

Functional description

EN 50160 Watchdog

for UMG 605, UMG 511 and UMG 512

Article no.: 51.00.264

Janitza® UMG511

EN50160 Watchdog

Select a Power Quality report from the reportlist

DEVICE UMG511 NOMINAL FREQUENCY 50 Hz NOMINAL VOLTAGE 230 V

| Reports | Status | Overview according to EN 50160 over timeperiod | | |
|------------|--------|--|--------------------|------------------------------|
| | | Variable | Minimum Percentage | Percentage Inside Standard |
| 12 March | ● | Power frequency 99.5% | 99.5% | 100% |
| 11 March | ● | Power frequency 100% | 100% | 100% |
| 10 March | ● | Supply voltage unbalance | 95% | 100% |
| 9 March | ● | Supply voltage variations 95% | 95% | L1: 100%, L2: 100%, L3: 100% |
| 8 March | ● | Supply voltage variations 100% | 100% | L1: 100%, L2: 100%, L3: 100% |
| 7 March | ● | Flicker severity | 95% | L1: 100%, L2: 100%, L3: 100% |
| 6 March | ● | THD | 95% | L1: 100%, L2: 100%, L3: 100% |
| 5 March | ● | | | |
| 4 March | ● | | | |
| 3 March | ● | | | |
| 2 March | ● | | | |
| Events | 0 | | | |
| Transients | 0 | | | |

| | | Individual Harmonics | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|------|----------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| Harmonic | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | |
| L1 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | |
| L2 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | |
| L3 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | |

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Introduction

Copyright

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Disclaimer

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Comments on the manual

We welcome your comments. In the event that anything in this manual seems unclear, please let us know and send an EMAIL to: info@janitza.de



Follow the instructions in the operating manual when installation and operating the device!

Meaning of the symbols

The following pictograms are used in the operating manual at hand:



Dangerous voltage!

Danger to life or risk of serious injury. Disconnect system and device from power supply before beginning work on them.



Caution!

Please follow the documentation. This symbol warns of possible dangers that can arise during installation, commissioning and use.



Note

"EN 50160 Watchdog" app

Continuous monitoring according to the EN 50160 standard with the Power Quality Watchdog.

The voltage quality supplied by your energy supplier must comply to the EN 50160 standard, which stands for voltage parameters of electrical energy in public distribution networks.

The EN 50160 regard to the supply voltage, i.e. the voltage which is measured at the point of common coupling. The EN 50160 Watchdog app is based on the official Standard EN 50160 ICS 29.020

Short description

The "EN 50160" app, once installed on your Janitza meter, makes it possible to view reports created using the EN 50160 standard. With help of the reports, you can check the voltage quality continuously and act on any discrepancies.

Most important characteristics:

- Embedded watchdog functionality in accordance with the EN 50160 standard
- It is not necessary to transfer large amounts of data from the meters to a host system
- Ability to generate reports per week
- Ability to change the settings to match your electrical network
- Saving communication costs to external applications
- Easy Analysis with embedded traffic light principle
- Possible to do PQ-analyses without specific power quality knowledge



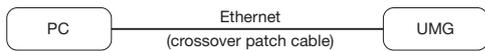
Note!

The auxiliary voltage of the device should be buffered to ensure that power failures can be reliably detected as events.

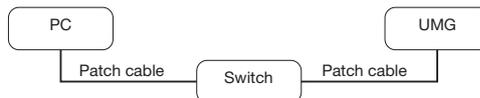
Integrate Power Analyser into the GridVis

To integrate the Power Analyser into the GridVis evaluation and configuration software an Ethernet connection must be established to the device and the TCP/IP address defined.

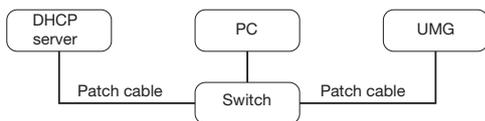
- Establish a connection between the PC and the device (see connection example) via a direct connection or via a switch/router. It is recommended to use CAT5 cable.
- Determine or set the addressing mode ("fixed IP" or "DHCP"). If "fixed IP" mode is selected then set the TCP/IP address of the device.



*Fig. Example connection:
Direct connection between UMG and PC. Both devices require a fixed IP address.*



*Fig. Example connection:
Configuration using a switch UMG and PC require a fixed IP address.*



*Fig. Example connection:
Integration into a network with DHCP server.
UMG and PC are assigned their IP addresses automatically from a DHCP server.*

Fixed IP address

In simple networks without a DHCP server, the network address has to be set directly in the device.

With a direct PC-UMG connection, note:

- Use a crossover patch cable.
- The first three segments of the IP addresses for the device and the computer should be identical. The last segments must be different! The subnet mask must match in all four blocks.

Example:

Computer's IP address: 192.168.000.**020** with the subnet mask: 255.255.255.0

UMG's IP address: 192.168.000.**021** with the subnet mask: 255.255.255.0

DHCP mode

DHCP allows for the fully automatic integration of a UMG into an existing network without additional configuration. When started, the UMG automatically obtains the IP address, the network mask and the gateway from the DHCP server.



Attention

The connection of the UMG to an existing Ethernet network may only be carried out after discussion with the network administrator!

Integrating the UMG 605

- Change the device to programming mode. To do so press buttons 1 and 2 simultaneously for approx. 1 second. With the password query deactivated the programming mode is then started and identified with the text "PRG". The first digit of the address flashes.
- Set the address 205 for the selection "**DHCP-Modus**" (=2) or "**Fixed IP address**" (=0).
 - To do so, use button 2 to set the first digit to the value 2. Then switch to the second digit with button 1 and set it to a value of 0 with button 2. Set the third digit to a value of 5 in the same way.
 - Once the address is set, switch to the setting with button 1. Use button 2 to set the parameter to the corresponding value (cf. "Addressing mode" table).
 - For further settings use button 1 to go back and enter the next address.
 - If no button is actuated for ca. 60 seconds, or if buttons 1 and 2 are pressed simultaneously for ca. 1 seconds, then the device exits programming mode and changes back to display mode.

| Address | Description |
|---------|---|
| 205 | DHCP mode 0 = Fixed IP 1 = BootP 2 = DHCP client 3 = Zeroconf |

Table: Addressing mode

- With the selection of "Fixed IP address", other additional network parameters must be set:
 - Setting the device IP address
 - Change to programming mode. Set the address 300 as described and set the first three digit block of the device IP address (cf. IP addresses table).
 - Then set the address 301 and allocate the second block of the device IP address.
 - Complete the entries with the addresses 302 and 303.
 - Setting the subnet mask
 - Set the subnet mask, using the same method as for configuring the device IP address, with addresses 304 to 307 (cf. IP addresses table).
 - Setting the standard gateway
 - Set the standard gateway (if present), in the same way as the IP address, with addresses 310 to 313 (cf. IP addresses table).
 - Note: Gateway adjustment is normally not required for the configuration.
- Read out the device address with "DHCP mode" selection:
 - Change to the programming mode as described. Set the address to 300, using buttons 1 and 2 and note down the three digit block in the Contents area. Carry out the same step for addresses 301 to 303 (cf. table under step 10).

| Address | Description | Address | Description | Address | Description |
|---------|--------------------------------|---------|-------------------------------|---------|--------------------------------|
| 300 | IP address, xxx --- --- --- | 304 | IP mask, xxx --- --- --- | 310 | IP gateway, xxx --- --- --- |
| 301 | IP address, --- xxx --- --- | 305 | IP mask, --- xxx --- --- | 311 | IP gateway, --- xxx --- --- |
| 302 | IP address, --- --- xxx --- | 306 | IP mask, --- --- xxx --- | 312 | IP gateway, --- --- xxx --- |
| 303 | IP address, --- --- --- xxx | 307 | IP mask, --- --- --- xxx | 313 | IP gateway, --- --- --- xxx |

Table: ID addresses

Integrating the UMG 511 / 512

- Start the configuration menu from the home display with button 1 ("ESC"). Change to the "Communication" entry with button 3 and open this with button 6.
- Similarly to above, set the selection to "DHCP". To do so mark the "DHCP" entry and open this via button 6. Select the corresponding entry "DHCP" or "Off" with button 3 or 4 and confirm this with button 6. Deactivate the entry in the case of networks without DHCP servers ("Off").
- With the DHCP mode deactivated ("Off") further network parameters must be set:
 - Setting the device IP address
 - Select the entry "Address" with button 3 or 4 and open this with button 6. Change the first digit of the address via button 3 or 4. Then switch to the second digit with button 5 and set this in a similar manner to above. Complete the IP address and confirm the entries with button 6.
 - Setting the subnet mask
 - Select the entry "Netmask" with button 3 or 4 and open this with button 6. Set the subnet mask in a similar manner to the setting of the IP address for the device.
 - Setting the standard gateway
 - Select the entry "Address" with button 3 or 4 and open this with button 6. Set the IP address for the Standard Gateway (if present) in a similar manner.
 - Note: Gateway adjustment is normally not required for the configuration.
- Reading out the device address:
 - Start the configuration menu from the home display with button 1 ("ESC"). Change to the "Communication" entry with button 3 and open this with button 6.
 - Note the addresses under "Address" and "Netmask".

Setting the IP address of the computer for a direct connection

PCs on company networks normally use DHCP. If you would like to assign a fixed IP address for the PC (e.g. for a direct PC to UMG connection), proceed as follows:



Attention

Settings in a company network can vary.



Attention

The connection of the UMG to an existing Ethernet network may only be carried out after discussion with the network administrator!

- Open the Network and Sharing Center in the Windows Control Panel.
- Open the status window via the LAN connection (fig. Network and Sharing Center).
- By selecting "Properties", it is possible to assign a fixed IP address to the PC (see fig. Process for defining a fixed IP address under Windows 7).

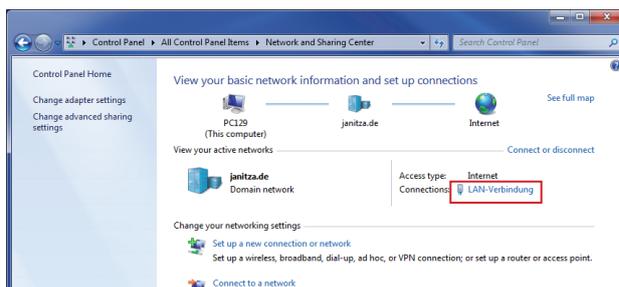


Fig.: Network and Sharing Center

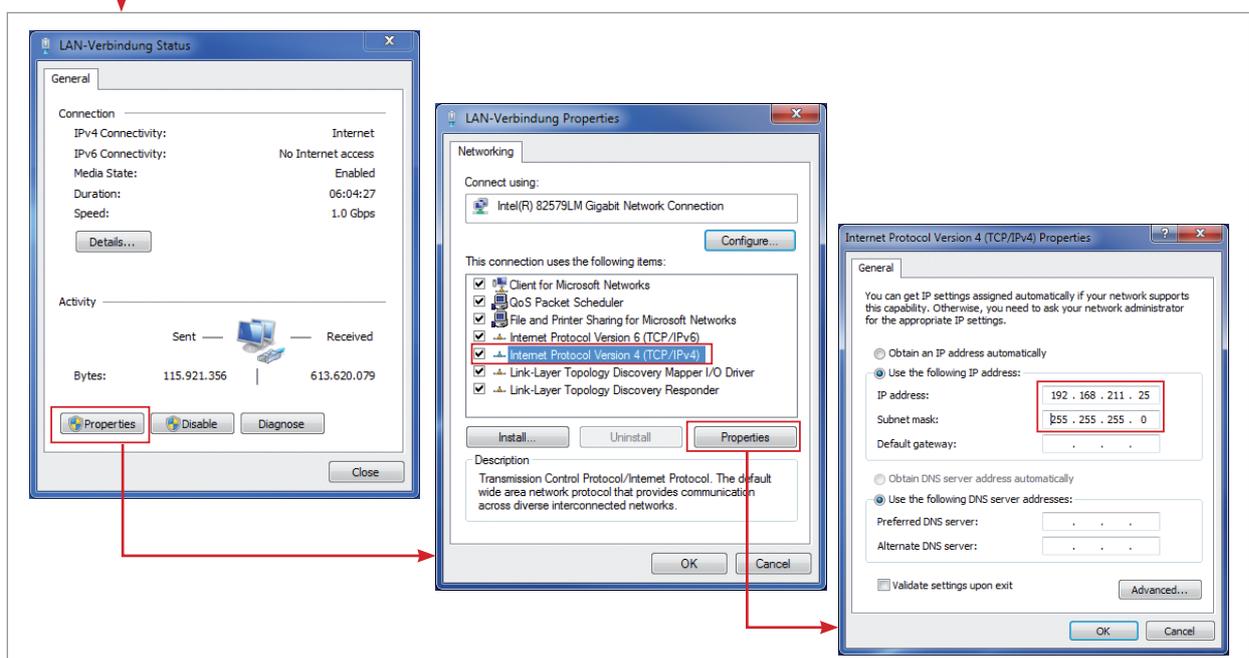


Fig.: Process for defining a fixed IP address under Windows 7.

Insert the device in the GridVis software

- Open the GridVis software and load or create a project.
- Open the "Device" node in the project window and activate the context menu for the "Device" node with a right click of the mouse.
- Select the "Add new device" context menu item (cf. fig. Add new device).

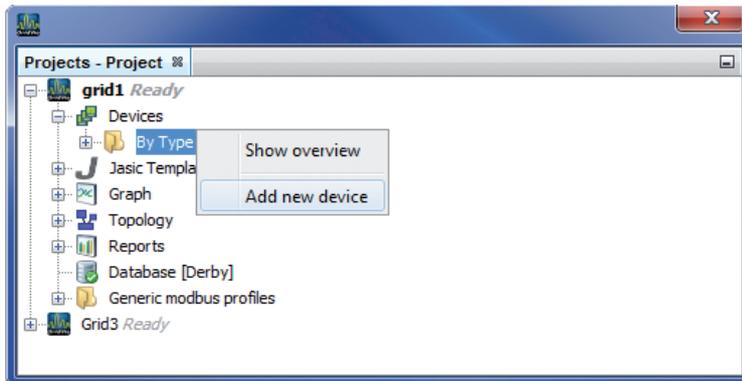


Fig.: "Add new device"

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

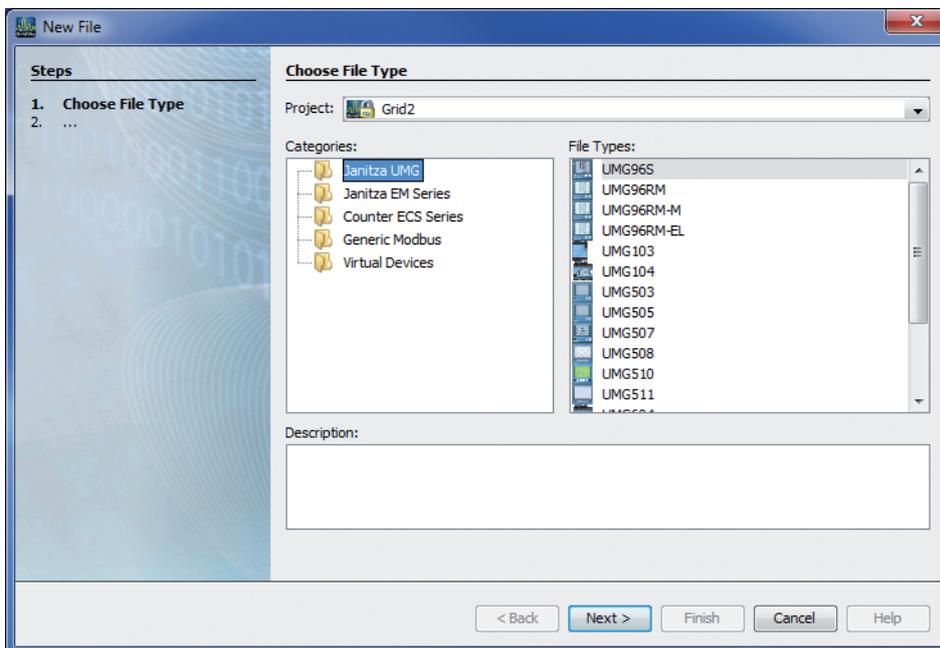


Fig.: "Add new device" - Device selection

- Set the connection type to "TCP/IP" and enter the corresponding device IP address (cf. chapter "Integrate UMG 605" or "Integrate UMG 511 / 512")

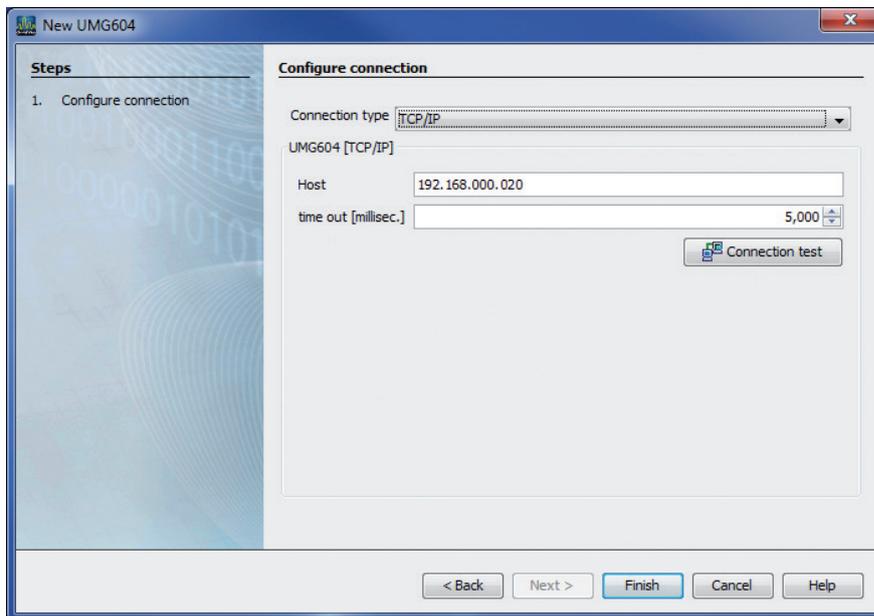


Fig.: Configure device integration

- Carry out a connection test after entering the device IP address. If the connection with the UMG has been established then device information - such as the serial number for example - will be displayed. The device can now be used and configured within the software.

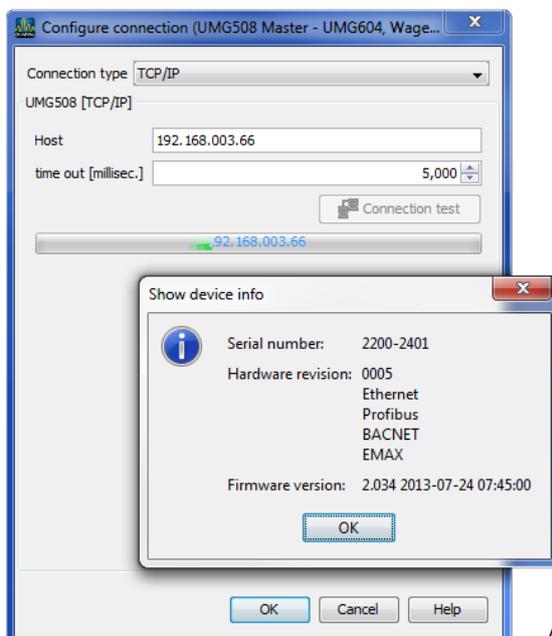


Fig: Successful connection test for device



Further information on using the GridVis software can be found in the internet at:

<https://wiki.janitza.de/display/GRIDVIS60/GridVis-Dokumentation+6.0>

Installing the app

- To install the app, start the GridVis software. Click "Extras / Install app" and select the app via the button "...". Then select the device for installation and choose a program location.

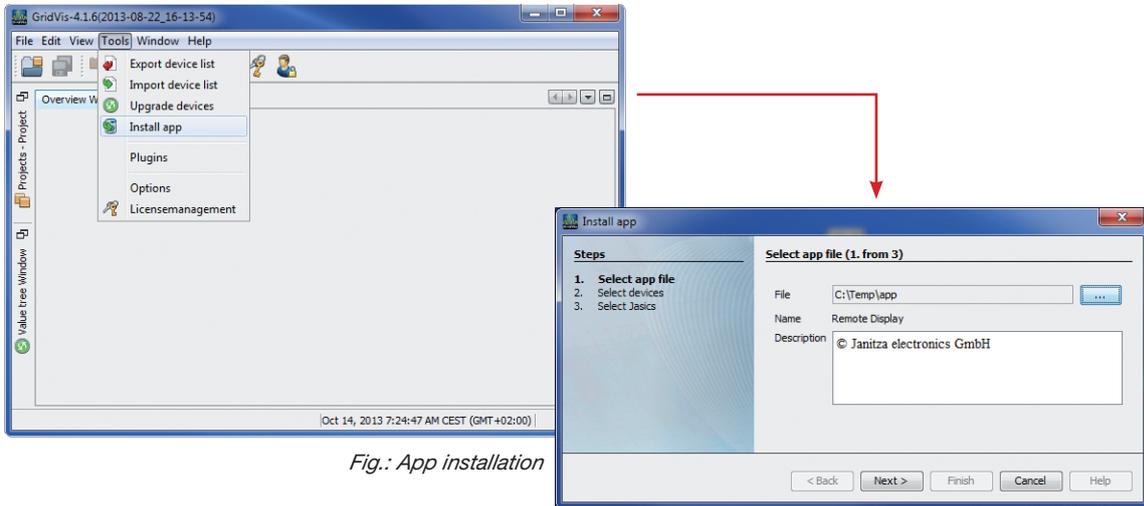
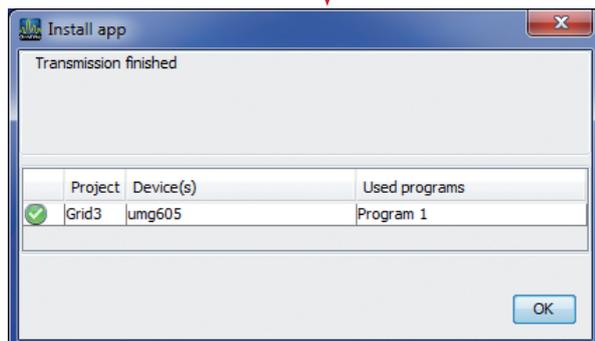
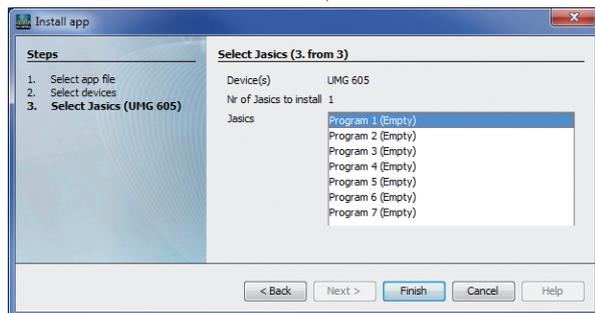
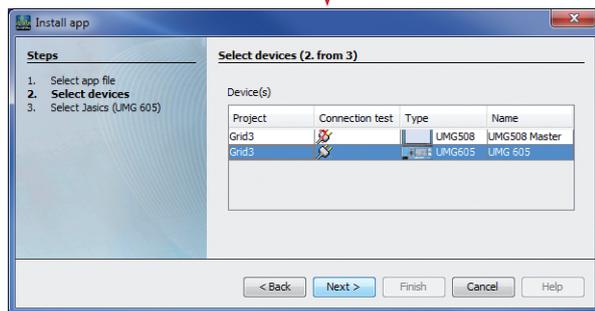
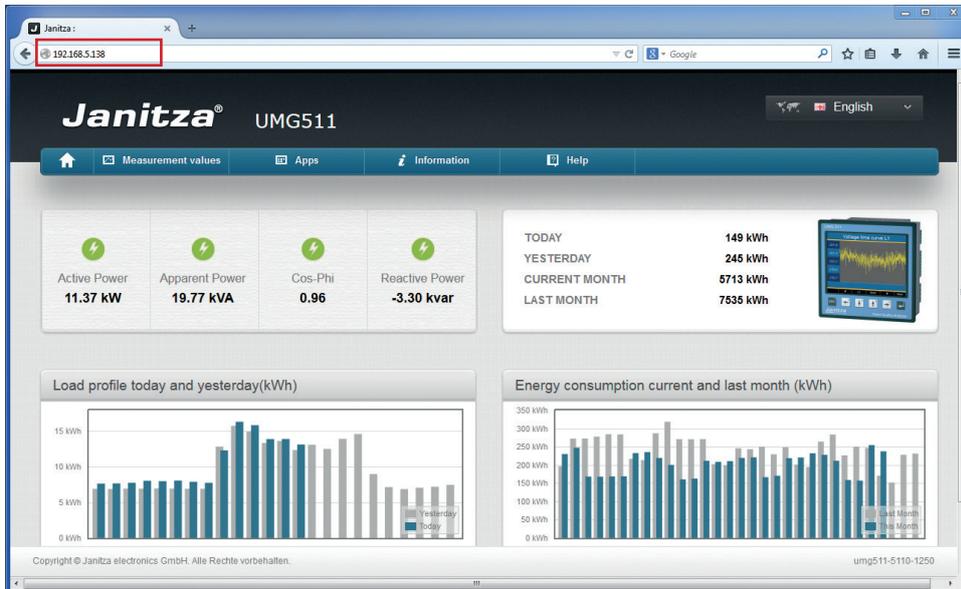


Fig.: App installation

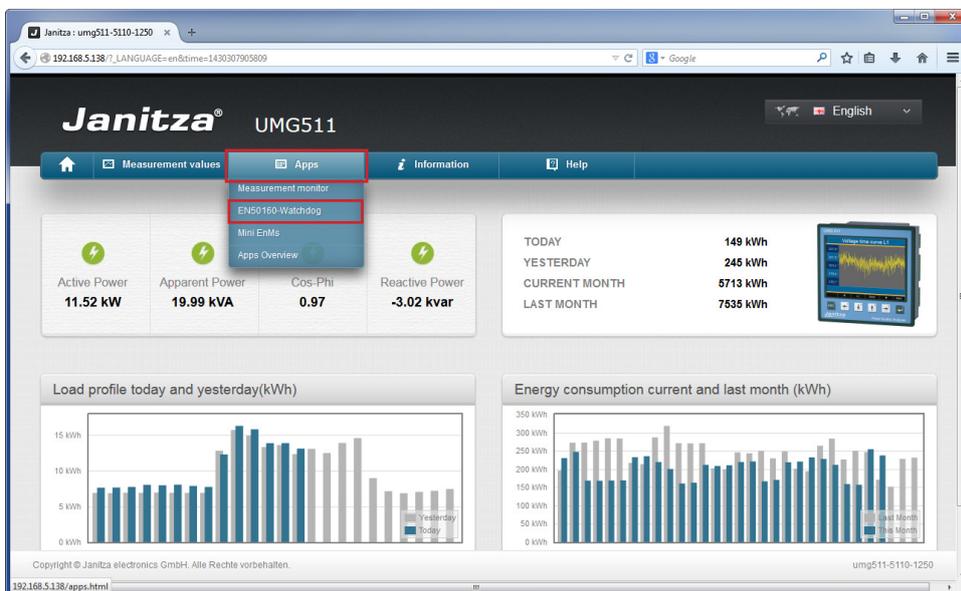


Getting to the app

- The app can be approached via the website of the meter, this website can be reached by typing the IP-address of the meter in your web browser.
- For example: the IP-address of the meter is 192.168.000.021, you type 192.168.000.021 in the address bar of your browser.



- Once you are at the website of your meter, you can find your app by clicking on the menu apps.



- When you click on the EN 50160 app, the app will load automatically.

Basic operation of the app

- In the following chapter we will be looking at the basic operation of the EN 50160 app.

Opening the app

- When opening the app, you arrive at the following screen.

The screenshot shows the Janitza UMG511 EN50160 Watchdog app interface. The top navigation bar includes 'Measurement values', 'Apps', 'Information', and 'Help'. The main content area is titled 'EN50160 Watchdog' and features a section for selecting a Power Quality report from a reportlist. The device information is 'umg511-5110-4018 Geb.290'. The nominal frequency is 50 Hz and the nominal voltage is 230 V. The overview table shows the following data:

| Variable | Minimum Percentage | Percentage Inside Standard | | |
|--|--------------------|----------------------------|----|----|
| Power frequency 99.5% 99.5% of the 10 sec values during 1 year are within +/- 1% of 50Hz | 99.5% | | | |
| Power frequency 100% All of the 10 sec values are within +/-0.5% of 50Hz | 100% | | | |
| Supply voltage unbalance 95% of the 10 min average values during 1 week are within 0 and 2% | 95% | | | |
| Supply voltage variations 95% / 99% (depending on nominal voltage) 95% / 99% of the 10 min average values during 1 week are within +/- 10% of U Nominal | 95% / 99% | L1 | L2 | L3 |
| Supply voltage variations 100% All of the 10 min average values are within (+10/-15%) or (+/- 15%) of U Nominal | 100% | L1 | L2 | L3 |
| Flicker severity 95% of the values during 1 week, less than or equal to 1 | 95% | L1 | L2 | L3 |
| THD 95% of the 10 min r.m.s values during 1 week, less than or equal to 8% | 95% | L1 | L2 | L3 |

Below the overview table is a table for Individual Harmonics (THD) with the EN50160 limit of 95%. The table has columns for Harmonic (2-25) and rows for L1, L2, and L3.

- This screen is the starting point for the reports. Once you click on one of the reports on the left of the screen, the values will be presented in the overview window.

Structure of the screen

The screenshot shows the Janitza UMG511 EN50160 Watchdog interface. The top navigation bar includes 'Measurement values', 'Apps', 'Information', and 'Help'. The main content area is titled 'EN50160 Watchdog' and contains the following sections:

- 1. Header information:** Displays 'DEVICE umg511-5110-4018 Geb.290', 'NOMINAL FREQUENCY 50 Hz', and 'NOMINAL VOLTAGE'.
- 2. Reports menu:** A list of dates from 25 to 31 March 2015, with the latest report (31 March 2015) highlighted in red.
- 3. Status:** A traffic light indicator with three circular lights, currently showing green.
- 4. Overview according to EN 50160 over time period:** A table showing power quality variables and their compliance percentages.
- 5. Individual Harmonics - EN50160 limit: 95%:** A table showing the percentage of individual harmonics (2 to 25) for L1, L2, and L3 phases.

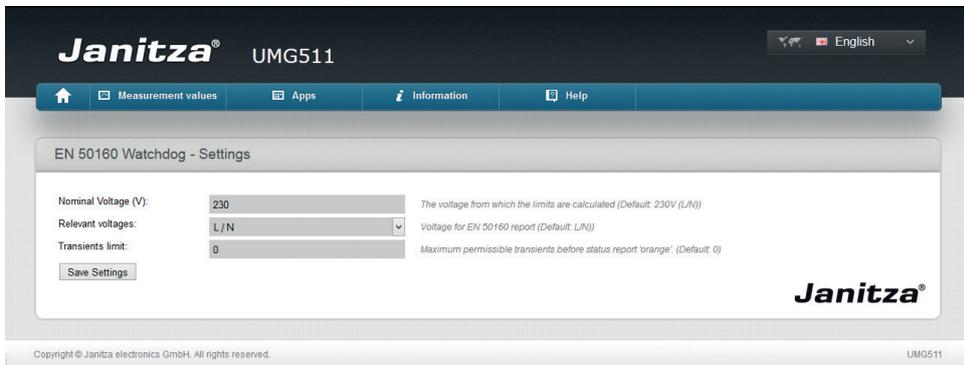
| Variable | Minimum Percentage | Percentage Inside Standard | | |
|---|--------------------|----------------------------|----|----|
| Power frequency 99,5% <small>99,5% of the 10 sec values during 1 year are within $\pm 1%$ of 50Hz</small> | 99,5% | | | |
| Power frequency 100% <small>All of the 10 sec values are within $\pm 0,5%$ of 50Hz</small> | 100% | | | |
| Supply voltage unbalance <small>95% of the 10 min. average values during 1 week are within 0 and 2%</small> | 95% | | | |
| Supply voltage variations 95% / 99% (depending on nominal voltage) <small>95% / 99% of the 10 min. average values during 1 week are within $\pm 10%$ of U Nominal</small> | 95% / 99% | L1 | L2 | L3 |
| Supply voltage variations 100% <small>All of the 10 min. average values are within $\pm 10,15%$ or $\pm 1,15%$ of U Nominal</small> | 100% | L1 | L2 | L3 |
| Flicker severity <small>95% of the values during 1 week, less than or equal to 1</small> | 95% | L1 | L2 | L3 |
| THD <small>95% of the 10 min. rms values during 1 week, less than or equal to 8%</small> | 95% | L1 | L2 | L3 |

| Harmonic | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| L1 | | | | | | | | | | | | | | | | | | | | | | | | |
| L2 | | | | | | | | | | | | | | | | | | | | | | | | |
| L3 | | | | | | | | | | | | | | | | | | | | | | | | |

- The screen is divided in 5 parts:
 - Header information:** Once a report is selected, the information on which the report is based is shown here.
 - Reports menu:** Here you can choose which report to view. The latest report is on top of the list.
 - Status traffic light:** Once a report is selected, the traffic light will show if the voltage quality for that period was healthy. Green means the voltage quality for the selected period was within the standard, orange means there were more events or transients than mentioned in the app settings but the values are still within the EN 50160 standard. Red means that the voltage quality is outside the EN 50160 standard.
 - Overview window:** Once a report has been selected, this window will show all the values corresponding to the report period. We will go more into details later in the user guide.
 - Individual Harmonics Window:** Once a report has been selected, this window will show the percentages of the individual harmonics corresponding to the report period. We will go more into details later in this user guide.

EN 50160 Settings app

- The EN 50160 settings app allows you to change the settings for the reports to be generated.



- Nominal Voltage (V):** The voltage from which the limits values are calculated (Default: 230 V (L / N))
- Relevant voltages:** Voltage for the EN 50160 report (Default: L/N)
- Transients limit:** Maximum permissible transients before status report 'orange'. (Default: 0)
- After you changed the settings to the appropriate values, you can click the Save Settings button.

Comprehensive user guide

Viewing a report

1 Power Quality report based on EN 50160 from 29. March 2015 (evaluation period: 1 week)

DEVICE: umg511-5110-4018 Geb.290 | NOMINAL FREQUENCY: 50 Hz | NOMINAL VOLTAGE: 12000 V

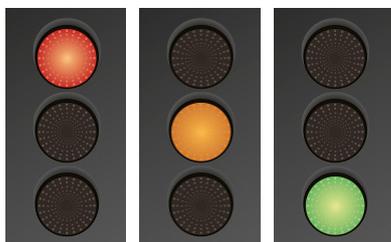
2 Reports | **3** Status | **4** Events: 0 | Transients: 0

| Variable | Minimum Percentage 13 | Percentage Inside Standard 14 |
|--|------------------------------|--------------------------------------|
| Power frequency 99,5% 99,5% of the 10 sec values during 1 year are within +/- 1% of 50Hz | 99,5% | 100% |
| Power frequency 100% All of the 10 sec values are within +/- 0,5% of 50Hz | 100% | 100% |
| Supply voltage unbalance 95% of the 10 min. average values during 1 week are within 0 and 2% | 95% | 100% |
| Supply voltage variations 99% 99% of the 10 min. average values during 1 week are within +/- 10% of U Nominal | 99% | L1: 100% L2: 100% L3: 100% |
| Supply voltage variations 100% All of the 10 min. average values are within +/- 5% of U Nominal | 100% | L1: 100% L2: 100% L3: 100% |
| Flicker severity 95% of the values during 1 week, less than or equal to 1 | 95% | L1: 100% L2: 100% L3: 100% |
| THD 95% of the 10 min. rms values during 1 week, less than or equal to 8% | 95% | L1: 100% L2: 100% L3: 100% |

| Harmonic | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| L1 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| L2 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| L3 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

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- 1. Header Information:** The information on which the report is based. In this case the report is based on class 2 of the EN 50160 standard with L/N as relevant Voltages and Nominal values 230 V at a Frequency of 50 Hz.
- 2. Reports:** The lists of reports you can select.
- 3. Status traffic light:** In this case we see the traffic light being green. This means that the EN 50160 standard has been met. You can also see this in the Reports list. The reports color corresponds to the color of the traffic light.



- Red: At least one value is outside of the EN 50160 standard.
- Orange: Orange means that at least one event or transient has occurred. There occurred more transients than the amount of transients set in the settings of the EN 50160 app.
- Green: All values are within the limits of the EN 50160 standard.

4. **Events and Transients:** Events and Transients which are registered by the meter. The result of this depends on what you have configured in Gridvis.
5. **Variable header:** The variable names are shown in this column
6. **Power frequency 99,5%:** According to the EN 50160 standard. 99,5 % of the 10 second values during one year are within +/- 1% of 50 Hz.
7. **Power frequency 100%:** According to the EN 50160 standard. All of the 10 second values are within +4%/-6% of 50 Hz.
8. **Supply voltage unbalance:** 95% of the 10 minute average values during one week are within 0% and 2% according to the EN 50160 standard.
9. **Supply voltage variations 95%/99%:** According to the EN 50160 standard. 95 % (in case of low Voltage) of the 10 minute average values during one week are within +/- 10% of the 95% of U Nominal. In case of medium Voltage the percentage has to be 99%.
10. **Supply voltage variations 100%:** According to the EN 50160 standard. All of the 10 minute Average values are within +10%/-15% or +/- 15% of U Nominal. This is depending on your nominal voltage value.
11. **Flicker severity:** According to the EN 50160 standard. 95% of the values during one week are less than or equal to 1
12. **THD:** According to the EN 50160 standard. Total Harmonic Distortion 95% of the 10 minute root mean square values during one week are less than or equal to 8%
13. **Minimum Percentage:** The minimum percentage allowed within the boundaries of the EN 50160 standard
14. **Percentage Inside Standard:** The percentage values within the EN 50160 standard: Green means the values are within the standard. Orange means that at least one event or transient has occurred. Red means the that the percentage values are outside of the limits according to the EN 50160 standard.
15. **Harmonic individual:** The percentages of the harmonics according to the EN 50160 standard for L1, L2 and L3 within one week are shown here.

Modbus counters

The results of the PQ reports are also written in three Modbus counters. These counters can be read out in external systems or can be used by Jasic programs. This makes it possible to alert on faulty PQ reports without having to check the application.

The application has the following Modbus counters:

| Variable name | Modbus register | Type | Description |
|---------------------|-----------------|-------------|---|
| _gbl_50160_counter1 | 21200 | 32bit Float | Report counter: Displays the number of reports calculated by the app. Whenever a new report is calculated, 1 will be added to the counter. |
| _gbl_50160_counter2 | 21202 | 32bit Float | 'Orange' counter: Whenever a report is generated which is outside the 'Orange traffic light' limits, 1 will be added to this counter. |
| _gbl_50160_counter3 | 21204 | 32bit Float | 'Red' counter: Whenever a report is generated which is outside the 'Red traffic light' limits, 1 will be added to this counter. |