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800-CT12-SVD-US
Current measuring module

Extension module for UMG 800/801 basic devices

*UMG 801 in preparation as of firmware 1.7.3

User manual and technical data

Doc. no.: 2.053.246.1.c 06/2025

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Janitza®

Suitable basic devices and number of module slots:

Suitable basic devices / Number of free slots	Slot assignment of an 800-CT12-SVD-US module on the basic device
UMG 800 (from FW 1.7.2) / 13 slots	1.5 slots (12 current measuring channels)
UMG 801 (from FW 1.7.3) / 13 slots	

Tab. Suitable basic devices

Example: Eight 800-CT12-SVD-US modules make 96 current measuring channels possible and require 12 slots on the basic device. The one free slot can be used for an 800-DI14 module with digital inputs, for example.

800-CT12-SVD-US current measuring module

(Suitable for the basic devices listed in the table)

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The German version is the original edition of the documentation.

Subject to technical alterations.

The contents of our documentation have been compiled with great care and reflect the current state of the information available to us. Nonetheless, we wish to point out that updates of this document are not always possible at the same time as technical refinements are implemented in our products. Please see our website under www.janitza.com for the current version.
Please see our website under www.janitza.com for the current version.

Information about the GridVis® software.

Janipedia: wiki.janitza.de

Tutorials: youtube.com/@gridvis

TABLE OF CONTENTS

1. Information on the devices and the user manual 8

1.1 Disclaimer 8
1.2 Copyright notice 8
1.3 Technical changes 8
1.4 About this user manual 8
1.5 Defective device/disposal 9

2. Safety 10

2.1 Display of warning notices and safety information 10
2.2 Hazard levels 10
2.3 Product safety 10
2.4 Hazards when handling the device, components and modules 11
2.5 Electrically qualified personnel 12
2.6 Warranty in the event of damage 13

3. Product description 14

3.1 800-CT12-SVD-US current measuring module 14
3.2 Incoming goods inspection 15
3.3 Intended use 15
3.4 Overview of module functions 15
3.5 Conformity declaration 16
3.6 FCC Declaration of Conformity 16
3.7 Protective device 16
3.8 Scope of delivery 16
3.9 Accessories 16
3.10 Operating concept 17
3.11 GridVis network analysis and programming software 17
3.12 Physical mode and Virtual Meter mode 17

4. Connections/controls 18

5. Module markings – rating plate 19

6. Mounting ... 20
6.1 Mounting a current measuring module with 800-CON RJ45 transfer module ... 20
6.2 The current measuring module in JanBus module topologies ... 22
6.2.1 Topology example: 4 current measuring modules with 48 measurement channels ... 23
6.2.2 Topology example: Combination with other modules ... 24
7. Installation ... 25
7.1 Current measurement with the module ... 25
7.2 Connection diagram ... 26
8. Module communication / PC connection ... 27
8.1 Ethernet communication via basic device ... 27
8.1.1 Connection example 1 ... 27
8.1.2 Connection example 2 ... 28
8.1.3 Connection example 3 ... 29
8.2 Module communication options ... 30
8.2.1 Module handling in the GridVis software ... 30
8.2.2 Device homepage of the basic device ... 30
8.2.3 Module handling via a user interface (HMI) ... 30
9. Commissioning ... 31
9.1 Startup procedure/initialization ... 31
9.2 Checking module communication ... 31
9.3 Display the module's system information ... 32
9.4 Identifying modules ... 33
9.4.1 The "Identify single module" entry ... 34
9.4.2 The "Identify all modules" entry ... 34
9.4.3 Module identification - LED blink interval ... 35
9.5 Assign voltage reference (phase assignment) ... 36
9.6 Setting the nominal current ... 36
9.7 Health Check ... 37
9.7.1 Status LED on the measurement channel ... 37
9.8 Checking voltage detection ... 37
9.9 Voltage calibration (calibration of the measurement channels) ... 38
9.9.1 Carrying out voltage calibration ... 38
9.9.2 The "Calibrate voltage all modules" entry ... 39

10. Operation and button functions of the basic device with module 40

10.1 Operation and button functions of the basic device with current measuring module 40
10.2 Module-relevant menu items of the basic device with 8 modules of the type 800-CT12-SVD-US 40
10.3 Module-relevant menu items of the UMG 800 basic device with 8 modules of the type 800-CT12-SVD-US 44

11. Module-relevant configurations 45

11.1 Configuring the voltage threshold 45
11.2 Inverting measurement groups with Virtual Meter 46
11.3 Module combination with mixed measurement groups of 3/4 47
11.4 Configuration via the device homepage of the basic device 48

12. Module-relevant measuring displays of the basic device with 3 modules of the type 800-CT12-SVD-US 49

13. Views 56

14. Technical specifications 57

14.1 Technical data 57
14.2 Performance characteristics of functions 59

15. Dismounting 60

16. Module exchange/error cases 61

16.1 Module replacement 61
16.2 Module - Error cases (blinking) 61
16.3 Procedure in the event of a malfunction 62
16.4 Remedies for faults 63

17. Service and maintenance 64

17.1 Repair 64
17.2 Service 64
17.3 Device adjustment 64
17.4 Calibration interval 64
17.5 Firmware update 64
17.6 Reset to factory settings 65
17.7 Information on saving measured values and configuration data 65

1. Information on the devices and the user manual

1.1 Disclaimer

Compliance with the usage information for the devices, modules and components is a prerequisite for safe operation and attaining the stated performance characteristics and product features.

Janitza electronics GmbH assumes no liability for bodily injury, material damage or financial losses which result from disregard of the usage information.

Ensure that the usage information for the products is legible and accessible.

1.2 Copyright notice

1.3 Technical changes

- Make sure that your device (modules/components) matches the user manual.
- This user manual is valid for the 800-CT12-SVD-US current measuring module. Separate validities and distinctions are marked.
- First make sure you have read and understood the usage information accompanying the product.
- Keep the usage information associated with the product available for the entire service life and pass it on to any possible subsequent users.
- Find out about device revisions and the associated modifications of the usage information associated with your product at www.janitza.com.

1.4 About this user manual

If you have questions, suggestions or ideas for improvement of the user manual let us know via email at: info@janitza.com.

INFORMATION

This user manual describes the 800-CT12-SVD-US current measuring module for a suitable basic device (see „Tab. Suitable basic devices“ on p. 2) and provides information about the operation of the devices and modules.

Also consult the additional usage information relevant for this user manual, such as:
- the installation manual.
- the "Safety information" supplement.
- the usage information on the basic device and the integrated modules of your meter and module topology.

Furthermore, the **GridVis software** has an "online help” feature.

INFORMATION

Our usage information uses the grammatical masculine form in a gender-neutral sense! This form always refers equally to women, men and diverse. In order to make the texts more readable, distinctions are not made. We ask for your understanding for these simplifications.

1.5 Defective device/disposal

Before sending **defective devices, modules or components** back to the manufacturer for testing:
· Contact the manufacturer's Support department.
· Send devices, modules or components complete with all accessories.
· When doing so, please bear the terms for transportation in mind.

INFORMATION

Return defective or damaged devices, modules or components to Janitza electronics GmbH in accordance with the shipping instructions for air or road freight (complete with accessories).
Observe special regulations for devices with built-in batteries or rechargeable batteries!

Do not attempt to open or repair the device (the module, the component) on your own because otherwise all warranty claims become invalid!

For the **disposal** of the device (the module, the components), observe the national regulations! Dispose of individual parts, as applicable, depending on their composition and existing country-specific regulations, for example, as

· Electronic waste,
· Batteries and rechargeable batteries,
· Plastics,
· Metals.

Engage a certified disposal company to handle scrapping as needed.

Information on "Service and maintenance" of your device can be found in Sect. 17 on p. 64.

2. Safety

The chapter on Safety contains information which must be observed to ensure your personal safety and avoid material damage.

2.1 Display of warning notices and safety information

The warning notices shown below
· are found throughout the usage information.
· can be found on the devices themselves.
· indicate potential risks and hazards,
· underscore aspects of the information provided that clarifies or simplifies procedures.

The additional symbol on the device, the module or the component itself indicates an electrical hazard that can lead to severe injury or death.

This general warning symbol draws attention to a possible risk of injury. Be certain to observe all of the information listed under this symbol in order to avoid possible injury or even death.

2.2 Hazard levels

Warning and safety information is marked by a warning symbol, and the hazard levels are shown as follows, depending on the degree of hazard:

⚠ DANGER
Warns of an imminent danger which, if not avoided, results in serious or fatal injury.

⚠ WARNING
Warns of a potentially hazardous situation which, if not avoided, could result in serious injury or death.

⚠ CAUTION
Warns of an immediately hazardous situation which, if not avoided, can result in minor or moderate injury.

ATTENTION
Warns of an immediately hazardous situation which, if not avoided, can result in material or environmental damage.

INFORMATION

Indicates procedures in which there is **no** hazard of personal injury or material damage.

2.3 Product safety

The devices, components and modules reflect current engineering practice and accepted safety standards, but hazards can arise nonetheless.

Observe the safety regulations and warning notices. If notices are disregarded, this can lead to personal injury and/or damage to the product.

Every type of tampering with or use of the devices and the modules,
· which goes beyond the mechanical, electrical or other operating limits can lead to personal injury and/or damage to the product;
· constitutes “misuse” and/or “negligence” under the product’s warranty and thus voids the warranty for any possible resulting damage.

Read and understand the user manual and the usage information on the basic device before installing, operating, maintaining and using the devices, components and modules.

Only operate the devices, components and modules when they are in perfect condition and in compliance with this user manual and the usage information that is included. Send defective devices, components or modules back to the manufacturer in compliance with proper transport conditions.
Retain the user manual throughout the service life of your product and keep it at hand for consultation.

When using the device, component or module, also observe the legal and safety regulations for your system that are applicable for the respective use case.

2.4 Hazards when handling the device, components and modules

When operating electric devices, components or modules, it is unavoidable for certain parts of these devices to conduct hazardous voltage. Consequently, severe bodily injury or material damage can occur if they are not handled properly.

Therefore, when handling our devices, components, or modules, always observe the following:

· do not exceed the limit values specified in the user manual and on the rating plate! This must also be observed during testing and commissioning!
· Take note of the safety and warning notices in all usage information that belongs to the device, components or modules!

⚠ WARNING

Disregarding the connection conditions of the Janitza measurement devices, modules or components can lead to injuries or even death or to material damage!

· Do not use Janitza meters, modules or components for critical switching, control or protection applications where the safety of persons and property depends on this function.
· Do not carry out switching operations with the Janitza measurement devices, modules or components without prior inspection by your system manager with specialist knowledge! In particular, the safety of persons, material assets and the applicable standards must be taken into account!

⚠ WARNING

Risk of injury due to electrical current and voltage! Severe bodily injury or death can result! Therefore please abide by the following:

· **Do not touch bare, stripped wires or device inputs that are dangerous to touch on the devices, components and modules.**
· **Switch off your installation before commencing work! Secure it against being switched on! Check to be sure it is de-energized! Ground and short circuit! Cover or block off adjacent live parts!**
· **During operation and troubleshooting (especially with DIN rail devices), check the environment for dangerous voltages and switch these off if necessary!**
· **Wear protective clothing and protective equipment in accordance with applicable guidelines when working on electrical systems!**
· **Before making connections, ground the device / component / module by means of the ground wire connection, if present!**
· **Do not touching bare or stripped leads that are energized! Equip stranded conductors with wire ferrules!**
· **Hazardous voltages can be present in all circuitry parts that are connected to the power supply.**
· **Protect wires, cables and devices with a suitable line circuit breaker/fuse!**
· **Never switch off, remove or tamper with safety devices!**
· **There can still be hazardous voltages present in the device or in the component (module) even after it has been disconnected from the supply voltage (capacitor storage).**
· **Only connect connection terminals with the same number of poles and type!**
· **Do not exceed the limit values specified in the user manual and on the rating plate! This must also be observed during testing and commissioning.**
· **Take note of the safety and warning notices in the usage information that belongs to the device, components or modules!**

⚠ WARNING

Life-threatening danger due to electrical voltage!
Insufficient insulation of cables (e.g. RJ45 cables) against mains supply circuits can lead to voltages that are dangerous to touch or to component damage.
· **Ensure reinforced or double insulation with respect to supply circuits!**
· **Route RJ45 cables separately from single-insulated cables, e.g. in a separate cable duct.**

ATTENTION

Material damage due to disruption of the JanBus during operation!
Establishing or disconnecting a JanBus connection during operation can disrupt communication and function.
· **De-energize the basic device before establishing or disconnecting a JanBus connection.**

2.5 Electrically qualified personnel

To avoid bodily injury and material damage, only electrically qualified personnel are permitted to work on the devices and their components, modules, assemblies, systems and current circuits who have knowledge of:
· The national and international accident prevention regulations.
· Safety technology standards.
· Installation, commissioning, operation, disconnection, grounding and marking of electrical equipment.
· the requirements concerning personal protective equipment.

Electrically qualified persons within the scope of the technical safety information of all usage information associated with the device and its components (modules) are persons who can furnish proof of qualification as an electrically skilled person.

⚠ WARNING

Warning against unauthorized manipulation or improper use of the device or its components (modules)!
Opening, dismantling or unauthorized manipulation of the device and its components (modules) which goes beyond the mechanical, electrical or other operating limits indicated can lead to material damage or injury, up to and including death.
· **Only electrically qualified personnel are permitted to work on the devices and their components (modules), assemblies, systems and current circuits.**
· **Always use your devices or components (modules) only in the manner described in the associated usage information.**
· **If there is discernible damage, send the device or the component (module) back to the manufacturer!**

2.6 Warranty in the event of damage

Any unauthorized tampering with or use of the device, component or module constitutes “misuse” and/or “negligence” under the product’s warranty and thus voids the warranty for any possible resulting damage. Note in this regard Sect. 3.3 on p. 15.

3. Product description

3.1 800-CT12-SVD-US current measuring module

The current measuring module
- Is suitable for UMG 800/801 basic devices (see „Tab. Suitable basic devices“ on p. 2)
- Extends the functional range of a basic device by 12 measurement channels, which are designed with cable bushings.
- Provides contactless voltage detection to functional earth in each measurement channel (continuous monitoring).[1)]
- Has an input and output for integration into a JanBus topology with a basic device.

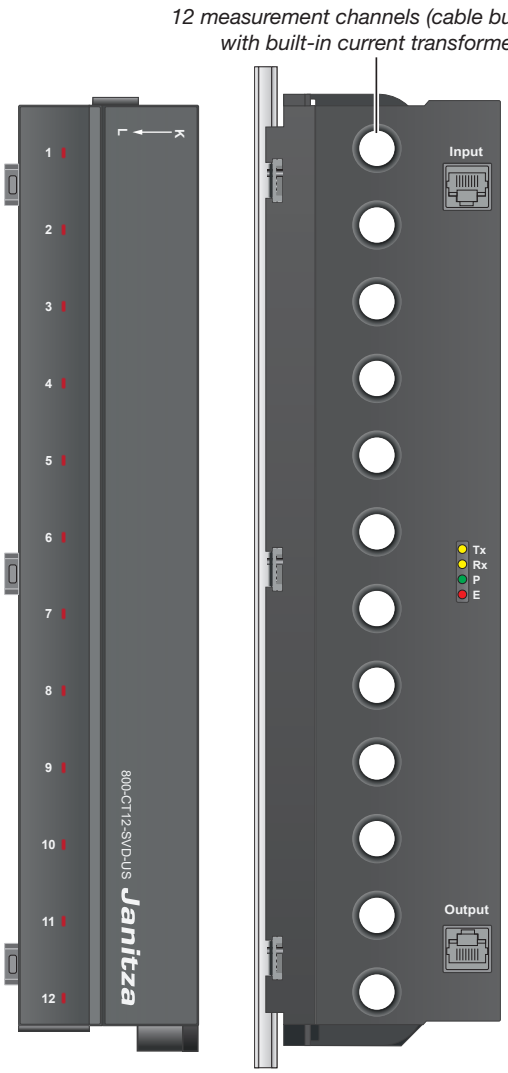


Fig.: 800-CT12-SVD-US module ("US": grid dimension of the measurement channels = 25.4 mm / 1.0 in)

The current measuring module requires at least one 800-CON-RJ45 transfer module for integration into a JanBus topology!

A basic device
- Allows the current measuring module to be integrated into a JanBus topology. Please refer to the usage information for the 800-CON-RJ45 transfer module for information on this.
- Has a limited number of module slots! Before setting up a JanBus measurement device and module topology, check the maximum number of slots of the basic device (see user manuals of the basic device and the modules)!

The number of modules of the type 800-CT12-SVD-US permitted on a basic device can be found in „Tab. Suitable basic devices“ on p. 2.

INFORMATION

- **The 800-CON-RJ45 module and the RJ45 cables are not included in the scope of delivery of the current measuring module!**
- **Do not exceed the maximum bus length of the JanBus (see** Sect. 14 on p. 57)!
- In addition to the usage information for the current measuring module , also observe all usage information for the modules and components integrated into the JanBus topology, especially that of your basic device!

[1)] The voltage measured on the basic device and the current measured on the module are used for the power and energy measurement.

3.2 Incoming goods inspection

The prerequisites for trouble-free and safe operation of the module include proper transport, storage, setup and assembly, as well as proper operation and maintenance.

Exercise due caution when unpacking and packing the device, do not use force and only use suitable tools. Check the following:
· the module by performing a visual inspection to ensure flawless mechanical condition.
· the scope of delivery (see Sect. 3.8 on p. 16) for completeness before beginning with assembly and installation.

If it must be assumed that safe operation of your basic device with module is not possible:
1. **Switch off the power to your system (your device)!**
2. **Secure it against being switched back on!**
3. **Check to be sure it is de-energized!**
4. **Ground and short circuit the system (device)!**
5. **Cover or block off adjacent live parts!**

Safe operation is impossible, if, for example, the basic device with module:
· Has visible damage,
· No longer functions despite an intact power supply,
· Was subjected to extended periods of unfavorable conditions (e.g. storage outside of the permissible climate thresholds without adjustment to the room climate, condensation, etc.) or transport stress (e.g. falling from an elevated position, even without visible external damage, etc.).

3.3 Intended use

The module / component
· is only for use in the industrial sector.
· is intended as an extension module for meter and module topologies with suitable basic devices in switchboard cabinets and small distribution boards.
· must only be mounted with a basic device that is disconnected from the power supply (see Sect. 6 on p. 20).

INFORMATION

More information on certain functions of the basic device with modules can be found in the usage information of the basic device.

The basic device and the modules are **not** designed for installation:
· In vehicles! Use of the basic device with modules in non-stationary equipment is considered an exceptional environmental condition and is only permissible by special agreement.
· In environments with harmful oils, acids, gases, vapors, dusts, radiation, etc.
· In potentially explosive environments.

3.4 Overview of module functions

Functions of the current measuring module:
· 12 current measurement inputs with voltage detection (3 groups of 4 channels each, 12 individual channels or free configuration via the Virtual Meter function)
· Measuring category 300 V CAT III
· Nominal current up to 100 A (120 A continuous overload)
· Cables to be measured having basic insulation up to 11 mm outer diameter

3.5 Conformity declaration

The laws, standards and directives applied by Janitza electronics GmbH for the devices can be found in the declarations of conformity at www.janitza.com.

3.6 FCC Declaration of Conformity

The device:
· complies with Part 15 of the FCC Rules for Class B digital devices (limits to protect against harmful interference in a residential installation).
· generates, uses and can radiate high-frequency energy
· can cause harmful interference to radio communications if not installed and used properly. There is no guarantee that interference will not occur in a particular installation.

If there is radio or television reception interference, which can be determined by turning the device on and off, proceed as follows:
· Align or reposition the receiving antenna.
· Increase the distance between the device and the radio/television receiver.
· Connect the device and the radio/television receiver in different circuits.
· if necessary, contact Janitza support or a radio/television technician.

Code of Federal Regulations, Title 47, Part 15, Subpart B - Unintentional Radiators.

3.7 Protective device

It is not permitted to use the outputs of Janitza measurement devices, components and modules for switching protective devices or protective relays!

3.8 Scope of delivery

Quantity	Part. no.	Designation
1	52313xx	800-CT12-SVD-US module (current measuring module)
1	3303913	Installation manual (DE/EN)
1	3303342	"Safety Information" supplement
1	1001953	End bracket

Tab. Current measuring module scope of delivery

INFORMATION

· All supplied options and design variants are described on the delivery note.
· With the GridVis network analysis software available at www.janitza.com, you can configure your basic device with modules and read out data for analysis (prerequisite: PC connection to your basic device).

3.9 Accessories

Quantity	Part. no.	Designation
1	5231242	Module 800-CON-RJ45 (transfer module)
1	1001953	End bracket

Tab. Available accessories for the current measuring module

3.10 Operating concept

The module is operated via the respective basic device. This determines the operating options (see user manual of the basic device).

INFORMATION

A Modbus address list with data on your basic device with module can be found in the download area at www.janitza.com.

3.11 GridVis network analysis and programming software

The GridVis software is the perfect tool for programming, reading and visualizing measurement data (download at www.janitza.com).

GridVis software performance characteristics

· Configuration of the basic device and the modules of your meter and module topology.
· Graphic display of measured values.
· Report functions.
· Online help and tutorials.

Connections to the PC (GridVissoftware)
Information on connections for communication between the PC and the basic device (with modules) can be found in the usage information for the basic device.

3.12 Physical mode and Virtual Meter mode

Various settings and functions depend on which basic device you are using and which mode the basic device is in.

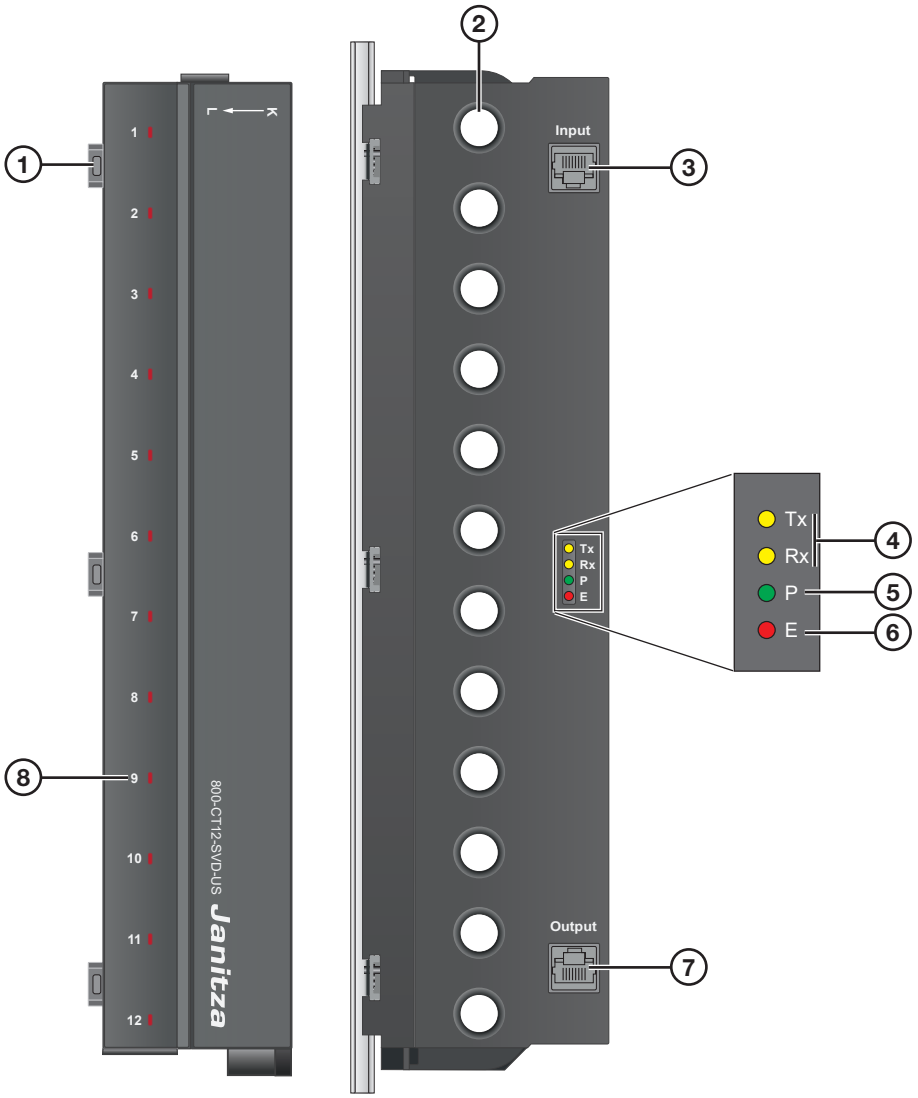
· **UMG 801**:
  - Physical mode (previous mode of the UMG 801 with physical measurement groups)
  - Virtual Meter mode (in preparation)

· **UMG 800**:
  - Virtual Meter mode

INFORMATION

· With the "Virtual Meter" function, you can virtually summarize measured values from real measurement points. This enables greater flexibility, for example, 3-channel measurement (L1, L2, L3) with the 800-CT12-SVD-US module instead of the standard 4-channel measurement, or the assignment of the channels to different modules.
· It is not possible to switch from Virtual Meter mode back to physical mode without losing data.
· Virtual meters are explained in detail in the user manual for the basic device.

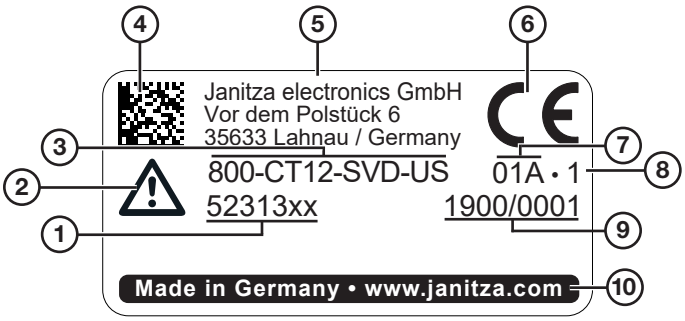
4. Connections/controls



Item	Designation	Description
1	Bottom bolt	For mounting the module on the DIN rail
2	12 measurement channels	Cable bushings for cables with basic insulation
3	RJ45 interface - input	· Interface input for integrating the module into the JanBus-device and module topology · JanBus (proprietary) via RJ45 cable (commercially available Ethernet cable).
4	2 LEDs (Tx ... Transmit data, Rx ... Receive data)	Blink "orange" during operation and indicate cyclic data exchange.
5	LED (P ... Power)	Lights "green" if the supply of power via the JanBus interface of the basic device is correct; the device is ready for operation.
6	LED (E ... Error)	Lights "red" during initialization/startup and blinks in the event of a fault (error). Error case: See Sect. 16.2 on p. 61.
7	RJ45 interface - output	· Interface output. Description as for no. 3. · The maximum bus length of the JanBus can be found in Sect. 14 on p. 57.
8	Status LED per measurement channel	Signals the status of the monitored line using colors (see Sect. 9.7.1 on p. 37).

Tab. Connections and controls

5. Module markings – rating plate



Item	Designation	Description
1	Part number	Marking for traceability
2	Symbol for “Danger sign”	General hazard symbol. Be certain to observe the warning notices applied to the device and shown in the documentation in order to avoid possible injury or even death.
3	Device description (identification)	Device designation (model, device type)
4	DataMatrix code	Coded manufacturer data
5	Manufacturer	Complete contact address of the manufacturer (company name, street, house number, postal code, city, country)
6	CE conformity marking	See Sect. 3.5 on p. 16
7	Manufacturer-specific data	Manufacturer data (date of manufacture)
8	Hardware version	Hardware version of the module
9	Type/serial number	Number for identification of the device
10	Designation of origin/web address	Country of origin and manufacturer’s web address

Tab. Identification of the module - rating plate

6. Mounting

6.1 Mounting a current measuring module with 800-CON RJ45 transfer module

⚠ CAUTION

Disregard of the installation instructions may cause property damage or personal injury!
Disregard of the installation instructions may cause damage to your basic device with module or destroy it and/or may also result in personal injury.

- **In addition to the installation instructions for your module, also observe the installation instructions for your basic device, in particular the safety and warning information.**
- **Before installing modules**
  - **Disconnect the supply of power to the system!**
  - **Secure it against being switched on!**
  - **Check to be sure it is de-energized!**
  - **Ground and short circuit!**
  - **Cover or block off adjacent live parts!**
- **Provide adequate air circulation in your installation environment and cooling, as needed, when the ambient temperatures are high.**
- **Return defective modules to Janitza electronics GmbH in accordance with the shipping instructions for air or road freight (complete with accessories).**

⚠ WARNING

Life-threatening danger due to electrical voltage!
Insufficient insulation of cables (e.g. RJ45 cables) against mains supply circuits can lead to voltages that are dangerous to touch or to component damage.

- **Ensure reinforced or double insulation with respect to supply circuits!**
- **Route RJ45 cables separately from single-insulated cables, e.g. in a separate cable duct.**

Install the current measuring module with the system de-energized in accordance with the installation instructions for the 800-CON-RJ45 module:

1. Select the mounting orientation of the module according to the direction of current flow (L = load side).

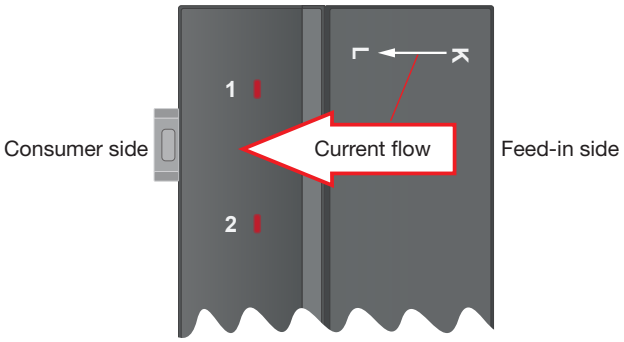


Fig.: Current flow direction of the current transformers (K = infeed, L = load)

2. If the DIN rail is oriented vertically: Mount the supplied end bracket underneath the module to prevent it from slipping down on the DIN rail.
3. Carefully press the module onto the DIN rail until the bottom bolts engage.
4. Feed the cables to be monitored through the measurement channels (max. diameter 11 mm).
5. Fit the wire ferrules and connect the cables.

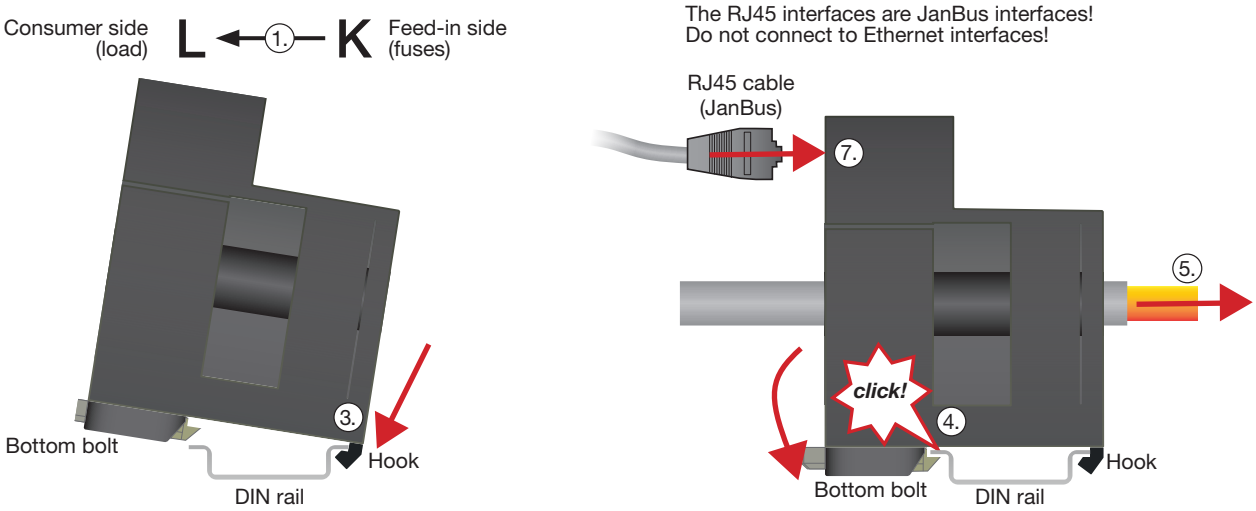


Fig.: Mounting

6. Route JanBus connections separately from voltage carrying cables:
   - Connect the input side of the first current measuring module to the 800-CON-RJ45 module. Use commercially available Ethernet patch cables (RJ45 cables for JanBus communication).
   - The output side of the current measuring module can be connected to the input side of the next current measuring module, for example (see Sect. 6.2 on p. 22).

ATTENTION

Material damage due to incorrect connection!
The module's RJ45 interfaces are proprietary JanBus interfaces. Connection to an Ethernet interface can disrupt the JanBus devices and modules or cause your network to fail!
· **Only use the RJ45 interfaces in proprietary JanBus topologies!**

6.2 The current measuring module in JanBus module topologies

Before setting up a JanBus module topology, check the number of free module slots in suitable basic devices (see „Tab. Suitable basic devices“ on p. 2). When planning a JanBus measurement device and module topology in a switchboard cabinet or small distribution board, it is important to make optimum use of the slots in the basic device.

Taking into account that an 800-CT12-SVD-US current measuring module occupies exactly 1.5 slots of the basic device, the following example topologies can be realized.

1. A **JanBus topology** consisting of up to 8 current measuring modules, which together occupy 12 slots and thus offer 96 measurement channels.
   See fig. Sect. 6.2.1 on p. 23.

2. A **combined JanBus topology** consisting of modules, each occupying one module slot, and the current measuring modules, each occupying 1.5 module slots.
   See fig. Sect. 6.2.2 on p. 24.

INFORMATION

In addition to the example topologies mentioned, there are many options and combinations for other measurement device and module topologies.

Please observe the following for the structure and dimensioning of your measurement device and module topology:

- The usage information of measurement devices, modules and components of your topology, in particular the usage information of the 800-CON-RJ45 transfer module!
- The interfaces of the current measuring module are proprietary RJ45 JanBus interfaces! Do not connect to RJ45 Ethernet interfaces!
- Use commercially available RJ45 cables (patch cables, not crossover cables) for smooth JanBus communication in your measurement device and module topology.
- Use end brackets to set up your measurement device and module series on the DIN rails.

System limits:
- Before mounting, check the number of suitable modules (slot requirements) for your measurement device and module topology based on the respective usage information (see Sect. on p. 2)! The 800-CON-RJ45 transfer module does not occupy a slot!
- The maximum bus length of the JanBus can be found in Sect. 14 on p. 57.

6.2.1 Topology example: 4 current measuring modules with 48 measurement channels

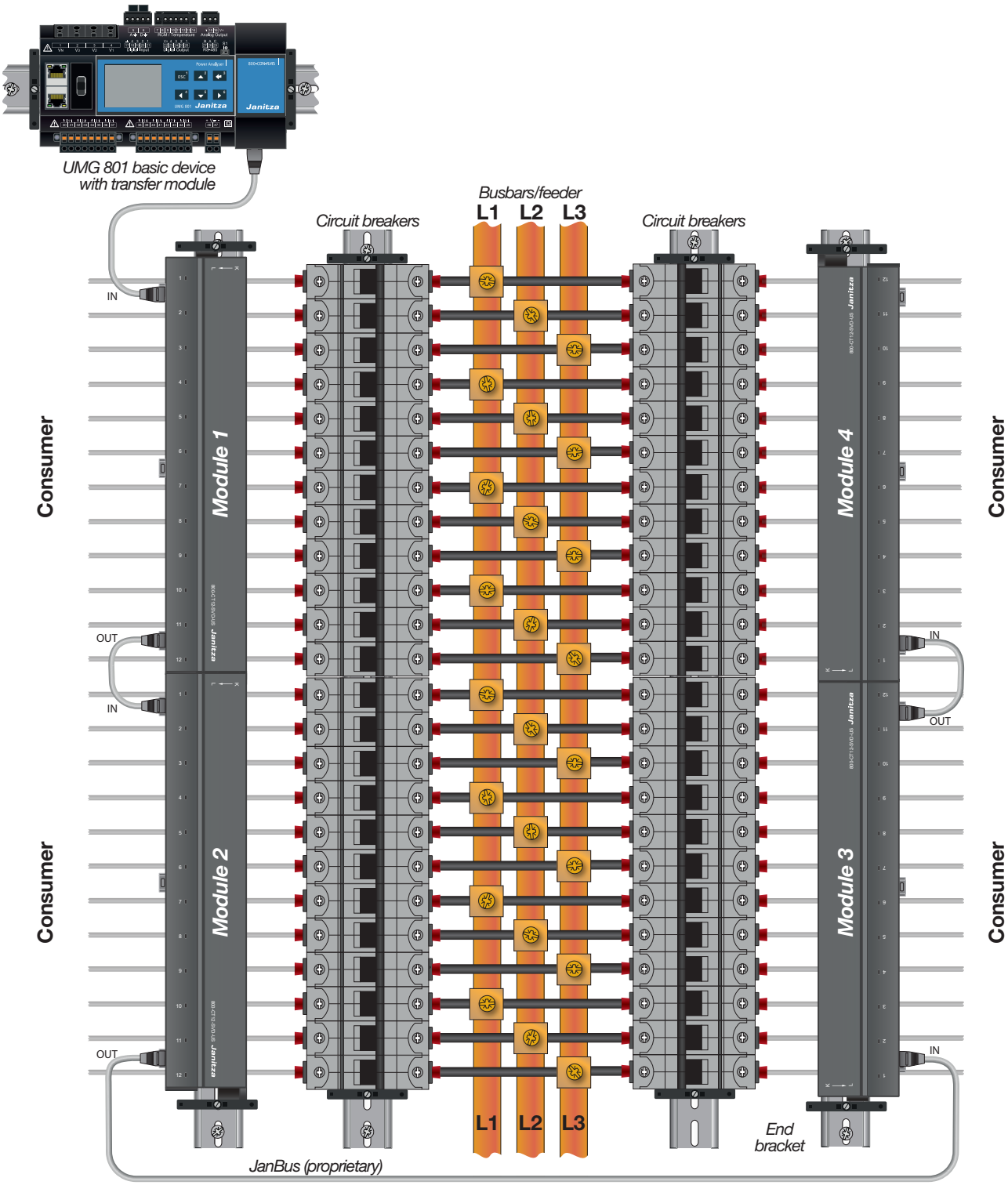


Fig. Topology example with 4 current measuring modules and 48 measurement channels

The module number is assigned automatically based on the sequence in the JanBus. The module closest to the basic device is then module 1.

6.2.2 Topology example: Combination with other modules

800-CT12-SVD-US current measuring modules can be combined with all suitable modules on the same JanBus.

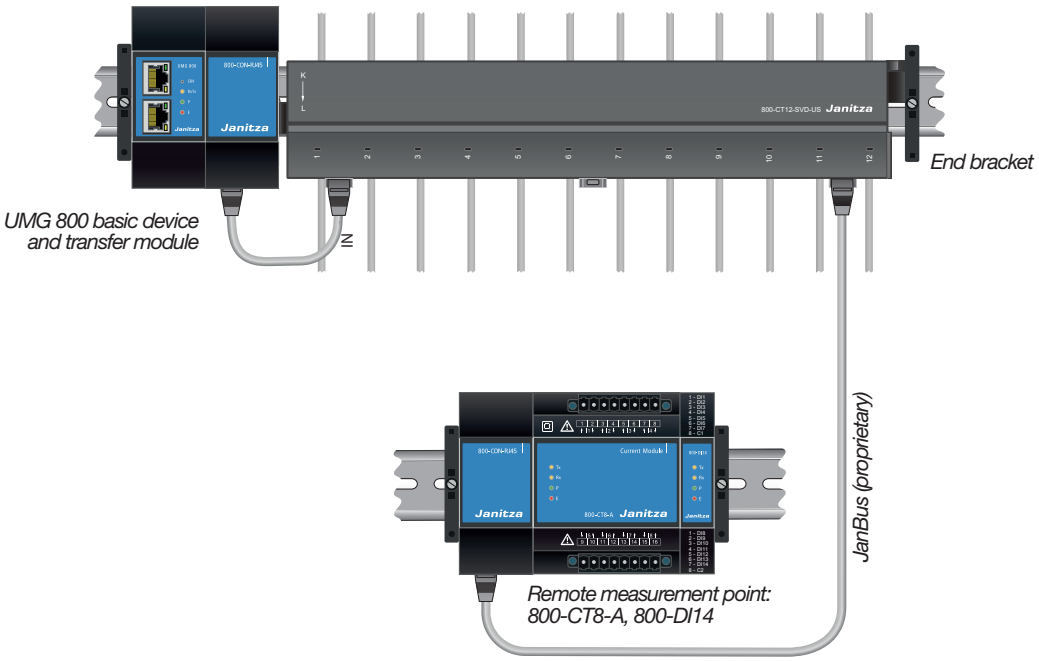


Fig. Topology example with a remote measurement point with additional modules

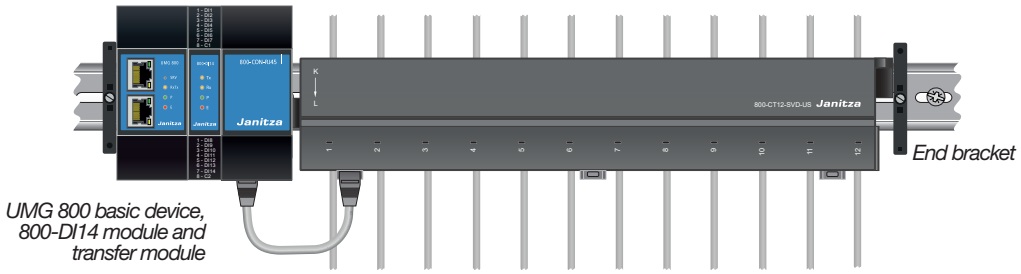


Fig. Topology example with digital input module

7. Installation

⚠ WARNING

Risk of injury due to high currents and high electrical voltages!
Severe bodily injury or death can result from:
· Touching bare or stripped leads that are energized.
· Inputs of devices, components and modules are dangerous to touch.
Therefore, please note for your system:
· **Disconnect the supply of power before starting work!**
· **Secure it against being switched on!**
· **Check to be sure it is de-energized!**
· **Ground and short circuit! Use the ground connection points with the ground symbol for grounding!**
· **Cover or block off adjacent live parts!**

⚠ WARNING

Disregard of the connection conditions of the transformers to Janitza measurement devices or their components can lead to injuries or even death or to material damage!
· Do **not** use the outputs of the Janitza measurement devices or their components for switching protective devices or protective relays! **Do not use "transformers for protection purposes"**!
· For Janitza measurement devices and their components use **only "Transformers for measurement purposes"** which are suitable for the energy monitoring of your system.
· Observe the information, regulations and limit values in the usage information on **"Transformers for measuring purposes"**, including during testing and commissioning of the Janitza measurement device, the Janitza component and your system.

7.1 Current measurement with the module

The current measuring module
· Measures current exclusively via the built-in current sensors.
· Measures current up to 100 A (120 A continuous overload).
· Detects the voltage in each measurement channel.
· Monitors the lines to be measured (Health Check).
· Only delivers measured values to suitable basic devices (see „Tab. Suitable basic devices“ on p. 2).
· Does not measure DC currents.

INFORMATION

Inductive current transformers must generally not be operated open-circuit on the secondary side, as otherwise there is a danger of high voltage peaks. However, this does not apply to the current transformers installed in the current measuring module because they are continuously loaded internally on the secondary side.

7.2 Connection diagram

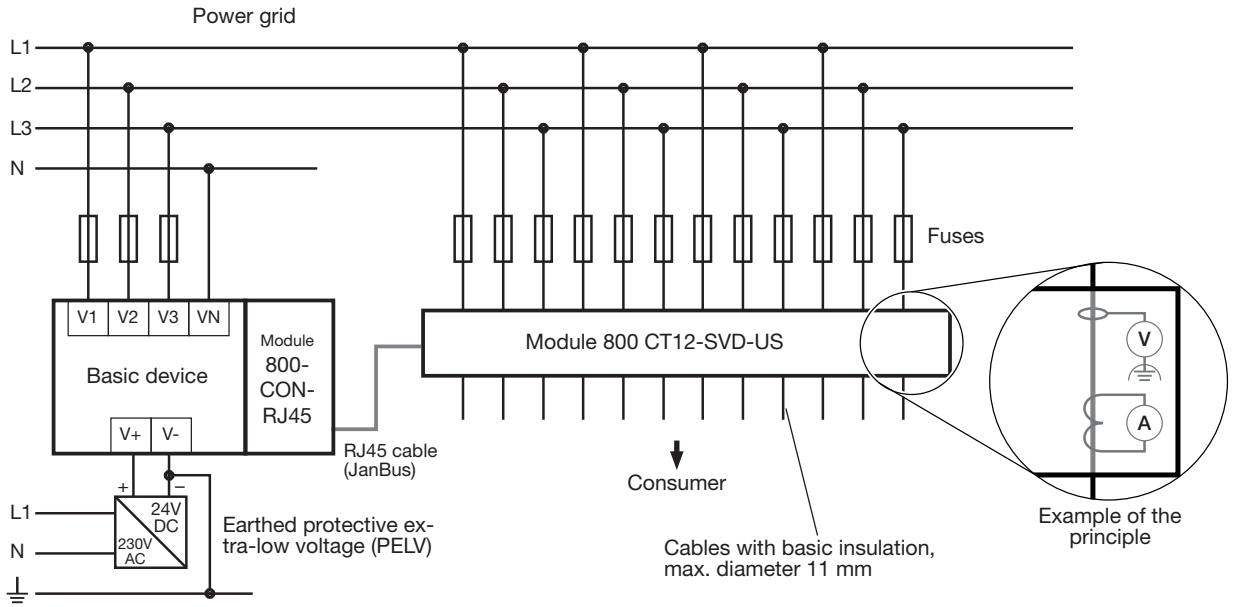


Fig.: Connection diagram with 800 CT12-SVD-US module

· Install the current measuring module according to the connection diagram and the figures in Sect. 6 on p. 20.
· Use a separate, grounded power supply unit (PELV) for the supply of power for each basic device.
· The communication with the basic device is then checked afterwards in the context of commissioning (see Sect. 9 on p. 31).

⚠ WARNING

Life-threatening danger due to electrical voltage!
Insufficient insulation of cables (e.g. RJ45 cables) against mains supply circuits can lead to voltages that are dangerous to touch or to component damage.
· **Ensure reinforced or double insulation with respect to supply circuits!**
· **Route RJ45 cables separately from single-insulated cables, e.g. in a separate cable duct.**

INFORMATION

The earthed protective extra-low voltage (PELV) is essential for the voltage detection function. The functional earth potential is transmitted to the current measuring module via RJ45 cable.
The module monitors the voltage relative to functional earth in each measurement channel.

8. Module communication / PC connection

8.1 Ethernet communication via basic device

The following are examples of some possibilities for connecting a measurement device and module topology via the Ethernet interfaces.

The basic device has two Ethernet interfaces for communication.

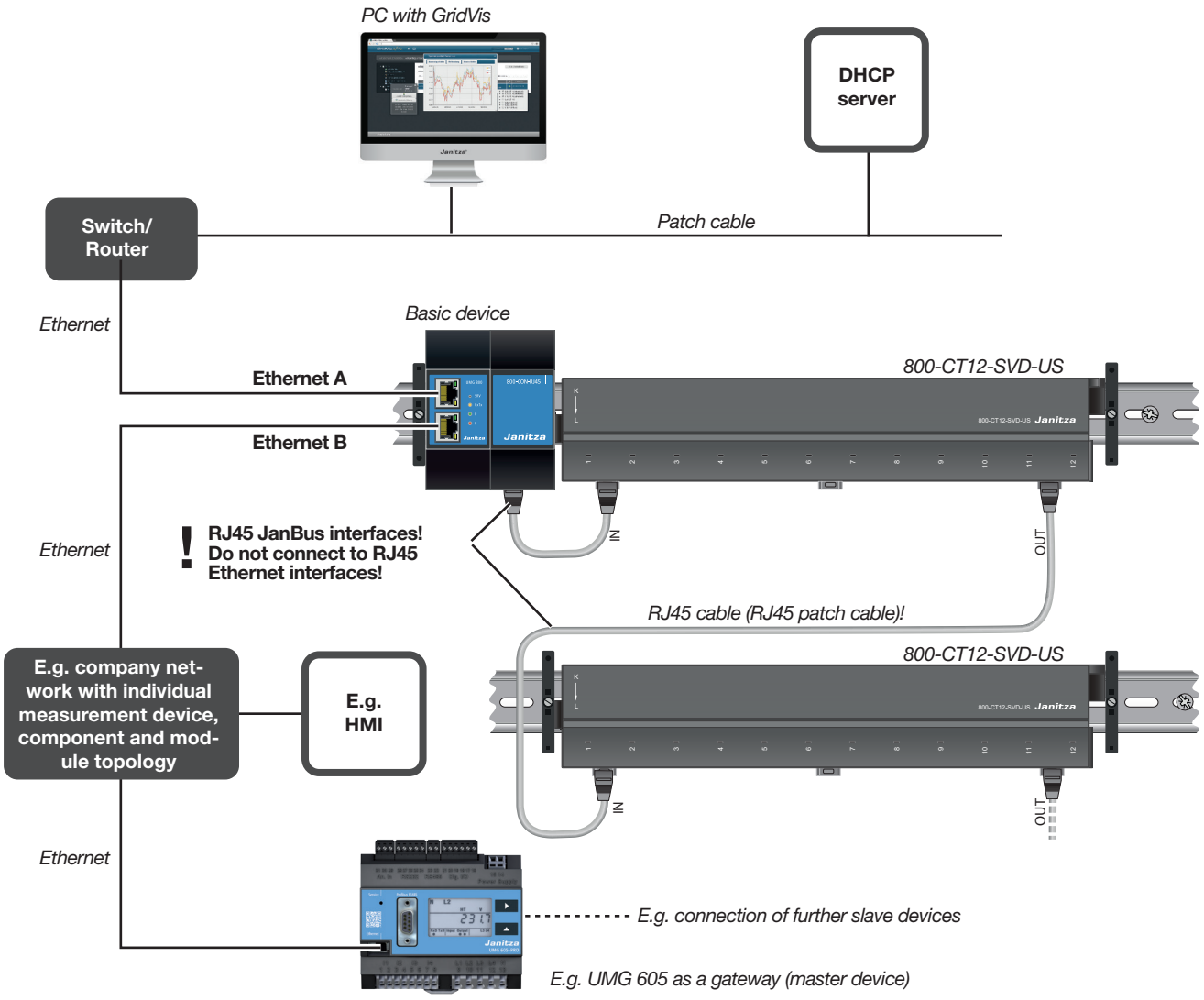
Use the two RJ45 Ethernet interfaces on the basic device to configure, manage and monitor your basic device with the modules.

You can access the basic device and the modules connected via JanBus in the following ways:

- The display and buttons of the basic device (UMG 801 only), or a connected remote display, e.g. RD 96.
- A network with a PC running the GridVis software or a generic OPC UA client.
- The device homepage of the basic device.
- An HMI (human machine interface) integrated into your measurement device and module topology.

8.1.1 Connection example 1

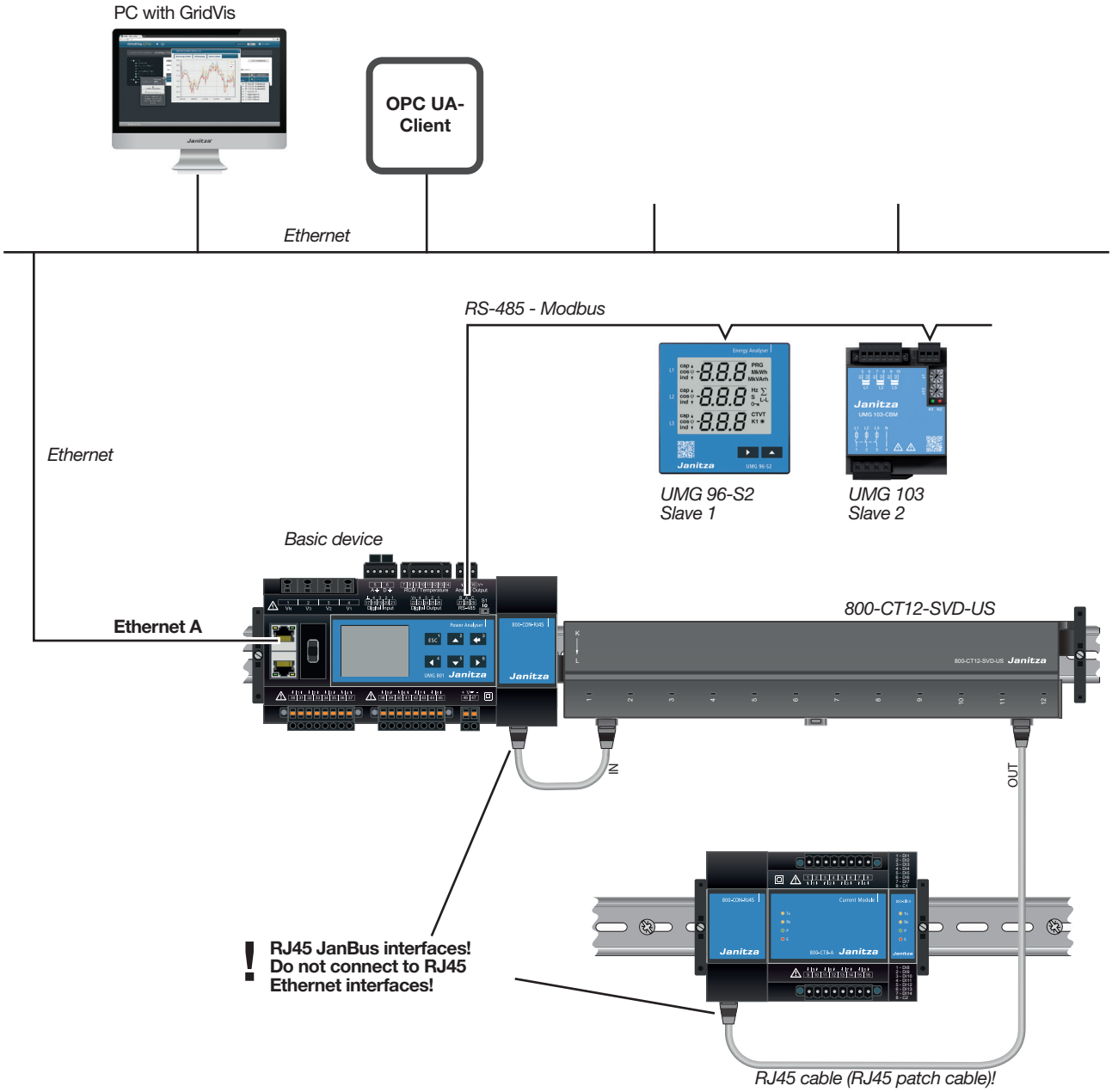
Schematic representation of the Ethernet communication of the basic device with connected modules with a PC and DHCP server.



Connection example 1 with connection to 2 networks and a UMG 800 as the basic device

8.1.2 Connection example 2

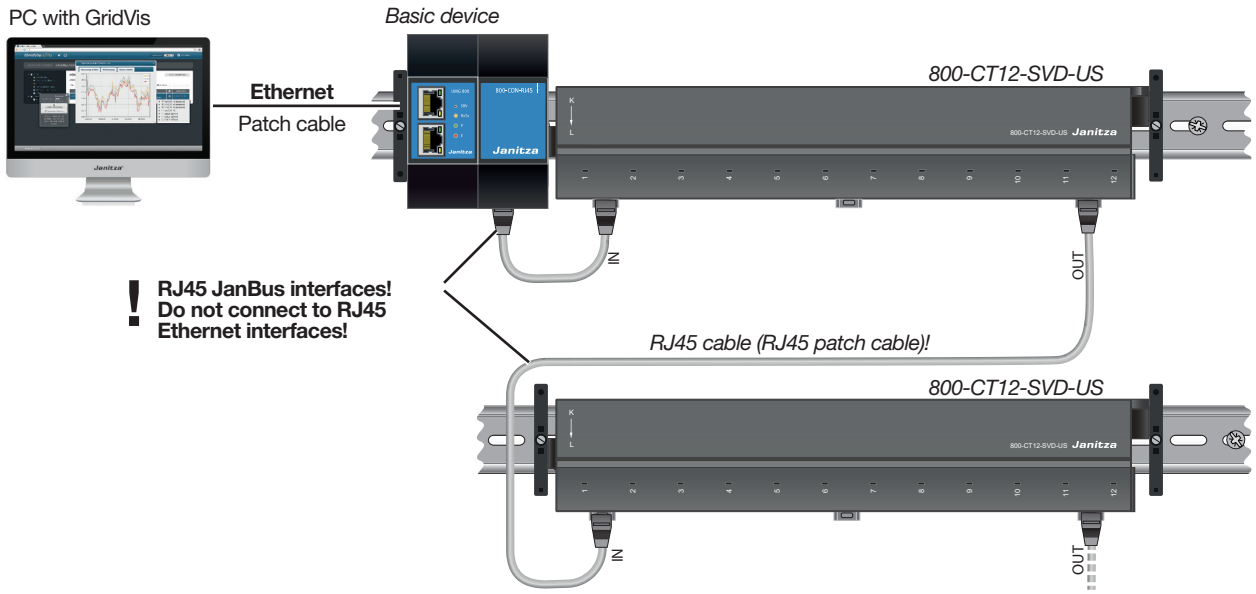
Schematic representation of the Ethernet communication of the basic device with connected modules with a PC and OPC UA client and connection to an RS-485 Modbus structure.



Connection example 2 with a UMG 801 as the basic device and optionally as Modbus master

8.1.3 Connection example 3

Schematic representation of the Ethernet communication of the basic device with connected modules with a PC via direct connection.



Connection example 3 with a UMG 800 as the basic device and a direct PC connection

INFORMATION

Descriptions of the Ethernet interfaces can be found in the user manual for the basic device.

ATTENTION

Material damage due to incorrect network settings.
Incorrect network settings can cause faults in the IT network!
Consult your network administrator for the correct network settings for your device.

ATTENTION

Material damage due to security vulnerabilities in programs, IT networks and protocols.
Security vulnerabilities can lead to data misuse and faults and even the standstill of your IT infrastructure.
To protect your IT system, network, data communications and measurement devices:

- **Inform your network administrator and/or IT representative.**
- **Always keep the meter firmware up to date and protect the communication to the meter with an external firewall. Close unused ports.**
- **Take protective measures against viruses and cyber attacks from the Internet, e.g. through firewall solutions, security updates and virus protection programs.**
- **Eliminate security vulnerabilities and update or renew existing protection for your IT infrastructure.**

8.2 Module communication options

8.2.1 Module handling in the GridVis software

The user interface of the GridVis network analysis software uses a graphical representation to show the modules connected to the basic device.

The options for what can be configured and carried out in the GridVis software include the following:
· Automatic module recognition
· Module addition at the end of the module topology of a basic device.
· Module addition within the module topology of a basic device.
· Module removal at the end of the module topology of a basic device.
· Module removal within the module topology of a basic device.
· Module swap.
· Module configuration swap (measurement).
· Data storage and data transfer.
· Swap out basic device.

INFORMATION

A description of how to configure the modules in the GridVis software can be found in the online help or the tutorials for the software.

8.2.2 Device homepage of the basic device

Another option for **configuring modules or reading out measured values** is available via the device homepage of the basic device.

INFORMATION

· A description of the device homepage can be found in the basic device user manual.
· Replacing or adding a module in the module topology is not possible using the device homepage; this is only possible with the GridVis software.

8.2.3 Module handling via a user interface (HMI)

As a 3rd option, you can manage, monitor and configure your modules via a web panel (e.g. JPC-100) integrated into your measurement device and module topology as a user interface (HMI) - see Sect. 8.1.1 on p. 27.

INFORMATION

Observe the usage information for your HMI as applicable!

9. Commissioning

9.1 Startup procedure/initialization

⚠ WARNING

Life-threatening danger due to electrical voltage in the event of improper installation!
Incorrect connection or exposed cable ends can result in live parts.
· **Check the wiring before switching on for the first time.**

ATTENTION

Material damage due to disruption of the JanBus during operation!
Establishing or disconnecting a JanBus connection during operation can disrupt communication and function.
· **De-energize the basic device before establishing or disconnecting a JanBus connection.**

The basic device automatically recognizes the connected modules during the power-up procedure. Modules started on a basic device trigger a blink interval of the LEDs. The blink interval of the LEDs and the meaning can be found in Sect. 9.4.3 on p. 35.

9.2 Checking module communication

After installing your module, check that the communication between the basic device and the module is working. Use the display of the basic device or a remote display to do so.

· When you are in the *Home* measuring display of the basic device, pressing button 1 *ESC* takes you to the *Menu* window.
· Use buttons 2 (▲) and 5 (▼) to select the menu item *System information* and confirm with button 3 *Enter*.
· The *System information* window with the items *Basic device* and the recognized modules appears.

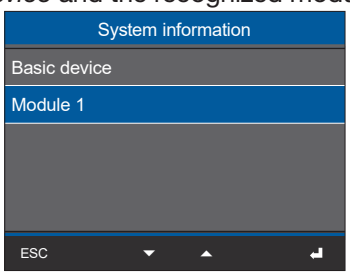


Fig.: System information window with the entries of the basic device and module 1.

· The basic device has detected module 1.

INFORMATION

You can rename the basic device and the modules in the GridVis software and on the device homepage and assign suitable designations.

In the event of module communication errors
If a module is not listed under *System information*, the basic device was unable to establish a connection to the module after starting (switching on).
In this case, no communication to the module can take place and the module functions (current measurement) are not supported.

If the basic device does not recognize a module, proceed as follows:

⚠ WARNING

Risk of injury due to electrical current and voltage!
Severe bodily injury or death can result! Therefore please abide by the following:
· **Do not touch bare, stripped wires or device inputs that are dangerous to touch on the devices, components and modules.**
· **Switch off your installation before commencing work! Secure it against being switched on! Check to be sure it is de-energized! Ground and short circuit! Cover or block off adjacent live parts!**

· Ensure that the power supply to the basic device is de-energized.
· Check the RJ45 cables and the connection of the module to the basic device (seating of the contacts of the RJ45 module, input/output not swapped).
· The module's RJ45 interfaces are proprietary JanBus interfaces! Do not connect to RJ45 Ethernet interfaces! Do not use crossover cables!
· Restart the basic device.
· If these measures do not lead to the desired result, please contact Janitza Support – **www.janitza.com**

9.3 Display the module's system information

This allows you to display information about a module in your measurement device and module topology:

- When you are in the *Home* measuring display of the basic device, pressing button 1 *ESC* takes you to the *Menu* window.
- Use buttons 2 (▲) and 5 (▼) to select the menu item *System information* and confirm with button 3 *Enter*.
- The *System information* window with the items *Basic device* and an entry for each connected module appears.

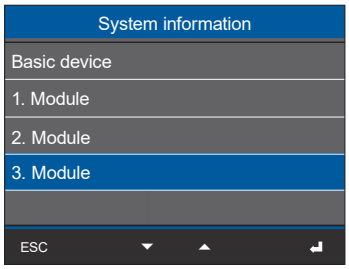


Fig.: System information window (example with 3 connected modules)

- Use buttons 2 (▲) and 5 (▼) to select, for example, the item *Module 3* and confirm with button 3 *Enter*.
- The *Module 3 Info 1/2* window appears with the items *Type, Serial no.* and *Position.*

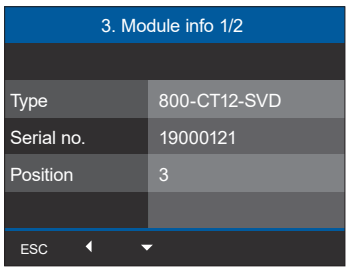


Fig.: Module 3 Info 1/2 window

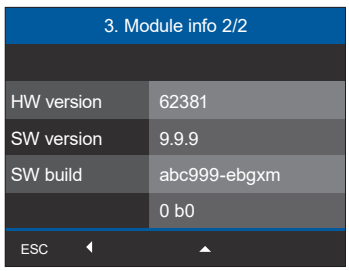


Fig.: Module 3 Info 2/2 window

- Use button 1 *ESC* to return to the *Menu* window.

9.4 Identifying modules

INFORMATION

Before you start the module identification function (*Diagnostic* menu item) on the basic device, make sure that the modules are mounted and connected correctly. Only correctly installed modules connected to the basic device guarantee the supply of power and data transmission.

The basic device provides the option of extending the range of functions using current measuring modules or digital input modules. The basic device automatically recognizes the module during the power-up procedure.

The *Diagnostic* menu item of the basic device is used to identify modules that are located at remote measurement points. After starting the module identification, the LEDs of the modules being searched for blink at an interval (see Sect. 9.4.3 on p. 35).

The module identification can be configured using the *Diagnostic* menu item of the basic device. Then proceed as follows:

· Press function button 1 *ESC* to open the menu.
· Use buttons 2 (▲) and 5 (▼) to select the *Diagnostic* menu item and confirm with button 3 *Enter*.
· The *Diagnostic* window appears.

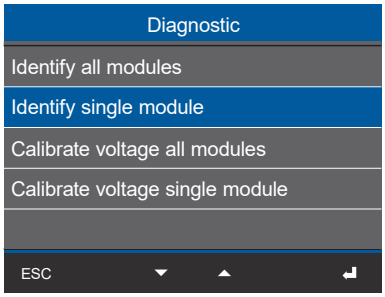


Fig. Diagnostic window with entries

· In the *Diagnostics* window, use buttons 2 (▲) and 5 (▼) to select the entry *Identify all modules* or *Identify single module.* These mean:

Identify all modules	Simultaneously identifies **all** current measuring modules or digital input modules connected to a basic device.
Identify single module	Identifies **one** module (current measuring module or digital input module) from the module topology of your basic device.

9.4.1 The "Identify single module" entry

· In the *Diagnostic* window, use buttons 2 (▲) and 5 (▼) to select the entry *Identify single module* and confirm with button 3 *Enter*.
· The *Identify single module* window appears.

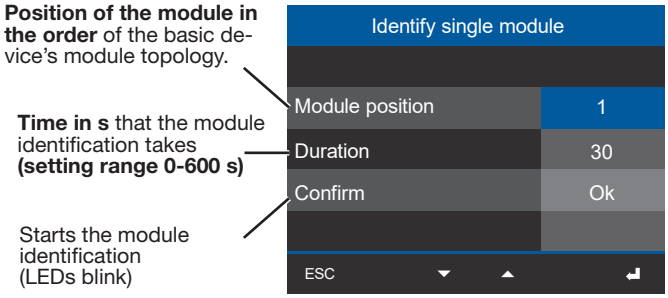


Fig. "Identify single module" window

· In the *Identify single module* window, use keys 2 (▲) and 5 (▼) to select the entry *Module position* and confirm with button 3 *Enter*.
· The entry *Module position* blinks.
· Use the buttons 2 (▲) and 5 (▼) to enter the position number of the module to be identified (the position number depends on the number of modules connected in series to the basic device).
· Confirm the entry with key 3 *Enter*.
· Use button 1 *ESC* and button 5 (▼) to go to the entry *Duration*.
· Press button 3 *Enter.*
· The first digit of the entry *Duration* blinks.
· Use buttons 4 (◀) and 6 (▶) to change the position of the digit to be set and buttons 2 (▲) and 5 (▼) to change the digit (-1/+1).
· Confirm your entries with key 3 *Enter*.
· Use button 1 *ESC* and button 5 (▼) to access the entry *Confirm*.
· Press button 3 *Enter.*
· *OK* blinks in the entry *Confirm*.
· Pressing button 3 *Enter* starts the module identification with a blink interval of the LEDs on the corresponding module (see Sect. 9.4.3 on p. 35).

9.4.2 The "Identify all modules" entry

· In the *Diagnostic* window, use buttons 2 (▲) and 5 (▼) to select the entry *Identify all modules* and confirm with button 3 *Enter*.
· The *Identify all modules* window appears.

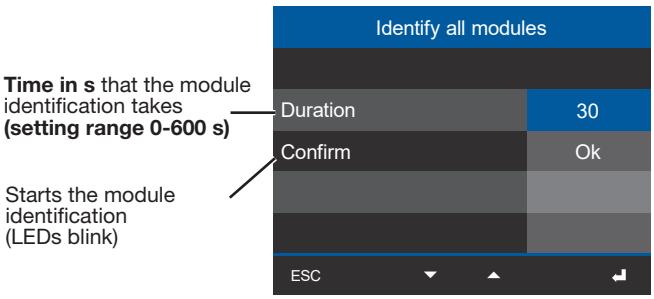


Fig. "Identify all modules" window

· In the *Identify all modules* window, use buttons 2 (▲) and 5 (▼) to select the entry *Duration* and confirm with button 3 *Enter*.
· The first digit of the entry *Duration* blinks.
· Use buttons 4 (◀) and 6 (▶) to change the position of the digit to be set and buttons 2 (▲) and 5 (▼) to change the digit (-1/+1).
· Confirm your entries with key 3 *Enter*.
· Use button 1 *ESC* and button 5 (▼) to access the entry *Confirm*.
· Press button 3 *Enter.*
· *OK* blinks in the entry *Confirm*.
· Pressing button 3 *Enter* starts the identification of all modules using a blink interval of the LEDs (see Sect. 9.4.3 on p. 35).

9.4.3 Module identification - LED blink interval

The module identification (diagnostics) procedure started on the basic device triggers a blink interval of the LEDs on the modules (e.g. current measuring modules or digital input modules). The blink interval for the functions ***Identify single module*** and ***Identify all modules*** works in the same way for a single module or all modules!

LED status of the module in operation:

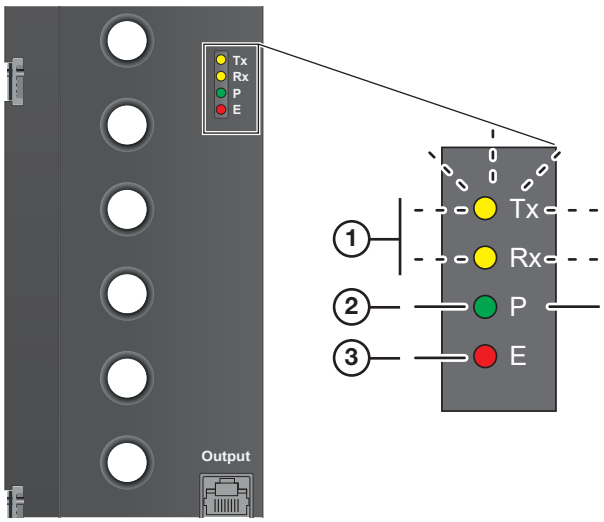


Fig.: LED status during operation

Item	Description
1	Blink "orange" during operation and signaling cyclic data exchange (Tx ... Transmit data, Rx ... Receive data).
2	Lights "green" if the supply of power via the JanBus interface of the basic device is correct, the device is ready for operation (P ... Power).
3	Lights "red" during initialization/startup and blinks in the event of a fault (error). **Note in this regard Sect. 16.2 on p. 61.**

LED status of the module during module identification:

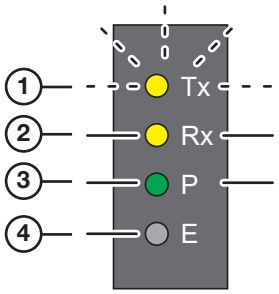


Fig.: LED status during module identification

Item	Description
1	Blinks "orange" for the *Duration* of the module identification.
2	Lights "orange" for the *Duration* of the module identification.
3	Lights "green".
4	“Off”

INFORMATION

During the **Duration of individual module identification**, the blink intervals of all other modules connected to the basic device are paused!

9.5 Assign voltage reference (phase assignment)

Each current channel of the module must be assigned a phase of the voltage measurement on the basic device as a "voltage reference" so that the power can be determined.

INFORMATION

If individual measurement channels are unused, no voltage reference may be assigned to them.

You can configure the voltage reference on the device homepage or the GridVis PC software, but not on the basic device or the remote display.

Physical mode (physical measurement groups)
When *Three Phase System* is selected, channels 1-3, 5-7 and 9-11 are automatically assigned to L1-L3. Channels 4, 8 and 12 are reserved for the neutral conductors (no phase assigned). If the installation requires a different assignment, select *Single measurements* and make the assignment individually or switch to the Virtual Meter mode.

Virtual Meter mode
Assign the voltage reference to each measurement channel according to the cabling (similar to the single measurement) in the GridVis software or on the device homepage.

This is how to assign the voltage reference of the basic device to measurement channels in the GridVis software:
· Select the module and the measurement group.
· Select the measurement group mode *Single measurements*.
· Select a current channel.
· Assign a voltage reference.

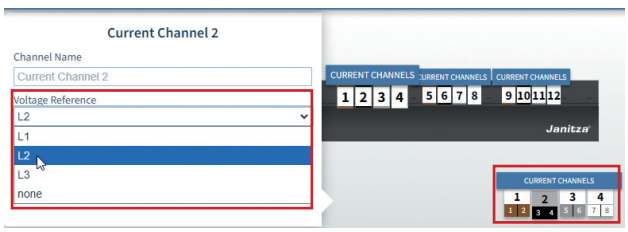


Fig. Assigning voltage reference in the GridVis PC software.

INFORMATION

Checking the phases: The current measuring module monitors the phase position of the detected voltage in comparison to the voltage reference of the basic device. Deviations of more than 10° are displayed in the *Health Check status*, which indicates any error in the assignment of the phases or installation errors (see Sect. 9.7 on p. 37).

9.6 Setting the nominal current

The nominal current must be set correctly for the overcurrent detection to work: If the set nominal current is exceeded, the LED of the measurement channel lights up blue (see Sect. 9.7.1 on p. 37).

You can configure the nominal current on the device homepage or in the GridVis PC software, but not on the basic device or the remote display.

ATTENTION

Material damage due to configuration errors
If the nominal current is set incorrectly, overcurrents may be displayed repeatedly or continuously, or the overcurrent detection may be ineffective.
· **Set the nominal current to match the nominal current of the application.**

· Select the module and the measurement group (or an individual current channel).
· Enter the nominal current under *Nominal value*.

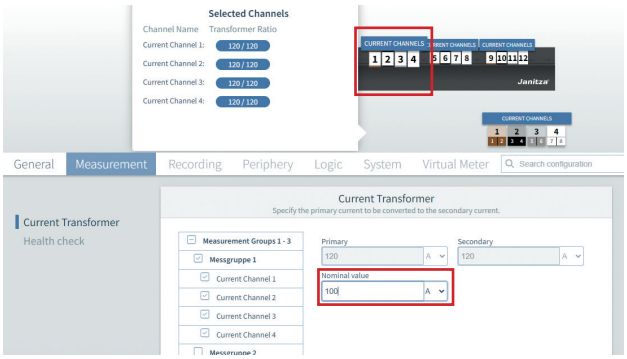


Fig. Configuring the nominal current in the GridVis PC software.

9.7 Health Check

The module continuously monitors each measurement channel with a Health Check, which, in addition to the voltage, also includes other values such as overcurrent.

The *Health Check Status* can be checked in various ways:
· Status LED on the measurement channel of the module
· On the display: *Voltage detection* > *Status*.
· In the GridVis software under OPC UA.
· Device homepage

The Health Check comprises three status values per channel in the *Diagnostic* menu:

Name of the status		Meaning
GridVis and device homepage	**OPC UA tree**	
Health Check status	VoltageMismatch	0 = Ok, 1 = Deviation (voltage level, phase position)
Health Check status (historic)	VoltageMismatch-NotAcked	0 = No deviation, 1 = Deviation in the past (status remains until confirmation)
Overcurrent status	RatedCurrentExceeded	0 = Ok, 1 = Overcurrent

9.7.1 Status LED on the measurement channel

⚠ WARNING

Life-threatening danger due to electrical voltage!
Regardless of the status of the LED on the measurement channel, voltage may be present on the line.
· De-energize the system before working on the test leads! Secure it against being switched on! Check to be sure it is de-energized! Ground and short circuit! Cover or block off adjacent live parts!

Status LEDs per measurement channel	
LED off	Voltage reference is missing and current is below nominal current.
Lights "red"	Health Check OK. (Voltage applied.)
Lights "green"	Health Check failed (voltage deviation). The green LED *does not* mean that the measurement channel is de-energized!
Lights "blue"	Overcurrent (set nominal current exceeded)
Blinking "red"	Maximum current exceeded (as of approx. 125 A)
Blinking "blue"/ "green" alternately	Overcurrent is present & Health Check failed.

The Health Check via the GridVis PC software, the device homepage and in OPC UA provides more details compared to the status LEDs.

9.8 Checking voltage detection

The current measuring module records the effective value of the voltage in each measurement channel without contact using an integrated voltage sensor.

Proceed as follows to show the status of the voltage detection on the display of the basic device:

· Press function button 1 *ESC* to open the menu.
· Use buttons 2 (▲) and 5 (▼) to select the menu item *Voltage detection* and confirm with button 3 *Enter*.
· The *Voltage Detection* window appears.
· In the *Diagnostic* window, use buttons 2 (▲) and 5 (▼) to select the desired measurement group.

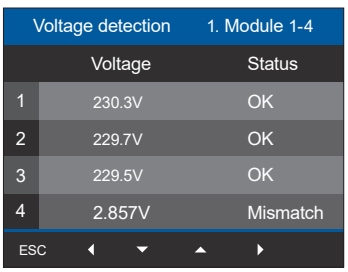


Fig.: Voltage Detection menu

Mismatch means that the detected voltage of the measurement channel deviates from the voltage measured on the basic device by more than the tolerance.
The tolerance (known as the "Voltage threshold value") is the value above which a voltage is considered a *Mismatch* and it is configurable (see Sect. 11.1 on p. 45).
The *Voltage* column shows "--" if the voltage reference is missing.

9.9 Voltage calibration (calibration of the measurement channels)

The following factors influence the accuracy of voltage detection in the current measuring module:
· Cross section of the cable to be measured
· Position of the cable in the measurement channel.

These influencing factors no longer change after installation.

Voltage adjustment improves the accuracy of voltage detection. The voltage is measured for each measurement channel in the basic device and a correction value is set for the voltage and phase position detected in the measurement channels. The voltage can thus be detected more precisely because the aforementioned static influencing factors are taken into account.

The correction values determined for voltage and phase position relative to the basic device are **stored in the module** for each measurement channel and are retained after a restart.

INFORMATION

· If you change the lines in the measurement channel at a later time (cross section or position within the measurement channel), carry out a calibration again.
· The voltage actually measured on the basic device for the corresponding phase (voltage reference) is used for calibration, not the nominal value.
· Unused measurement channels must not have a voltage reference.

9.9.1 Carrying out voltage calibration

ATTENTION

Material damage due to voltage calibration errors
Incorrect or unexpected voltage values and LED colors may be displayed due to configuration or operating errors during calibration!
Check before calibration:
· **Are all measurement channels assigned to the correct voltage reference of the basic device? Unused measurement channels must not have a voltage reference.**
· **Is the wiring correct?**
· **Is there voltage in the measurement channel? (e.g. circuit breakers must not have tripped)**

· Press function button 1 *ESC* to open the menu.
· Use buttons 2 (▲) and 5 (▼) to select the *Diagnostic* menu item and confirm with button 3 *Enter*.
· The *Diagnostic* window appears.

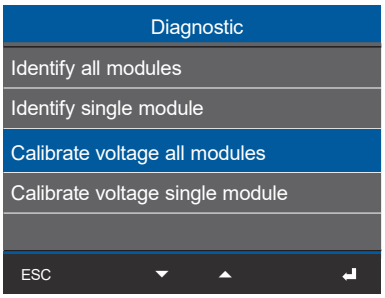


Fig. Diagnostic window with entries

· In the *Diagnostic* window, use buttons 2 (▲) and 5 (▼) to select the entry *Calibrate voltage all modules* or *Calibrate voltage single module.* These mean:

Calibrate voltage all modules	Performs the voltage calibration on **all** modules of type 800-CT12-SVD-US connected to the basic device at the same time.
Calibrate voltage single module	Performs the voltage calibration on **one** 800-CT12-SVD-US module connected to the basic device.

9.9.2 The "Calibrate voltage all modules" entry

· In the *Diagnostic* window, use buttons 2 (▲) and 5 (▼) to select the entry *Calibrate voltage all modules* and confirm with button 3 *Enter*.
· The *Calibrate voltage all modules* window appears.

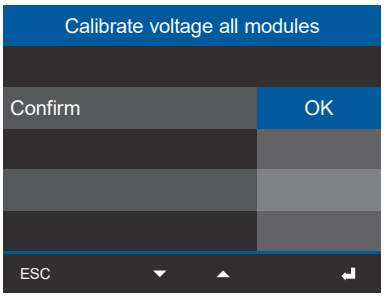


Fig. "Calibrate voltage all modules" window

· Press button 3 *Enter.*
· *OK* blinks in the entry *Confirm*.
· Press button 3 *Enter* and the voltage calibration is carried out in the next 200 ms cycle.
· You can display the time stamp of the last calibration in the GridVis PC software, on the device homepage or in the OPC UA tree to confirm that the voltage has been calibrated.

The voltage of a selected module can also be calibrated in the same way if this is necessary in individual cases.

10. Operation and button functions of the basic device with module

10.1 Operation and button functions of the basic device with current measuring module

For installation, commissioning and configuration without a PC, use the display on the basic device or a remote display.

INFORMATION

- The configuration of your module and the display of module-relevant measurement data is carried out via the basic device.
- For details and information on the display and button functions of the basic device, refer to the usage information of the basic device.
- With the **GridVis network analysis software** available at www.janitza.com, you can configure your basic device with modules and read out data for analysis (prerequisite: PC connection to your basic device).

10.2 Module-relevant menu items of the basic device with 8 modules of the type 800-CT12-SVD-US

The following menu example shows the JanBus communication between a UMG 801 basic device and the maximum expansion level with 8 current measuring modules via the 800-CON RJ45 module and an RJ45 cable.

Four channels of the current measuring module are combined into one measurement group.

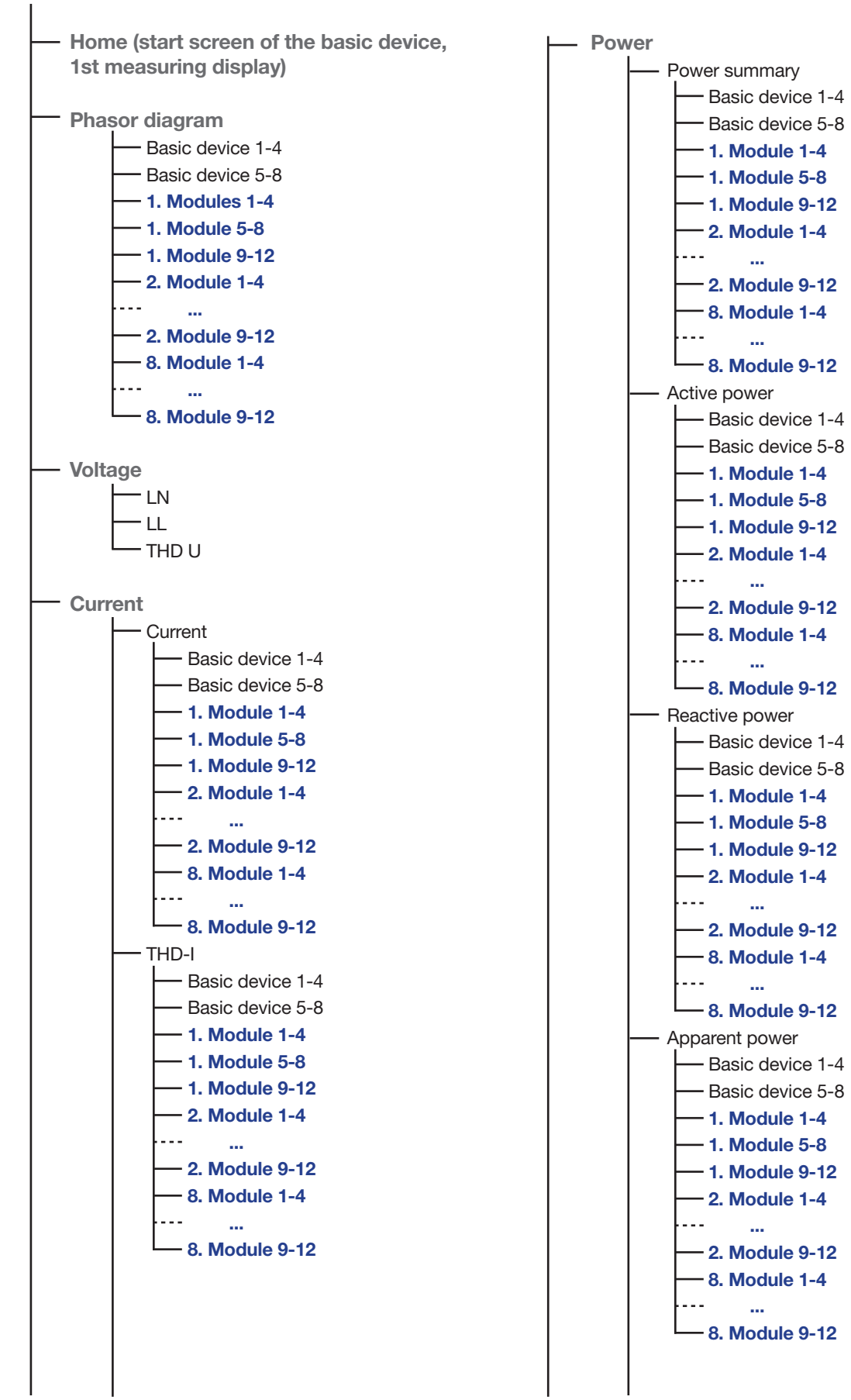
INFORMATION

- The following menu entries show the module-relevant display entries based on the UMG 801 basic device.
- Suitable basic devices and their number of module slots can be found in Sect. on p. 2.
- Please note that the names of the current measuring modules on the display of the basic device may differ! You must configure the names of your modules in the GridVis network analysis software.
- To detect added or removed modules on the basic device, restart the basic device and the GridVis software. Note in this regard Sect. 9.4 on p. 33.

INFORMATION

The designation of the measurement groups "1st module" etc. is a default setting that you can adapt to the specific function in the GridVis PC software.

Menu (Example for UMG 801 in physical mode)



- Power factor
  - Basic device 1-4
  - Basic device 5-8
  - **1. Module 1-4**
  - **1. Module 5-8**
  - **1. Module 9-12**
  - **2. Module 1-4**
  - **...**
  - **2. Module 9-12**
  - **8. Module 1-4**
  - **...**
  - **8. Module 9-12**

- **Energy**
  - Active energy
    - Basic device 1-4
    - Basic device 5-8
    - **1. Module 1-4**
    - **1. Module 5-8**
    - **1. Module 9-12**
    - **2. Module 1-4**
    - **...**
    - **2. Module 9-12**
    - **8. Module 1-4**
    - **...**
    - **8. Module 9-12**
  - Reactive energy
    - Basic device 1-4
    - Basic device 5-8
    - **1. Module 1-4**
    - **1. Module 5-8**
    - **1. Module 9-12**
    - **2. Module 1-4**
    - **...**
    - **2. Module 9-12**
    - **8. Module 1-4**
    - **...**
    - **8. Module 9-12**
  - Apparent energy
    - Basic device 1-4
    - Basic device 5-8
    - **1. Module 1-4**
    - **1. Module 5-8**
    - **1. Module 9-12**
    - **2. Module 1-4**
    - **...**
    - **2. Module 9-12**
    - **8. Module 1-4**
    - **...**
    - **8. Module 9-12**

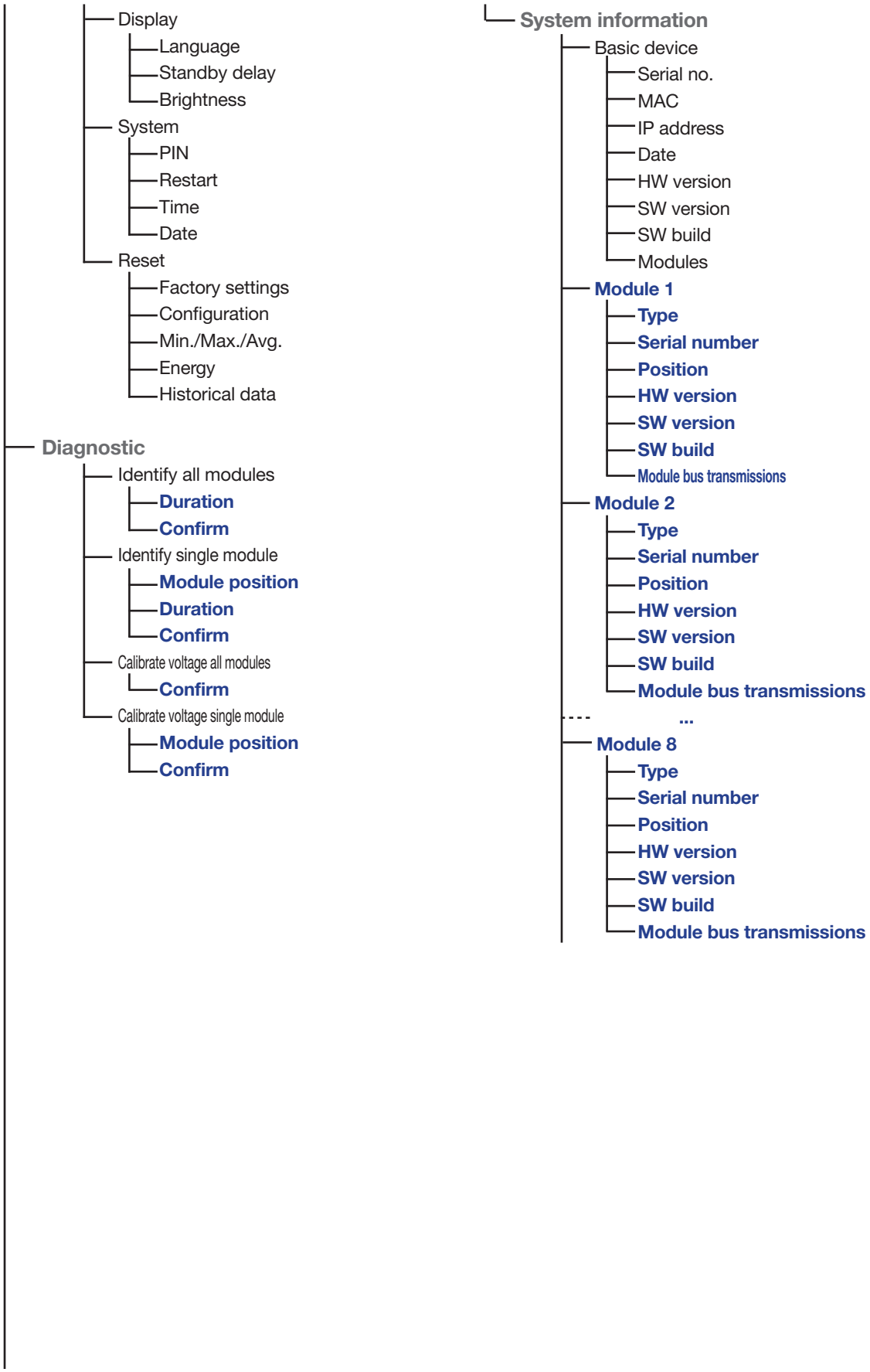
- **Drag pointer**
  - Basic device 1-4
  - Basic device 5-8

- **Voltage detection**
  - **1. Module 1-4**
  - **1. Module 5-8**
  - **1. Module 9-12**
  - **2. Module 1-4**
  - **...**
  - **2. Module 9-12**
  - **8. Module 1-4**
  - **...**
  - **8. Module 9-12**

- **Multifunction channels**
  - Current measurement
  - Temperature
  - RCM overview
  - RCM bar graphs
  - Linewriter RCM

- **Digital I/O status**
  - Basic device
  - Digital I/O status, modules

- **Configuration**
  - Ethernet config. A (Ethernet config. A)
    - IP configuration
    - IP address
    - Netmask
    - Gateway
  - Ethernet config. B
    - IP configuration
    - IP address
    - Netmask
    - Gateway
  - Fieldbus
    - Device address
    - Baud rate
    - Data frame
  - Current transformer
    - Current transformer basic device prim./sec.
  - Voltage transformer
    - Voltage transformer 1..4
  - Temperature
    - Sensor type
    - Unit
    - Temperature offset


Display
Language
Standby delay
Brightness
System
PIN
Restart
Time
Date
Reset
Factory settings
Configuration
Min./Max./Avg.
Energy
Historical data
Diagnostic
Identify all modules
Duration
Confirm
Identify single module
Module position
Duration
Confirm
Calibrate voltage all modules
Confirm
Calibrate voltage single module
Module position
Confirm
System information
Basic device
Serial no.
MAC
IP address
Date
HW version
SW version
SW build
Modules
Module 1
Type
Serial number
Position
HW version
SW version
SW build
Module bus transmissions
Module 2
Type
Serial number
Position
HW version
SW version
SW build
Module bus transmissions
...
Module 8
Type
Serial number
Position
HW version
SW version
SW build
Module bus transmissions

10.3 Module-relevant menu items of the UMG 800 basic device with 8 modules of the type 800-CT12-SVD-US

The following menu example shows the JanBus communication between a UMG 800 basic device and the maximum expansion level with 8 current measuring modules via the 800-CON RJ45 module and an RJ45 cable.

Menu **(Example for UMG 800 in Virtual Meter mode)**

- **Home (start screen of the basic device, 1st measuring display)**
- **Virtual meter**
  - Measurement group 1
  - Measurement group 2
  - Measurement group 3
  - ...
- **Phasor diagram**
  - Basic device 1-4
  - Basic device 5-8
  - **1. Module 1-4**
  - **1. Module 5-8**
  - **1. Module 9-12**
  - **2. Module 1-4**
  - ...
  - **2. Module 9-12**
  - **8. Module 1-4**
  - ...
  - **8. Module 9-12**
- **Voltage**
  - LN
  - LL
  - THD U
- **Current**
  - Current
    - Basic device 1-4
    - Basic device 5-8
    - **1. Module 1-4**
    - **1. Module 5-8**
    - **1. Module 9-12**
    - ...

Continue as in the physical mode.

11. Module-relevant configurations

The configuration options depend on which basic device you are using and which mode the basic device is in.

· **UMG 801**:
  - Physical mode (physical measurement groups)
  - Virtual Meter mode (in preparation)

· **UMG 800**:
  - Virtual Meter mode

INFORMATION

Note the difference between "Virtual Meter" and "Virtual Measurement Groups":
· With the "Virtual Meter" function, measured values from real measurement points can be summarized virtually. This enables greater flexibility, for example, 3-channel measurement (L1, L2, L3) with the 800-CT12-SVD-US module instead of the standard 4-channel measurement, or the assignment of the channels to different modules.
· In contrast, "virtual measurement groups" are a further development of the virtual devices in GridVis.

11.1 Configuring the voltage threshold

The voltage threshold value (tolerance) is dynamically applied to the voltage measured on the basic device (effective value of the respective phase).

If the detected voltage is outside this tolerance, the measurement device indicates this in the Health Check and on the display in the *Voltage Detection* menu as a deviation for this measurement channel.

Example:

Measured on the basic device	230.00 V
Voltage threshold	20%
Acceptable	184 ... 276 V
Outside this range: "Mismatch", LED on the measurement channel lights up green.	

You can configure the voltage threshold value using the device homepage or the GridVis PC software, but not on the basic device or remote display.

The threshold value for the **Phase position** is not configurable and is fixed at 10°.

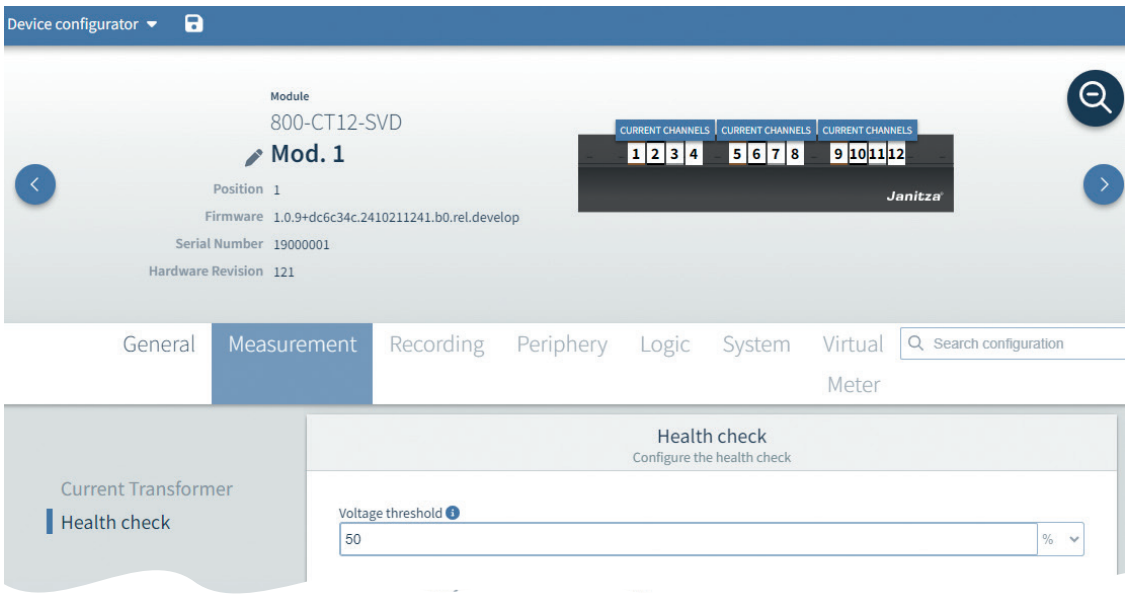


Fig. Configuration of the voltage threshold value in the GridVis PC software.

11.2 Inverting measurement groups with Virtual Meter

For certain applications, it can be useful to invert measurement groups and their channels, as the following application example shows. The "Inversion" can be configured in the *Virtual Meter* section on the device homepage or in the GridVis software. The example shows the *Three wire (measurement groups of 3)* mode.

ATTENTION

Material damage due to configuration errors!
Incorrect assignment of virtual or inverted channels can result in incorrectly assigned measured values, which can lead to misinterpretations.
· **Check the assignment of the channels carefully.**

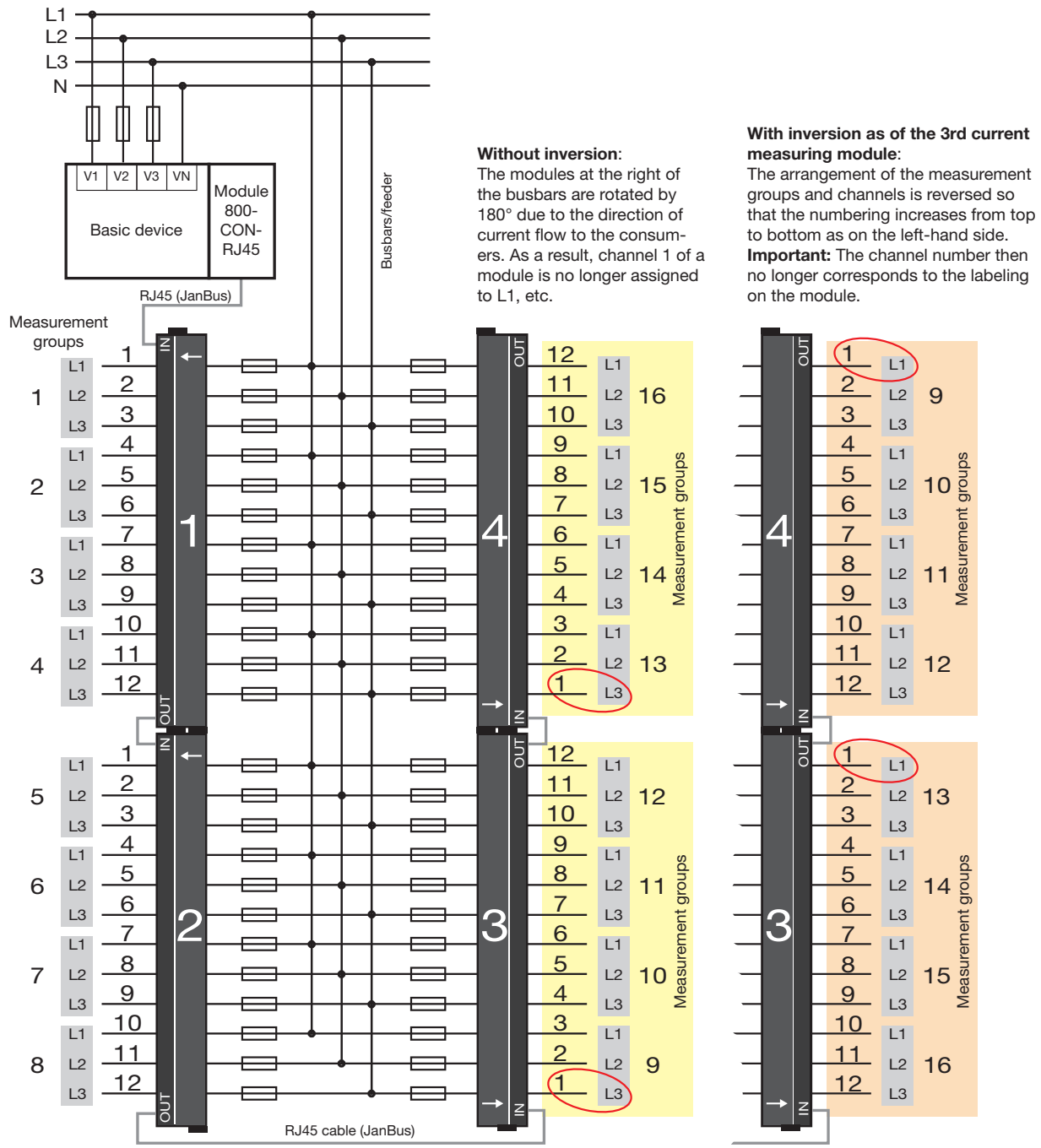


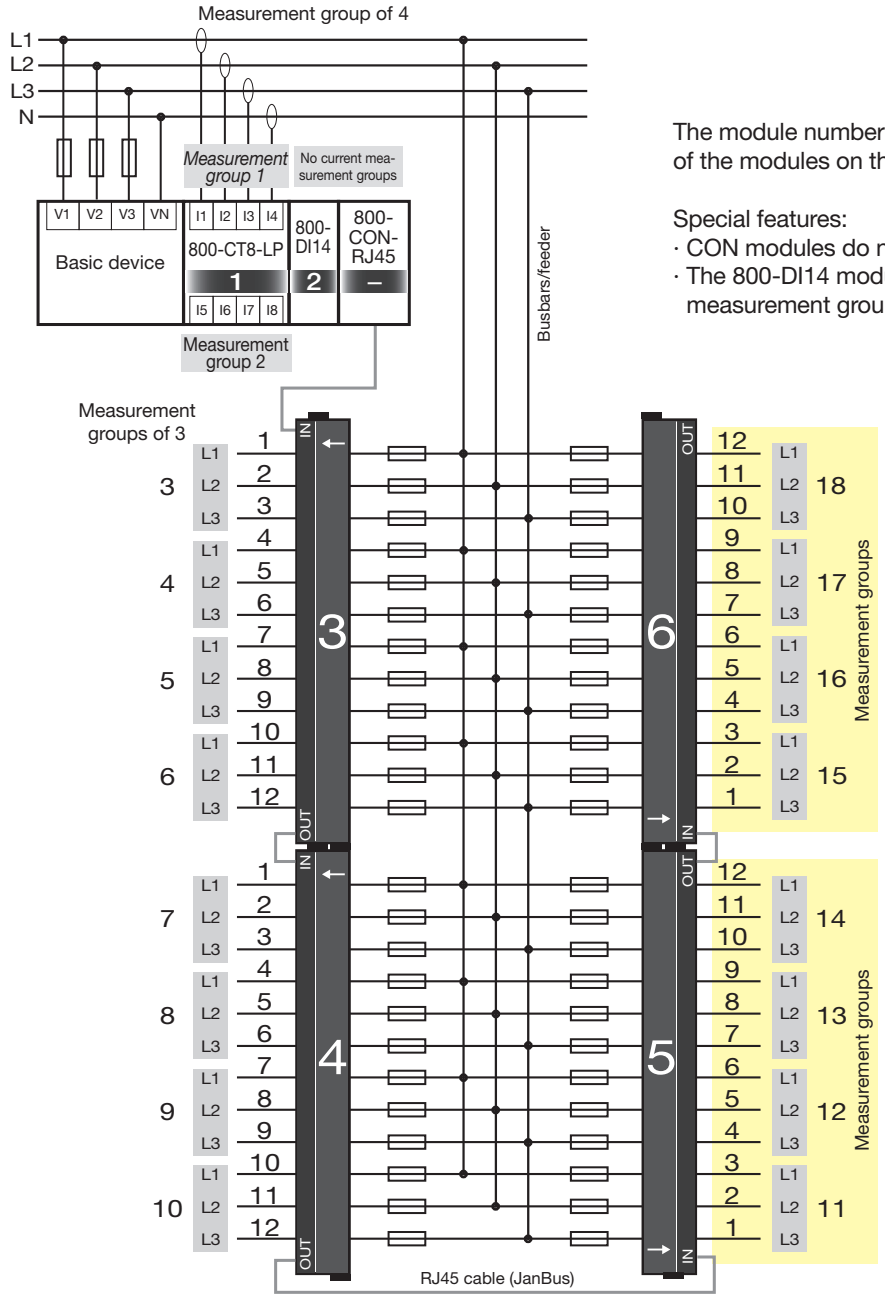
Fig. Schematic representation of a measurement device and module topology in three-wire (measurement groups of 3) mode: The module number results from the actual sequence of the modules on the JanBus and does not change with inversion.

11.3 Module combination with mixed measurement groups of 3/4

Measurement groups and channels **cannot** be inverted if both 3-wire and 4-wire measurement are to be realized with one basic device. In GridVis or on the device homepage, select the customer-specific configuration *(Custom Config)* for such configurations. In this case, the virtual measurement groups and channels must be assigned individually and manually.

ATTENTION

Material damage due to configuration errors!
Incorrect assignment of virtual or inverted channels can result in incorrectly assigned measured values, which can lead to misinterpretations.
· **Check the assignment of the channels carefully.**



The module number results from the actual sequence of the modules on the JanBus.

Special features:
· CON modules do not have a module number.
· The 800-DI14 module has a module number, but no measurement groups.

The 800-CT8-LP module is used to monitor the 4-phase feeder. In contrast, the current measuring modules only monitor the individual consumers on 3 phases. Inversion is not possible when mixing measurement groups of 3 and 4! The measurement channels must therefore be assigned to the phases manually.

Fig. Schematic diagram of a measurement device and module topology with measurement groups of 3 and 4

11.4 Configuration via the device homepage of the basic device

Not only can you read out measured values, you can also configure the current measuring module (e.g. Virtual Meter or nominal current) via the device homepage of the basic device.

To access the homepage, enter the IP address of the measurement device in the address line of a browser.

INFORMATION

A description of the device homepage can be found in the basic device user manual.

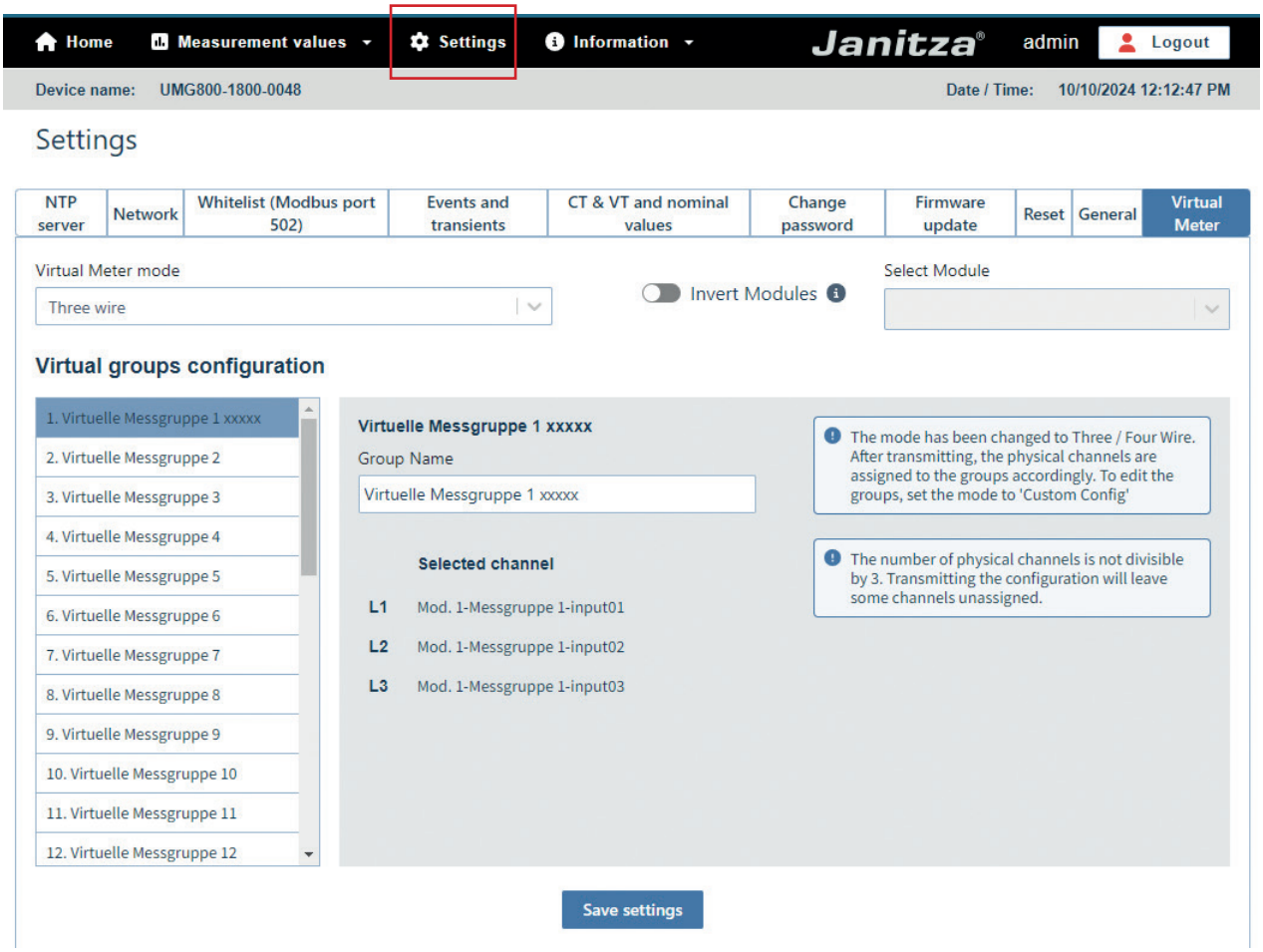


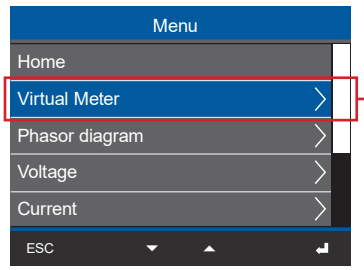
Fig. Configuration of the Virtual Meter on the device homepage of the basic device.

12. Module-relevant measuring displays of the basic device with 3 modules of the type 800-CT12-SVD-US

INFORMATION

- **The following measured value and device displays of the basic device refer to the measurement device and module topology described in Sect. 10.2 on p. 40.**
- The displays may vary depending on the type of basic device and the measuring environment!
- You can change the names of the basic device, the modules or the measurement groups shown in the measurement device display using the device configuration of the GridVis software.
- The measurement device display shows the measurement group names with the respective position number of the module.
- Depending on the text length, measurement group names appear as scrolling text in the title line of the measurement device display.
- Further measured value and device displays can be found in the usage information for the basic device.

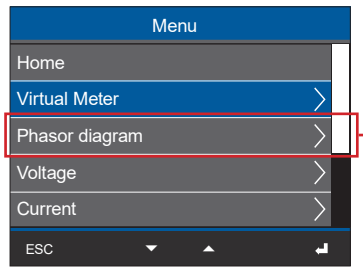
Virtual Meter menu

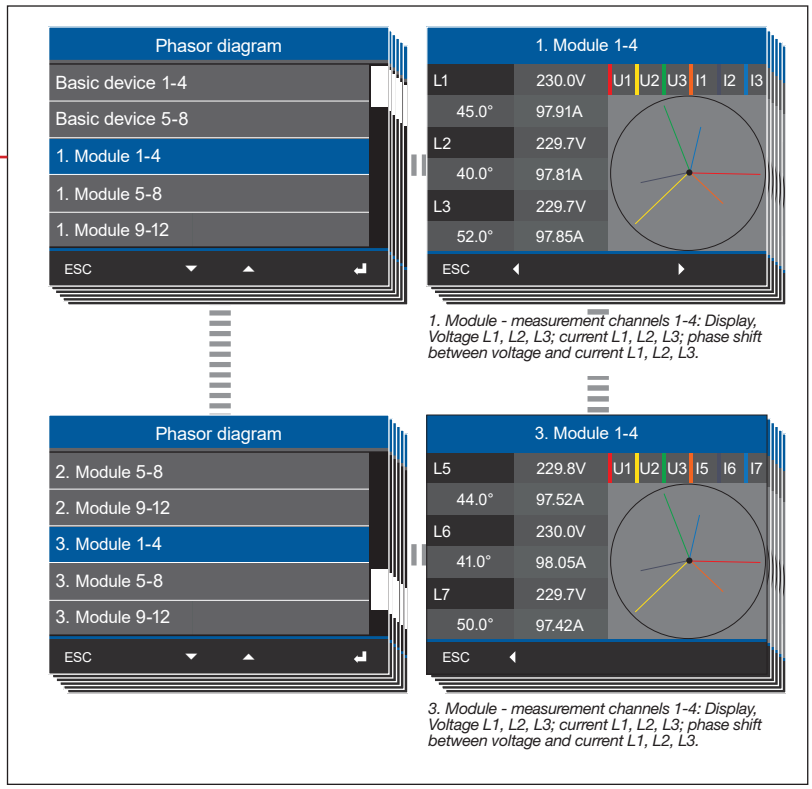


INFORMATION

The menu is only relevant for Virtual Meter mode (the menu is empty in physical mode). A description of the Virtual Meter and the menu can be found in the user manual for the basic device.

Phasor diagram menu

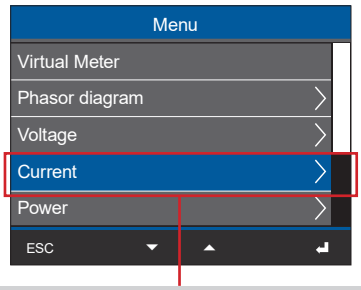




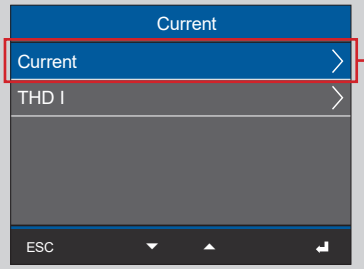
1. Module - measurement channels 1-4: Display, Voltage L1, L2, L3; current L1, L2, L3; phase shift between voltage and current L1, L2, L3.

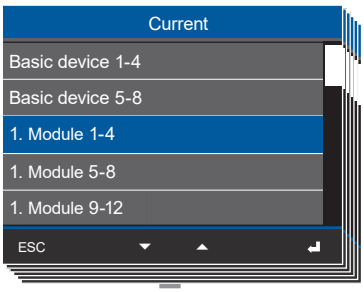
3. Module - measurement channels 1-4: Display, Voltage L1, L2, L3; current L1, L2, L3; phase shift between voltage and current L1, L2, L3.

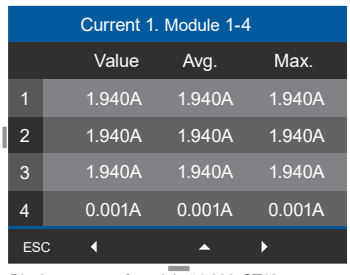
Current menu



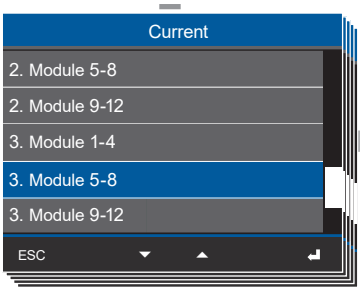
Current submenu

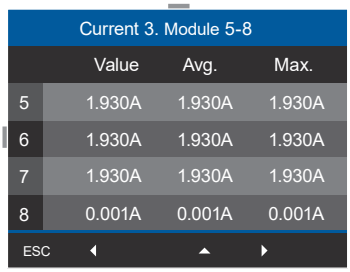






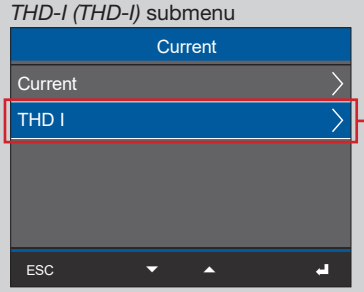
Display current of module #1 800-CT12, measurement channels 1-4 with average and maximum values.

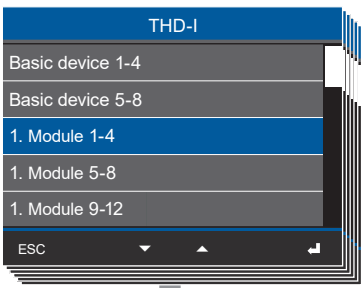


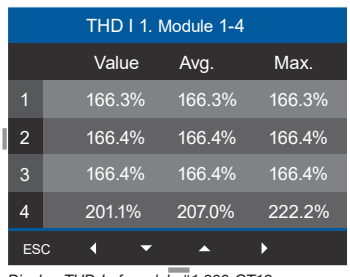


Display current of module #3 800-CT12, measurement channels 5-8 with average and maximum values.

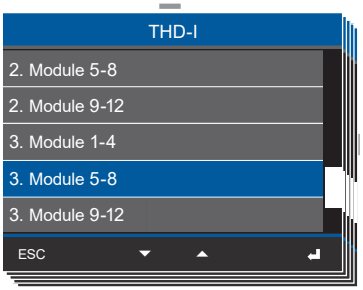
THD-I (THD-I) submenu

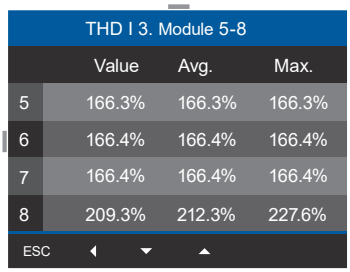






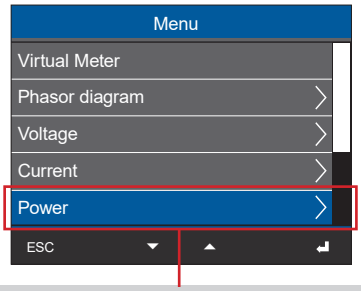
Display, THD-I of module #1 800-CT12, measurement channels 1-4 - (Total Harmonic Distortion of the current in %) with average and maximum values.





Display, THD-I of module #3 800-CT12, measurement channels 5-8 - (Total Harmonic Distortion of the current in %) with average and maximum values.

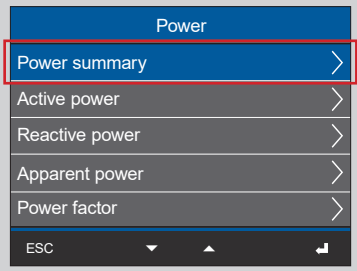
Power menu

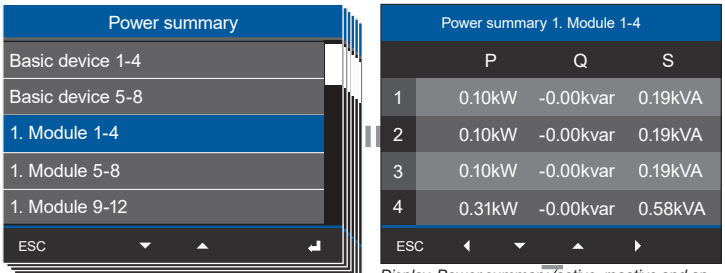


INFORMATION

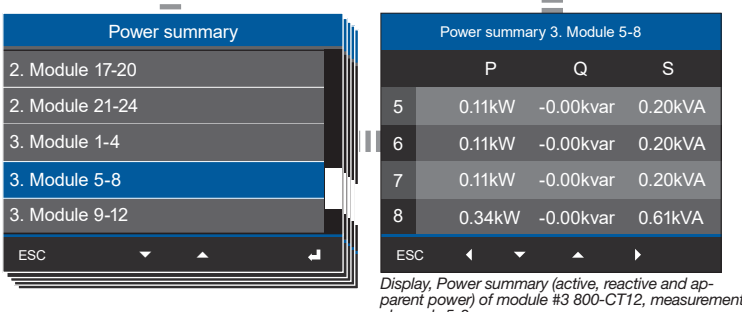
The **measured voltage values of the basic device** are used for power and energy measurement (not the voltage detection of the module), as well as the currents measured on the module.

Power summary submenu



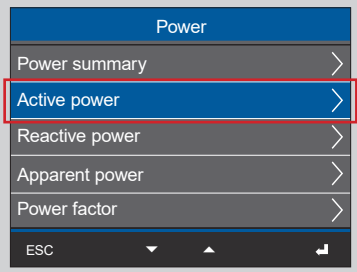


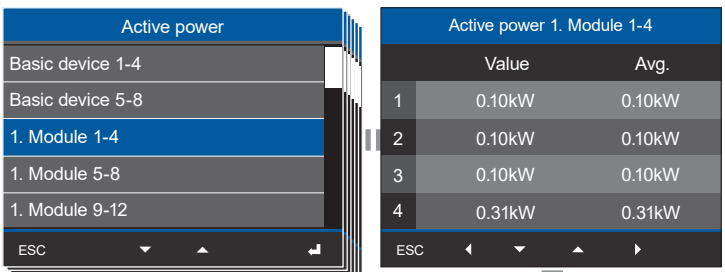
Display, Power summary (active, reactive and apparent power) of module #1 800-CT12, measurement channels 1-4.



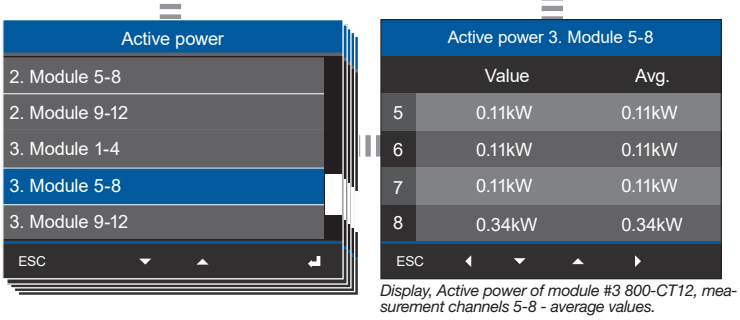
Display, Power summary (active, reactive and apparent power) of module #3 800-CT12, measurement channels 5-8.

Active power submenu



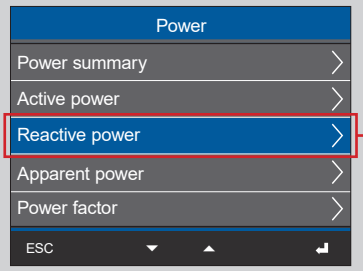


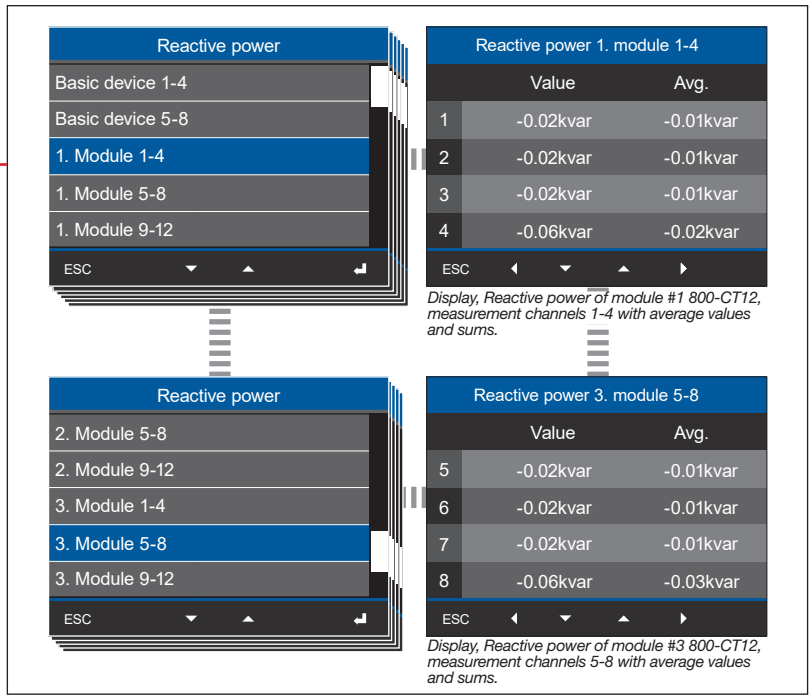
Display, Active power of module #1 800-CT12, measurement channels 1-4 - average values.



Display, Active power of module #3 800-CT12, measurement channels 5-8 - average values.

Reactive power submenu

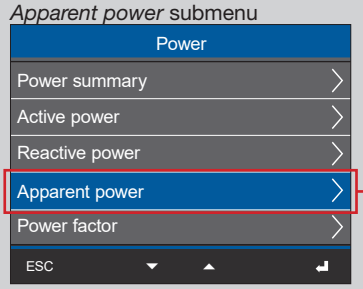


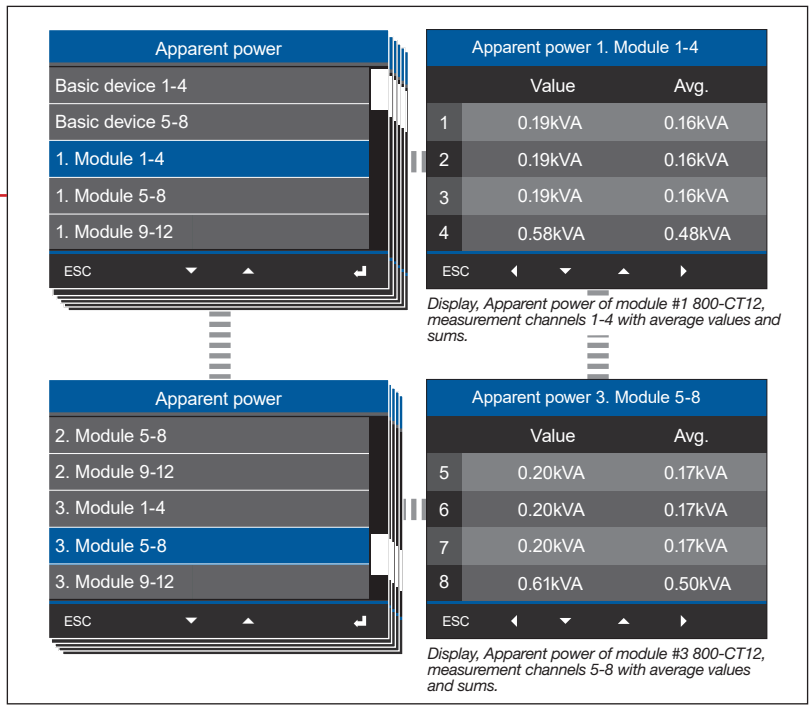


Display, Reactive power of module #1 800-CT12, measurement channels 1-4 with average values and sums.

Display, Reactive power of module #3 800-CT12, measurement channels 5-8 with average values and sums.

Apparent power submenu

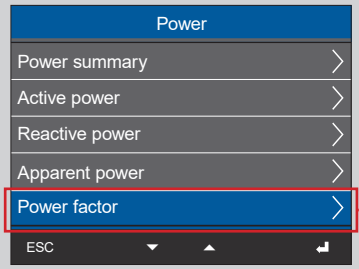


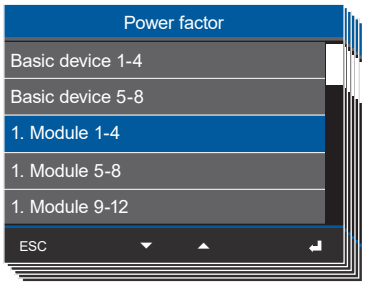


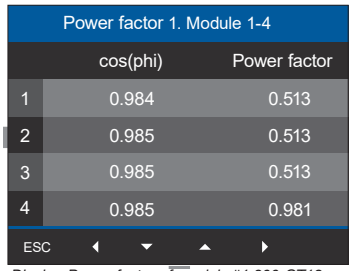
Display, Apparent power of module #1 800-CT12, measurement channels 1-4 with average values and sums.

Display, Apparent power of module #3 800-CT12, measurement channels 5-8 with average values and sums.

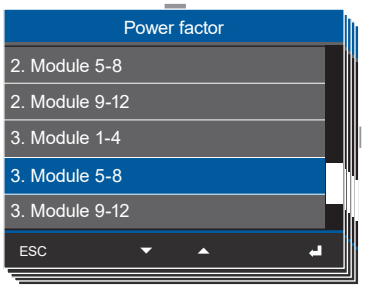
Power factor submenu

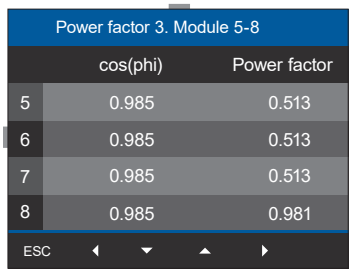






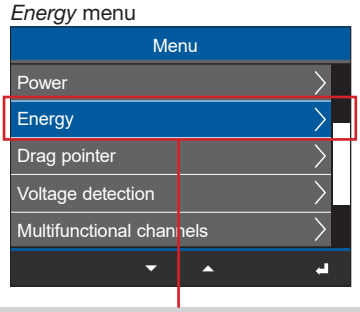
Display, Power factor of module #1 800-CT12, measurement channels 1-4 with cos(phi) and sums.



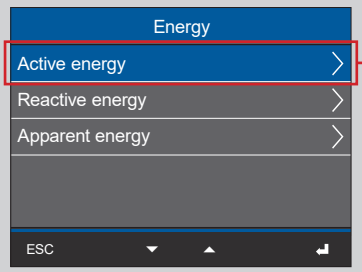


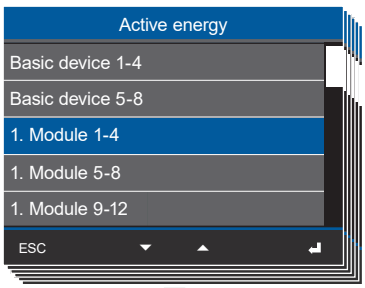
Display, Power factor of module #3 800-CT12, measurement channels 5-8 with cos(phi) and sums.

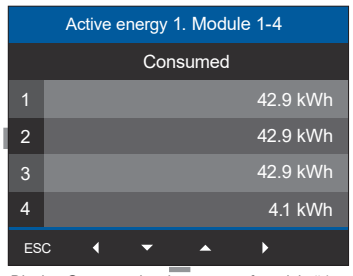
Energy menu



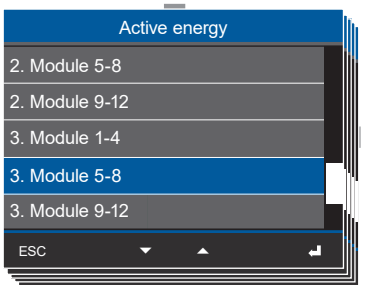
Active energy submenu

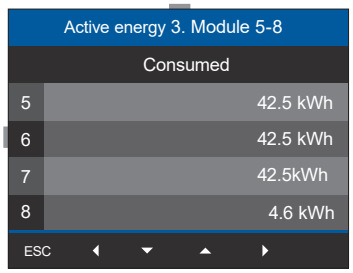






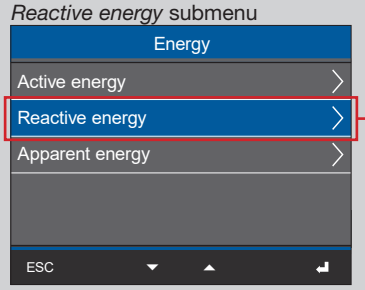
Display, Consumed active energy of module #1 800-CT12, measurement channels 1-4.

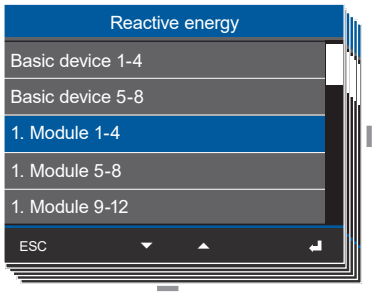


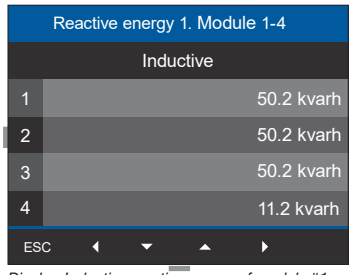


Display, Consumed active energy of module #3 800-CT12, measurement channels 5-8.

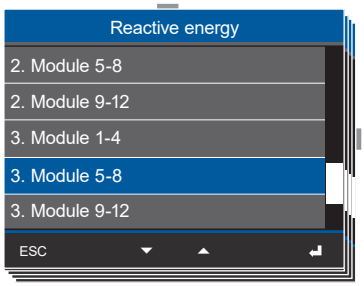
Reactive energy submenu

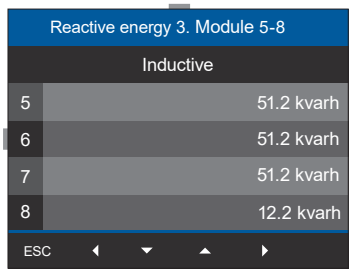






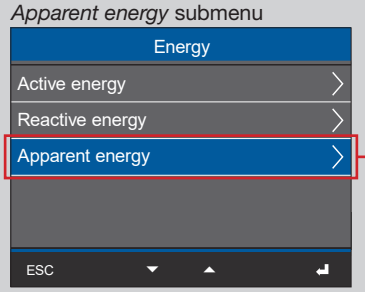
Display, Inductive reactive energy of module #1 800-CT12, measurement channels 1-4.

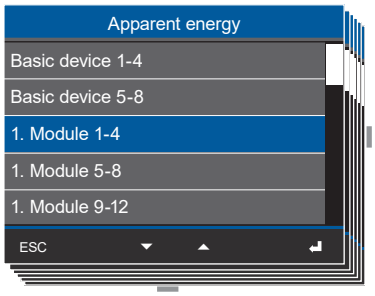


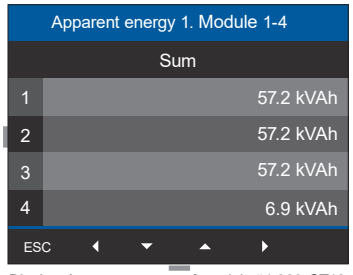


Display, Inductive reactive energy of module #3 800-CT12, measurement channels 5-8.

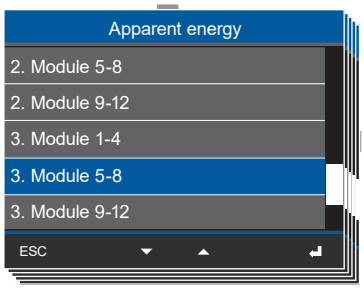
Apparent energy submenu

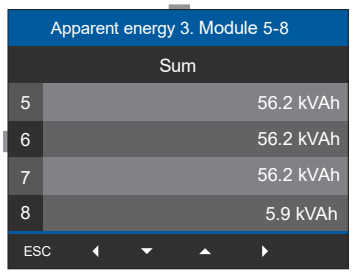






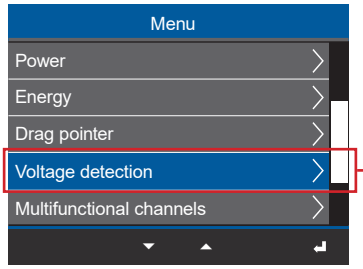
Display, Apparent energy of module #1 800-CT12, measurement channels 1-4.

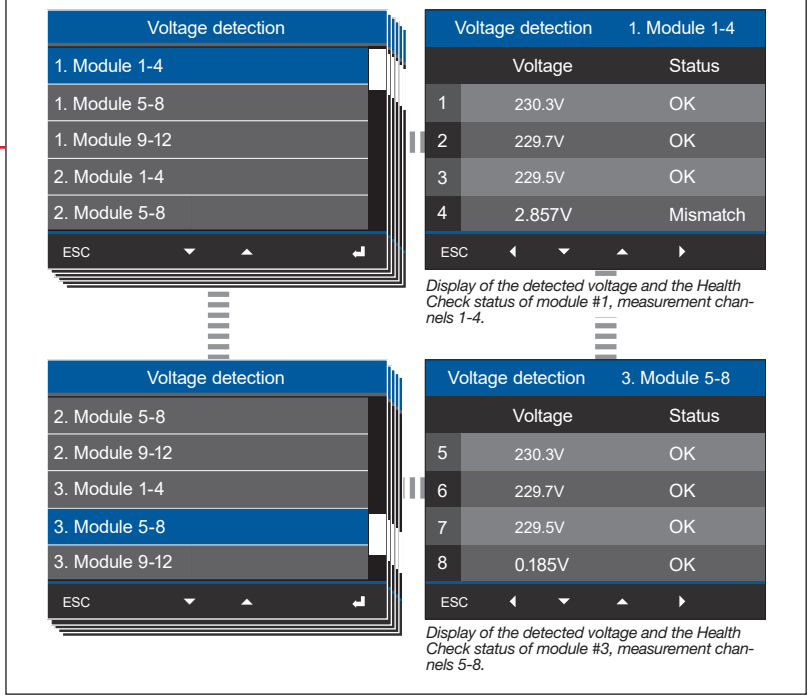




Display, Apparent energy of module #3 800-CT12, measurement channels 5-8.

Voltage detection menu

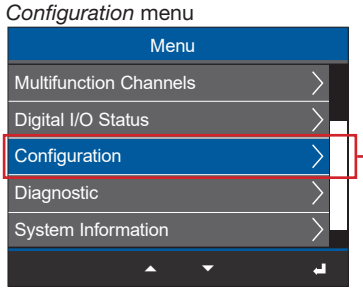




Display of the detected voltage and the Health Check status of module #1, measurement channels 1-4.

Display of the detected voltage and the Health Check status of module #3, measurement channels 5-8.

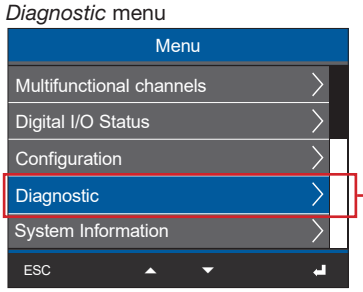
Configuration menu



INFORMATION

The descriptions for the "Configuration" menu can be found in Sect. 11 on p. 45.

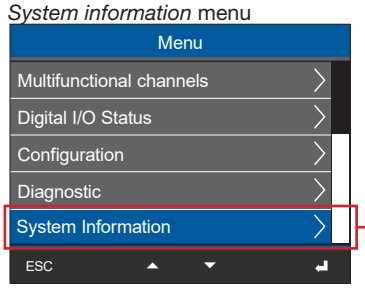
Diagnostic menu



INFORMATION

Descriptions of the "Diagnostic" menu can be found in Sect. 9.4 on p. 33 and Sect. 9.9 on p. 38.

System information menu



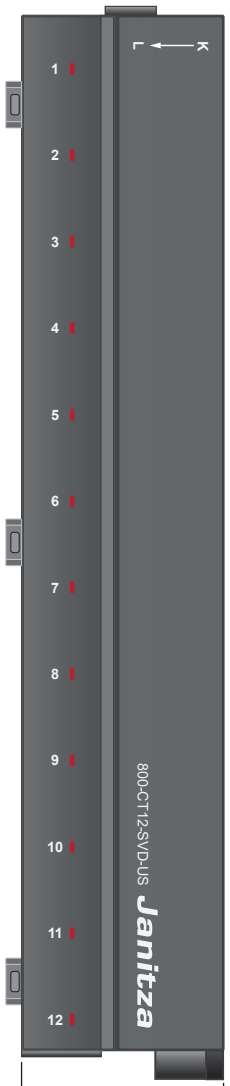
INFORMATION

The descriptions of the "System Information" menu can be found in the Sect. 9.3 on p. 32.

13. Views

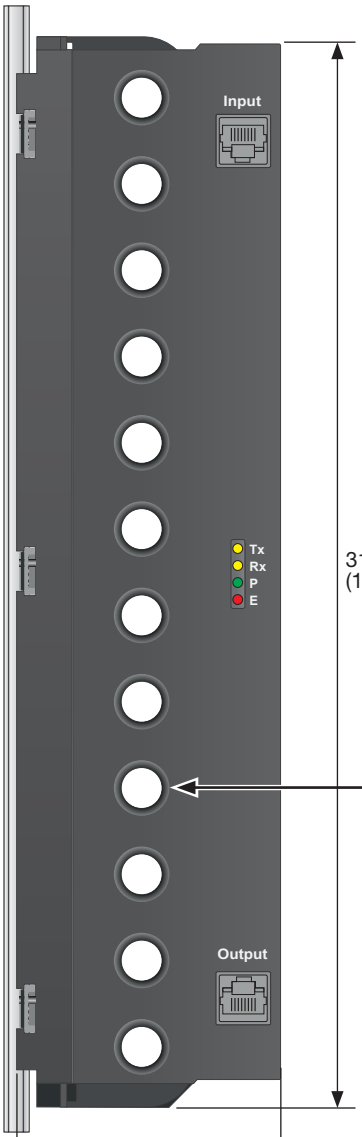
· The figures are for illustration purposes only and are not to scale.
· Dimensions in mm (in).

Top view



60 mm (2.365 in)

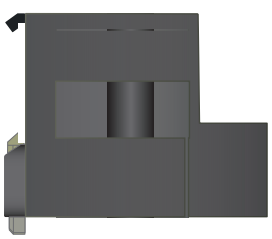
Side view



316 mm
(12.4 in)

77 mm (3.04 in)

12 measurement channels (cable bushings) with built-in current transformers and voltage detection



14. Technical specifications

14.1 Technical data

General	
Net weight approx.	880 g (1.94 lbs)
Dimensions	W = 316 mm (12.45 in), H = 60 mm (2.37 in), D = 77 mm (3.04 in)
Grid dimension of the measurement channels (cable bushings)	25.4 mm / 1.0 in
Mounting orientation	As desired
Fastening/mounting - Suitable DIN rails (35 mm / 1.38 in)	TS 35/7.5 according to EN 60715 TS 35/10 TS 35/15 x 1.5
Protection against foreign matter and water	IP20 according to EN60529
Impact resistance	IK07 according to IEC 62262

Transport and storage The following specifications apply for devices transported and stored in the original packaging.	
Free fall	1 m (39.37 in)
Temperature	-25 °C (-13 °F) to +70 °C (158 °F)
Relative humidity	0 to 95% without condensation

Environmental conditions during operation	
The module · Must only be operated with suitable basic devices (see Sect. on p. 2). · Is for weather-protected and stationary use. · Fulfills the operating conditions according to IEC 61000-4-30, IEC 60721-3-3. · Has protection class II according to IEC 60536 (VDE 0106, part 1), a ground wire connection is not required!	
Working temperature	-10 °C (14 °F) .. +55 °C (131 °F)
Relative humidity	5 to 95% at 25 °C (77 °F), no condensation
Pollution degree	2
Ventilation	No forced ventilation required.

Current measurement	
Nominal current	100 A (120 A continuous overload)
Channels	12 (3x4): · 3 systems - L1, L2, L3, N or 12 individual channels [1)] · Virtual meter for configuration as needed, e.g. L1, L2, L3
Measuring range	1 ... 120 A (eff)
Crest factor	1.5 (relative to nominal current)
Overload for 1 s	500 A (sinusoidal)
Resolution	0.1 A
Sampling frequency	6.8 kHz
Overvoltage category	300 V CAT III
Rated surge voltage	4 kV
Harmonics	1 .. 15 (odd only)

1) Physical measurement groups are only possible with a UMG 801 as the basic device. The UMG 800 always uses Virtual Meter with predefined or freely definable measurement groups.

Voltage detection	
3-phase-4-conductor systems with rated voltages up to	277 V_{LN} / 480 V_{LL} (±10%) according to IEC/UL
Overvoltage category (up to 2000 m)	300 V CAT III according to IEC/UL
Rated surge voltage	4 kV
Measuring range L-PE	0 .. 300 Vrms
Sampling frequency	6.8 kHz

Cable bushing					
Line type		Single-core, insulated cable (basic insulation according to UL/CSA 61010)			
Outer diameter		Up to 11 mm			
Wire size		Load capacity in A at a permissible continuous temperature of 75°C (167°F) on the conductor depending on the Ambient temperature			
AWG	mm²	≤ 30°C / 86°F	≤ 35°C / 95°F	≤ 45°C / 113°F	≤ 55°C / 131°F
14	2.07	30	28	25	20
12	3.29	35	33	29	23
10	5.26	50	47	41	34
8	8.38	70	66	57	47
6	13.32	95	89	78	64
4	21.09	100	100	100	84
2	33.63				100

Interface and energy supply	
RJ45 interface (In/Out)	JanBus (proprietary) via RJ45 patch cable.
JanBus (proprietary) - Max. bus lengths/cable lengths of the RJ45 cables (use shielded RJ45 cables as of 30 m)	Cat 7/7a = 100 m (109.36 yd) (AWG 22: Ø = 0.64 mm, cross-sectional area = 0.33 mm²)
	Cat 6/6a = 75 m (82.02 yd) (AWG 23: Ø = 0.57 mm, cross-sectional area = 0.26 mm²)
	Cat 5/5e = 60 m (65.62 yd) (AWG 24: Ø = 0.51 mm, cross-sectional area = 0.21 mm²)
Supply voltage	24 V via JanBus interface
Power consumption	max. 1 W

Module LEDs	
Tx (send data)	Blink "orange" during operation and indicate cyclic data exchange.
Rx (receive data)	
P (power – power supply)	Lights "green" if the supply of power via the JanBus interface is correct.
E (error – initialization and malfunction)	Lights "red" when initializing/starting the device and blinks in the event of a fault.

14.2 Performance characteristics of functions

All performance characteristics only apply in combination with UMG 801 or UMG 800 as basic device.

Voltage detection

Function	Symbol	Accuracy class	Measuring range
Voltage	U_{L-PE}	20% [1]	0 .. 300 V_{rms}

[1] Calibration of the measurement channels required, see section „9.9 Voltage calibration (calibration of the measurement channels)“.

Current measurement, module 800-CT12-SVD-US in combination with basic device

Function	Symbol	Accuracy class – 100 A nominal current
Total active power	P	0.5 (IEC61557-12)
Total reactive power	QA, Qv	1 (IEC61557-12)
Total apparent power	SA, Sv	0.5 (IEC61557-12)
Total active energy	Ea	0.5 (IEC61557-12) 0.5S (IEC62053-22)
Total reactive energy	ErA, ErV	1 (IEC61557-12)
Total apparent energy	EapA, EapV	0.5 (IEC61557-12)
Phase current	I	0.5 (IEC61557-12)
Power factor	PFA, PFV	1 (IEC61557-12)
Current harmonics	Ih	Cl. 1 (IEC61000-4-7)
THD of the current	THDI	1.0 (IEC61557-12)

INFORMATION

Detailed information on the functions and data of the basic device can be found in the usage information included with the basic device or available for download at www.janitza.com!

15. Dismounting

ATTENTION

Improper handling or handling them too roughly can destroy your devices, modules and components!
Contacts, bottom bolts and retaining brackets can be damaged or broken off during mounting or dismounting.
- **Never use force to mount or dismount devices, modules and components! Never tear devices, modules or components off of the DIN rail.**
- **When dismounting devices, modules and components, remove the wiring beforehand (e.g. cables, (LP) current transformers, etc.).**
- **Carefully unlock the bottom bolts and retaining brackets of the devices, modules and components with a screwdriver!**
- **Never touch or manipulate contacts! Protect the contacts during handling, transport and storage!**
- **Observe related usage information on the devices, modules and components!**

ATTENTION

Handling the module too roughly may cause damage to the module and result in material damage!
Measurement channels can be damaged when the monitored cables are pulled out. The bottom bolts can be damaged or broken off when dismounting the module.
- **First remove the RJ45 cables, then carefully remove the monitored cables.**
- **Finally, carefully release the bottom bolts with a screwdriver.**

1. Disconnect the supply of power to the system! Secure it against being switched on! Check to be sure it is de-energized! Ground and short circuit! Cover or block off adjacent live parts!
2. Disconnect the current measuring module from the JanBus topology by removing the RJ45 cables.
3. Carefully remove the monitored cables from the measurement channels.
4. Carefully release the 3 bottom bolts with a screwdriver.
5. Remove the module from the DIN rail.

INFORMATION

After dismounting the current measuring module, the GridVis software deactivates the corresponding module! Information on this and further procedures can be found in the online help for the GridVis software.

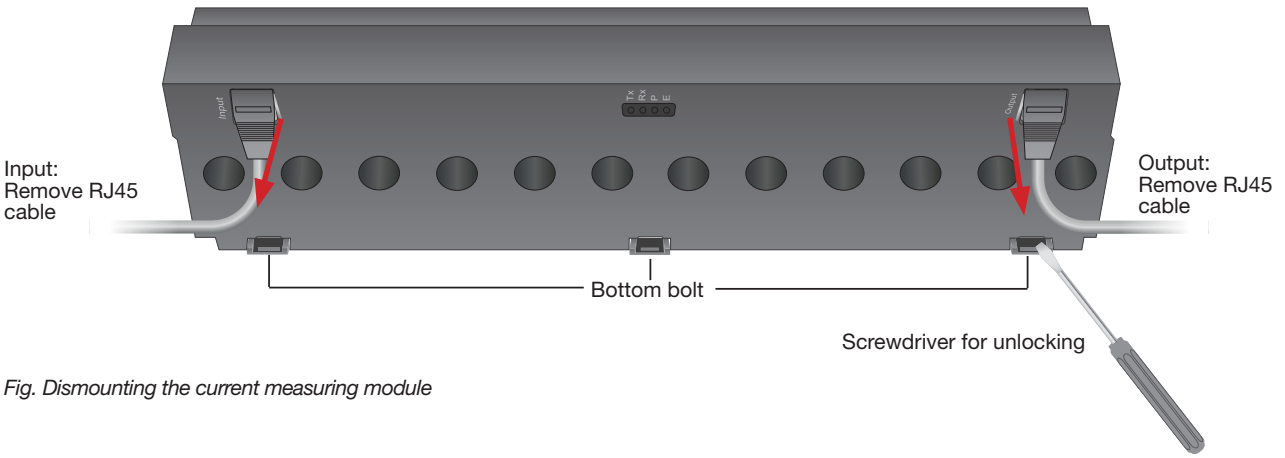


Fig. Dismounting the current measuring module

16. Module exchange/error cases

To replace a module, proceed as described in Sect. 15 on p. 60.

For the subsequent installation of the new module, see section „6. Mounting“ on p. 20.

16.1 Module replacement

A module must be exchanged, for example, to replace a defective module with an intact module in your meter and module topology.

- The assignment of the measurement groups depends on the position of the module in the JanBus.
- After replacing a module, the measurement groups are assigned to the new modules according to their actual arrangement in the JanBus. This is particularly important if the number of measurement groups of the replaced modules differs.
- The *Module swap* function in the GridVis software does not have to be used.

On the basic device, you can recognize a defective module of your measurement device and module topology in the "Configuration" display. The defective module is **missing** in the "Configuration" display.

To exchange a module, proceed as follows:

1. Proceed with a module exchange as described in Sect. 15 on p. 60 and Sect. 6 on p. 20.
2. Replace the module when it is switched off, e.g. a defective module with an intact one.
3. Supply your meter and module topology (your system) with voltage.

INFORMATION

The *Module swap* function in the GridVis software can be used to swap modules. This causes data records from replaced modules to be overwritten in the memory of the basic device!
A description of the module swap in the GridVis software can be found in the online help or the tutorials for the software.

16.2 Module - Error cases (blinking)

As already described in Sect. 9.4.3 on p. 35, the module has 4 LEDs.

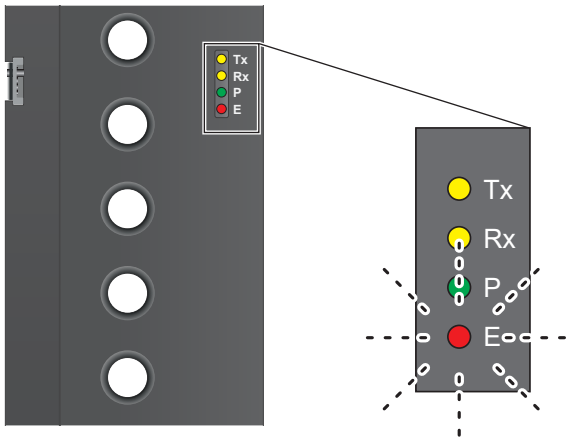


Fig.: LED status in the event of an error

In the event of an error, the red LED (E) of the relevant module blinks during operation at an interval of **0.5 s**.

After the definition of the error state there is a pause of **2 s** and the blink interval starts again from the beginning (repetition loop).

The number of blinks indicates the following error states:

Number of blinks	Error state
0	No error - normal operation.
1	Waiting for termination of the start pulse for the termination.
2	Waiting for response of the following module.
3	Waiting for start of addressing pulse
4	Waiting for the end of the addressing pulse.
5	Termination failed.
6	Reading the EEPROM failed.
7	Module is incompatible, module disabled in JanBus.
10	Application could not be started, module is still in the bootloader.

Tab.: Number of blinks / error status

16.3 Procedure in the event of a malfunction

ATTENTION

An error in the communication with the basic device leads to a device fault!
If communication from the basic device to the modules is lacking or faulty during operation, a warning signal will appear on the display of the basic device.
Prior to dismounting or disconnecting the modules of the basic device (the system)
- **Disconnect the supply of power! Secure it against being switched on! Check to be sure it is de-energized! Ground and short circuit! Cover or block off adjacent live parts!**
- **Prior to remounting, it may be necessary to restart the basic device.**
- **Also take note of the chapter "Procedure in the event of a malfunction" in the documentation of your basic device.**
- **If the measures indicated here are unsuccessful, please contact our support team (www.janitza.com)!**
- **If there is discernible damage, send the meter, module or component back to the manufacturer in compliance with proper transport conditions.**

Proceed as follows in the event of a module error:
1. Restart your measurement device and module topology (basic device: menu *Configuration* > *System* > *Reboot*).
2. Check the connections and the fit of the devices, modules and components of your meter and module topology while complying with the safety rules!

⚠ WARNING

Risk of injury due to electrical current and voltage!
Severe bodily injury or death can result! Therefore please abide by the following:
- **Do not touch bare, stripped wires or device inputs that are dangerous to touch on the devices, components and modules.**
- **Switch off your installation before commencing work! Secure it against being switched on! Check to be sure it is de-energized! Ground and short circuit! Cover or block off adjacent live parts!**

3. If these measures do not lead to the desired result, please contact Janitza Support **www.janitza.com**

16.4 Remedies for faults

Errors, unexpected behavior	Possible cause	Remedy
Red LED "E" on the module blinks	Error in the module or communication with the basic device	· **For the meaning of the blink patterns, see** Sect. 16.2 on p. 61.
Channel LED on the module lights up green. Or: Voltage is displayed for an unused measurement channel.	Voltage on the module does not match the basic device. The green channel LED can be an indicator that the configuration or wiring does not match.	· Check wiring and circuit breaker. · Check configuration: Is the correct phase of the basic device assigned to the measurement channel as a voltage reference? Unused measurement channels must not have a voltage reference. · Recalibrate the voltage of the measurement channel (see Sect. 9.9 on p. 38).
The basic device repeatedly or continuously reports an overcurrent, or does not report an overcurrent.	Nominal current is set incorrectly.	· Set the nominal current correctly so that the overcurrent detection can function **(see** Sect. 9.6 on p. 36).
Module communication does not work.	A JanBus cable was disconnected or reconnected during operation.	· Only disconnect or connect JanBus connections when switched off.
Power is displayed with the wrong sign (delivered instead of consumed power).	Current measuring module is installed the wrong way around so that the cables to be monitored are routed through the module the wrong way around.	· Change the mounting orientation (see Sect. 6 on p. 20). · Or: In the GridVis device configuration, select the current channels individually and change the current direction using the option *Change s1(k) and s2(l)*.

17. Service and maintenance

Your measurement device (module/component) goes through various safety tests and is marked with a seal before delivery. If a measurement device (module/component) is opened, the safety tests must be repeated. A warranty is only assumed for unopened measurement devices (modules/components).

17.1 Repair

Repairs can only be carried out by the manufacturer.

17.2 Service

If questions arise which are not described in this user manual contact the manufacturer.
To answer your questions, it is essential that you provide the following information:
· Device designation (see rating plate).
· Serial number (see rating plate).
· Hardware version (see system display).
· Software release (see system display).
· Measured voltage and supply voltage.
· Error description.

17.3 Device adjustment

Devices (components/modules) are adjusted by the manufacturer prior to outbound delivery. No readjustment is required when the environmental conditions are complied with.

17.4 Calibration interval

A recalibration is recommended after about 5 years. Contact the manufacturer or an accredited laboratory for calibration.

Calibrate the measurement channels yourself during commissioning and after modifications to the switchboard cabinet, see section „9.9 Voltage calibration (calibration of the measurement channels)“.

17.5 Firmware update

A firmware update of the basic device and the module works as follows:
1. Via the device homepage of the basic device (menu *Settings -> Firmware update* - see usage information for the basic device).
2. Via the firmware update wizard of the GridVis software:
   - Open the firmware update wizard in the GridVis software by clicking on *Upgrade devices* in the *Tools* menu.
   - Select a corresponding update file and carry out the update.

INFORMATION

This user manual describes the modules and provides information on the operation of the modules via the basic device.

In addition to this user manual, refer to the usage information for your basic device, such as:
· User manual
· Installation manual
· Safety information
· Data sheet
· Installation supplement

In addition, also note any special usage information for your application/project!

Furthermore, the **GridVis software** has an "online help" feature.

17.6 Reset to factory settings

You can reset to the factory settings via the basic device using the menu *Configuration* > *Reset*. A description of this can be found in the user manual for the basic device.

The various reset options affect not only the module, but also the basic device.

17.7 Information on saving measured values and configuration data

INFORMATION

The basic device stores the following measured values every 5 minutes at the latest:
· Min. / max. / average values
· Energy values (work values)
The basic device saves configuration data immediately!

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