- "*Change colour*"

  The graph colour is changed via a colour selection dialogue.
- "*Toggle visibility*"

  This shows or hides the selected graph.
- "*Move forward*" / "*Move back*"

  This moves the selected graph into the foreground or background.
- "*Remove*"

  This removes the selected graph out of a diagram.
- "*Adjust time*"

  Enables the graph display to be time-shifted (from nanoseconds to days) via a slider.
- "*Painting method*"

  This provides of a selection of graph types (e.g. pie, line, cubic, differential, bar chart).

- "*Toggle Min/Max*"

  Enables Min/Max values to be shown/concealed.
- "*Reset graph*"

  This reloads the selected graph in the diagram.
- "*Average*"

  The values of the selected graph are displayed via the selected average (e.g. hourly average).
- "*Export data to CSV file*"

  This facilitates exporting the graphed values to a CSV file.
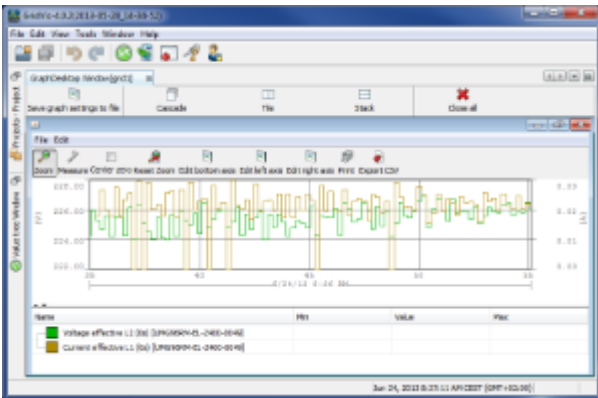
Fig. Graphs with legend

10.6.15 Saving graph settings in file

Saving graph settings to a file

How:

- By selecting the "*Graphs*" node in the Graphs window using the "*Save graph settings to a file*" button in the toolbar.

Brief description:

- Saves the currently selected graph with its window position to a file. This can be opened again under the "*Graphs*" node in the project window (Create graphs, Graphs window).
- Also supports graph display based on historical values in the time period previous day, last week, last month

Steps:

- Create a graph by dragging a value or a value group into the graph window (Create graphs).
- Select the "*Save graph settings to a file*" button from the toolbar, then assign a configuration name.
    - If the graph has been created with **online values**, then the listed time periods do not have any function.
    - If the graph is created from historical values, then a graph configuration can be created with a preset time period via the selection of time periods.

- "*Do not reload values when opened*"

  Creates a graph setting with the data currently displayed in the graph.
- "*Reload with the data of the last day*"

  Creates a graph setting with the yesterday's data.
- "*Reload with the data of the last week*"

  Creates a graph setting with the last week's data.
- "*Reload with the data of the last month*"

  Creates a graph setting with the last month's data.
- Confirm with "*OK*". The saved graph setting appears under the "*Graphs*" node in the projects window and can be opened directly.

If the graph setting is created from historical data and if a time period has been selected, when the graph setting is called up, the graph below the "*Graphs*" node with the corresponding data is generated.
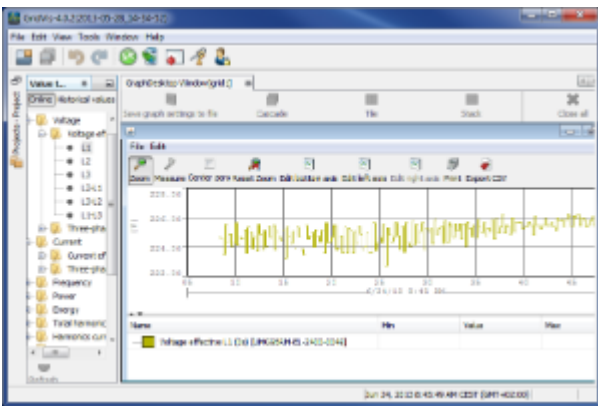
Fig. Value tree and graph window

10.6.16 Printing and saving graphs

Saving graphs or printing them out on a printer

How:

- When displaying a graph via the "Print" button in the graphs window.

Brief description:

- Opens the "Print Graph" window with a print preview of the graph. The preview is saved an printed via the corresponding icons above the display.

Steps:

- Create a graph (Create graphs).
- Use the "*Print*" button and change over to the newly opened "*Print Graph*" window.
- Print and save the PDF display with the respective icons above.
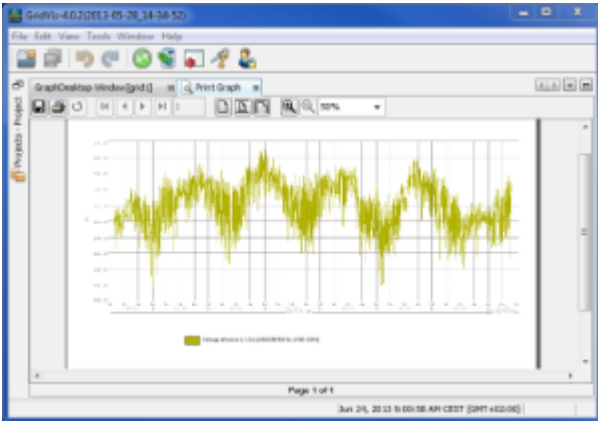
Fig. "Print Graph" window for a printout

10.6.17 Creating graphs

Creating graphs

How:

- By selecting the Graphs node in the projects window and dragging at least one measurement value from the Value Explorer into the graph window.
- Selection of at least one measurement value in the value tree window and selecting the menu item "*Show in graph*" by right-clicking in the pop-up menu.

Brief description:

- Displays selected current and historic measurement values in a diagram Displaying graphs, Graph windows).

Steps:

- Select the "*Graphs*" node in the project window.
- Via the menu "*Windows --> Value type(s)*", open the Value tree window and choose in the menu between online and historical values.
  Note: It is necessary to read out the device to display historical values!
- Using the plus sign or arrow symbols, open a branch in the Value tree window and follow it until the desired measurement values appear.
- Highlight a subordinate value group (e.g. effective voltage) or at least one measurement value and drag this to the graph window with the mouse button held down.
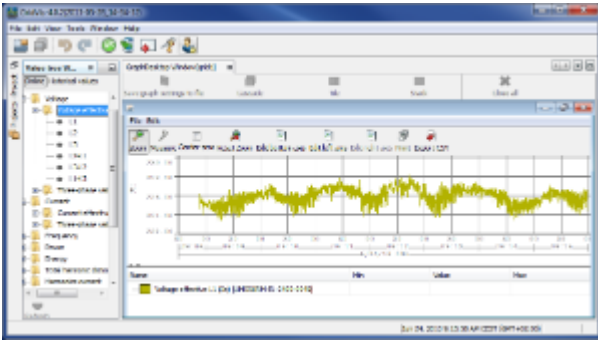
Fig. Value tree and graph window

10.6.18 Measuring graphs

Checking area under graph

How:

- When displaying a graph via the "*Measure*" button in the Graphs window.

Brief description:

- Measurement of the time and amplitude spectrum differences in a graph.

Steps:

- Create a graph (Creating graphs).
- To calculate an area, select the "*Measure*" button and select an area by holding down the left mouse button and dragging the mouse, for example, from the upper left to the lower right.
- This displays the time and amplitude spectrum differences within the selected area.
- Select "Zoom" to enlarge the graph, if this is desired.
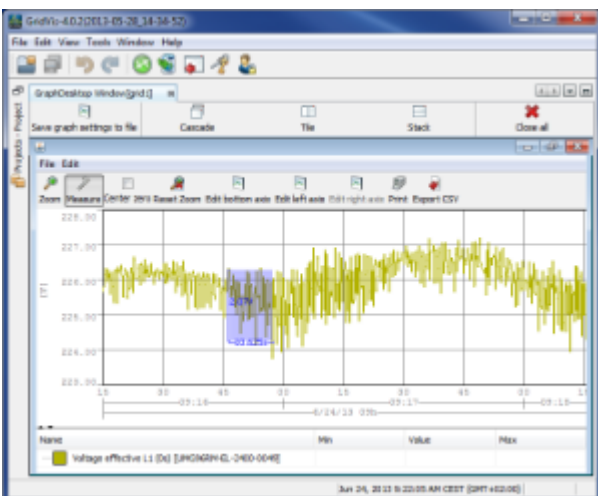
Fig. Measuring graph area

10.6.19 Zeroing graphs

Zeroing

How:

- When displaying a graph via the "Center zero" button in the graphs window.

Brief description:

- Alignment of the amplitude spectrum centre with a centred zero baseline within the graphs.

Steps:

- Create a graph (Creating graphs).
- Select the "*Center zero*" button to zero graph.
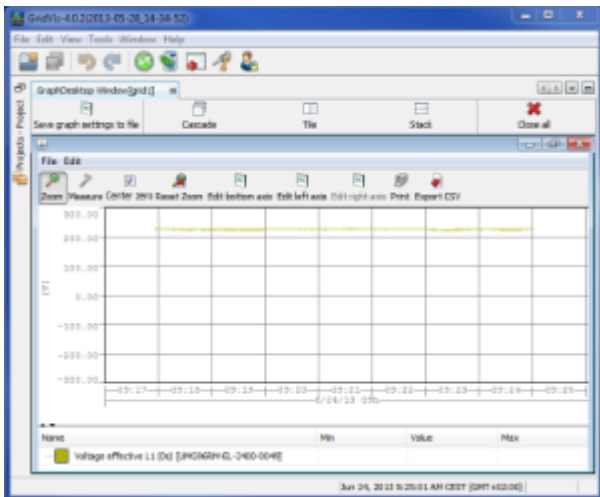
Fig. Zeroed graph

10.6.20 Zooming graphs

Zooming in /out on a selected area of the graph

How:

- When displaying a graph via the "*Zoom*" button in the Graphs window.

Brief description:

- This function zooms in /zooms out on a selected section of the graph.

Steps:

- Create a graph (Creating graphs).
- To enlarge the selected area, select the "*Zoom*" button and highlight an area by holding down the left mouse button and dragging the mouse from the upper left to the lower right.
- To reset the zoom level, proceed as explained above but drag the mouse from the lower right to the upper left or click the "*Reset zoom*" button.
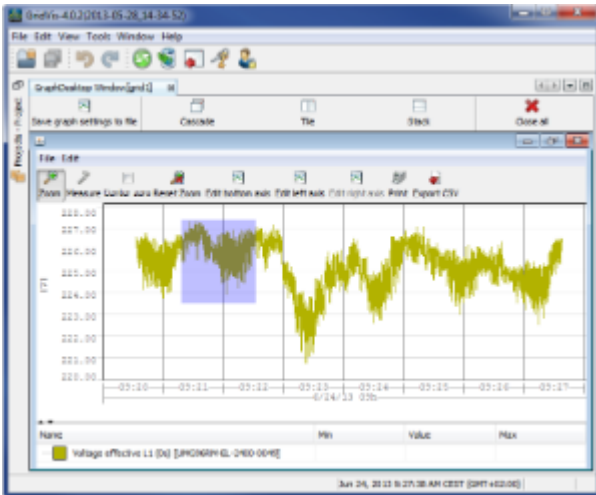
Fig. Zooming in on graph with mouse

10.6.21 Resetting graph zoom

Zooming out from expanded area of the graph.

How:

- When displaying a graph via the "*Reset zoom*" button in Graphs window.

Brief description:

- Shrinks zoomed area of graph to original size.

Steps:

- Create a graph (Creating graphs) and zoom in on the graph (see Zooming graphs).
- Zoom out again from the graph via the "*Reset zoom*" button or by selecting an area in the graph from the bottom right to top left.
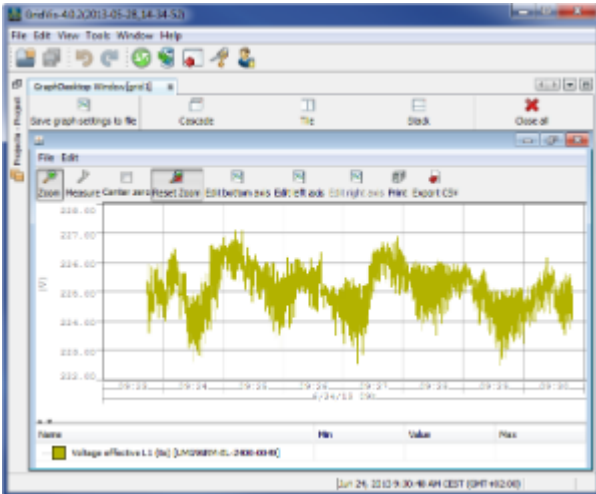
Fig. Graphic display

10.6.22 Configuration

Device configuration

How:

- Right-click to select a device in the Projects window.
- When a device is selected in the projects window and then the "*Configure*" button in the overview window.

Brief description:

- Opens the configuration window for the device.

Steps:

- Select a suitable device in the project window.
- Start the configuration window via the "*Configure*" window in the overview window (see configuration of devices, for example UMG 604 - Configuration).
- Set the required device settings and save these with the "*Transmit*" button. The settings will then be transferred to the device.
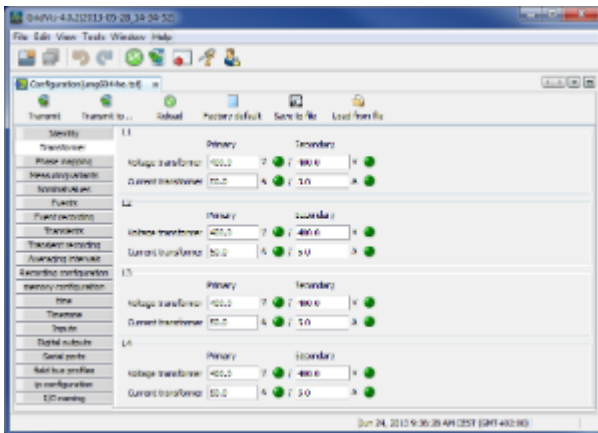
Fig.: Configuration window

10.6.23 Copying / inserting

Copying / paste

How:

- Right-click to select a device in the Projects window.
- Via the menu "*Edit --> Copy*" or "*Edit --> Paste*"

Brief description:

- Copies the device selected in the projects window to the clipboard, for example, or inserts in from the clipboard.

Steps:

- Example: Copy device to a new node
- Select a device in the projects window and right-click to open the pop-up menu. Select the menu time "*Copy*".
- Create a new tree (see "*Creating customized tree*").
- Select this tree and right-click to open the pop-up menu. Select the menu time "Paste".

10.6.24 Creating customized tree

Creating new tree

How:

- By selecting the "*Devices*" node in the Projects window.

Brief description:

- To make a project display clearer, other nodes can be generated under the "*Devices*" level.
- Previously created devices can be dragged to the new tree with the mouse or be saved under the new node with the functions "Copy" and "Paste". In the process, a link is established to the created device. If the origiinal device - presented in the "*By device type*" node - deleted, the device and also the created link will be removed. If only the link is to be deleted, this should be selected and deleted.

Caution: If the devices under the "*By device type*" node are deleted, the device will be removed from the project and data may be lost. In contrast, links can be deleted without any risk of data loss!

Steps:

- Select the "*Devices*" node in the projects window and right-click to open the pop-up menu.
- Start the wizard via the menu item "*Create customized tree*" and assign it a unique name.
- After confirmation via the "*OK*" button, a new tree appears under the "*Devices*" node.
- Set a link to a device by dragging a device with the mouse from the "*By device type*" node into the new tree. The device and a link to it will now be displayed in the tree.
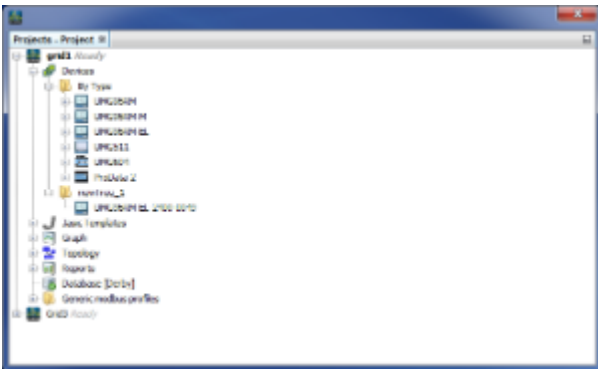
Fig. Customized tree "newTree_1"

10.6.25 Adding a new device

Adding a new device

How:

- Menu item " *File / New File*".
- Right-click to select a device group in the Projects window.
- With the selection of a device group in the project window using the "*Add new device*" button in the overview window.

Brief description:

- For adding a new device to the current project.

Steps:

- Select the type of device, listed under the device category, and confirm the selection with "*Next*".

- Configure the connection and parameters for the type of device. Depending on the type of connection, the Connection test button can be used to perform a connection test.
- The device appears under the *Devices* node in the project window when the wizard closes.
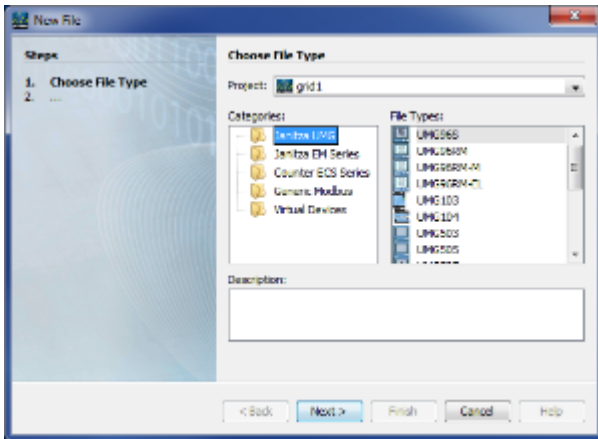
FIg. Adding a new device to a project

10.6.26 Palette - Browser window

"Browser window" function of the Palette window

How:

- By selecting the "*Graphs*" node in the Projects window and the menu for the Palette window display.

Brief description:

- Creates an empty browser window in the graphs window which can show events, harmonics or sequences from the value tree window.

Steps:

- Select the "*Graphs*" node in the projects window.
- Using the menu item "*Window --> Palette*", open the palette window.
- Drag the "*Browser window*" symbol by pressing the mousekey to the Graphs window. An empty window appears.
- Open the Value tree window for a device and click the "*Historical values*" button (also see "Download memory")
- Open the "*Harmonics*" or "*Events*" node and drag a subgroup over the window. The measurement values are presented in tabulated form.
- The graphic display is generated by double-clicking the respective entry. Alternatively, the switch *"Show in graph"* can be set, which generates a graphic display of the selected table entry below the value table.
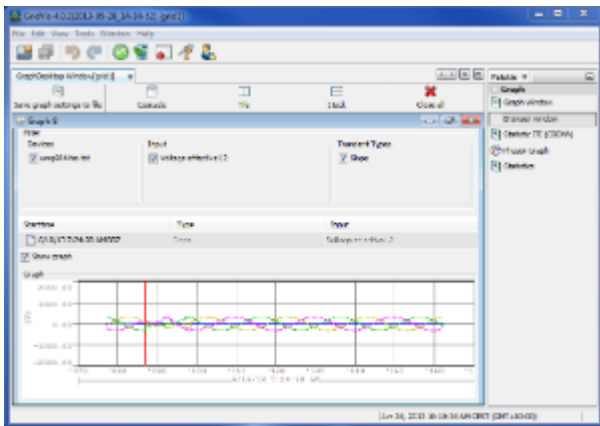
Fig. Browser window with transients display

10.6.27 Palette - Graph window

"Graph window" function in the Palette window

How:

- By selecting the "*Graphs*" node in the Projects window and the Palette window display.

Brief description:

- Creates an empty graph window, which can be populated with measurement values from the value tree window.

Steps:

- Select the "*Graphs*" node in the projects window.
- Using the menu item "*Window --> Palette*", open the palette window.
- Drag the "*Graph window*" symbol, while holding down the mousekey to the Graphs window. An empty graph window appears.
- Via the menu item "*Window/Value type(s)*", open the value tree window and drag a measurement value or a measurement value group (such as "*Effective voltage*") over the empty graph window. The measurement values will now be displayed there (see for example"Creating graphs", "Changing graph properties".)

  Note: If the device has been read out (see "Download memory"), additional historical values can be displayed ("*Historical values*"button in the Value tree window).
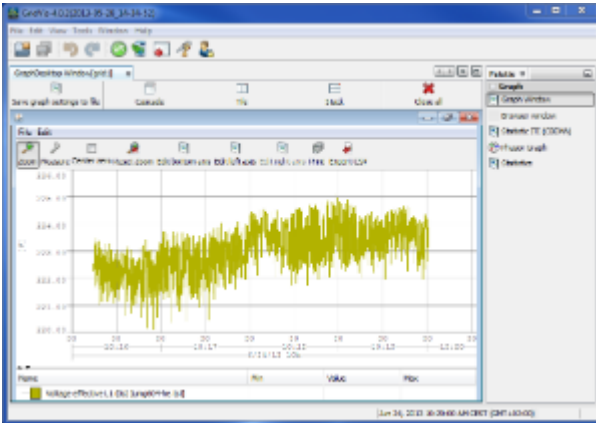
Fig. Graphs window

10.6.28 Palette - ITI statistics (CBEMA)

"ITI (CBEMA) statistics" function in the Palette window

The ITIC or CBEMA curve (Computer Business Equipment Manufacturers Association) describes the maximum voltage deviation in relation to the event duration that an electronic device has to be able to tolerate. The curve defines permitted tolerances for evaluation of events, thus enabling interpretation of any malfunctions and can be used as evaluation benchmark.

A point in the diagram represents the voltage deviations presented on the Y-axis (voltage outages, voltage drops or overvoltages) linked with the duration presented on the X-axis, thus describing the event. These values should be within the permitted range of the CBEMA curve.

How:

- By selecting the "*Graphs*" node in the Projects window and the Palette window display.

Brief description:

- Creates a CBEMA in the graphs window without measurement value assignment.

Steps:

- Select the "*Graphs*" node in the projects window.
- Using the menu item "*Window --> Palette*", open the palette window.
- Drag the "*ITIC (CBEMA)statistics*" symbol while holding the mousekey down to the Graphs window. A CBEMA diagram appears.
- Drag a read-out device from the project window (see "Download memory"), a UMG 604, for example, over the respective area of the diagram.
- Saved events will then appear in the diagram as points.

Interpretation of the display: Events within the coloured areas are outside the tolerance range. Overvoltage (red zone) can lead to a defect, undervoltage (yellow zone) to a temporary outage of the device.
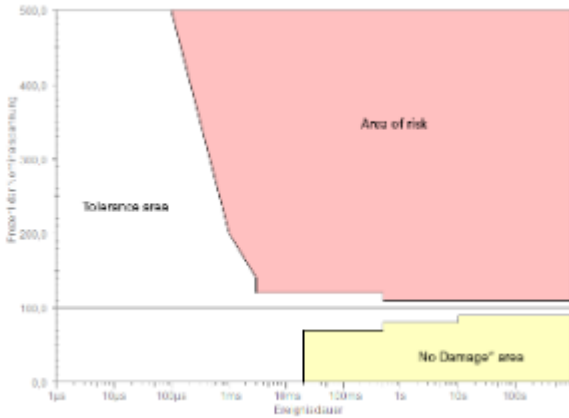
Fig. Areas of the ITIC (CBEMA) curve
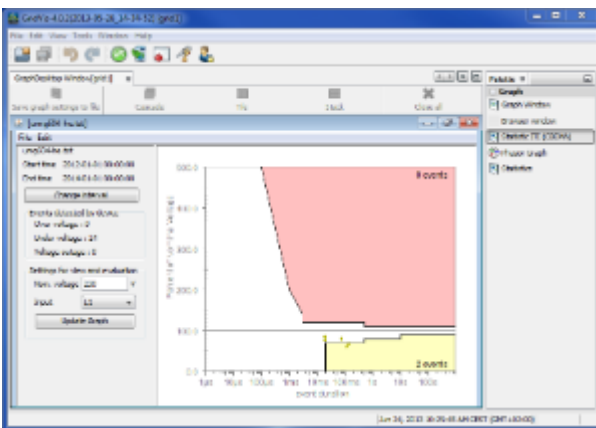
Fig. Example of ITIC (CBEMA) curve

10.6.29 Palette - Statistics

"Statistics" function in the Palette window

How:

- By selecting the "*Graphs*" node in the Projects window and the Palette window display.

Brief description:

- Creates an empty statistics window in the graphs window, which can be populated with historical values.

Steps:

- Select the "*Graphs*" node in the projects window.
- Using the menu item "*Window --> Palette*", open the palette window.
- Drag the "*Statistics*" symbol by pressing the mousekey to the Graphs window. An empty diagram appears.

- Click the "*Historical data*" button in the value tree window and open a value-specific tree (e.g. voltage).
- Drag a historical data group over the diagram. The values are then displayed and can be varied in the window via the statistics properties.
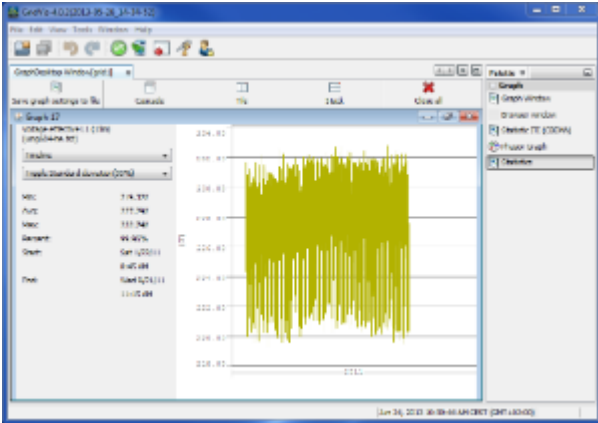
Fig. "Timeline" statistics display
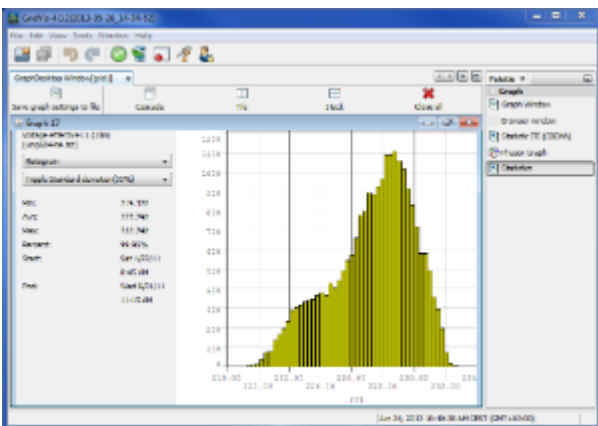
Fig. "Histogram" statistics display

10.6.30 Palette - Phasor graph

"Phasor graph" function in the Palette window

How:

- By selecting the "*Graphs*" node in the Projects window and the Palette window display.

Brief description:

- Creates an empty phasor diagram in the graphs window, which can be linked with a device.

Steps:

- Select the "*Graphs*" node in the projects window.
- Using the menu item "*Window --> Palette*", open the palette window.
- Drag the "*Phasor graph*" symbol while holding down the mousekey to the Graphs window. An empty diagram appears.
- Drag a linked device from the projects window to the diagram - the phasor diagram for the respective device will appear.
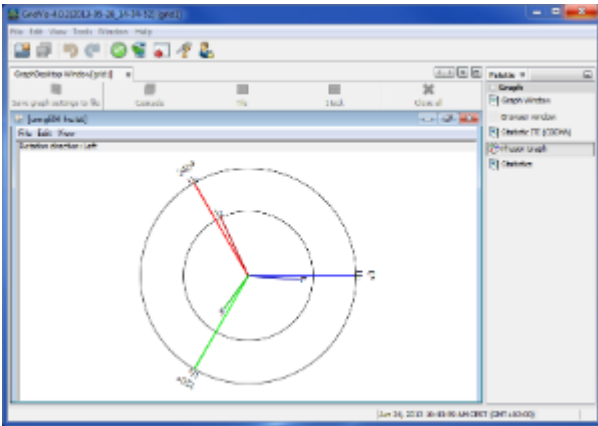
Fig. Phasor diagram

10.6.31 Generating a report

Generating a report

How:

- By selecting one of the report nodes under "*Reports*" in the Projects window by clicking the "*Execute*" button in the Report overview window.
- With a right-click on a selected report node in the projects window.

Brief description:

- Creates report with contents in accordance with selected report node.

Steps:

- Select a report class under the "*Reports*" node in the projects window (e.g. "*Report in accordance with DIN 50 160*").
- Using the "*Execute*" button in the report navigation window, open the "Create a report" wizard and follow its instructions.
- The created report will be shown in a preview window. Using the buttons in the window bar, the report can for example be printed, saved or reviewed.
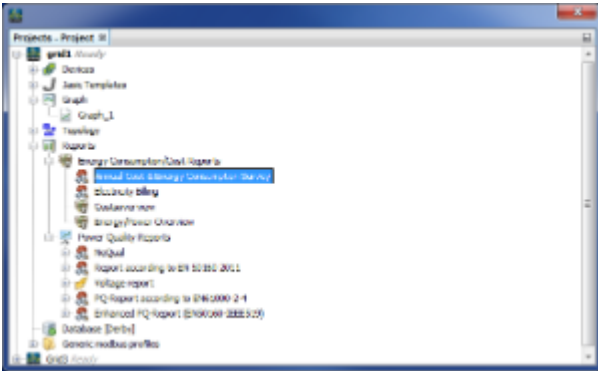
Fig. Selecting report in projects window

10.6.32 Generating and printing connection test report

Printing device report (summary)

How:

- By selecting a device group in the Projects window and selecting at least one device in the Overview window via the "*Print report*" button.
- Tip: By pressing the <Ctrl> key or the <Shift> key, the mouse can be used to select more than one device at a time in the overview window for inclusion in the report.

Brief description:

- Generates a report for the selected devices with the most important parameters (serial number, firmware version, connection type, address ...).

Steps:

- Select a device group in the projects window (e.g. "*By device type*" group).
- Select at least one device in the overview window (menu window/overview) and perform a connection test via the "*Connection test*" button in the overview window.
- Create a report with the "*Print report*" button.
- Complete the customer/tester details and confirm with "*OK*".
- You can print out the report by clicking the printer icon in the toolbar above the report. Select a suitable printer and start printing with "*OK*".
- You can save the report by clicking the save icon in the toolbar. Define the storage location, assign the report a name and confirm with "OK".

NOTE: Without a previous successful connection test, the report will be provide you with all values. If you come across the term "Unknown", the connection test was either unsuccessful or nothing was done before the report was called up. In the second case, close the report again, repeat the connection test and regenerate the report. Values should be displayed for all devices whose connection test was successful.
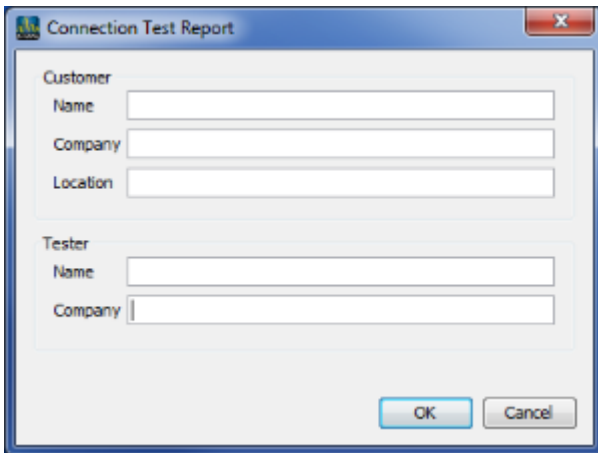
Fig. Configuring time setting

10.6.33 Schedule-controlled generation of reports

Automatically starting a saved report configuration

How:

- By selecting a saved report configuration (Save report) under report class in the Projects window and clicking the "*Schedule*" button in the report overview window.
- With a right-click on a saved report configuration in the projects window.

Brief description:

- Via a schedule, enables automatic execution of a saved report configuration in the background and subsequent saving of the result quantity.

Steps:

- Under the Reports node in the projects window, select a previously saved report configuration from (Save report).
- By clicking the "*Schedule*" button in the report navigation window, open the schedule selection.
- Select a saved schedule or create a new schedule and confirm the selection with "*Next*".
- Select the desired export settings with:
    - Define the directory in which the export file is to be saved via the "..." button.
    - Select a file type (PDF, CSV, RTF, ODT, DOCX, HTML or XLS).
- The report is automatically generated according to the schedule and the export file is saved in the selected directory.
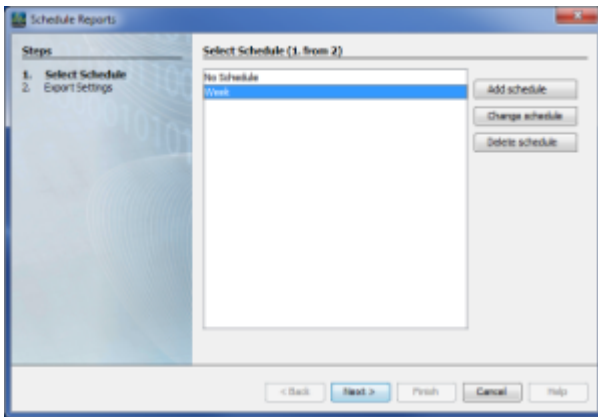
Fig. Scheduling report order
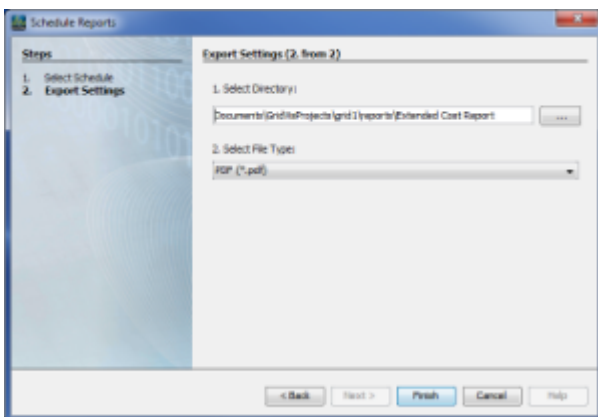
Fig. Chaning export settings

10.6.34 Saving report

Saving report

How:

- By selecting one of the report nodes under "*Reports*" in the Projects window by clicking the "*Save*" button in the Report overview window.
- With a right-click on a selected report node in the projects window.

Brief description:

- Saves a report configuration displayed under the selected report node in the projects window.
- The saved report configuration can be manually started by clicking the "*Execute*" button or automatically started via a schedule.

Steps:

- Select a report node under the "*Reports*" node in the projects window (e.g. "*Report in accordance with DIN 50 160*").

- Using the "*Save*" button in the report navigation window, open the "Create report" wizard and follow its instructions.
- The report configuration is created under the corresponding node in the projects window.
- After the report configuration has been selected in the projects window, this can be executed, edited, assigned a schedule or deleted via the corresponding buttons in the Report overview window.
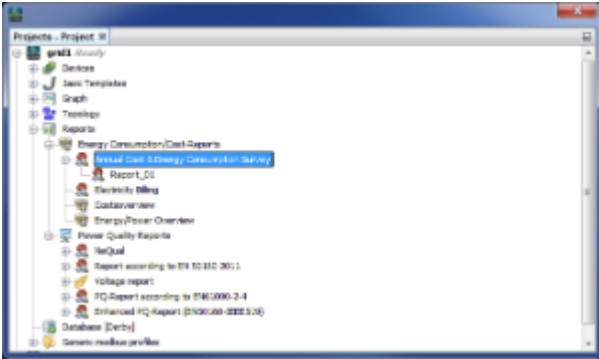
Fig. Report selection in the projects window

10.6.35 Resetting measurement values

Resetting the measurement values

How:

- By selecting a device in the Projects window by right-clicking in the pop-up menu under "*Reset values*".
- By right-clicking the "*Reset values*" button in the overview window when selecting a device in the projects window.

Brief description:

- Depending on the selection, enables resetting of minima, maxima, active energy, apparent energy, reactive energy and historical data

Steps:

- Select a device in the projects window by right-clicking it and select the item "*Reset value*" in the pop-up menu.
  Alternatively, after selecting a device, you can also click the corresponding button in the overview window.
- Then make a selection of values to be deleted in the "*Reset values*" window and confirm this selection.
- The selected values will then be deleted on the device.
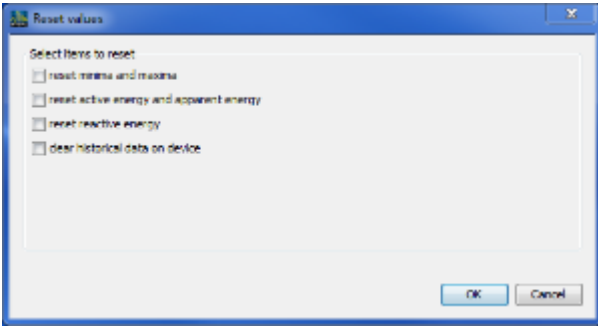
Fig. Resetting measurement values

10.6.36 Sorting elements in a user-defined tree

Sorting elements under a tree

How:

- By selecting a user-defined tree in the projects window by right-clicking the "*Sort...*" pop-up menu.

Brief description:

- Enables device links within a user-defined tree to be sorted.

Steps:

- If no user-defined tree is available in the projects window, this must be created (see "Creating new tree").
- Select a user-created tree in the projects window and change the order of the elements below the tree by right-clicking the "*Sort...*" pop-up menu.
- Via the corresponding submenu entries, opt for a specific or alphabetical order
    - alphabetical order
      Sorts the elements below the tree alphabetically
    - specific order
      Enables definition of an individual order. Via a dialogue, devices can be selected and move up or down a list.
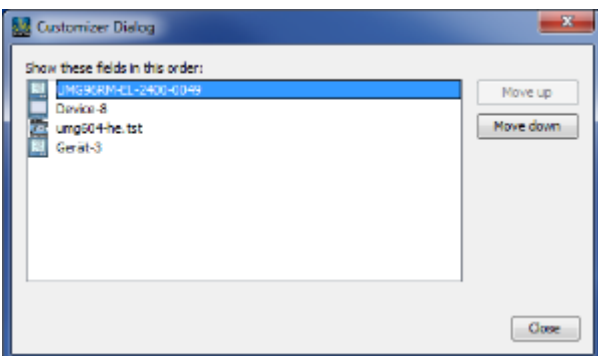
Fig. Defining a specific order

10.6.37 Download memory

Download memory (only for devices with memory)

How:

- Right-click to select a device in the Projects window.
- By selecting a device in the projects window and then clicking the "*Download memory*" button in the overview window.
- By selecting a device group in the project window and selecting at least one device in the Overview window with the "*Download memory*" button.

Brief description:

- Depending on the type of device (device memory), the measurement data is loaded from the device memory to GridVis. The imported measurement values are to found, for example, in the value tree window under "Historical data".

Steps:

- Select a suitable device (device with internal memory) in the projects window.
- Start the measurement value transmission from the device using the "*Download memory*" button in the navigation window.
- This starts the transmission. A status bar shows the progress of the transmission. It is still possible to work with GridVis during transmission.
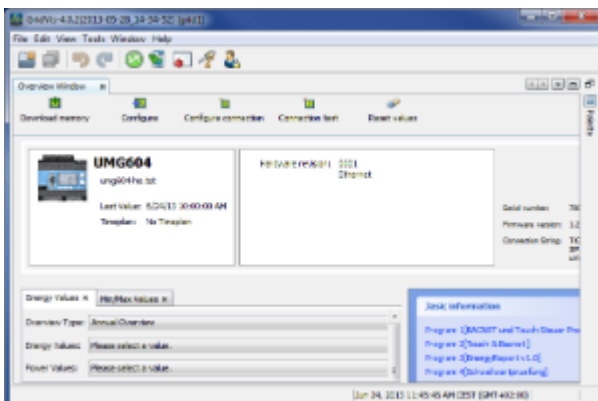
Fig. Reading out device memory

10.6.38 Add topology page

Add new topology page

How:

- By selecting the Topology node in the Projects window via the right mousekey.

Brief description:

- Visualisation of a topology structure with devices and measurement values.

Steps:

- Select the "*Topology*" node in the projects window.
- Select "*Add new topology page*" by right-clicking on "*Topology*" in the pop-up menu.
- Assign the new topology page a name. It appears as a node under "*Topology*".
- Create an individual topology with the devices and values (see Adding topology, Topology window).
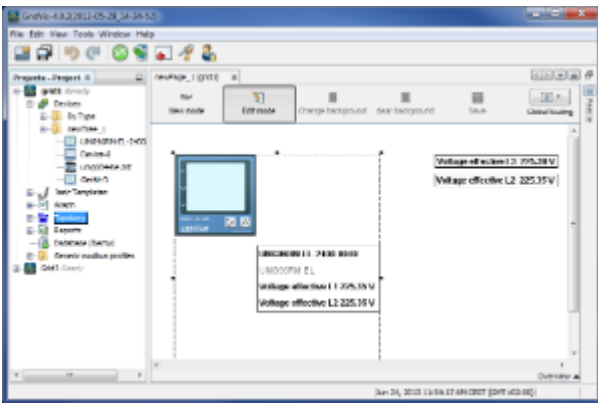
Fig. Display of elements on a topology page
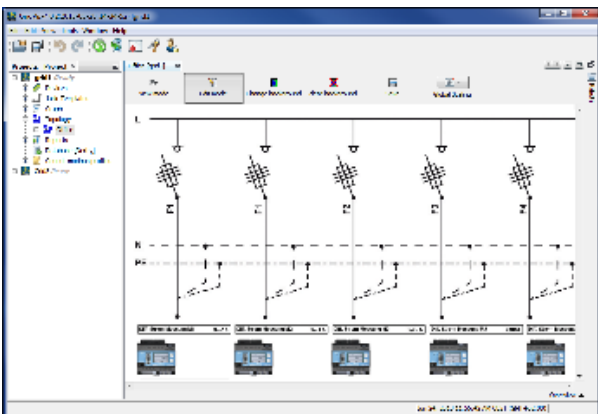
Fig. Example of a topology page

10.6.39 Editing topology page

Editing new topology pages

How:

- By selecting a newly created topology page in the Projects window by double-clicking the "*Edit mode*" button in the topology window.

Brief description:

- Enables a topology page to be edited.

Steps:

- Double-click a previously created and saved topology page in the projects window (see "Topology window", "Adding topology").
- Click the "*Edit mode*" button in the topology window.
- Edit the displayed elements or create new ones (see "Adding topology").
- Save the change(s) via the "*Save*" button. If the window is closed after an unsaved change has been made to the topology page, a prompt on saving the changes appears.
- Afterwards quit edit mode with the "*View mode*" button.

10.6.40 Changing topology page backgrounds

Changing / deleting background of topology page

How:

- By clicking the "*Change background*" or "*Delete background*" buttons within a topology window in edit mode.

Brief description:

- Enables a background image to be defined or deleted for an existing topology page.

Steps:

- Via the projects window, create a new topology page (see "Add topology page") or selected an existing page in the projects window by double-clicking (see "Topology window", "Adding topology").
- Click the "*Edit mode*" button in the topology window.
- To upload a background image click the "*Change background*" button and via the following selection dialogue select the background image created in an external program (for example in JPG, PNG, GIF or BMP formats).
- If the selected file format is supported, it will be displayed in the topology window as the background image. Then position the devices or measurement values, as required, in the topology window.

- A background image is deleted in edit mode via the "*Delete background*" button.
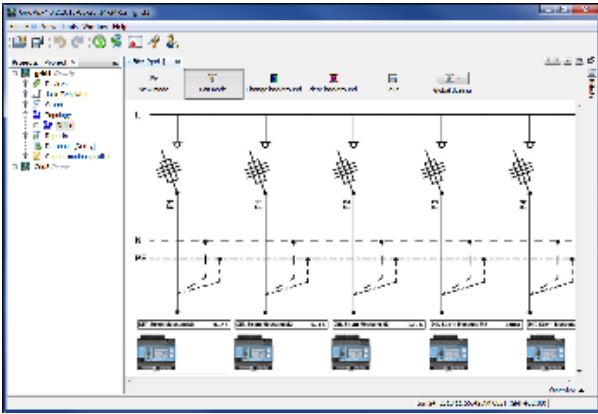
Fig. Topology page with background

10.6.41 Deleting topology page

Deleted existing topology page

How:

- By selecting an existing topology page in the projects window and by right-clicking "*Delete topology page*" in the pop-up menu.

Brief description:

- Enables a saved topology page to be deleted.

Steps:

- Right-click a saved topology page and select "*Delete topology page*" in the pop-up menu that appears.
- Confirm the prompt in relation to the desired deletion with "OK". This deletes the selected topology page from the project.

10.6.42 Renaming topology page

Changing name of existing topology page

How:

- By selecting an existing topology page in the projects window and by right-clicking "*Rename topology page*" in the pop-up menu.

Brief description:

- Enables a saved topology page to be renamed.

Steps:

- Right-click a saved topology page and select "*Rename topology page*" in the pop-up menu that appears.
- Assign a new name and confirm with "*OK*".
- The saved topology page then appears in the projects window with a new name.

10.6.43 Adding and configuring topology elements

Adding and configuring elements on a topology page

How:

- Adding elements: By editing (edit mode) an existing topology page via the palette window, for example
- Configuring elements: By right-clicking elements on an existing topology page and selecting the appropriate function in the pop-up menu.

Brief description:

- Enables topology elements to be added and then configured.

Steps:

- Double-click a previously created and saved topology page in the projects window (see "Topology window", "Adding topology").
- Click the "*Edit mode*" button in the topology window.
- If the palette window is not visible, click the menu item "*Window --> Palette*" to open it.
- Set some topology elements. In this regard, see Adding topology.
  - Drag the element "device" from the palette window and drop it in the topology window area. Then select a device in the projects window and drag this with the mouse and drop it on the newly created device element. The device is shown with several measurement values. Configure the element (configure device element).

    Note: Device elements can also be directed inserted into an editable topology page by dragging a device from the projects window.
  - Drag the element "online values" from the palette window and drop it in the topology window area. Then selected an online value from the value tree window for a device and drag this over the newly created element. The selected measurement value is then displayed.

    Note: Online elements can also be directed inserted into an editable topology page by dragging a device from the value tree window.
  - Drag the element "links", "text" and "image" one after another and drop them in the topology window area.
    - Device: Enables display of a device with associated measurement values
    - Links: Enables other topology pages, external files and URL pages to be linked.

- Online values: Enables display of online measurement values.
- Text: Enables input of individual texts.
- Image: Enables individual images to be placed, which can be changed in accordance with a measurement value size.
- Configure the individual elements by right-clicking the respective elements and the relevant pop-up menu items and then save the changed topology page by clicking the "*Save*" button.
- Configuring devices element
- Configuring link element
- Configuring online values element
- Configuring text element
- Configuring image element
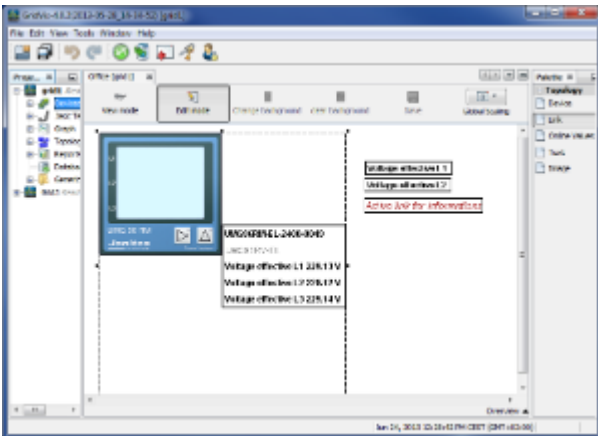
Configuring "link" topology element

Configuring "link" topology element

- Double-click a previously created and saved topology page in the projects window via the "Topology" node (see "Add topology page", "Editing topology page").
- If the palette window is not visible, open it via the "*Window --> Palette*" menu.
- Drag the "*Link*" element from the palette window and drop it in the topology window area.
- Open the flyout menu by right clicking desired element and select the menu item "*Title*".
  - Enter your individual display in the text box. Select the desired font via "*Select font parameters*" and via "*Select font colour*". Define the background colour and frame colour/thickness via the respective buttons.
  - Select the desired link type via the list and confirm the selection with "*OK*".
    - "*Open linked Topology Page*"
      Create a link to a previously existing, saved topology page. To do this, select the desired topology page from the second list.
    - "*Open external File*"
      Creates a link to an existing external file. To do this, open the file selection box via the "..." button and select the desired file, which is to be opened by clicking the element.
    - "*Browse URL*"
      Creates a link to a URL address. To do this, assign the desired URL address plus protocol (e.g. "http://", "ftp://").

- "*Execute File*"

   Creates a link to an executable file (e.g. a batch/script or EXE file).

   If required, you can enter transfer parameters for the executable file via the free input box.

- Determine via the items "*To front*" or "*To back*" in the flyout menu, the visible order of the elements (see "Configuring topology element "Device"")

- An element can be removed from the topology page via "*Remove link*" in the flyout menu for the element.
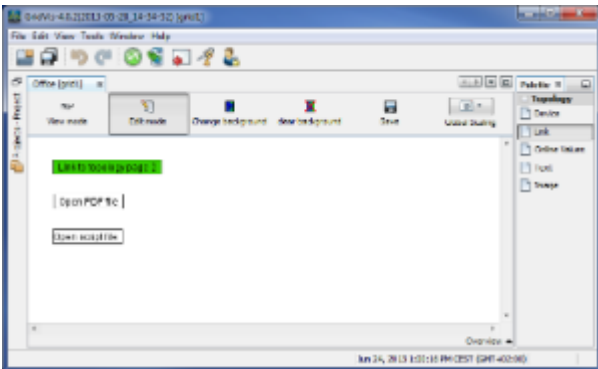
Fig. Display of topology page with links
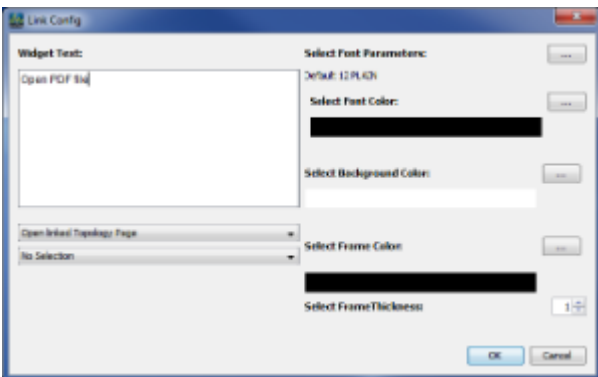
Fig. Link element configuration

Configuring topology element "device"

Configuring topology element "device"

- Select a device in the projects window and drag it to the open topology window.
- Open the flyout menu by right clicking desired element (device) and select the desired function:
   - "*To front*" , "*To back*"

      If two elements are superimposed or overlap, then the visible sequence can be changed via these settings.
   - "*Remove values from display*"

      The device element is connected with the display of several measurement values. Via this menu item, the measurement values to be displayed can be determined via a dialog box.

Select the undesired measurement values and remove these from the element with the "Remove values" button and then confirm with "*OK*". The measurement value display for the device is then updated on the topology page.

- "*Remove all values from display*"
Removes the measurement value display associated with the device element. Only the device then appears on the topology page as element.
  - "*Copy list of displayed values*", "*Insert values from the copied list*"
  Enables copying of the displayed value types for a device and the use of these in the value display of another device.

  Example:
  Via "*Delete values from display*", delete all displayed values except for "Effective voltage L1 and L2" from the device element A.
  Copy the list with the menu item "*Copy list of displayed values*" in the flyout menu.
  Create a new device element B (see Adding topology) and delete all associated measurement value displays for this element via "*Delete all values from display*".
  Via the menu item "*Insert values from the copied list*", insert the measurement values previously copied from device element A in device element B.
- "*Remove device*"
Deletes the device element from the topology page.
- "*Activate automatic scaling (all devices)*", "*Switch off scaling (all devices)*"
The measurement devices for all devices are automatically scaled by GridVis via their units. If scaling is deactivated, the measurement value display will be determined by the device.
- "*Edit scaling (all devices)*"
The group of work and power values are individually adjustable in the scaling. For other values, a selection is made between "*No scaling*" or "*Automatic scaling*".
- "*Edit size*"
Enables change of display size of the device element by entering pixel width and height.
Enables display to be scaled via the element corners (see Adding topology)
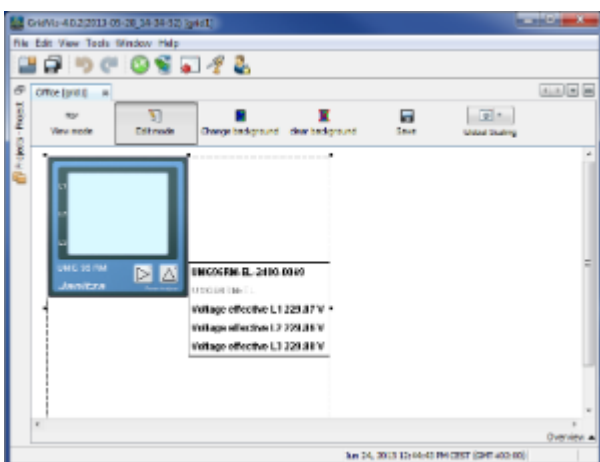
Configuring topology element "image"

Configuring topology element "image"

- Double-click a previously created and saved topology page in the projects window via the "Topology" node (see "Add topology page", "Editing topology page").
- If the palette window is not visible, open it via the "*Window --> Palette*" menu.
- Drag the "*Image*" element from the palette window and drop it in the topology window area.
- Open the flyout menu by by right mouseclicking desired element and select the menu item "*Configure*".
  NOTE: Any changes to the configuration are immediately effective, i.e. their effects can be viewed in the background without having to first quit the configuration dialog.
- Select the corresponding device and the desired measurement value for the image.
- Add an image in PNG or JPG format via the "*Add image*" button. The selected image then appears in the Images pane. A value ranage initialized with - to + appears under the image.
  The upper and lower limit of the selected value is defined via the value range; these limits control the display of the associated image, i.e. if the selected measurement value is within the value range, then precisely this image is displayed. Via a click with the right mousekey on the image, a configuration window for the boundary values of the image is opened, by means of which these can be adjusted.
  An error image is displayed next to the selection boxes for the device and value type. This can be modified via the corresponding button below or provided again on the system. Default image with red cross on white background is reset. The error image is displayed if an invalid boundary value configuration series is present, no access to device is possible or the selected value type is no longer available.
- Invalid image boundary value configurations: If the value ranges of various images overlap, depending on the current value status, no clear assessment can be made about the image display in the topology. Furthermore, gaps between the individual limit value ranges are not permissible. Further errors can result from the use of open barriers at the bottom (-) or top (+). Only if there are gaps between the boundary value ranges can all 3 different elements be used with open interval at the same time, otherwise only a maximum of 2 of them (in this case the 3rd element closes the gaps). Two equal elements with open interval (even if the close interval boundary is the same) remain unpermissible. Every invalid state is acknowledged with an error message at the bottom of the configuration window and it is not possible to save this configuration.
- It should be noted that any changes to the configuration are immediately effective, i.e. their effects can be viewed in the background. However, invalid configurations cannot be permanently saved, as in this case the Finish button is concealed and only way to quit the configuration window is via the reset button or corrections must be made previously.
- Add another image via the "*Add image*" button. The value range of this image is then initialized with minus infinity (-) to plus infinity (+). As the value range of both images overlap, an error message appears and saving is not possible.
- Then configure the value range of the loaded images via the right mousekey. Click the corresponding image and select the item "*Bounds Config*" in the flyout menu. Set the corresponding value range via the input fields for the upper and lower boundary. If no specific boundary is entered, this input is read as "infinity" (). The image value ranges may not overlap and may not have gaps! The images are automatically sorted in rising order from the lower boundary value. It thus does not play a role in which order you insert the images. If no errors are present, the configuration dialog can be saved via "*Exit*". The "Revert and Exit" button enables the changes to be reset.
- Example:
  - Select a device and set the measurement value to "Effective power L1".
  - Add an image via the "*Add image*" button (the value range is from "-" to "+")..

- Add another image (the value range is from "-" to "+")..
- The configuration indicates an error as the value ranges overlap.
- Set the value range in the flyout menu via item "*Bounds Config*" by right clicking the corresponding image (image 1). Set the upper limit to a sensible value (x1).
- Proceed as above to configure the value range for the second image. Set the lower limit to the valuex1 (see above, upper boundary of Image 1).
- If the measurement value size now changes the value range, then the image also changes. The change is directly visible in the topology window.
- Quit the configuration dialog with "*Exit*".

- The image to be shown in the event of an error (e.g. "Connection to device lost" or "Measurement value no longer available") can be edited via the "*Select Error Image*" button.

- By clicking the image element, determine with the items "*forward*" or "*back*" in the flyout menu, the visible order of the elements (see "Configuring device topology element").

An element can be removed from the topology page via "*Delete element*" in the flyout menu for the element.
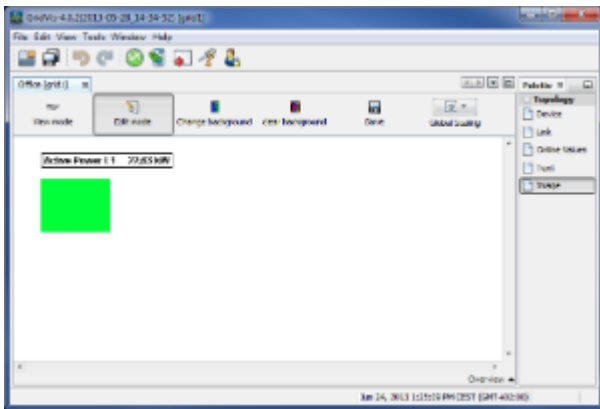
Fig. Display of an active topology element.
Green = upper limit at 21000 W
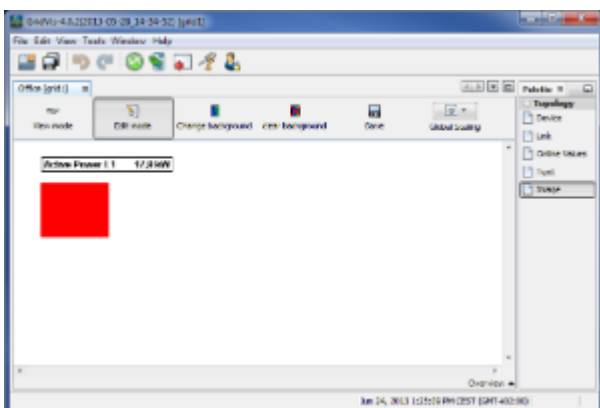
Fig. Presentation of an active image element.
Red = lower limit at 21000 W
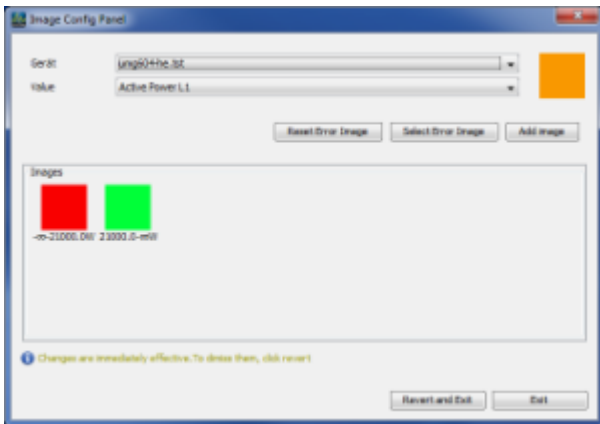
Fig. Configuration dialog of active image

Configuring topology element "Online value"

Configuring topology element "Online value"

- Using the menu item "*Window --> Value type(s)*", open the value tree window.
- Select a device in the project window. The online values in the value tree window then show the measurement values for this device.
- Open the desired measurement value type in the node structure for the online values (e.g. "*Effective voltage*").
    - With the left mousekey or alternatively with <Ctrl> or <Shift>, select several of these and also drag it/them with the left mousekey to the topology window.
- Open the flyout menu by right clicking desired element (measurement value) and select the desired function:
    - "*To front*" , "*To back*"
      If two elements are superimposed or overlap, then the visible sequence can be changed via these settings.
    - "*Title*"
      Opens a dialog for element configuration with settings for frame, title, background and text colour, font, number of decimal places and enables the configuration of a colour change when the set boundary value is exceeded/undershot.
    - "*Remove value*"
      Deletes the selected element.
    - "*Activate automatic scaling (all devices)*" , "*Switch off scaling (all devices)*"
      The measurement devices for all devices are automatically scaled by GridVis via their units. If scaling is deactivated, the measurement value display will be determined by the device.
   - "*Edit scaling (all devices)*"
      The group of work and power values are individually adjustable in the scaling. For other values, a selection is made between "*No scaling*" and "*Automatic scaling*".
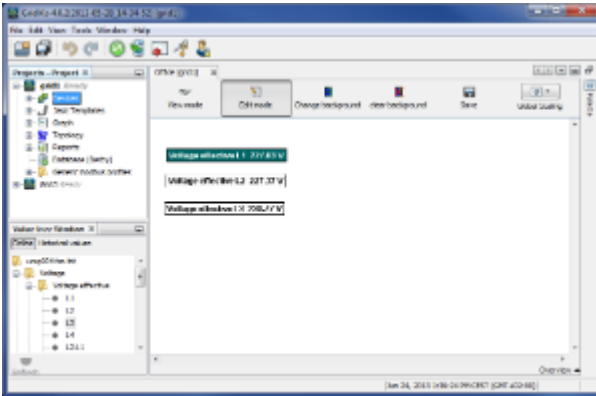
Fig. Online measurement values display
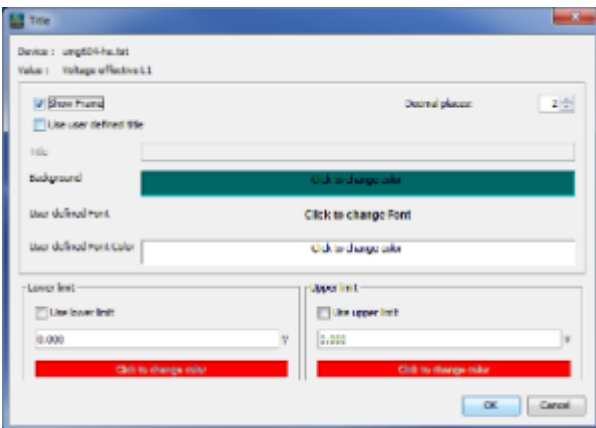
Fig. Graphic configuration of the measurement values

Configuring topology element "Static text"

Configuring topology element "Static text"

- Double-click a previously created and saved topology page in the projects window via the "Topology" node (see "Creating topology page", "Editing topology page").
- If the palette window is not visible, open it via the "*Window --> Palette*" menu.
- Drag the "*Text*" element from the palette window and drop it in the topology window area.
- Open the flyout menu by right clicking desired element and select the menu item "*Title*".
- Enter your individual text in the text box. Select the desired font via "*Select font parameters*" and via "*Select colour*" and confirm the configuration with "*OK*".
- Determine via the items "*To front*" or "*To back*" in the flyout menu, the visible order of the elements (see "Configuring topology element "Device"").
- An element can be removed from the topology page via "*Remove text*" in the flyout menu for the element.
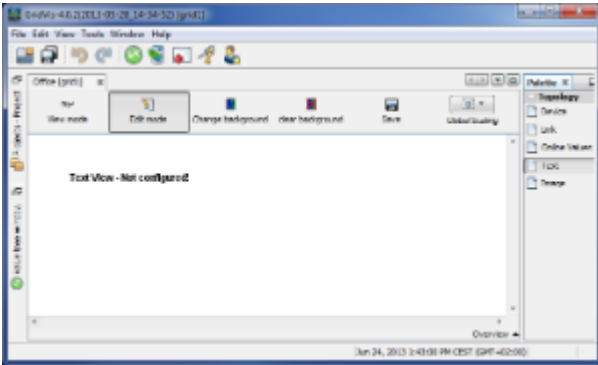
Fig. Topology page display with text element
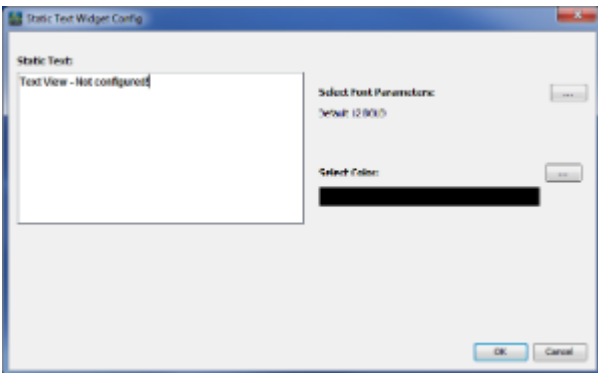
Fig. Text element configuration (Title)

10.6.44 Configuring connection

Configuring device connection

How:

- By right-clicking a device in the projects window.
- By selecting a device in the projects window and then clicking the "*Configure connection*" button in the overview window.
- By selecting a device group in the projects window and then selecting at least one device in then navigation window via the "*Configure connection*" button.

Brief description:

- Enables configuration of the device connection (see "Creating new device").

Steps:

- Select a device in the projects window by right-clicking it and select "*Configure connection*" in the pop-up menu. Select a connection type and complete the remaining entries (such as device address).
- As a precaution, perform a connection test via the "*Connection test*" button. If the connection is successful, a dialogue with additional device information will be displayed.
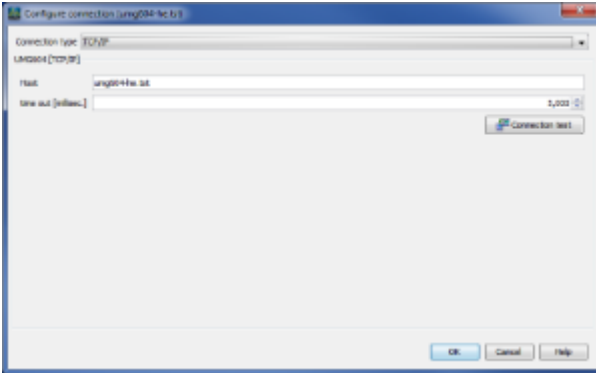
Fig. Configuring connection

10.6.45 Connection test

Testing device connection

How:

- By right-clicking a device in the projects window.
- By selecting a device in the project window via the "*Connection test*" button in the overview window.
- By selecting a device group in the projects window and then selecting at least one device in the overview window via the "*Connection test*" button.

Brief description:

- Attempts to establish a connection with the selected device(s).

Steps:

- Select a suitable device or a device group in the projects window.
- When selecting a project group, select at least 1 device in the overview window. Start the device connection test via the "*Connection test*" button in the overview window.
- An attempt will be made to establish a connection to the device. A window will inform you whether a connection was established.

A list of possible conditions

No connection to a device could be established	
A connection to the device has not yet been established	
A connection to the device exists	
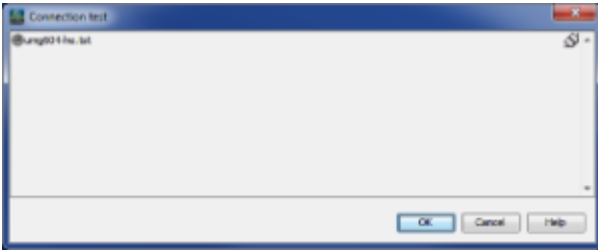
Fig.: Connection test

10.6.46 Creating directories in the user-defined tree

Creating sub-directories in the tree

How:

- By selecting an existing tree in the projects window by right-clicking in the pop-up menu under "*Create directory*".

Brief description:

- Enables the creation of additional sub-directories in a tree created by the user.

Steps:

- If no user-defined tree is available in the projects window, this must be created (see "Creating customized tree").
- Select a tree created by the user in the projects window and create a sub-directory by right clicking the pop-up menu and selecting "*Create folder*".
- Assign a name to the sub-directory and confirm with "*OK*".
- A new entry then appears in the projects window below the tree created by the user. By sliding a device from the "By device type" group to the sub-directory, a link to this device is created to this device.
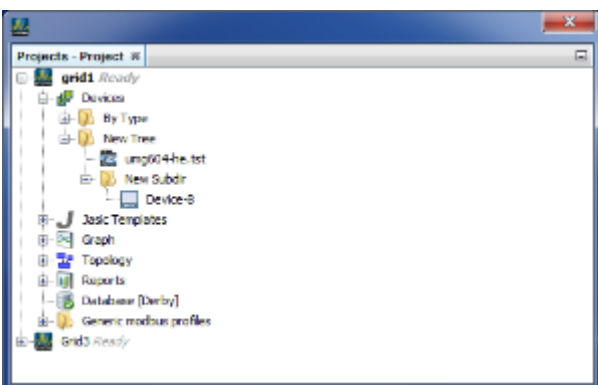
Fig. Projects window with additional tree and sub-directory.

10.6.47 Phasor diagram

Phasor diagram

How:

- By selecting a device in the projects window and by right-clicking "*Show phasor graph*" in the pop-up menu.
- In the palette window, by selecting the "*Graphs*" node in the projects window.

Brief description:

- Shows the phase angle and the rotary field direction of the selected device in a phasor diagram.
- The rotary field usually rotates to the "right".

Steps:

- Select a device in the projects window by right-clicking it and select "*Show phasor graph*" in the pop-up menu.
- Or select the Graphs node in the projects window. Open the palette window (menu item "Windows/Palette") and drag the "*phasor graph*" icon into the graphs window. Drag a device from the projects window to the empty phasor diagram.
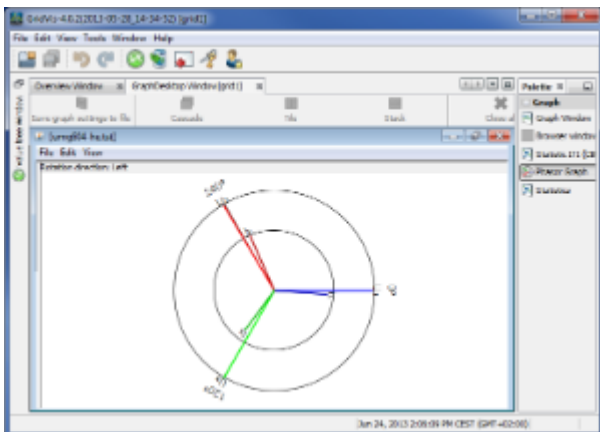
Fig. Phasor diagram

10.6.48 Displaying overview window

Showing overview

How:

- By selecting the "*By type*" node, a device class or a device in the projects window - either by double-clicking or via the right-mousekey and the item "*Show overview*" in the pop-up menu.

Brief description:

- Opens the overview window and shows additional information in this:
- Overview window for the "*By device type*" node:
  List of all integrated devices with the following information: Device name, type, description, connection type with status, last synchronised value and read-out schedule.
- Overview window for a device class:
  List of all devices, which belong to the same class, with the following information: Device name, type, description, connection type with status, last synchronised value and read-out schedule.
- Device overview window:
  Presentation of specific information for a certain device e.g. serial number, firmware version, hardware revision, connection, address, selection of energy values, min/max values etc.

Steps:

In the projects window, either select:

- the "*By type*" node:
- a device group node or
- an individual device.

Double click with the right mousekey the selected entry or alternatively open the pop-up menu via the right mousekey and then click "*Show overview*". The overview window is opened.
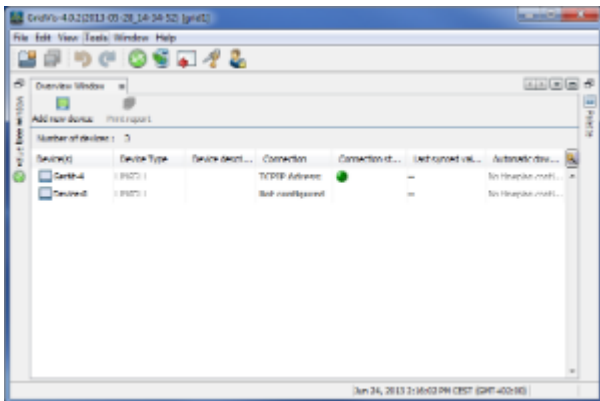
Fig. Navigation window

10.6.49 Configure time synchronisation

Configure time synchronisation

How:

- By selecting a device in the projects window and right-clicking "*Configure time synchronisation"* in the pop-up menu.

- By selecting a device group in the projects window and at least one device in the overview window, and then right-clicking "*Configure time synchronisation*" in the pop-up menu.
  By pressing the <Ctrl> key or the <Shift> key, the mouse can be used to select more than one device at a time in the overview window.

Brief description:

- Enables synchronisation of the device time with the PC time.

Steps:

- Select a device group in the project window.
- Select at least one device in the overview window.
- Right-click the mouse and select the item "*Configure time synchronisation*" in the pop-up menu.
- If a schedule does not yet exist, this can be configured by selecting "*Add schedule*" (see Schedules).
- Select a schedule and confirm the time setting with "*OK*".
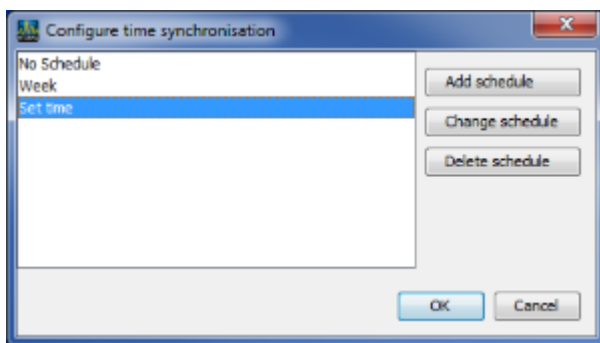
Fig. Configure time setting

10.7 Alarm Management

10.7.1 Alarm Management
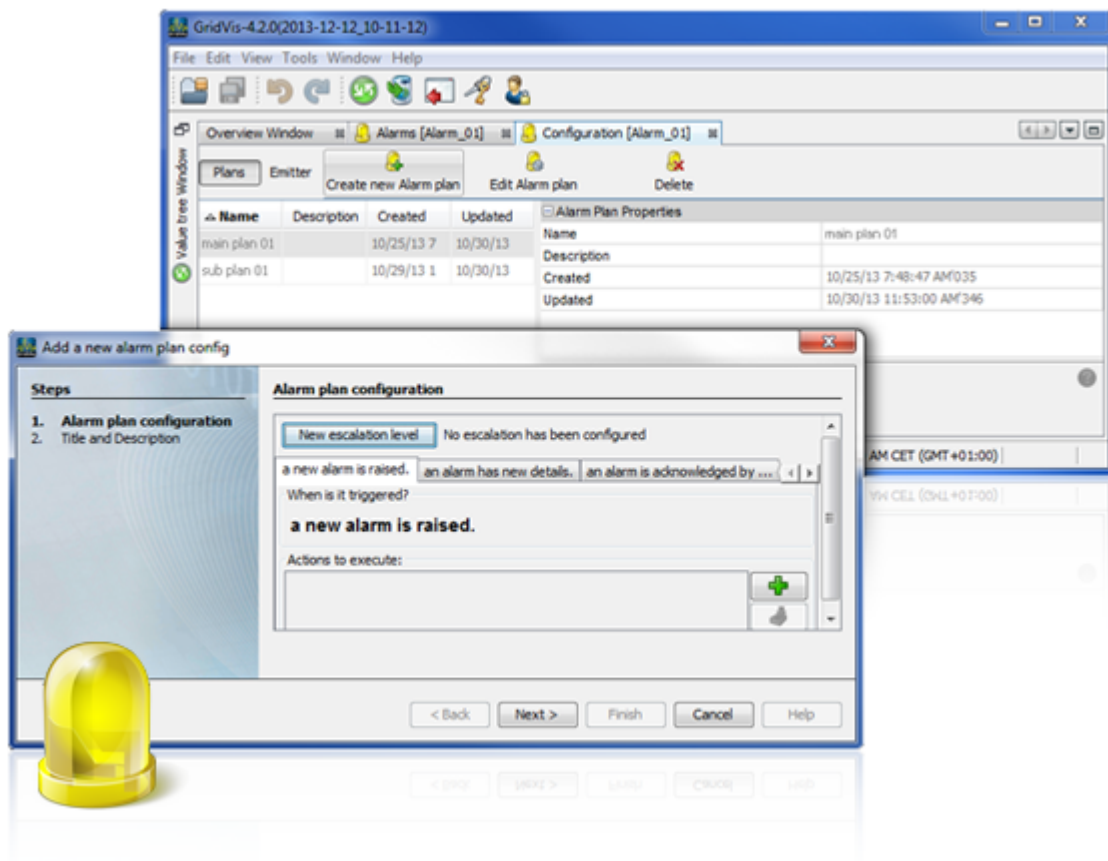
10.7.2 General informations of the alarm management

General

The GridVis software alarm management enables the monitoring of measurement parameters with an automatic notification function. Monitored states can be checked for deviations and faults and an alarm can be responded to over various channels according to individually set alarm plans and emitter sources.

Alarm management features:

- Immediate information for deviating measuring states or faults
- Individual configuration of the states to be monitored (e.g., values above or below measurement values connection errors)
- Acknowledge function for alarms (alarms can/must be confirmed)
- Escalation management with adjustable escalation levels (in case alarm messages are not acknowledged, the next level of the alarm chain is carried out after a defined time period expires)
- Logbook function and alarm lists
- Monitoring of historical and current values
- Availability and synchronisation testing of equipment

Software requirements for alarm management:

- An installed GridVis Service edition (see "GridVis Service") in conjunction with a GridVis Desktop edition (see "Software editions"). For alarm messages via e-mail, an e-mail account must be configured in the GridVis service edition..
  Fig.: Alarm plan overview window.
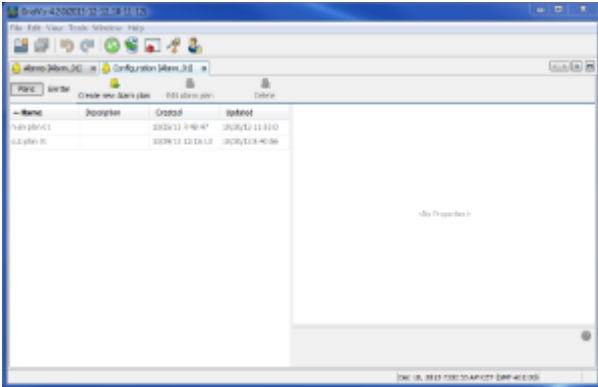
Fig.: Alarm plan overview window

General

10.7.3 Alarm overview window

Alarm overview window

The alarm overview window displays a table of the alarm messages with the corresponding properties. Alarm plans and sources must be defined using the alarm configuration function. Functions allow you to manage the messages.

- Open the "*Alarm overview*" window by
  - navigating through the right-click menu to the "*Alarm Management*" node in the project window and selecting the "*Show Alarm Overview*" menu item.
  - double-clicking the "*Alarm Management*" node.

- Alarm properties
  - "*Created*": Time at which the alarm was active
  - "*Updated*": Time when:
    - alarm acquired new details or
    - escalation level was changed or
    - alarm message was acknowledged
  - "*Name*": Alarm name (see "Create a new emitter").
  - "*Escalation level*": information on the escalation level active when the alarm was triggered (see "Create new alarm plan").
  - "*Acknowledged*": Alarm messages acknowledged by a user. An acknowledgement stops the escalation level from continuing.
  - "*Back to normal*": displays the content of the alarm message. "*Back to normal*" describes the normal state.

- Management
  - "*Acknowledge*"
    Confirms an alarm message. The user can acknowledge every message with a description. If escalation levels are configured for the relevant alarm plan, the escalation is interrupted by the acknowledgement.
  - "*Show open alarms*"
    Only the opens alarms are displayed in the alarm message table.
  - "*Remove all filters*"
    Set filters for viewing the alarms are removed/cleared. All alarm messages are displayed again.
  - "*Refresh*"
    Checks the project database on the server for new alarm messages and updates the overview.
  - "*Show alarm config*"
    Opens the alarm configuration window (Configuration window for alarms).
  - "*Alarm Details Window*"
    Displays the additional details on the selected alarm in a window. Past details can be viewed with the corresponding escalation level under "Logs".
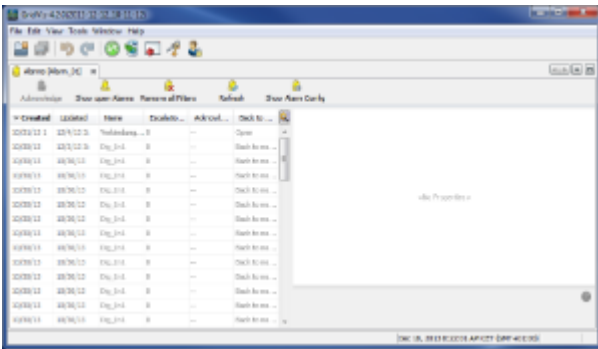
Fig.: Alarm overview window
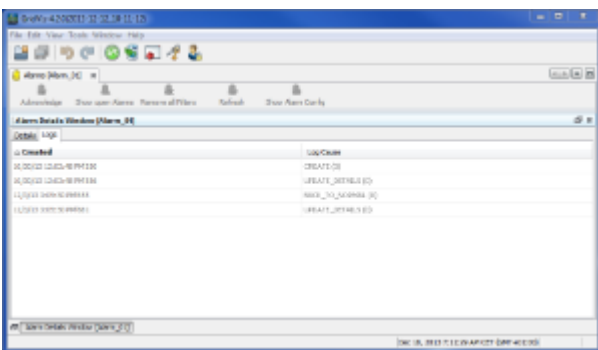
Fig.: Alarm details window (history)

10.7.4 Configuration window for alarms

Configuration window for alarms

The configuration window for alarms displays an overview of the created alarm plans and emitters. You manage and edit the plans and sources using the displayed functions.

- Select the "*Alarm Management*" node in the projects window.
- Open the "*Alarm configuration*" window by
    - navigating through the right-click menu to the "*Alarm Management*" node and selecting the "*Show alarm config*" menu item.
    - selecting the "*Show alarm config*" button in the "*Alarm overview*" window.
- Alarm plans and sources are configured using the buttons of the same name.

- "*Plans*""
  Alarm plans define an action, which is carried out during an alarm or an escalation level and determine when a new escalation level takes places. Alarm plans are linked to an emitter.
    - "*Create new alarm plan*"
      Allows you to created new alarm plan (Create new alarm plan).
    - "*Edit alarm plan*"
      If there are alarm plans available, they can be subsequently edited after selecting the corresponding plan.
      Using the mouse, highlight the desired alarm plan from the alarm plan table and start the wizard using the "*Edit Alarm plan*" button (see Create new alarm plan).
    - *"Delete"*
      An existing alarm plan with the links to the emitters is deleted.
      Using the mouse, highlight the desired alarm plan from the alarm plan table and delete it using the "*Delete*" button.

- *"Emitters"*
  Emitters describe a measurement data or state check that can generate an alarm.
    - "*Add a new emitter*"
      Allows you to create new emitters (Create a new emitter).
    - "*Edit emitter(s)*"
      If there are emitters available, they can be subsequently edited after selecting the corresponding emitter.
      Using the mouse, highlight the desired source from the emitter table and start the wizard using the "Edit emitter" button (see Create a new emitter).
    - "*Delete*"
      An available emitter is deleted.
      Using the mouse, highlight the desired source from the emitter table and delete it using the "*Delete*" button.
    - "*Refresh*"
      Updates the view of the emitters taking into consideration external changes.
    - "*Set server*"
      Emitters are always assigned to an executing server (with the GridVis service edition). This connection (emitter to the server) must be set by the user when configuring the emitters.
        - Using the mouse, highlight the desired source from the emitter table.
        - Start the wizard for setting the server using the "*Set server*" button.
        - Select the server that executes the emitter from the list of the available servers.
        - Confirm the selection with the "*Finish*" button.

- In the emitter table, the corresponding server appears in the "*Execution server*" column.
- "*Clear server*"
  - Using the mouse, highlight the desired source from the emitter table.
  - Delete the assigned server using the "*Delete server*" button.
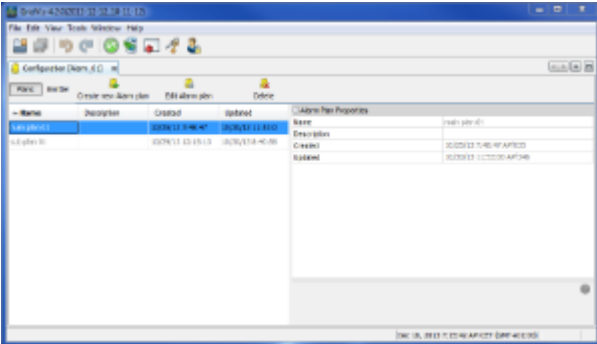
Fig.: Alarm configuration window (alarm plans)
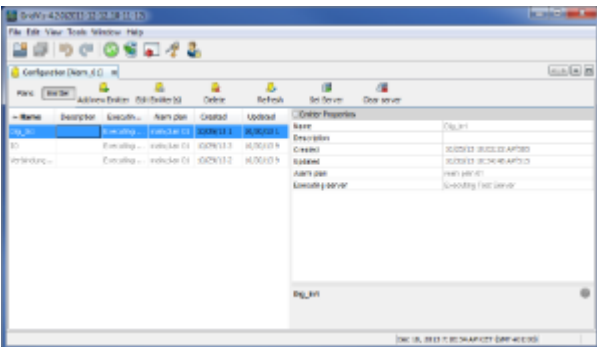
Fig.: Alarm configuration window (emitters)
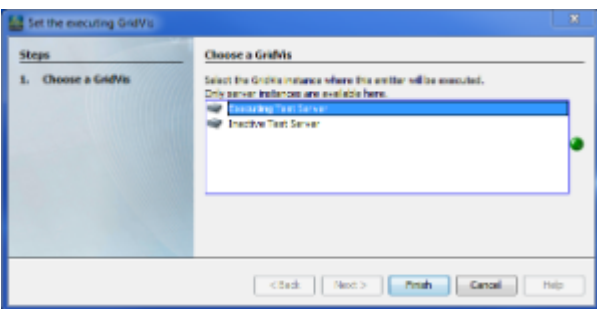
Fig.: Wizard for setting the server
(emitter: execution server)

10.7.5 Create new alarm plan

Create new alarm plan

Alarm plans and emitters must be configured to use the alarm management:

- Select the "Alarm Management" node in the projects window.
- Open the "Configuration" window of the alarm management.
  - by navigating through the right-click menu to the "*Alarm Management*" node in the project window and selecting the "*Show Alarm Config*" menu item or
  - double-clicking the "*Alarm management*" node and selecting the "*Show alarm config*" button in the open "Alarm overview" window
- Start the "*Create new alarm plan configuration*" wizard using the "*Create new alarm plan*" button
  - First define the actions for the events
    - "*A new alarm is raised*"
      Starts a specific action if there is a new event assigned to the plan.
    - "*An alarm has new details*"
      Starts a specific action if the new alarm message contains new details..
    - "*An alarm is acknowledged by a user*"
      Starts a specific action if the assigned active alarm has been acknowledged by the user.
    - "*An alarm was set back to normal by its source*"
      Starts a specific action if the alarm was reset by the source.
  - For each desired event, set the action using the "*Plus*" button next to the "*Actions to execute*" area..
    Then define the corresponding action using the drop-down menu in the "*New action*" window::
    - "*Send an e-mail*"
      Allows you to send a detailed e-mail to a recipient to be configured. To do this, perform the following steps:
      - configure the e-mail recipient by entering a valid e-mail address and
      - the title as well as a more detailed description of the e-mail
    - "*Program execution action*"
      Executes a configurable command line operation. To do this, define
      - the command lines to be opened and the desired parameters and working directory,
      - the title as well as a more detailed description of the program call

-
  - If the actions to execute for an event are defined, they are displayed in a list in the "*Actions to execute*" area under the corresponding events. The actions are edited or managed using the buttons

-
  -
    - "*Edit*"
      Allows you to edit the action.
    - "*Copy*"
      Allows you to copy the action to an intermediate buffer. If the action is to be carried out for other events, it can be added using the "*Copy*" button next to the "Actions to execute" area.
    - "*Delete*"
      Allows you to delete the corresponding action.

-
  - If desired, create other escalation levels for an alarm plan.
    Escalation levels enable additional responses to an alarm that has not been acknowledged by

the user. If several escalation levels are set up, the levels are based each other. The escalation chain is interrupted by a user acknowledgement or if the alarm is reset (see Alarm overview window).

- Start the setup process for other escalation levels using the "*New escalation level*"
- Select an escalation reason and confirm the time setting with "*Next*"
  - "*Relative time escalator*"
    Allows you to set another action for an alarm according to a configurable time period.
    To do this, define the time period of the last alarm message/escalation level until the desired action.
    Define the title and description of the escalation level and close the window using the "*Finish*" button.
- New escalation levels are displayed in new additional tabs within the alarm plan configuration (fig.: Escalation level in the alarm plan)
  - As explained above, define the actions to be performed for the respective escalation level
  - Escalation levels can be edited or deleted using the corresponding buttons

= Delete escalation level

= Add actions

= Add copied actions

Fig.: Alarm management overview window
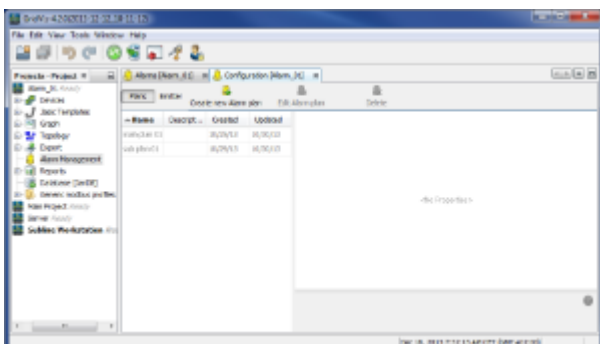
Fig.: Configuration window for alarm management
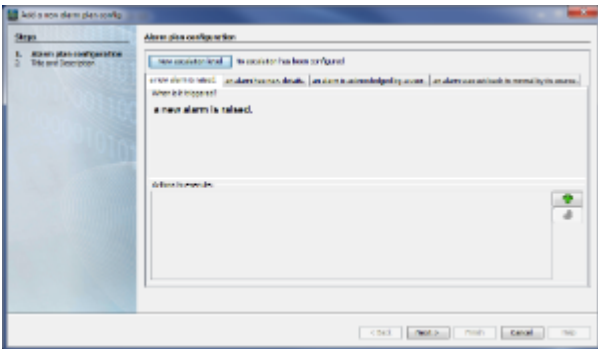
Fig.: Wizard for creating an alarm plan
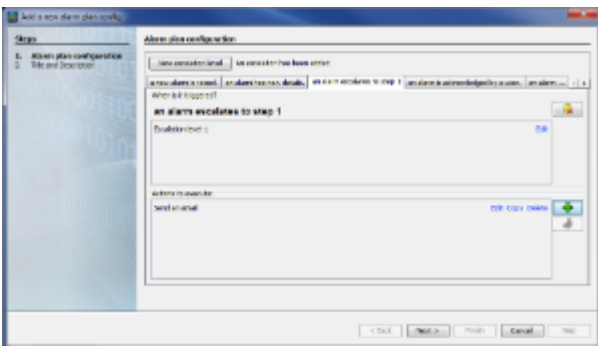
Fig.: Escalation level in the alarm plan

Delete escalation level

10.7.6 Create new emitter

Create new emitter

After the desired alarm plans are set up, the emitters for using the alarm management must be configured (i.e., without the presence of at least one alarm plan, no emitters can be created):

- Open the "*Configuration*" window of the alarm management
  - by navigating through the right-click menu to the "*Alarm Management*" node in the project window and selecting the "*Show Alarm Config*" menu item or
  - double-clicking the "*Alarm management*" node and selecting the "Show alarm config" button in the open "*Alarm overview*" window
- Using the "*Emitter*" button in the "*Configuration*" window of the alarm management, switch to the overview of the emitters
- Start the "*Add new Emitter*" wizard using the "*Add new Emitter*" button and then select the desired check

- "*Last value check*"
  Checks the last value that was saved in the database. An alarm is triggered for incorrect values caused by the system.
    - After selecting this option, define at least one device
      You can select several devices, e.g., by holding the Ctrl. button pressed down and clicking a device. If a selection of devices is to be highlighted, select the first device by clicking it and click the last device while holding the Shift button pressed down..
    - Then highlight the value or values to be checked (requirement: Device recordings available in the database, selection of values with the same time base)
      Several values are selected just like several devices are selected (see above).
    - Set the time blocks for the values
      The following applies: The time stamp of the most recently saved value may NOT be older than the time blocks. If this rule is violated, an alarm is triggered
    - Define the interval of the automatic check (time interval according to which the values are automatically checked)
    - Assign a previously set alarm plan to the configured emitter.
    - Set the title and the description of the emitter
- "*Hist. consumption check*"
  Checks the consumption values saved in the database for adjustable limits.
    - After selecting this option, define at least one device
    - Then highlight the consumption value to be checked and using the "..." button, define the lower threshold value, upper threshold value, hysteresis and the corresponding time interval (time window).
        - Prerequisite: there must be device recordings available in the database.
        - Several values can be selected simultaneously (see above). All limits, etc. are set using the "..." button in the "*Properties*" area..
    - Set the time blocks for the values
      The following applies: The time stamp of the most recently saved value may NOT be older than the time blocks. If this rule is violated, an alarm is triggered.
    - Define the interval of the automatic check (time interval according to which the values are automatically checked).
    - Assign a previously set alarm plan to the configured emitter
    - Set the title and the description of the emitter
- "*No connectivity check*"
  Checks the availability of devices. An alarm is triggered if there are connection problems.
    - After selecting this option, define at least one device
    - Define the interval of the check (time interval according to which the devices are automatically checked)
    - Assign a previously set alarm plan to the configured emitter
    - Set the title and the description of the emitter
- "*Device synch check*"
  Checks the last state of the device synchronisation. An alarm is triggered if there is an error in the synchronisation.
    - After selecting this option, define at least one device

- Set the time block for the last synchronisation
  The following applies: An alarm is triggered if the last synchronisation was carried out later than the time limit.
  - Assign a previously set alarm plan to the configured emitter
  - Set the title and the description of the emitter
- "*Online value check*"
  Checks an online value for a set threshold value breach.
  - After selecting this option, define at least one device
  - Then set a selection of online value types and threshold values. To do this, define the desired online size in the displayed value tree and highlight it using the mouse. Several values are selected using the Ctrl. or Shift buttons (see above)
    In the right half of the window (or directly in the corresponding line of the value tree), define the desired lower and/or upper threshold value. An alarm is triggered if a threshold value is violated
  - Assign a previously set alarm plan to the configured emitter
  - Set the title and the description of the emitter
- "*Hist. Boundary check*"
  Checks the database values for a violation of the set threshold values.
  - After selecting this option, define at least one device
  - Then set a selection of historical value types and threshold values. To do this, define the desired historical parameter in the displayed value tree and highlight it using the mouse. Several values are selected using the Ctrl. or Shift buttons (see above)
    In the right half of the window (or directly in the corresponding line of the value tree), define the desired lower and/or upper threshold value. An alarm is triggered if the value threshold in the database has been violated
  - Set the time blocks for the database area check. The area to be checked here is between the set time limit and the current time
  - Assign a previously set alarm plan to the configured emitter
  - Set the title and the description of the emitter

- If alarm plans and emitters are defined, the created emitter are assigned to a server with the GridVis Service edition. This can be performed directly using the wizard for creating each emitter or after selecting the desired emitter from the list of all emitters and confirming the "*Set server*" action in the alarm configuration.
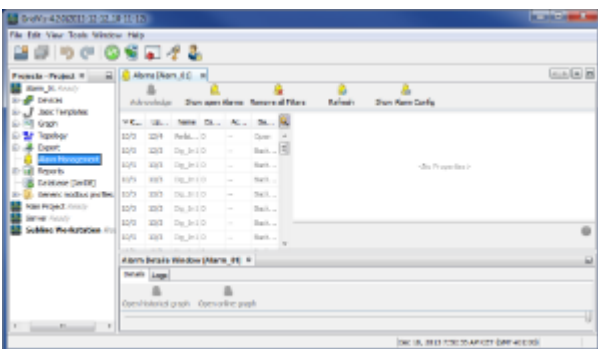
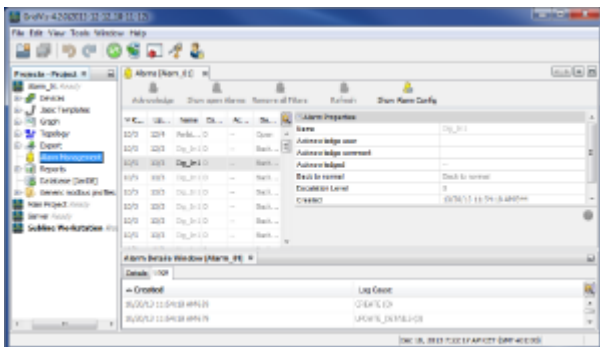Fig.: Alarm management overview window
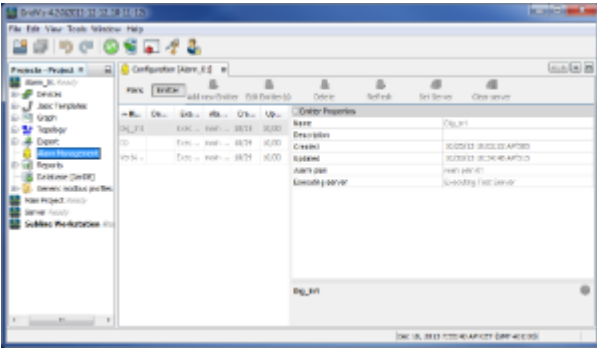
Fig.: Configuration window for alarm management
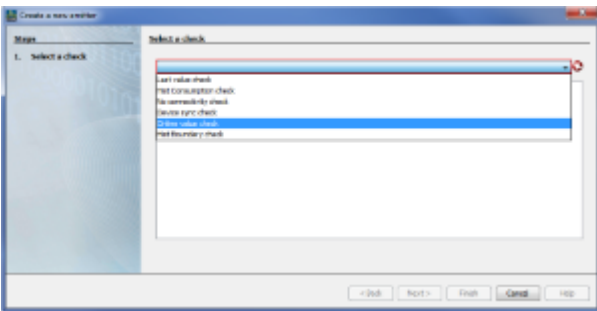
Fig.: Wizard for creating new emitters
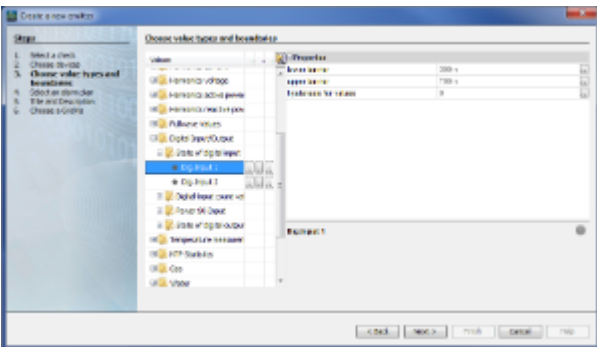
Fig.: Wizard for new emitters
(checking online values)

10.8 User administration

10.8.1 User administration

10.8.2 Introduction

Introduction

User administration supports the specific assignment and deletion of each user's rights. Certain prohibitions and authorisations can be assigned for certain groups within GridVis via user rights.

Users are created and they are assigned rights or to groups via the GridVis software user administration. In the process, a User Admin is normally assigned who has no restrictions within the GridVIs, i.e. the Administrator can for example administer other users and add or delete devices/topologies etc.

- It is possible to separately define for each project within the GridVis software, whether the user administration should be active for this project. Project protection is performed via user administration in the project properties (see "Protecting project with user adminstration")
- Only one user administration can be assigned to each project.
- All users, passwords, roles and rights are held in one database (security realm). The security realm is to be created via GridVis.
- The individual rights of users are compiled in predefined roles (groups of entitlements). Roles cannot be individually modified!
- Roles (groups of rights) are cumulative, i.e. the rights of users from various roles are added together.
- If a project is protected via the user administration, it is necessary to log in to gain access to the project!

Use of user administration within the software is available in all editions (from Version 4.0) except for the basic edition!
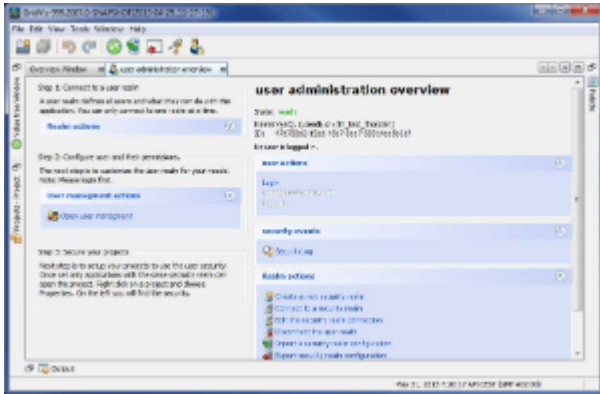
10.8.3 Creating a new security realm

Setting up user administration

When you set up a user administration (from GridVis Professional) you will be assisted by a wizard. To start open the user administration window via the link "*User Administration - Overview*" in the welcome window or via the menu *"Window/User Administration/User administration overview"*. To set up a user administration go through the following steps:

- In step 1, create a new security realm via "*Create a new security realm*". A user directory defines all users and their rights. More than one security realm can be open at the same time.
  The status is displayed on the right of the window.
- If, for example, only a basic licence is available, the missing licence will be displayed under status.
- Select the type of database (MS-SQL, MySQL) for the user administration and confirm the selection with "*Next*".
- Have the configuration data ready so that you can configure the database link. If necessary ask you administrator about this and confirm the configuration with the "*Next*" button.
- Create a user password for administrative work in GridVis under the user name "*admin*" (e.g. user administration) and confirm this by entering it a second time. Note the password as it will be needed again for user administration etc.! Confirm the password with the "*Ready*" button.
- If the user administration database has been successfully created, a prompt will appear that you will have to confirm. If a database without tables already exists (e.g. created by your administrator), the prompt does not appear!

  If the database cannot be created, you will be informed of this via a dialog field (see Graphic). After the message is confirmed, you return to the wizard and have the option to edit the data.

  A new security realm created with GridVis will be automatically linked with this.
  The current user administration status is displayed in the window "*User administration overview*"

under Status.

If a link to a security realm has been successfully established, "ready" and the ID number of the user directory (user administration database) appear under Status.

Users are created in the user editor
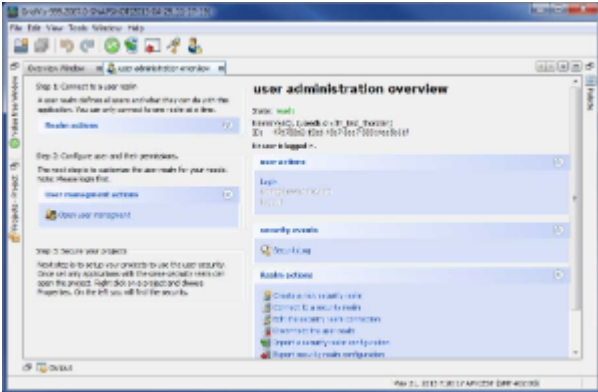
Fig.: User Administration - Overview window
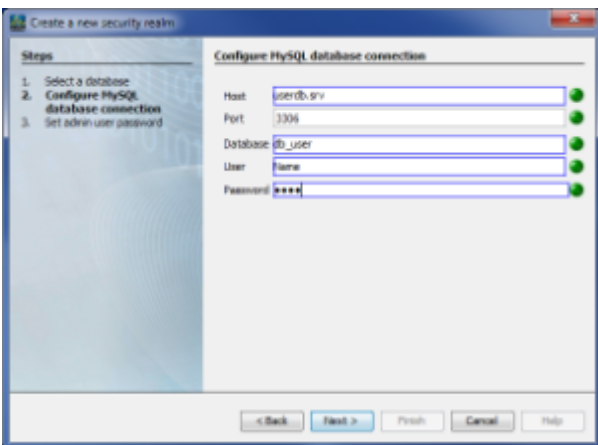
Fig.: Database Configuration
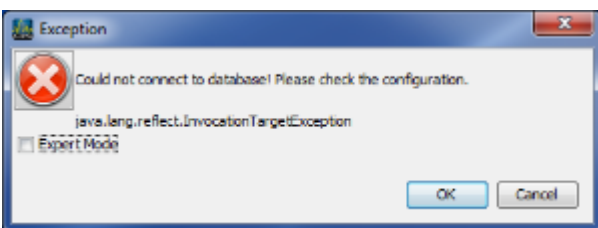
Fig.: Database creation failed

10.8.4 User editor

Opening the user editor

Users, who wish to access a project protected by the user administration can be added, edited and deleted via the user editor. To this end, the user must log in and can - providing he has the required rights - work with the editor. For users who do not posses this right, only the user's own access is visible in the editor. Messages/exceptions to possible changes with subsequent saving are displayed in the "Exceptions" column!

If a seurity realm (user administration database) has been successfully created and linked with GridVis, various users can - provided that the corresponding rights are available - be created.

- Start the user editor with step 2 ("*Open user management*") in the window "*User administration overview*" or via the menu item "W*indow/User administration/Open user management*".
- If you are not yet logged in, log in via the "Log in" button. Enter your user name and password and confirm the dialogue with "OK".
  If no user have been created yet or only the user "admin" exists, enter "*admin*" as the user name along with the password issued for administrative work within GridVis (see "Creating a new security realm").
  If the user name and/or password are incorrect or if the required rights are not available, an error message will appear.
  If the login is successful, depending on the respective rights, all users will be presented in tabulated form.

- Add a user via the "*New user*" button. An additional line will appear in the user table with the user name "*New user*".
- Click the user name "*New user*" to select it. The field will then be marked with a colour as "to be written over".
- Enter a user name and confirm it with the "Return" key.
- Assign a password for this user. To do this click the "..." button at the end of the field. Create the password in the following dialogue field and confirm this by entering it again. Confirm the dialogue with "OK".
- Define the GridVis rights (roles) for the selected user. To do this click the "..." button at the end of the field. In the next dialogue you can assign the user to a rights group (see Roles). The roles are cumulative, i.e. if the user is a member of several roles (group of rights), the rights from all groups are added together. Confirm the selection with the "OK" button.
- The status of the new user is shown in the "*State*" column. In the case of a newly created user, who has not yet been saved, the status is "*New*". In the case of changes (e.g. assignment of new rights) the status is "*Changed*". The "*Exception*" column flags possible errors.
  If the changes (e.g. new users) have not yet been saved (Status = "*New*" or "*Changed*") then all changes can be reversed via the "*Discard changes*" button.

  Example: If a new user has been created, then the status is set "*New*". Until the input has been saved via the "*Save*" button, it will still be possible to delete all users with the status "New" via the "*Discard changes*" button (in addition all unsaved changes will be deleted).
- If a user has been created or changes made, these changes are not saved in the database until the *"Save"* button is pressed. The status thereupon changes from "*New*" to "*Unchanged*". If an error occurs during saving, this is indicated in the "*Exception*" column.

If all desired users have been created and saved, the desired project can be protected via the project properties with the user administration (see "Protecting project with user administration").
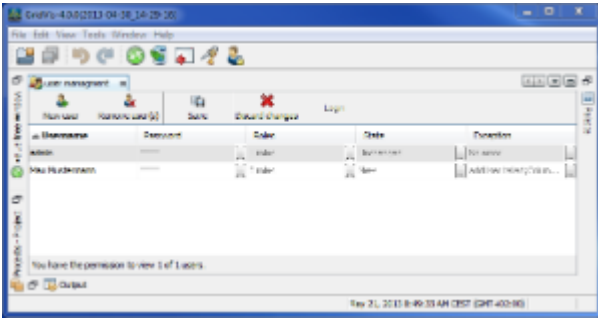
Fig.: User editor
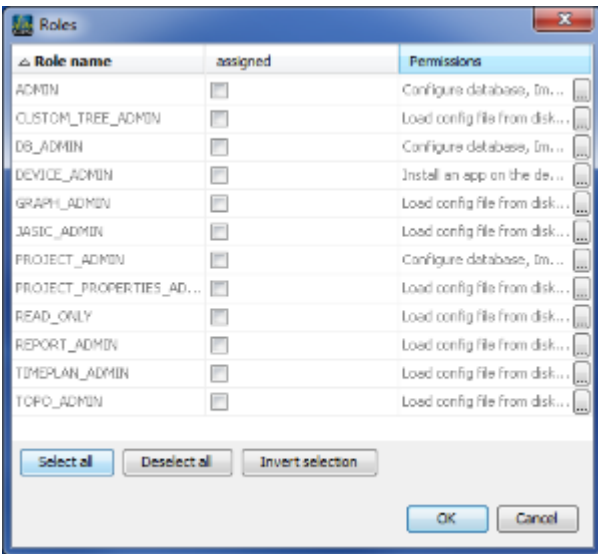
Fig.: Assignment to roles
(groups of rights)

10.8.5 Rights (roles)

Roles (groups of entitlements)

Users can be assigned specific rights within the GridVis software. These are to be created via the user editor and assigned to specific groups of rights, known as roles (please refer to the chapter "Roles and rights" for a detailed list of roles with their associated rights).

At present, 12 roles are available in GridVis:

Roles	Rights
ADMIN	Administrator of the GridVis software. A user who is a member of this group has extensive rights. He has, for example, rights to:

Roles	Rights
	- create / edit / delete users, - create / administer / optimise databases, - create / edit / delete projects, - create / edit / delete devices, - create / edit / delete topologies, - create / edit / delete graphs, - create / edit / administer Jasic files, - add / edit / delete graphs reports, - delete values, - create / delete / administer time plans.
PROJECT_ADMIN	Project administrator He has similar rights to the administrator but cannot create or administer users.
PROJECT_PROPERTIES_ADMIN	Project properties administrator In addition to the basic "READ_ONLY" rights, the right to assign or administer certain project properties.
DB_ADMIN	Database administrator In addition to the basic "READ_ONLY" rights, the right to configure or administer the database.
DEVICE_ADMIN	Device administrator In addition to the basic "READ_ONLY" rights, the *Device Admin may* - create, delete / configure devices, - delete values in the device memory, - edit / delete schedules for device synchronisation, - update device firmware, - install apps on the device.
GRAPH_ADMIN	Graph administrator In addition to the basic "READ_ONLY" rights, the *Graph Admin* may create / delete / administer graphs.
JASIC_ADMIN	Jasic administrator In addition to the basic "READ_ONLY" rights, the *Jasic Admin* may create / delete / administer Jasic files.

Roles	Rights
REPORT_ADMIN	Reports administrator In addition to the basic "READ_ONLY" rights, the *Report Admin* may • create / delete / administer reports.
TIMEPLAN_ADMIN	Time plan administrator In addition to the basic "READ_ONLY" rights, the *Timeplan Admin* may • create / delete / administer time plans.
TOPO_ADMIN	Topology administrator In addition to the basic "READ_ONLY" rights, the *Topology Admin* may • create / delete / administer topology pages.
CUSTOM_TREE_ADMIN	Custom tree administrator In addition to the basic "READ_ONLY" rights, the *Custom Tree Admin* may • create / delete / edit user-defined trees. • create / delete / sort user realms in user-defined trees.
READ_ONLY	User with basic reading rights only.

Additional information: Roles and rights

10.8.6 Roles and rights

Roles and rights

Rights	Admin	Project Admin	Project Properties Admin	DB Admin	Device Admin	Graph Admin	Jasic Admin	Report Admin	Timeplan Admin	
Configure database	X	X	-	X	-	-	-	-	-	-
	X	X	-	X	-	-	-	-	-	-

Rights	Admin	Project Admin	Project Properties Admin	DB Admin	Device Admin	Graph Admin	Jasic Admin	Report Admin	Timeplan Admin	
Import database										
Administer databases	X	X	-	X	-	-	-	-	-	-
Migrate database	X	X	-	X	-	-	-	-	-	-
Optimise database	X	X	-	X	-	-	-	-	-	-
Install app on device	X	X	-	-	X	-	-	-	-	-
Load configuration from drive	X	X	X	X	X	X	X	X	X	X
Save configuration on drive	X	X	-	-	X	-	-	-	-	-
Save configuration in device	X	X	-	-	X	-	-	-	-	-
Load configuration from device	X	X	X	X	X	X	X	X	X	X
Overwrite device connection	X	X	-	-	X	-	-	-	-	-
Read device connection	X	X	X	X	X	X	X	X	X	X
Create new device	X	X	-	-	X	-	-	-	-	-
Delete device	X	X	-	-	X	-	-	-	-	-
Show device list	X	X	X	X	X	X	X	X	X	X
	X	X	-	-	X	-	-	-	-	-

Rights	Admin	Project Admin	Project Properties Admin	DB Admin	Device Admin	Graph Admin	Jasic Admin	Report Admin	Timeplan Admin	
Edit device name and description										
Change device owner	X	X	-	-	X	-	-	-	-	-
Delete energy values in device memory	X	X	-	-	X	-	-	-	-	-
Delete event values in device	X	X	-	-	X	-	-	-	-	-
Delete historical values in device	X	X	-	-	X	-	-	-	-	-
Delete MinMax values in device	X	X	-	-	X	-	-	-	-	-
Delete runtime values in device	X	X	-	-	X	-	-	-	-	-
Delete the current timeplan for device time synchronisation	X	X	-	-	X	-	-	-	-	-
Assign the current timeplan to device time synchronisation	X	X	-	-	X	-	-	-	-	-
Change the current timeplan for device time synchronisation	X	X	-	-	X	-	-	-	-	-

Rights	Admin	Project Admin	Project Properties Admin	DB Admin	Device Admin	Graph Admin	Jasic Admin	Report Admin	Timeplan Admin	
Read the current timeplan for device time synchronisation	X	X	X	X	X	X	X	X	X	
Synchronise device	X	X	X	X	X	X	X	X	X	
Assign the current timeplan to device time synchronisation	X	X	-	-	X	-	-	-	-	
Edit the current timeplan for device time synchronisation	X	X	-	-	X	-	-	-	-	
Delete current timeplan for device time synchronisation	X	X	-	-	X	-	-	-	-	
Read current timeplan for device time synchronisation	X	X	X	X	X	X	X	X	X	
update device firmware	X	X	-	-	X	-	-	-	-	
Create Modbus profile	X	X	-	-	-	-	-	-	-	
Delete Modbus profile	X	X	-	-	-	-	-	-	-	
Edit Modbus profile	X	X	-	-	-	-	-	-	-	
Read Modbus profile	X	X	X	X	X	X	X	X	X	
Open graphset	X	X	X	X	X	X	X	X	X	

Rights	Admin	Project Admin	Project Properties Admin	DB Admin	Device Admin	Graph Admin	Jasic Admin	Report Admin	Timeplan Admin	
Create graphset	X	X	-	-	-	X	-	-	-	-
Save graphset	X	X	-	-	-	X	-	-	-	-
Deletle graphset	X	X	-	-	-	X	-	-	-	-
Delete Jasic file on device	X	X	-	-	-	-	X	-	-	-
Generate Jasic file on device	X	X	-	-	-	-	X	-	-	-
Update Jasic file on device	X	X	-	-	-	-	X	-	-	-
Read Jasic file from device	X	X	X	X	X	X	X	X	X	X
Update Jasic file on drive	X	X	-	-	-	-	X	-	-	-
Read Jasic file from drive	X	X	X	X	X	X	X	X	X	X
Eine Jasic-Datei auf der Festplatte erstellen	X	X	-	-	-	-	X	-	-	-
Delete Jasic file on drive	X	X	-	-	-	-	X	-	-	-
Create report	X	X	-	-	-	-	-	X	-	-
Delete report	X	X	-	-	-	-	-	X	-	-
Open report	X	X	X	X	X	X	X	X	X	X
Change report	X	X	-	-	-	-	-	X	-	-
Export saved report	X	X	X	X	X	X	X	X	X	X
Delete report timeplan	X	X	-	-	-	-	-	X	-	-
	X	X	-	-	-	-	-	X	-	-

Rights	Admin	Project Admin	Project Properties Admin	DB Admin	Device Admin	Graph Admin	Jasic Admin	Report Admin	Timeplan Admin	
Change report timeplans										
View report timeplans	X	X	X	X	X	X	X	X	X	
Set new timeplan for report	X	X	-	-	-	-	-	X	-	
Assign project to user registry	X	-	-	-	-	-	-	-	-	
Break link between project and user realm	X	X	-	-	-	-	-	-	-	
Edit user	X	-	-	-	-	-	-	-	-	
Read out user	X	-	-	-	-	-	-	-	-	
Delete user	X	-	-	-	-	-	-	-	-	
Create new user	X	-	-	-	-	-	-	-	-	
Display user list for user realm	X	-	-	-	-	-	-	-	-	
Change user password	X	-	-	-	-	-	-	-	-	
Create security realm in user-defined tree	X	X	-	-	-	-	-	-	-	
Change user-defined tree	X	X	-	-	-	-	-	-	-	
Delete user-defined tree	X	X	-	-	-	-	-	-	-	

Rights	Admin	Project Admin	Project Properties Admin	DB Admin	Device Admin	Graph Admin	Jasic Admin	Report Admin	Timeplan Admin	
Sort user realms in user-defined tree	X	X	-	-	-	-	-	-	-	-
Create user-defined tree	X	X	-	-	-	-	-	-	-	-
Delete user-defined tree	X	X	-	-	-	-	-	-	-	-
Open project	X	X	X	X	X	X	X	X	X	
Edit project security	X	X	X	-	-	-	-	-	-	-
Edit project description	X	X	X	-	-	-	-	-	-	-
Edit number of devices to be synchronised at same time	X	X	X	-	-	-	-	-	-	-
Edit automatic device synchronisation	X	X	X	-	-	-	-	-	-	-
Edit device time synchronisation	X	X	X	-	-	-	-	-	-	-
Edit online recording of project	X	X	X	-	-	-	-	-	-	-
Edit project timeplan	X	X	X	-	-	-	-	-	-	-
Edit project watchdog	X	X	X	-	-	-	-	-	-	-
Edit project start options	X	X	X	-	-	-	-	-	-	-

Rights	Admin	Project Admin	Project Properties Admin	DB Admin	Device Admin	Graph Admin	Jasic Admin	Report Admin	Timeplan Admin	
Read timeplan	X	X	X	X	X	X	X	X	X	X
Create timeplan	X	X	-	-	-	-	-	-	X	-
Delete timeplan	X	X	-	-	-	-	-	-	X	-
Edit timeplan	X	X	-	-	-	-	-	-	X	-
Save topology	X	X	-	-	-	-	-	-	-	X
Delete topology page	X	X	-	-	-	-	-	-	-	X
Create new topology	X	X	-	-	-	-	-	-	-	X
Open topology										

Rights (roles)

10.8.7 User administration log

User administration log

The function "User administration log" flags certain events within user administration.
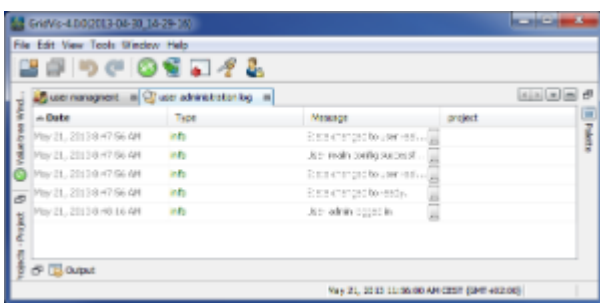
Fig.: User administration log

10.8.8 Connecting to a security realm

Connecting to a security realm (user administration database)

If a security realm (user administration database) is already available for the GridVis software, then this function creates a link between GridVis and the security realm.

If a security realm has already been created with GridVis from the Professional edition, then this user administration can be integrated in the existing GridVis Professional via "*Connect to a security realm*". In this case there is no need to create users and their rights.

As GridVis only supports one security realm simultaneously, a link to a security realm can only be established if there is no existing link to a security realm. If a security realm is already linked to GridVis, then this link must be previously cancelled (see "Disconnecting a user realm").

- Select the connecting wizard in the window "*User administration overview*" or via the menu item "*Window/User Administration/Connect to a security realm*".
- Select the type of database (MS-SQL, MySQL) for the user administration and confirm the selection with "*Next*".
- Have the configuration data ready so that you can configure the database link. If necessary ask you administrator about this and confirm the configuration with the "*Next*" button.

The connection to the selected security realm will be established.
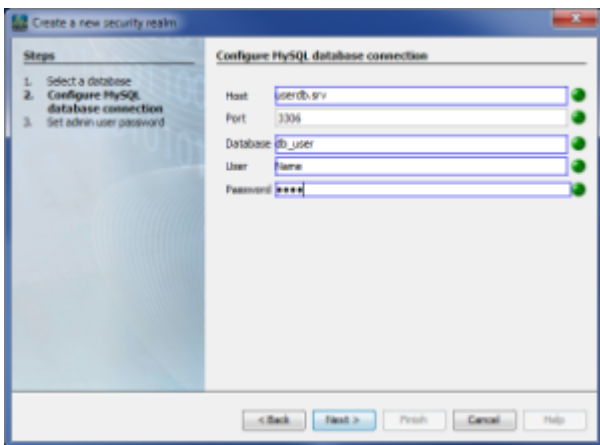
Fig.: Database link

10.8.9 Editing a security realm

Editing a security realm (user administration database)

The configuration change can be accepted via this function if the configuration data for the security realm has changed.

- Select the configuration editing wizard in the window "*User administration overview*" or via the menu item "*Window/User Administration/Edit the security realm connection*".
- Select the type of database (MS-SQL, MySQL) for the user administration and confirm the selection with "*Next*".
- Have the changed configuration data ready so that you can configure the database link. If necessary ask you administrator about this and confirm the configuration with the "*Next*" button.
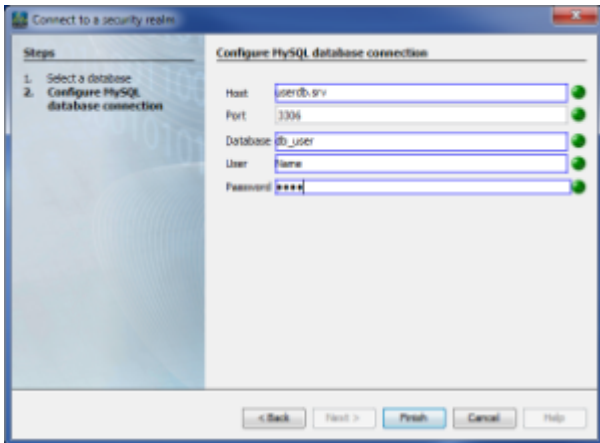
Fig.: Database link

10.8.10 Disconnecting a user realm

Disconnecting a security realm (user administration database) from GridVis

If a security realm (user administration database) is linked to the GridVis software, then this link can be broken with the function "*Disconnect the user realm*". If there are reasons to wish to change the user realm (user administration), then the link to the current user administration must be broken. Only after the current link has been broken can, for example, a new security realm be created or a new link be established to another security realm.

- Select the function "*Disconnect the user realm*" in the window "*User administration overview*" or via the menu item "*Window/User administration/Disconnect the user realm*". The link to the current database is then deleted.

10.8.11 Logging in

Logging into security realm

If a user realm has been successfully created and linked with GridVis, the various rights do not become active until the user logs in. If no log in takes place, then some functions will remain blocked for the not logged in user.

- The administration of users requires a log in with the appropriate rights.
- If a project is protected via the user administration, it is necessary to log in to gain access to the project!
- Depending on the respective user rights, only certain functions will be available

To access the security realm (user administration database) a login is required:

- Open the window "*User administration overview*" and log in via the "*Login*" link. Or start the login via the menu item "*Window/User administration/Login*".
- If a **project projected by the linked user administration** already exists, then the user can log into this project with a right mouse click on the respective project.

The status and unique ID number of the linked security realm (user administration database) are displayed in the login dialogue. The user can log into this user database by entering the user name followed by the password. If these login details are saved in the user administration linked to GridVis, the login is successful.

If the user name and/or password are incorrect, an error message will appear. Check your login details and take into account that the login is case sensitive. If several security realms (user administration databases) exist, then make sure the correct security realm is entered (ID number of associated user administration).
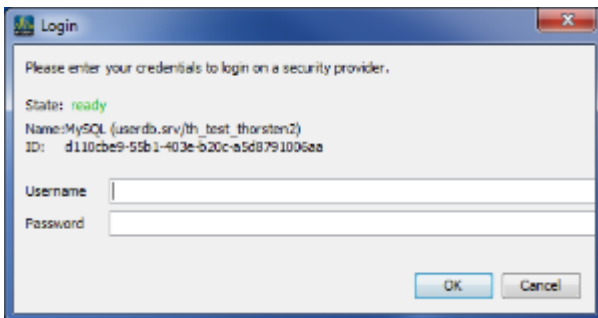
Fig.: Login dialogue

10.8.12 Protecting project with user administration

Protecting project with user administration

If a user realm is linked to GridVis, a project can be protected after login. However, this is only possible with admin rights.

- If you wish to link a security realm with GridVis, log in as "*admin*" or as user with admin rights.
- Select the project properties by right clicking the respective project in the "*Project window*" or select the project in the "*Projects window*" and open the properties via the menu item "File/Project Properties" (Fig. 1).
- Select the "Access protection" from within the category.
- Set the corresponding protection method.
- For project protection via a security realm (user administration database), the entry "*Use the user administration*" should be selected! The status, name and unique ID of the user administration will be shown.

- Confirm the project protection with "OK".
- A "lock" icon will then appear on the corresponding project symbol

If a project is protected and the user possesses no rights for this project and/or is not logged in (see Fig. 2), an explanation appears in the project window below the project name:

- "A user must be logged in."
- "The user requires the right to open this project"

If a project is protected and a link exists in GridVis with **another** security realm (user administration database), then the required security realm will be shown below the project (see Fig. 3).
If in this case, the user logs in to this project, then the current link to security realm must be disconnected (see "Disconnecting a user realm") and GridVis should be reconnected to the correct user directory (see "Connecting to a security realm").
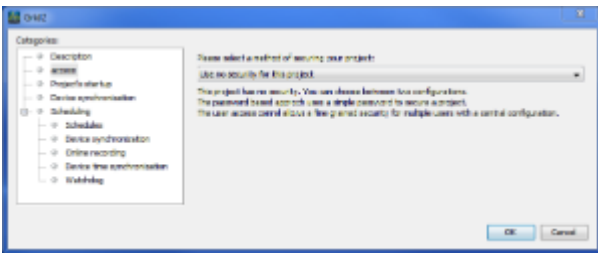
Fig. 1: Access protection for project
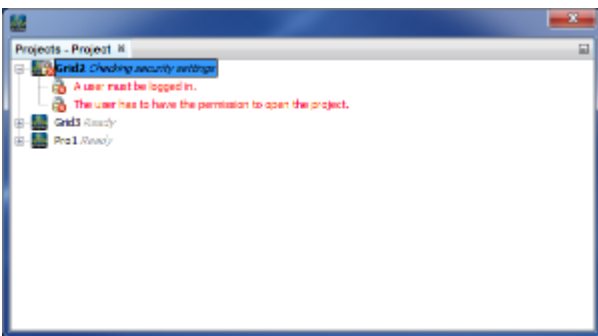
Fig. 2: Display of project with access protection
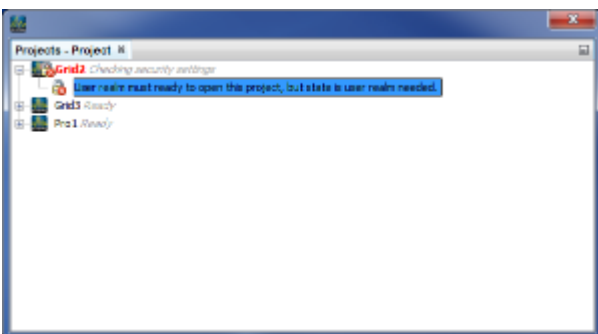
Fig. 3: Display of project with access protection
and required security realm

10.9 UMG 96S

10.9.1 UMG 96S - Universal Integrated Measuring Unit

10.9.2 UMG 96S - Connection to computer

Connection PC - UMG 96S

Example 1:
The UMG96S has an RS485 interface and the PC has an RS232 interface. An interface converter is required.
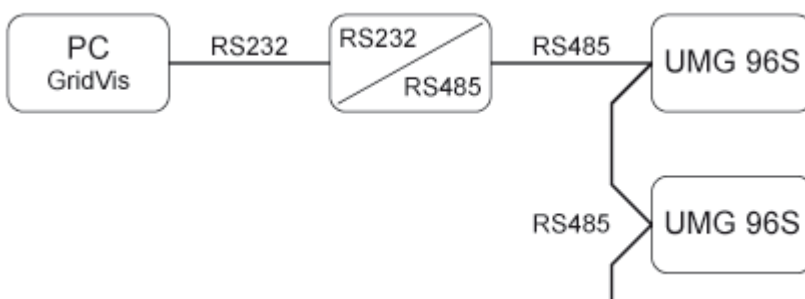
Example 2:
The UMG96S has an M bus interface and the PC has an RS232 interface. An interface converter is required.
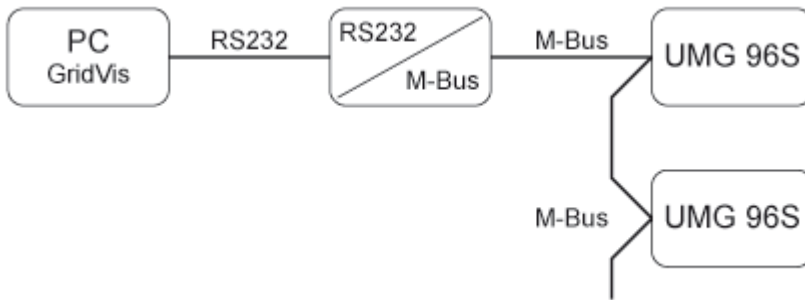
Example 3:

The UMG96S has an RS485 interface and the PC has an Ethernet interface. A gateway is required.

The UMG 604/605, the UMG 508 and the UMG 511 can be used as gateways.
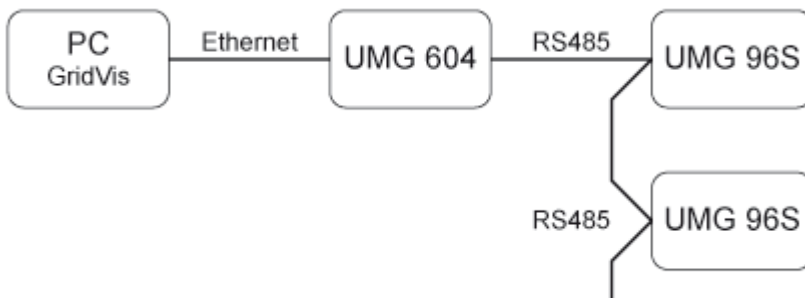
10.9.3 UMG 96S - Adding device

- **Integration the UMG 96S into the GridVis**
  - The UMG96S must be connected to the PC via a gateway (device type) or via an interface converter (example of connection).
    Create a new UMG96S in the GridVis and determine the type of connection (First steps, Adding new device).

Connection types

Ethernet gateway (e.g. for the devices connected to the RS485)

A gateway is required to be able to connect the UMG96S via Ethernet to the PC and to be able to configure it and read it with the GridVis.

- The UMG96S has an RS485 interface.
- The gateway must have both an RS485 and an Ethernet interface (e.g. a UMG604 with the appropriate options).
- The gateway address (e.g. 192.168.1.1) must be set under the connection settings (see Fig. Configuring the connection).
- Because more than one UMG96S can be connected to the gateway, the device address set in the UMG96S must also be set under the connection settings (see Fig. Configuring the connection).
- If no connection could be established to the UMG96S, an attempt will be repeated following the set Timeout.
- When attempting to read data from the UMG96S, the number of attempted connections will be limited by the number set under Max. no. of attempts.

- The connection protocol must be set via the Modbus protocol. TCP/IP packets are used when connecting via Modbus TCP. The TCP port 502 is reserved for Modbus TCP.

When measuring online, the GridVis will repeatedly attempt to establish a connection to the UMG96S.

Modbus RTU (RS485/RS232)

An interface converter is required to be able to connect the UMG96S to the PC's RS232 interface and to be able to configure it and read it with the GridVis.

- The UMG96S has an RS485 interface.
- An interface converter from RS485 (UMG96S) to RS232 (PC) is required.
- Adapt the PC's RS232 interface (e.g. COM1) to be used as the interface.
- The interface converter is also connected to this interface (e.g. COM1).
- Baud rate; the baud rate is the speed at which the data is to be transmitted between the PC, the interface converter and the UMG96S.
- Because more than one UMG96S can be connected, the device address set in the UMG96S must also be set under the connection settings.
- If no connection could be established to the UMG96S, an attempt will be repeated following the set Timeout.
- When attempting to read data from the UMG 96S, the number of attempted connections will be limited by the number set under Max. no. of attempts.

When measuring online, the GridVis will repeatedly attempt to establish a connection to the UMG96S.

UMG96S - Available selection for the type of connection

Device type / gateway	Modbus RTU (RS485)	Modbus via Ethernet		M-Bus
		Modbus-TCP	Modbus-RTU	

UMG 604	-	x	x	-
UMG 507	-	-	x	-
UMG 510	-	x	-	-
Interface converter RS232/RS485	x	-	-	-
Interface converter RS232/M bus	-	-	-	x

10.9.4 UMG 96S - Configuration

UMG 96S - Configuration

UMG 96S - Identity

Identity

The name is used, among other things, to identify the device in the device list.

Additional information can be saved under Description.

UMG 96S - Transformers

Transformers

Voltage transformers

- The voltage measurement inputs are designed for the measurement of low voltages in which rated voltages (L-N/PE) of up to 300V against earth can occur.
- Voltage transformers are necessary in networks with higher rated voltages.
- Outer voltage L-L must be input for the primary voltage.
- Set the transformer requirements for the current measurement inputs.

Current transformers

- Currents up to 5A can be measured directly. Observe the installation guide when doing this.
- Transformers are used when measuring currents greater than 5A.
- Set the transformer requirements for the current measurement input.

UMG 96S - Nominal values

Nominal values

- The rated frequency applies for all 3 measurement channels.
- Select the mains frequency in accordance with the existing mains.
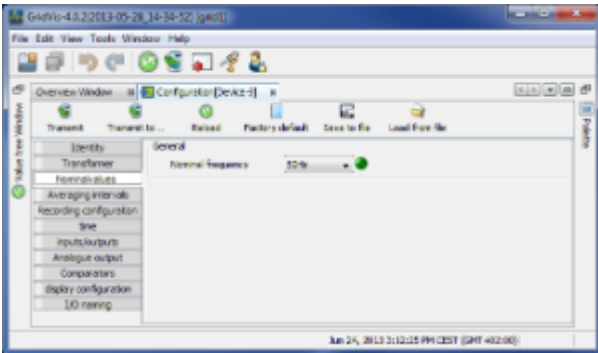
UMG 96S - Averaging intervals

Averaging intervals

- The applied exponential messaging method reaches at least 95% of the measurement value once the reporting time has run its course.
- A reporting time of 15 minutes is set ex works.
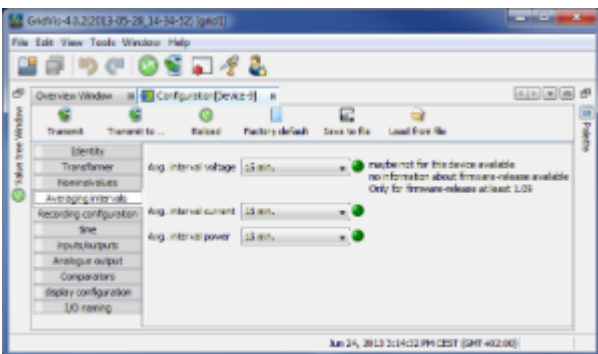
UMG 96S - Recording configuration

Recording configuration

- The UMG 96S saves the configuration data, the minimum and maximum values and the measurement values for the effective power and for the inductive reactive power to the EEPROM memory. Devices with flash memory (option) can also record mean values for current, voltage and power.
- The reporting times for current, voltage and power can be customised.
- The recording intervals reflect the reporting times for the measurement values for current, voltage and power.
- Mean values also identify the saving time in UTC time as additional information.
- Effective power and inductive reactive power can be saved every 60 minutes.
- A threshold event is recorded when it occurs.
- The maximum saving time cannot be calculated when saving threshold events.
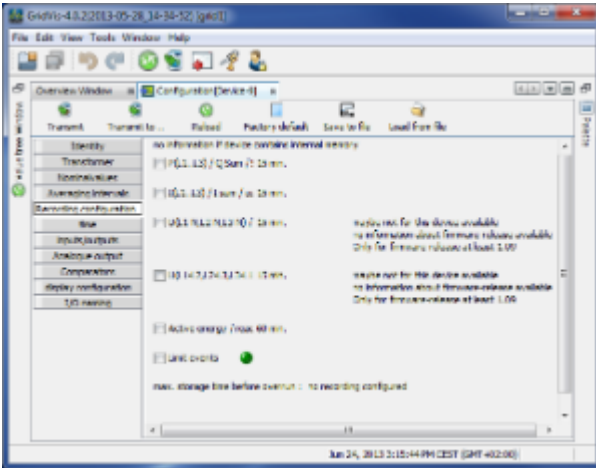
UMG 96S - Time

Time

- The UMG96S is available with a clock with a battery backup (option).
- The clock is programmed ex works for local time.
- During configuration, the clock can be aligned to UTC time in the connected PC.
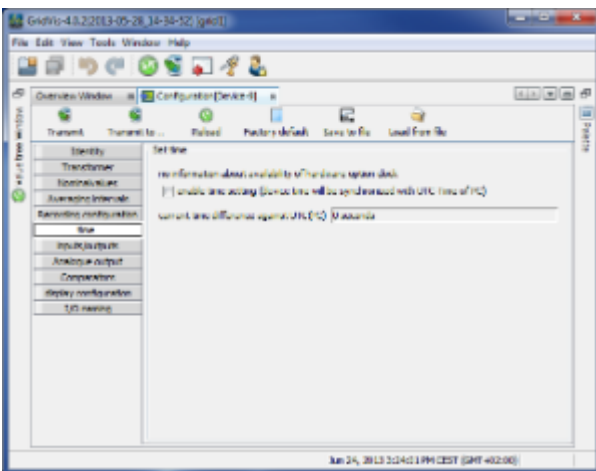
UMG 96S - Inputs/outputs

Inputs / Outputs

- The UMG 96S has two configurable connections. Various configurations are possible.
- Connection terminal 11/12
    - Pulse output for reactive power - pulse output for the supplied effective power
    - Comparator 1 - output comparator 1
    - Analogue output 1 - output 1 as an analogue output (option)
    - Profibus remote off 1 - Profibus output 1 (option)

- HT/LT switching for effective power - high-rate tariff/low-rate tariff switching for the effective power.
- HT/LT switching for reactive power - high-rate tariff/low-rate tariff switching for the reactive power.
- HT/LT switching for effective and reactive power - high-rate tariff/low-rate tariff switching for the effective and reactive power.
- Connection terminal 11/13
  - Pulse output for reactive power - pulse output for the inductive reactive power
  - Comparator 2 - output comparator 2
  - Analogue output 2 - output 2 as an analogue output (option)
  - Profibus remote off 2 - Profibus output 2 (option)
  - HT/LT switching for effective power - high-rate tariff/low-rate tariff switching for the effective power.
  - HT/LT switching for reactive power - high-rate tariff/low-rate tariff switching for the reactive power.
  - HT/LT switching for effective and reactive power - high-rate tariff/low-rate tariff switching for the effective and reactive power.
- If a connection is used as a pulse output, the pulse value (Wh/pulse) and the minimum pulse width can be programmed.
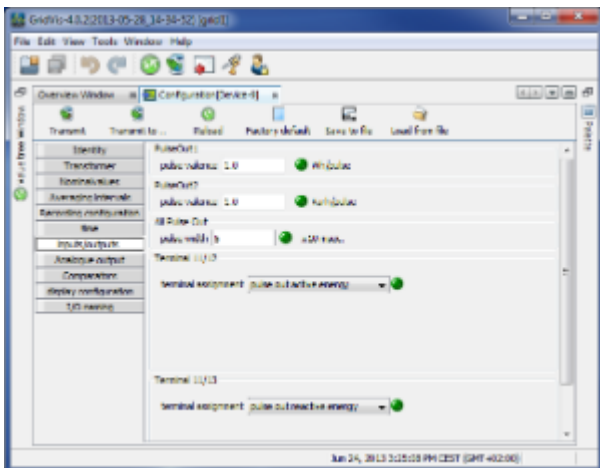
UMG 96S - Analogue output

Analogue outputs (option)

- For versions with analogue outputs, the outputs can either be configured as analogue outputs, as pulse outputs or as switching outputs.
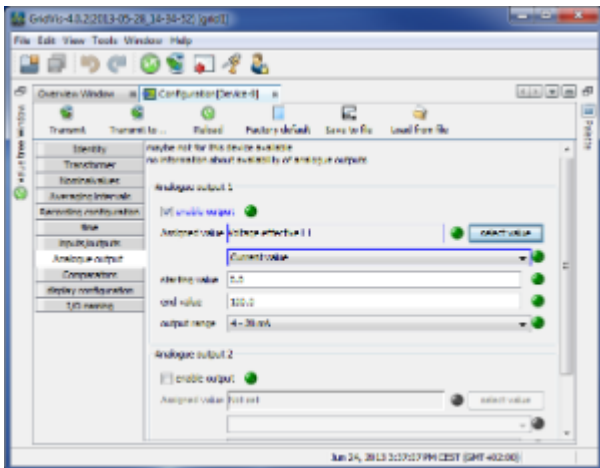
UMG 96S - Comparator

Comparator

- 2 comparator groups, each with 3 comparators (A,B,C), are provided for the monitoring of threshold values.
- The results of the comparators can be AND or OR linked and the result inverted if desired.
- The overall linked result for the comparator group 1 can be allocated to the digital output 1 and the overall linked result for the comparator group 2 can be allocated to the digital output 2.
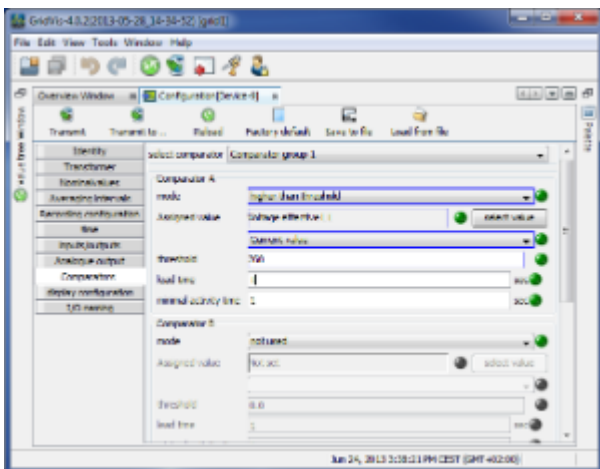
UMG 96S - Display configuration

Display configuration

- Following a power resumption, the UMG96S displays the first measurement value table in the current display profile.
- To keep the selection to a manageable size, only a fraction of the available measurement values was pre-programmed in the factory for retrieval in the measurement value display.
- Select another display profile if the display of other measurement values in the UMG96S is desired.

- 3 fixed and pre-populated display profiles and a customer specific display profile are available for selection.
  - Profile 1, fixed - pre-populated
  - Profile 2, fixed - pre-populated
  - Profile 3, fixed - pre-populated
  - User defined
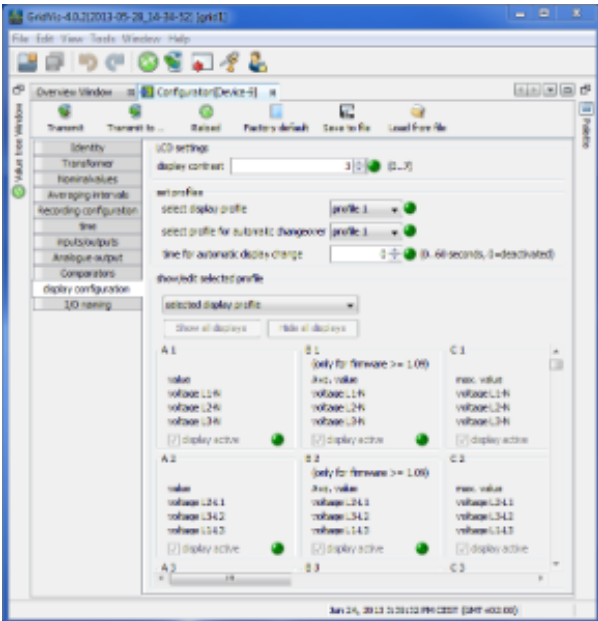
UMG 96S - Naming of inputs

Naming of inputs

- Enables naming of inputs and outputs.
- The respective inputs/appoints can be assigned names by entering a name in the corresponding box.
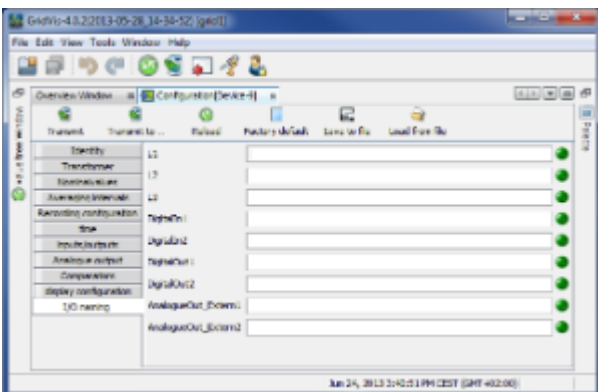
10.9.5 UMG 96S - Connection example

Example of connection: Measurement

- Measuring on separating transformer with centre tapping.
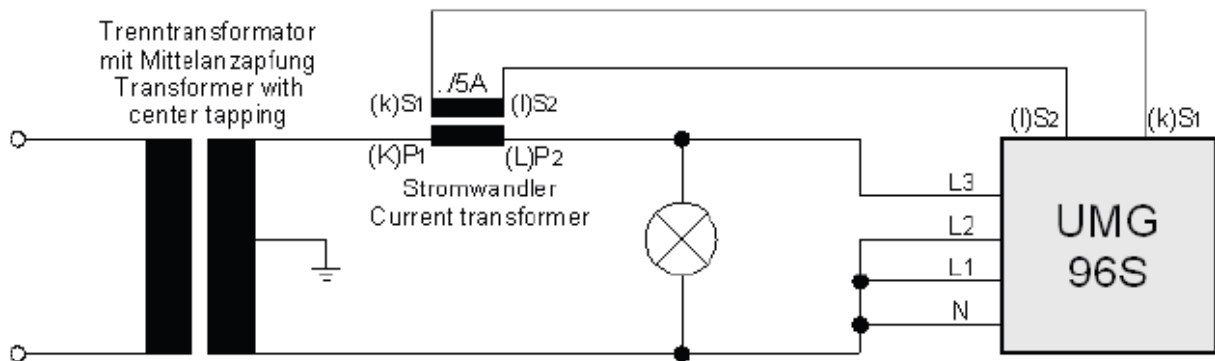
10.9.6 UMG 96S - Modbus functions

Modbus functions

- Modbus functions supported by UMG 96:
    - 03 Read Holding Registers
    - 06 Preset Single Register
    - 16 Preset Multiple Registers

10.10 UMG 103

10.10.1 UMG 103 - Universal meter for top hat rails

10.10.2 UMG 103 - Connection to computer

Connection

Connection PC - UMG 103

Example 1:
The UMG103 has an RS485 interface and the PC has an RS232 interface. An interface converter is required.
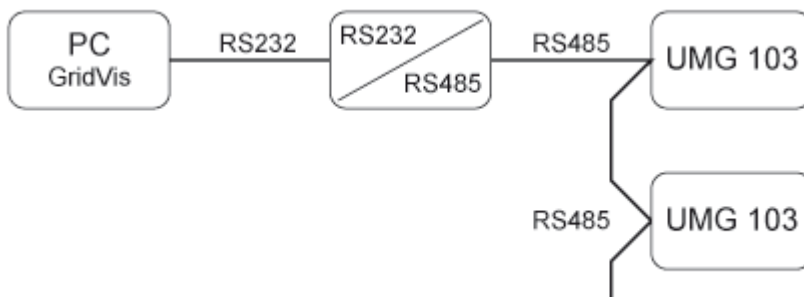
Example 2:
The UMG103 has an RS485 interface and the PC has an Ethernet interface. A gateway is required. The following devices can be used as gateways: UMG 604, UMG 605, UMG 511, UMG 510, UMG 508 and UMG 507.
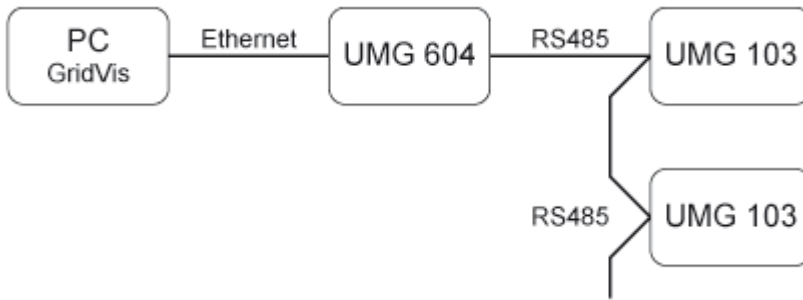
10.10.3 UMG 103 - Adding device

Integrating UMG 103 in GridVis
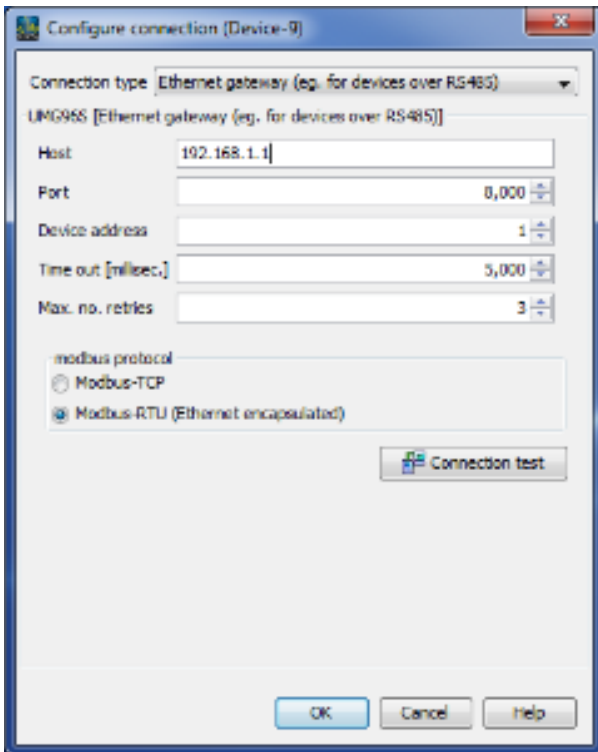
- The UMG103 must be connected to the PC via a gateway (device type) or via an interface converter (
  Example of connection).
  Create a new UMG 103 in GridVis and define the connection type (First steps, Adding new device).

Connection types

Ethernet gateway (e.g. for the devices connected to the RS485)
A gateway is required to be able to connect the UMG 103 via Ethernet to the PC and to be able to configure
it and read it with GridVis.

- The UMG103 has an RS485 interface.
- The gateway must have both an RS485 and an Ethernet interface (e.g. a UMG604 with the
  appropriate options).
- The gateway address (e.g. 192.168.1.1) must be set under the connection settings (see Fig.
  Configuring the connection).
- Because more than one UMG103 can be connected to the gateway, the device address set in the
  UMG103 must also be set under the connection settings (see Fig. Configuring the connection).
- If no connection could be established to the UMG103, an attempt will be repeated following the set
  Timeout.
- When attempting to read data from the UMG 103, the number of attempted connections will be limited
  by the number set under max. no. of attempts.
- The connection protocol must be set via the Modbus protocol. TCP/IP packets are used when
  connecting via Modbus TCP. The TCP port 502 is reserved for Modbus TCP.
- When measuring online, the GridVis will repeatedly attempt to establish a connection to the UMG103.

Modbus RTU (RS485/RS232)

An interface converter is required to be able to connect the UMG 103 to the PC's RS232 interface and to be able to configure it and read it with GridVis.

- The UMG103 has an RS485 interface.
- An interface converter from RS485 (UMG103) to RS232 (PC) is required.
- Adapt the PC's RS232 interface (e.g. COM1) to be used as the interface.
- The interface converter is also connected to this interface (e.g. COM1).
- Baud rate; Is the speed at which the data is to be transmitted between the PC, the interface converter and the UMG103.
- Because more than one UMG103 can be connected to the interface converter, the device address set in the UMG103 must also be set under the connection settings.
- If no connection could be established to the UMG103, an attempt will be repeated following the set Timeout.
- When attempting to read data from the UMG 103, the number of attempted connections will be limited by the number set under Max. no. of attempts.
- When measuring online, the GridVis will repeatedly attempt to establish a connection to the UMG96S.

10.10.4 UMG 103 - Configuration

UMG 103 - Configuration
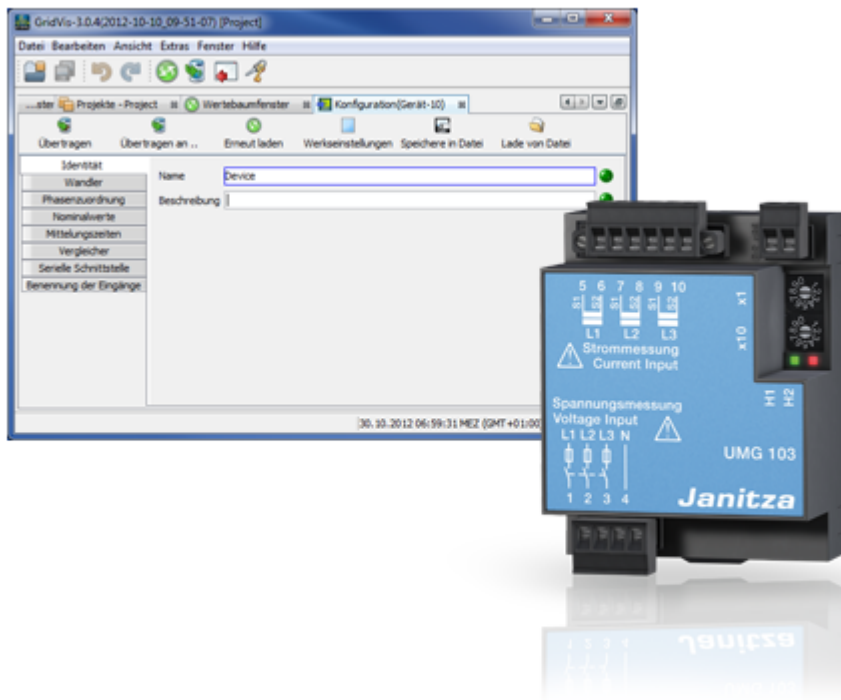
UMG 103 - Identity

Identity

- The name is used, among other things, to identify the device in the device list.
- Additional information can be saved under Description.
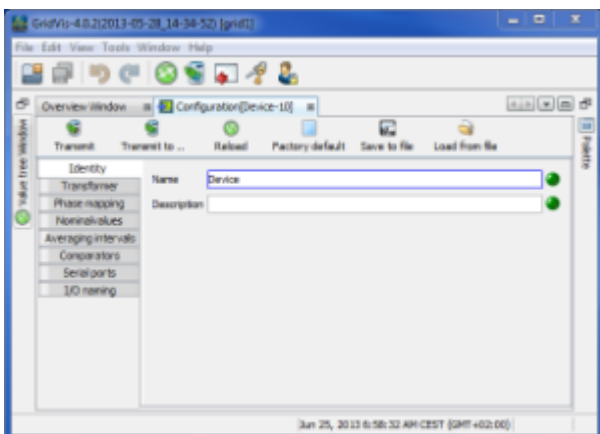
UMG 103 - Transformer

Transformers

Voltage transformers

- The voltage measurement inputs are designed for the measurement of low voltages in which rated voltages (L-N/PE) of up to 300V against earth can occur.
  Voltage transformers are necessary in networks with higher rated voltages.
- Outer voltage L-L must be input for the primary voltage.
- Set the transformer requirements for the current measurement inputs.

Current transformers

- Currents up to 5A can be measured directly. Observe the installation guide when doing this.
- Transformers are used when measuring currents greater than 5A.
- Set the transformer requirements for the current measurement input.
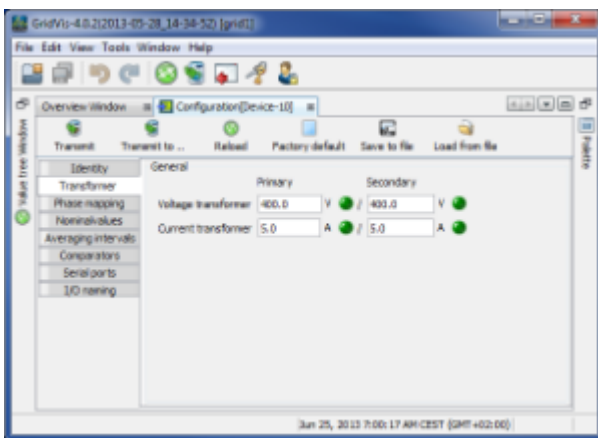
UMG 103 - Phase mapping

UMG103 - Phase mapping

- The phase wiring and the electricity consumer wiring can be redefined by the phase assignments.
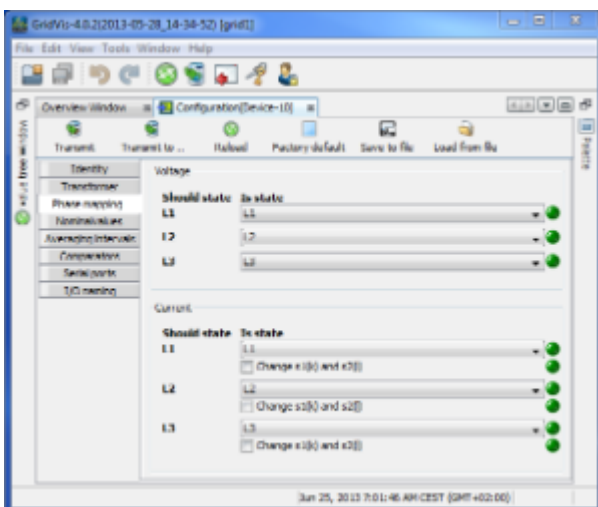
UMG 103 - Nominal values

Nominal values

- The rated frequency applies for all 3 measurement channels.
- Select the mains frequency in accordance with the available mains supply.
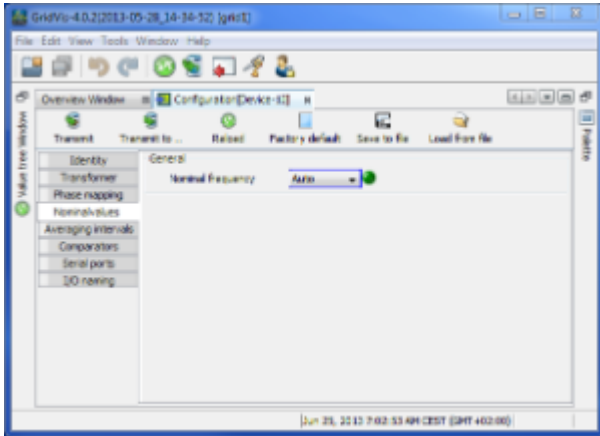
UMG 103 - Averaging intervals

Averaging intervals

- The applied exponential messaging method reaches at least 95% of the measurement value once the reporting time has lapsed.
- A reporting time of 15 minutes is set ex works.
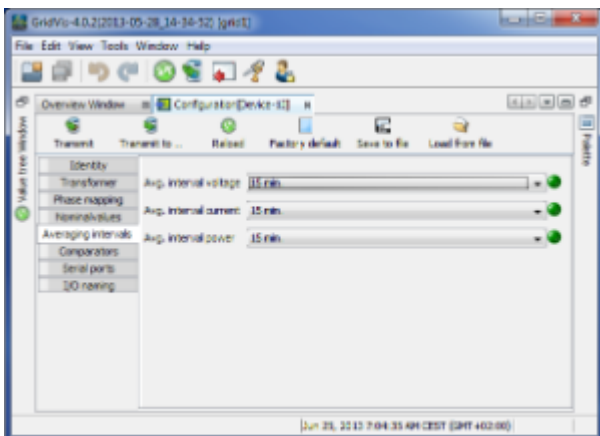
UMG 103 - Comparators

Comparators

- 2 comparator groups, each with 3 comparators (A,B,C), are provided for the monitoring of threshold values.

- The results of the comparators can be linked by AND or OR operators and the result inverted if desired.
- The overall linked result for the comparator group 1 can be allocated to the digital output 1 and the overall linked result for the comparator group 2 can be allocated to the digital output 2.
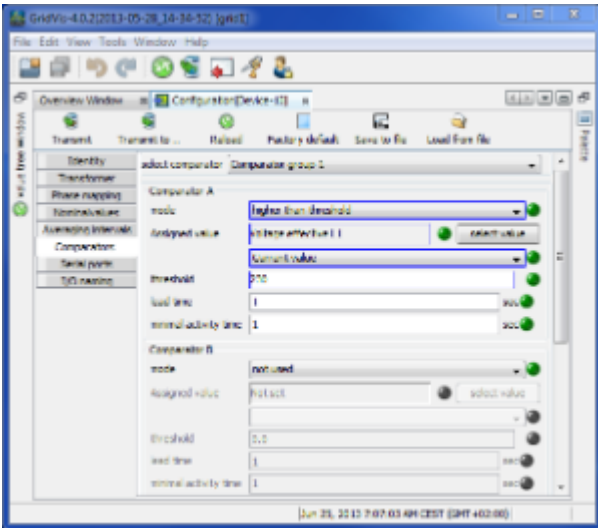
UMG 103 - Serial interface

Serial outputs

An interface converter is required in order to establish a direct connection between the PC (RS232 interface) and the UMG103 (RS485 interface). The UMG103 can only function as a Modbus slave. As more than one UMG103 can be connected to an interface converter, each UMG103 must be set with its own device address. Note that the device address 0 is reserved for servicing. Two rotary switches on the device are used to set the device address.

- RS485 in the Modus Modbus slave
- Baud rate selection from 9600bps, 19200bps, 38400bps, 115200bps and auto detect.

The baud rate is the speed at which the data is to be transmitted between the PC, the interface converter and the UMG604. The UMG103 is set in the factory to the automatic baud rate recognition feature, "auto detect".

If a fixed baud rate is selected in the UMG103, it must also be programmed in the remote station (PC, UMG604). The auto detect setting in the UMG103 attempts to establish the baud rate in the remote station with a maximum of 8 attempts.
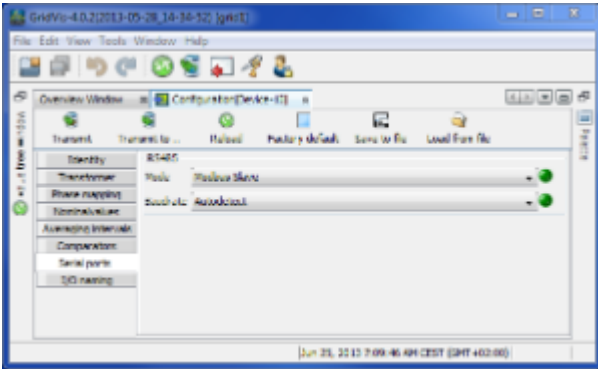
UMG 103 - Naming of the inputs

Naming of inputs

- Enables naming of inputs and outputs.
- The respective inputs/appoints can be assigned names by entering a name in the corresponding box.
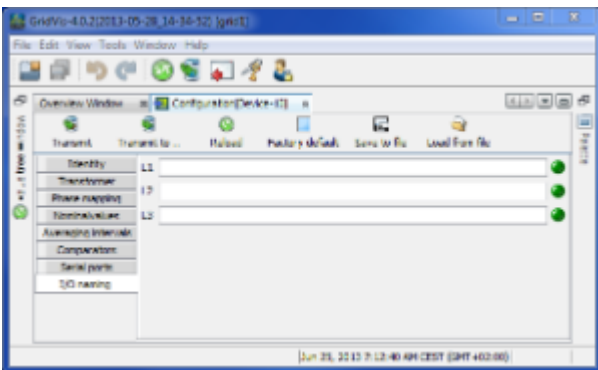
UMG 103 - Setting device address

Setting the device address

- Two rotary switches on the device are used to set the device address from 1 to 99.
- When using more than one UMG103, for example with an interface converter, each device must be set with its own address.
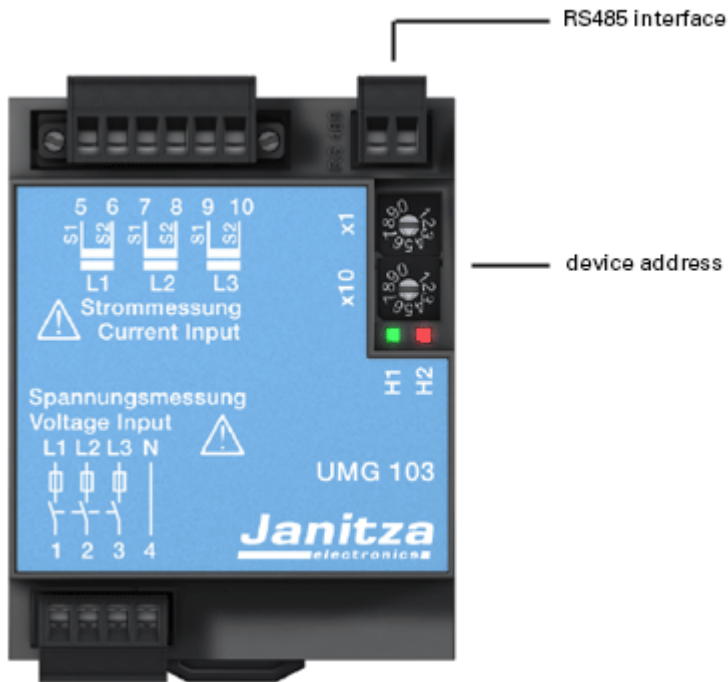
10.10.5 UMG 103 - Modbus functions

Modbus functions

- Modbus functions supported by UMG 103:
    - 03 Read Holding Registers
    - 04 Read Input Registers
    - 06 Preset Single Register
    - 16 Preset Multiple Registers

10.11 UMG 104

10.11.1 UMG 104 - Grid analyser

10.11.2 UMG 104 - Connection to computer

Connection

PC - UMG 104 connection

Example 1:
The UMG104 and the PC have an RS232 interface.
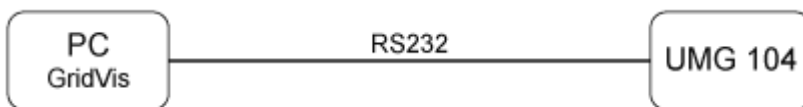
Example 2:
The UMG104 has an RS485 interface and the PC has an Ethernet interface. A gateway is required. The following devices can be used as gateways: UMG 604, UMG 605, UMG 511, UMG 510 and UMG 508
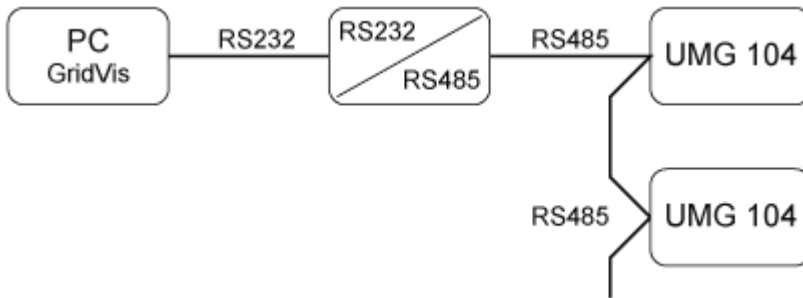
Example 3:
The UMG104 has an RS485 interface and the PC has an Ethernet interface. A gateway is required. The following devices can be used as gateways: UMG 604, UMG 605, UMG 511, UMG 510 and UMG 508.
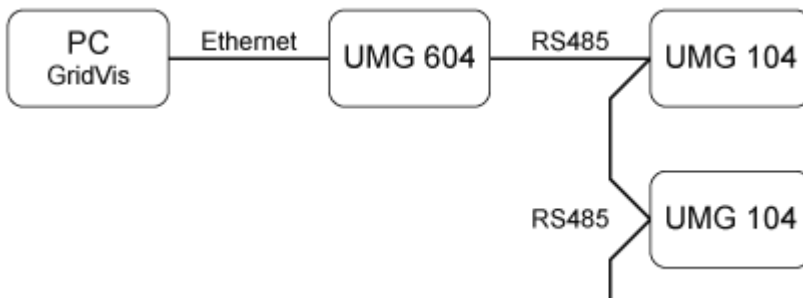
10.11.3 UMG 104 - Adding device

Integrating UMG 104 in GridVis

- Create a new UMG 104 in GridVis and define the appropriate type of connection for your device (First steps, Adding new device).

Connection types

Ethernet gateway (e.g. for the devices connected to the RS485)
A gateway is required to be able to connect the UMG 104 via Ethernet to the PC and to be able to configure it and read it with GridVis.

- The UMG104 has an RS485 interface.
- The gateway must have both an RS485 and an Ethernet interface (e.g. a UMG604 with the appropriate options).
- The gateway address (e.g. 192.168.1.1) must be set under the connection settings (see Fig. Configuring the connection).
- Because more than one UMG 104 can be connected to the gateway, the device address set in the UMG103 must also be set under the connection settings (see Fig. Configuring the connection).
- If no connection could be established to the UMG104, an attempt will be repeated following the set Timeout.
- When attempting to read data from the UMG 104, the number of attempted connections will be limited by the number set under Max. no. of attempts.

- The connection protocol must be set via the Modbus protocol. TCP/IP packets are used when connecting via Modbus TCP. The TCP port 502 is reserved for Modbus TCP.
- When measuring online, the GridVis will repeatedly attempt to establish a connection to the UMG104.

- Modbus RTU (RS485/RS232)
  Using an RS485 connection, a direct connection can be established over an interface converter between the UMG 104 and the PC's RS232 interface (Connection).
  RS232-RS232 connection
    - The UMG104 has an RS232 interface.
    - Adapt the PC's RS232 interface (e.g. COM1) to be used as the interface.
    - Baud rate; the baud rate is the speed at which the data is to be transmitted between the PC, the interface converter and the UMG104.
    - Device address: set the set UMG104 device address.
    - If no connection could be established to the UMG104, an attempt will be repeated following the set Timeout.
    - When attempting to read data from the UMG 104, the number of attempted connections will be limited by the number set under Max. no. of attempts.
    - When measuring online, the GridVis will repeatedly attempt to establish a connection to the UMG104.
  RS232-RS485 connection
    - The UMG103 has an RS485 interface.
    - An interface converter from RS485 (UMG104) to RS232 (PC) is required.
    - Adapt the PC's RS232 interface (e.g. COM1) to be used as the interface.
    - The interface converter is also connected to this interface (e.g. COM1).
    - Baud rate; the baud rate is the speed at which the data is to be transmitted between the PC, the interface converter and the UMG96S.

- Because more than one UMG104 can be connected to the interface converter, the device address set in the UMG104 must also be set under the connection settings.
- If no connection could be established to the UMG104, an attempt will be repeated following the set Timeout.
- When attempting to read data from the UMG 104, the number of attempted connections will be limited by the number set under Max. no. of attempts.
- When measuring online, the GridVis will repeatedly attempt to establish a connection to the UMG104.

10.11.4 UMG 104 - Configuration

UMG 104 - Configuration

UMG 104 - Identity

Identity

- The name is used, among other things, to identify the device in the device list.
- Additional information can be saved under Description.
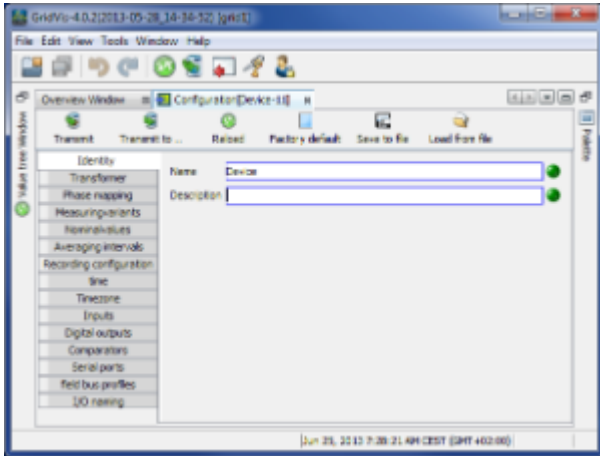
UMG 104 - Transformers

Transformers

Voltage transformers

- The UMG104's voltage measurement inputs are designed for the measurement of low voltages in which rated voltages (L-N/PE) of up to 300V against earth can occur.
- Voltage transformers are necessary in networks with higher rated voltages.
- The converter requirements for each voltage input must be determined separately.

Current transformers

- Currents up to 5A can be measured directly. Observe the installation guide when doing this.
- Transformers are used when measuring currents greater than 5A.
- Set the current converter requirements for the current measurement input.
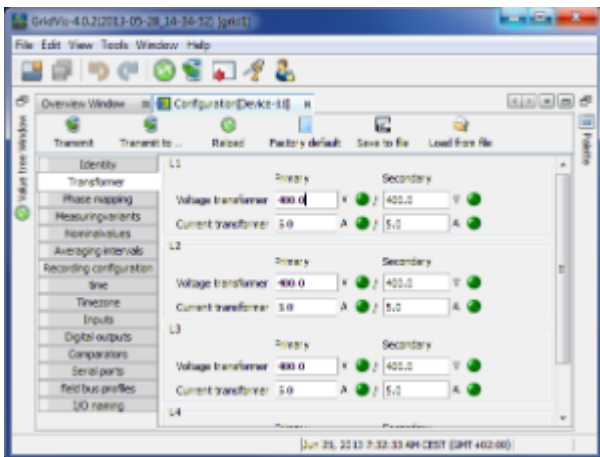
UMG 104 - Phase mapping

Phase mapping

- The phase wiring and the electricity consumer wiring can be redefined by the phase assignments.
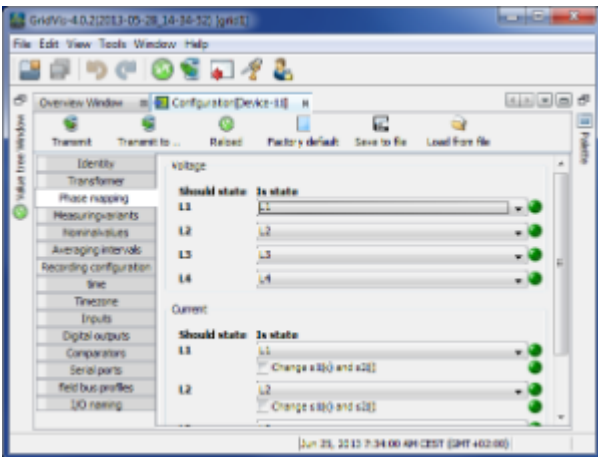
UMG 104 - Measuring variants

Measuring variants

- Set the device's connection variant for the voltage and current measurements (operating manual).

UMG 104 - Nominal values

Nominal values

- All 4 of the measurement channels are activated via the rated frequency. Select the mains frequency in accordance with the available grid supply.
- Nominal values are required as a reference to identify events (over/undervoltage and overcurrent).
- The rated current of the transformer at the supply is required in order to calculate the K factor.
- The relevant voltage indicates whether a measurement is to be made between the
- outer conductor L-L or between
- outer conductor L and neutral conductor N.
- The relevant voltage is required for the calculation of harmonics, events and flicker.

- For UMG 508, UMG 604 and UMG 104 devices with the firmware small Rel. 2.x, the relevant voltage is not adjustable and is always L-N.
- In the 3-conductor network (e.g. mean voltage) the relevant voltage relates to a calculated star point.

UMG 104 - Averaging intervals

Averaging intervals

- The applied exponential messaging method reaches at least 95% of the measurement value once the reporting time has run its course.
- A reporting time of 10 minutes is set ex works.
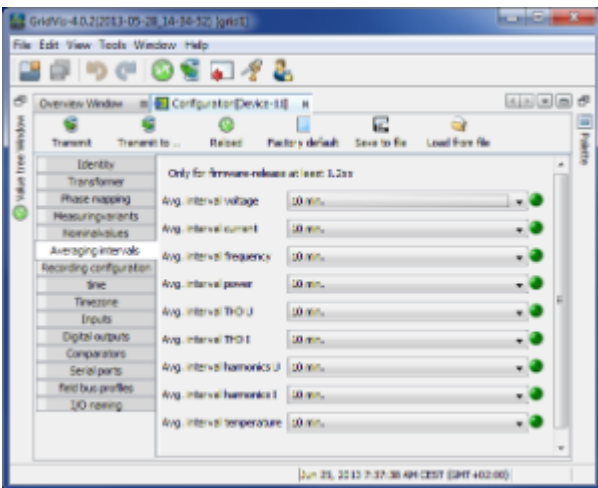
UMG 104 - Recording configuration

Recording configuration

- Up to 16 records can be configured when configuring recording.
- A record can have a maximum of 1000 values.
- A record holds a measurement value or the mean value of the measurement value.

- Mean value records can also include the minimum and the maximum values.
- Mean values, minimum values and maximum values are derived from the measurement values in the measurement timeframe.
- The mean value measurement timeframe is established by the time set under "Time basis".
- Measurement values are saved once the time set under "Time base" has lapsed (Calculation of required storage capacity).
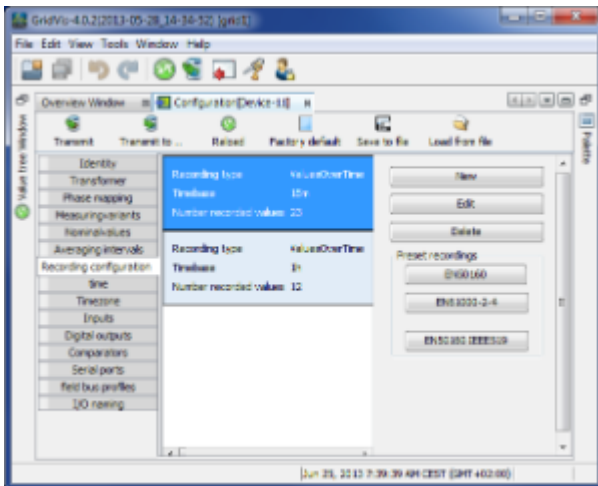
Setting up / editing a recording configuration

- An individual recording instance can be set up using the "*New*" or "*Edit*" buttons.
- Measurement values are selected in the recording window using the "*Add values*" button.
- To do so drag the desired measurement value (measurement value group) over the value field. This saves and displays the measurement values.
  The selected measurement values can be described in more detail via the option "Mean (arithmetical)", "Mean (RMS)", "Minimum", "Maximum", "Sample" and "With value change".
  - Mean (arithmetical)
    The arithmetical mean is the ratio of the sum and the number of all 200ms measurement values:
    $x(arithm.) = (x1+x2+x3...) / n$
  - Mean (rms)
    This value describes a quadratic mean (potential mean) with:
    $x (rms) = root ((x1^2+x2^2+x3^2+..) / n)$
  - Minimum / Maximum
    When these buttons are selected, the means of the minimum and/or maximum values are recorded.
  - Sample
    Sample describes the recording of the measurement value within the defined time duration.
    The time baseline defines the time intervals at which the recording is made.

In contrast to the arithmetical mean, the quadratic mean is of increasing importance when the measurement values vary greatly cyclically. Outliers in the measurement values thus have a greater significance. With a value like voltage, it is a good idea to take this more into account than for a power value.

- Using the "*Delete values*" button, selected measurement values can be deleted.
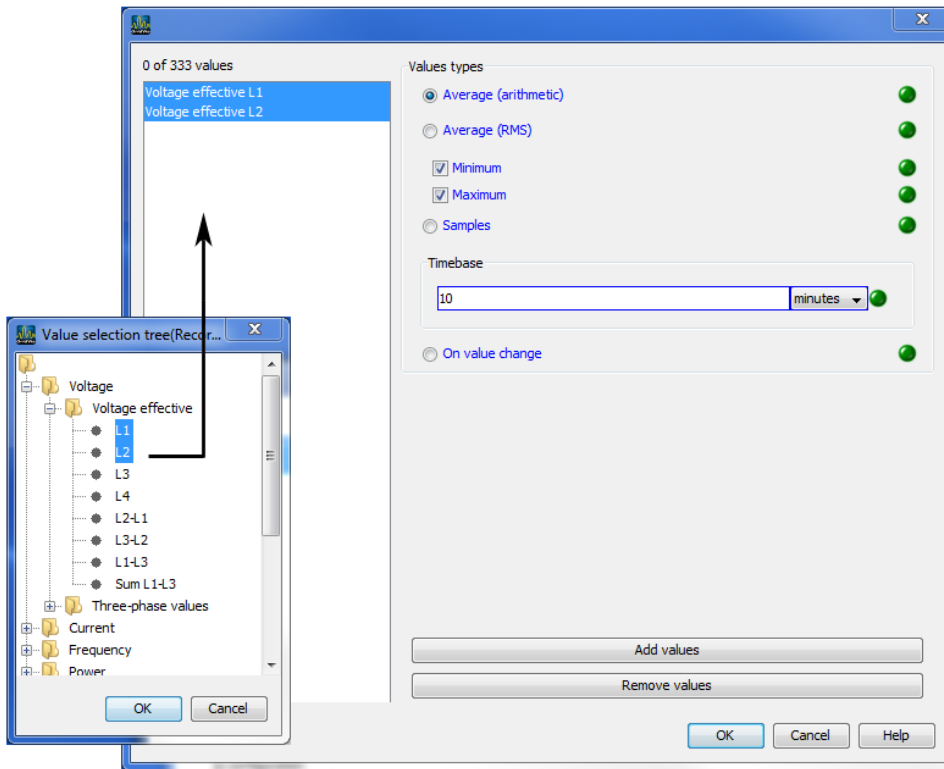
EN50160 and EN61000-2-4 presettings selection aid

- Via the EN50160 and EN61000-2-4 buttons, recording configurations can be predefined.
- If the device does not support measurement as per EN50160, a prompt appears.

UMG 104 - Time

Time

- The UMG 104 has a clock with a battery backup.
- The fault in the clock's quartz is aligned with room temperature during production so that the clock only deviates by +- 1 minute/month.
- The clock is programmed ex works for local time.
- During configuration, the clock can be aligned to UTC time in the connected PC.
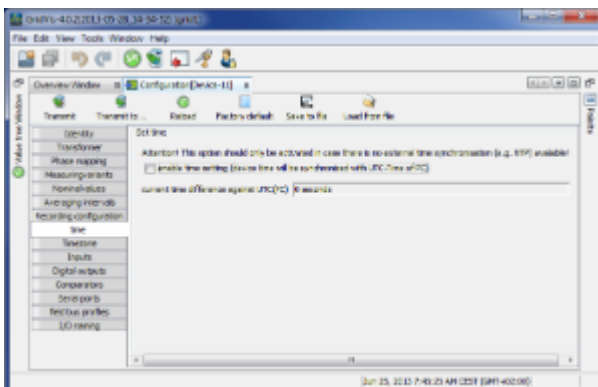
UMG 104 - Time zone

Time zone

All time information with regard to measurement values, events and transients relate to UTC time (Coordinated Universal Time). GridVis converts UTC time to Central European Time (CET) when it displays measurement results. Central European Time (CET) is the applicable time zone in central Europe and therefore also in Germany.

- *Winter time* - time offset from Central European Winter Time relative to UTC time.
- *Summer time* - time offset from Central European Summer Time relative to UTC time.
- *Start of daylight saving time* - start of daylight saving time.
- *End of daylight saving time* - end of daylight saving time.
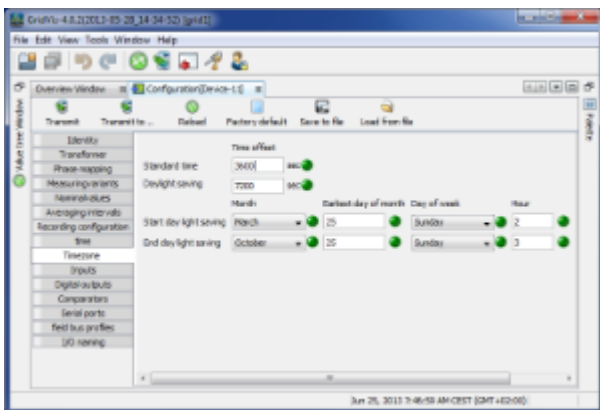
UMG 104 - Inputs

Inputs

The UMG104 has two digital outputs and an input used to measure temperature. Both digital inputs can be used as digital inputs and as input pulse meters.

A pulse value can be assigned to every pulse input.

Various temperature sensors can be connected to the input used to measure temperature:

- PT100 - temperature range -55°C .. +175?
- PT1000 - temperature range -40°C .. +300°C
- KTY83 - temperature range -99°C .. +500?
- KTY84 - temperature range -99°C .. +500?
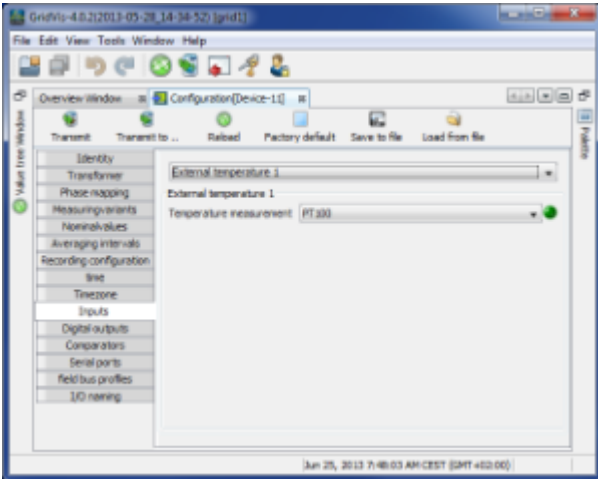
UMG 104 - Digital outputs

Outputs

The UMG104 has two digital outputs. Both of these digital outputs can be programmed as a pulse output (S0 output) or as a comparator group output.

- Each digital output can be programmed as a NC or NO contact.
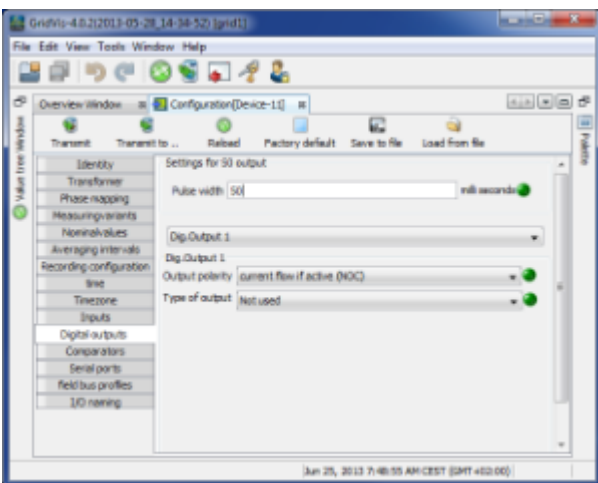
UMG 104 - Comparator

Comparator

- 2 comparator groups, each with 4 comparators (A,B,C,D), are provided for the monitoring of threshold values.
- The results of the comparators can be AND or OR linked and the result inverted if desired.
- The overall linked result for the comparator group 1 can be allocated to the digital output 1 and the overall linked result for the comparator group 2 can be allocated to the digital output 2.
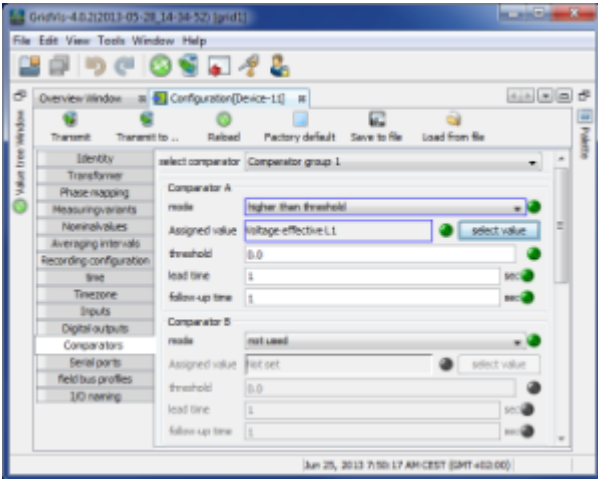
UMG 104 - Serial ports

Serial ports

- Device ID

  The device ID (device address) is required for Modbus communication and for the Profibus.

  Each device has its own address within the bus.

- RS485

  Modbus setting: Modbus slave

  Baudrate selection from 9600bps, 19200bps, 38400bps, 57600bps, 115200bps and 921600bps

  The baudrate is to be selected uniformly in grid.

- RS232

  Modbus settings: Modbus slave and SLIP

  Baud rate selection from 9600bps, 19200bps, 38400bps, 57600bps and 115200bps

- Profibus (version P)

  Note! Additional Profibus settings are made under Fieldbus profiles.
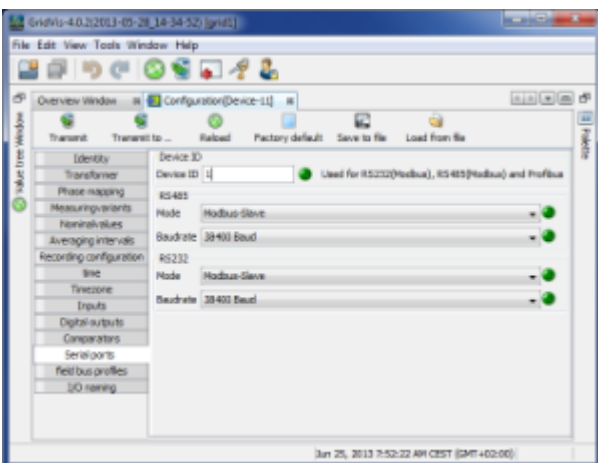
UMG 104 - Fieldbus profiles

Fieldbus profiles

Fieldbus profiles hold a list of values which can be read or written by a PLC over the Profibus.

- Using GridVis, 16 fieldbus profiles can be configured.
- The UMG 104 is pre-programmed ex works with 4 fieldbus profiles.
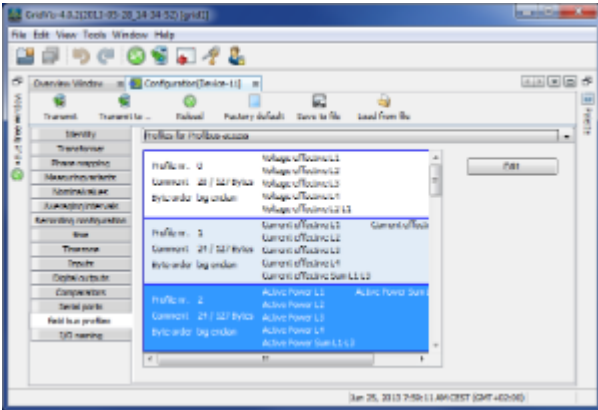
- Using the Edit button, the preconfigured fieldbus profiles can be retrospectively changed.
- To do so drag the desired measurement value (measurement value group) over the value field. This saves and displays the measurement values.
- Using the Delete values button, selected measurement values can be deleted.
- The measurement value sequence can be determined with the position buttons.
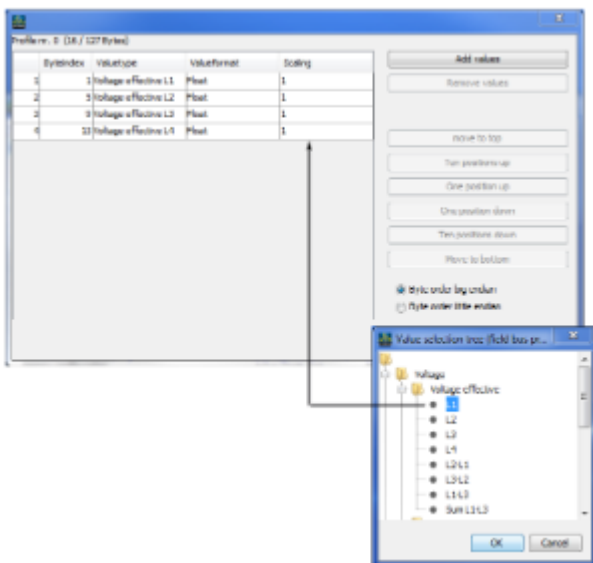
UMG 104 - Naming of inputs

Naming of inputs

- Enables naming of inputs and outputs.
- The respective inputs/appoints can be assigned names by entering a name in the corresponding box.
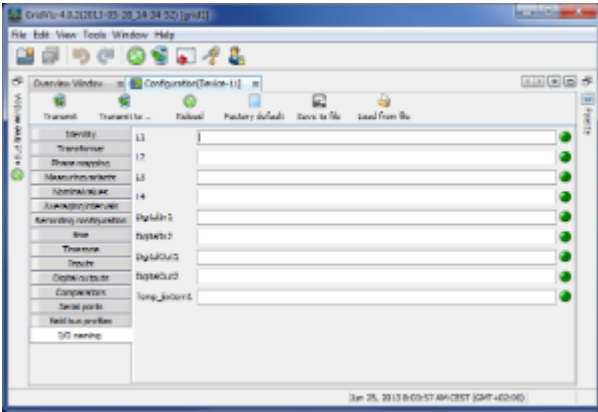
10.12 UMG 604

10.12.1 UMG 604 - Grid analyser

10.12.2 UMG 604 - Connections to computer

Connections

PC - UMG 604 connection

Example 1 (RS232-RS485 connection):
The PC has an RS232 interface and the UMG604 an RS485 interface. An interface converter is required.
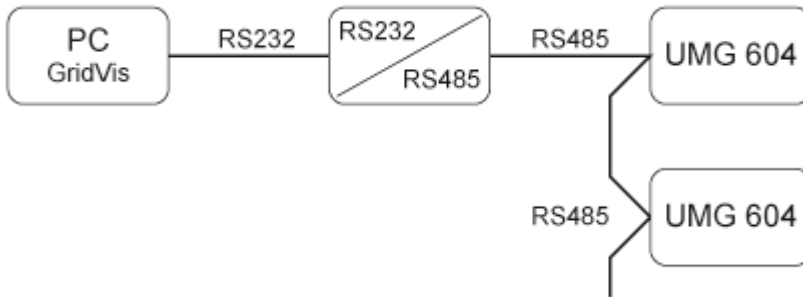
Example 2 (direct Ethernet connection):
The PC and the UMG604 have an Ethernet interface. Because there is a direct connection, a "twisted" patch cable must be used.
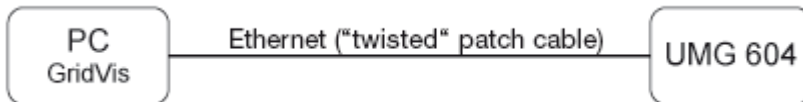
Example 3 (Ethernet connection):
The PC and the UMG604 have an Ethernet interface. The connection is established in a network via a switch or a hub.
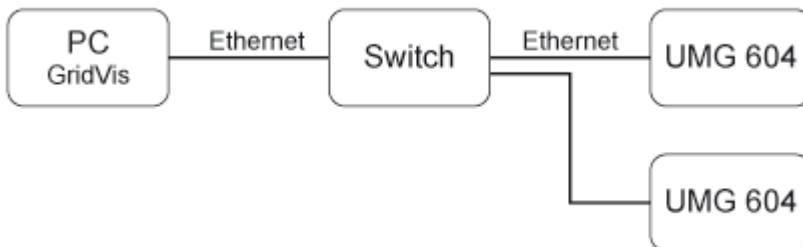
Example 4 (BACnet gateway connection):
The UMG604 is used as a BACnet gateway with which to connect RS485 devices (e.g. UMG96S). The UMG604 is the Modbus master (RS485) and the UMG96S the Modbus slave, whereby the BACnet shows the UMG96S as the UMG604's virtual device. A Jasic program queries the measurement values for the connected devices and provides the values to the BACnet.
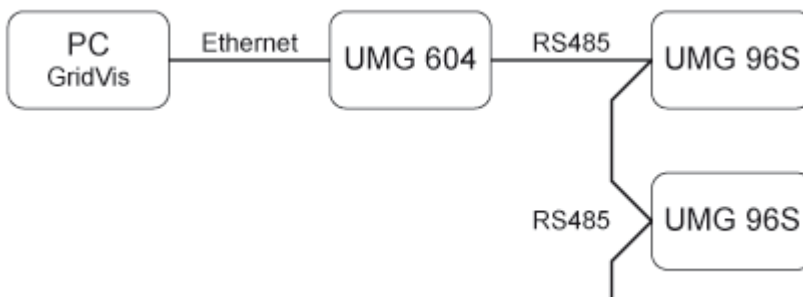
Example 5 (Modbus gateway connection):
The UMG604 is used as a gateway with which to connect RS485 devices (e.g. UMG96S). The UMG604 is the Modbus master (RS485) and the UMG96S the Modbus slave, whereby the baud rate to be set for both devices must concur. A Jasic program queries the measurement values for the connected UMG96S and makes them available for further processing.

10.12.3 UMG 604 - Adding device

Integrating UMG 604 in GridVis

Create a new UMG 604 in GridVis and define the appropriate type of connection for your device (First steps, Adding new device).

- Ethernet interface (option) with the connection types TCP/IP and Modbus via Ethernet
- RS485 interface with the connection type Modbus RTU (RS485)

Connection types

- TCP/IP connection
  A "twisted" patch cable is required in order to establish a direct connection between a PC and a UMG 604 via the Ethernet interface. A normal patch cable is used when establishing a connection in a network (a hub/switch is present).
- The UMG604 address can be pulled via DHCP from a server or a fixed address set directly in the UMG604.
- The address can be input as an address or as a name.
- Using Timeout it is possible to limit the time in which to attempt to establish a connection, when no connection exists.

- Modbus RTU (RS485/RS232)
  An interface converter is required to be able to connect the UMG 604 to the PC's RS232 interface and to be able to configure it and read it with GridVis.

- An interface converter from RS485 (UMG604) to RS232 (PC) is required.
- Adapt the PC's RS232 interface (e.g. COM1) to be used as the interface.
- The interface converter is also connected to this interface (e.g. COM1).
- The baud rate is the speed at which the data is to be transmitted between the PC, the interface converter and the UMG604.

- As more than one UMG604 can be connected to the interface converter, the device address set in the UMG604 must also be set in the interface converter.
- If it is not possible to establish a connection with the UMG604, an attempt will be repeated following the set Timeout.
- When attempting to read data from the UMG 604, the number of attempted connections will be limited by the number set under Max. no. of attempts.
- With online measurements, GridVis will repeatedly attempt to establish a connection to the UMG604.

- Ethernet gateway (e.g. for the devices connected to the RS485)
  A gateway is required to be able to connect the UMG 96S via Ethernet to the PC and to be able to configure it and read it with GridVis. A UMG604 can be used to establish this gateway function (Connection example 5).
- The gateway address (e.g. 192.168.1.1) must be set under the connection settings (see Fig. Configuring the connection).
- Because more than one device (e.g. UMG96S) can be connected to the gateway, the device address set in the UMG96S must also be set under the connection settings (see Fig. Configuring the connection).
- If no connection could be established to the UMG96S, an attempt will be repeated following the set Timeout.
- When attempting to read data from the UMG96S, the number of attempted connections will be limited by the number set under Max. no. of attempts.
- The connection protocol must be set via the Modbus protocol. TCP/IP packets are used when connecting via Modbus TCP. The TCP port 502 is reserved for Modbus TCP.
- When measuring online, the GridVis will repeatedly attempt to establish a connection to the UMG96S.

- Secured TCP
- A connection between a PC and a UMG 604 via TCP/IP connection with secured access data.
- The UMG604 address can be dragged via DHCP from a server or a fixed address set directly in the UMG604.
- Using Timeout it is possible to limit the time in which to attempt to establish a connection, when no connection exists.
- Enter your access data (username, password) for a secured connection.

10.12.4 UMG 604 - Introduction

UMG 604 - Introduction

UMG 604 - Data memory

Data memory

- The UMG 604 has a flash memory of 128 MByte.
- Of this, approx. 112 MByte are available to the user as data memory.
- Homepage add-ons or files loaded to the UMG604 via FTP reduce the available data memory.

In its delivery condition, with the factory default data memory configuration settings, the UMG can save the following quantities of data:

	Available memory capacity in the factory configuration (112MByte)		
	Memory capacity in %	Memory capacity in Mbyte	Memory capacity is sufficient for
Records (standard configuration)	40	44.8	approx. 4 years
Harmonics	22.5	25.2	1,500 transients
Recording of events	10	11.2	80,000 events
Full wave effective values	22.5	25.2	1,000 full wave effective values

Flagging	5	5.6	100,000 flags

Estimated memory capacity for records

- Measured value, mean value, minimum value and maximum value each requires 4 bytes of memory.
- A dataset without measurement values requires 24 bytes of memory.

- A dataset with one measurement value requires the following per record: 24 bytes + 4 bytes = 28 bytes.
- A dataset with one mean value requires the following per record: 24 bytes + 4 bytes = 28 bytes.
- A dataset for a mean value with minimum and maximum values requires the following per record: 24 bytes + 4 bytes + 4 bytes + 4 bytes = 36 bytes.
- Example: Measurement value records for the voltage in L1. Time basis = 60 seconds.
- Dataset = 24 bytes + 4 bytes measurement value, i.e.: Dataset = 28 bytes
- Required memory per day (86,400 seconds):
- Per day, 86400: 60 = 1440 datasets are saved.
- 1440 datasets * 28 bytes = 40320 bytes of memory required per day.
- Required memory per month:
  40320 bytes * 31 days = 1249.92 kB required memory per month.
- Required memory per year:
  1249.92 kB * 12 months = approx. 15 MB required memory per year.

UMG 604 - Error message

Error message

- The UMG604 display shows the error message "Error CF".
- Cause
  The calibration data cannot be read from the memory without error.
- Remedy
  Send the device to the manufacturer for inspection and testing.

UMG 604 - Jasic

Jasic

- 7 Jasic programs can be executed simultaneously in the UMG604.
- 128 kByte of memory is available for each program.
- Jasic programs are easily created with the graphic programming integrated into GridVis.

UMG 604 - Parameter list

Parameter list

- The parameter list is a list of addresses for settings that can be directly implemented on UMG604.
- The parameter list forms part of the installation instructions.

If the UMG604 is in "Programming mode" you can edit the values in the parameter list with numeric 1 and 2 keys (see Manual).

Parameterliste

Adr.	Bezeichnung	Einstellbereich	Einheit	Vorein-stellung
000	Stromwandler, primär, L1..L4	0 .. 1000000	A	5
001	Stromwandler, sekundär, L1..L4	1 .. 5	A	5
002	Spannungswandler, primär, L1..L4	0 .. 1000000	V	400
003	Spannungswandler, sekundär, L1..L4	1 .. 400	V	400
010	Stromwandler, primär, L1	0 .. 1000000	A	5
011	Stromwandler, sekundär, L1	1 .. 5	A	5
012	Spannungswandler, primär, L1	0 .. 1000000	V	400
013	Spannungswandler, sekundär, L1	1 .. 400	V	400
020	Stromwandler, primär, L2	0 .. 1000000	A	5
021	Stromwandler, sekundär, L2	1 .. 5	A	5
022	Spannungswandler, primär, L2	0 .. 1000000	V	400
023	Spannungswandler, sekundär, L2	1 .. 400	V	400
030	Stromwandler, primär, L3	0 .. 1000000	A	5
031	Stromwandler, sekundär, L3	1 .. 5	A	5
032	Spannungswandler, primär, L3	0 .. 1000000	V	400
033	Spannungswandler, sekundär, L3	1 .. 400	V	400
040	Stromwandler, primär, L4	0 .. 1000000	A	5
041	Stromwandler, sekundär, L4	1 .. 5	A	5
042	Spannungswandler, primär, L4	0 .. 1000000	V	400
043	Spannungswandler, sekundär, L4	1 .. 400	V	400

Excerpt from the installation instructions for *UMG 604.*
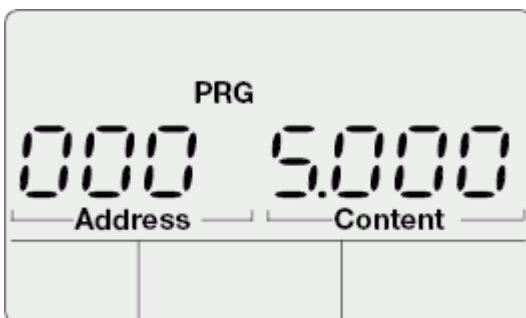
LCD in UMG 604.
Example: Address 000 with the content 5.

UMG 604 - Configuration file init.jas

Configuration file init.jas

- init.jas is a text file that is saved in the directory /sys/config/init.jas of the UMG 604.
- init.jas contains the configuration data for the UMG 604.
- Part of init.jas is overwritten by GridVis.
- init.jas does not contain any configuration data for the EMAX program (option).
- init.jas does not contain any configuration data for recordings.

Example of *init.jas*

10.12.5 UMG 604 - Measurement

UMG 604 - Measurement

UMG 604 - Measurement values

Measurement values

- A measurement value (in the UMG604) is an effective value generated over a 200ms period (measurement window).
- A measurement window has 10 periods in the 50Hz network and 12 periods in the 60Hz network.
- A measurement window has a starting point and an end point.
- There are approx. 2ns between the starting point and end point.
- The precision of the starting and end points depends on the precision of the internal clock. (Typically +- 1minute/month)
- Comparing and aligning the time in the device with that of a time server is recommended in order to improve the internal clock's precision (time).

UMG 604 - Full wave effective values

Full wave effective values

- A full wave effective value is a measurement value that corresponds with the formation of a full wave over a measurement period.
- For full wave effective values, measurement results are generated every 20ms (50Hz) or every 16.7Hz (60Hz).

- Full wave effective values can be used in Jasic programs.

- Calculated full wave effective values

-
    - Voltage, UL1-N, UL2-N, UL3-N, UL4-N
    - Current, IL1, IL2, IL3, IL4
    - Effective power, PL1, PL2, PL3, PL4
    - Fundamental-wave reactive power Q0L1, Q0L2, Q0L3, Q0L4

The fundamental wave-reactive power compensation has a measurement error of as much as 0.2% due to a constant phase shift of 1.5° and a ripple of 0.1%.

- Processing time (calculation)
    - Typically 5ms
    - Maximum 10ms

Processing time variables: Number and runtime of Jasic programs; homepage accesses.

- Transmission to the interfaces
    - Typical latency period 1ms
    - maximum 7ms

- Calculation of the full wave effective values
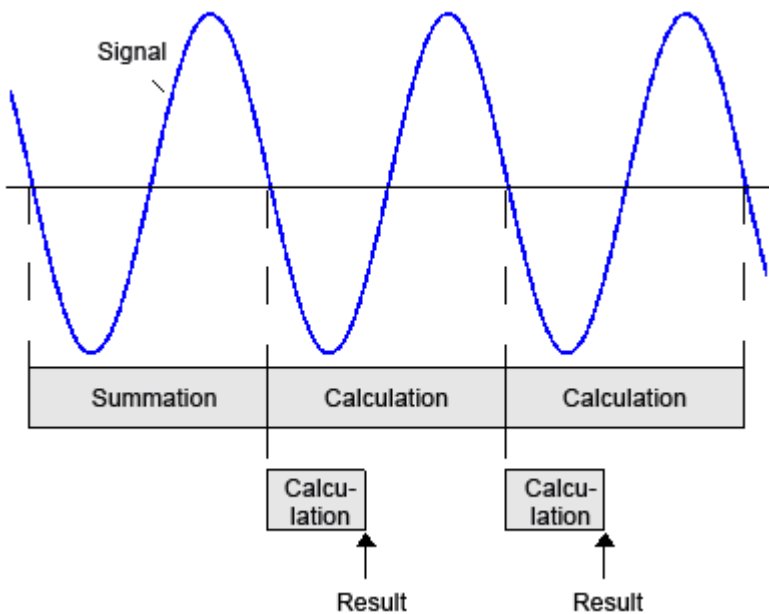
UMG 604 - Fixed frequency

Fixed frequency

A frequency in the range 40Hz – 70 Hz can be selected for grid analysis.
Modbus address: 10248; type: float; number range: 0, 40 .. 70; Hz

- Selectable in GridVis:
  - 50Hz fixed frequency
  - Measurement values are calculated on the basis of 10 periods (200ms measurement window).
  - 60Hz fixed frequency
  - Measurement values are calculated on the basis of 12 periods (200ms measurement window).
  - 0 automatic frequency determination
  - Frequency range: 40Hz – 70Hz
  - Measurement values can be formed from the number of periods that best reflect a 200ms measurement window.

Note:

1. If a fixed frequency of e.g. 50Hz or 60Hz is selected, currents can be measured even if a measurement voltage has not been applied.
2. Other fixed frequencies in the range 40Hz –70Hz can only be set via the Modbus address.
3. The network frequency can also be calculated and for example displayed by GridVis only if automatic frequency determination has been selected. Otherwise, only the selected fixed frequency will be displayed as the network frequency.

UMG 604 - Flagging

Flagging

- The identification of unreliable measurement values is called flagging.
- During voltage drops or increases or during an interruption, the measuring process can provide unreliable values for other variables (e.g. frequency measurement). It indicates that an extrapolated value can be unreliable.
- The UMG604 applies the flagging concept in accordance with DIN EN 61000-4-30.

UMG 604 - Deleting consumption meters

Deleting consumption meters

- Consumption meters can be deleted in the Modbus address list or in a Jasic program.
- The UMG604 uses the following consumption meters:
  - Effective and apparent consumption meters
  - Reactive consumption meters

Table: Options for resetting meters in UMG604

	Parameter list	Modbus address list	Jasic program
Resetting all effective and apparent consumption meters.	Yes	Yes	Yes
	Yes	Yes	Yes

Resetting all reactive consumption meters			
Resetting all minimum and maximum values	Yes	Yes	Yes
Resetting the measurement period for EMAX	No	No	Yes

The addresses used to reset the consumption meters and the min./max values can be found in the Modbus address list and parameter list.

UMG 604 - Recording

Recording

You can define your own values to be used when recording. These values are saved in the device (e.g. UMG 604) (recording configuration).

- Only numeric values can be recorded.
- Records can be read out by GridVis and saved in the database.
- Records can be used in the device's homepage (e.g. UMG 604).

The following recording methods are available:

- Mean values
  Mean values provided from the measurement values in a time window which can be selected, with the time window's start and end times. The corresponding min./max. values can also be recorded.
- Measurement values
  Record measurement values with the corresponding start and end times.
- Associated measurement values
  Measurement values with the corresponding end time and with the end time of the last measurement value as the start time.
  Advantage: The graphic representation shows no gaps.

Note: The selected recording method applies for all of the value names set up in the icon.

Jasic recording icon

Connections:

- Update

  Input of update starts the calculation of the min., max. and mean values from the saved measurement values in the measurement buffer.

- Reset

  Reset deletes the measurement buffer content.

- Save

  Entering save saves the pending measurement values (e.g. burner period) in the corresponding measurement value buffer.

- "Value name"

  At least one value name must be set up (e.g. burner period).

Note: It is necessary to at least link the save input and a "value input".

Defining recording in Jasic

Double-clicking on the Jasic recording module (Jasic start) defines the recording method with a value name.

- Select the recording type.
- Use the Add button to assign a name to the measurement value.
- Define the value unit by double-clicking on the respective field under value unit.
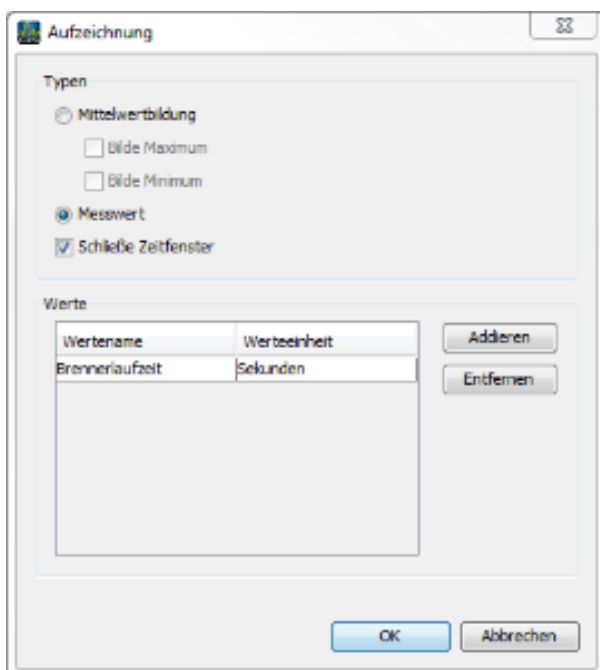
Example of graphic programming:
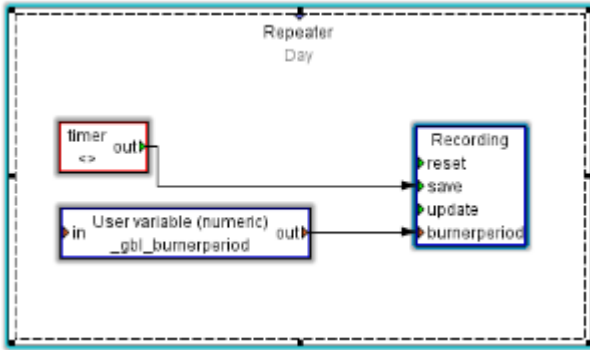
UMG 604D - Residual current monitoring (RCM)

Residual current monitoring (RCM)

Monitoring residual current by measuring residual current in electric systems is a precaution used in preventative maintenance. Insulation faults caused by fault currents can be recognised early using residual current monitors (RCM) as specified in DIN EN 62020 (VDE 0663).

- Residual current monitoring is not a substitute for the recurring inspections to be carried out in accordance with DIN VDE 0105!
- Alternating currents and pulsing direct currents are monitored in accordance with EN62020:1998+A1:2005.

Application

Protection and monitoring of systems in which fault currents form, e.g. as a result of:

- Dust deposits or moisture,
- Porous cables and wires,
- Capacitive fault currents,
- Insulation faults.

Measuring current in the UMG640D

Measurement range:

- Current measuring input I1 .. I3 : via transformer ../5A or ../1A (0.001A .. 7.5A AC)
- Current measuring input I4: via residual transformer ../30mA (0.03mA .. 30mA AC)

Example: UMG604D with residual current monitor via the current measuring input (I4)
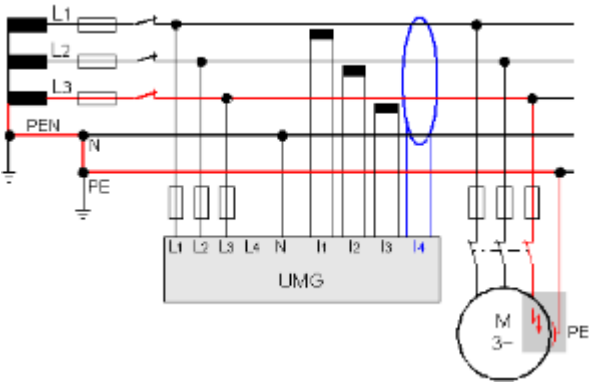
Note!
Direct current cannot be monitored.

Note!
In no way does measuring in this way relieve the user from the obligation to carry out recurring inspections of permanently installed electrical systems in accordance with DIN VDE 0105-100, Section 5.3.

10.12.6 UMG 604 - Configuration

UMG 604 - Configuration

UMG 604 - Identity

Identity

- The name is used, among other things, to identify the device in the device list.
- Additional information can be saved under Description.
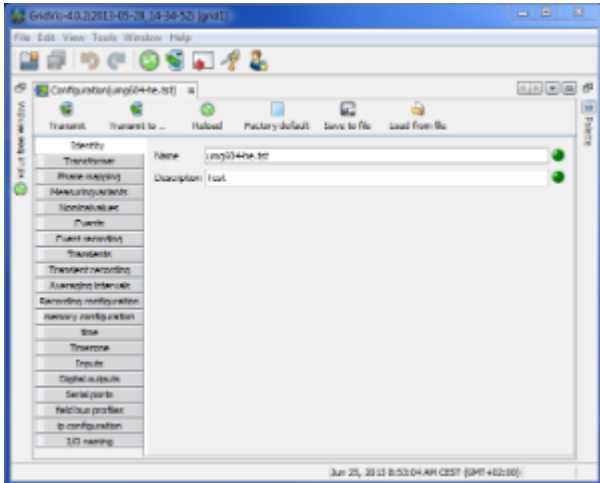
UMG 604 - Transformers

Transformers

Voltage transformers

- The UMG 604's voltage measurement inputs are designed for the measurement of low voltages in which rated voltages (L-N/PE) of up to 300V against earth can occur.
- Voltage transformers are necessary in grids with higher rated voltages.
- The converter requirements for each voltage input must be determined separately.

Current transformers

- Currents up to 5A can be measured directly. Observe the installation guide when doing this.
- Transformers are used when measuring currents greater than 5A.
- Set the current converter requirements for the current measurement input.
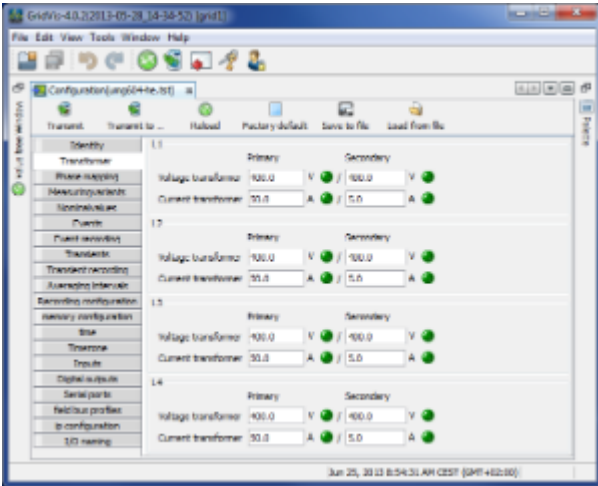
UMG 604 - Phase mapping

Phase mapping

- The phase wiring and the electricity consumer wiring can be redefined by the phase assignments.
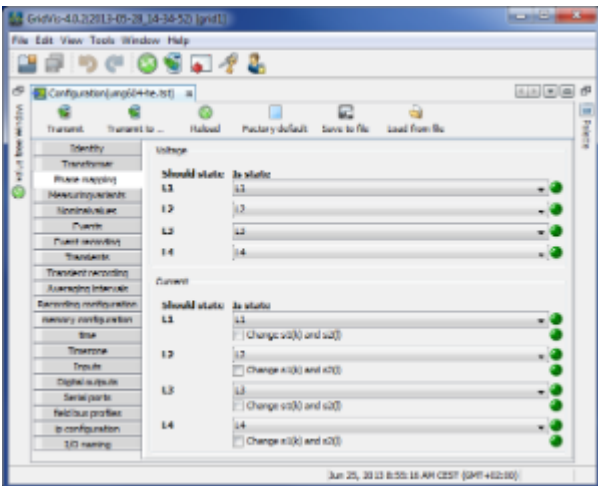
UMG 604 - Measuring variants

Measuring variants

- Set the device's connection variant for the voltage and current measurements (operating manual).

UMG 604 - Nominal values

Nominal values

- All 4 of the measurement channels are activated via the rated frequency. Select the mains frequency in accordance with the available grid supply.
- Nominal values are required as a reference to identify events (over/undervoltage and overcurrent).
- The rated current of the transformer at the supply is required in order to calculate the K factor.
- The relevant voltage indicates whether a measurement is to be made between the
    - outer conductor L-L or between
    - outer conductor L and neutral conductor N.
- The relevant voltage is required for the calculation of harmonics, events and flicker.
- For UMG 508, UMG 604 and UMG 104 devices with the firmware small Rel. 2.x, the relevant voltage is not adjustable and is always L-N.
- In the 3-conductor network (e.g. mean voltage) the relevant voltage relates to a calculated star point.

UMG 604 - Events

Events

- An event occurs if threshold values set for the current and the voltage are violated.
- An event has a mean value, a minimum or maximum value, a start time and an end time.
- The GridVis event browser can display recorded events.
- Threshold values are set per measurement channel (L1 .. L4) for excess voltage, undervoltage and overcurrent as a percentage of the nominal values.
- Threshold values can be switched off by switching the Manual/Off button to Off.
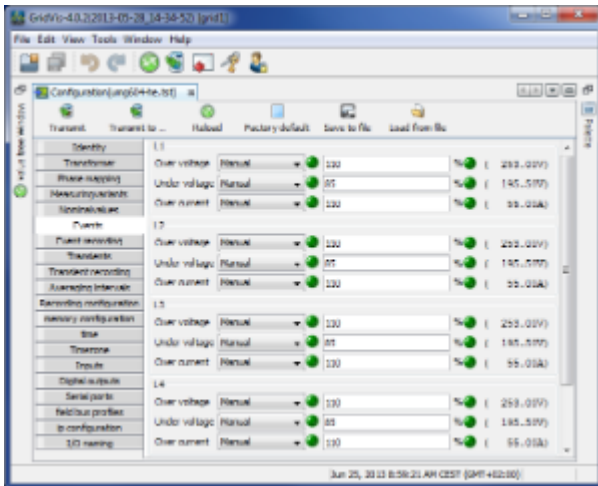
UMG 604 - Event recording

Recording of events

- Effective values recorded in the UMG604 describe the trend of full wave effective values.
- Effective value recording can be started by an event or by a Jasic program.
- Various recording modes can be selected to record effective values triggered by an event.
    - Only the value in which the event was found.
    - Only voltage and current in the phase in which the event was found.
    - All of the inputs of the value in which the event was found.
    - All of the values in all the inputs
- The length of the effective value record is determined by the number of full wave effective values up to the beginning of the event (pre-run) and by the number of full wave effective values after the beginning of the event (after-run).
    - Pre-run setting range: 64 .. 8192 full waves (up to firmware rel. 1.1: 64..6144 full waves)
    - After-run setting range: 64 .. 8192 full waves (up to firmware rel. 1.1: 64..6144 full waves)
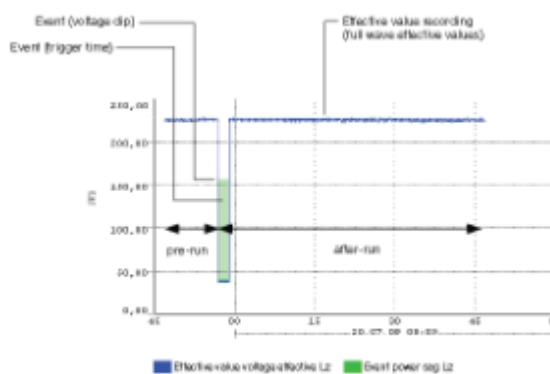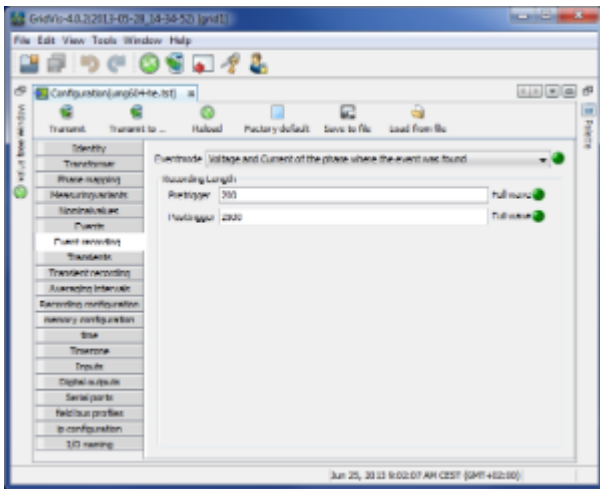
UMG 604 - Transients

Transients

- Transients are fast voltage changes.
- The UMG 604 recognises transients if they are longer than 50µs, although it only monitors the four voltage measurement inputs.
- There are two independent criteria by which transients are recognised.
    - Absolute: If a sampled value exceeds the set threshold, a transient is recognised.
        - Available settings:
        - Off - transient monitoring has been switched off
        - Automatic - the threshold value is calculated automatically and comes to 110% of the current 200ms effective value.
        - Manual - the transient monitoring uses the set threshold values.

    - Fast increase: If the difference between two neighbouring sampled points exceeds the set threshold, a transient is recognised.
        - Available settings:
        - Off - transient monitoring has been switched off.
        - Automatic - the threshold value is calculated automatically and comes to 0.2175 times the current 200ms effective value.
        - Manual - the transient monitoring uses the set threshold values.

- If a transient has been recognised, the threshold value increases by 20V, both in automatic and in manual mode. This automatic increase of the threshold value switches off within 10 minutes.
- If a transient has been recognised, the wave form will be saved to a transient record.
- If a further transient is recognised within the next 60 seconds, it will be recorded with 512 points.

UMG 604 - Transient recording

Recording transients

- If a transient has occurred, the wave shape can be saved in a transient record with an adjustable number of sampled points before and after the transient.
- The time between two sample points is always 50μs.
- You can choose between the following measurement channels for recording in the transient record:
- The phase voltage will be recorded with the transient.
- The phase voltage and current will be recorded with the transient.
- All currents will be recorded.
- All voltages and all currents will be recorded.

Record length

The number of sample points to be saved before the transient occurred:

- Pre-run setting range: 64 .. 8192 points (up to firmware rel. 1.1: 64..6144 points)
- After-run setting range: 64 .. 8192 points (up to firmware rel. 1.1: 64..6144 points)
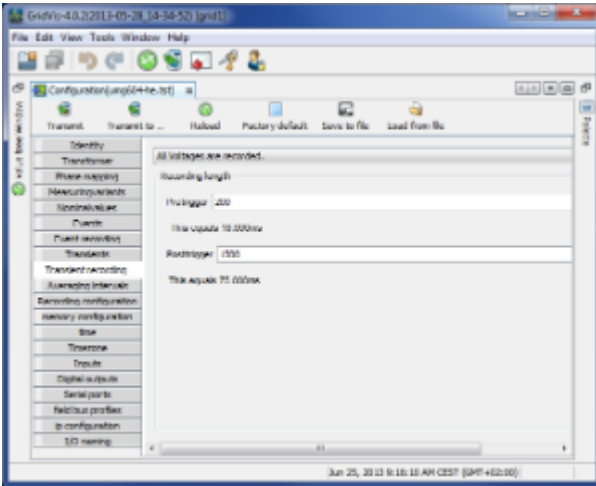
UMG 604 - Averaging intervals

Averaging intervals

- Parameterisation of the floating average (previous name for trailing value indicator) for the individual measurement values.
- The measurement values of the mean values are marked in the device display with an overline.
- The values can also be used for operators or comparators (Jasic).
- The adjustment range of the reporting times of the selected group (L1-L4) is 10, 15, 30, 60 seconds and 5, 8, 10, 15 minutes.
- The settings of different reporting intervals for each individual phase are made on the device.

UMG 604 - Recording configuration

Recording configuration

- Up to 16 records can be configured when configuring recording.
- A record can have a maximum of 1000 values.

- A record holds a measurement value or the mean value of the measurement value.
- Mean value records can also include the minimum and the maximum values.
- Mean values, minimum values and maximum values are derived from the measurement values in the measurement timeframe.
- The mean value measurement timeframe is established by the time set under "Time basis".
- Measurement values are saved once the time set under "Time basis" has run its course (Calculating required memory capacity).

Setting up / editing a recording configuration

- An individual recording instance can be set up using the New or Edit buttons.
- Measurement values are selected in the recording window using the Add values button.
- To do so drag the desired measurement value (measurement value group) over the value field. The measurement values are adopted and displayed.
  The selected measurement values can be described in more detail via the option "Mean (arithmetical)", "Mean (RMS)", "Minimum", "Maximum", "Sample" and "With value change".
    - Mean (arithmetical)
      The arithmetical mean is the ratio of the sum and the number of all 200ms measurement values:
      $x(arithm.) = (x1+x2+x3...) / n$
    - Mean (rms)
      This value describes a quadratic mean (potential mean) with:
      $x (rms) = root ((x1^2+x2^2+x3^2+..) / n)$
    - Minimum / Maximum
      When these buttons are selected, the means of the minimum and/or maximum values are recorded.
    - Sample
      Sample describes the recording of the measurement value within the defined time duration. The time baseline defines the time intervals at which the recording is made.
- With value change
  If the measurement value is changed, the 200ms measurement value is recorded. This setting is useful for, for example, the monitoring of digital inputs and outputs (not with high frequency signals) or of the temperature input.

In contrast to the arithmetical mean, the quadratic mean is of increasing importance when the measurement values vary greatly cyclically. Outliers in the measurement values thus have a greater significance. With a value like voltage, it is a good idea to take this more into account than for a power value.

- Using the Delete values button, selected measurement values can be deleted.

EN50160 and EN61000-2-4 presettings selection aid

- Via the EN50160 and EN61000-2-4 buttons, recording configurations can be predefined.
- If the device does not support measurement as per EN50160, a prompt appears.

Calculation of the required memory capacity

With the default programming for recordings a data memory of approx. 11 MByte p.a. will be occupied.

Recording 1

- 23 values, 900 seconds
- (4+4+4) * 23 + 24 = 300 Bytes per dataset
- A dataset is written into the memory every 900 seconds.
- This means that the required annual memory capacity is
  =>96 datasets per day, => 35040 datasets p.a., => 10.512 MByte p.a.

Recording 2

- 12 values, 3600 seconds
- 4 * 12 + 24 = 72 Bytes per dataset
- A dataset is written into the memory once an hour.
- This means that the required annual memory capacity is
  =>24 datasets per day, => 8760 datasets p.a., => 630.72 kByte p.a.

UMG 604 - Memory configuration

Configuring data memory

- The UMG 604 has a storage capacity of approx. 112 MByte.
- The data memory has been partitioned as follows ex works:
  - 40% for user-defined recording.
  - 22.5% for the recording of transients.
  - 22.5% for the recording of full wave effective values.
  - 10% for the recording of events.
  - 5% for the recording of flags (flagging).
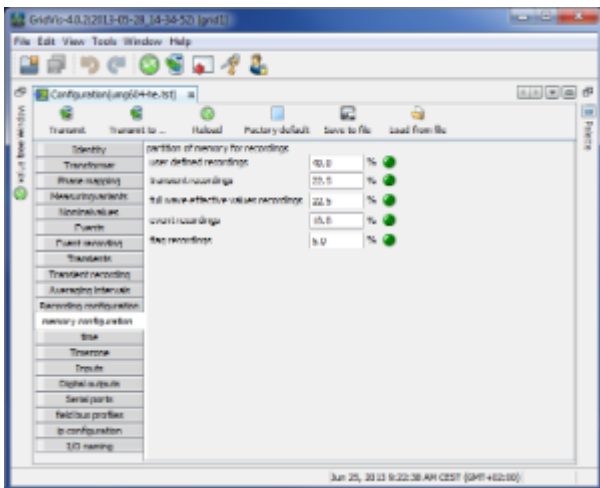
UMG 604 - Time

Configuring of time

The UMG 604 has a clock with a battery backup. The fault in the clock's quartz is aligned with room temperature during production so that the clock only deviates by +- 1 minute/month. If transient records and event records are to be compared with other measurement records, it is recommended that the time indicated by the UMG604 be compared and aligned with that in a time server. For this purpose, the UMG604 requires the Ethernet interface (option). The network time protocol (NTP) is used for synchronisation.

- Mode
  Off - synchronisation of the clock with an external time server is switched off.
  Lists - The UMG 604 is waiting for time information from a time server.
  Active - The UMG 604 automatically requests time information from an NTP server every 64 seconds.
- NTP server - this is where the time server's address is input.
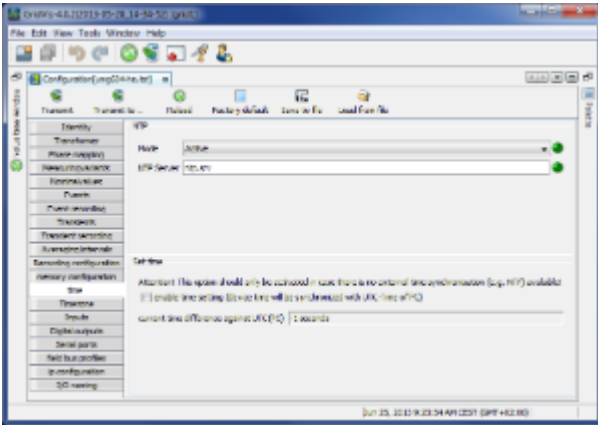
Time setting

- During configuration, the clock can be aligned to UTC time in the connected PC.

UMG 604 - Time zone

Time zone

All time information with regard to measurement values, events and transients relate to UTC time (Coordinated Universal Time). GridVis converts UTC time to Central European Time (CET) when it displays measurement results. Central European Time (CET) is the applicable time zone in central Europe and therefore also in Germany.

- - *Winter time* - time offset from Central European Winter Time relative to UTC time.
  - *Summer time* - time offset from Central European Summer Time relative to UTC time.
  - *Start of daylight saving time* - start of daylight saving time.
  - *End of daylight saving time* - end of daylight saving time.
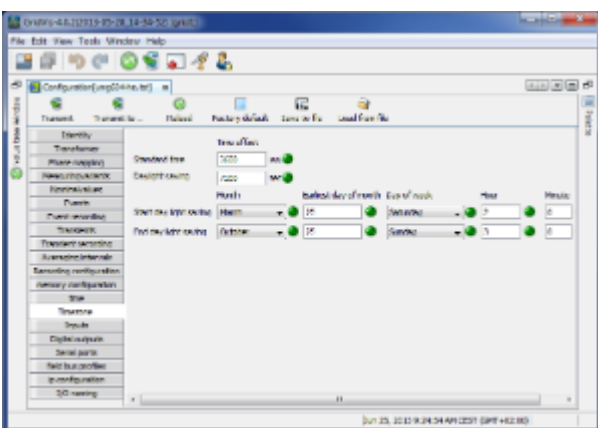
UMG 604 - Inputs

Inputs

The UMG604 has two digital outputs and an input used to measure temperature. Both digital inputs can be used as digital inputs and as input pulse meters.

- A pulse value can be assigned to every pulse input.
- Various temperature sensors can be connected to the input used to measure temperature:
    - PT100 - temperature range -55°C .. +175?
    - PT1000 - temperature range -40°C .. +300°C
    - KTY83 - temperature range -99°C .. +500?
    - KTY84 - temperature range -99°C .. +500?
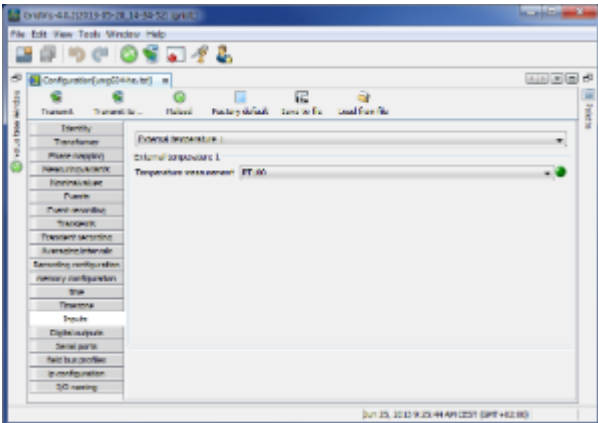
UMG 604 - Digital outputs

Digital outputs

The UMG604 has two digital outputs. Both of these digital outputs can be programmed for event messages or as a pulse output (S0 output).

- - Each digital output can be programmed as a NC or NO contact.
    - One or more events can be allocated to an output if it is programmed for event updates.
    - The event output activates if a selected event occurs.
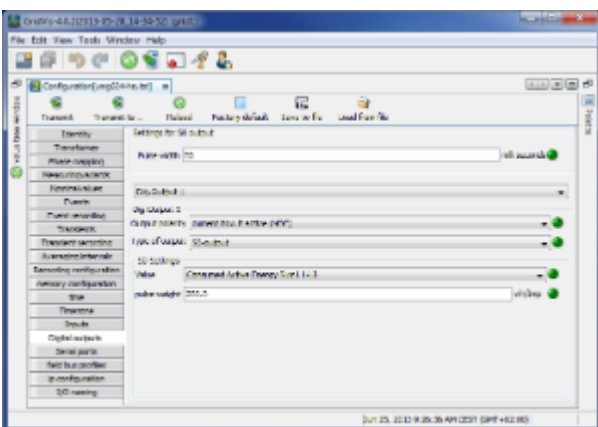
UMG 604 - Serial outputs

Serial outputs

- Device ID

  The device ID (device address) is required for Modbus communication and for the Profibus.
- RS485

  Setting the Modbus selection between Modbus master, Modbus slave, transparent gateway and BACnet IP.

  Baud rate selection from 9600bps, 19200bps, 38400bps, 76800bps, 115200bps and 921600bps
- RS232

  Setting the Modbus selection between Modbus slave, debug protocol and SLIP

  Baudrate selection of 9600bps, 19200bps, 38400bps, 57600, 76800bps, 115200bps
- Profibus (option)

  Note! Additional Profibus settings are made under Fieldbus profiles.
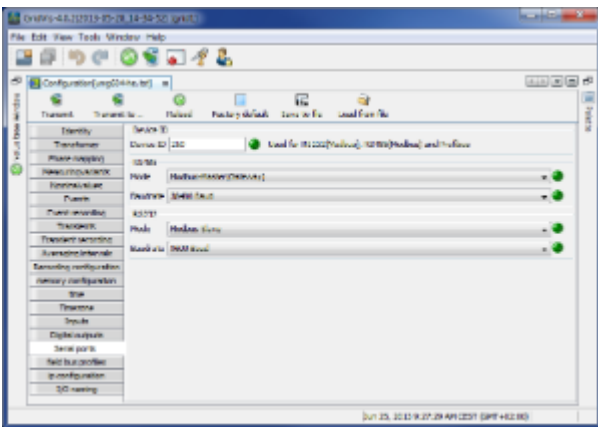
UMG 604 - Fieldbus profiles

Fieldbus profiles

Fieldbus profiles hold a list of values which can be read or written by a PLC via the Profibus (see Profibus profiles).

- Using GridVis, 16 fieldbus profiles can be configured.
- In the UMG604, with firmware from 1.095, 4 fieldbus profiles are preconfigured ex works.
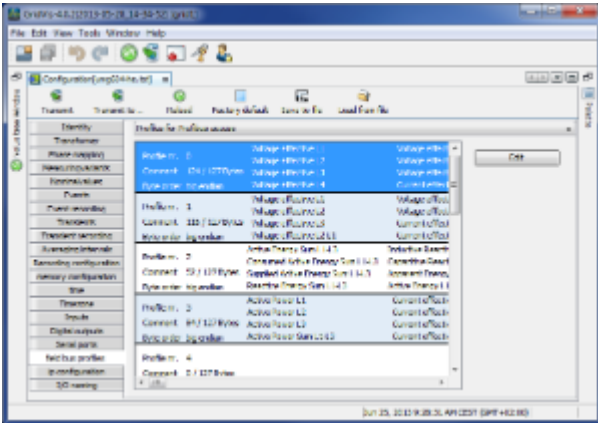
- Using the "*Edit*" button, the preconfigured fieldbus profiles can be retrospectively changed.
    - Clicking the "Add values" button opens an selection of measurement values or measurement value groups.
    Drag the desired measurement value (measurement value group) over the value field. This saves and displays the measurement values.
    - Using the Delete values button, selected measurement values can be deleted.
    - The measurement value sequence can be determined with the position buttons.
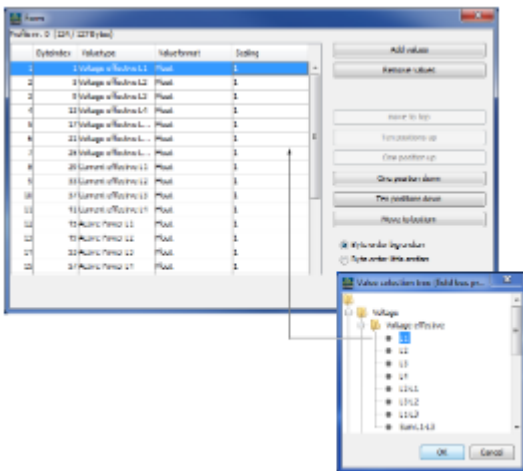
UMG 604 - IP configuration

IP configuration

- For devices with the Ethernet option, it is necessary to set at least the IP address and the subnet mask.
- In the UMG 604, it is possible to choose between the options fixed IP address, BootP and DHCP mode.

- Fixed IP address
    All settings are undertaken by the user.
- BootP
    BootP allows for the fully automatic integration of a UMG 604 into an existing network.

- DHCP mode
  When started, the UMG 604 pulls all of its settings from the DHCP server.

IMPORTANT: Any settings should only be made after these have been discussed with the administrator.
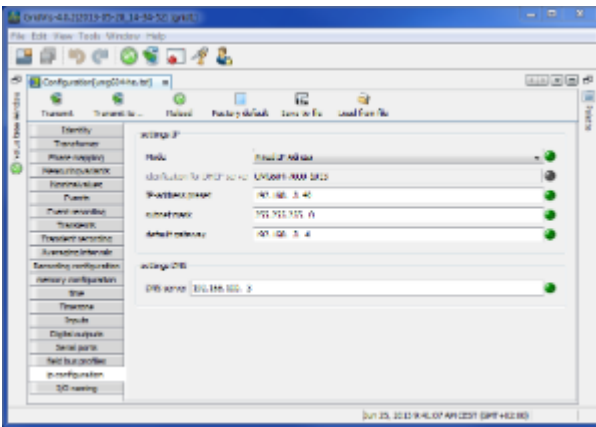
UMG 604 - Naming of inputs

Naming of inputs

- Enables naming of inputs and outputs.
- The respective inputs/appoints can be assigned names by entering a name in the corresponding box.
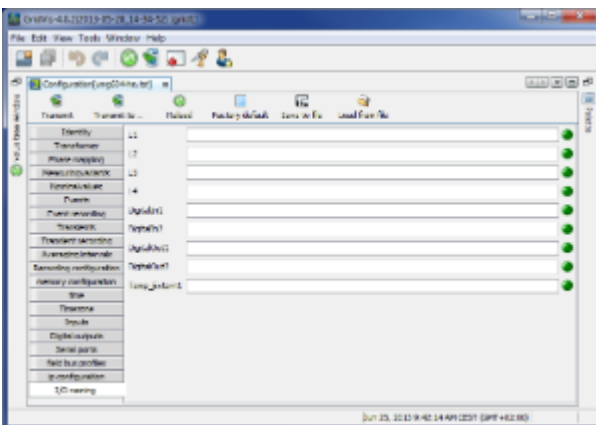
10.12.7 UMG 604 - Serial interfaces

UMG 604 - Serial interfaces

UMG 604 - BACnet

UMG 604 - BACnet

UMG 604 - General information on BACnet

BACnet: Introduction

BACnet = **B**uilding Automation and **C**ontrol **N**etworks is a network protocol for building automation.

BACnet ensures that devices made by different manufacturers can operate together as long as the partners involved in a project agree on certain BIBB standards. A BIBB (BACnet Interoperability Building Block) defines which services and procedures must be supported on the server and client sides in order to realise certain system requirements.

UMG604 supports the device type B-SA with the BIBBs DS-RP-B and DS-WP-B.
In addition the BIBBs DS-WP-B, DS-WPM-B, AE-N-B and AE-N-B are supported.

A Jasic program provides the interface between the BACnet protocol in the UMG604 and external devices (GLT, UMG 96S, devices from third parties, etc.).

- - BACnet is a software add-on subject to purchase and must be activated.
  - BACnet can only be activated directly on the device.
  - The two 4-digit codes which comprise the activation code must be entered on the device under the addresses 520 and 521.
  - The user can customise the interface (Jasic program).
  - Jasic programs are accessible to the user, who is able to edit them.
  - Editing or writing Jasic programs requires only basic programming knowledge.

- BACnet knowledge is necessary to be able to customise the BACnet interface in a Jasic program.
- Janitza electronics GmbH has the BACnet vendor ID number: 316.

UMG 604 - in BACnet

UMG 604 in BACnet

An Ethernet network connects one PC and two UMG604. The RS485 interface connects two UMG103 to a single UMG604.

- - A UMG604 can manage a max. 90 dedicated objects of its own.
  - A UMG604 can manage a max. 40 objects per connected device (e.g. UMG103).
  - A Jasic program is used to assign measurement values to the respective device.
  - The UMG604 can manage a max of 32 virtual devices (0..31), each with 40 dedicated objects of its own.
  - One measurement value in the UMG604 corresponds to the "analogue input" in the BACnet.
  - All of the remaining float values correspond with the "analogues values" in the BACnet.
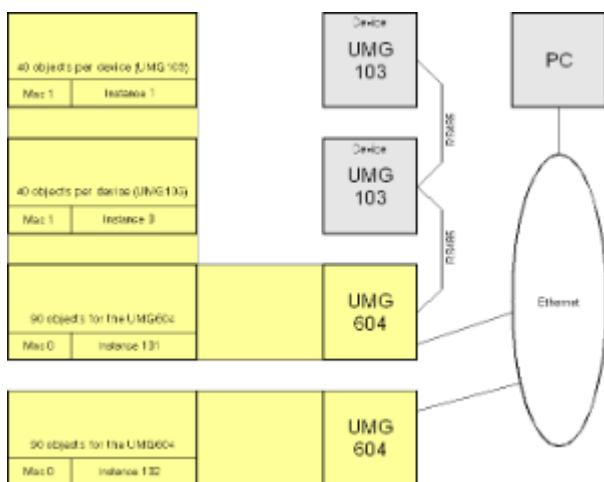
UMG 604 - Jasic example 1

Jasic example 1

Programming example (Jasic program) for the transfer of data from one UMG604 to the BACnet.

The name of the program in GridVis: "Program 1"

Create REM structured variables (header for BACnet)
record main_dev = (int,error) (string,name$)(string,desc$)(string,location$) (int,mac) (int,instance)

Add measurement values to the REM structure.
REM all of the available measurement values are described in the system variables list. The list can be accessed in the Jasic help
addrecord main_dev = (system,_uln[0..3]) (system,_iln[0..3]) (system,_sln[0..3]) (system,_freq)

Populate REM structure
REM mac = 0 -> local network
dev.mac =0

Enter REM Instance / Name / Description / Location
main_dev.mac =0;
main_dev.instance=102;
main_dev.name$="UMG604"
main_dev.desc$="Network analysis"
main_dev.location$="Production"

Register REM structure in system
call init_bacnet_device main_dev
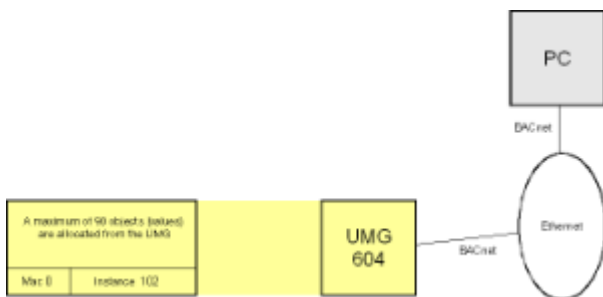
Example of operation of UMG604 via Ethernet in BACnet.

UMG 604 - Jasic example 2

Jasic example 2

Programming example (Jasic program) for the transfer of data from a UMG604 and a UMG103 to the BACnet.

- - A UMG604 is connected to a PC by the Ethernet. The BACnet protocol is selected for this connection.
  - An additional device, in this case a UMG103, is connected to the UMG604 via an RS485 interface. This connection uses the MODBUS protocol.
  - The UMG604 reads out the UMG103 measurement values via the RS485 interface.

A Jasic program reads out measurement values from the UMG103 and configures the UMG604 for the BACnet.
With GridVis it is possible to generate the Jasic program, which runs on the UMG604.

The name of the program in GridVis: "Program 2"

REM Note! BACnet can only operate with global variables.
global (FLOAT,_voltage_103a[0..2],0,0,"Volt",0)
global (FLOAT,_current_103a[0..2],0,0,"A",0)
global (FLOAT,_power_103a[0..2],0,0,"W",0)

```
REM UMG604 sends "Iam" every 5 seconds
_bacnet_sendIam_time = 5
REM Baudrate 0=9600Baud
_baud485=0
REM 1= Master
_mode485=1
REM UMG604, Modbus address = 10
_mbusaddr=10

REM measurement values from UMG103 via RS485 (MODBUS)
record umg103_modbus = (int,error) (int,addr) (int,fcode) (int,index) (hfloat,uln[0..2]) (hfloat,ull[0..2])
(hfloat,i[0..3]) (hfloat,p[0..3]) (hfloat,q[0..3]) (hfloat,s[0..3])

REM measurement values from UMG103 and UMG604 for BACnet
record main_dev = (int,error) (string,name$)(string,desc$)(string,location$) (int,mac) (int,instance)
addrecord main_dev = (system,_uln[0..3]) (system,_iln[0..3]) (system,_sln[0..3]) (system,_freq)
record umg103_0 = (int,error) (string,name$)(string,desc$)(string,location$) (int,mac) (int,instance)
addrecord umg103_0 = (system,_spannung_103a[0..2]) (system,_strom_103a[0..2])
(system,_leistung_103a[0..2])

REM UMG604, settings for BACnet
main_dev.mac =0
main_dev.instance=123
main_dev.name$="UMG604"
main_dev.desc$="Network analysis"
main_dev.location$="Production"

REM UMG103, settings for BACnet
umg103_0.mac =10
umg103_0.instance=1
umg103_0.name$="UMG103"
umg103_0.desc$="Grid analysis"
umg103_0.location$="Office"

call init_bacnet_device main_dev
call init_bacnet_device umg103_0

REM UMG103, settings for MODBUS
umg103_modbus.addr = 1
umg103_modbus.fcode = 3
umg103_modbus.index = 1000

loop:
REM Get measurement values from the Modbus device.
call read_modbus_485 umg103_modbus
for i=0 to 2 do
REM Transfer measurement values from MODBUS to BACnet.
_voltage_103a[i] = umg103_modbus.uln[i]
```

_current_103a[i] = umg103_modbus.i[i]
_power_103a[i] = umg103_modbus.p[i]
next i
REM msync = 200ms
wait(msync)
goto loop
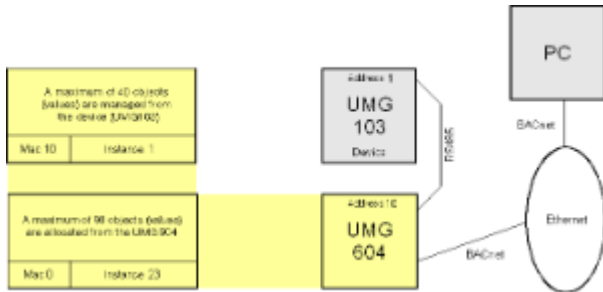
UMG 604 - Jasic example 3

Jasic example 3

Programming example (Jasic program) for the transfer of data from one UMG604 and two UMG103 to the BACnet.

- A UMG604 is connected to a PC by the Ethernet. The BACnet protocol is selected for this connection.
- Two additional devices (UMG103) are connected to the UMG604 via an RS485 interface. This connection uses the MODBUS protocol.
- The UMG604 reads out the devices' measurement values via the RS485 interface.

A Jasic program reads out measurement values from the UMG103 and configures the UMG604 for the BACnet.
With GridVis it is possible to generate the Jasic program, which runs on the UMG604.

The name of the program in GridVis: "Program 3"

REM - Note! BACnet can only operate with global variables.
global (FLOAT,_voltage[0..5],0,0,"Volt",0)
global (FLOAT,_current[0..5],0,0,"A",0)
global (FLOAT,_power[0..5],0,0,"W",0)

REM UMG604 sends "Iam" every 5 seconds
_bacnet_sendIam_time = 5
REM Baudrate 0=9600Baud
_baud485=0
REM 1= Master
_mode485=1
REM UMG604, Modbus address = 10
_mbusaddr=10

```
REM measurement values from UMG103 via RS485 (MODBUS)
record umg103_modbus = (int,error) (int,addr) (int,fcode) (int,index) (hfloat,uln[0..2]) (hfloat,ull[0..2])
(hfloat,i[0..3]) (hfloat,p[0..3]) (hfloat,q[0..3]) (hfloat,s[0..3])

REM measurement values from UMG103's and UMG604 for BACnet
record main_dev = (int,error) (string,name$)(string,desc$)(string,location$) (int,mac) (int,instance)
addrecord main_dev = (system,_uln[0..3]) (system,_iln[0..3]) (system,_sln[0..3]) (system,_freq)
record umg103_0 = (int,error) (string,name$)(string,desc$)(string,location$) (int,mac) (int,instance)
addrecord umg103_0 = (system,_voltage[0..2]) (system,_current[0..2]) (system,_power[0..2])
record umg103_1 = (int,error) (string,name$)(string,desc$)(string,location$) (int,mac) (int,instance)
addrecord umg103_1 = (system,_voltage[3..5]) (system,_current[3..5]) (system,_power[3..5])

REM UMG604, settings for BACnet
main_dev.mac =0
main_dev.instance=123
main_dev.name$="UMG604"
main_dev.desc$="Network analysis"
main_dev.location$="Production"

REM UMG103, settings for BACnet
umg103_0.mac =10
umg103_0.instance=1
umg103_0.name$="UMG103"
umg103_0.desc$="Cost input"
umg103_0.location$="Hall 1"

umg103_1.mac =10
umg103_1.instance=2
umg103_1.name$="UMG103_a"
umg103_1.desc$="Cost input"
umg103_1.location$="Hall 2"

call init_bacnet_device main_dev
call init_bacnet_device umg103_0
call init_bacnet_device umg103_1

REM UMG103, start address and settings for MODBUS
umg103_modbus.addr = 1
umg103_modbus.fcode = 3
umg103_modbus.index = 1000

loop:
REM Get measurement values from the MODBUS devices.
umg103_modbus.addr=j+1
call read_modbus_485 umg103_modbus
if umg103_modbus.error=0 then
for i=0 to 2 do
REM Transfer measurement values from MODBUS to BACnet.
```

```
_voltage[i+j*3] = umg103_modbus.uln[i]
_current[i+j*3] = umg103_modbus.i[i]
_power[i+j*3] = umg103_modbus.p[i]
next i
else
print "Error read device Nr",j+1,"\r\n"
endif
next j
REM msync = 200ms
wait(msync)
goto loop
```
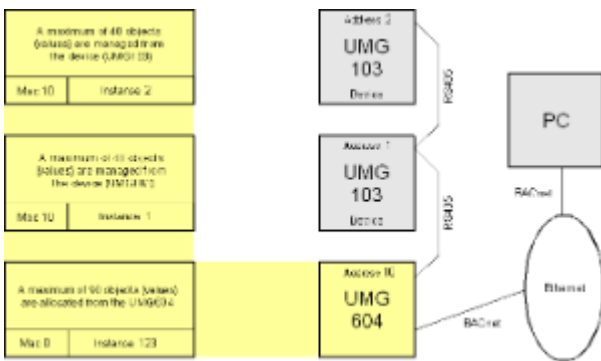

UMG 604 - Ethernet

Ethernet: Introduction

To be able to operate the UMG604 in the Ethernet, the UMG604 requires an Ethernet address. There are three options here:

- - Fixed IP address
    In networks without a DHCP server, the network address must be set directly in the UMG604.
  - BootP
    BootP allows for the fully automatic integration of a UMG 604 into an existing network.
    However, BootP is an older protocol and does not provide the scope of functions provided by DHCP.
  - DHCP mode
    DHCP allows for the fully automatic integration of a UMG604 into an existing network without additional configuration.
    When started, the UMG604 automatically draws the IP address, the network screen and the gateway from the DHCP server.

The respective settings can be programmed into the UMG 604 under the parameter address 205.

- - 0 = fixed IP
  - 1 = BootP
  - 2 = DHCP

Ethernet: Fixed IP address

In networks without a DHCP server, the network address must be set directly in the UMG604. To do this, the following settings must be carried out:

1. Set up the UMG604 for a fixed IP address.
2. Set the desired IP address, IP screen and IP gateway.

Put the UMG604 into programming mode as explained in the operating manual and, using the keys 1 and 2, input the following addresses:

Address:

300 = xxx --- --- --- (IP address)
301 = --- xxx --- --- (IP address)
302 = --- --- xxx --- (IP address)
303 = --- --- --- xxx (IP address)

304 = xxx --- --- --- (IP screen)
305 = --- xxx --- --- (IP screen)
306 = --- --- xxx --- (IP screen)
307 = --- --- --- xxx (IP screen)

310 = xxx --- --- --- (IP gateway)
311 = --- xxx --- --- (IP gateway)
312 = --- --- xxx --- (IP gateway)
313 = --- --- --- xxx (IP gateway)

Ethernet: Ports

Devices equipped with the Ethernet option can use the following ports:

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

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

UMG 604 - Modbus

Modbus address list

A list of the measurement values available in the device with the corresponding addresses and formats can be found on the CD/DVD provided with GridVis.

Modbus status

The Modbus functions, "*Write Modbus*" and "*Read Modbus*", provided in the programming language Jasic deliver status messages. These can be written to a Log file or displayed directly in the Debug log.
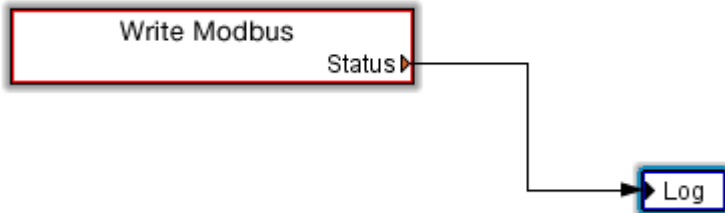
Modbus status messages

- 0 (there are no faults)
- -1 (request submitted incorrectly)
- There is a serious fault. This should not occur in the graphic programming.
- -2 (CRC fault)
- Checksum fault
- -3 (device does not respond)
- The device is not connected. The baud rate does not match up.
- -4 (device in Modbus slave mode)
- For the Modbus functions, Write Modbus and Read Modbus in theprogramming language Jasic, the UMG604's RS485 interface must be switched to Modbus master.
- 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 Adress)
    - 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

UMG604 supports the following Modbus functions as **master** :

- 01 Read Coil Status
  - Reads the ON/OFF status of discrete outputs (0X references, coils) in the slave. Broadcast is not supported.
- 02 Read Input Status
  - Reads the ON/OFF status of discrete inputs (0X references) in the slave. Broadcast is not supported.
- 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.
- 05 Force Single Coil
  - Forces a single coil (0X references) to either ON or OFF. When broadcast, the function forces the same coil reference in all attached slaves.
- 06 Preset Single Register
  - Presets a value into a single holding register (4X reference). When broadcast, the function presets the same register reference in all attached slaves.
- 15 (0F Hex) Force Multiple Coils
  - Forces each coil (0X references) in a sequence of coils to either ON or OFF. When broadcast, the function forces the same coil reference in all attached slaves.
- 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.

UMG604 supports the following Modbus functions as **slave**:

- 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.
- 06 Preset Single Register

- Presets a value into a single holding register (4X reference). When broadcast, the function presets the same register reference in all attached slaves.
- 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.

UMG 604 - Profibus

UMG 604 - Profibus

UMG 604 - Profibus profiles

Profibus profiles

A Profibus profile contains the data to be exchanged between a UMG and a PLC. A Profibus profile can:

- - Retrieve measurement values from the UMG,
    - Set the digital outputs in the UMG and
    - Query the status of the digital inputs in the UMG.

Each Profibus profile can hold a maximum of 127 bytes of data. If more data has to be transferred, simply create additional Profibus profiles.

- - Every Profibus profile has a profile number. The profile number is sent by the PLC to the UMG.
  - Using GridVis, 16 Profibus profiles (profile numbers 0..15) can be edited.
  - Additional Profibus profiles (profile numbers 16..255) can be created using Jasic programs.
  - Four Profibus profiles have been preconfigured in the factory.

Profibus profiles preconfigured ex works:

Profibus profile number 0

	Byte Index	Value type	Value format	Scaling
1	1	Voltage L1-N	float	1
2	5	Voltage L2-N	float	1
3	9	Voltage L3-N	float	1
4	13	Voltage L4-N	float	1
5	17	Voltage L2-L1	float	1
6	21	Voltage L3-L2	float	1
7	25	Voltage L1-L3	float	1
8	29	Current L1	float	1
9	33	Current L2	float	1
10	37	Current L3	float	1
11	41	Current L4	float	1
12	45	Effective power L1	float	1
13	49	Effective power L2	float	1
14	53	Effective power L3	float	1
15	57	Effective power L4	float	1
16	61	Cosphi (math.) L1	float	1
17	65	Cosphi (math.) L2	float	1
18	69	Cosphi (math.) L3	float	1
19	73	Cosphi (math.) L4	float	1
20	77	Frequency	float	1
21	81	Effective power total L1-L4	float	1
22	85	Reactive power L1-L4	float	1
23	89	Apparent power total L1-L4	float	1
24	93	Cosphi (math.) total L1-L4	float	1
25	97	Effective current total L1-L4	float	1
26	101	Effective consumption total L1-L4	float	1
27	105	Ind. reactive consum. total L1-L4	float	1
28	109	THD voltage L1	float	1
29	113	THD voltage L2	float	1
30	117	THD voltage L3	float	1
31	121	THD voltage L4	float	1

Profibus profile number 1

	Byte-Index	Value type	Values-format	Scaling
1	1	Voltage L1-N	Float	1
2	5	Voltage L2-N	Float	1
3	9	Voltage L3-N	Float	1
4	13	Voltage L2-L1	Float	1
5	17	Voltage L3-L2	Float	1
6	21	Voltage L1-L3	Float	1
7	25	Current L1	Float	1
8	29	Current L2	Float	1
9	33	Current L3	Float	1
10	37	Effective power L1	Float	1
11	41	Effective power L2	Float	1
12	45	Effective power L3	Float	1
13	49	Cosphi (math.) L1	Float	1
14	53	Cosphi (math.) L2	Float	1
15	57	Cosphi (math.) L3	Float	1
16	61	Frequency	Float	1
17	65	Effective power total L1-L3	Float	1
18	69	Reactive power total L1-L3	Float	1
19	73	Apparent power total L1-L3	Float	1
20	77	Cosphi (math.) total L1-L3	Float	1
21	81	Effective current total L1-L3	Float	1
22	85	Effective consumption total L1-L3	Float	1
23	89	Ind. Reactive consum. total L1-L3	Float	1
24	93	THD voltage L1	Float	1
25	97	THD voltage L2	Float	1
26	101	THD voltage L3	Float	1
27	105	THD current L1	Float	1
28	109	THD current L2	Float	1
29	113	THD current L3	Float	1

Profibus profile number 2

	Byte-Index	Value type	Values-Format	Scaling
1	1	Effective consumption total L1-L3	Float	1
2	5	Drawn eff. consum. total L1-L3	Float	1
3	9	Supplied eff. consum. total L1-L3	Float	1
4	13	Reactive consumption total L1-L3	Float	1
5	17	Ind. reactive consum. total L1-L3	Float	1
6	21	Cap. reactive consum. total L1-L3	Float	1
7	25	Apparent consumption total L1-L3	Float	1
8	29	Effective consumption L1	Float	1
9	33	Effective consumption L2	Float	1
10	37	Effective consumption L3	Float	1
11	41	Inductive reactive consumption L1	Float	1
12	45	Inductive reactive consumption L2	Float	1
13	49	Inductive reactive consumption L3	Float	1

Profibus profile number 3

	Byte-Index	Value type	Values-Format	Scaling
1	1	Effective power L1	Float	1
2	5	Effective power L2	Float	1
3	9	Effective power L3	Float	1
4	13	Effective power total L1-L3	Float	1
5	17	Current L1	Float	1
6	21	Current L2	Float	1
7	25	Current L3	Float	1
8	29	Current total L1-L3	Float	1
9	33	Effective consumption total L1-L3	Float	1
10	37	CosPhi (math.) L1	Float	1
11	41	CosPhi (math.) L2	Float	1
12	45	CosPhi (math.) L3	Float	1
13	49	CosPhi (math.) total L1-L3	Float	1
14	53	Reactive power L1	Float	1
15	53	Reactive power L2	Float	1
16	53	Reactive power L3	Float	1
17	53	Reactive power total L1-L3	Float	1
18	53	Apparent power L1	Float	1
19	53	Apparent power L2	Float	1
20	53	Apparent power L3	Float	1
21	53	Apparent power total L1-L3	Float	1

UMG 604 - Retrieving measurement values

Retrieving measurement values with Profibus (example)

- At least one Profibus profile must be set up with GridVis and transferred to the UMG604.
- A Jasic program is not required.
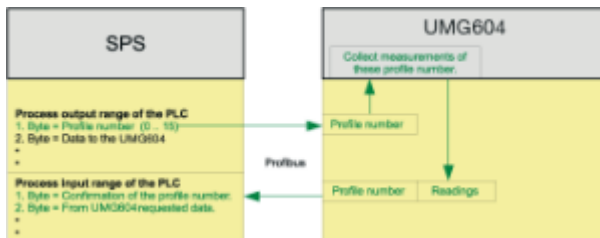
### Programming the Profibus profile with GridVis

- Open the device configuration window and select fieldbus profiles.
- Select a profile number.
- Select "Edit" and drag the desired measurement values into the Profibus profile.
- In this example, only frequency was selected for the Profibus profile with the profile number 0.

Note: Once created, Profibus profiles can be changed but not deleted.
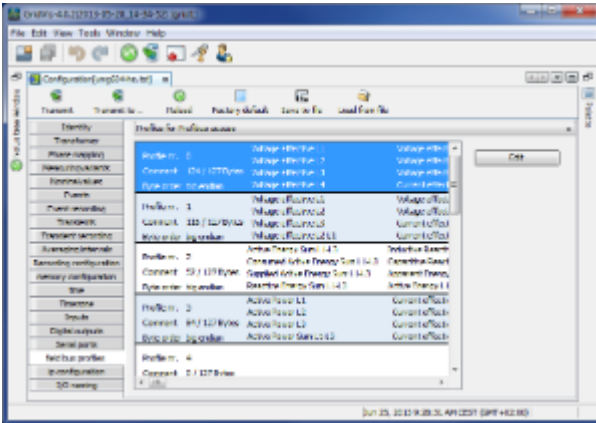
Display of the variables in the PLC

- PAB 0: The Profibus profile (profile number 0) requested by the UMG604 is input here
- PAB 1: Data transferred to the UMG604. This data can only be analysed using a customer-specific Jasic program.
- PEB 272: Return signal from the profile number. In this example, the profile number =0.
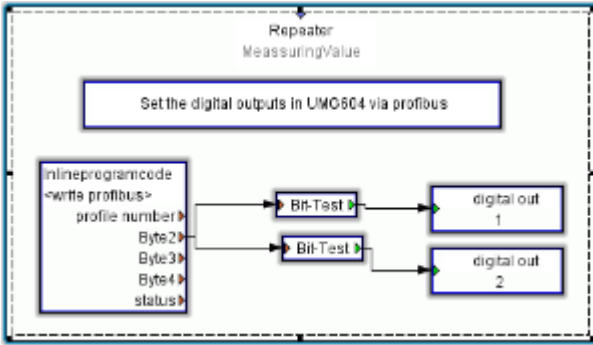- PED 273: Data provided by the UMG604. In this example, the frequency.
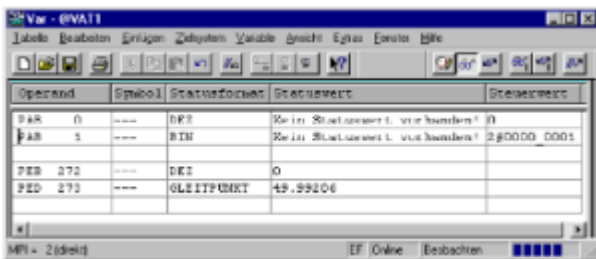
UMG 604 - Setting digital outputs via Profibus

Example: Setting digital output 1 and digital output 2 using Profibus.

- A customer-specific Jasic program is required.
- Programming can be carried out with graphic components.
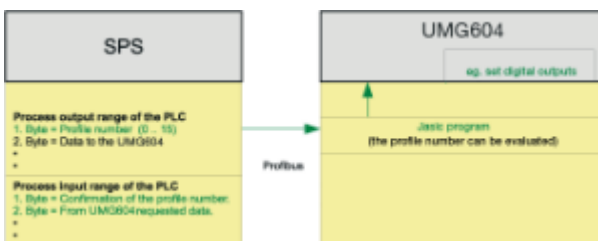

Jasic program (customised)

The content in bit 0 from byte 2 is transferred to digital output 1 of UMG604.

The content in bit 1 from byte 2 is transferred to digital output 2 of UMG604.

UMG 604 - Customised processing of data

Example: Processing data as required by the customer.

- All data in the PLC process output box is transferred to a customer-specific Jasic program in the UMG604.
- The customer-specific Jasic program provides the data for the PLC process output box.
- A Jasic program uses Profibus profiles with the profile numbers 16 to 255.
- Profibus profiles with the profile numbers 0 to 15 are reserved for GridVis.
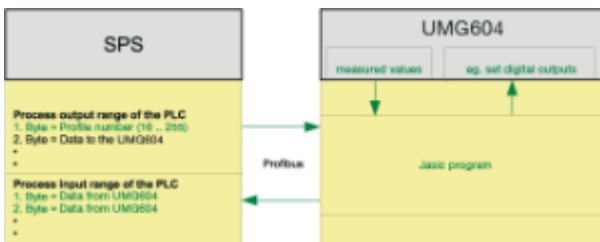
10.12.8 UMG 604 - Security

UMG 604 - Security

UMG 604 - File permissions

File permissions

- Read and write permissions are identical and depend on the login (FTP).
- Read permissions for data files and logs can be configured.
- ADMINISTRATORS can write and delete.

UMG 604 - Directory permissions

Directory permissions

Directories created by the system cannot be deleted.

- /
  This can be read by GUESTS and written and deleted by the SYSTEM.
- /data
  This and the subdirectories can be read by the USER and written and deleted by the SYSTEM.
- /sys
  This and the subdirectories can be read by the USER and written and deleted by ADMIN.
- /basic
  This and the subdirectories can be read by the USER and written and deleted by USER.

- /http

  This and the subdirectories can be read by the GUEST and written and deleted by USER.

UMG 604 - Encryption

Encryption

Directories created by the system cannot be deleted.

- Files between GridVis and the UMG604 can be encrypted for transmission.
- Files can be AES encrypted.
- AES stands for Advanced Encryption Standard. AES is a symmetrical encryption technology.

UMG 604 - Authentification procedure

Authentication procedure

- The UMG604 can use the CRAM-MD5 authentication procedure when connecting to GridVis.
- With this process, the password is not transferred in plain text.
- The process is explained in the RFC2195.

UMG 604 - Password

Password

- FTP password (admin)
    - Allows access to all of the values listed in the Modbus address listed in the device.
    - Allows access to all of the Jasic programs in the device.
    - Allows the device's homepage to be updated.
    - Factory default setting
        - Username: admin
        - Password: Janitza
    - **Password forgotten** -

- FTP password (user)
    - Allows access to all of the values listed in the Modbus address listed in the device.
    - Allows access to all of the Jasic programs in the device.
    - Allows the device's homepage to be updated.
    - Factory default setting
        - Username: user
        - Password: Janitza
    - **Password forgotten** - Using GridVis, establish a secure connection to the device and log in as admin.

- FTP password (guest)

- Allows access to all of the values listed in the Modbus address listed in the device.
- Allows access to all of the Jasic programs in the device.
- Allows the device's homepage to be updated.
- Factory default setting
    - Username: guest
    - Password: Janitza
- **Password forgotten** -

- Homepage password
    - The homepage password (Modbus address 502) provides administrator rights for the device homepage.
    - The homepage password enables loading and starting Jasic programs on the device homepage.
    - Password mode (Modbus address 501). The UMG604 uses three different password modes to access the homepage:
        - 0 - The homepage password is not requested at all. (Factory default setting)
        - 2 - The ability to change the configuration and to display measurement values requires the password to be entered once.
        - 128 - Every change in the configuration requires that the password be entered again.
    - The factory default setting for the homepage password is 0.
    - The homepage password has 4 digits.
    - The homepage password is requested every time the homepage is opened.
    - The homepage password is requested again after 5 minutes of inactivity.
    - **Password forgotten** - Using GridVis, establish a secure connection to the device and log in as admin.

- Display password
    - To make it difficult for program files to be changed accidentally on the device, the UMG604 can be programmed with a 4-digit display password (Modbus address 500).
    - The factory default setting does not request a display password.
    - A forgotten display password can only be deleted using GridVis together with the FTP password.
    - The display password has 4 digits.
    - The display password can be input directly in the UMG604.
    - **Password forgotten** - Using GridVis, establish a secure connection to the device and log in as admin.

- GridVis and FTP programs
    - The FTP password is required.
    - The FTP password is required in order to transfer files between GridVis and the device via Modbus TCP.
    - The FTP password is required in order to transfer files between GridVis and the device via Modbus RTU over Ethernet.

- Modbus TCP, Modbus RTU
    - No password protection is provided for, in order to enable retrieving measurement values (Modbus address list) using the Modbus RTU protocol.

- The FTP password is required in order to transfer files between GridVis and the device via Modbus TCP.
- The FTP password is required in order to transfer files between GridVis and the device via Modbus RTU over Ethernet.

- Profibus
  - Profibus does not require a password.

10.13 UMG 511

10.13.1 UMG 511 - Grid quality analyser

10.13.2 UMG 511 - Adding device

Integrating UMG 511 in GridVis

Create a new UMG 511 in GridVis and define the appropriate type of connection for your device (First steps, Adding new device).

- - Ethernet interface (option) with the connection types TCP/IP and Modbus via Ethernet

- RS485 interface with the connection type Modbus RTU (RS485)

Connection types

- - TCP/IP connection
    A "twisted" patch cable is required in order to establish a direct connection between a PC and a UMG 511 via the Ethernet interface. A normal patch cable is used when establishing a connection in a network (a hub/switch is present).
  - The UMG511 address can be pulled via DHCP from a server or a fixed address set directly in the UMG511.
  - The address can be input as an address or as a name.
  - Using Timeout it is possible to limit the time in which to attempt to establish a connection, when no connection exists.

- - Modbus RTU (RS485/RS232)
    An interface converter is required to be able to connect the UMG 511 to the PC's RS232 interface and to be able to configure it and read it with GridVis.

- - An interface converter from RS485 (UMG511) to RS232 (PC) is required.
  - Adapt the PC's RS232 interface (e.g. COM1) to be used as the interface.
  - The interface converter is also connected to this interface (e.g. COM1).
  - The baud rate is the speed at which the data is to be transmitted between the PC, the interface converter and the UMG511.
  - Because more than one UMG511 can be connected to the interface converter, the device address set in the UMG511 must also be set in the interface converter.
  - If no connection could be established to the UMG511, an attempt will be repeated following the set Timeout.
  - When attempting to read data from the UMG 511, the number of attempted connections will be limited by the number set under Max. no. of attempts.

With online measurements, GridVis will repeatedly attempt to establish a connection to the UMG511.

Ethernet gateway (e.g. for the devices connected to the RS485)
A gateway is required to be able to connect the UMG 96S via Ethernet to the PC and to be able to configure it and read it with GridVis. A UMG604 can be used to establish this gateway function (Connection example 5).

- - The gateway address (e.g. 192.168.1.1) must be set under the connection settings (see Fig. Configuring the connection).
  - Because more than one device (e.g. UMG96S) can be connected to the gateway, the device address set in the UMG96S must also be set under the connection settings (see Fig. Configuring the connection).
  - If no connection could be established to the UMG96S, an attempt will be repeated following the set Timeout.
  - When attempting to read data from the UMG96S, the number of attempted connections will be limited by the number set under Max. no. of attempts.
  - The connection protocol must be set via the Modbus protocol. TCP/IP packets are used when connecting via Modbus TCP. The TCP port 502 is reserved for Modbus TCP.

- When measuring online, GridVis will repeatedly attempt to establish a connection to the UMG96S.

Secured TCP

-
  - A connection between a PC and a UMG 511 via TCP/IP connection with secured access data.
  - The UMG511 address can be dragged via DHCP from a server or a fixed address set directly in the UMG511.
  - Using Timeout it is possible to limit the time in which to attempt to establish a connection, when no connection exists.
  - Enter your access data (username, password) for a secured connection.
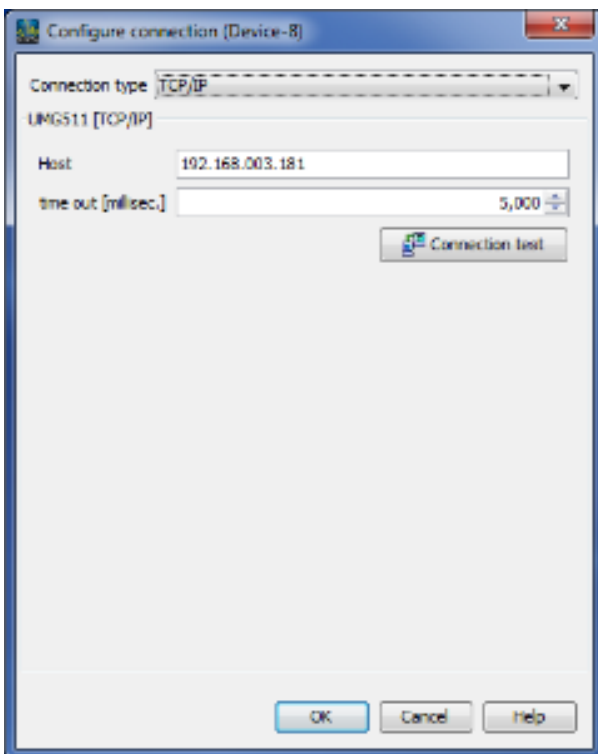
10.13.3 UMG 511 - Connections to computer
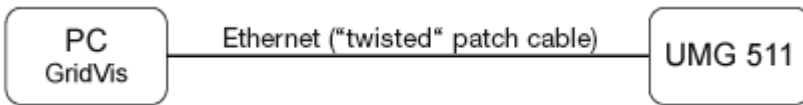
Connections

PC - UMG 511 connection

Example 1 (RS232-RS485 connection):
The PC has an RS232 interface and the UMG 511 an RS485 interface. An interface converter is required.
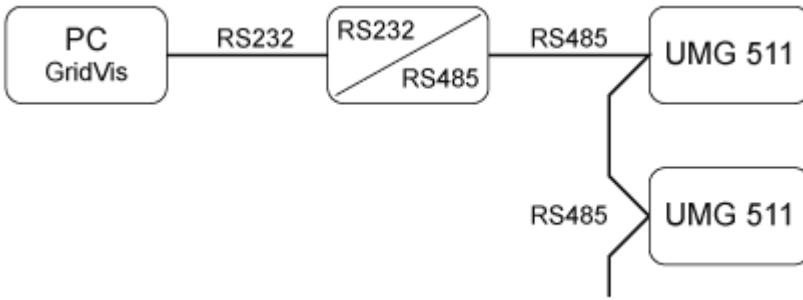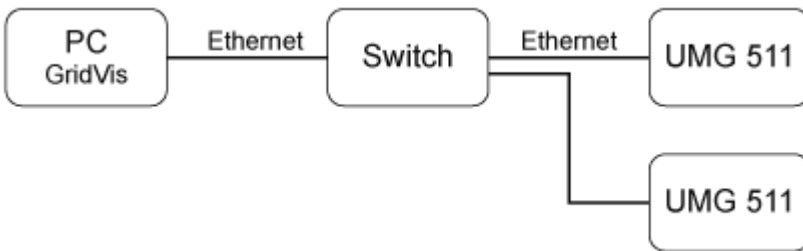
Example 2 (direct Ethernet connection):

The PC and the UMG 511 have an Ethernet interface. Because there is a direct connection, a "twisted" patch cable must be used.


Example 3 (Ethernet connection):

The PC and the UMG 511 have an Ethernet interface. The connection is established in a network via a switch or a hub.


Example 4 (BACnet gateway connection):

The UMG511 is used as a BACnet gateway with which to connect RS485 devices (e.g. UMG96S). The UMG 511 is the Modbus master (RS485) and the UMG 96S the Modbus slave, whereby the BACnet shows the UMG 96S as the UMG 511's virtual device. A Jasic program queries the measurement values for the connected devices and provides the values to the BACnet.
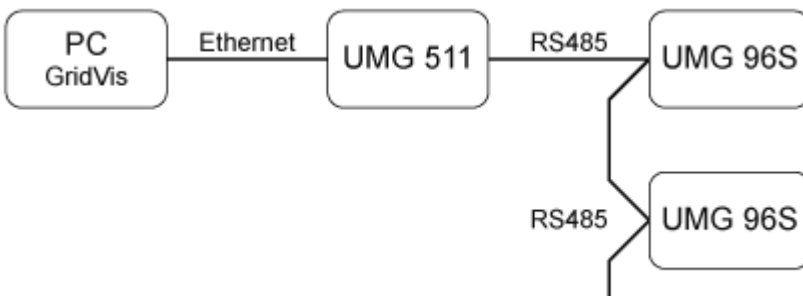
Example 5 (Modbus gateway connection):

The UMG 511 is used as a gateway with which to connect RS485 devices (e.g. UMG 96S). The UMG 511 is

the Modbus master (RS485) and the UMG 96S the Modbus slave, whereby the baud rate to be set for both devices must be the same. A Jasic program queries the measurement values for the connected UMG 96S and makes them available for further processing.
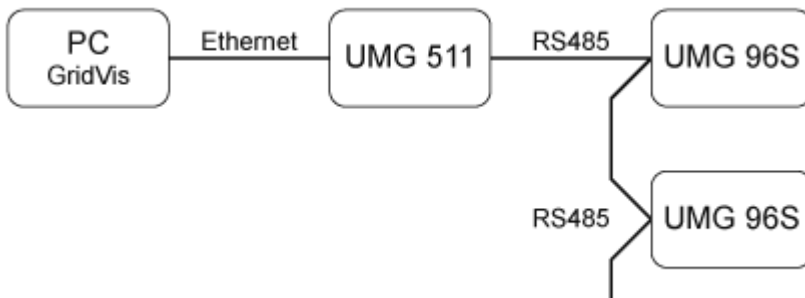
10.13.4 UMG 511 - General information

UMG 511 - General information


UMG 511 - Measurement

Measurement

The UMG511 has 4 measurement channels used to measure the current (I1..I4) and 4 measurement channels used to measure the voltage (V1..V4 against Vref). Measured voltage and measured current for the measurement channels 1-4 must derive from the same network.

- - Baseline measurement
    - The baseline measurement uses the measurement channels 1-3.
    - Use the measurement channels 1-3 in three-phase systems.

- - Supporting measurement
    - The supporting measurement only uses measurement channel 4.
    - Use measurement channel 4 when measuring in single-phase systems or in three-phase systems with symmetrical loads.
    - The frequency setting and the setting for the relevant voltage are pulled automatically from the baseline measurement settings.

UMG 511 - Half wave effective values

Half wave effective value

- A half wave effective value is a measurement value that corresponds with the formation of a full wave over a measurement period.
- For half wave effective values, measurement results are generated every 10ms (50Hz) or every 8.3Hz (60Hz).
- Half wave effective values CANNOT be used in Jasic programs.
- Calculated full wave effective values
- Voltage, UL1-N, UL2-N, UL3-N, UL4-N
- Current, IL1, IL2, IL3, IL4
- Calculation of the half wave effective values.
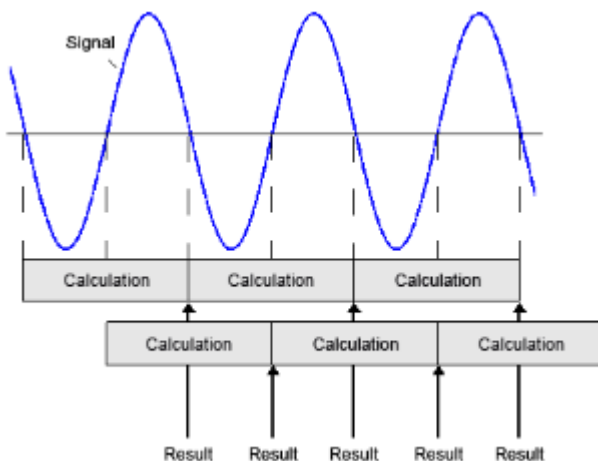
UMG 511 - Base frequency

Base frequency

- The UMG 511 operates in networks with base frequencies from 15 to 440Hz.
- If a fixed base frequency of 50Hz or 60Hz has been set in the UMG 511,
  - then the voltage quality will be measured in accordance with EN61000-4-30 **Class A**,
  - and flicker calculated in accordance with EN61000-4-15.

- If automatic frequency recognition has been selected,
  - voltage quality will be measured in accordance with EN61000-4-30 Class S (as there is no synchronisation of the 10 minute measurement windows),
  - and **no** flicker is calculated in accordance with EN61000-4-15.

UMG 511 - Jasic

Jasic

- - 7 Jasic programs can be executed simultaneously in the UMG511.
  - 128 kByte of memory is available for each program.
  - Jasic programs are easily created with the graphic programming integrated into GridVis.

UMG 511 - Relevant voltage

Relevant voltage

In three-phase systems, measurements can be carried out between the outer conductors and between the outer conductors and the star point.

The relevant voltage indicates whether a measurement is to be made between the

- - outer conductors (mesh voltage) L-L or between
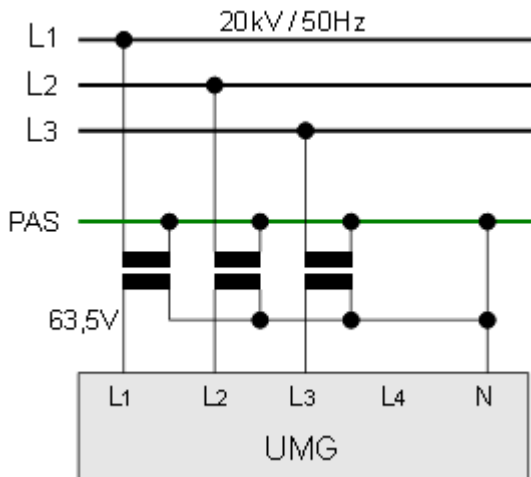 - the outer conductors and the star point (star voltage) L-N

Establishing the relevant voltage is required in order to calculate

- - transients,
  - events and
  - flicker

UMG 511 - Mean voltage flicker measurement

Measuring mean voltage flicker

Example of a flicker measurement in a mean voltage network.
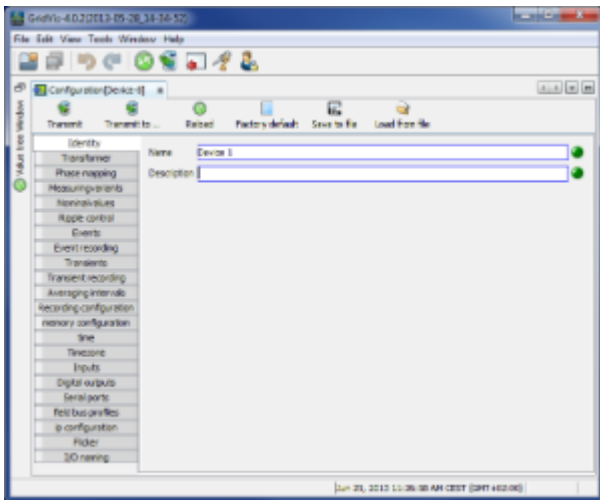
10.13.5 UMG 511 - Configuration

UMG 511 - Configuration


UMG 511 - Identity

Identity

- The name is used, among other things, to identify the device in the device list.
- Additional information can be saved under Description.

UMG 511 - Transformers

**Transformers**

- Voltage measurement
    - Three-phase, 4-conductor networks with earthed neutral line
        - Rated voltages (L-N/PE) to a maximum of 417V
        - Rated voltages (L-N/PE) to a maximum of 277V in accordance with UL
    - Three-phase, 3-conductor networks, not earthed
        - Rated voltages (L-L) to a maximum of 480V
    - Voltage transformers are necessary in networks with higher rated voltages

- Voltage transformers
    - The converter requirements for the main measurement and secondary measurement must be determined separately.
    - Select the 400/400V setting when measuring without a voltage converter.

- Current measurement
    - The UMG511 can measure currents up to 5A directly. Observe the installation guide when doing this.
    - Transformers are used when measuring currents greater than 5A.

- Current transformers
    - The converter requirements for the main measurement and secondary measurement must be determined separately.
    - Select the 5/5A setting when measuring currents directly.
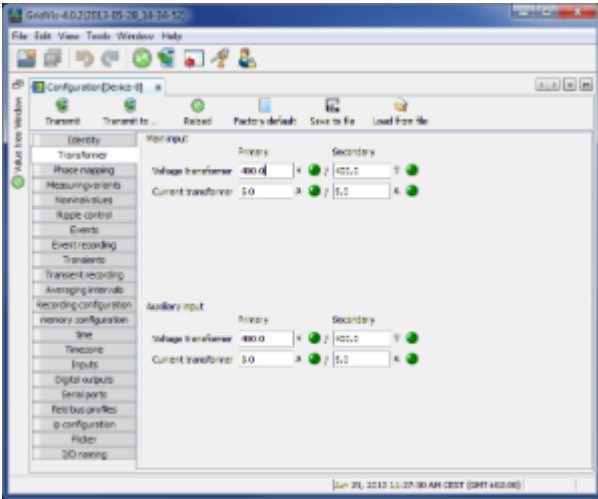
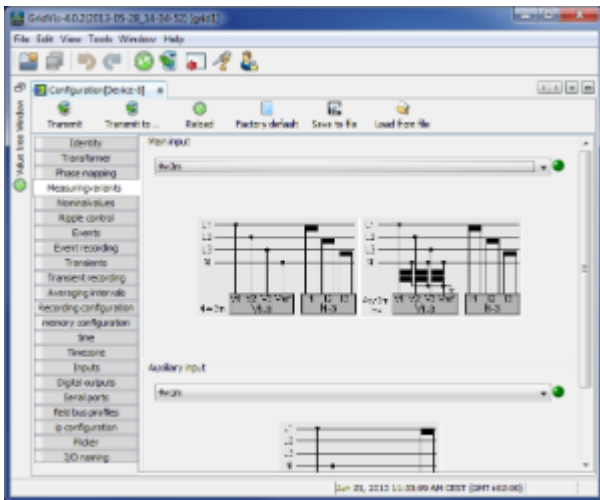# UMG 511 - Phase mapping

Phase mapping

- The phase wiring and the electricity consumer wiring can be redefined by the phase assignments.
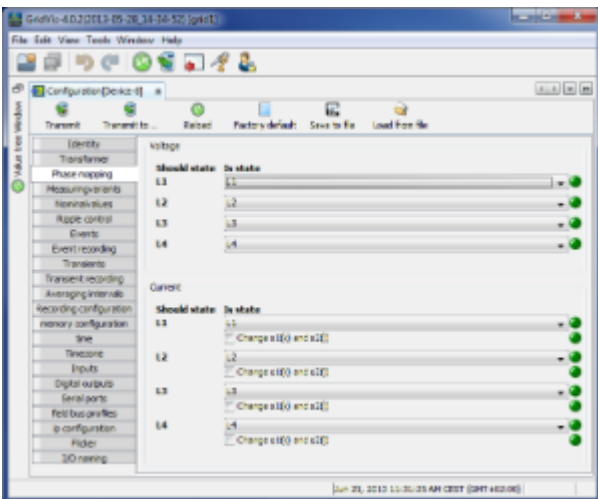

UMG 511 - Connection variants

Connection variants

- Set the device's connection variant for the voltage and current measurements (operating manual).

UMG 511 - Nominal values

Nominal values

- The measurement channels are addressed via the rated frequency. Select the mains frequency in accordance with the existing mains.
- Nominal values are required as a reference to identify events (over/undervoltage and overcurrent), harmonics and flickers will require the nominal values as reference.
- The rated current of the transformer at the supply is required in order to calculate the K factor.
- The relevant voltage indicates whether a measurement is to be made between the
    - outer conductor L-L or between
    - outer conductor L and neutral conductor N.
- The relevant voltage is required for the calculation of harmonics, events and flicker.
- The relevant voltage can be set for UMG 511 and UMG 605 devices. For UMG 508, UMG 604 and UMG 104 devices with the firmware small Rel. 2.x, the relevant voltage is not adjustable and is always L-N.
    - In the 3-conductor network (e.g. mean voltage) the relevant voltage relates to a calculated star point.
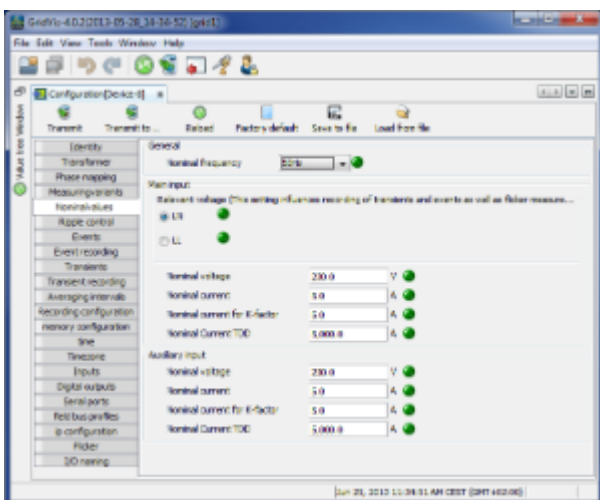
UMG 511 - Ripple control signal

Ripple control signal

- The ripple control voltage is a voltage measured with a carrier frequency established by the user. Only frequencies below 3kHz are taken into account.
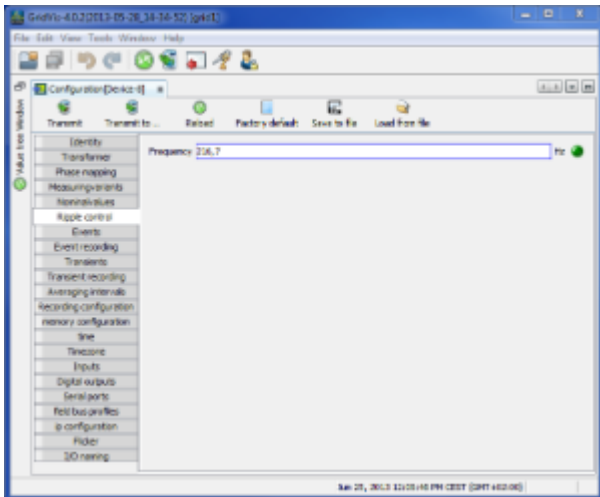

UMG 511 - Events

Events

- An event occurs if threshold values set for the current and the voltage are violated.
- An event has a mean value, a minimum or maximum value, a start time and an end time.
- The GridVis event browser can display recorded events.
- The threshold values are set for excess voltage, undervoltage, voltage interruption and overcurrent as a percentage of the nominal values.
- Threshold values can be switched off by switching the Manual/Off button to Off.
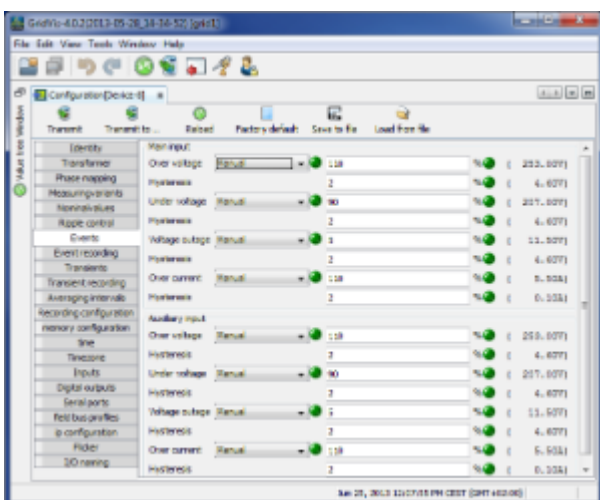
UMG 511 - Event recording

Event recording

- Effective values recorded in the UMG 511 describe the change in half wave effective values.
- Effective value recording can be started by an event.
- Various recording modes can be selected to record effective values triggered by an event.
    - Only the value in which the event was found.
    - Only voltage and current in the phase in which the event was found.
    - All of the inputs of the value in which the event was found.
    - All of the values in all of the inputs
- The length of the effective value record is determined by the number of half wave effective values up to the beginning of the event (pre-run) and by the number of half wave effective values after the beginning of the event (after-run).
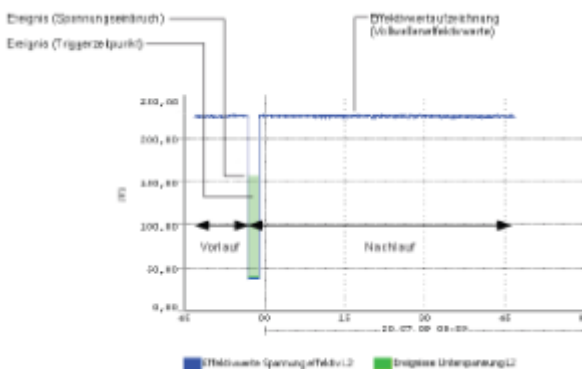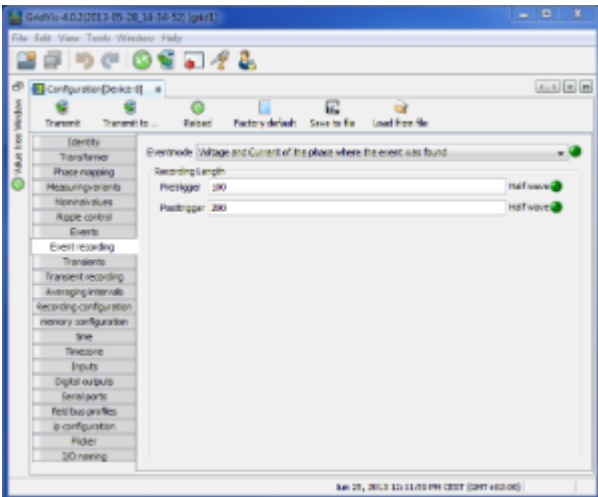
UMG 511 - Transients

Transients

- Transients are fast voltage changes.

- The UMG511 recognises transients if they are longer than 50µs, although it only monitors voltage measurement inputs.
- There are three independent criteria by which transients are recognised.
- Absolute: If a sampled value exceeds the set threshold, a transient is recognised.

Available settings:

- - Off - transient monitoring has been switched off
  - Automatic - the threshold value is calculated automatically and comes to 110% of the current 200ms effective value.
  - Manual - the transient monitoring uses the set threshold values.
- Fast increase: If the difference between two neighbouring sampled points exceeds the set threshold, a transient is recognised.

Available settings:

- - Off - transient monitoring has been switched off.
  - Automatic - the threshold value is calculated automatically and comes to 0.2175 times the current 200ms effective value.
  - Manual - the transient monitoring uses the set threshold values.
- Envelope: If a set threshold value has been exceeded, a transient is recognised.

Available settings:

- - Off - transient monitoring has been switched off.
  - Automatic - the threshold value is calculated automatically.
  - Manual - the transient monitoring uses the set threshold values.

- If a transient has been recognised, the threshold value increases by 20V, both in automatic and in manual mode. This automatic increase of the threshold value switches off within 10 minutes.
- If a transient has been recognised, the wave form will be saved to a transient record.
- If a further transient is recognised within the next 60 seconds, it will be recorded with 512 points.
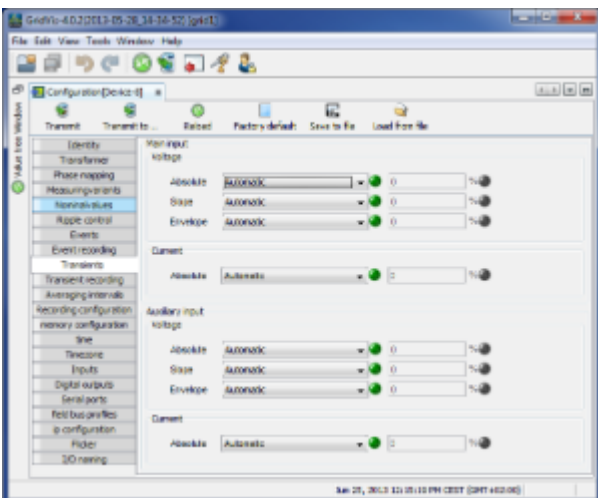
UMG 511 - Transients recording

Transients recording

- If a transient has occurred, the wave shape can be saved in a transient record with an adjustable number of sampled points before and after the transient.
- The distance between two sample points is always 50µs.
- You can choose between the following measurement channels for recording in the transient record:
  - The phase voltage will be recorded with the transient.
  - The phase voltage and current will be recorded with the transient.
  - All voltages will be recorded.
 - All voltages and all currents will be recorded.

Record length

The number of sample points to be saved before the transient occurred:
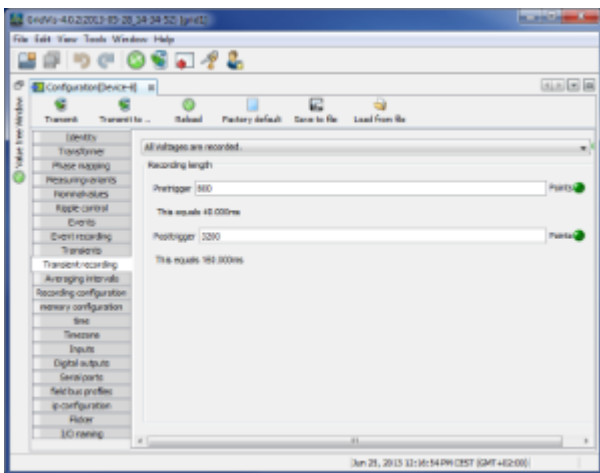

UMG 511 - Averaging intervals

Averaging intervals

- Parameterisation of the floating average (previous name for trailing value indicator) for the individual measurement values.
- The measurement values of the mean values are marked in the device display with an overline.
- The values can also be used for operators or comparators (Jasic).
- The adjustment range of the reporting times of the selected group (L1-L4) is 10, 15, 30, 60 seconds and 5, 8, 10, 15 minutes.
- The settings of different reporting intervals for each individual phase are made on the device.
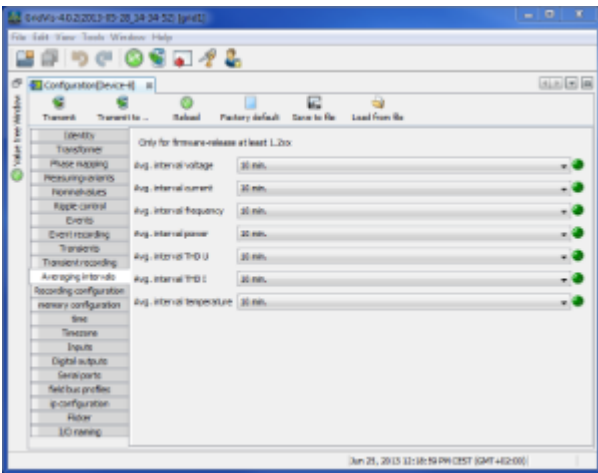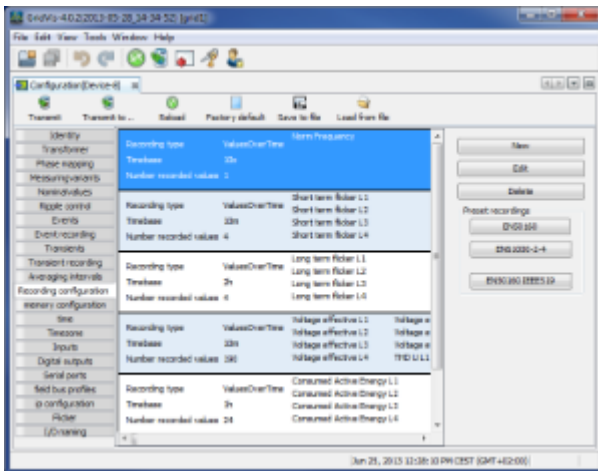
- If different reporting intervals have been set via the device within a L1-L4, then after the configuration has been read in, the corresponding group box is marked in red. A reselection of the reporting time followed by transfer, resets the group (L1-L4) to the selected value.
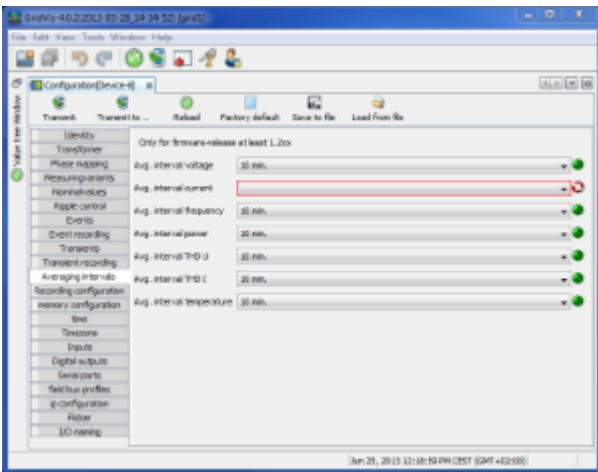
UMG 511 - Recording configuration

Recording configuration

- Default profiles can be loaded or up to 16 records configured in recording configuration.
- A record can have a maximum of 1000 values.
- A record holds a measurement value or the mean value of the measurement value.
- Mean value records can also include the minimum and the maximum values.
- Mean values, minimum values and maximum values are derived from the measurement values in the measurement timeframe.
- The mean value measurement timeframe is established by the time set under "Time basis".
- Measurement values are saved once the time set under "Time basis" has run its course (Data memory capacity calculation using UMG 604 as example).

Setting up / editing a recording configuration

- An individual recording instance can be set up using the New or Edit buttons.
- Measurement values are selected in the recording window using the Add values button.
- To do so drag the desired measurement value (measurement value group) over the value field. The measurement values are adopted and displayed.
  The selected measurement values can be described in more detail via the option "Mean (arithmetical)", "Mean (RMS)", "Minimum", "Maximum", "Sample" and "With value change".
  - Mean (arithmetical)
    The arithmetical mean is the ratio of the sum and the number of all 200ms measurement values:
    x(arithm.) = (x1+x2+x3...) / n
  - Mean (rms)
    This value describes a quadratic mean (potential mean) with:
    x (rms) = root (($x1^2$+$x2^2$+$x3^2$+..) / n)
  - Minimum / Maximum
    When these buttons are selected, the means of the minimum and/or maximum values are recorded.
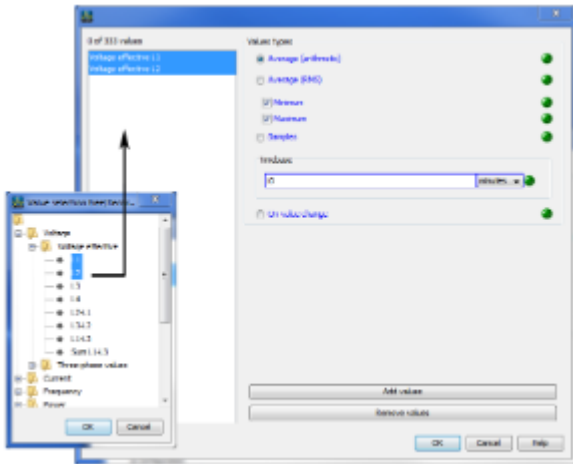 - Sample
    Sample describes the recording of the measurement value within the defined time duration. The time baseline defines the time intervals at which the recording is made.
  - With value change
    If the measurement value is changed, the 200ms measurement value is recorded. This setting is useful for, for example, the monitoring of digital inputs and outputs (not with high frequency signals) or of the temperature input.

In contrast to the arithmetical mean, the quadratic mean is of increasing importance when the measurement values vary greatly cyclically. Outliers in the measurement values thus have a greater significance. With a value like voltage, it is a good idea to take this more into account than for a power value.

Using the Delete values button, selected measurement values can be deleted.

EN50160 and EN61000-2-4 presettings selection aid

- Via the EN50160 and EN61000-2-4 buttons, predefined recording settings can be made.
- If the device does not support measurement as per EN50160, a prompt is issued.

UMG 511 - Memory configuration

Configuring data memory

- The UMG 511 has a storage capacity of approx. 256 Mbyte.
- The data memory has been partitioned as follows ex works:
    - 40% for user-defined recording.
    - 22.5% for the recording of transients.
    - 22.5% for the recording of full wave effective values.
    - 10% for the recording of events.
   - 5% for the recording of flags (flagging).
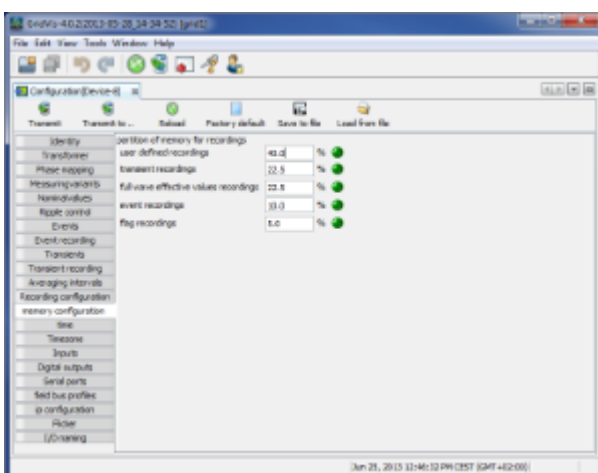
UMG 511 - Time

Configuring data memory

The UMG 511 has a clock with a battery backup. The fault in the clock's quartz is aligned with room temperature during production so that the clock only deviates by +- 1 minute/month. If transient records and event records are to be compared with other measurement records, it is recommended that the time indicated by the UMG 511 be compared and aligned with that in a time server via an Ethernet connection. For synchronisation, the Network Time Protocol (NTP) is used.

- - Mode
    Off - synchronisation of the clock with an external time server is switched off.
    Lists - The UMG 511 is waiting for time information from a time server.
    Active - The UMG 511 automatically requests time information from an NTP server every 64 seconds.
 - NTP server - this is where the time server's address is input.
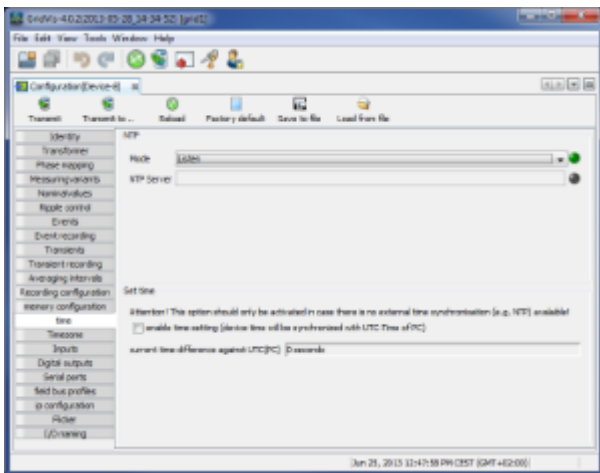
Time setting

- The time can be reset during configuration by adopting the UTC time from the connected PC.

UMG 511 - Time zone

Time zone

All time information with regard to measurement values, events and transients relate to UTC time (Coordinated Universal Time). GridVis converts UTC time to Central European Time (CET) when it displays measurement results. Central European Time (CET) is the applicable time zone in central Europe and therefore also in Germany.

- *Winter time* - time offset from Central European Winter Time relative to UTC time.
- *Summer time* - time offset from Central European Summer Time relative to UTC time.
- *Start of daylight saving time* - start of daylight saving time.
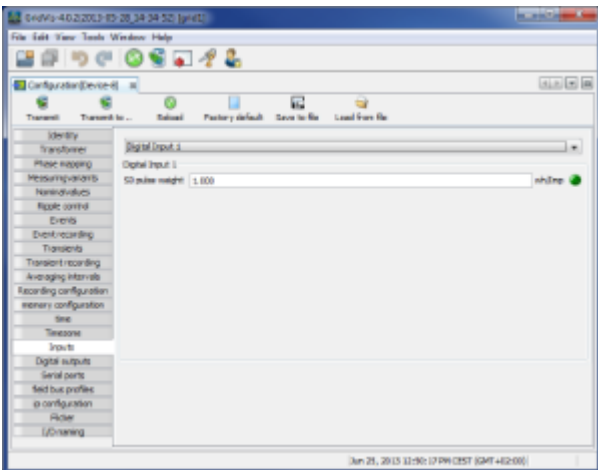- *End of daylight saving time* - end of daylight saving time.
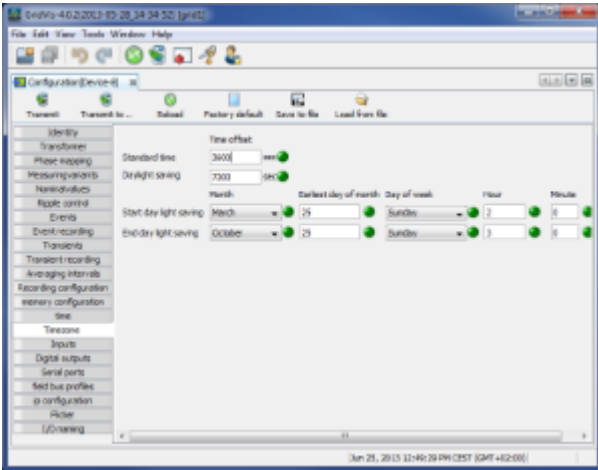
UMG 511 - Inputs

Inputs

The UMG511 has eight digital inputs. These inputs can be used as digital inputs and as input pulse meters

- A pulse value can be assigned to every pulse input.

# UMG 511 - Digital outputs

Digital outputs

The UMG 511 has five digital outputs. Both of these digital outputs can be programmed for event messages or as a pulse output (S0 output).

- Each digital output can be programmed as a NC or NO contact.
- One or more events can be allocated to an output if it is programmed for event updates.
- The event output activates if a selected event occurs.
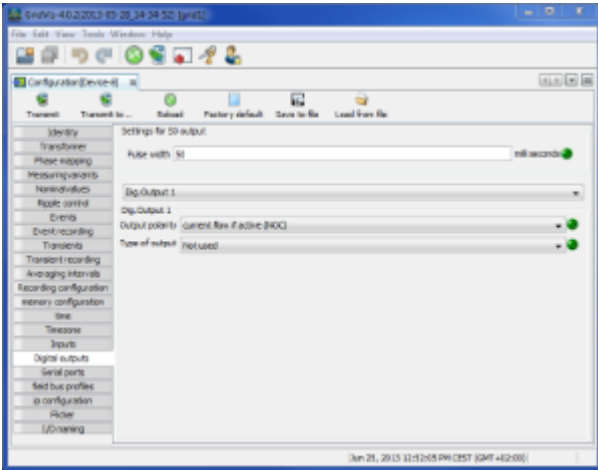
UMG 511 - Serial outputs

Serial outputs

- Device ID

  The device ID (device address) is required for Modbus communication and for the Profibus.
- RS485

  Setting the Modbus selection between Modbus master (gateway), Modbus slave or Profibus

  Baudrate selection of 9600bps, 19200bps, 38400bps, 57600bps, 115200bps and 921600bps
- Profibus

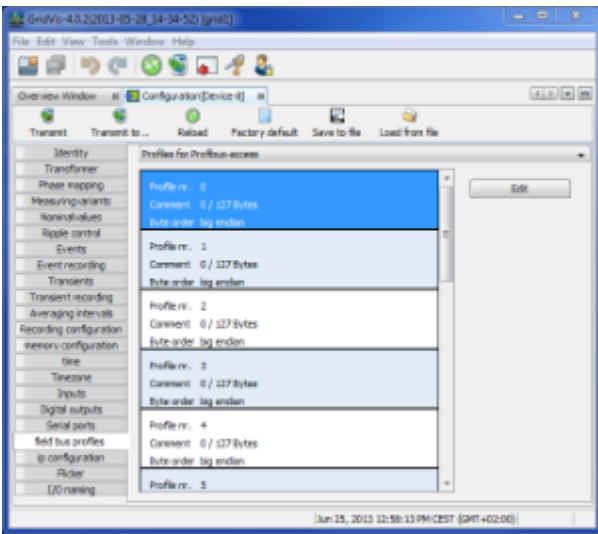 Additional Profibus settings are performed under fieldbus profiles.
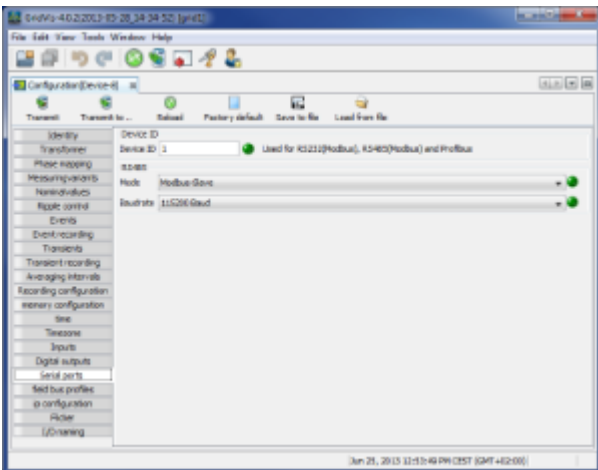
UMG 511 - Fieldbus profiles

Fieldbus profiles

Fieldbus profiles hold a list of values which can be read or written by a PLC over the Profibus.

- Using GridVis, 16 fieldbus profiles can be configured.

- The UMG 511 is pre-programmed in the factory with 4 fieldbus profiles.

- Profiles can be created or changed using the Edit button.
- To do so drag the desired measurement value (measurement value group) over the value field. This saves and displays the measurement values.
- Using the Delete values button, selected measurement values can be deleted.
- The measurement value sequence can be determined with the position buttons.
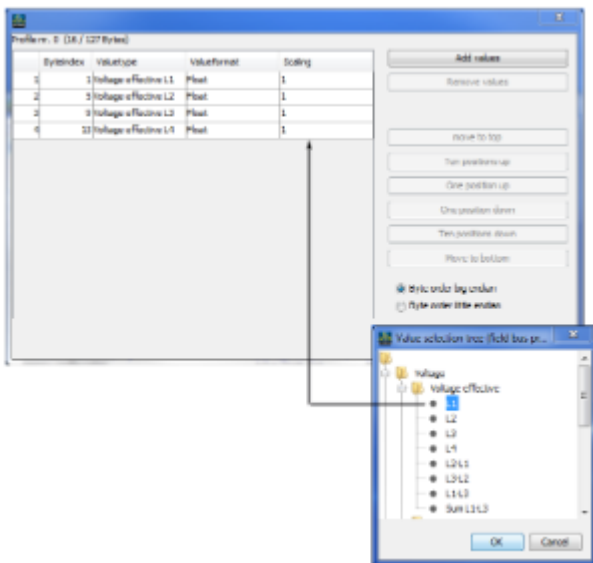
UMG 511 - IP configuration

IP configuration

- For devices with Ethernet, it is necessary to set at least the IP address and the subnet mask.
- In the UMG 511, it is possible to choose between the options fixed IP address, BootP and DHCP mode.

- Fixed IP address

  All settings are undertaken by the user.
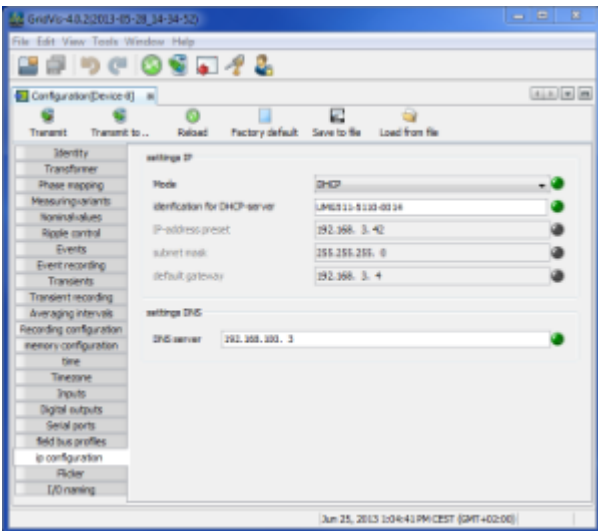- BootP

  BootP allows for the fully automatic integration of a UMG 511 into an existing network.
- DHCP mode

  When started, the UMG 511 obtains all its settings from the DHCP server.

IMPORTANT: Setting should only be undertaken after these have been discussed with the administrator.

UMG 511 - Flicker

Flickers

The UMG511 requires the mains base values in order to provide voltage and frequency-independent measurement and calculation of the flicker values (flicker measurement as per DIN EN61000-4-15:2011). These values are to be specified by the user and can be selected from a predefined list:

- - 230V/50Hz (factory presetting)
    - 120V/50Hz
    - 230V/60Hz
    - 120V/60Hz
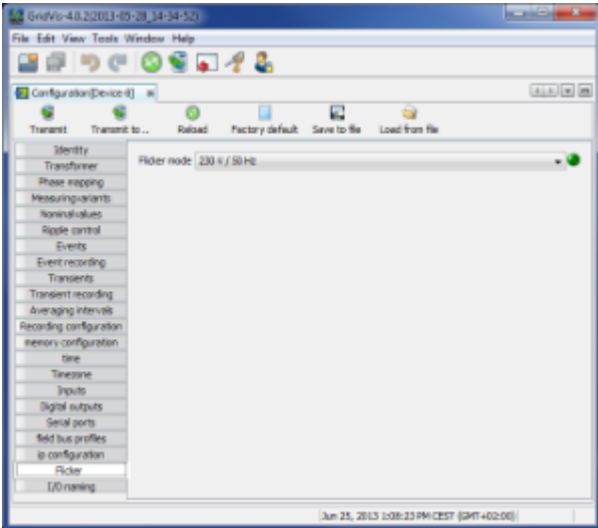
UMG 511 - Naming of inputs

Naming of inputs

- Enables naming of inputs and outputs.
- The respective inputs/outputs can be assigned names by entering a name in the corresponding box.

10.13.6 UMG 511 - Interfaces

UMG 511 - Serial interfaces

UMG 511 - BACnet

BACnet: Introduction

BACnet = **B**uilding Automation and **C**ontrol **N**etworks is a network protocol for building automation.

BACnet ensures that devices made by different manufacturers can operate together as long as the partners involved in a project agree on certain BIBB standards. A BIBB (BACnet Interop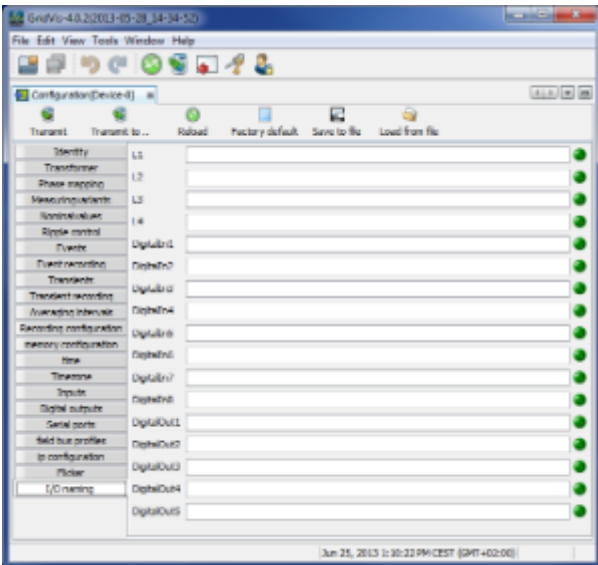erability Building Block) defines which services and procedures must be supported on the server and client sides in order to realise certain system requirements.

UMG 511 supports the device type B-SA with the BIBBs DS-RP-B and DS-WP-B.
In addition the BIBBs DS-WP-B, DS-WPM-B, AE-N-B and AE-N-B are supported.

A Jasic program provides the interface between the BACnet protocol in the UMG604 and external devices (GLT, UMG 96S, devices from third parties, etc.).

- BACnet is a software add-on subject to purchase and must be activated.
- The BACnet can only be activated directly on the device.
- The two 4-digit codes which comprise the activation code must be entered on the device under the addresses 520 and 521.
- The user can customise the interface (Jasic program).
- Jasic programs are accessible to the user, who is able to edit them.
- Editing or writing Jasic programs requires only basic programming knowledge.

- BACnet knowledge is necessary to be able to customise the BACnet interface in a Jasic program.
- Janitza electronics GmbH has the BACnet vendor ID number: 316.

Further information at:

- UMG 604 - in BACnet
- UMG 604 - Jasic example 1
- UMG 604 - Jasic example 2
- UMG 604 - Jasic example 3

UMG 511 - Modbus

Modbus address list

A list of the measurement values available in the devie with the corresponding addresses and formats can be found on the CD/DVD provided with GridVis.

Further information at:

- UMG 604 - Modbus

UMG 511 - Ethernet

Ethernet: Introduction

To be able to operate the UMG 511 in the Ethernet, the UMG 511 requires an Ethernet address. There are three options here:

- - Fixed IP address
    In networks without a DHCP server, the network address must be set directly in the UMG 511.
  - BootP
    BootP allows for the fully automatic integration of a UMG 511 into an existing network.
    However, BootP is an older protocol and does not provide the scope of functions provided by DHCP.
  - DHCP mode
    DHCP allows for the fully automatic integration of a UMG 511 into an existing network without additional configuration.
    When started, the UMG 511 automatically draws the IP address, the network screen and the gateway from the DHCP server.

For more information, refer to the UMG 511 guide!

Ethernet: Fixed IP address

In networks without a DHCP server, the network address must be set directly in the UMG511. To do this, the following settings must be carried out:

-

- Set up the UMG 511 for a *fixed* IP address.
- Set the desired IP address, IP screen and IP gateway.

Put the UMG511 into parameterisation mode as explained in the operating manual and set the Ethernet address under Communication.

Ethernet: Ports

Devices equipped with the Ethernet option can use the following ports:

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

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

UMG 511 - Profibus

Profibus profiles

A Profibus profile contains the data to be exchanged between a UMG and a PLC. A Profibus profile can:

- Retrieve measurement values from the UMG,
- Set the digital outputs in the UMG and
- Query the status of the digital inputs in the UMG.

Each Profibus profile can hold a maximum of 127 bytes of data. If more data has to be transferred, simply create additional Profibus profiles.

- Every Profibus profile has a profile number. The profile number is sent by the PLC to the UMG.
- Using GridVis, 16 Profibus profiles (profile numbers 0..15) can be edited.
- Additional Profibus profiles (profile numbers 16..255) can be created using Jasic programs.
- Four Profibus profiles are preconfigured ex works.

Further information at:

- UMG 604 - Profibus profiles
- UMG 604 - Retrieving measurement values
- UMG 604 - Setting digital outputs via Profibus
- UMG 604 - Customised processing of data

10.14 Virtual device

10.14.1 Virtual device
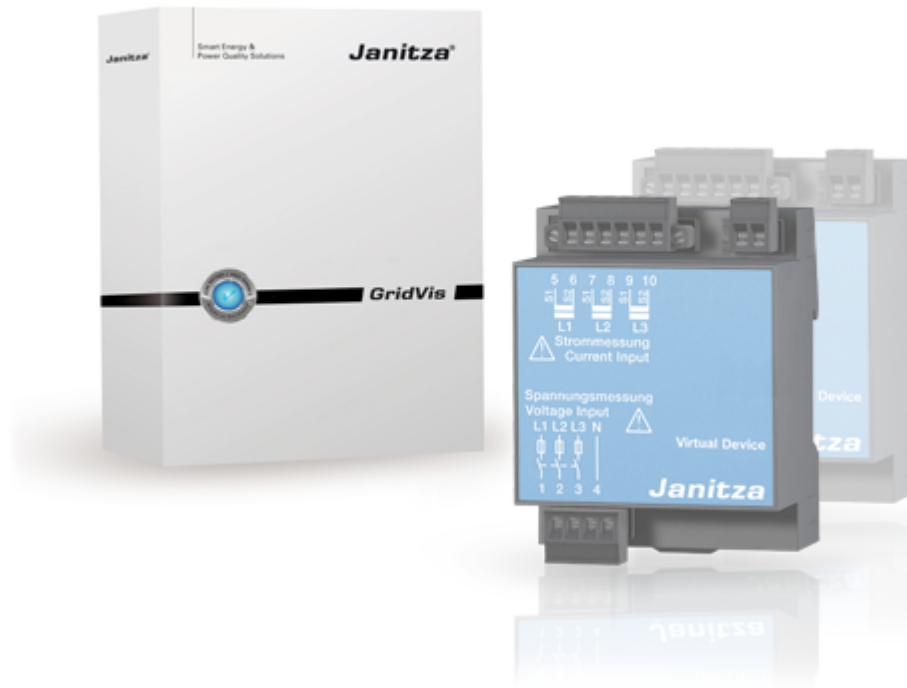
10.14.2 Adding virtual device

Add a virtual device

Measurement values from other devices incorporated into GridVis can integrated in a virtual device. In the process, real measurement values from devices are assigned to the virtual device and - if desired - relinked and recalculated. Inside the software it is possible to treat the virtual device in the same way as a real device and, for example, to use it in creating graph and topology settings.

Example of recalculating and linking real measurement values:
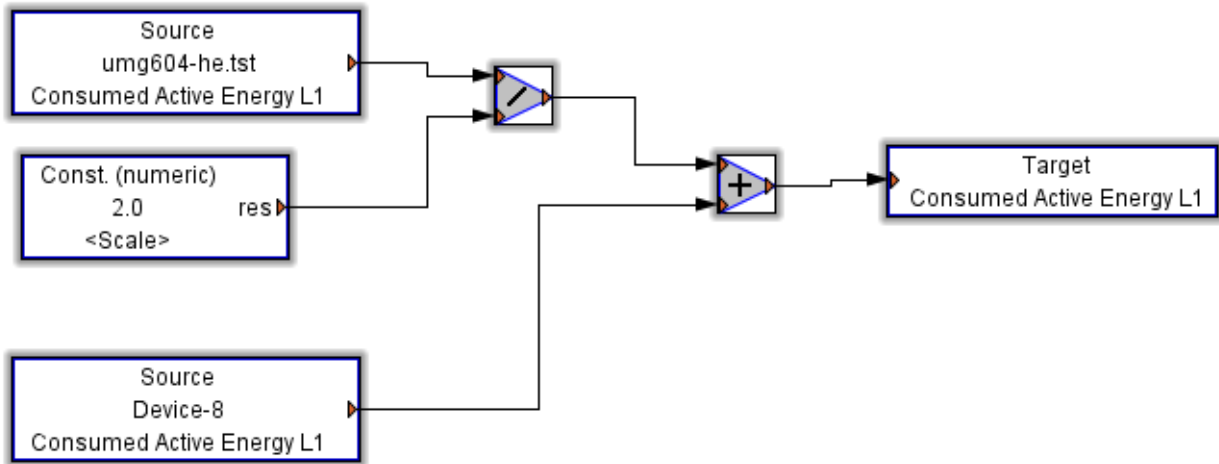
- Create a new virtual device in GridVis. The type of connection remains "Without connection" and cannot be configured (First steps, Adding new device).

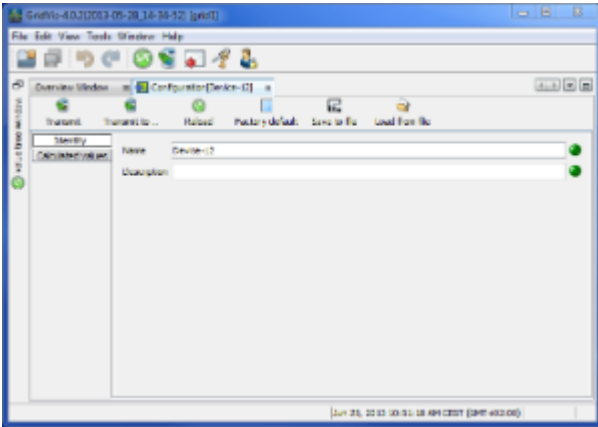# 10.14.3 Virtual device - Configuration

Virtual device - Configuration

Virtual Device - Identity

Identity

- The name is used, among other things, to identify the device in the device list.
- Additional information can be saved under Description.

Virtual device - Calculated values

Calculated values

- Using the palette window, the desired measurement values and operators for the virtual device can be set using the modules (e.g. input measurement values and output values).
- Drag the "*Value source*" icon from the Palette window to the configuration area.
- Set the device and the desired measurement value by double-clicking on the module.
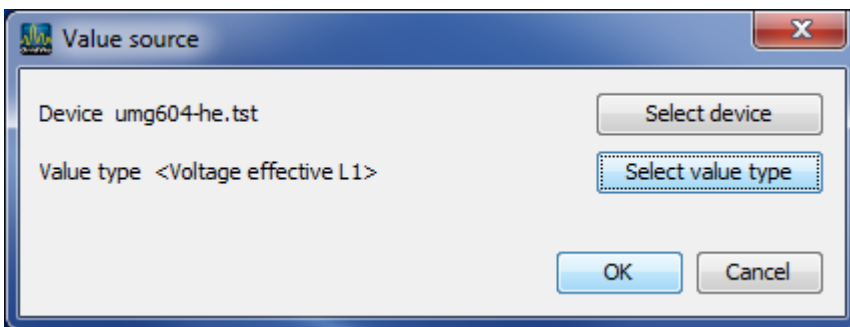
- Drag the "*Target*" icon from the Palette window to the configuration area.
- Set the output measurement value for the virtual device by double-clicking on the module.
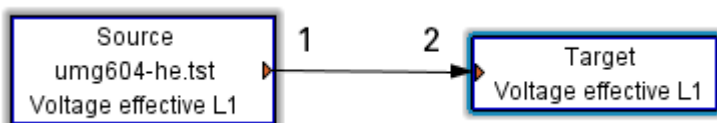
- Connect the two modules and then, using the "*Transfer*" button, transfer the configuration to the virtual device.

  A connection between the components is established by dragging the coloured triangles in the modules to another triangle until these perceptibly "click together" (1 to 2).

- Example of a virtual device with different input values and two virtual output values.

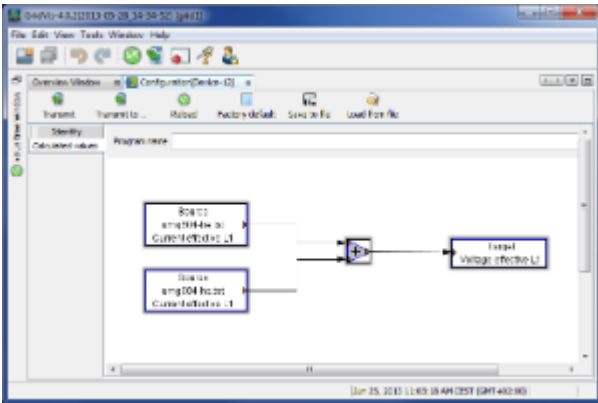

10.14.4 Example: Accessing global variables

Recording global variables and assigning to a virtual device

In order to be able to access a global recording of a JASIC-compatible device (e.g. UMG 605) of a virtual device, the following steps should be performed:

- Select a Jasic-compatible device (e.g. UMG 605) by double-clicking in the projects window.
- Select a free Jasic program location by clicking in the navigation window.
- Assign a program name.
- Drag the module "*Repeater*" from the palette window to the graphic programming area (see Jasic start).
- Set a system variable (SysVar) from the palette window with the "*System variable*" module. Place the module in the repeater pane.
  Assign the module a value (e.g. voltage L1) by double clicking it.
- Set a global variable by placing the module "*User variable (numeric)*" within the repeater pane.
- Open the configuration of this module by double-clicking.
- Assign a global variable name ("*_gbl_...*").
- Set the variable type to "*Global variable*".
  A global variable - in contrast to local variables - is provided via the Jasic program boundary. The name of this variable must begin with "*_gbl*". This variable can be preassigned an initial value and permanently saved in the memory via the corresponding option. Via the value type, the variable is classified as a "*Short*", "*Integer*" or "*Floating decimal*" value. In addition, it is possible to place the variable value to an adjustable Modbus address. The assignment of a unit or name is optional.
- Drag the "*Simple recording*" module from the palette window to the repeater pane.
- Open the configuration of simple recording by double-clicking the module.

- Assign a value name via the "*Add values*" button.
  The value name must be the same as the name of the previously created global variable ("*_gbl_...*")
  (see Fig. Configuration "Simple recording").
- Link the modules for the two variables (see Jasic start / Basis of graphic programming).
- Transfer the graphic programming to the device (e.g. UMG 605) with the "Transfer" button.

After the device has been read out, the recordings of the global variable can be found at value tree window under "*Historical values*" in the "Global values" tab!
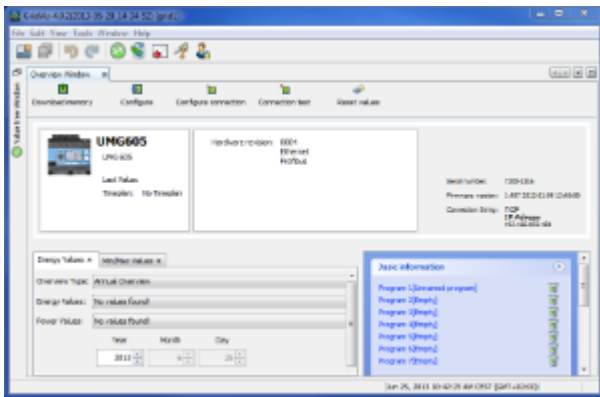
Fig.: Navigation window for UMG 605
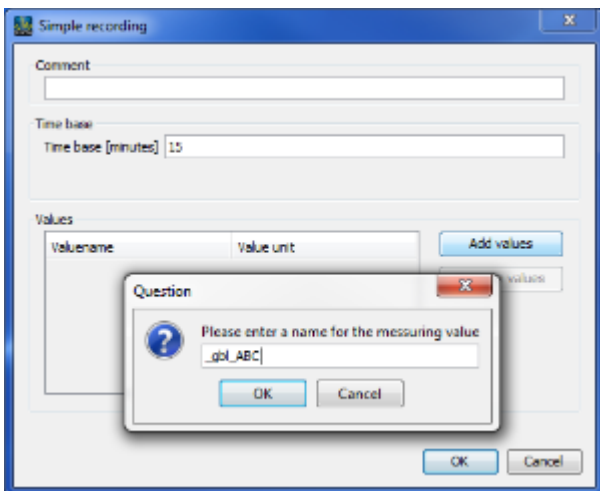
Fig.: "Simple recording" configuration

Creating virtual device

- Create a virtual device (not available in the basic edition) (see "Adding virtual device") and start the configuration (see "Virtual device - Configuration").
- Place the module "*Value source*" from the palette window under "*Calculated values*".
- Start the configuration of this module by double-clicking.
- Select the corresponding Jasic-compatible device with the previously created program (e.g. UMG 605) and the set global variable via the "*Select value type*".
- For a multiplication with 2, for example, set a numerical constant and the mathematical operator "Multiply"

- Configure the set constant by double-clicking the value 2
- Set the "*Target*" module and configure this by double-clicking: Select the value type by clicking the "*Select value type*" button.
- Connect the two modules (see Jasic Start / Principles of basic programming) and transfer this configuration with the "*Transfer*" button to the virtual device.
- Access to the online and historical values of the virtual device is then achieved via the value tree window.
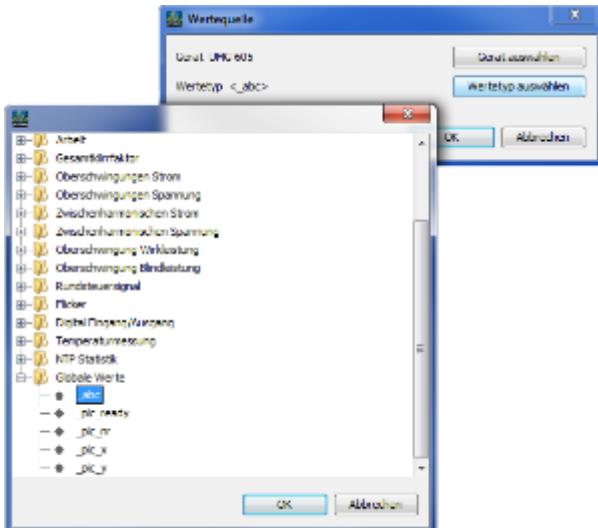
Fig.: "*Value source*" configuration
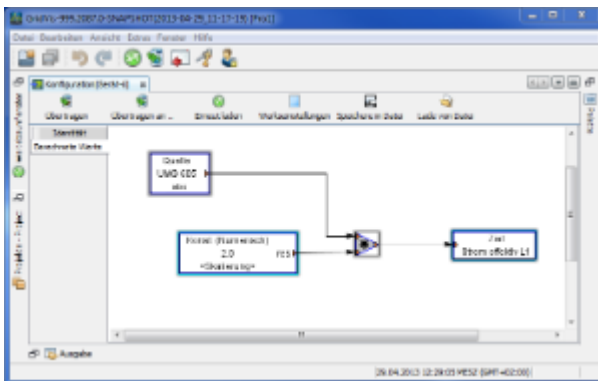
Fig.: Configuration of virtual device

11 FAQs

11.1 FAQs
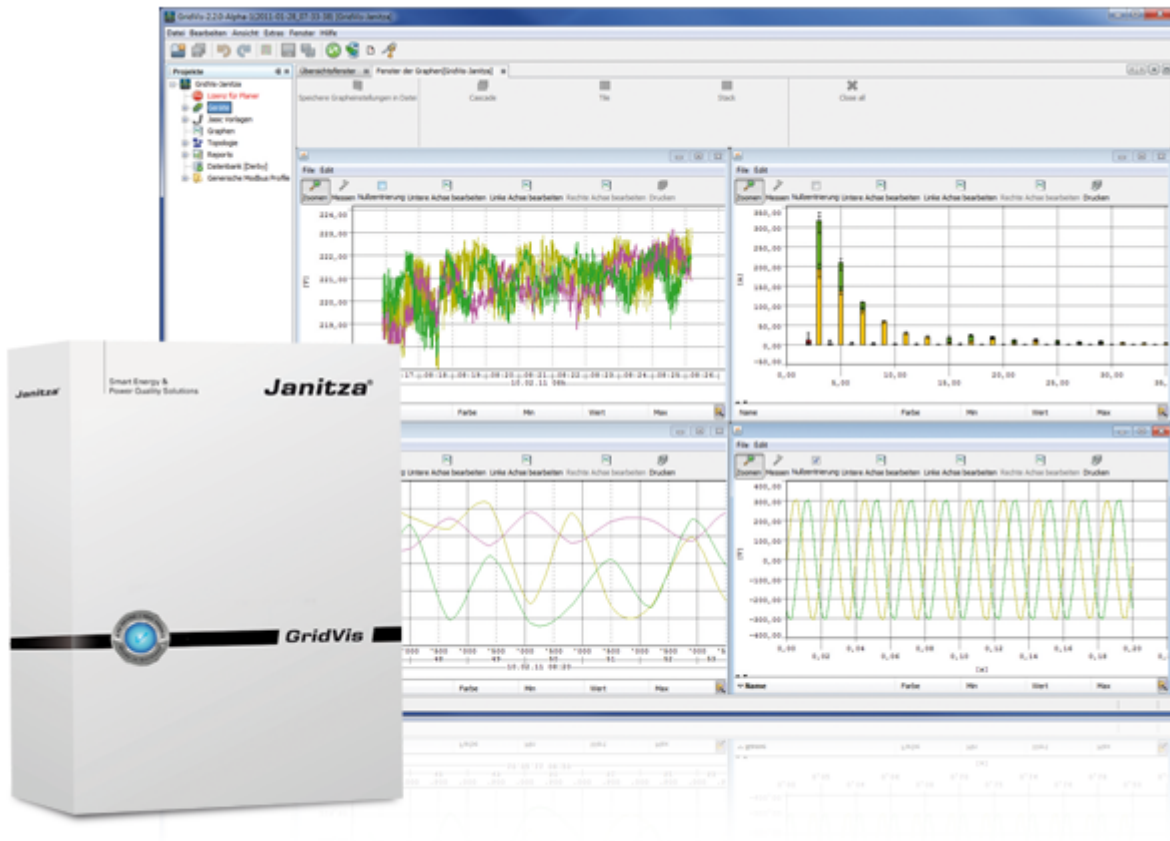
11.2 GridVis compatibility Service/Desktop versions

Compatibility between the GridVis Service edition and GridVis Desktop versions

If the GridVis service edition is used, the desktop edition (Basic, Professional and Enterprise) or the service edition must be adjusted according to the following guideline:

- The first two digits of the version numbers of the service and the desktop editions must match to ensure sufficient compatibility
  A desktop edition with the version number 3.1.x expects a service edition with the version number 3.1.x
- Examples:
    - A desktop edition (e.g., GridVis Professional) with the version number 3.1.0 functions with the Service edition 3.1.7

- A desktop edition (e.g., GridVis Professional) with the version number 3.0.2, however, MUST not necessarily function with the service edition 3.1.0

11.3 GridVis license and virtual machines

Virtual machines and the GridVis license system

- Virtual machines are dynamic systems that are not executed directly on the computer hardware. Certain parameters can change dynamically as required here, and therefore cause problems within the GridVis licensing system.
  - Due to new system parameters on the virtual machine, the GridVis software license is no longer accepted and it reverts back to the "GridVis Basic" license. Therefore, using the GridVis software within a virtual machine (e.g. VMware) is only suitable to a limited extent.
- The licensing system of the GridVis software checks the following parameters:
  - CPU
    Key: HKLM\HARDWARE\DESCRIPTION\System\CentralProcessor\0
    Values: "Identifier", "VendorIdentifier"
  - Machine
    Key: HKLM\SOFTWARE\Microsoft\Windows NT\CurrentVersion
    Values: "ProductId", "CurrentVersion"
  - DISK
    Size of the root partition
    This value is determined by Java. Can be viewed in the error report, file "SystemInfo.xml"
    filesystem\root\drive = hard disk name
    filesystem\root\totalspace = the value
  - MAC
    List of all MAC addresses (of the computer but only percentages) without a loopback and without a PointToPoint.
- If the GridVis software is to be installed on a virtual machine despite this, inform your administrator of the licensing system.

11.4 Flags

Flags

Flags indicate abnormal, irregular states of a device. After reading out the device, they are – if available –displayed in the historical values in the value tree window below the "Flags" tree.

- Select a device in the project window
- Set the view in the value tree window using the button with the same name to "Historical data"
- For an enlarged flag display, drag an entry below the "Flags" tree onto a graph window

Flag	Note
LostWindow	The device has lost the grid synchronisation
LostPLL	Firmware upgrade
OverCurrent	Overcurrent A
OverVoltage	Overvoltage V
ClockNotSet	Clock not set
MemoryDeleted	Memory deleted
EEPROMDefect	EEprom defective
ErrorInCyclicBuffer	Error in cyclic buffer
CyclicBufferNew	New cyclic buffer
CyclicBufferManualDeleted	Cyclic buffer manually deleted
ErrorInFirmware	Error in firmware
ClockSetting	Clock setting
ClockWasSet	Clock was set
Initialization	Buffer initialisation
WatchDog	WatchDog
ResetEMAX	Reset Emax
Timemark	Timemark

11.5 RS485 network topology

RS485 network topology

- Devices are connected in a bus structure (in a line).
- Up to 32 subscribers can be connected together in a single segment.
- The cable is terminated with resistors (bus termination) at the beginning and at the end of a segment.
- With more that 32 subscribers, repeaters (amplifiers) must be used to connect the individual segments.
- Devices for which the bus connection is switched on must be under current.
- It is recommended that the master be placed at the end of a segment.
- If the master is replaced with a bus connection, the bus must be switched off.
- Replacing a slave with a bus connection that is either switched on or de-energised can destabilise the bus.

- Devices that are not connected to the bus can be replaced without destabilising the bus.
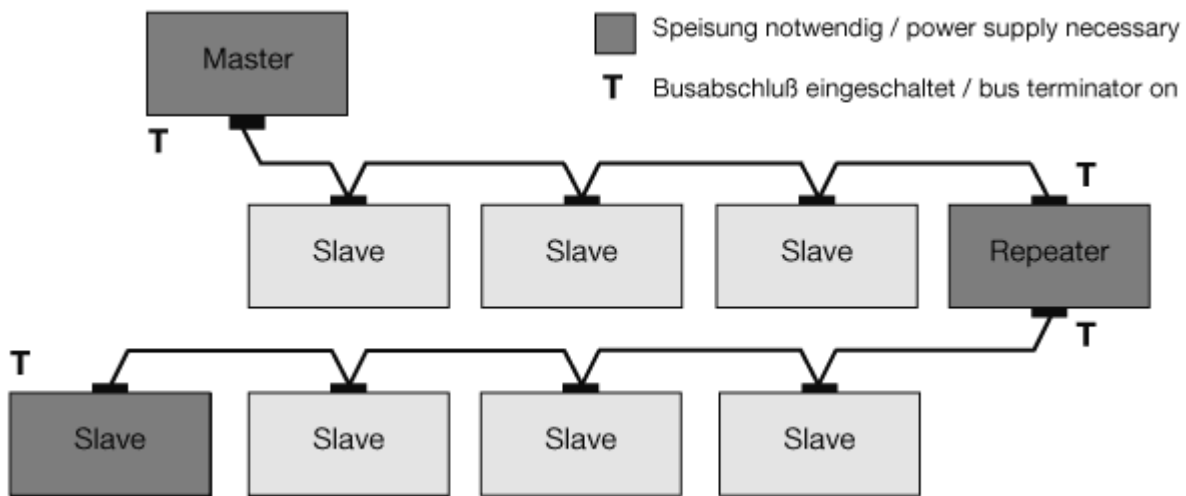
11.6 Ports, protocols and Connections

Port and protocols

Devices and software: Communication protocols and the required ports.

Device	Protocols	Ports
UMG 604/605	TFTP	1201
	Modbus/TCP - Modbus/UDP	502, 4 Ports
	DHCP	68
	NTP	123
	Bacnet	47808
	Nameservice	1200
	HTTP	80
	FTP	21
	FTP data port	1024, 1025
	FTP data port	1026, 1027
	Modbus over Ethernet	8000, 1 Port
	Service port (telnet)	1239
	SNMP	161 / 162 (TRAP)
	Email Port (current)	25

	Email Port (in preparation)	587
UMG 511	TFTP	1201
	Modbus/TCP - Modbus/UDP	502, 4 Ports
	DHCP	68
	NTP	123
	Bacnet	47808
	Nameservice	1200
	HTTP	80
	FTP	21
	FTP data port	1024, 1025
	FTP data port	1026, 1027
	Modbus over Ethernet	8000, 1 Port
	Service port (telnet)	1239
	SNMP	161 / 162 (TRAP)
	Email Port (current)	25
	Email Port (in preparation)	587
UMG 510	Modbus/TCP	502
	Modbus over Ethernet	8000
	UMG510 command language	1234, 1235
UMG 508	TFTP	1201
	Modbus/TCP - Modbus/UDP	502, 4 Ports
	DHCP	68
	NTP	123
	Bacnet	47808
	Nameservice	1200
	HTTP	80
	FTP	21

	FTP data port	1024, 1025
	FTP data port	1026, 1027
	Modbus over Ethernet	8000, 1 Port
	Service port (telnet)	1239
	SNMP	161 / 162 (TRAP)
	Email Port (current)	25
	Email Port (in preparation)	587
UMG 507	Modbus/TCP	502
	Modbus over Ethernet	8000
	Read out telnet data port	1239
	Update telnet data port	1236, 1237
UMG 103/104	The device does not have an Ethernet connection	
GridVis	Modbus/TCP - Modbus UDP	502
	HTTP	80
	FTP	21
	FTP data port	1024, 1025
	FTP data port	1026, 1027
	Modbus/TCP	502
	Modbus over Ethernet	8000
	UMG510 command language	1234
	Read out telnet data port	1239
	Update telnet data port	1236, 1237
	Email Port (in preparation)	25
	Email Port (in preparation)	587
PCAnywhere	UDP, TCP/IP	5631, 5632

**Anzahl der TCP/UTP-Verbindung (UMG 604/605/508/511/96RM-E)**

- Insgesamt sind max. 24 Verbindungen über die TCP-Gruppe möglich. Es gilt:

- Port 21 (FTP): Max. 4 Verbindungen
- Port 25/587 (E-Mail): Max. 8 Verbindungen
- Port 1024-1027 (Datenport zu jedem FTP-Port): Max. 4 Verbindungen
- Port 80 (HTTP): Max. 24 Verbindungen:
- Port 502 (Modbus TCP/IP): Max. 4 Verbindungen
- Port 1239 (Debug): Max. 1 Verbindung
- Port 8000 (Modbus oder TCP/IP): Max. 1 Verbindung
- Verbindungslose Kommunikation über die UTP-Gruppe
  - Port 68 (DHCP)
  - Port 123 (NTP)
  - Port 161/162 (SNMP)
  - Port 1200 (Nameservice)
  - Port 1201 (TFTP)
  - Port 47808 (BACnet)

TCP-Gruppe: Max. 24 Verbindungen (queue scheduling)
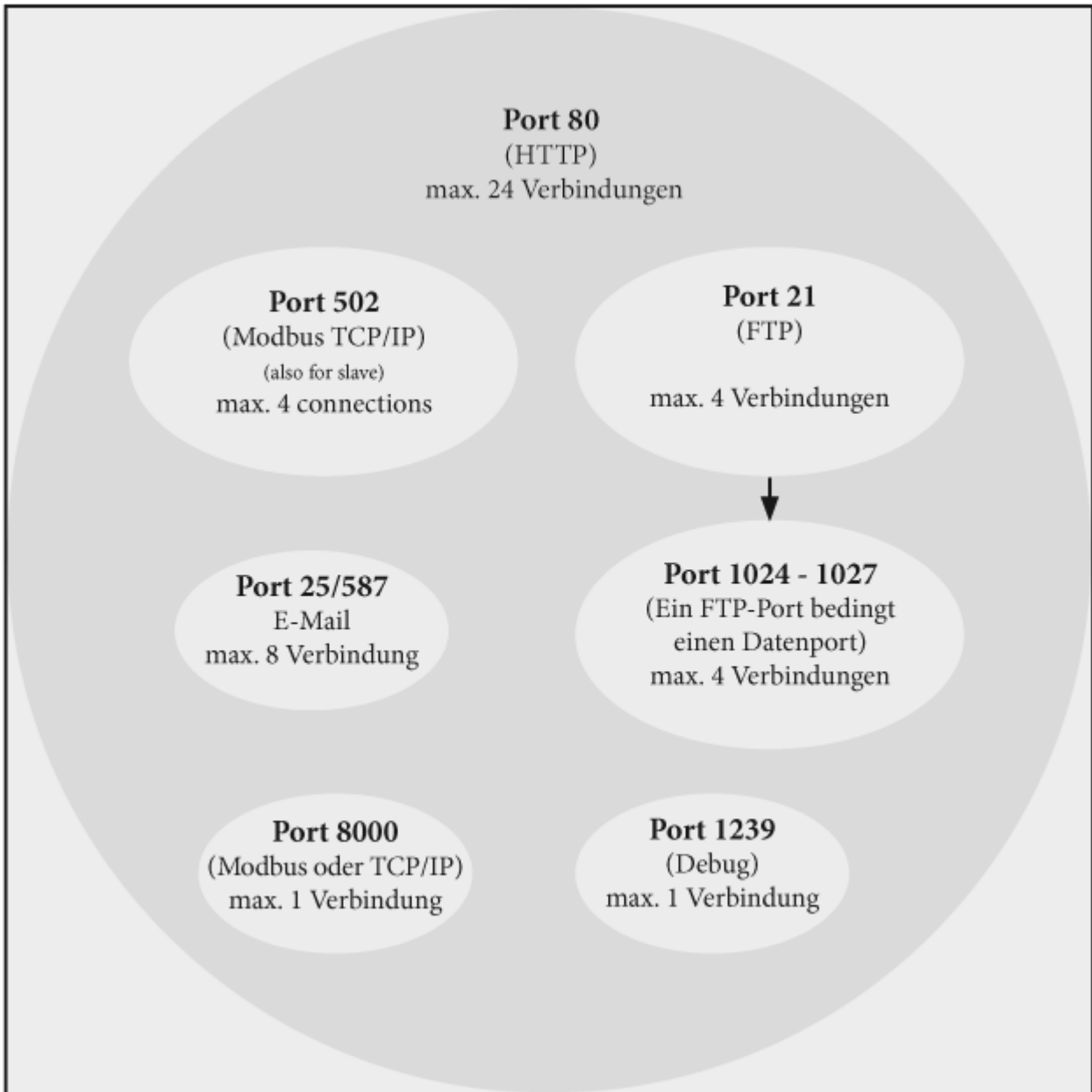
UTP-Gruppe: Verbindungslose Kommunikation

Port **68** (DHCP)
Port **123** (NTP)
Port **161/162** (SNMP)
Port **1200** (Nameservice)
Port **1201** (TFTP)
Port **47808** (BACnet)
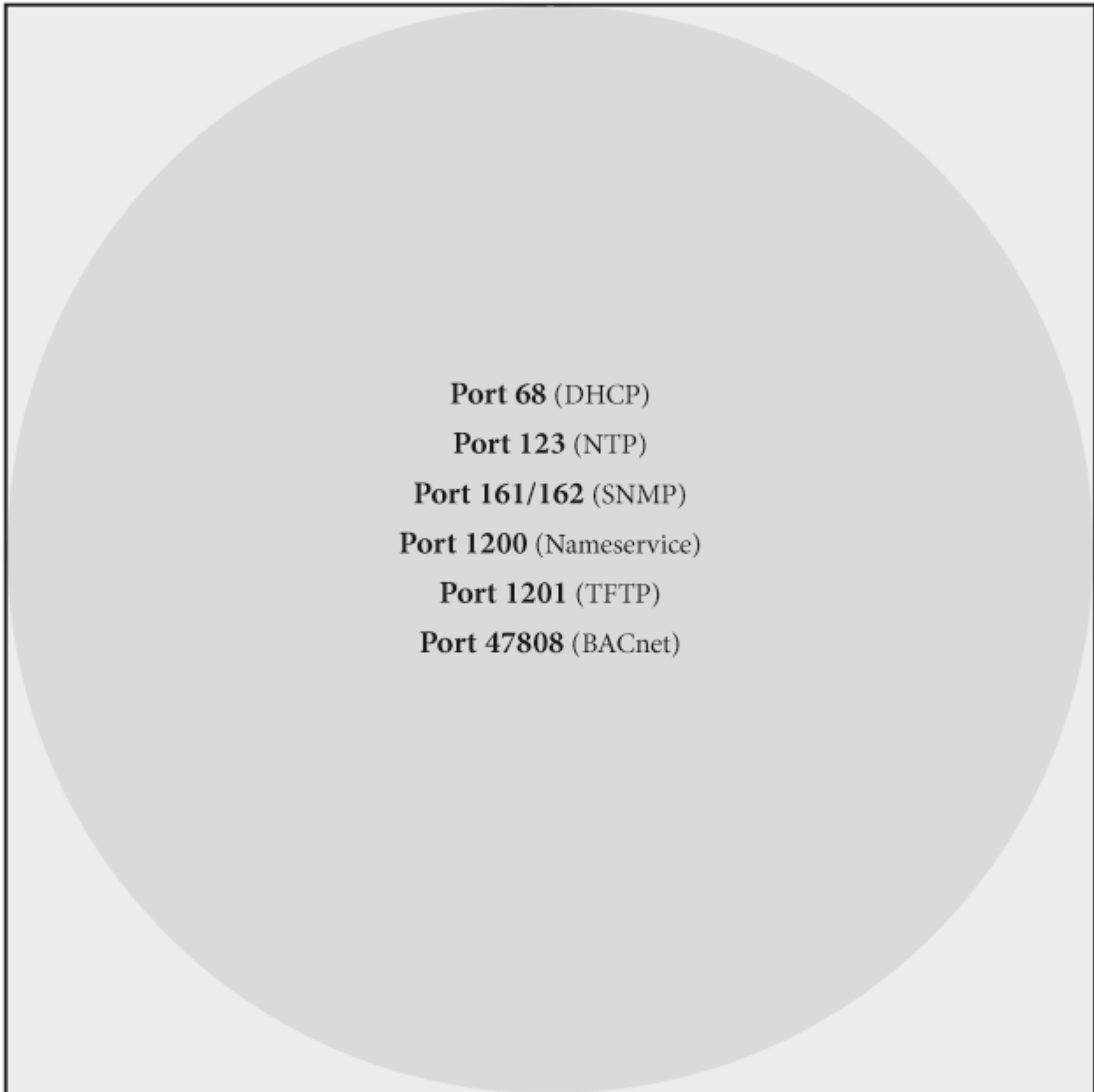
11.7 Events

Events

Events are threshold value violations of set threshold values for current and voltage. In this case, the threshold values are compared with the full wave (e.g., UMG 508) or half wave effective values (e.g., UMG 511) of current and voltage from the measurement channels. The event record consists of a mean value, a minimum or maximum value, a start time and an end time..

- Events are handled differently in the different UMG versions (see UMG 604: Events, event record and UMG 511: Events, event record)

Example UMG 511, UMG 605

Event:

- - An event occurs if threshold values set for the current and the voltage are violated
  - An event is recorded with a mean value, a minimum or maximum value, a start time and an end time

Threshold value

- - Monitoring of the threshold values can be switched off (Off/Manual)
  - Threshold values and hysteresis are set as a percentage of the nominal value
  - Threshold values are compared with the half wave effective values of current and voltage from the measurement channels
  - Adjustable threshold values for:
    - Overvoltage
    - Undervoltage
    - Voltage interruption
    - Overcurrent
  - An event has a mean value, a minimum or maximum value, a start time and an end time

Recording of events

- - The recording for an event is configured with GridVis
  - If an event has occurred, the corresponding measurement value is recorded with the set pre-run and after-run periods
    - Pre-run period: 0 to 1000 have waves
    - After-run period: 0 to 1000 have waves
  - A mean value, a minimum or maximum value, a start time and an end time of an event are recorded
  - The GridVis event browser can display recorded events

Main event according to EN 610004-30

The devices record a multiple phase event for the actual event.

- - This event type - described in EN610004-30 - only occurs for UMG511 / UMG605
  - This event type is also recorded starting with one event and onward, but can also be ended by an event in another phase. This may be the case if a second event occurs during the first event and lasts longer than the first event, e.g., the recording is ended if the system does not have an event
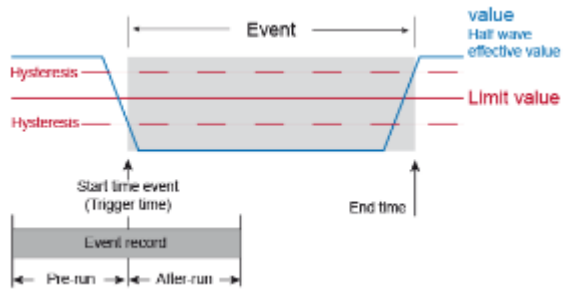
Abb.: Ereignisaufzeichnung UMG 511