COMTRAXX® CP700

Condition Monitor for the connection of Bender BMS devices and universal measuring devices to TCP/IP networks
Software version: V2.xx

CP700_D00005_03_M_XXEN/03.2019

Manual EN

Table of Contents

1. Making effective use of this document

1.1 How to use this manual

This operating manual will concern qualified experts in electrical engineering and communication technology!

To make it easier for you to understand and revisit certain sections of text and instructions in the manual, we have used symbols to identify important instructions and information. The meaning of these symbols is explained below:

 DANGER	*The signal word indicates that there is a **high** risk danger that **will** result in **electrocution** or **serious injury** if not avoided.*
 WARNING	*This signal word means that there is a **medium** risk of danger that can lead to **death** or **serious injury,** if not avoided.*
 CAUTION	*This signal word indicates a **low level risk** that can result in minor or **moderate injury** or **damage to property** if not avoided.*
	*This symbol denotes information intended to assist the user to make **optimum use of the product**.*

1.2 Quick start

Connection of the CP700
If you are familiar with the installation and connection of electrical devices as well as networking, particularly with Ethernet, you can start right away with the wiring diagram on "Connection of the device" on page 20.

Using the web user interface
You can easily access the CP700 using a standard web browser. For details refer to page 35.

Using the Modbus/TCP functions
Information about this complex field can be found as of page 121.

2. Safety instructions

2.1 Work activities on electrical installations

DANGER

Risk of fatal injury from electric shock

Any work on electrical installations which is not carried out properly can lead to death and injury!

► *Only skilled persons are permitted to carry out the work necessary to install, commission and run a device or system.*

- Compliance with applicable regulations governing work on electrical installations, and with the regulations derived from and associated with them, is mandatory. EN 50110 is of particular importance in this regard.
- If the device is being used in a location outside the Federal Republic of Germany, the applicable local standards and regulations must be complied with. European standard EN 50110 can be used as a guide.

2.2 Intended use

The Condition Monitor CP700 connects the following devices to Ethernet TCP/IP networks:

- Devices on the Bender internal serial BMS bus
- Bender universal measuring devices PEM… to Modbus/RTU or Modbus/TCP.

The CP700 converts alarms, measured values and statuses into Modbus/TCP protocols and HTTP. That allows connection to Modbus/TCP networks as well as visualisation and evaluation using standard web browsers with Silverlight™ plugin.

The CP700 has been designed, developed and produced for normal use in the industrial sector. The CP700 has not been designed for use bearing high risks and dangers, which can result in death, injury, serious physical harm or any other loss unless exceptionally high safety measures are ensured. In particular, its application for the monitoring of nuclear reactions in nuclear power stations, monitoring of flight control systems, for air traffic control, control of means of mass transport, medical life support systems, and weapon system control involve these risks.

CAUTION

The device is only suitable for use in the industrial sector. The emissions of the device may exceed the permissible limits for residential, business or commercial areas or small companies.

The CP700 is not intended for use on smartphones or tablet PCs.

2.3 Address setting and termination

In order to ensure proper functioning of the Condition Monitor CP700, correct address assignment and termination of the connected bus systems according to their specification is of utmost importance.

CAUTION

Assigning addresses that are already used by existing devices on the bus systems concerned may cause serious malfunctions.

► *Ensure correct address setting and termination of the CP700.*

2.4 Delivery conditions, guarantee, warranty and liability

The conditions of sale and delivery set out by Bender apply.
Conditions of sale and delivery can be obtained from Bender in printed or electronic format.

The five year guarantee "5forU" does not include parts subject to wear, such as the touch screen and the battery.

3. Product description

3.1 Scope of supply

You will receive:

- The CP700
- This operating manual as pdf file in the device memory, accessible via the web user interface under "Tools" > "Manual"
- A short operating instruction
- A pluggable screw clamp for the voltage supply
- Two RS-485 cables for the connection to the BMS bus and the Modbus/RTU, 2 m
- Two terminating resistors each for BMS bus and Modbus/RTU (bus termination set)
- Four mounting brackets for panel mounting

3.2 Device features

- Condition Monitor for Bender BMS devices and universal measuring devices
- 7“ TFT WVGA Colour Display
- Analogue resistive touch screen
- Small mounting depth
- Fanless operation
- Integrated gateway to Ethernet (TCP/IP), 10/100/1000 Mbit/s
- Remote access via LAN, WAN or Internet
- Support of devices connected to the internal bus via Modbus/RTU or Modbus/TCP
- Access to **all devices connected to the BMS bus** using the web server
- Can be operated on Modbus/RTU
- History memory for 1000 entries
- 12 data loggers, freely configurable with 1000 entries each

3.3 Possible applications

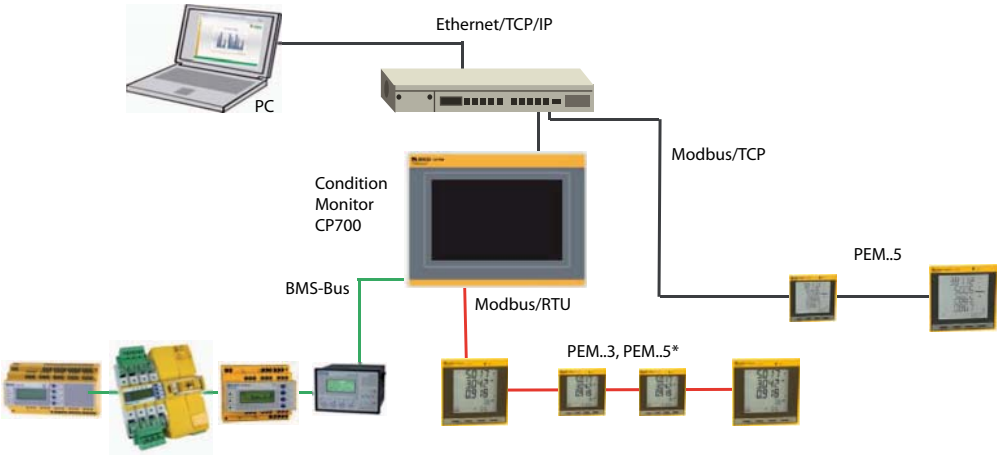
- Clearly presented information about the status of devices and systems via 7“ touch screen
- Specific system overview according to individual system description
- Display und visualisation of device and system statuses via web browser
- Selective e-mail notification to various user groups in the event of alarms
- Support of professional visualisation programs
- Observing and analysing of compatible Bender products (universal measuring devices, RCMS, Isometer, EDS systems)
- Parameter setting for devices, storing, documentation and restoring of parameters in a clear and practice-oriented manner
- Remote diagnosis, remote maintenance

3.4 Description of function

3.4.1 Interfaces

The CP700 communicates with the associated devices via three different interfaces:

- BMS bus (RS-485) for Bender systems such as EDS46x/49x, RCMS46x/49x and MEDICS. The CP700 can be operated as master or slave. With the CP700 in master mode, requests can be answered faster. The CP700 can only be operated on the internal BMS bus.
- Modbus/RTU (RS-485) CP700 in master mode for Bender universal measuring devices PEM..3 and also PEM..5 with reduced functionality (*).
- Modbus/TCP Ethernet) for Bender universal measuring devices PEM..5



The CP700 can usually be integrated into existing LAN structures, but can also be operated on a single PC via Ethernet/TCP/IP. The CP700 can also be used as master for Bender BMS devices and/or universal measuring devices without being connected to a PC.

3.4.2 Process image

Using the information from communication with the assigned devices, the CP700 creates and saves a process image. This process image contains all alarms, status information and measured values of the associated devices.
The CP700 combines the information of three different interfaces and makes it available for:

- indication on the integrated touch screen
- the operation of a PC via the web user interface
- the transmission to external visualisation programs or PLCs via Modbus/TCP.

The CP700 provides a uniform user interface for the devices associated via different interfaces (max. 247 devices). In order to be able to identify each individual device, one individual address is available for each device on this interface. BMS and Modbus/RTU devices receive the appropriate address for their interface. A virtual address is assigned to Modbus/TCP devices.

3.4.3 CP700-compatible devices

For an up-to-date list of the Bender BMS devices compatible with CP700 and the universal measuring devices PEM…. refer to:
http://www.bender-de.com/en/products/system-components/cp700-compatible-devices.html

3.4.4 Functions available via touch screen

- Display of current alarm messages including help texts
- Bus overview of the assigned devices. Indication of alarm and measured values. Indication of the interfaces of the devices in use. In case of universal measuring devices, also the indication of the harmonics in tabular form or as a chart. Waveform recorder and graphical representation of measuring values (bar graph, phasor diagram, power triangle).
- Interface settings with password protection
- Operating language, selectable

3.4.5 Functions available via the web user interface

The device utilises an integrated web server which can be used to display data in a convenient way on any PC by means of a web browser and Silverlight™ plug-in.
In addition, it provides a Modbus/TCP server which converts data of the associated devices for a Modbus client. Also, the CP700 contains an FTP server for file access. Functions available via the web user interface are:

- Bus overview of the associated devices (max. 247 devices).
  - Indication of alarm and measured values.
  - Indication of the interfaces of the devices in use.
  - In case of universal measuring devices, also the indication of the harmonics in tabular form or as a chart. Waveform recorder and graphical representation of measuring values (bar graph, phasor diagram, power triangle).
  - Parameter setting
  - Device failure monitoring
  - The "Backup/Report" function saves measured values and settings. Saved settings from previous configurations can be compared with the current settings made on the CP700. The saved settings can be reloaded into the CP700.
  - Assignment of individual texts for devices, measuring points (channels) and alarms.
  - E-mail notifications to different user groups according to a time controlled schedule in the event of alarms and system faults. The sender's e-mail address can be entered.
  - Display of virtual devices. A virtual "measuring point" is obtained by evaluating "real" measured values of devices connected to the CP700 logically or numerically.
- Manage Modbus devices
  - Adding/deleting devices to/from the bus overview.
  - Creating a template with selected measured values
- Visualisation
  - Fast and simple visualisation without any programming. Measured values or alarms can be displayed in front of a graphic (system diagram, room plan).
  - Displaying an overview page. Click to jump to another view. Return to the overview page.
- From an external application (e.g. visualisation software) commands can be sent to BMS devices. The "Modbus control commands" menu provides Modbus control commands for selected BMS commands. These commands can be copied to the clipboard of the PC and then included in the programming for external application.
- A graphical representation for the CP700 data logger and compatible Bender devices is available. The time axis can be varied to view different periods.

- System visualisation: Displaying several gateways (COM460IP, CP700) on one website. Displaying common alarms of the devices. Clicking on a device being displayed will open its web user interface.
- Displaying the CP700 operating manual

3.5 Software products used

- MIT license (http://opensource.org/licenses/mit-license.php)
  - jQuery-Scrollbar
  - jQuery Timer Plugin
  - jQuery NiceScroll Plugin
  - jsmn JSON parser (http://zserge.bitbucket.org/jsmn.html)
- FJCore and jqPlot under the MIT license (http://www.opensource.org/licenses/mit-license.php)
- AES256 implementation:
  - Copyright (c) 2007-2009 Ilya O. Levin, ?http://www.literatecode.com
  - Other contributors: Hal Finney(modified to AES128)
- Silk icons. This work is licensed under a Creative Commons Attribution 2.5 License.
  [http://creativecommons.org/licenses/by/2.5/]
- GPLv2 license (http://www.gnu.org/licenses/old-licenses/gpl-2.0.html):
  mongoose web server (https://code.google.com/p/mongoose/)
- GPL 3 (http://code.google.com/p/rootaufs/)
- (C) 2008 Kishore Nallan for DesignShack
  (http://www.kishorelive.com) kishore.nc@… (jquery Keyboard (modified))

4. Installation, connection and commissioning

If you are familiar with the configuration of computer networks, you can carry out the connection of the CP700 yourself. ***Otherwise please contact your EDP administrator!***

4.1 Preliminary considerations

1. Have all the questions as regards the installation been answered by the technician responsible for the installation?
2. Do you know the BMS address to be set?
   Can CP700 be operated as the master (BMS address 1)? If apart from the CP700, an alarm indicator and test combination MK800 is connected to the internal bus, the CP700 m**ust not** have address 1 (Master).
   You will find more detailed information on the BMS topic, in particular about the wiring of bus devices, in the separate document "BMS bus". You can download the document from the download area of the website www.bender.de.
3. Does the computer network comprise a DHCP server?
   Otherwise, the network data such as the IP address and netmask allocated by the person responsible for the electrical installation have to be set manually.
4. Ask for the IP address of the NTP server, which is required for automatic time setting.
5. Are suitable PC hardware and software available for commissioning?
   Minimum system requirements: 1.6-GHz prozessor/512 MB RAM/Windows XP/Vista/7/web browser with Microsoft Silverlight™ (version 5.0 or higher).
   System requirements (recommended): Dual-Core processor/1024 MB RAM/
   Windows XP/Vista/7/web browser with Microsoft Silverlight™ (version 5.0 and higher)

For initial connection, the basic configuration of the CP700 is to be undertaken outside the installation, depending on the specific situation.

4.2 Installing the device

4.2.1 Essential information on mounting

- Mounting is to be carried out with suitable equipment and tools according to the documentation.
- The device must only be installed by appropriately qualified personnel in de-energised state. Disconnect the switchboard cabinet from the power supply and protect the system against accidental switch-on.
- The general safety conditions as well as the prevailing national accident prevention regulations are adhered to. Electrical installation is to be carried out according to all applicable local laws (e.g. wire cross section, protection, PE connection).
- The climatic conditions must be complied with. The device is only permitted to be used in enclosed rooms. The device must not be exposed to direct sunlight.

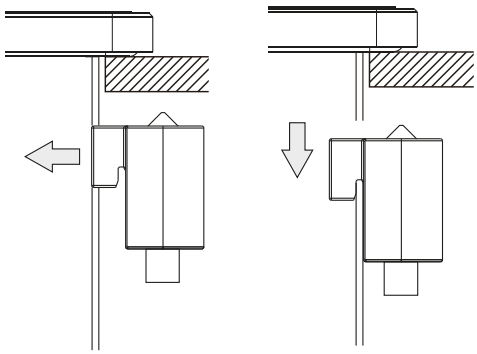
- The device must be installed on a flat surface. While tightening the screws, irregularities may damage the display.
- The ventilation holes must not be covered.
- When installing the device, the permissible mounting positions are to be observed.
- Take into consideration that the wall or the sheet metal of the switchboard cabinet can hold four times the total weight of the device.
- When connecting the cables it is essential to note the bending radius.
- The device should be positioned in such a way that it is visible for the user and that reflexions on the screen are avoided as far as possible.

4.2.2 Type of installation

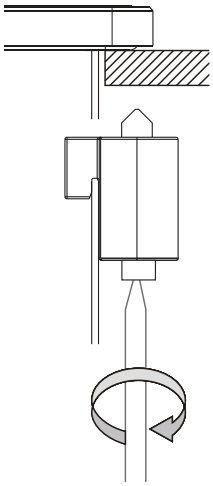
The CP700 is preferably installed into consoles and control panel doors using the mounting brackets supplied with the device. Strength of the material to be clamped: minimum 2 mm, maximum 6 mm.

4.2.3 Practice

1. Insert the device frontally into the prepared, plane and smooth installation cut-out. The dimensions for the installation cut-outs can be found on page 161.
2. Attach the mounting brackets to the CP700. For this purpose, insert all mounting brackets into the slots (marked with orange circles) at the CP700 and slide them down.

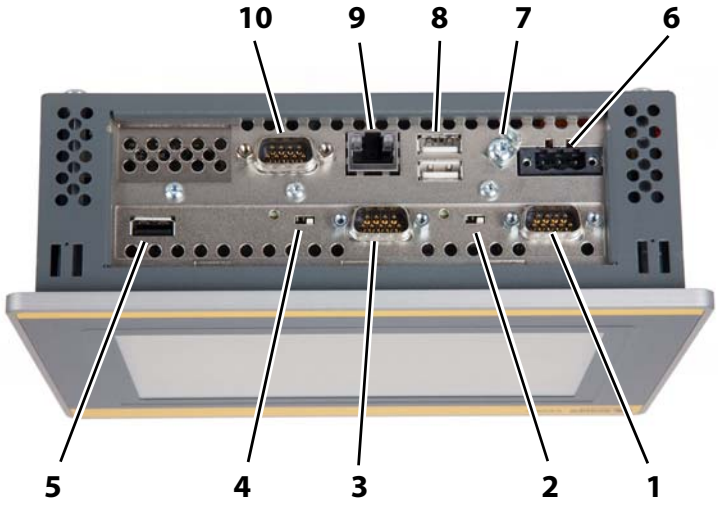


3. Fix the mounting brackets to the wall resp. to the sheet metal of the switchboard cabinet by tightening the screws using a large flat-tip screwdriver. A tightening torque of approx. 0.5 Nm is recommended.



4.3 Connection of the device

4.3.1 Overview of the bus device interfaces



	Key
1	Modbus/RTU interface. (cable included in the scope of delivery)
2	Switch for terminating resistor/bus bias voltage for Modbus/RTU interface.
3	BMS bus (Bender measuring device interface, cable included in the scope of delivery)
4	Switch for BMS bus termination/bus bias voltage.
5	USB interface, is not used
6	Connection to the supply voltage, "see chapter "DC 24 V power supply" on page 21
7	Functional earth, see chapter "Earthing" on page 21
8	USB interfaces, are not used
9	Ethernet 10/100/1000, RJ45 socket for connection to a personal computer or to the local network (hub, switch, router)
10	RS-232 interface, is not used

Details on the items 2 and 4:
"Terminating resistor/bus bias voltage" switch for Modbus/RTU interface:

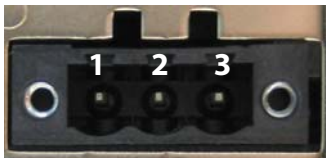
Communication mode	Switch position	Terminating resistor/ bus bias voltage	LED
MASTER	left	activated	on

"Terminating resistor/bus bias voltage" switch for BMS interface.

Communication mode	Switch position	Terminating resistor/ bus bias voltage	LED
MASTER	left	activated	on
Slave	right	deactivated	off

4.3.2 DC 24 V power supply

The 3-pole plug required for the connection of the power supply is included in the scope of delivery.



The pin assignment is shown in the following table or is printed on the enclosure. The supply voltage is internally protected by a permanently soldered fuse (10 A, fast-acting), so that in case of overload (replacement of the fuse required) or wrong connection of the supply voltage the device will not be damaged. If the fuse is damaged due to a fault, the device has to be returned to Bender for repair.

Pin	Description
1	+
2	Functional earth
3	-

Recommended power supply units:

Material number/Type	Manu-facturer	Description
0PS1025.2	B&R	DC 24 V power supply unit, 2.5 A, input AC 100…240 V, DIN rail mounting/wall mounting WxHxD: 72 x 90 x 61 mm
0PS1020.0	B&R	DC 24 V power supply unit, 2 A, input AC 100…240 V, DIN rail mounting WxHxD: 45 x 99 x 107 mm
1SVR427044R0200/ CP-D 24/2.5 EAN: 4016779661188	ABB	Power supply unit In: AC 100…240 V Out: DC 24 V/2.5 A, DIN rail mounting WxHxD: 71 x 91 x 57.5 mm

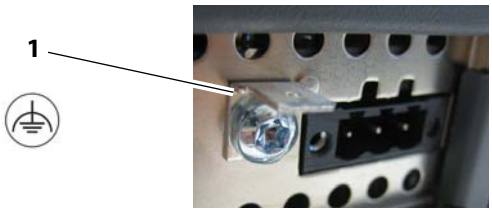
4.3.3 Earthing

CAUTION

Connect the functional earth (Pin 2) to the earth connection (e.g. switchboard cabinet) using a cable as short as possible. Use the largest possible conductor cross section that is permitted for the supply plug.

In addition, the earthing connection on the rear of the device has to be connected as follows.

An earthing connection (1) is located at the rear of the CP700 for connection to a central earthing point in the switchboard cabinet or the system where the device is to be installed. The largest possible wire cross section (minimum 2.5 mm²) should be used.



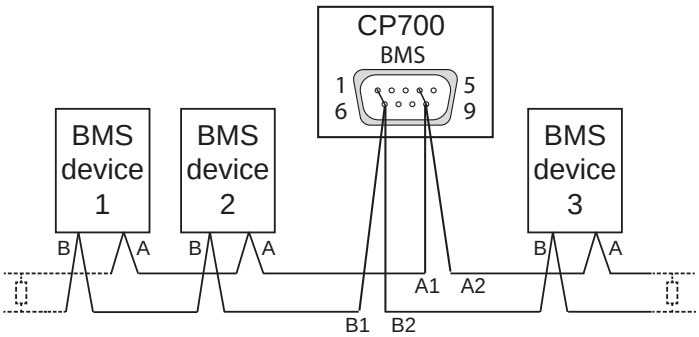
4.3.4 BMS bus, Modbus/RTU

Two connecting cables (RS-485 cable) are included in the scope of delivery. The double cable ends facilitate the connection of the device if it is arranged in the middle of the bus. Both cables have the same pin assignment.

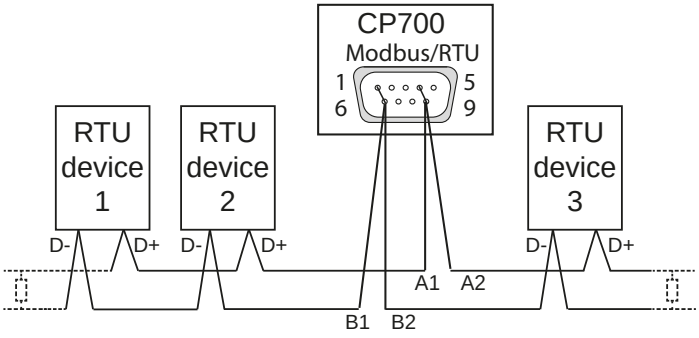
Plug connector	Loose cable ends	Core colour	Connection to the BMS bus	Connection to Modbus
Bridge 4--9	A1	white	A	D+
	A2	yellow		
Bridge 1--6	B1	brown	B	D-
	B2	green		
Not connected	shield	black	shield	shield

Wiring examples

BMS bus



Modbus/RTU



4.4 Commissioning

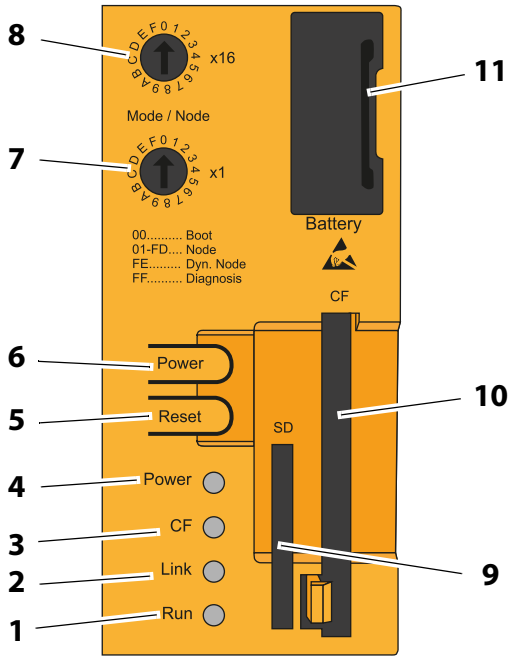
1. Switch the supply voltage on. - The "Settings" > "Interface" menu appears on the touch screen (for details and factory settings refer to page 29).
   Click on "Login" enter the settings.

2. Set the IP address.
   If the connected computer network contains a DHCP server, activate the "DHCP" button. An IP address is automatically assigned and displayed.

   If the computer network does not include a DHCP server, the IP address, network mask (SN) and standard gateway must be specified by the EDP administrator.
   An IP address has been permanently assigned to the device. Therefore, deactivate the "DHCP" button.
3. Set the BMS bus address for the CP700.
4. Set the baud rate and parity for the Modbus/RTU.
5. Set the display timeout. If no entry is made via the touchscreen of the CP700 for a predefined time (e.g. five minutes), the screen is blanked.
   The touch screen will be activated again when
   - a new alarm occurs
   - the number of alarms changes
   - the screen is touched
6. Deactivate the "Show at startup" button. The "Settings" > "Interface" menu will no longer be displayed during startup.
7. Confirm the changed settings with "OK". Tap on "Log out" when no more settings are to be changed (not logged in).

5. Display and operating elements

5.1 Operating elements at the rear of the device



	Key
1	LED "Run"
2	LED "Link"
3	LED "CF"
4	LED "Power".
5	"Reset" button, operation is not required. CP700 starts as soon as supply voltage is applied. When the "Reset" button is pressed, a hardware reset will be initiated. The device restarts (cold start). A system reset may result in data loss!
6	"Power" button", operation not required. CP700 starts as soon as supply voltage is applied. The function of the "Power" button is identical to that of a mains switch of current desktop personal computers: Pressing the button for a short timewill switch the device on resp. will shut the operating system down and switch the device off. Pressing the button for a long timewill switch the device off without shutting down the operating system (Risk of data loss!)
7	"Mode/Node x16" switch, has no function
8	"Mode/Node x1" switch, has no function
9	SD memory card slot, has no function. Must not be used!
10	CompactFlash Slot. **Must not be removed.**
11	Battery, see chapter "Battery" on page 26

5.1.1 Status LEDs

For the status LEDs (Power, CF, Link, Run), the following time frame is being used:
Box width: 250 ms
Interval: 500 ms; Hence, 2 boxes correspond to one interval

LED	Color	Status	Meaning	LED indicator
Power	Green	On	Supply voltage OK	
		Blinking	The device has booted, the battery status is "BAD".	
			Information: **For more information, see see " Battery" on page 33.**	
	Red	On	The system is in standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk)	
		Blinking	The MTCX is running, the battery status is "BAD". The system is in standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk)	
	Red / green	Blinking	Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status OK, power supply OK	
			Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status OK, standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk)	
			Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status BAD, power supply OK	
			Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status BAD, standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk)	
			Information: **An update must be performed again.**	
CF	Yellow	On	Indicates IDE drive access (CF)	
Link	Yellow	On	Indicates an active SDL connection on the panel plug.	
		Blinking	An active SDL connection has been interrupted by a loss of power in the display unit.	
			Information: **Check the power supply / power connector of the connected display unit.**	
Run	Green	Blinking	Automation Runtime booting Handled by Automation Runtime (ARemb and ARwin).	
	Green	On	Application running Handled by Automation Runtime (ARemb and ARwin).	
	Red	On	Application in service mode Handled by Automation Runtime (ARemb and ARwin).	

5.1.2 Battery

The lithium battery (3 V, 950 mAh) buffers the internal real-time clock (RTC) and is located behind the black cover. The duration of the battery is at least four years (at 50 °C, 8.5 µA current requirements of the supplied components and a self-discharge of 40 %). The battery is subject to wear and should be replaced regularly (at least following the specified life span) (see chapter "Battery change" on page 165).

5.1.3 CompactFlash card

CAUTION

*Do not remove the CompactFlash card in order to ensure that **all** device properties are available!*
If a replacement of the CompactFlash card becomes necessary, you have to disconnect the device from the power supply.

5.2 Touchscreen

CAUTION

Do not apply excessive force to the screen. Do not use a ballpoint pen, a pencil or other sharp objects to operate the touch screen. This may damage or destroy the touch screen.

The integrated 7 inch touch screen is used at the same time for indication and operation. This is a resistive touch screen which responds to pressure.

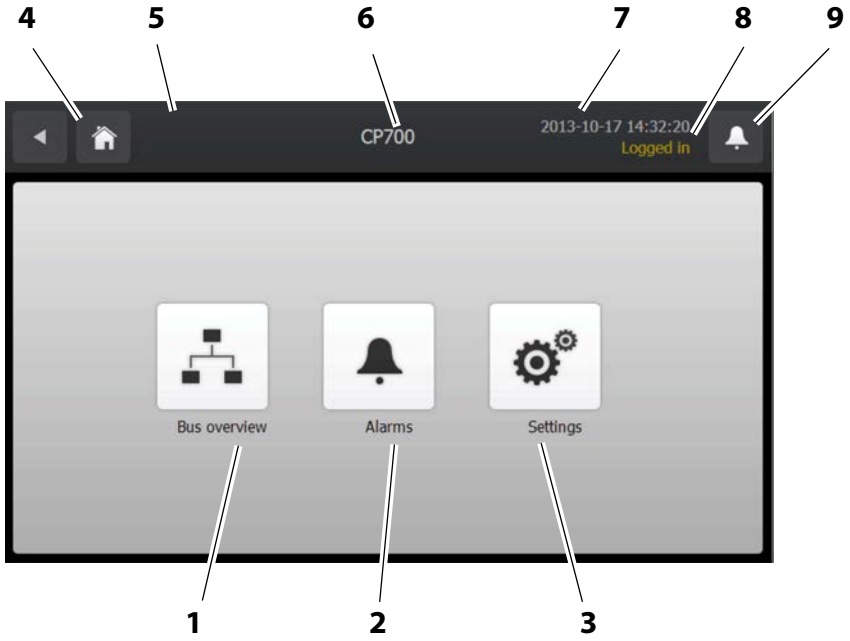
For operation solely use finger or a touch pen. When sliding your finger over the display (e.g. when scrolling through the language selection), apply the necessary pressure to the display.

5.3 Operation via touch screen

After the initial power-up, the CP700 enters the "Settings" > "Interface" menu. By tapping the " " button you will access the main menu. If no entry has been made via the touch screen for several minutes and the touch screen has switched to standby mode, the CP700 will automatically switch to the main menu.

5.3.1 Main menu

The CP700 is equipped with a touch screen. That allows intuitive operation using your finger or a special touch screen stylus.



	Key
1	"Bus overview" button. Shows a list of the bus devices for selection, querying and parameterisation. BMS-bus device, Modbus/RTU devices, Modbus/TCP devices and virtual devices are displayed in the same list.
2	"Alarms" button. Shows a table of the pending alarms. The background of the button - is red when an alarm exists - is white when no alarm exists.
3	"Settings" button. Allows the setting of the interface and the operation language of the device.
4	"Back" button. One operating step back.
5	" " button. Return to the main menu.
6	Device type or an individually entered text in the web user interface.
7	Date and time display.
8	Display "Logged in". Settings in the "Interface" menu can only be carried out after "Login". This login applies to the operation of the touch screen only.
9	"Alarms" button. Shows a table of the pending alarms. The same function as "2", but accessible from each submenu.

5.3.2 "Settings" menu

Select:

Interface	Interface parameter setting
Language	Selection of the operation language for the CP700

5.3.2.1 "Interface" menu

Display settings

The existing settings will be displayed.

If you have not logged in, you cannot change the settings. Therefore the buttons for the setting values are not active (greyed out).

Changing settings

The settings can only be changed in the "Logged in" mode. Tap on the "Login" button.
A password can be set in the "Bus overview > "Settings" > "Password" menu via the web user interface. The password consists of a 3-digit number. If a password has been set and activated (status "on"), the following entry field will appear:

Enter the password. Then tap on "OK". The status "Logged in" is displayed.

If no password has been set, the status "logged in" will be displayed immediately.

Tap on the entry to be changed. An entry field appears. Enter the new value and Tap on "Close".

CP700 will check the settings:

✓	identifies a permissible setting value
!	identifies an impermissible setting value or a setting value that makes no sense

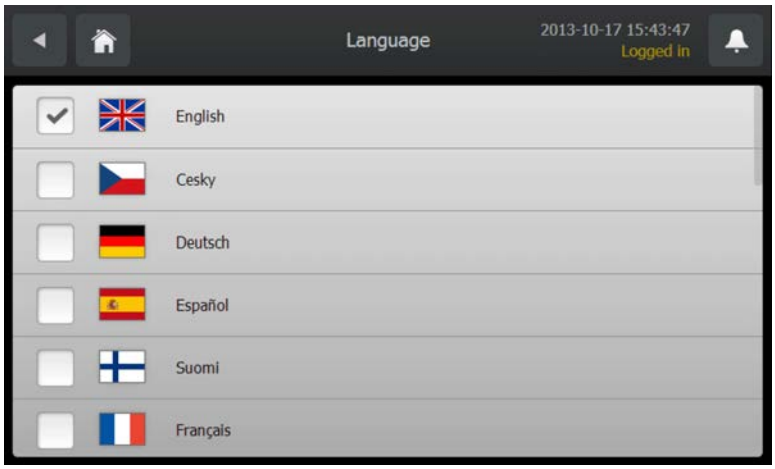
Parameter settings and factory settings

	Factory setting	Description
IP	192.168.0.254	Set the IP address of CP700
SN	255.255.0.0	Set the subnet mask of CP700
Standard gateway	192.168.0.1	Set the IP address of the gateway
BMS	2	Set the BMS address of CP700: 1…99 (internal BMS bus)
Modbus/RTU	9600 Bd, even	Modbus/RTU: Select baudrate and parity
DHCP	☑	Activate/deactivate automatic IP address assignment using the DHCP server
Display timeout (min)	1	If no entry is made via the touchscreen of the CP700 for a predefined time (e.g. five minutes), the screen is blanked.
Show on startup	☑	Activate/deactivate the display of the "Settings" > "Interface" menu when starting the device.

The CP700 can also be set via the web user interface (see "Parameter setting of the CP700 using the "Settings" menu" on page 62).

5.3.2.2 "Language" menu

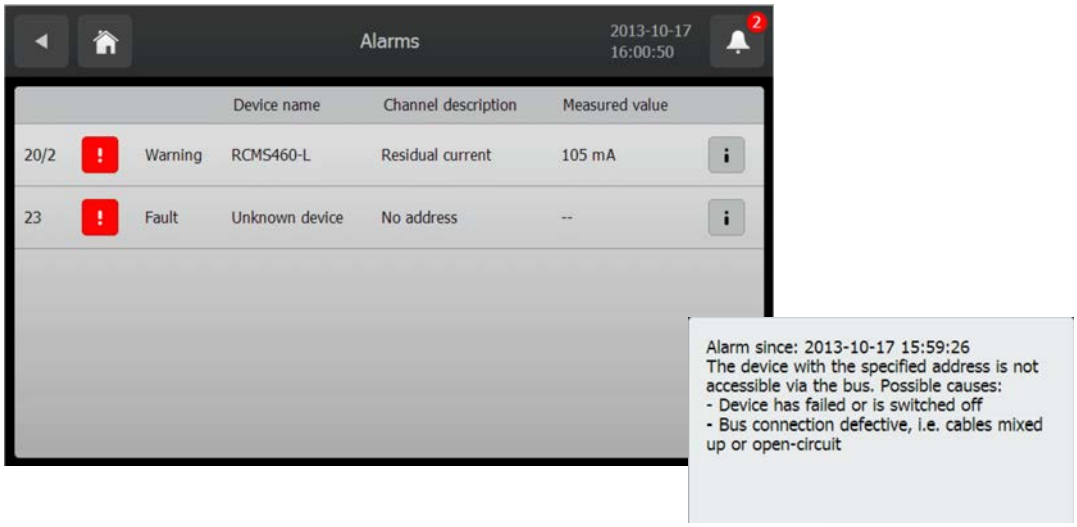
Select the preferred language by tapping on the respective button in the language column. Changes take effect immediately.



The scroll bar on the right of the touch screen shows that more languages are listed below. Move the presently displayed content upwards to display other languages.

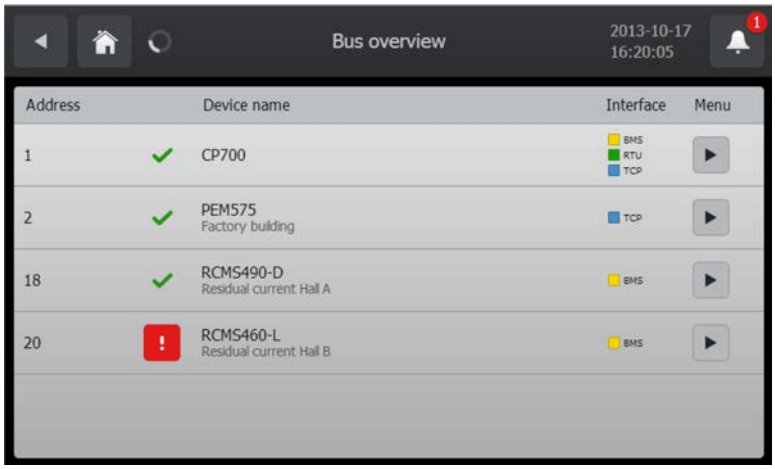
5.3.3 "Alarms" menu

Indication of alarm messages. Tap on "i" for a help text about this alarm.



5.3.4 "Bus overview" menu

The bus overview lists all devices connected to the CP700 as well as all virtual devices. Here, it does not make a difference whether these devices are connected via BMS bus, Modbus/TCP or Modbus/RTU.



	Description
Address	Device address
,	Indicates for this device: "No alarm" or "Alarm"
Device name	Device name. If previously entered in the web user interface, also an individual text will be displayed.
Interface	Interface of the device that is used for communication with CP700, virtual device (VD)
Menu	Button to display all available menus of the device. Example: Display alarm/meas. values and device info of the CP700.
	The display is being updated. An update is performed every 3…5 seconds.

5.3.5 Displaying the device info for CP700

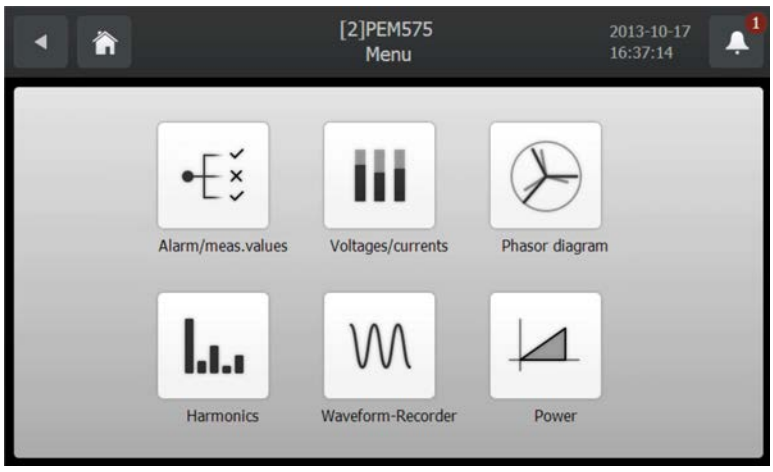
Select "Bus overview" > "CP700 ▸" > "Device info".

This menu displays information about the device and the software. Please have this information to hand if you should need to contact us for assistance by telephone.

The scroll bar on the right of the touch screen shows that more information is given below. Move the presently displayed content upwards to display the rest of the information.

5.3.6 Using the functions for Bender PEM… universal measuring devices

Select "Bus overview" > "PEM575 ▸" > "Device info". For a description of these functions refer to chapter "Monitor for Power quality" on page 141.



6. Web user interface of the CP700

6.1 Menu structure of the web user interface

The table below provides an overview of the menus. The menus are easy to use by means of a browser. The listing is arranged according to the menu-bar shown below.

Menu bar	Submenu:	Description	Page
Start	Deutsch	Indication and selection of the operating language	38
	English		
	Other languages..		
Bus overview	List of bus devices for - Selection - Query - Parameter setting	– Presentation of the bus structure with the existing interfaces (BMS, Modbus/RTU, Modbus/TCP)	42
		– Colour coding of the bus devices according their alarm or operating state	42
		– Presentation of additional data of the bus device selected via the "Device info" button	43
		– Menu presentation of a selected bus device	
		– Parameter setting of the bus device selected	45
		– Create, export or import a back-up/report including all parameters of the respective device	60
		– Enter individual texts for devices and channels	46
		– Configure e-mail notification for alarm condition	
		– Activate/deactivate monitoring function for device failure	65
		– History memory and data logger	71, 74
			77
			50, 53
Alarms	Alarm window	Presentation of all pending alarms and data of devices sending an alarm.	80
Tools	BMS recording	Manual recording of the BMS bus activity, saving the record to a storage media outside the CP700.	82
	BMS analyser	Evaluation of the BMS recording	83
	BMS log files	Selection and indication of the recorded BMS-log files in the browser window*	86
	Network parameters	Displaying and changing network parameters*	86
	Socket state	Indication of the socket status in the browser window*	86

	Software update	Update of the system software of CP700*	88
	Software options	Indication of the range of functions of the corresponding option and the licensing of additional options.	90
	Modbus register	Modbus register presentation of the connected BMS devices and PEM... Bender universal measuring devices	93
	Modbus control commands	Commands can be sent to BMS devices and Bender PEM... universal measuring devices from an external application (e.g. visualisation software). The "Modbus control commands" menu provides Modbus control commands for selected BMS commands. These commands can be copied to the clipboard of the PC and then included in the programming for external application.	95
	Manage Modbus devices	This function is used to make settings for Bender devices of the PEM… series connected via Modbus/RTU or Modbus/TCP and to save them in a template.	114
	Individual texts	Overview of all individual texts in the web user interface pre-defined for devices and measuring points (channels). Individual texts can be: - exported to CSV format, - processed externally (e.g. in Excel®) - and imported.	67
	Device failure monitoring	Overview of all devices for which device failure monitoring has been activated.	78
	E-mail overview	Overview of all devices and channels for which an e-mail notification has been configured in the event of an alarm.	75
	E-mail configuration	Setting e-mail templates: days of the week, time of day, e-mail addressee and texts.	71
	Visualisation	Fast and simple visualisation without any programming.	97
	Manual	Function, connection, operation etc.*	109
	System visualisation	Several gateways (COM460IP, CP700) on one website. Displaying common alarms of the devices.	110
	Manage virtual devices	Set/modify/delete virtual devices	117
Info	Software D405 V2.5x Software D278 V2.5x	This menu displays information about the device and the software. Please have this information to hand if you need to contact us for assistance by telephone.	89
Visualisation		Carrying out visualisation	107

* Deactivate the pop-up-blocker function to use these functions, see chapter "6.2 ".

6.2 Browser configuration

The latest version of the Windows© Internet Explorer is recommended.

In order to fully benefit from all functions of the web user interface Silverlight™ has to be installed on the computer being used and Java Script has to be activated too. In addition, the pop-up blocker has to be deactivated so that all functions are available to you.

Silverlight	Microsoft Silverlight (version 5.0 or higher) must be installed.
JavaScript	Should be activated; required for backup/report, software update etc.
Pop-up blocker	Should be deactivated for the IP address of the CP700; otherwise there would be no access to the manual , software updates, network settings etc.
ActiveX	Not required.

6.3 Initial operation of the web user interface:

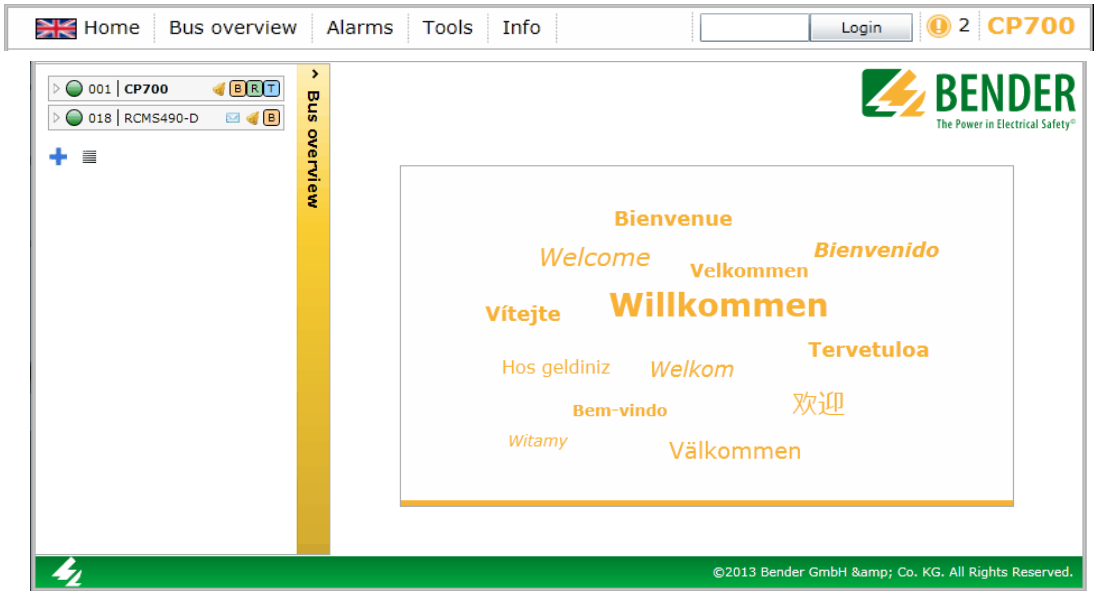
1. Select the screen resolution as follows:
   Width ≥ 1000 pixels, height ≥ 900 pixels, example: 1600 x 1200
2. Start the Internet browser
3. Read the IP address from the "Settings" > "Interface" menu using the touch screen and enter the address into your Internet browser.
4. Select the user language for the web user interface. Click the language you want to use resp. click the appropriate flag.
5. Click on "Bus overview" to get a graphical representation of all BMS bus devices. If everything works properly, a list of all accessible BMS devices should appear after a few seconds. In the most unfavourable case, it can take up to 7.5 minutes to list all the accessible devices on the internal BMS bus (CP700 = MASTER).

If, nevertheless, malfunctions occur at the bus devices, please check if you use the current software version for the respective device (also see "CP700-compatible devices" on page 14).

6.4 Start page and operating language

6.4.1 Opening the start page

1. Open an Internet browser.
2. Enter the IP address of the CP700 into the address line (Example: http://162.18.22.18/). The start screen will appear:



6.4.2 Changing the language

If a German Windows operating system is installed on the PC, the web user interface will start up in German language.

1. Click "Home".
2. Click the required language resp. on the typical national flag, to select the operating language for the graphical user interface.

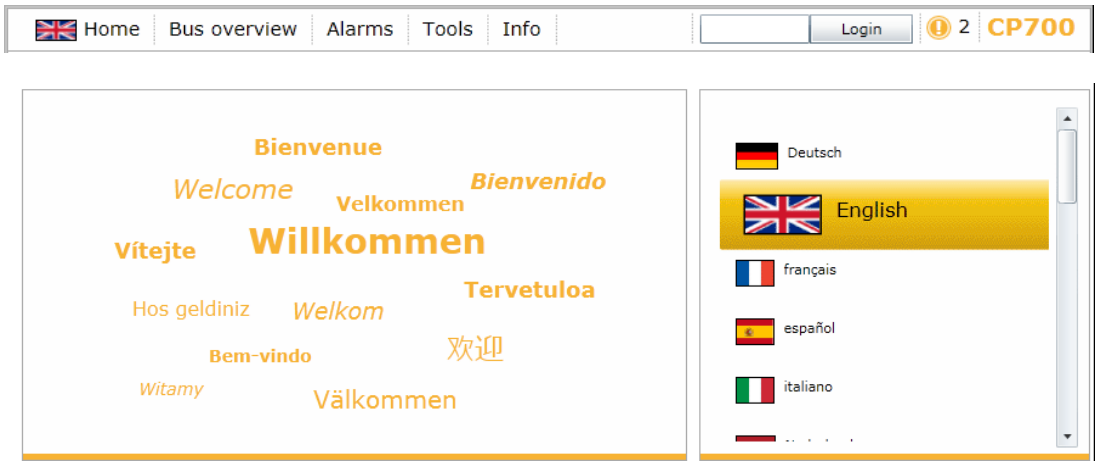


Fig. 6.1: Language selection

6.5 Menu bar

The user interface can largely be controlled per mouse click.

	Key
1	Menus and functions. Example: Start = select the menu language.
2	Input field for entering the password to log in. The edit filed won't appear unless a "Login" password has been assigned in the password menu of the CP700 and the password protection has been activated before.
3	Button "Log in" resp. "Log out". **Logging in is the precondition for:** - the parameter setting of the recorded bus devices - the settings of device failure monitoring, e-mail notification, individual texts and visualisation Logging in ensures that only one user can change parameters at a given point of time. For detailed information about parameter setting refer to page 60.
4	Common alarm indication. In the example illustrated above, two alarms exist. Click this button to display the alarms (the same effect as menu item "Alarms").

6.6 Bus overview and device information

6.6.1 Creating a password protection for CP700

DANGER

Risk of damage to equipment due to unauthorized access
The password protection for the CP700 protects against unauthorised access to a limited extent only. Attackers from the Internet may still be able to read data and to change settings.
It is absolutely necessary
- that the network is separated from the Internet
- common security mechanisms are applied (firewall, VPN access)

The device allows a staggered password protection. The necessary settings are carried out via the web user interface. Select "Bus overview" > "CP700" > "Load menu" resp. "Reload menu" > "Settings" > "Password".

	Password for	Protection ex factory	Password ex factory	Function of the password types Character pool for passwords
◢ Settings ▷ Server Interface Modbus Display ▷ History/Logger Clock ◢ Password Device Server Login FTP	Device	off	000	Access to the "Settings" > "Interface" menu of the CP700. Login via the touch screen of the CP700 Password: 000…999
	Server	off	default	Access to the web server of the CP700 by logging on to the web server; Password: a...z, 0...9, minus sign, underscore
	Login	off	default	Access to the parameterisation functions by logging on to the web user interface; Password: a...z, 0...9, minus sign, underscore
	FTP	off	default	Access to the FTP server of the CP700; Password: a...z, 0...9, minus sign, underscore

If you log in with the password types "Server" and "FTP", you have to enter the username "user" first!

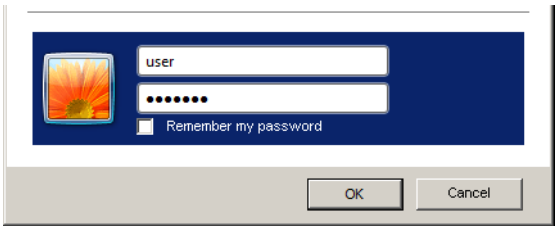
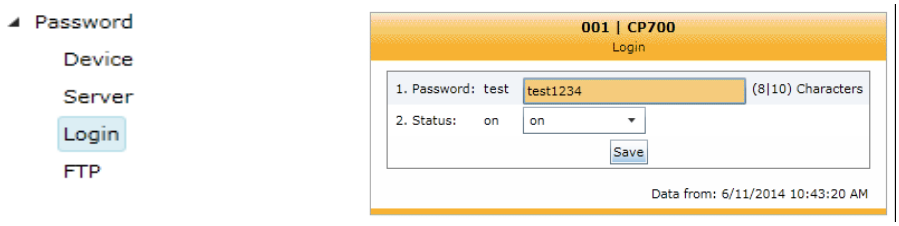


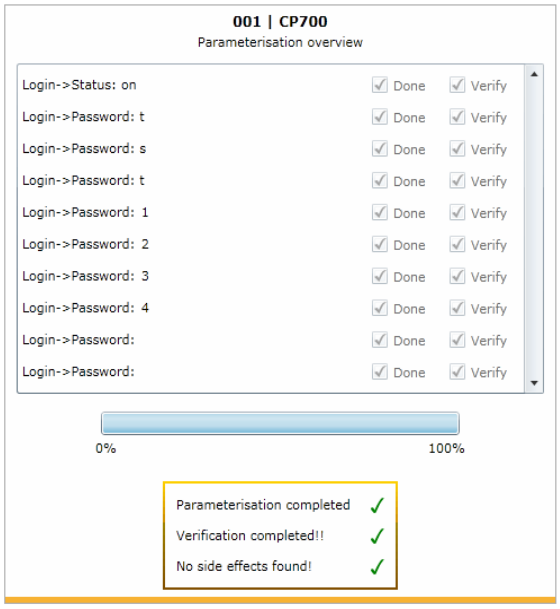
Fig. 6.2: The standard user "user" logs on to the web server or FTP server with "default" or by entering his password.

Example:
The parameterisation function of the CP700 is to be protected by a new password. According to the table above, a login password has to be assigned. The password protection must also be activated!

1. Select "Bus overview" > "CP700" > "Load menu" resp. "Reload menu" > "Settings" > "Password" > "Login".
   In the first line, the appropriate edit field appears after which the maximum number of characters currently used is displayed. Double-click the current password and overwrite it with your new password. After entering the first character, the colour of the edit field changes.



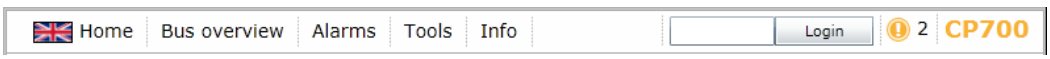
2. Click the button in the status line and select "on" in order to activate the password protection.
3. Press "Save". The result of the changes will appear in the "Parameterisation overview" window.



4. Click the "Log out" button in the menu bar.

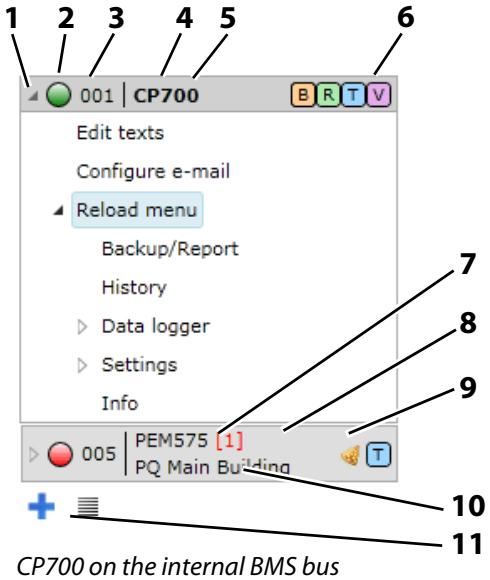
   As of now, parameter setting of the CP700 can only be carried out after logging in with the new login password.

5. For logging on again, enter the password



Click "Login" prior to parameterisation even if password protection is deactivated! Logging in ensures that only one user can change parameters at a given point of time.

6.6.2 Buttons for the list of bus devices



CP700 on the internal BMS bus

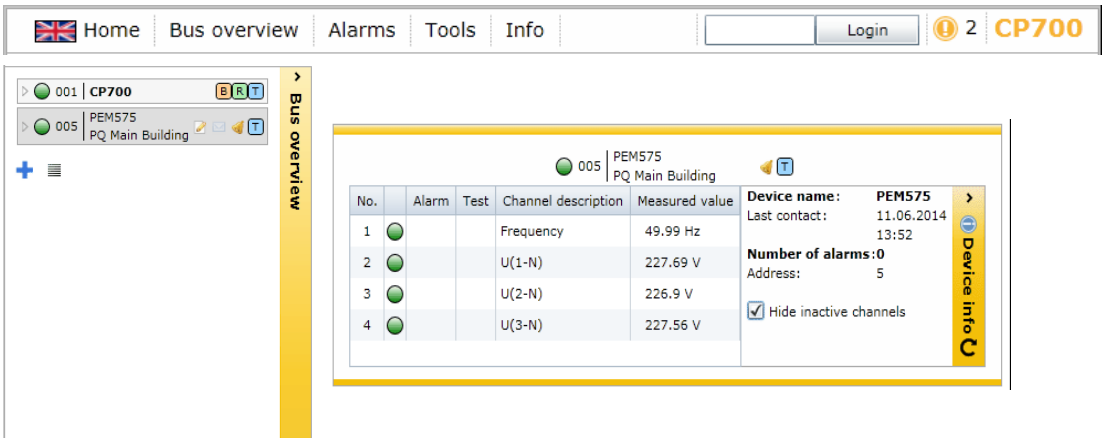
	Key
1	Button to open or close the list of bus devices and the device menu. Instead of using the triangular buttons it is also possible to double-click or click the button of the bus device resp. on the sub menus.
2	Alarm status of the device Green: Operating message Red: Alarm message Grey: Bus device has not responded for several minutes. The grey symbol will only appear if the device failure monitoring function has been activated before. As soon as the device failure monitoring function is deactivated, the device will disappear from the list.
3	Internal BMS bus address
4	Type of BMS device Click this button to open the device window indicating the measured values and alarms. For details refer to chapter "6.6.4 Querying device information"
5	Indication of the CP700 the web server of which was used to set up a connection (font "bold" and dark background)
6	Interface of the device that is used for communication with CP700: B: BMS bus R: Modbus/RTU T: Modbus/TCP VD: Virtual device
7	Number of alarms of this BMS device
8	Dark background identifies the selected bus device or menu item
9	Buttons for editing individual texts, configuring e-mails and activating device failure monitoring function. You have to log in to activate the buttons. For details refer to chapter "6.5 Menu bar"
10	Individual text "PQ Main Building"
11	+: Add Modbus devices or virtual devices. Note: BMS devices are automatically recognised. ≣: Close all opened menus of the bus overview

6.6.3 CP700 on the internal BMS bus

The device is operated on the internal bus. Only the internal addresses and bus devices are displayed.

6.6.4 Querying device information

1. Click on "Bus overview" in the menu bar to open the menu of the same name.
2. After uploading all devices, select the respective device from the list.
   The device window will open displaying the measured values and alarms.



3. Enlarging and reducing the bus overview and device info: The display area can be enlarged to the full width of the window by clicking on the "bus overview" resp. "device info" button. Another click the button reduces the respective display area.

Presentation of basic data on the selected device:

No.	Channel number resp. consecutive number of measured values resp. alarms
red **Yellow** **green**	Alarm status of the channel Red = alarm, warning, device error Yellow = prewarning Green = operating message
Alarm	Possible alarm messages: "Alarm", "Fault", "Prewarning" or "Warning"
Test	"Internal test" or "External test"
Description	Description of the alarm or operating message
Measured value	Measured values transmitted from the bus

Additional data presented after clicking the "Device info" button:

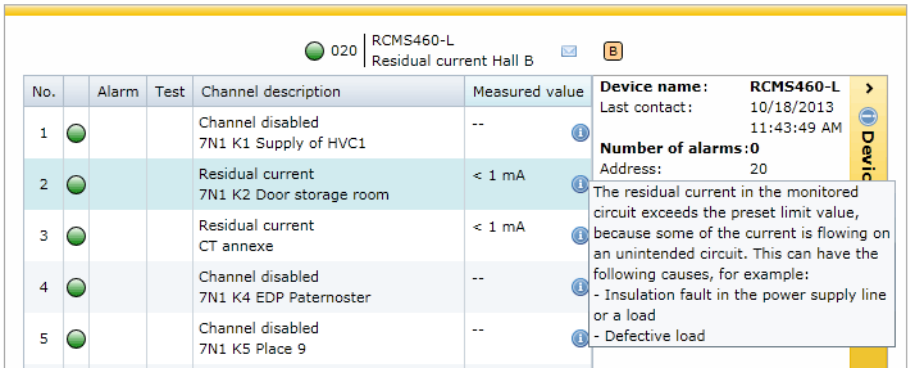
Device type	Example: isoMED427P
Last contact	Last BMS-bus connection: Date and time
Number of alarms	Number of alarms
External address	External BMS address. will only be indicated when the CP700 is operated on the external bus
Internal address	Internal BMS address

Activate "Hide inactive channels" to display active channels only.

6.6.5 Displaying the help text

If help texts exist, they will be marked by a blue "i" icon

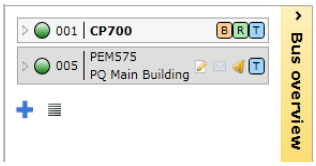
1. Move the mouse pointer to the blue "i" icon in the "Measured value" column.
2. Keep the mouse pointer there (without clicking). - The help text will be displayed.

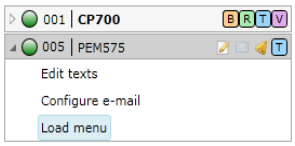


6.6.6 Loading the menu of a bus device

A PEM575 is used in the example below to illustrate the selection of a device menu

1. Start the browser and wait until the web user interface appears.
2. Select the appropriate device: Click on "▷" or double-click device type.
3. Click "Load menu".



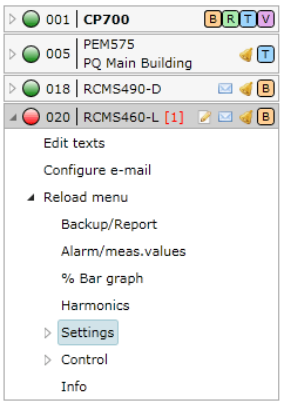


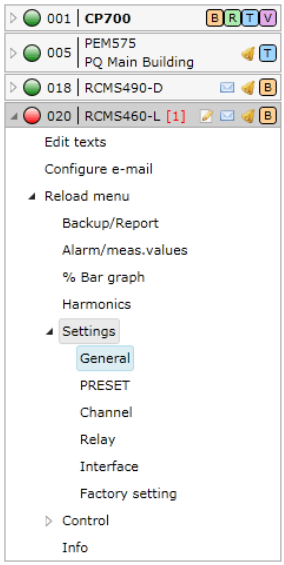
The menu of the bus device is loaded completely. The menu presentation of the bus device in the browser largely corresponds to the menu structure of the bus device in the device display.

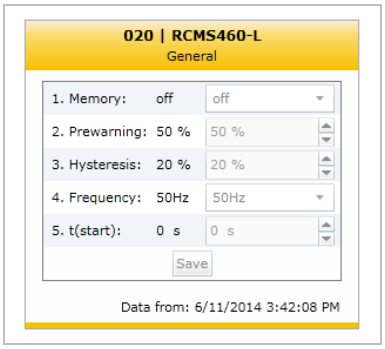
6.6.7 Displaying the settings of a bus device

After loading the menu of the bus device, the "Settings" menu is available. In the example below, the settings of an RCMS460-L are queried in the "General" menu.

1. Select "Settings": Click "▷" or double-click "Settings"
2. Click "General"
3. The settings of the "General" menu item are listed





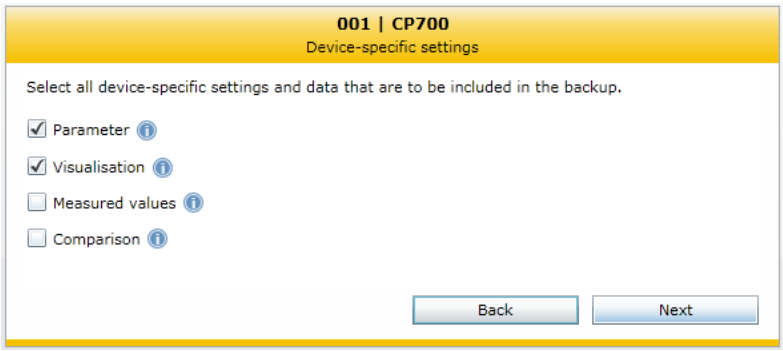


6.6.8 Creation and further processing of a bus device Back-up/Report

To store settings and measured values of a bus device, select the "Back-up/Report" menu item. In addition, the contents of the "Info" menu are recorded. The HTML file can be displayed and evaluated using a standard browser. In order to display all the elements of a back-up file, JavaScript must be activated. By creating a backup you can avoid data loss (e.g. by accidentally deleting settings). The backup can also be imported to another device of the same type. This can be necessary when a device is to be replaced or when several devices with similar tasks are to be configured.

6.6.8.1 Creating a backup

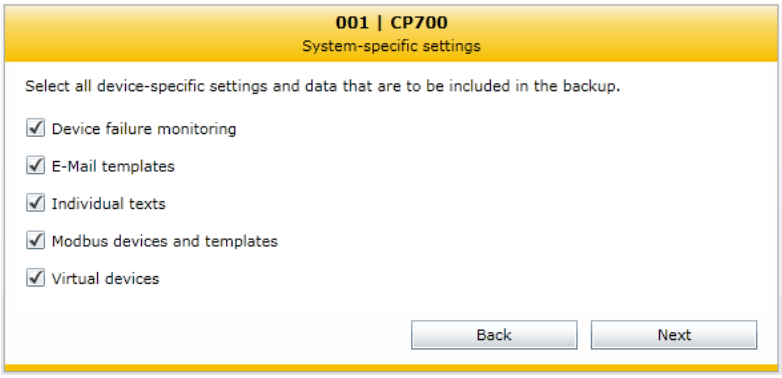
1. Example CP700: Select "Bus overview" > "PEM575" > "Load menu" resp. "Reload menu" > "Backup/Report“ > "Create backup".
2. Enter a text for backup identification.
3. Activate the appropriate check box "Device-specific settings":



Parameter	Add the device settings to the backup.
Measured values	Add the current measured values to the backup.
Comparison	Load a stored backup to compare the parameters of an existing backup with the parameters of a new backup to be created.

Click the "Next" button.

4. Activate the appropriate check boxes "System specific settings":



Activated system settings will be added to the backup.

Click the "Next" button. – Data is collected.

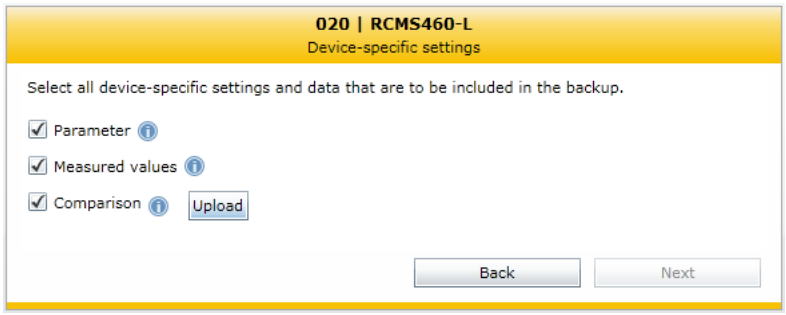
5. Click on "Complete". Confirm the subsequent security warning with OK. You can accept the file name appearing in the subsequent window appearing or specify an individual name. After storing the file the backup is completed.

6.6.8.2 Show the backup

1. Double-click the backup file in the storage location to open the file. As a result, the browser will show a list field that corresponds to the device menu.
2. You can enlarge or reduce the individual menu items using the "+" and "-" buttons. Use "+All" resp. "-All" to enlarge or reduce all menu items simultaneously.
3. Click the sub menu item you want to display. The associated parameters and its values will be listed.

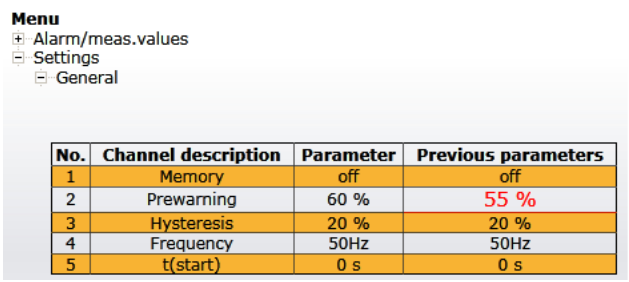
6.6.8.3 Creating a new backup with a comparison of the device parameters

1. Example RCMS460-L: Select "Bus overview" > "RCMS460-L" > "Load menu" resp. "Reload menu" > "Backup/Report" > "Create backup".
2. Activate the respective selection box:



Parameter	Add the device settings to the backup.
Measured values	Add the current measured values to the backup.
Comparison	Load a stored backup to compare the parameters of an existing back-up with the parameters of a new backup to be created.

   – Click the "Upload" button to load the previous backup to which the current parameters are to be compared.
   – Click the "Next" button. – Data is collected
3. Click on "Complete". Confirm the subsequent safety query with OK. You can accept the file name appearing in the subsequent window appearing or specify an individual name. After storing the file the backup is completed.
4. Double-click the backup in the storage location to open the file. In the new backup, the parameters and statuses to be compared are displayed side by side. Deviating measured values will appear in red.



No.	Channel description	Parameter	Previous parameters
1	Memory	off	off
2	Prewarning	60 %	55 %
3	Hysteresis	20 %	20 %
4	Frequency	50Hz	50Hz
5	t(start)	0 s	0 s

6.6.8.4 Using a backup for parameter setting

The parameter settings stored in a backup can be transferred to a bus device of the same type using the function "Compare/Import".
On the one hand the backup file can be used to set the parameters of a bus device, on the other hand, the parameters of a device used to replace an existing device can be set in a convenient manner.

PEM… only: If addresses are assigned twice, it is not possible to access the device!
The backup files of PEM… also contain the address data of the original device. After transmitting the backup file to another device, the address is also set in this device. If two devices with the same address exist on the bus, it will be no longer possible to access these devices via the web user interface. Correct the addresses directly at the device.

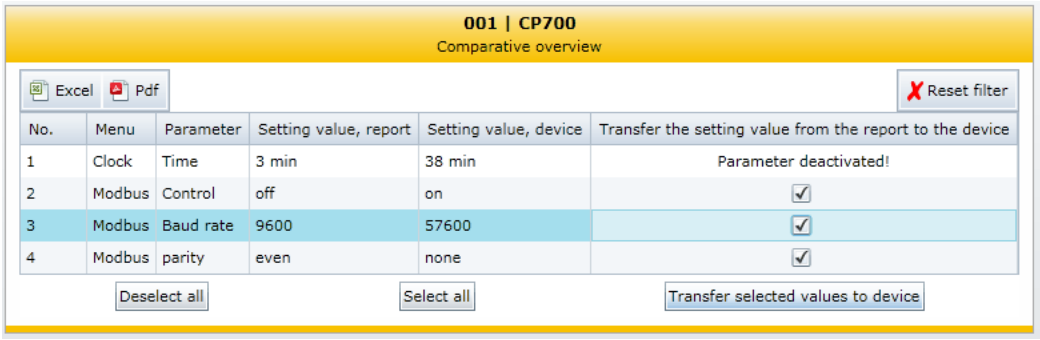
1. Login to the menu bar. 

2. Select "Bus overview" > "PEM575" > "Load menu" resp. "Reload menu" > „Backup/Report“ > „Create backup".
3. Click the "Open backup" button to open the report file containing the parameter settings. Click the "Next" button.
4. Activate the appropriate check box "Device-specific settings":

   Parameter — Add the device settings to the backup.
   Measured values — Add the current measured values to the backup.
   Only activated settings will be transmitted from the backup file to the CP700

   Click the "Next" button.
5. CP700 only: Activate the appropriate check boxes "System-specific settings": device failure monitoring, e-Mail templates, individual texts, Modbus devices and templates, virtual devices. Only activated settings will be transmitted from the backup file to the CP700.

   Click the "Next" button.
6. The "Comparative overview" window will then open. By means of the "Excel" or "PDF" button. The table can be exported for documentation purposes.



In the "Comparative overview" window **only the differing** parameter settings are displayed.

– Select the parameters to be transferred, by specifying the parameter individually or via the respective check box.

- In case of longer lists, select via the "Select all" button or cancel the selection with the "Deselect all" button or use the filter.
- Click on "Transfer selected values to device" to start the parameter transfer to the bus devices. The "Parameterisation overview" window will show the process of transmission.

7. Click on "Complete". The backup has now successfully been loaded onto the device.

6.6.9 History memory

The history memory stores up to 1000 entries (prewarnings, alarms, tests) occurred on the BMS bus. A maximum of 50 open alarm messages can be pending at the same time. The history memory can be stored failsafe in the EEPROM.

If the history memory is full, the oldest entry will be deleted in each case in the event of an alarm, to create space for the new entry.

6.6.9.1 Displaying the history memory

Select "Bus overview" > "CP700" > "Load menu" resp. "Reload menu" > "History". The history memory will be displayed:

001 | CP700
History

Excel Pdf Reset filter

No.	Address	Channel	min.	max.	Channel description	Test	Start	Ack.	End
211	11	2	50 mA	202 mA	Residual current		10/2/2013 2:40:37 PM	--	10/2/2013 4:14:11 PM
210	11	12	100 mA	100 mA	Residual current	Test internal	10/2/2013 2:40:00 PM	--	10/2/2013 2:40:13 PM
209	11	11	100 mA	100 mA	Residual current	Test internal	10/2/2013 2:40:00 PM	--	10/2/2013 2:40:12 PM
208	11	10	100 mA	100 mA	Residual current	Test internal	10/2/2013 2:40:00 PM	--	10/2/2013 2:40:12 PM
207	11	9	100 mA	100 mA	Residual current	Test internal	10/2/2013 2:39:59 PM	--	10/2/2013 2:40:12 PM
206	11	8	100 mA	100 mA	Residual current	Test internal	10/2/2013 2:39:59 PM	--	10/2/2013 2:40:12 PM
205	11	7	100 mA	100 mA	Residual current	Test internal	10/2/2013 2:39:59 PM	--	10/2/2013 2:40:12 PM
204	11	6	100 mA	100 mA	Residual current	Test internal	10/2/2013 2:39:58 PM	--	10/2/2013 2:40:12 PM
203	11	5	100 mA	100 mA	Residual current	Test internal	10/2/2013 2:39:58 PM	--	10/2/2013 2:40:12 PM
202	11	4	100 mA	100 mA	Residual current	Test internal	10/2/2013 2:39:57 PM	--	10/2/2013 2:40:12 PM
201	11	3	100 mA	100 mA	Residual current	Test internal	10/2/2013 2:39:57 PM	--	10/2/2013 2:40:12 PM
200	11	2	100 mA	100 mA	Residual current	Test internal	10/2/2013 2:39:57 PM	--	10/2/2013 2:40:11 PM
199	11	1	300 mA	300 mA	Residual current	Test internal	10/2/2013 2:39:56 PM	--	10/2/2013 2:40:36 PM
198	12	11	> 36 A	> 37 A	Residual current		10/2/2013 2:39:49 PM	--	10/8/2013 2:51:25 PM
197	11	2	200 mA	201 mA	Residual current		10/2/2013 2:39:40 PM	--	10/2/2013 2:39:46 PM
196	12	11	> 37 A	> 37 A	Residual current		10/2/2013 1:30:49 PM	--	10/2/2013 2:35:28 PM
195	11	12	100 mA	100 mA	Residual current	Test internal	10/2/2013 1:29:42 PM	--	10/2/2013 1:29:52 PM
194	11	11	100 mA	100 mA	Residual current	Test internal	10/2/2013 1:29:42 PM	--	10/2/2013 1:29:52 PM
193	11	10	100 mA	100 mA	Residual current	Test internal	10/2/2013 1:29:42 PM	--	10/2/2013 1:29:52 PM
192	11	9	100 mA	100 mA	Residual current	Test internal	10/2/2013 1:29:41 PM	--	10/2/2013 1:29:51 PM
191	11	8	100 mA	100 mA	Residual current	Test internal	10/2/2013 1:29:41 PM	--	10/2/2013 1:29:51 PM
190	11	7	100 mA	100 mA	Residual current	Test internal	10/2/2013 1:29:40 PM	--	10/2/2013 1:29:51 PM
189	11	6	100 mA	100 mA	Residual current	Test internal	10/2/2013 1:29:40 PM	--	10/2/2013 1:29:51 PM
188	11	5	100 mA	100 mA	Residual current	Test internal	10/2/2013 1:29:40 PM	--	10/2/2013 1:29:50 PM

11/12/2013 8:55:52 AM

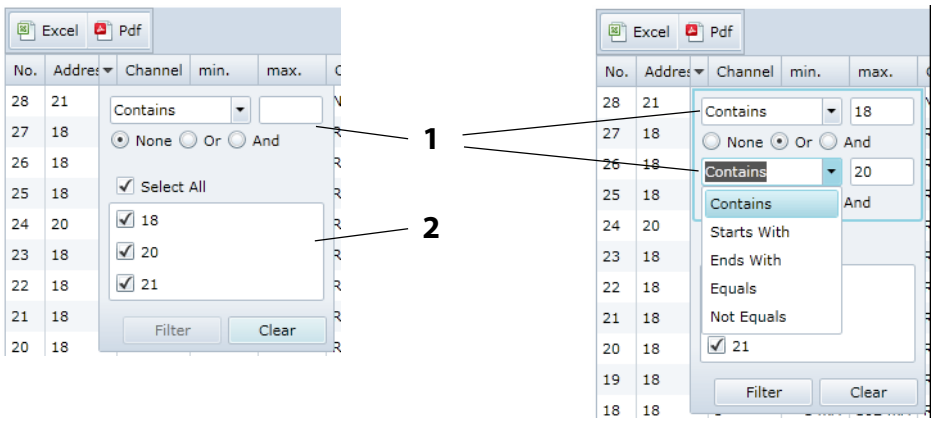
6.6.9.2 Evaluating the history memory

Sorting or filtering criteria saved in the history memory will be deleted after leaving the "History" menu.

Sorting entries
Click the column heading. Each time you click the column heading, you can choose whether you want to sort in ascending or descending order.

Filtering entries

1. Move the mouse without clicking close to the required column heading.
2. Click the "▼" symbol.
3. Enter your own filter criteria (1) or activate/deactivate filter criteria proposed in the list (2).
   You can link up to four filter criteria using "Or" resp. "And".
   All entries of the history memory, including numerical values are treated like text by the filters.



4. Click the "Filter" button. The " " symbol will appear next to the column heading. The filter is set.

It allows the setting of several filter criteria which are to be fulfilled at the same time. In addition, the entries can be sorted.

Clearing filters

- If a filter is no longer required, click the " " symbol and then on the "Clear" button.
- Click on "Reset filters" to reset all filters

6.6.9.3 Exporting the history memory

The current representation of the history memory (if required, sorted and/or filtered) will be exported.

Excel	Exports to an Excel file. That allows further processing of data.
Pdf	Exports to a pdf file (e.g. forwarding by e-mail etc.).

6.6.9.4 Delete the history memory

1. Login to the menu bar. 

2. Select "Bus overview" > "CP700" > "Load menu" resp. "Reload menu" > "Settings" > "History/ logger" > "History" > "1. Delete".
3. Click the "Delete" button. This entry must be confirmed once again.

Also refer to the description in table "History" on page 63.

6.6.9.5 Displaying the history memory of BMS devices

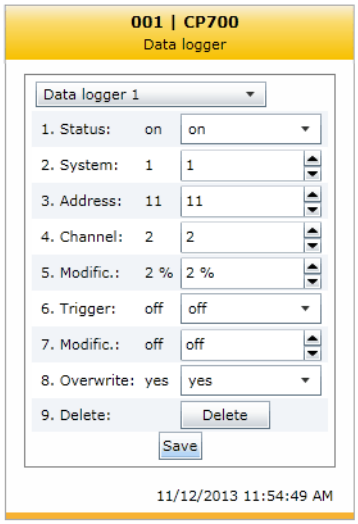
If a BMS device features a history memory, its entries can also be sorted and/or filtered as well as exported (Example: RCMS490-D).

6.6.10 Data logger

Up to 1000 entries can be recorded for each of the 12 data loggers.

6.6.10.1 Data logger setting

A new measured value will be saved when the conditions set in the "Bus overview" > "CP700" > "Load menu" resp. "Reload menu" >"Settings" > "History/logger" > "Data logger" menu are fulfilled (refer to the description of settings in the table "Data logger" on page 63). You also make settings for overwriting and deleting measured values here.



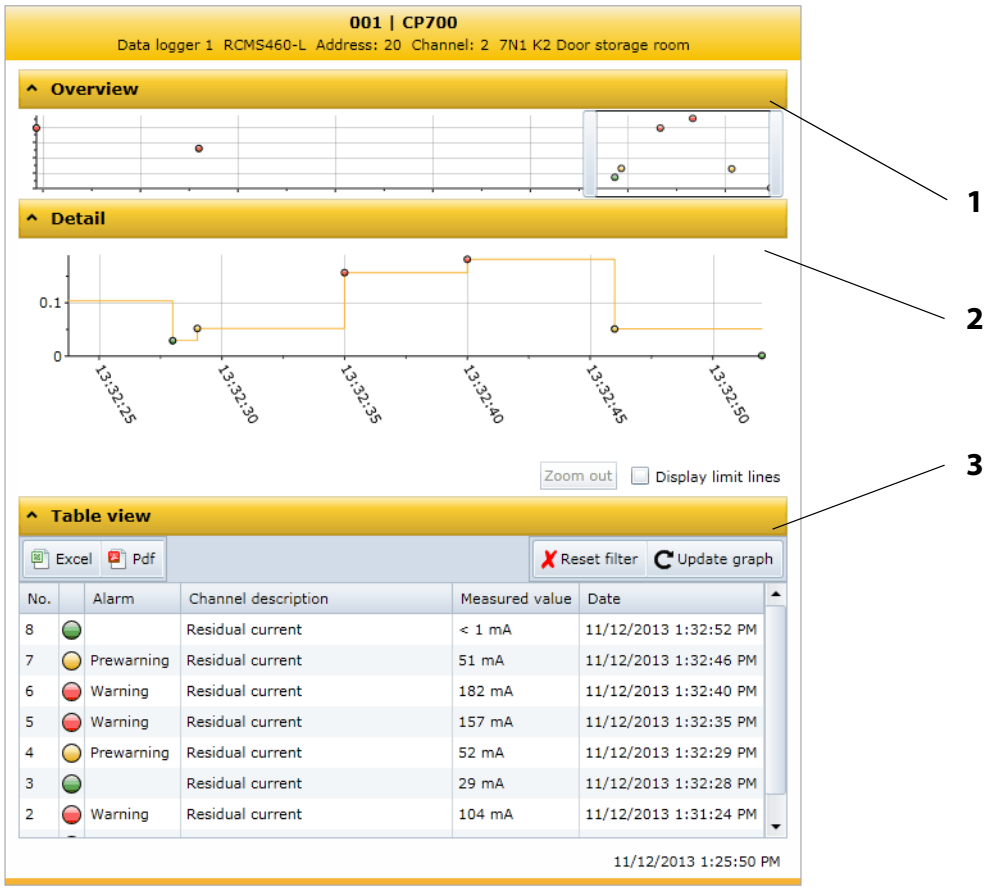
An existing data logger will be deleted when one of the settings "System", "Address" or "Channel" is changed.

6.6.10.2 Displaying the data logger

Select "Bus overview" > "CP700" > "Load menu" resp. "Reload menu" > "Data logger" > "Data logger..".

If measured values recently changed are not displayed, select "Load menu" resp. "Reload menu".

The selected data logger will be displayed:



1	Overview of the graphical representation (Option D only).
2	Details of the graphical representation (Option D only).
3	Table view. Entries can be sorted and/or filtered as well as exported

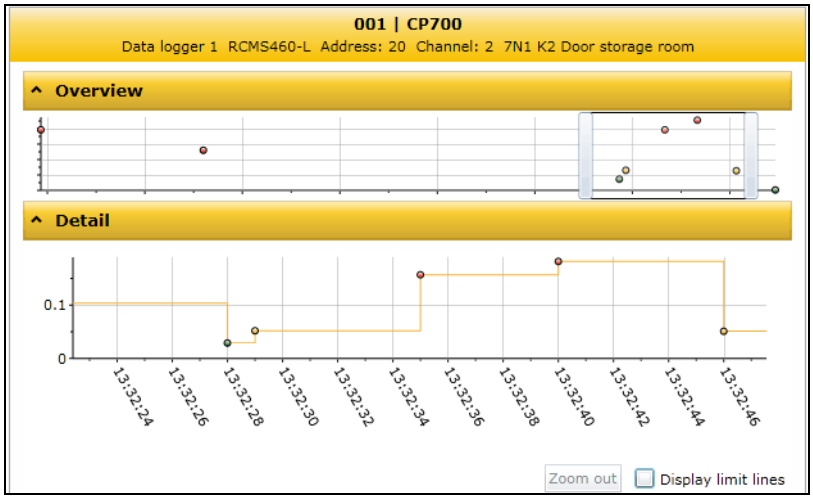
Each of the three representations can be reduced by clicking the associated orange bar. This provides more space for other representations. Clicking the orange bar again will maximise the representation again.

6.6.10.3 Evaluating the data logger

All settings made for sorting or filtering the table view and settings for the graphical representation will be deleted as soon as the "Data logger..." menu is exited.

Using the overview

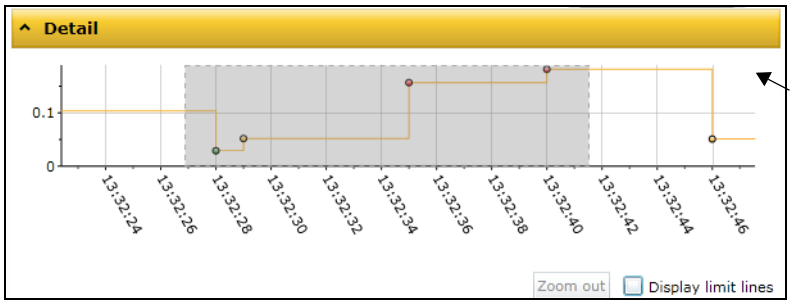
Determine the section to be zoomed in by moving the grey slider on the time axis to get a close-up view of your document.



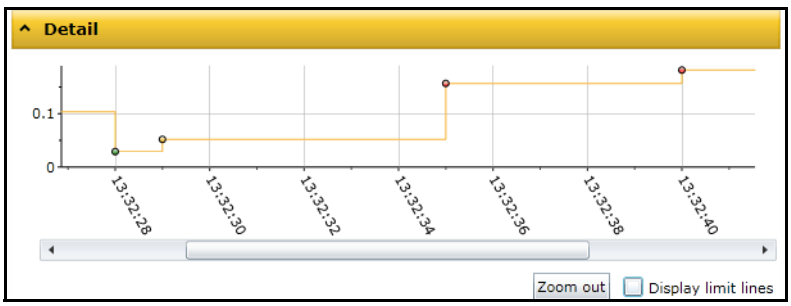
View details

In the "Details" mode you can zoom in the section to be viewed until the required zoom setting is reached:

1. Click the beginning of the presentation to be viewed while holding down the mouse key.
2. Drag the mouse pointer to the end of the section to be viewed (dotted line) and release it.

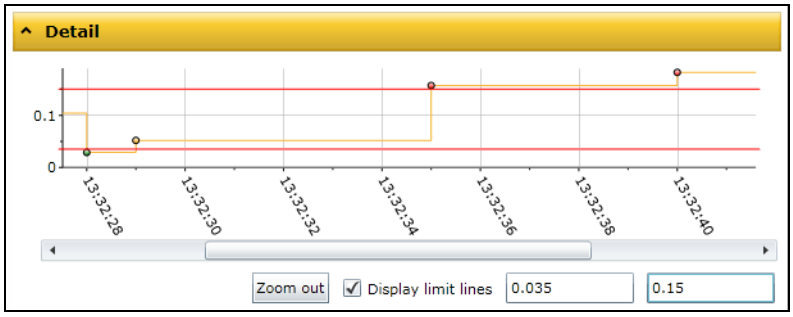


A close-up view of the selected section will appear immediately.



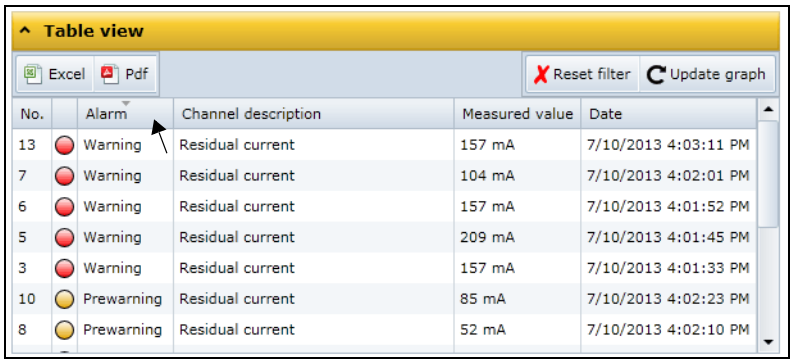
- If you want to zoom in the current representation even more, repeat the previous procedure as described in step 1 and 2.
- Select "Zoom out" to restore the original representation.

- Activate "Display limit lines" to display the limit lines (red) of the graphics. Enter the appropriate limit values.



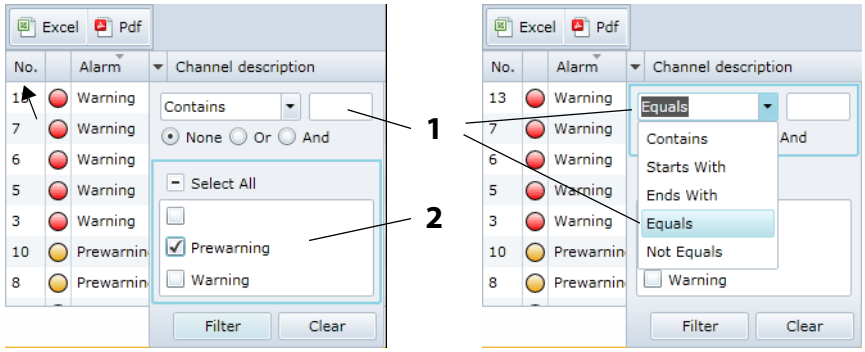
Sorting entries of the table view

Click the column heading. Each time you click the column heading, you can choose whether you want to sort in ascending or descending order.



Filtering entries

1. Move the mouse without clicking close to the required column heading.
2. Click the "▼" symbol.
3. Enter your own filter criteria (1) or activate/deactivate filter criteria proposed in the list (2). You can link up to four filter criteria using "Or" resp. "And".

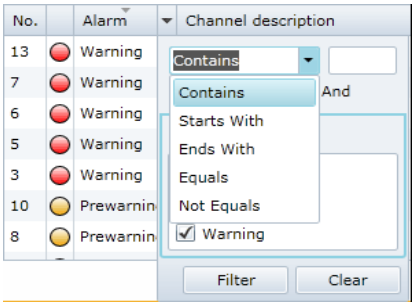
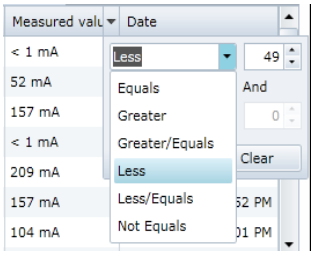


4. Click the "Filter" button. The " " symbol will appear next to the column heading. The filter is set.

It allows the setting of several filter criteria which are to be fulfilled at the same time. In addition, the entries can be sorted.

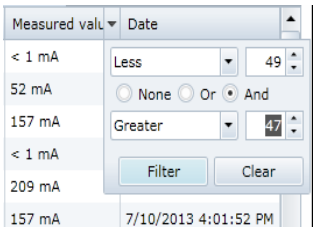
Information on the use of the filter

Different filters are available for the entries of the data logger (numerical values, text, date/time).

Example: Text	Example: Numerical values
	

Filtering numerical values reliably

Numerical values are treated as floating point values by the CP700 and are reduced to a meaningful representation. The "Equal to" therefore might not provide the appropriate numerical value. Use the filter criteria "Greater than" and "Less than" to narrow down the numerical value.

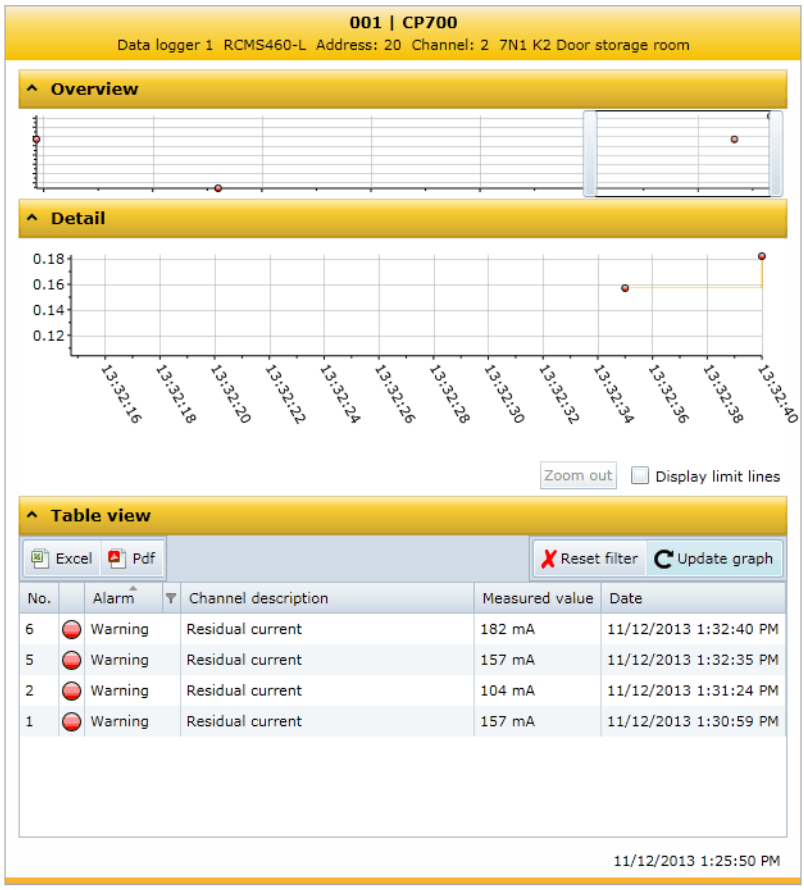


Clearing filters

- If a filter is no longer required, Click the " " symbol and then on the "Clear" button.
- Click on "Reset filters" to reset all filters

6.6.10.4 Apply the filter to the graphical representation

Click on "Update graph" to apply the filter to the graphical representation.



6.6.10.5 Exporting the data logger

The current representation of the data logger (where applicable sorted and/or filtered) will be exported.

Excel	Exports to an Excel file. That allows further processing of data.
Pdf	Exports to a pdf file (e.g. forwarding by e-mail etc.).

6.6.10.6 Deleting the data logger

1. Login to the menu bar. 

2. Select "Bus overview" > "CP700" > "Load menu" resp. "Reload menu" > "Settings" > "History/logger" > "Data logger".
3. Select one data logger or all data loggers (1…12).
4. Click the "9. Delete". This entry must be confirmed once again.

Also refer to the description in table "Data logger" on page 63.

6.6.10.7 Displaying the data logger of BMS devices

If a BMS device features a data logger its entries can also be sorted and/or filtered as well as exported (Example: RCMS490-D).

6.7 Parameter setting for bus devices

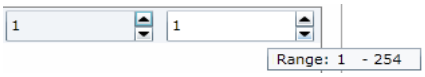
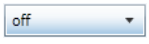
The CP700 is compatible with Bender BMS devices and universal measuring devices PEM… (also see "CP700-compatible devices" on page 14).

CAUTION

Incorrect parameter setting on bus devices may result in malfunctions! Therefore, the CP700 is to be protected by passwords against unauthorized access!

In the factory setting, password protection is deactivated. This facilitates the **first** parameter setting during commissioning.

6.7.1 Operating elements for parameter setting

	Edit field to change the values using the "▲" or "▼" buttons Slide the cursor over the edit field to view the value range
	Drop down list to select modes and functions. Click the button to open the list
	Corresponding function of the button

6.7.2 Setting the parameters for RCMS460-L

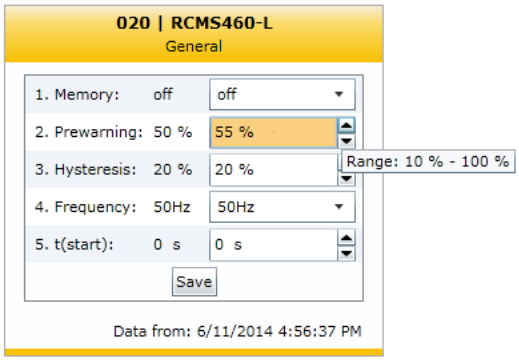
Click "Login" prior to parameterisation even if password protection is deactivated! Logging in ensures that only one user can change parameters at a given point of time.

If a user has already logged on via the CP700, the next user will be informed about it.

Example:
The percentage prewarning level of the RCMS460-L is to be set to 55 % of the alarm value.

1. Login to the menu bar for setting the parameters. 

The "General" window will then show additional input fields.
2. Select "Bus overview" > "RCMS460-L" > Load menu" resp. "Reload menu" >"Settings" > "General".
3. Select "2. Prewarning", to increase the response value "▲" from 50 to 55 %. The colour of the edit field changes when a change has been made. The percentage prewarning threshold has been changed.



4. Press "Save". The result of the changes will appear in the "Parameterisation overview" window. Side effects displayed, displayed where appropriate, provide information about indirect impact of parameter setting on other device functions.
5. Click the "Log out" button in the menu bar, if no other settings are to be changed. Further parameter setting is only possible after logging on again.

6.7.3 Parameter setting of the CP700 using the "Settings" menu

If the device is incorrectly connected, parameter setting is not possible!
If the plug of the BMS connecting cable is not plugged in, the CP700 will not be presented on the web user interface. Therefore, ensure that the BMS connecting cable is connected to the CP700.

Once the CP700 is installed, parameterised via the device display and connected to the web server of the gateway, additional settings or changes can be carried out comfortably using the browser. For this purpose, the CP700 provides its own menu.

1. Login to the menu bar. 

2. Select "Bus overview" > "CP700" > "Load menu" resp. "Reload menu" > "Settings".

Menu level 2	Menu level 3	Menu level 4	Factory setting	Description
Server	IP	1. IP	192.168.0.254	Set the IP address of the CP700
		2. SN	255.255.0.0	Set the subnet mask of CP700
	Standard gateway	1. IP	192.168.0.1	Set the IP address of the gateway
	DHCP	1. DHCP	on	Activate/deactivate automatic IP address assignment using the DHCP server
		2. T(off)	30 s	CP700 contacts the DHCP server for maximum 30 s to obtain an IP address; the communication time is adjustable in steps of five seconds for approx. 5...60 s; if no DHCP server can be reached, CP700 will use the currently set IP address
Interface	1. Address	—	2	Set the BMS address of CP700: 1…99 Setting has an effect on the internal bus
	2. Interval	—	2 s	Set the cycle time 1…3 s for the sequence: - Querying alarms in the BMS bus - Querying new bus devices - Offering the BMS master function
Modbus	1. Control	—	off	Switch on or switch off the control via Modbus
	2. Baud rate	—	9600	Select the baudrate for the Modbus
	3. Parity	—	even	Select parity for the Modbus
Display	1. Timeout	—	5 min	If no entry is made via the touchscreen for a predefined time, the touch screen will be blanked (energy-saving mode). If the touch screen of the CP700 is touched, it will switch on again.

Menu level 2	Menu level 3	Menu level 4	Factory setting	Description
History/ Logger	History	1. Delete	—	Delete the history memory. The entry must be confirmed once again.
	Data logger	—	Data logger 1	Click the "▼" symbol and select the data logger to be set. 1, 2, … single data logger 1…12 all 12 data loggers
		1. Status	off	Activate or deactivate the data logger
		Address and channel of the device to be monitored:		
		2. System	1	External BMS bus address
		3. Address	2	Internal BMS bus address
		4. Channel	1	Channel of the BMS device
		A new entry will be saved when all three conditions (modification, trigger, modification) are fulfilled (AND operator):		
		5.Modific.	2%	A new measured value will be saved if it differs from the previous measured value by the percentage value defined here.
		6. Trigger	off	A new entry will be saved after xx hours resp. 7 days.
		7. Modific	off	A new measured value is saved if it differs from the previous measured value by the absolute value defined here.
		8. Overwrite	yes	yes: If the memory is full (1000 entries per data logger), the oldest entry will be deleted to create space for the new entry (ring buffer). no: Data logger records 1000 measured values then stops.
		9. Delete	—	Delete data logger. The entry must be confirmed once again.
	Interface	1.Interface	off	Recording of the BMS-bus traffic, adjustable for 1...7 days or deactivation of the log function
Clock	1. Format	—	d.m.y	Date format
	2. Date	—	01.01.2010	Date
	3. Time	—	00:00	Time
	4. CEST	—	off	Select Central European Summer Time: off = Function switched off DST = Automatic switchover, USA, CDN CEST = Automat. switchover, Central Europe on = set time zone + 1 h
	5. NTP	—	off	Activate/deactivate the NTP server query for time synchronisation;
	6. IP	—	192.168.0.123	Set the IP address for the NTP server
	7. UTC	—	+1	Time zone setting (-12...+13): UTC + 1h = CET UTC + 2h = … UTC + 3h = …

Menu level 2	Menu level 3	Menu level 4	Factory setting	Description
Password	Device	1. Password	000	Enter/change password: 0…999
		2. Status	off	Enable/disable password protection for **Parameter setting via the buttons of the CP700**
	Server	1. Password	default	Enter/change password with a maximum of 10 characters: a...z, 0...9, minus sign, underscore
		2. Status	off	Enable/disable password protection for access to the CP700 web server
	Login	1. Password	default	Enter/change password with a maximum of 10 characters: a...z, 0...9, minus sign, underscore
		2. Status	off	Enable/disable password protection for the **Parameter setting via web user interface**
	FTP	1. Password	default	Enter/change password with a maximum of 10 characters: a...z, 0...9, minus sign, underscore
		2. Status	off	Enable/disable password protection for **FTP access to CP700**

The setting of the password protection is described on page 40, the parameter setting of a bus device by the example of an RCMS460-D starting on page 60.

6.8 Entering individual texts

Individual texts allow unique identification of devices and measuring points (channels). The texts appear on the webuser interface, in exported files (backups) or in the visualisation.

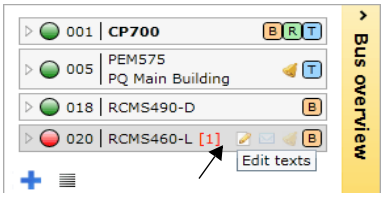
Economising on texts in larger BMS systems!
If an individual text is assigned to each channel of a device, the limit of 1200 texts can be reached in larger BMS systems. Therefore it is recommended to use texts that apply to the whole device. These will be counted as one text entry, although they are displayed for all device channels.

6.8.1 Enter individual texts for an RCMS460-L

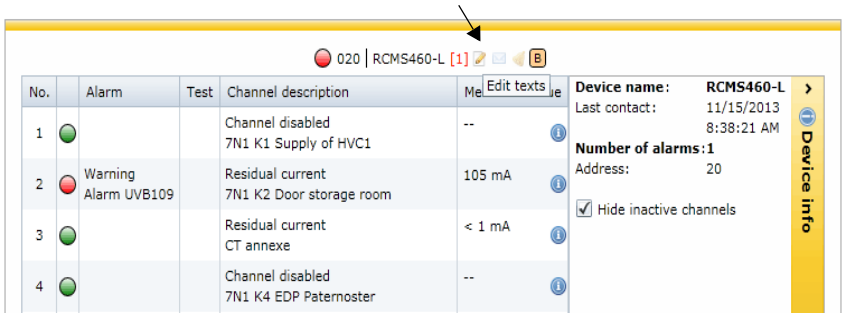
Example: Individual texts are to be assigned to an RCMS460-L and to its channels.

1. Login to the menu bar. 

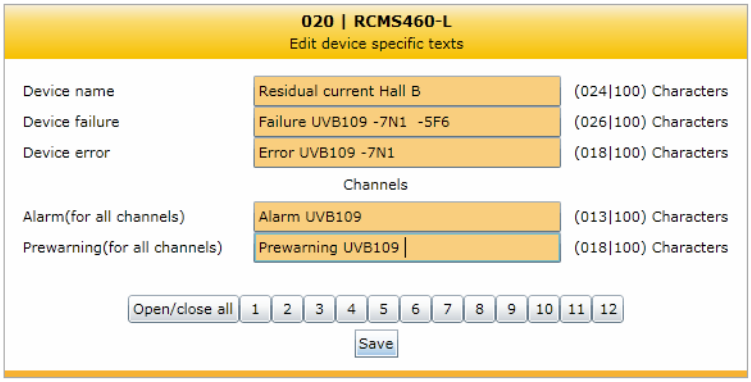
2. Click the "Edit texts" field of the "RCMS460-L" bus device. This is optionally available in the bus overview or in the device information.



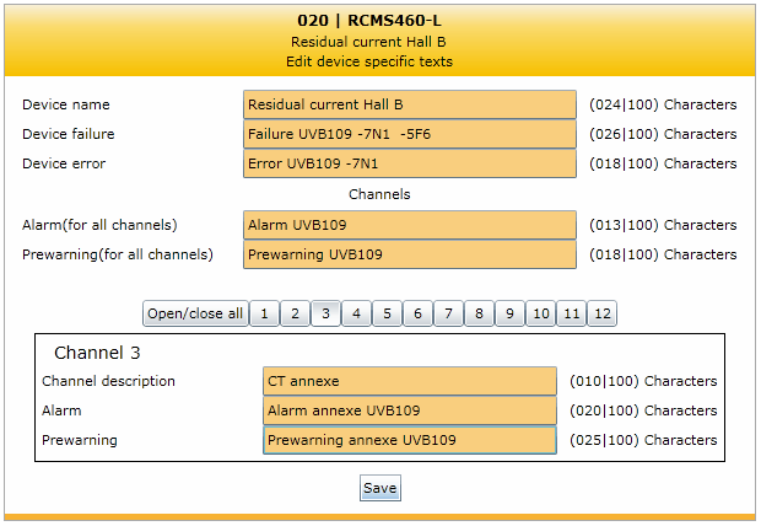
or



3. Complete all fields which are to be applied for the whole "RCMS460-L" device. It is possible to leave fields unused.



4. Proceed as follows to enter texts which are to be used for several channels:
   - Click in turn the respective channels to open its input form. Clicking a channel again will close the input form.
   - In case of longer lists, use the "Open/close all" button
   - Complete all fields which are intended for each of the selected channels. (Example: channel 3). It is possible to leave fields unused.

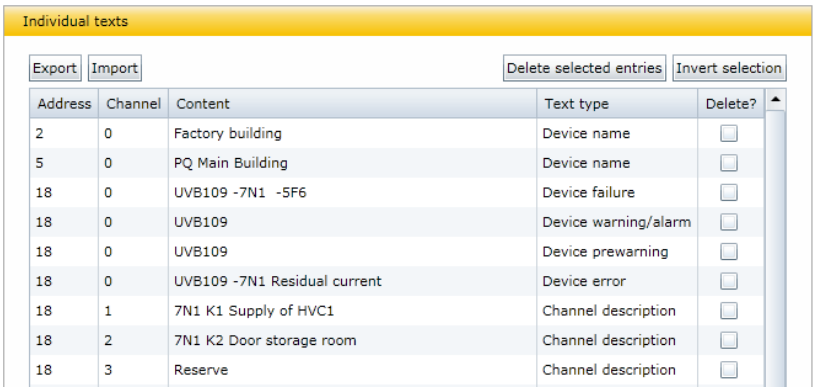


5. Press "Save". Modifications take effect immediately. The bus overview shows the RCMS460-L and the associated text.
6. Click the "Log out" button in the menu bar, if no other settings are to be changed.

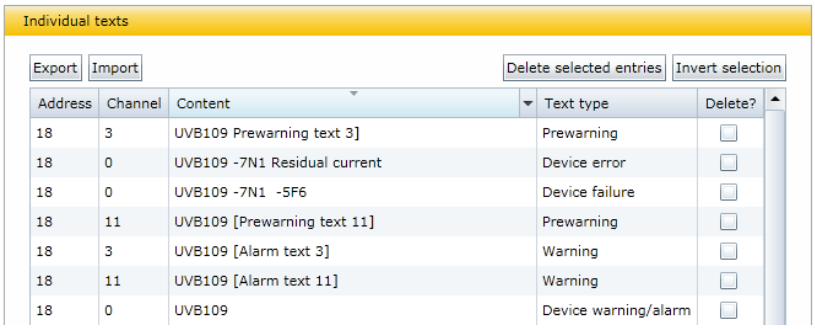
6.8.2 Displaying, filtering, exporting and importing individual texts

6.8.2.1 Displaying individual texts

1. Select "Tools" > "Configuration" > "Individual texts". The window "Individual texts" appears.

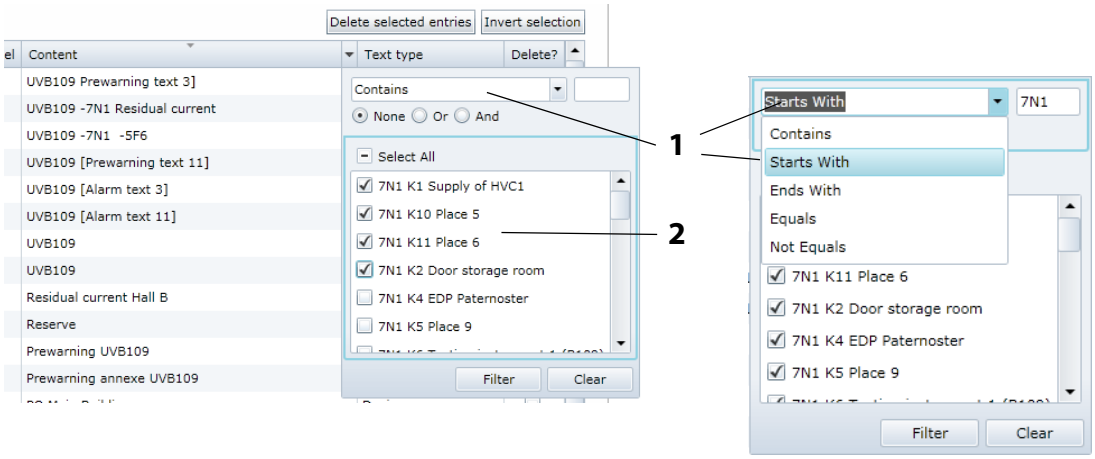


2. Click or double-click the column heading. The data will be sorted according to the column heading in ascending or descending order.



6.8.2.2 Filtering entries

1. Move the mouse without clicking close to the required column heading.
2. Click the "▼" symbol.



3. Enter your own filter criteria (1) or activate/deactivate filter criteria proposed in the list (2).

4. Click the "Filter" button. The " " symbol will appear next to the column heading. The filter is set.
5. It allows the setting of several filter criteria which are to be fulfilled at the same time. In addition, the entries can be sorted. If a filter is no longer required, Click the " " symbol and then on the "Clear" button.

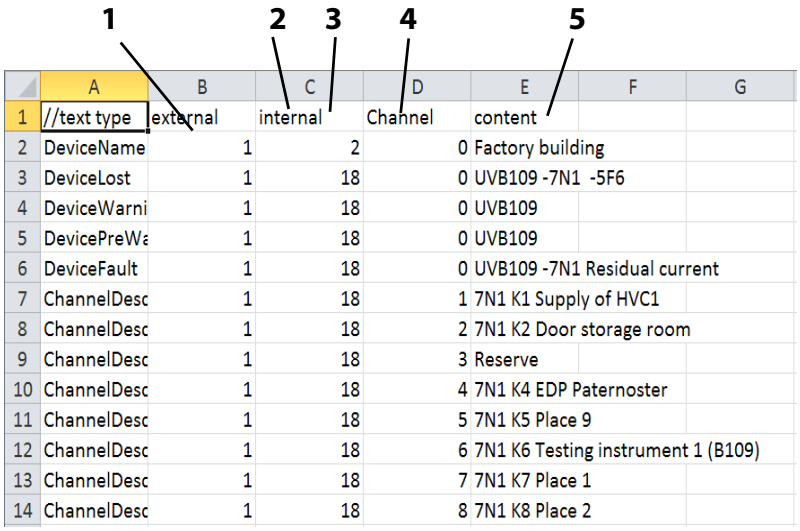
6.8.2.3 Exporting individual texts

Click on "Export" to export data in CSV format. The data can be externally displayed (e.g. in Excel®) printed and edited.

6.8.3 Editing and importing individual texts

Individual texts can be externally created in CSV format (character encoding: UTF-8), edited and imported to the CP700.

Evaluation is carried out line by line. The identification in the first line informs about the type of individual text. The lines can be in any order. The layout within the lines is as follows:



	A	B	C	D	E	F	G
1	//text type	external	internal	Channel	content		
2	DeviceName	1	2	0	Factory building		
3	DeviceLost	1	18	0	UVB109 -7N1 -5F6		
4	DeviceWarni	1	18	0	UVB109		
5	DevicePreWa	1	18	0	UVB109		
6	DeviceFault	1	18	0	UVB109 -7N1 Residual current		
7	ChannelDesc	1	18	1	7N1 K1 Supply of HVC1		
8	ChannelDesc	1	18	2	7N1 K2 Door storage room		
9	ChannelDesc	1	18	3	Reserve		
10	ChannelDesc	1	18	4	7N1 K4 EDP Paternoster		
11	ChannelDesc	1	18	5	7N1 K5 Place 9		
12	ChannelDesc	1	18	6	7N1 K6 Testing instrument 1 (B109)		
13	ChannelDesc	1	18	7	7N1 K7 Place 1		
14	ChannelDesc	1	18	8	7N1 K8 Place 2		

Key

1 Identifier allowing the CP700 to recognise what kind of individual text it is.
Other possible identifiers:
// Comment line

2 External BMS bus address

3 Internal BMS bus address

4 Channel number of the BMS device.
Channel number "0" means that this text applies to the whole device.

5 Individual text which will be assigned to the BMS device

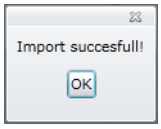
Description of identification in column A

Identification in column A	Plain text	Individual text is being displayed..
DeviceName	Device name	... as name of the device
DeviceLost	Device failure	... when the device has failed
DeviceFault	Device error	... when the device signals a fault
DeviceWarning	Alarm (for all channels)	... when one of the channels signals an alarm
DevicePreWarning	Prewarning (for all channels)	... when a prewarning is signalled by one of the channels
ChannelDescription	Description channel	... as a description of an individual channel
ChannelWarning	Warning/alarm channel	... when an alarm is signalled by an individual channel
ChannelPreWarning	Prewarning channel	... when a prewarning is signalled by an individual channel

If individual texts are to be assigned to many BMS devices, we recommend to proceed as follows:

1. Login to the menu bar. 

2. Create individual texts for a BMS device on the web user interface (see chapter "7.7 Entering individual texts")
3. Export these individual texts to a CSV file
4. Open the CSV file (e.g. using the Windows editor). Enter individual texts in the same way for all other devices in the CSV file according.
5. Select "Tools" > "Configuration" > "Individual texts".
6. The window "Individual texts" will appear. Click "Import" and select the file to be imported.
7. After successful import, the message appears.

   Click "OK"
8. Click the "Log out" button in the menu bar, if no other settings are to be changed.

Individual texts can also be set and assigned to devices not currently existing, if device failure monitoring has been parameterised.

6.9 E-mail notification in the event of an alarm

CP700 allows e-mail notifications to be sent in the event of an alarm or system fault to different groups of users. Up to five different templates can be set up. For using e-mail notifications, the CP700 must include Option A.

In just two steps e-mail notifications can be set up:

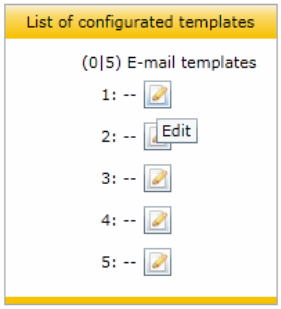
1. Create templates: To whom and when is an e-mail to be sent
2. Select devices and channels which are to trigger an e-mail notification

6.9.1 Create templates: To whom and when is an e-mail to be sent

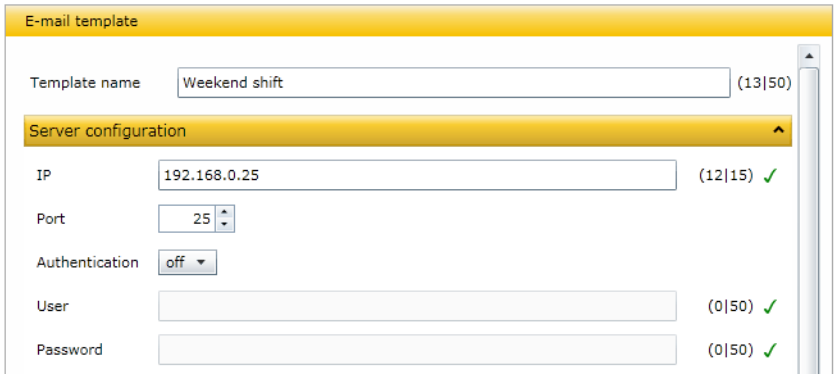
A maximum of five templates can be created.
Example: A template for the weekend emergency service is to be created.

1. Login to the menu bar. 

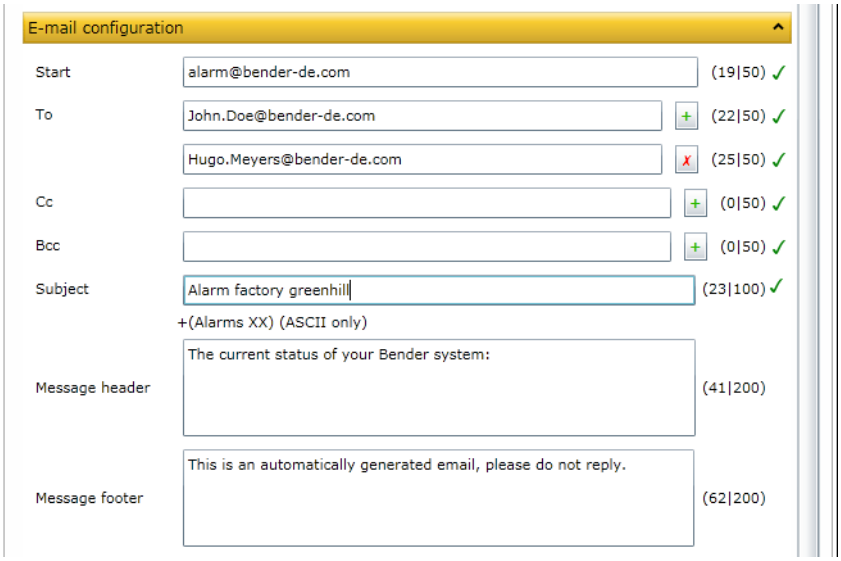
2. Select "Tools" > "Configuration" > "E-mail configuration".
3. Click "  " to edit this template.



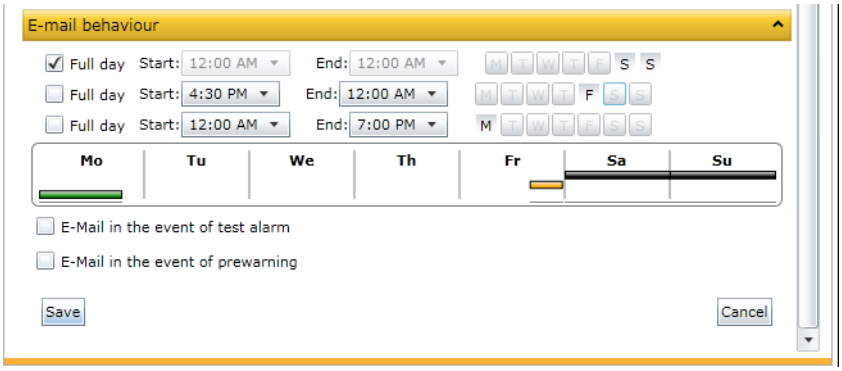
4. Enter the template name and the server settings.
   The CP700 uses the e-mail server of the network in which it is located. Enter the IP address and the port **of the e-mail server**. Enter the name of the user and the password for SMTP authentication.



5. E-mail settings
   - Enter the sender address to be displayed.
   - Enter the address the e-mail is to be sent to. Click "+" to add address fields.
   - Enter subject, header and footer. There must not be umlauts in the subject line.

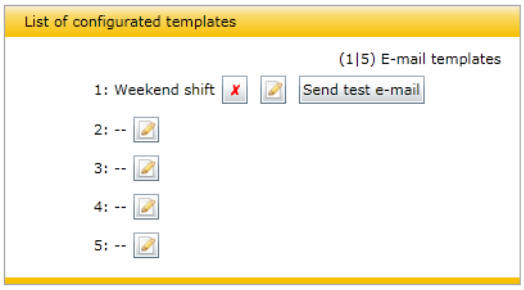


6. E-mail behaviour:
   - Select days and hours that are to be applied for the template.
   - Activate or deactivate "E-mail in the event of test alarm" resp. "E-mail in the event of prewarning" ".



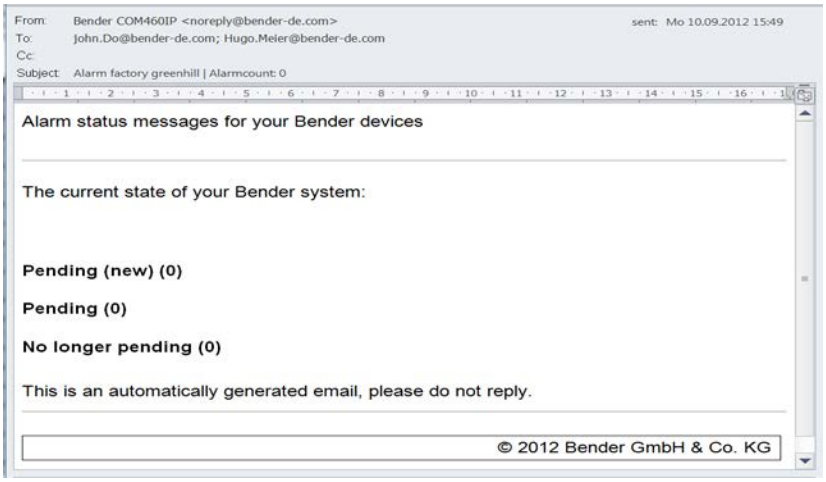
7. Click "Save" to save the entries.

8. The list of configured templates will appear.



Click "Send test e-mail" to check the correct function of this e-mail notification. Other operating options:
- Click "✗" to delete this template
- Click "✎" to change this template

9. Open your e-mail post box to display the "Test e-mail".

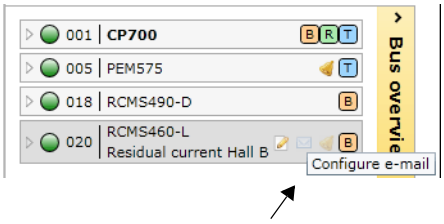


10. Click the "Log out" button in the menu bar, if no other settings are to be changed.

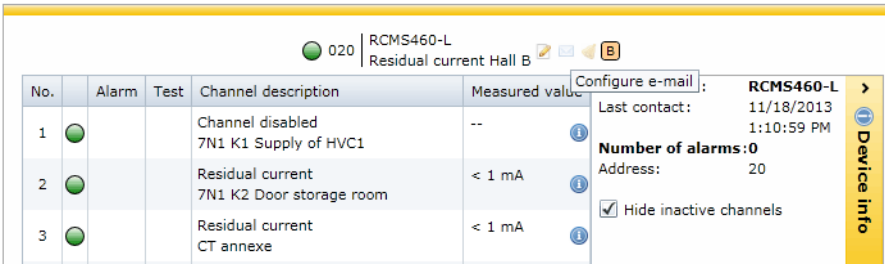
6.9.2 Select devices and channels that are to trigger an e-mail notification

1. Login to the menu bar. 

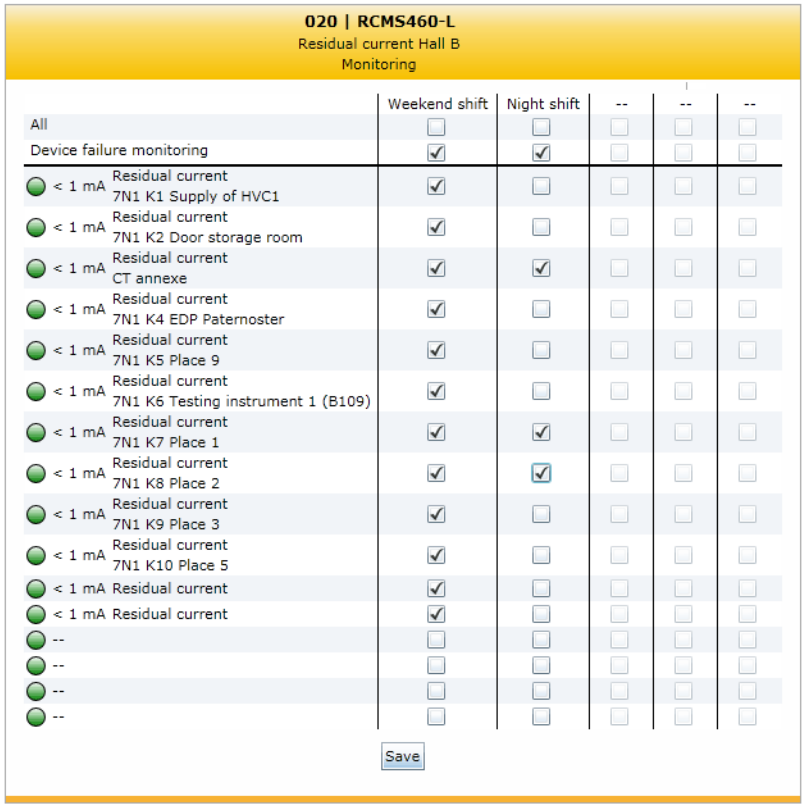
2. Click the "Configure e-mail" field of the "RCMS460-L" bus device. This is optionally available in the bus overview or in the device information.



or



3. Assign the devices and channels that are to trigger an e-mail notification to the respective templates.



Click "Save" to save the entries. The blue symbol " " in the bus overview shows that e-mail notifications for this device have been stored.

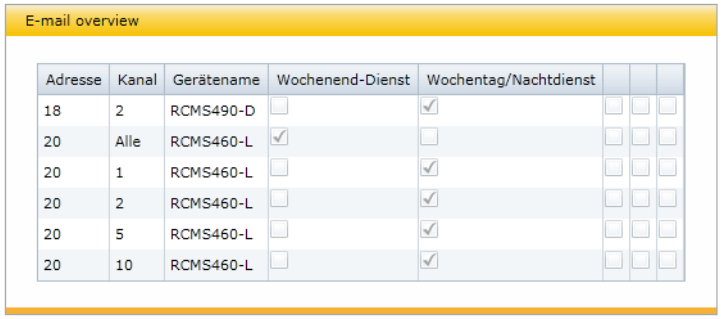
4. Repeat steps 2 and 3 for all devices assigned to the CP700.

You can also set up e-mail notifications for devices currently not available on the bus if a device failure monitoring function has been configured for these devices.

5. Click the "Log out" button in the menu bar, if no other settings are to be changed.

6.9.3 Displaying an e-mail overview

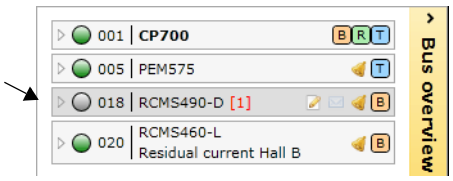
Once the e-mail notifications are set up for all required devices, an overview can be displayed. Select "Tools" > "Configuration" > "E-mail overview"



6.10 Using the device failure monitoring function

Devices assigned to the CP700 can be monitored for failure.

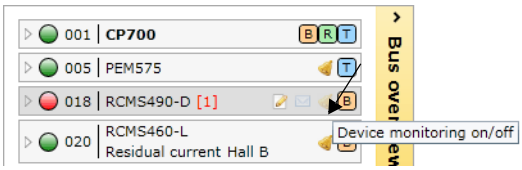
Behaviour when device failure monitoring is activated
If the device fails the "Alarm status" field in the bus overview is grey-shaded out.



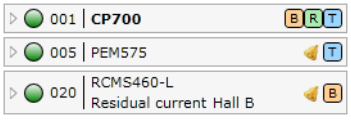
Although the device is currently not available, it is treated as if it were available:

- An alarm will be signalled in the event of a device failure
- It will be displayed in the bus overview
- Individual texts can be entered
- E-mail notifications can be configured
- It can be visualised

Behaviour when device failure monitoring is deactivated
The device RCMS490-D will not be monitored for failure.



If the device RCMS490-D fails, it will disappear from the list. **No** alarm will be signalled.

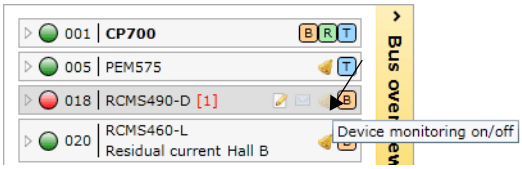


6.10.1 Activating/deactivating device failure monitoring function in the bus overview

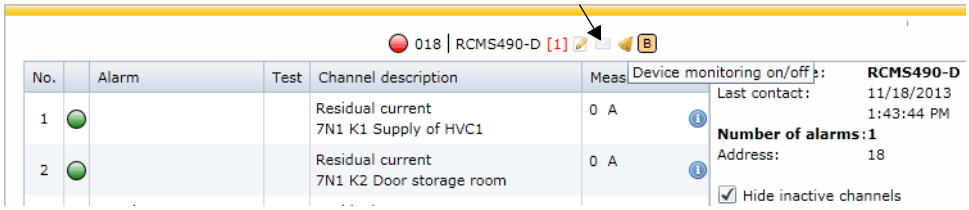
Activating device failure monitoring function
Example: The RCMS460-D is to be monitored for failure.

1. Login to the menu bar. 

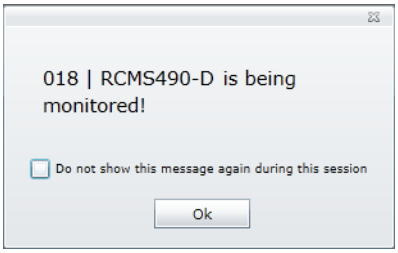
2. Click "Device failure monitoring on/off" of the bus device "RCMS460-D". This is optionally available in the bus overview or in the device information.



or



3. A message will confirm the activation of device failure monitoring.



In the bus overview the symbol " " shows that this device is monitored for failure.

4. Click the "Log out" button in the menu bar, if no other settings are to be changed.

Deactivating the device failure monitoring function
Example: The device failure monitoring function of the RCM460-L is to be deactivated

1. Login to the menu bar. 

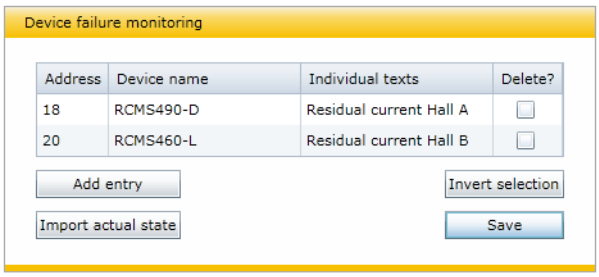
2. Click the "Device failure monitoring on/off" field of the bus device "RCMS460-L". This is optionally available in the bus overview or in the device information.
3. A message will confirm the deactivation of device failure monitoring.
4. Click the "Log out" button in the menu bar, if no other settings are to be changed. Further parameter setting is only possible after logging on again.

6.10.2 Displaying overview device failure monitoring and adding devices

An overview of the devices monitored for failure will be displayed. Devices not yet connected to the BMS bus can be added by entering the planned BMS address. For these devices individual texts can be entered and e-mails can be configured. They can be visualised.

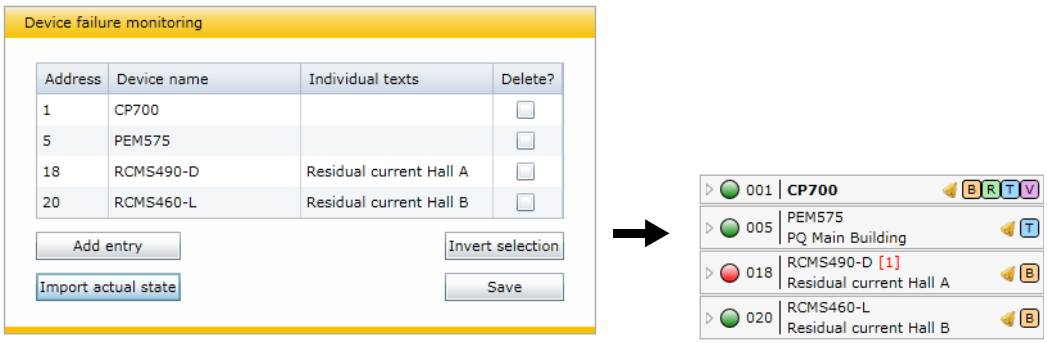
1. Login to the menu bar. 

2. Select "Tools" > "Configuration" > "Device failure monitoring".
3. An overview of the devices monitored for failure will be displayed.



Monitoring all BMS devices

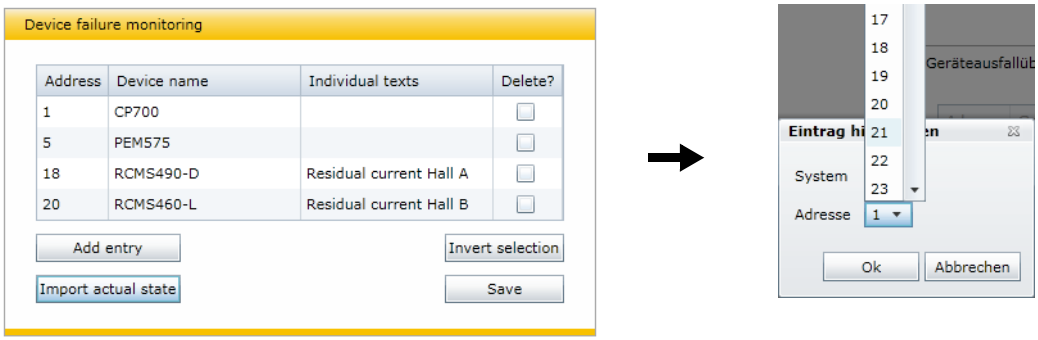
Select "Tools" > "Configuration" > "Device failure monitoring". Click "Import current state" and then "Save" to monitor all active devices for failure which are currently connected to the BMS bus.



In the bus overview now all devices are now marked with the symbol " ".

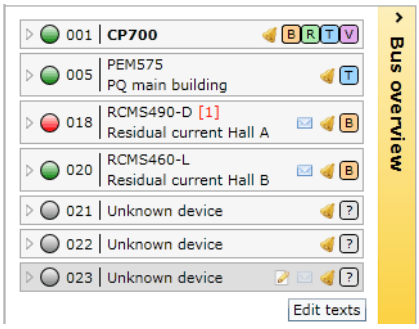
Assigning a device to the CP700 that has not yet been connected

1. Select "Tools" > "Configuration" > "Device failure monitoring". Click "Add entry" to add a device not yet connected.
2. Select the BMS address of the device and then click "OK".



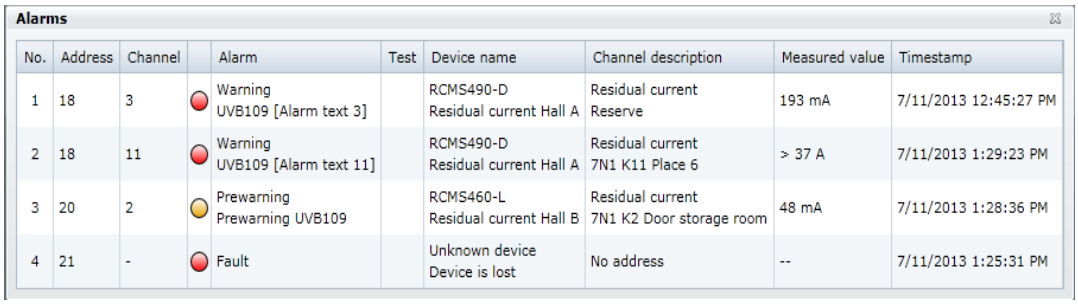
Repeat step 2 for all devices to be added. Once all devices are added, click "Save". Although the devices are currently not available, they are treated as if they were available:

- An alarm will be signalled in the event of failure of these devices
- They will be displayed in the bus overview
- Individual texts can be entered
- E-mail notifications can be configured
- They can be visualised



6.11 Alarms

1. Click the common alarm button marked with an "!" or on the "Alarms" menu to open the window with the same name. Opening the window "Alarms" will deactivate the background.



   Alarms can be sorted and filtered.

2. Close the alarm window by clicking on the "Close" symbol in the top right corner or press the "ESC" button to return to the main menu.

The meaning of the table entries is described below.

No.	Consecutive number of alarms
Address	Internal BMS address
Channel	BMS channel number
red **Yellow**	Red = alarm, warning, device error Yellow = prewarning
Alarm	Alarm, warning, prewarning, device error
Test	Alarm caused by "Internal test"
Device name	Name of the BMS device
Description	Description of the alarm or operating message
Measured value	Measured values transmitted from the bus
Timestamp	Time and date the first alarm occurred

6.12 Tools

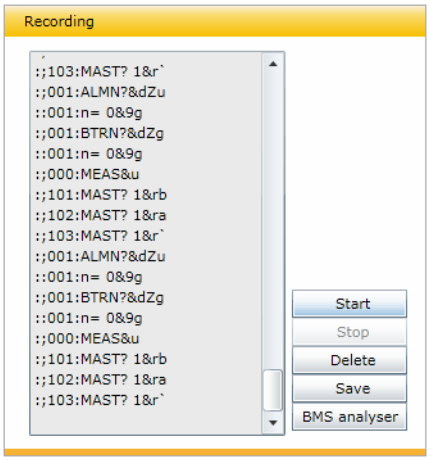
Select "Bus overview" > "Tools".

Display	Menu	Menu item	Page
◢ BMS Recording Analyser Log files ◢ Network Parameter Socket status ◢ Software Update Options ◢ Modbus Modbus register Control commands Manage devices ◢ Configuration Individual texts Device failure monitorin E-mail overview E-mail configuration Visualisation ◢ Miscellaneous Manual System visualisation Manage virtual devices	BMS	Recording	82
		Analyser	83
		Log files	86
	Network	Parameters	86
		Socket state	87
	Software	Update	88
		Options	90
	Modbus	Register	93
		Control commands	95
		Manage devices	114
	Configuration	Individual texts	67, 96
		Device failure monitoring	78, 96
		E-mail overview	75, 96
		E-mail configuration	71, 96
		Visualisation	97
	Other	Manual	109
		System visualisation	110
		Manage virtual devices	117

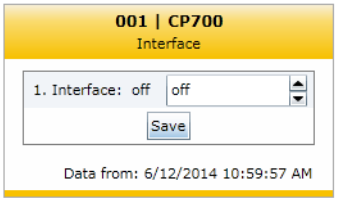
6.12.1 BMS recording

You can record the current BMS bus traffic for control and analysing purposes and save it in a separate file on an external medium. For accessing and analysing recordings, use the BMS analyser.

1. Click "Tools" > "BMS" > "Recording". Recording will start immediately.
2. As soon as you consider the volume of the recording as sufficient, press the "Stop" button. Recording is finished.
3. Now you have the choice to
   - delete the recording
   - save it on the PC or an external medium
   - or to evaluate it using the BMS analyser
4. Click the respective button to carry out one of the activities listed above



In addition to the method described here, it is possible to record the BMS traffic (BMS logger) for a period of 1…7 days.
Select "Bus overview" > "CP700" > "Load menu" resp. "Reload menu" > "Settings" > "History/logger" > "Interface". Select the preferred duration by mouse click.

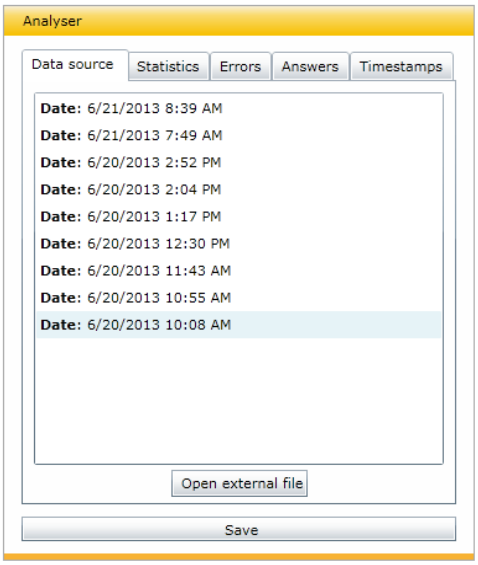


6.12.2 BMS analyser

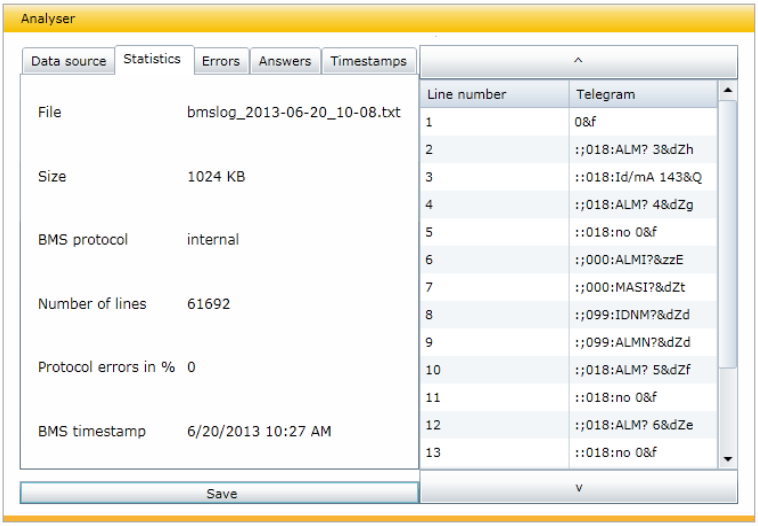
With this tool, you can select the log file you need, open this file and analyse the recorded data of the BMS bus using the different submenus.
The log files either are derived from the BMS logger previously activated in CP700 (CP700 >Settings > History/Logger > Interface) or from the BMS recording. The recorded files of the BMS logger are listed in the "Data source" submenu. Click the "Open external file" button to import the recorded BMS data.
In the following example, data of the BMS logger are used.

Open recorded log files:

1. Click "Tools" > "BMS" > "Analyser".
2. Click the date of the desired file you need to open the "Statistics" data field.
3. In this data field, in particular, check the value "Protocol errors in %".
   If the value is greater than 0, further analyses will be necessary. The "Errors" submenu may be helpful in this case.



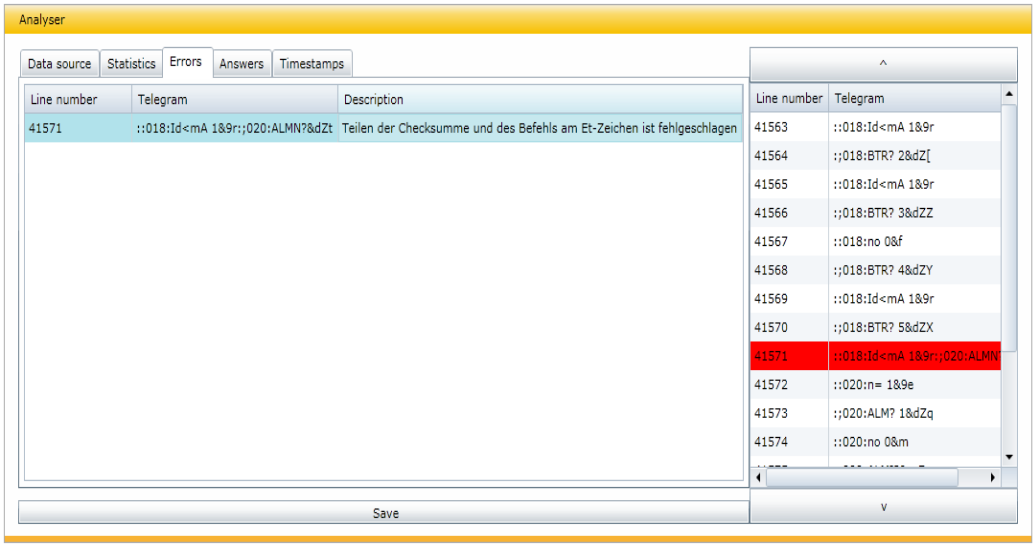
BMS analysis, statistics



BMS analysis, error

In the "Errors" list field, bus faults and special bus activities are listed. Faults appearing in the right protocol field are marked in red, bus activities by contrast are marked in grey.

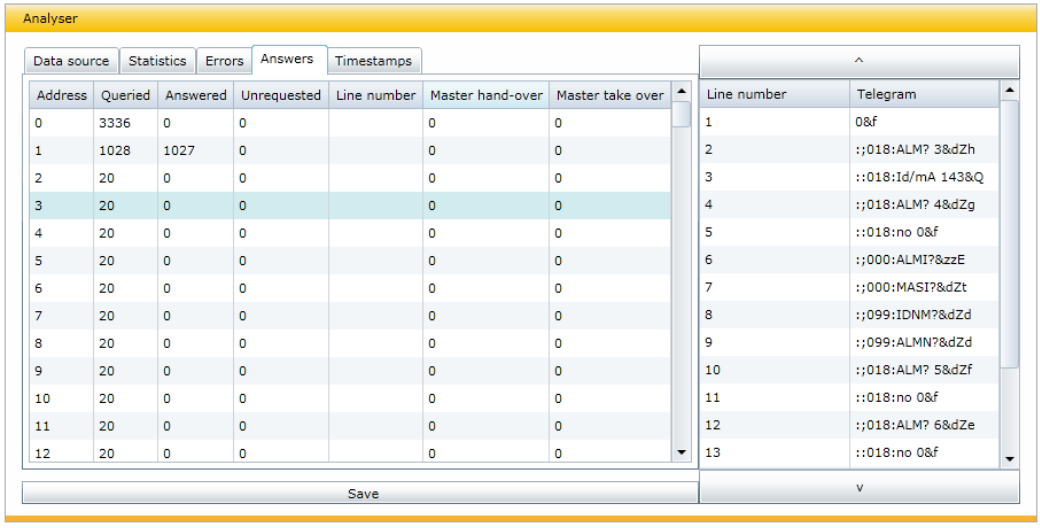
1. Click the first line of the list in the "Errors" list field. As a result, the first faulty line in the right protocol field will appear red marked.
2. Proceed accordingly with the next and the other lines in the "Errors" list field. The selected line of the protocol field will be highlighted.



BMS analysis, answers

In the "Answers" list field, the master-slave behaviour relating to the BMS addresses of the bus devices is shown in detail. The column "Unrequested", for example, shows whether a certain bus device has answered without having received a request.

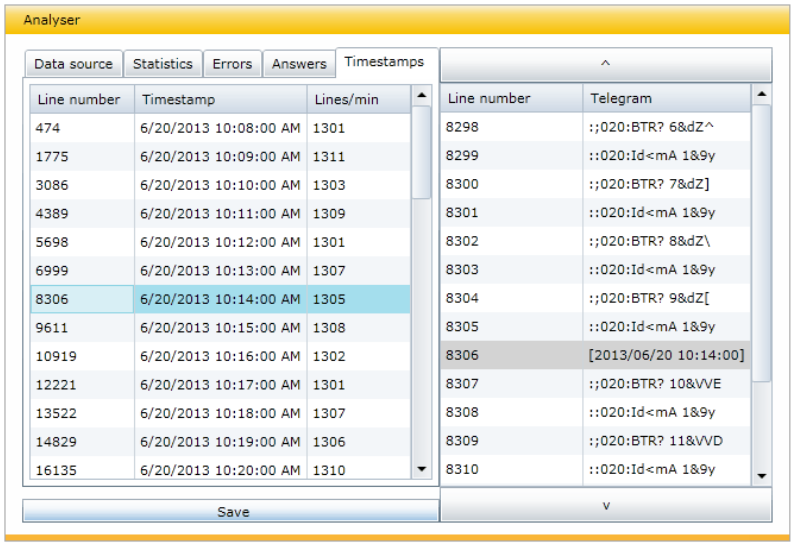
1. Click the "Answer" tab“, to open the list field of the same name and to get information about the answering behaviour of the recorded bus devices.



BMS analysis, timestamp

Every minute, timestamps are added to the BMS data flow.
In the "Timestamps" list field, the timestamps added and the associated line numbers are put into context. In addition, you can see how many lines have been recorded between two timestamps. This information may be useful for the analysis of bus faults.

1. Click the "Timestamps" tab. The timestamps will appear in the list box in chronological order.
2. Click on one of the other timestamps in the list field on the left. In parallel, the associated timestamp of the recorded BMS traffic will be highlighted in the protocol field.



6.12.3 BMS Log files

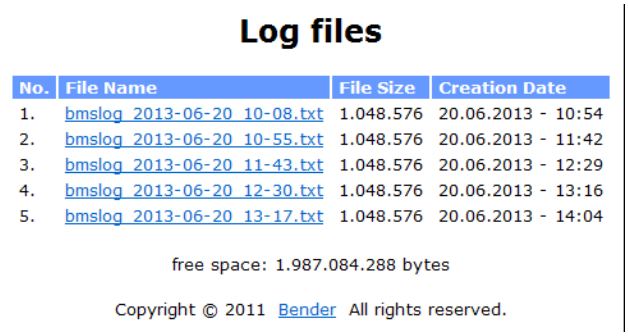
Use this menu item to view the complete text of the log file in a browser window.

Start recording

Select "Bus overview" > "CP700" > "Load menu" resp. "Reload menu" > "Settings" > "History/logger" and specify the number of days you want to record.

Display recording

1. Click "Tools" > "BMS" > "Log files". The list of all log files that are automatically recorded will appear in a browser window.



Log files

No.	File Name	File Size	Creation Date
1.	bmslog_2013-06-20_10-08.txt	1.048.576	20.06.2013 - 10:54
2.	bmslog_2013-06-20_10-55.txt	1.048.576	20.06.2013 - 11:42
3.	bmslog_2013-06-20_11-43.txt	1.048.576	20.06.2013 - 12:29
4.	bmslog_2013-06-20_12-30.txt	1.048.576	20.06.2013 - 13:16
5.	bmslog_2013-06-20_13-17.txt	1.048.576	20.06.2013 - 14:04

free space: 1.987.084.288 bytes

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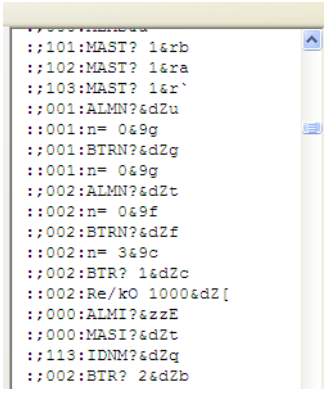
2. Click the required log file in the "File name" column. The recorded BMS lines appear in text format in a separate window.



```
:;101:MAST? 1&rb
:;102:MAST? 1&ra
:;103:MAST? 1&r`
:;001:ALMN?&dZu
::001:n= 0&9g
:;001:BTRN?&dZg
::001:n= 0&9g
:;002:ALMN?&dZt
::002:n= 0&9f
:;002:BTRN?&dZf
::002:n= 3&9c
:;002:BTR? 1&dZc
::002:Re/kO 1000&dZ[
:;000:ALMI?&zzE
:;000:MASI?&dZt
:;113:IDNM?&dZq
:;002:BTR? 2&dZb
```

6.12.4 Network parameters

You can change the network parameters of the CP700 in this menu.
Only change parameters after careful planning!

CAUTION

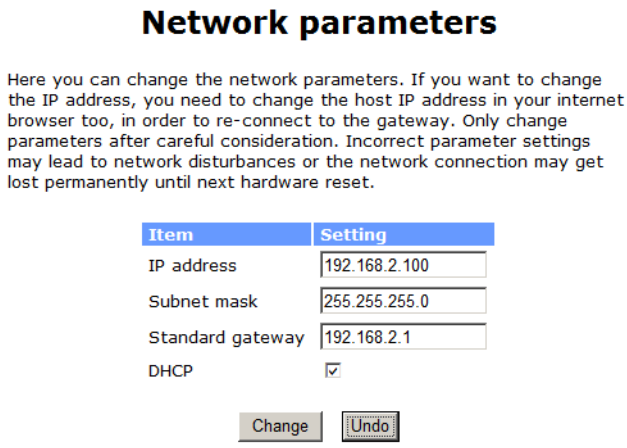
Incorrect settings may lead to serious disturbances in the network!

The following parameters can be set:

- IP address
- Netmask
- Standard gateway
- DHCP activated/deactivated

Proceed as follows:

1. Select "Tools" > „"Network" > "Parameter". The window "Network parameters" will appear.

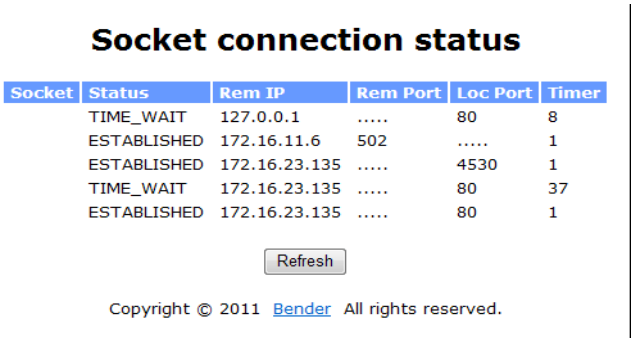


2. Carry out your modifications and enter them into the input fields intended for this purpose and confirm with "Change".
   If you do not want the entries to be saved, select "Undo" to maintain the previous value.

6.12.5 Socket state

The current socket parameters appear in this list field. It allows to check the client/server connections.

1. Select "Tools" > "Network" > "Socket status". The current state of all sockets appears in a browser window.
2. Click on "Refresh", if you want to update the list of connections.



6.12.6 Software update

You can update the operating software for CP700 as soon as Bender makes a new software version available.
The "Software Update" menu allows you to comfortably:

- load the update file from your computer to the CompactFlash card of the CP700
- start the operating software update

Proceed as follows:

Adjust the browser settings

1. Make sure that JavaScript is activated.
2. Deactivate the pop-up blocker for the duration of the update process.

Open the "Software Update" window

1. Select "Tools" > "Software" > "Update"
2. Find out which software version is installed, e.g.: 2.xx.

Loading the current update file from the Bender Internet server

1. Click on "Bender download area" in the "Software update" window.
   Alternatively you can also enter the address
   `http://www.bender-de.com/en/service-support/download.html`
   into the address line of your web browser.
2. Load the update file `CP700 Vx.xx.BUF from the category software.`
   The category software will be visible as soon as the login procedure has elapsed.
3. Click the respective icon in the software list and specify a place Icon and specify a place to save the update when you are prompted to do so.

Uploading the update file to the CP700

1. Click on "Browse" in the "Software update" menu to select the loaded update file. In the window "Software update" the respective path will appear.
2. Click on "Upload" to copy the update file `CP700 Vx.xx.BUF` to CP700. Once the file transfer is completed the file path is blanked out.

Starting the software update

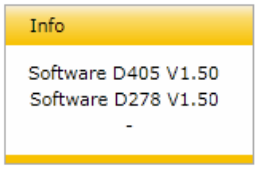
1. Click on "Start update" to start the update of the system files.
   The progress bar in the "Software update" window will tell you when transmission is complete.
2. An activity indicator and the lettering "UPDATE" will appear in the display of the CP700.
   Once the update is completed, after approximately 10 minutes, the device can be operated again.

During the software update, the following directories are deleted and renamed:
\DEVICES
\IMAGES
\JS
\BIN
\HELP
\MISC
\LANG

Select language:

Testing the status of the updated software

1. Select "Info" from the menu bar to open the window of the same title.
2. If the software has been updated correctly, the numbers of the software versions will be identical.



If the number of the version in the upper line is higher than the number in the line below, the browser cache should be cleared and the request for the software version should be repeated.

6.12.7 Software options and licensing

6.12.7.1 Identifying activated software options

Click the menu item "Software options" to make the currently enabled options visible. In line "Activated" in the "Software options" window, currently activated options are indicated with a green check mark, options that are not activated are marked with a red X.

In the standard version of the CP700, all software options are already activated.

Proceed as follows to identify activated options:

1. Select "Tools" > "Software" > "Options".
2. Line "Activated" shows the activated options.

Software options

Functionality	Basic device	Option A Individual texts, e-mail	Option B Modbus/TCP, gateway	Option C Parameterisation	Option D Visualisation
Complete system overview with indication of alarm messages and measured values	•				
Web server with Silverlight	•				
Multilingual menu structure	•				
IPaddress setting manually or via DHCP	•				
Time synchronisation for the BMS bus system via NTP	•				
Diagnostics function (bus log, analyser...)	•				
Modbus/TCP data access for the BMSaddresses 1... 10 on the internal BMS bus	•				
To read out data from the history memory and data logger of BMS devices/with report function	•				
History memory for alarms, warnings and tests	•				
Data logger	•				
Individual text messages for all devices/channels		•			
E-mail/alarm message		•			
Report function (file export) import/export		•		•	
Modbus/TCP data access for all BMS devices			•		
Modbus/TCP to control BMS devices			•		
Parameter setting for all BMS devices				•	
Visualisation					•
System visualisation					•
Data logger Visualisation					•
Activated	✓	✓	✓	✓	✓

Import

Fig. 6.3: The software options A, B, C and D are activated

When not all software options are activated, other options can be acquired and can be imported using a license file.

6.12.7.2 Acquiring licences for additional software options and loading the licence file

Once a licence is acquired from our sales department for one or several software options, the corresponding licence *.BLF will be available under the address

`http://www.bender-de.com/en/licences.html`

As soon as the login procedure has been passed successfully, the website "licences" appears. Follow the user guidance there.

1. Enter the groups of numbers, which are printed on the device label or on the enclosure or are available in the Info menu of the CP700, into the edit fields "Artikel-Nr./Art. no" and Werk-Nr./ Serial no".
2. Then click on "Get licence file". A green text field will appear showing the name of your new licence.
3. Right-click to open the context menu and click on „Target save as". There, you select the memory location and confirm with OK.

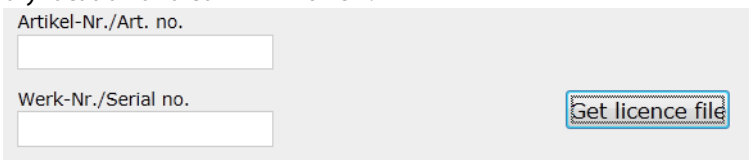


Fig. 6.4: Enter the article number and serial number into the licence window

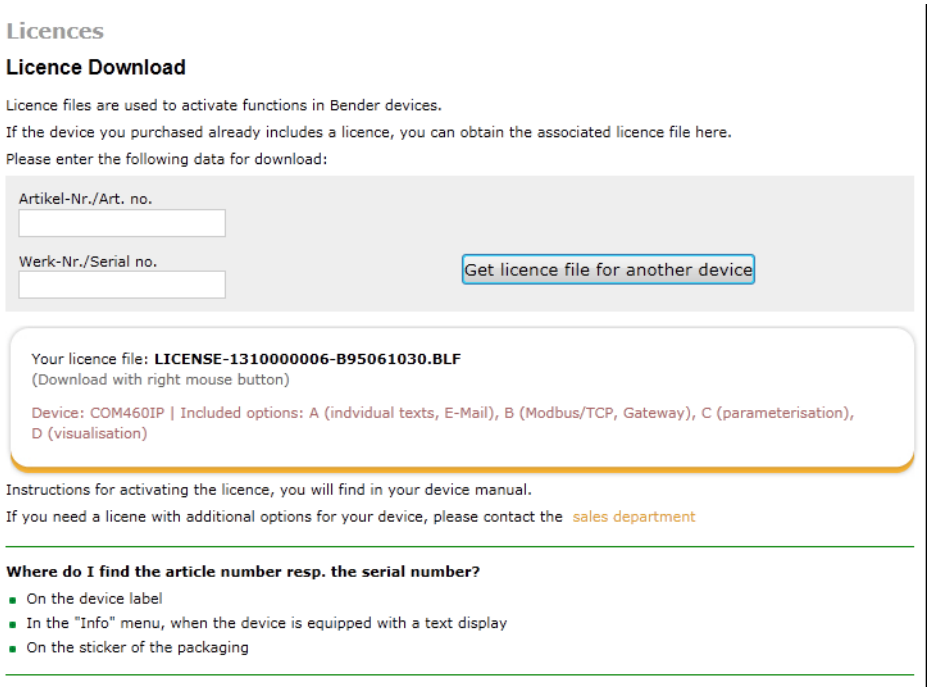


Fig. 6.5: The licence file was generated and must be saved

6.12.7.3 Activate acquired software options

The license file *.BLF loaded from the Bender server has to be imported to the CP700 in order to activate additional software options.

1. Select "Tools" > "Software" > "Options".
2. Click on "Import" to open the file list that contains the loaded licence file of the format *.BLF.
3. Select the required file and confirm with "Open".
   All available options will then be confirmed by a green check mark in the line "Activated" of the "Software options" window.

6.12.8 Modbus register

Also refer to the chapters "Manage Modbus devices" on page 114, "Data access using the Modbus/TCP protocol" on page 121 and "Process image in the memory of the CP700" on page 123.

Display Modbus functions and their register addresses

Sections of the memory image of a BMS device can be represented graphically using the "Modbus register" menu. 12 BMS channels can be displayed individually or details about the device. Up to 30 channels can be displayed on universal measuring devices PEM….
A detailed description of the Modbus data structure can be found on page 121 onwards.

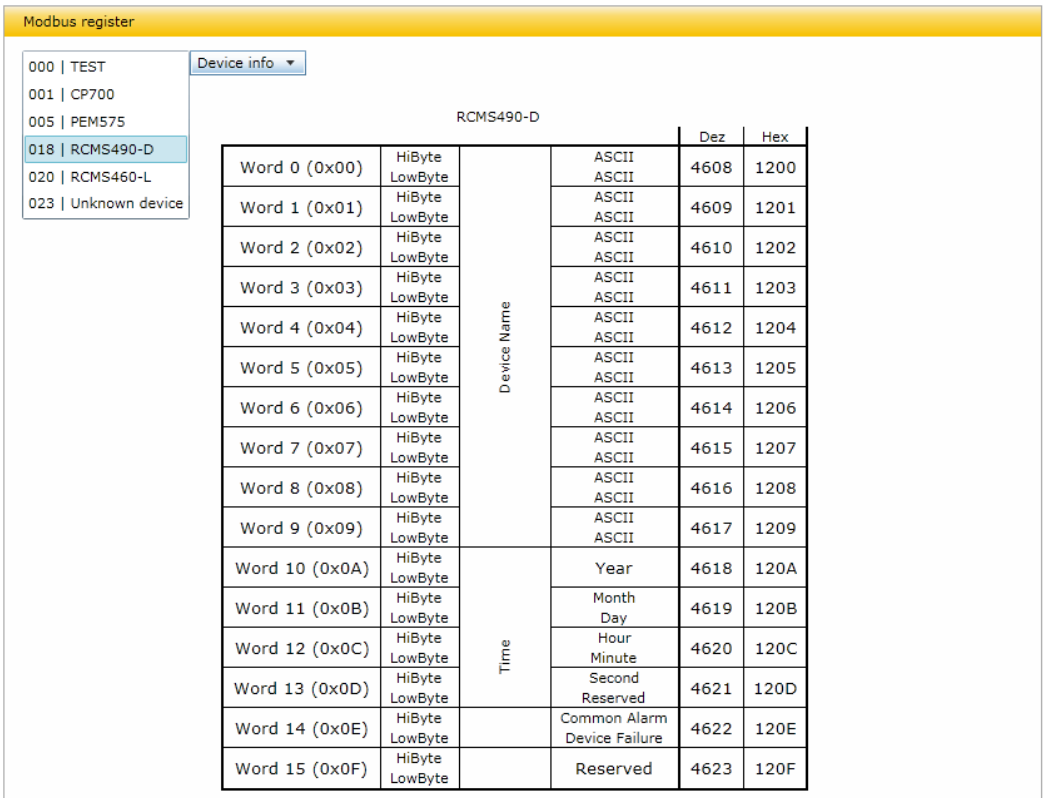
6.12.8.1 Modbus representation of device information

In the example below details about an RCMS460 device with BMS address 18 is shown.

1. Select "Tools" > "Modbus" > "Modbus register".
2. First click on RCMS460-D in the device list and then select "Device info" from the drop down list next to it. The Modbus representation of the device information and the corresponding start addresses will appear.

In the column furthest to the right, the hexadecimal start addresses of the respective information blocks are listed:

- Start address 0x1200 = BMS address 18, device type
- Start address 0x120A = BMS address 18, timestamp
- Start address 0x120E = BMS address 18, common alarm and device error



				Dez	Hex
Word 0 (0x00)	HiByte LowByte	Device Name	ASCII ASCII	4608	1200
Word 1 (0x01)	HiByte LowByte		ASCII ASCII	4609	1201
Word 2 (0x02)	HiByte LowByte		ASCII ASCII	4610	1202
Word 3 (0x03)	HiByte LowByte		ASCII ASCII	4611	1203
Word 4 (0x04)	HiByte LowByte		ASCII ASCII	4612	1204
Word 5 (0x05)	HiByte LowByte		ASCII ASCII	4613	1205
Word 6 (0x06)	HiByte LowByte		ASCII ASCII	4614	1206
Word 7 (0x07)	HiByte LowByte		ASCII ASCII	4615	1207
Word 8 (0x08)	HiByte LowByte		ASCII ASCII	4616	1208
Word 9 (0x09)	HiByte LowByte		ASCII ASCII	4617	1209
Word 10 (0x0A)	HiByte LowByte	Time	Year	4618	120A
Word 11 (0x0B)	HiByte LowByte		Month Day	4619	120B
Word 12 (0x0C)	HiByte LowByte		Hour Minute	4620	120C
Word 13 (0x0D)	HiByte LowByte		Second Reserved	4621	120D
Word 14 (0x0E)	HiByte LowByte		Common Alarm Device Failure	4622	120E
Word 15 (0x0F)	HiByte LowByte		Reserved	4623	120F

Fig. 6.6: Modbus representation of device information

A real BMS device cannot have address 0!
Address 000/TEST only serves to simulate data access
(see "Reference data records of the process image" on page 131).

6.12.8.2 Modbus representation of a BMS channel

In the following example, the BMS channel 1 of an RCMS460 with BMS address is shown.

1. Select "Tools" > "Modbus" > "Modbus register".
2. First click on RCMS460-D in the device list and then select "Channel 1" from the drop down list next to it. The Modbus representation of BMS channel 1 with the respective start addresses will appear.

In the column furthest to the right, the hexadecimal start addresses of the selected BMS channel are shown. These addresses represent the beginning of the related information blocks in each case:

- Start address 0x1210 = BMS address 18, channel 1, floating point value (Value (Float))
- Start address 0x1212 = BMS address 18, channel 1, alarm type and type of test as well as range & unit
- Start address 0x1213 = BMS address 18, channel 1, description

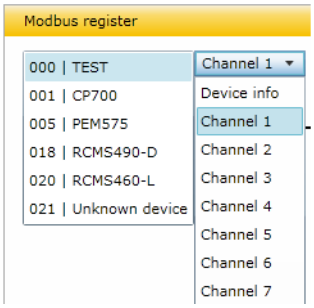


Fig. 6.7: Selection of the BMS device and of an BMS channel

	Dez | Hex		Unit identifier: 0x01			Dez	Hex
Channel 1	Word 16 (10) Word 17 (11)		Value(Float)			4624	1210
	Word 18 (12)	HiByte	Alarm type & Test	Test ext.	7	4626	1212
				Test int.	6		
				State	5		
				Res.	4		
				Res.	3		
				Alarm	2 1 0		
		LowByte	Range & Unit	Range Validity	7 6		
					5		
				Unit	4 3 2 1 0		
	Word 19 (13)	HiByte LowByte	Description			4627	1213

Fig. 6.8: Modbus representation of the BMS address and BMS channel 1

6.12.9 Modbus control commands for BMS devices

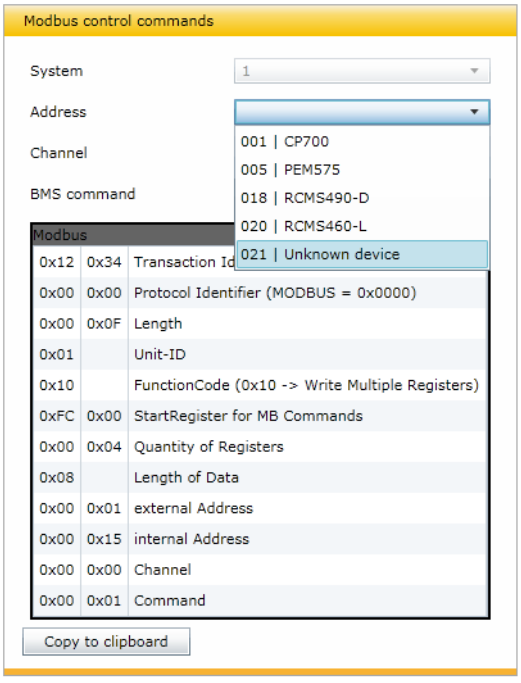
From an external application (e.g. visualisation software) commands can be sent to BMS devices. This menu item provides the Modbus control commands for selected BMS commands.
The control function via Modbus can be activated in the "Settings" > 3. Modbus > 1. Control" menu. (see chapter "6.7.3 ").

Control commands for the internal BMS bus

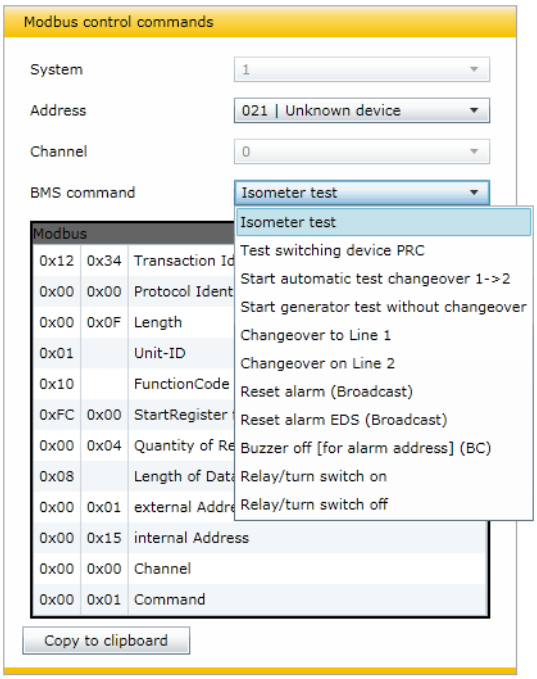
- Test Isometer
- Test changeover device PRC, ATICS
- Start automatic test changeover 1->2, end after T(test)
- Start Test generator without changing over
- Changeover to line 1
- Changeover to line 2
- RESET alarm (broadcast)
- RESET alarm EDS (broadcast)
- Buzzer off [for alarm address] (broadcast)
- Switch on relay/switch
- Switch off relay/switch

These control commands can be copied to the clipboard of the PC and then included in the programming for external application. The menu item "Modbus control commands" therefore serves as a programming aid.

1. Select "Tools" > "Modbus" > "Control commands".
2. Select the address of the device from the list the command is to be sent to. The list shows all devices available on the BMS bus as well as devices which are currently not available, for which a "device failure monitoring" function is set up.



3. Select the command you intend to send to the device from the list "BMS command". Commands marked with "Broadcast" apply to all BMS devices.



The Modbus commands and the associated explanations will be displayed.

4. Click "To the clipboard“. This command can now be included into the programming of an external application (e.g. visualisation software).

6.12.10 Individual texts, device failure monitoring, e-mail configuration

The following functions are described elsewhere within this operating manual:

Menu item	Description	Page
Individual texts	Overview of all individual texts in the web user interface pre-defined for devices and measuring points (channels). Individual texts can be: - exported to CSV format, - edited externally (e.g. in Windows® editor) - and can be imported.	67
Device failure monitoring	Overview of all devices for which device failure monitoring has been activated.	78
E-mail overview	Overview of all devices and channels for which an e-mail notification has been configured in the event of an alarm.	75
E-mail configuration	Setting e-mail templates: days of the week, time of day, e-mail addressee and texts.	71

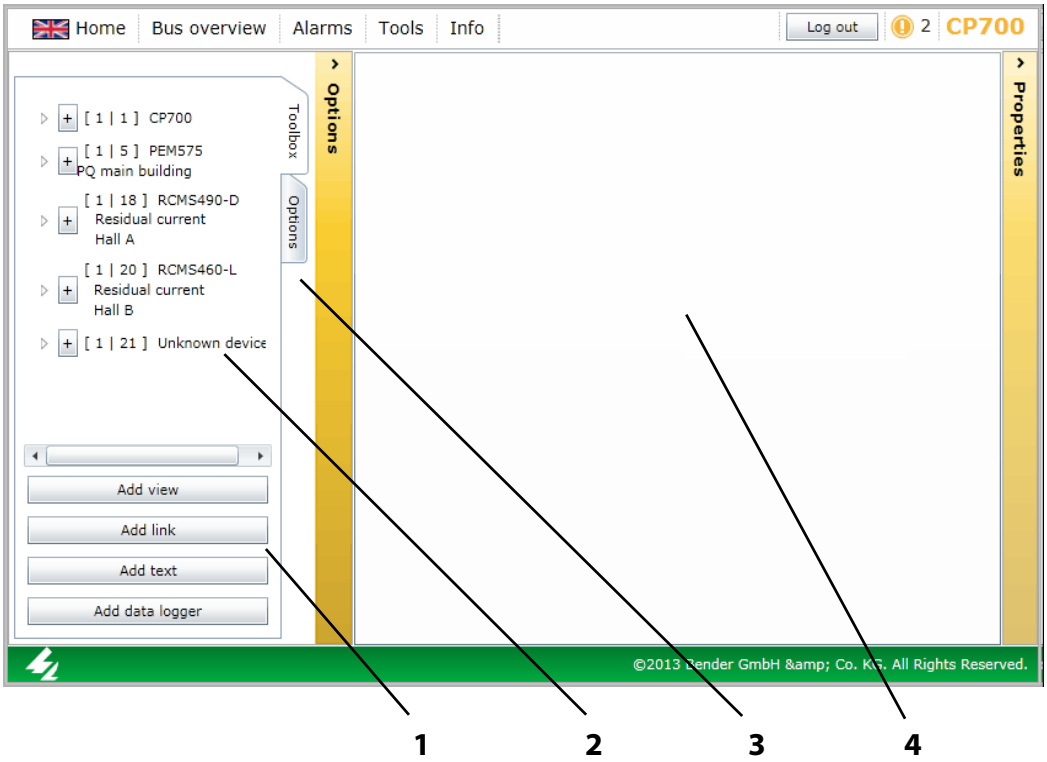
6.13 Visualisation

Fast and simple visualisation without any programming. For example, measured values and alarm statuses of devices and channels can be arranged on a floor plan and can be displayed.
Displaying an overview the contents of which takes up more than one page. Jump to another view page and back to the overview page.

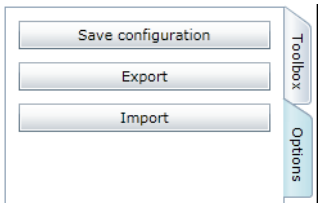
6.13.1 Create visualisation

1. Login to the menu bar. 

2. Select "Tools" > "Configuration" > "Visualisation".



	Key	
1	Tools for configuration:	
	- Add view	Creating a new view page
	- Add link	Add a jump to another view page
	- Add text	Add a text line with max. 100 characters
	- Add data logger	Add a data logger. A maximum of 12 data loggers can be inserted in one view page.
2	BMS bus devices and channels Insert the selected device or channel into the displayed view page by clicking "+".	

	Key
3	Options:  - Save configuration — Saves the current configuration to the CP700's micro-SD card. - Export — Exports the current configuration to a file on the PC (e.g. as backup copy) - Import Imports the configuration file saved on the PC to the CP700.
4	Visualisation view Up to 20 view pages can be displayed.

Clicking on the "Options" button will reduce the display area to provide more space for the visualisation view.

Use "Save configuration" to save the visualisation configuration on the CompactFlash card in the CP700 (see "Save and exit configuration" on page 106).

You can save the visualisation to a file on the PC by clicking "Export", even after only a fraction of the configuration file has been loaded (see "Export configuration" on page 106). In this way, you can avoid data loss (e.g. unintentionally deleting a page).

You can also carry out settings for visualisation for devices currently not available on the bus if a device failure monitoring function has been configured for this device.

6.13.1.1 Creating a new view page

Add view

3. Select "Add view". Enter a name for this view page (e.g. "Start") and click "OK".

A new view page with the name "Start" will appear. The "Properties" button provides the following functions:

- Name — Changing the name of the view page.
- Load image — Adds a new background image. Existing back ground images will be replaced.
- Delete element — Deletes this view page.

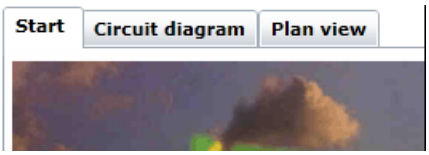
Loading a background image

4. Have a picture at hand in png or jpg format. Click "load image". Select the image file and click "Open". The image will be displayed immediately.

Images with clear contours and few colours produce a clear image. In case of coloured and complex images, CP700 optimises memory requirement in order to avoid blurred images.

Adding additional view pages

5. Repeat the steps 4 and 5 to add additional view pages. Example: "Circuit diagram" and "Plan view".



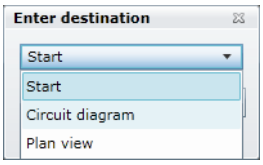
6.13.1.2 Adding a link to view pages

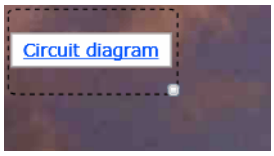
Links allow jump to other view pages.

Adding a link

On the view page "Start" two links are to be added which provide access to the view pages "Circuit diagram" and "Plan view".

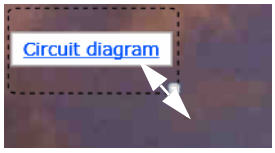
6. Click the view page "Start" and then "Add link". Select the view page to be linked to and then click "OK". The link will appear in the upper left corner of the page.



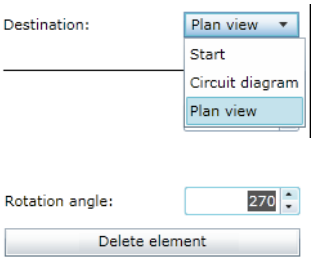


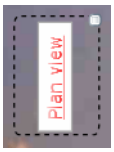
Delete/modify/edit a link

7. Click the link. The link is enclosed by a frame. A frame with additional editing options appears in the right-hand corner of the screen. Now the link can be edited:
   - move the link to another location on this page
   - resize the link by dragging the lower right-hand corner of the frame



   - Change the destination of the link
   - Change the rotation angle of the link

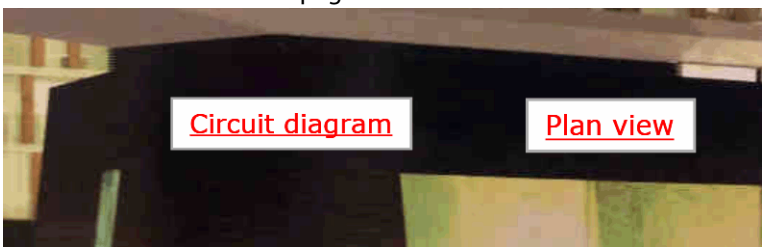




   - or "Delete element"

The link will appear in blue letters. If there is an element indicating an alarm on the view page referred to, the letters will appear in red.

8. Create another link for the page "Plan view".



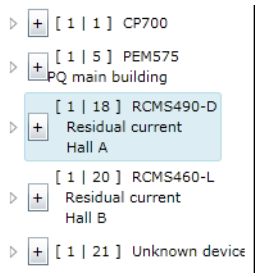
6.13.1.3 Adding new elements

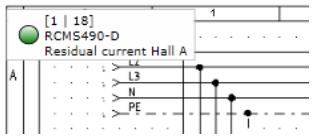
The list shows all devices available and devices currently not available on the BMS bus for which a device failure monitoring function has been set up. The BMS-bus address, the name, the individual text and the alarm status of the element can be displayed. Devices or/and individual channels of the devices can be displayed.

Adding elements

Two elements are to be added to the view page "Circuit diagram".

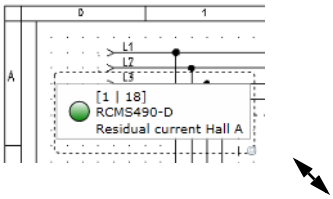
9. Click "Circuit diagram" on the view page.
10. The left window shows devices which can be added. After clicking the symbol "▶" the channels of the associated device are indicated. Click the "+" sign in front of the element you want to display. The element will appear in the upper left corner of the page.



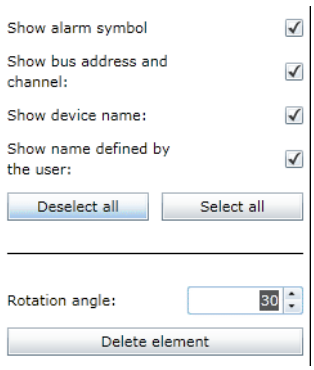


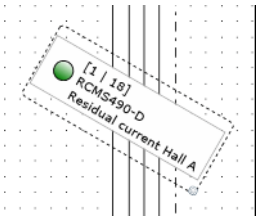
Delete/modify/edit an element

11. Click the element. The element is enclosed by a frame. A frame with additional editing options appears in the right-hand corner of the screen. Now the element can be edited:
    - move the link to another location on this page
    - resize the link by dragging the lower right-hand corner of the frame



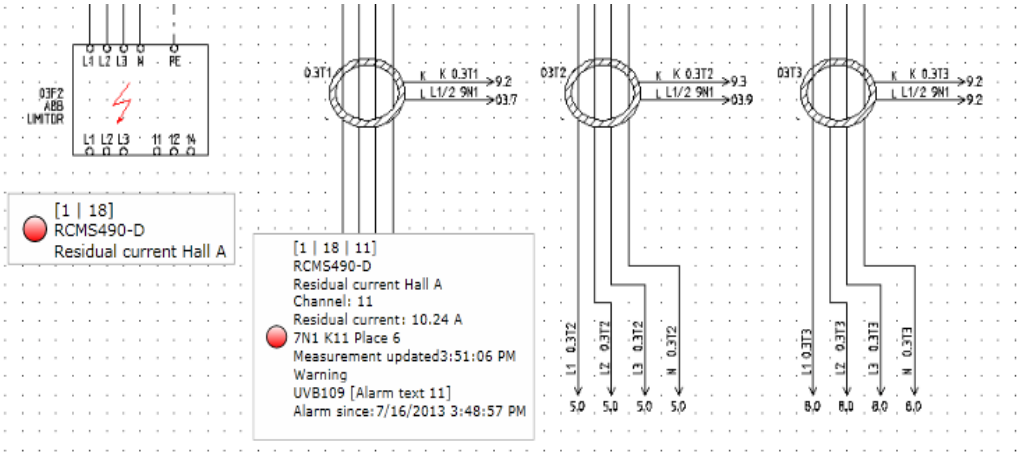
    - Activate/deactivate display options: Alarm marker (alarm status), BMS bus address and channel, device type, individual text
    - change the rotation angle of the element





    - or "Delete element"

12. Insert the second element in the same way.



The current values and the alarm status of the elements (here: red = alarm) are displayed.

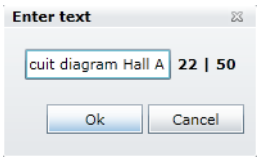
6.13.1.4 Adding a new text line

Explanatory text lines with a maximum of 100 characters can be added.

Adding text

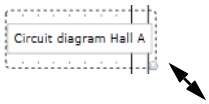
A heading is to be inserted on the view page "Circuit diagram".

13. Click the view page "Circuit diagram" and then click "Enter text". Enter the text.

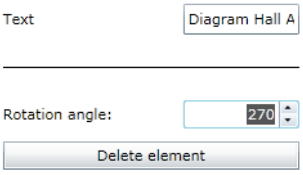


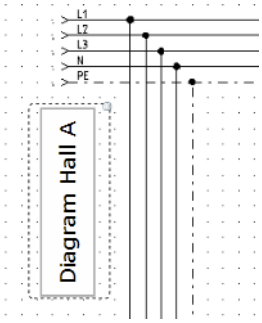
Delete/modify/edit a text

14. The text is enclosed by a frame. A frame with additional editing options appears in the right-hand corner of the screen. Now the text can be edited:
    - move the link to another location on this page
    - resize the link by dragging the lower right-hand corner of the frame



    - Change text
    - change the rotation angle of the text





15. or "Delete element"

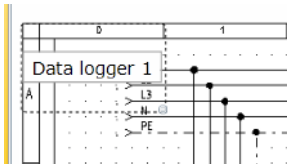
6.13.1.5 Adding a new data logger

Places an icon for a data logger into the respective view page. If "Visualisation" is started in the menu bar, the data logger can be selected and then used by clicking on the associated icon (see chapter "Data logger" on page 53).

Adding a data logger

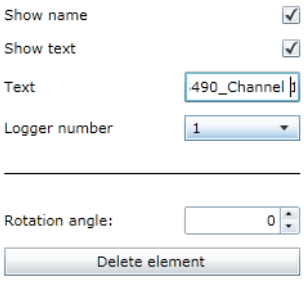
A data logger is to be inserted into the view page "Circuit diagram".

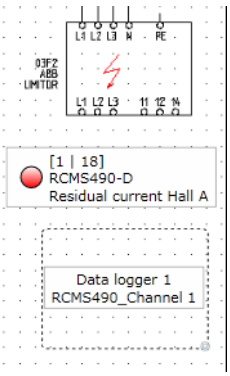
16. Click the view page "Circuit diagram" and then click "Add data logger".



Edit/modify/delete a data logger

17. The text is enclosed by a frame. A frame with additional editing options appears in the right-hand corner of the screen. Now the text can be edited:
    - move the link to another location on this page
    - Resize the text by dragging the lower right-hand corner of the frame
    - Hide or show name and text
    - Change text
    - Enter logger number
    - change the rotation angle of the text

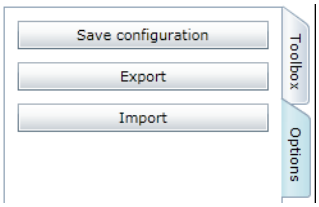




18. or "Delete element"

6.13.2 Save, export, import and exit configuration

Click on "Options".



6.13.2.1 Save and exit configuration

1. Select "Save configuration". Now the configuration is saved to the CP700 on the Micro-SD card. The configuration menu will be closed. Visualisation can be tested.
   The visualisation menu can now directly be selected from the menu bar by clicking "Visualisation".
2. Click the "Log out" button in the menu bar, if no other settings are to be changed

6.13.2.2 Export configuration

You can save the visualisation to a file on the PC by clicking "Export". In this way, you can avoid data loss (e.g. unintentionally deleting a page).
In addition, the configuration can be imported to another CP700. This can be necessary when a CP700 is to be replaced or when several CP700 devices are to be configured for similar tasks.

1. Select "Export". Confirm the subsequent security warning with OK.
2. Select the memory location on your PC and then click "Save".

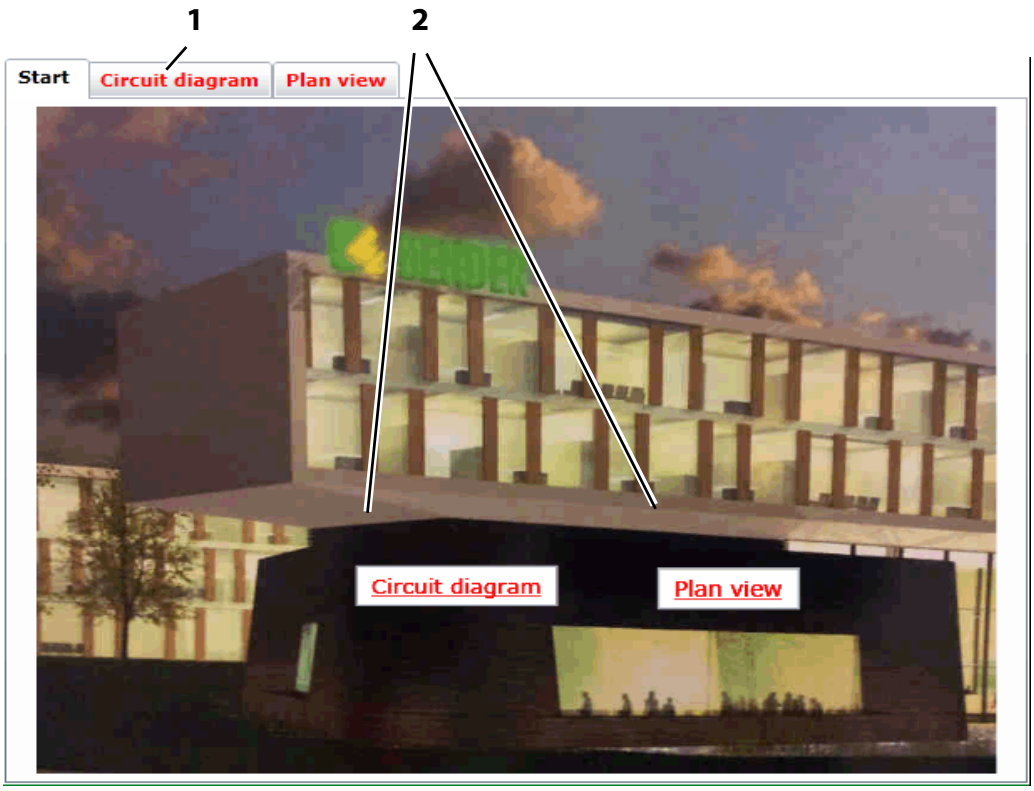
6.13.2.3 Import configuration

Imports the configuration file saved on the PC to the CP700.
Example: 1 - CP700 - Visualisation - 15_04_2014.vsc

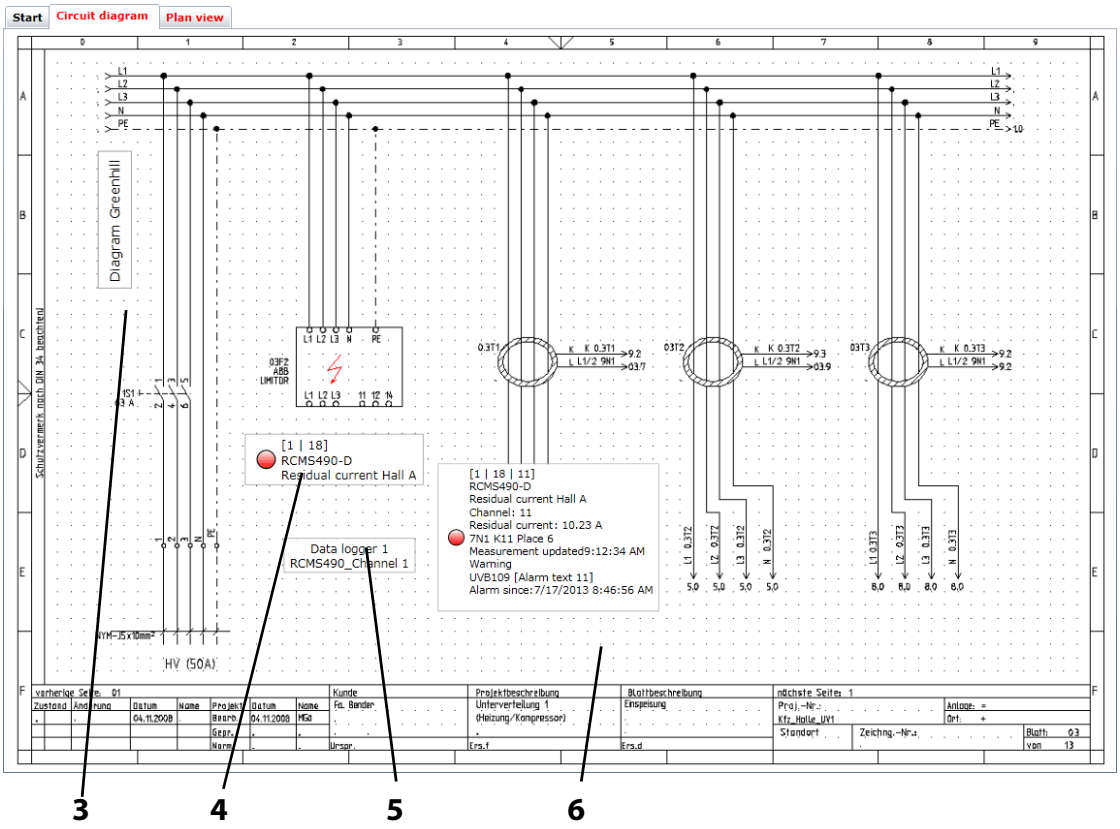
1. Select "Import".
2. Select the memory location on your PC.
   Click the file to be imported and then click "Open".

6.13.3 Using the visualisation function

Select "Visualisation" from the menu bar.



	Key
1	Open the view page by clicking the name on the respective page. The names will be shown in red lettering when an element with an alarm exists on the page.
2	Links to other view pages. Click the name of the respective page. The names will be shown in red lettering when an element with an alarm exists on the page.



	Key
3	Entered text
4	Element for displaying a device. Depending on the configuration, the following details will be displayed: the BMS-bus address, the name, the individual text and the alarm status of the element
5	Data logger can be selected by clicking on the associated icon. For more information about the use refer to "Data logger" on page 53.
6	Element for the representation of a channel. Depending on the configuration, the following details will be displayed: the BMS-bus address, the name, the individual text, the measured value, the time stamp, and the alarm status of the element

Clicking on an element provides details on the channels of this device. Requirement: The visualisation configuration file must be closed.

6.13.4 Open the operating manual as PDF file

Open the operating manual stored in the device memory via the web user interface. Select "Tools" > "General data" > "Manual".

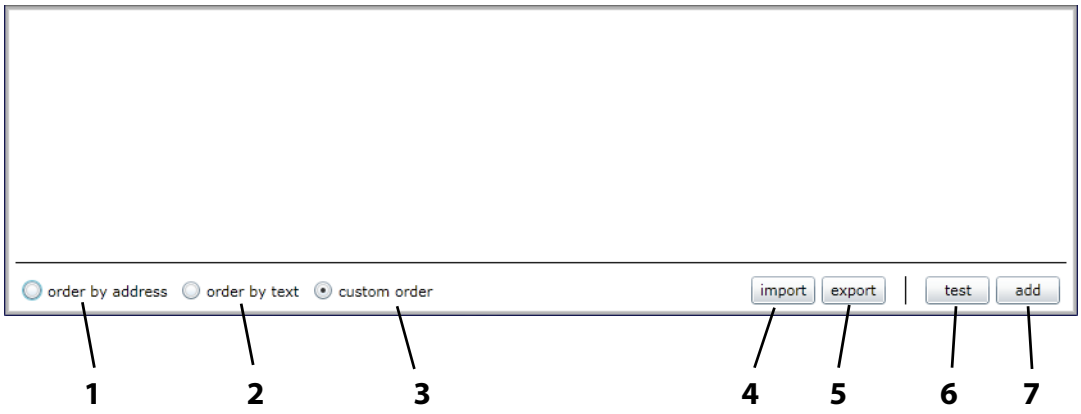
6.13.5 System visualisation

System visualisation is used when several COM460IP or CP700 exist in a network.
The devices are represented as tiles on a view page. The current alarm state of the devices is shown (red frame = alarm). The web user interface can be opened by clicking on one tile.

The visualisation of the system is saved on the current PC whilst being created, provided that the application memory is activated, (see xxxx). A copy can be exported and imported to another computer.

6.13.5.1 Start system visualisation

Select "Tools" > "General data" > "System visualisation". A new register card will be opened in the Internet browser.



	Key
1	Sort tiles: by address
2	Sort tiles: by text
3	Sort tiles: by your own order
4	Load stored system visualisation from PC (import)
5	Save system visualisation on PC (export)
6	Open the web user interface of all linked devices.
7	Add new device to system visualisation

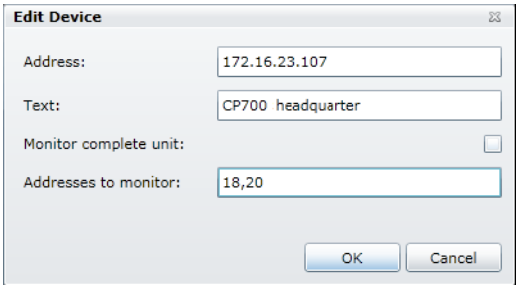
6.13.5.2 Check the activation of the application memory

The application memory in the "Microsoft Silverlight configuration" must be activated in order to use the system visualisation function.

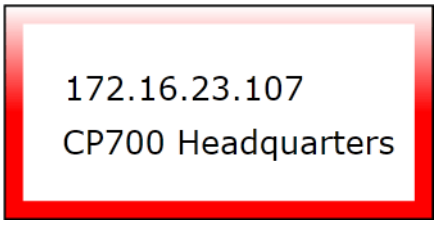
1. Start system visualisation
2. Click anywhere in the browser window using the right mouse button.
3. Click the "Silverlight" button.
4. Open the "Application memory" tab.
5. "Activate application memory" must be selected (check mark).

6.13.5.3 Add new device to system visualisation

1. Click on "add".
2. Enter the IP address and the respective text. Select whether the complete unit (monitor complete unit) or individual addresses (address to monitor, addresses separated by a comma, no blank) are to be monitored. Then click "OK".



". A new tile appears on the system visualisation surface.



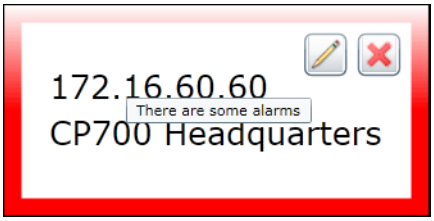
The colour of the frame shows the alarm status of the linked device:

green	No alarm
red	Alarm
Yellow	Device not found
grey	Device status (not yet) known

3. Repeat the steps 1 and 2 to add more devices to system visualisation.

6.13.5.4 Change or delete the device

1. Move the mouse to the respective tile without clicking.



2. Click the respective icon:

	Change IP address and text
	Delete device

6.13.5.5 Export system visualisation

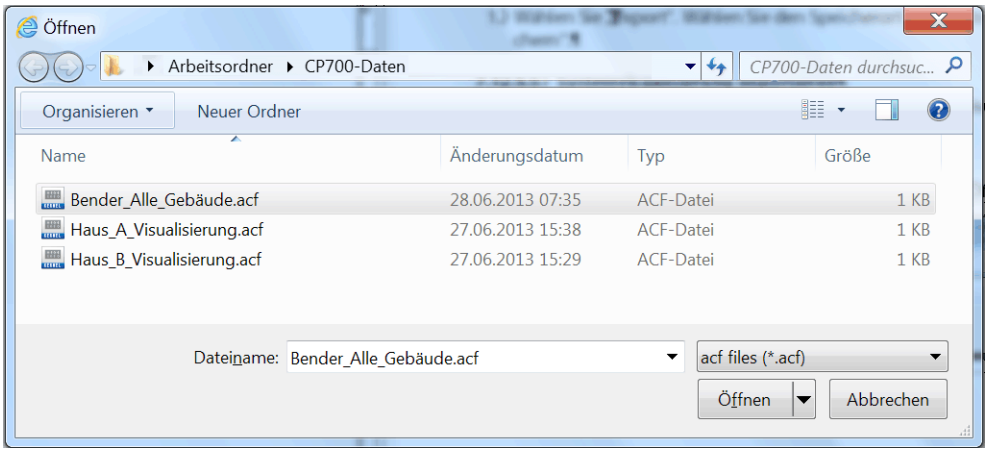
You can save the visualisation to a file on the PC by clicking "Export". In this way, you can avoid data loss (such as accidentally deleting a system visualisation).
In addition, the system visualisation can be imported to another CP700. This can be necessary when a CP700 is to be replaced or when several CP700 devices are to be configured for similar tasks.

1. Select "Export".
2. Select the memory location on your PC and then click "Save".

6.13.5.6 Import system visualisation

Imports the system visualisation saved in a file on the PC.

1. Select "Import".
2. Select the memory location on your PC.
   Click the file to be imported and then click "Open".



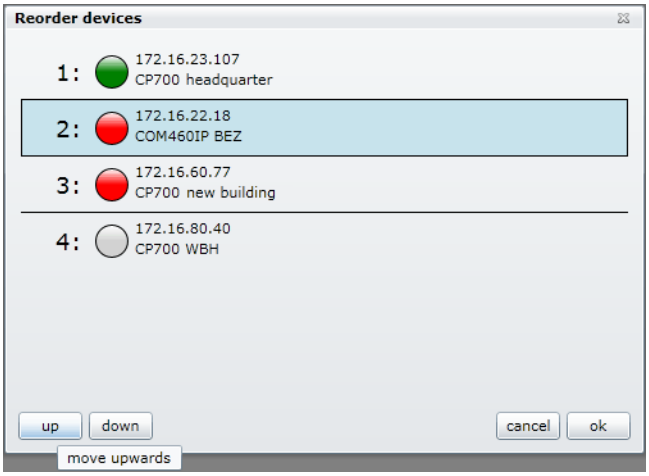
6.13.5.7 Sort system visualisation

Determine the order in which the tiles are arranged on a view page as follows:

order by address	Sort tiles: by address
order by text	Sort tiles: by text
order by customer	Sort tiles: by your own order

Select your own order

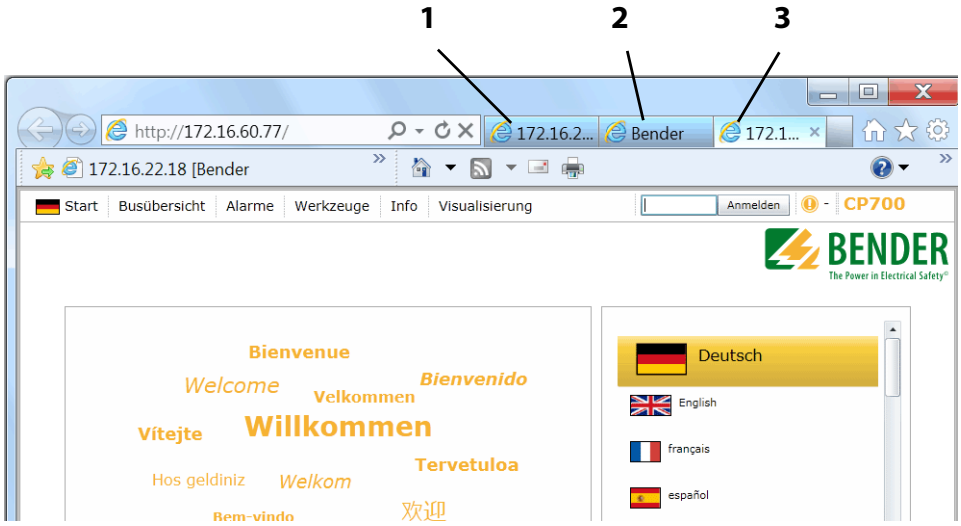
1. Click the element to be moved.
2. Use the "Up" resp. "Down" button to move it to the appropriate position.
3. Click on "OK" to save the new order. Or click on "Cancel" to keep the original order.



6.13.5.8 Use system visualisation

Click on one of the tiles. The web user interface of the device will appear.

You can optionally display the system visualisation or the web user interface using the register cards of the Internet browser.



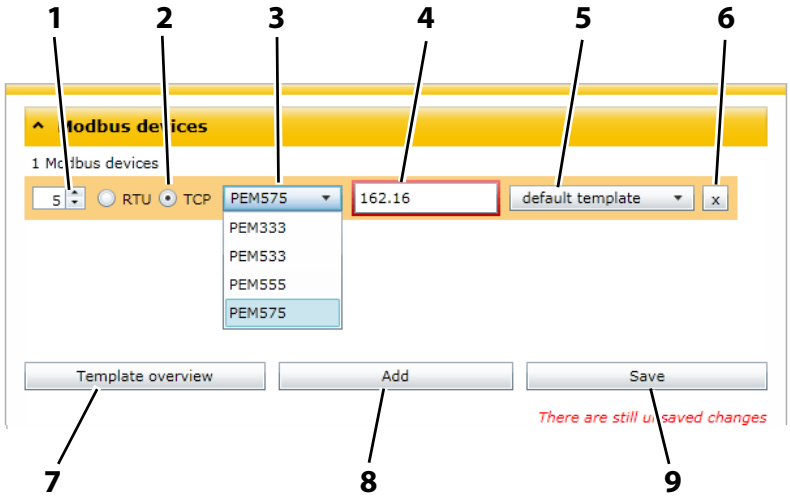
1	Web user interface that is used to call up the system visualisation
2	System visualisation
3	Web user interface of the device that is called up using the system visualisation

6.14 Manage Modbus devices

This function is used to make settings for Bender universal measuring devices of the LINETRAXX® PEM… series connected via Modbus/RTU or Modbus/TCP. These settings are used to identify the connected device by its address, interface type, device type and device IP, if required. By selecting a template you can specify which of the various measurements of a Modbus device are to be displayed on the CP700 touch screen or via the web user interface.

1. Login to the menu bar. 

2. Select "Tools" > "Modbus" > "Manage devices".
   If no device has been entered yet, the message "No device configured" will appear.



	Key
1	Enter the address for the new device directly or select the device using the arrow buttons. This virtual BMS bus address allows a common representation of BMS and Modbus devices. If an address is already assigned to another device, a red frame will appear around the address. In this case, select a different address.
2	Select the applicable type of modbus "RTU" or "TCP"
3	Select the Modbus device type
4	Modbus/TCP devices only: Enter IP address
5	Select template. One "Default template" is available for each device type. Individual templates can be created. Click the "Template overview" button.
6	Delete Modbus device
7	Template overview: Creating, editing or deleting templates
8	Add Modbus device
9	Save settings/changes

6.14.1 Adding a new Modbus device

1. In the "Modbus device" menu click on "Add".
2. Carry out the settings for address, Modbus type, device type, template and device IP, if necessary.
3. Click the "Save" button to save the changes.

6.14.2 Delete Modbus device

1. Click the "[x]" button of the device to be deleted.
2. Click the "Save" button to save the changes.

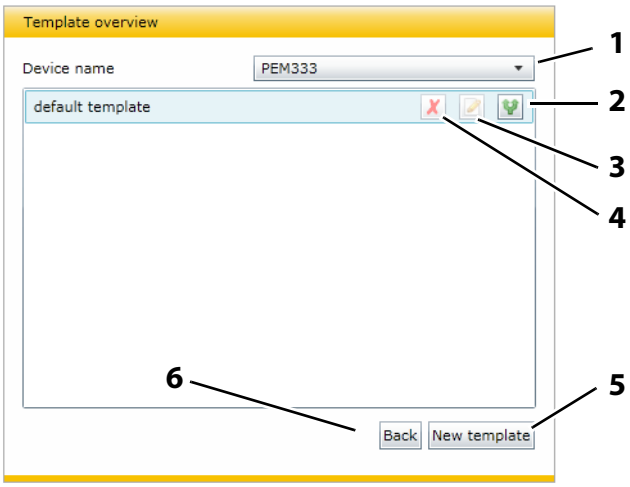
6.14.3 Editing a Modbus device

1. Change the address, Modbus type, device type, template or device IP, if necessary.
2. Click the "Save" button to save the changes.

6.14.4 Creating, editing or deleting templates

Templates can be created for the connected devices. In a template you can specify which of the various measurements of a Modbus device are to be displayed on the CP700 touch screen or via the web user interface. Each template is identified by a template name. Depending on the particular need, a template can be selected. One "Default template" is available for each device type.

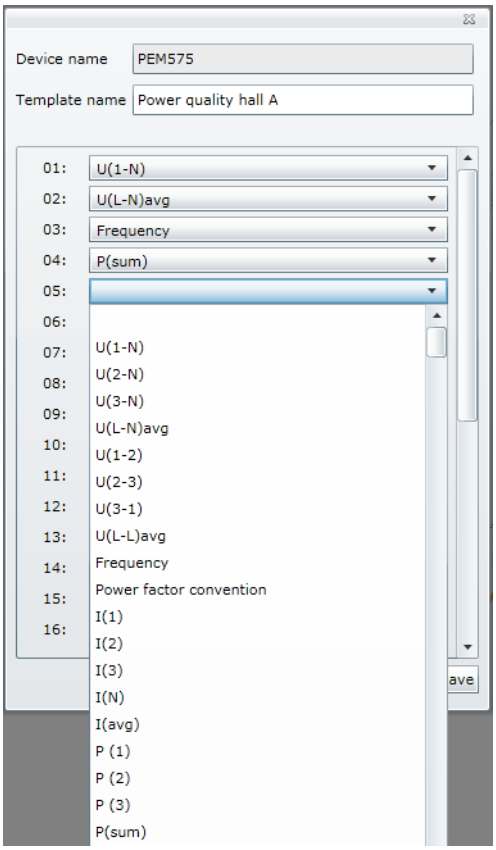
1. Select "Tools" > "Modbus" > "Manage devices" > "Template overview".
2. Select the appropriate Modbus device by clicking on the "Device name".
   If you haven't entered an individual template yet, only the "Default template" will appear.



	Key
1	Select the Modbus device type
2	Copy the template (for creating a new, similar template)
3	Change template
4	Delete template
5	Add new template
6	Back to the "Manage devices" menu

6.14.4.1 Add new template

1. Click on "New template" to add a new template
2. Enter a "Template name".
3. Specify which of the various measurements of a Modbus device are to be displayed on the CP700 touch screen or via the web user interface.



4. Click "Save" to save the entries.
   Click "X" to leave the menu without saving the settings.

6.14.4.2 Delete template

1. Click the "X" button of the template to be deleted.
2. Confirm the question "Do you really want to delete this entry" with "OK".

6.14.4.3 Change template

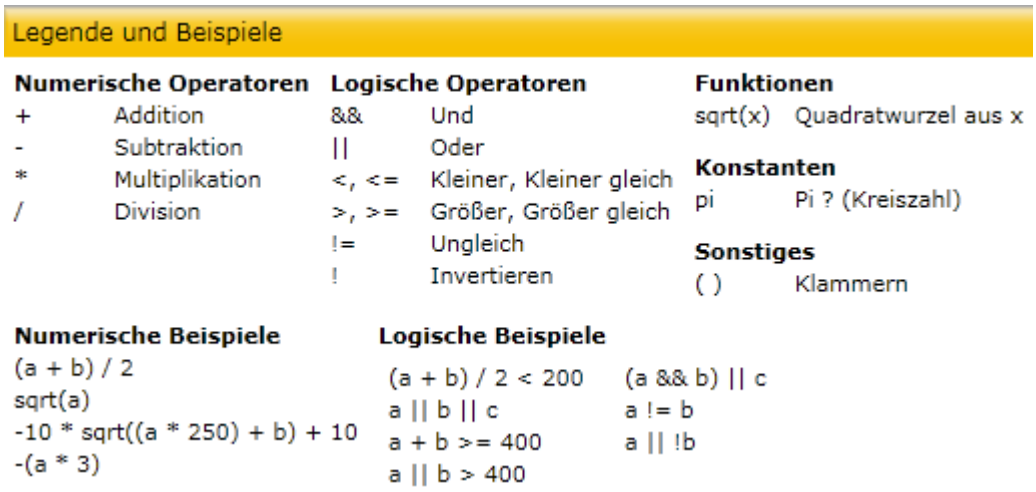
1. Click the " " of the template to be changed.
2. Change the settings.
3. Click "Save" to save the entries.
   Click "X" to leave the menu without saving the settings.

6.15 Manage virtual devices

A virtual "measuring point" is obtained from linking logical or numerical "real" measured values of devices. 16 channels (measuring points) can be set for each virtual device.

Virtual devices are treated in the same way as real existing devices:

- They will be displayed in the bus overview
- Individual texts can be entered
- E-mail notifications can be configured
- They can be visualised



Follow the steps below to access the function "Manage virtual devices":

1. Login to the menu bar. 

2. Select "Tools" > "Other" > "Manage virtual devices".

6.15.1 Adding a new virtual device

1. In the menu "Virtual devices" click on "Add".
2. Enter the address for the new device directly or select the device using the arrow buttons. This virtual BMS bus address can be displayed together with real existing devices. If an address is already assigned to another device, a red frame will appear around the address. In this case, select a different address.

3. Click the " " button to edit the channels of the virtual device. Click the " " button assigned to the channel to set the channel.
4. After completing the settings Click the "Accept" button to store the changes.

6.15.2 Deleting a virtual device

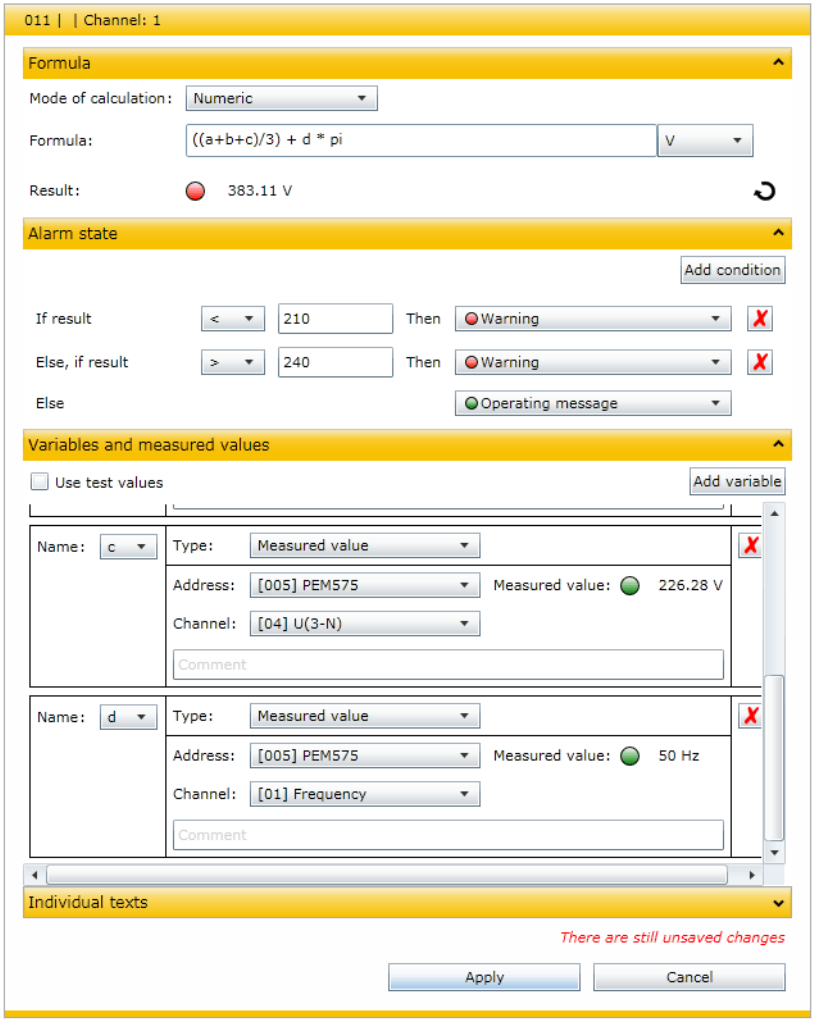
1. Click the "x" button of the device to be deleted.
2. Click the "Accept" button to store the changes.

6.15.3 Changing a virtual device

1. Click the " " button to edit the channels of the virtual device.
   Click the " " button assigned to the channel to select a device or on "x" to delete a channel.
2. Click the "Accept" button to store the changes.

6.15.4 Setting the channels of a virtual device

Consecutively make the following settings:



	Key
Formula	- Select calculation type: Numerical or logical. - Enter formula (see "Legend and examples"). - Select unit.
Alarm state	Specify one or several conditions for alarm status: operating message, prewarning, warning
Variables	Define the variables for the formulas: - Type: select measured value, constant or the alarm state. - Measured value only: Device address and channel the measured value will be assigned to. - Comment Use test value: A test value can be entered and the result determines if the formula is correct.
Legend and examples	Shows available functions and examples

Click the "Accept" button to store the changes. The button will only become active when all required settings have been entered.

7. Data access using the Modbus/TCP protocol

Requests to the Modbus/TCP server of the CP700 can be made using the function code FC4 (read out input register). The server will generate a function-related answer and send it to the Modbus client.

7.1 Exception code

If a request cannot be answered for whatever reasons, the server will send the so-called exception code with which possible faults can be narrowed down.

Exception code	Description
0x01	Impermissible function
0x02	Impermissible data access
0x03	Unacceptable data value
0x04	Slave device error
0x05	Acknowledgement of receipt (answer will be time-delayed)
0x06	Request not accepted (repeat request, if necessary)
0x08	Memory: Parity Error
0x0A	Gateway path not available
0x0B	Gateway error

7.2 Modbus requests

The required words of the process image can be read out from the input registers of the CP700 using the function code FC4. For this purpose, the start address and the number of the registers to be read out have to be entered.
Example:
The Words 0 and 1 are to be read out from the input registers 0x100 und 0x101.

Byte	Name	Example:
Byte 0, 1	Transaction identifier	0x0000
Byte 2, 3	Protocol identifier	0x0000
Byte 4, 5	Length field	0x0006
Byte 6	Unit identifier	Must always be "1"
Byte 7	Modbus function code	0x04
Byte 8, 9	Device address (BMS int * 0x100)	0x0100 (corresponds to the internal BMS address 1), Address assignment of the internal BMS bus
Byte 10, 11	Number of Words	0x0002

7.3 Modbus responses

The responses consist of 2 bytes per register. The succession of bytes is MSB first.

Byte	Name	Example:
…	…	…
Byte 7	Modbus function code	0x04
Byte 8	Byte count	0x04
Byte 9, 10	Value Register 0	0x1234 (fictitious value)
Byte 11, 12	Value register 1	0x2345 (fictitious value)

7.4 Structure of an exception code

Byte	Name	Example:
…	…	…
Byte 7	Modbus function code	0x84
Byte 8	Exception code	0x01 or 0x02

7.5 Modbus address structure for BMS devices

Function	Address range	Number of bytes	Number of Words
Device type	0x00…0x09	20 bytes	10 Words
Timestamp	0x0A…0x0D	8 bytes	4 Words
Common alarm	0x0E (High byte)	1 byte	0.5 Words
No BMS bus connection	0x0E (Low byte)	1 byte	0.5 Words
Unused	0x0F	2 bytes	1 Word
Channel 1…32	0x10…0x8F	32 x 8 bytes	128 Words
Alarm and test Channel 33…64	0x90…0xFC	218 x 8 bytes	109 Words

8. Process image in the memory of the CP700

The device holds a process image in the memory. It represents the current statuses and values of all BMS devices, Modbus/RTU devices and Modbus/TCP devices assigned.

8.1 Data request

8.1.1 Modbus function code

The memory of the CP700 can be read out using the Modbus function 4 "Read input registers“. The size of the data volume to be queried depends on the number of bytes selected in the Modbus client being used. Up to 125 Words (0x7D) can be read by one single request.
An individual addressable byte, such as the set bit of a stored common alarm, can also be read out.

8.1.2 How are memory areas organised?

Memory utilisation	Start address	End of the memory area	Size of the memory area
Reference values for testing purposes	0x0000	0x00FF	0x0100
Process image	0x0100	0x95FF	0x9500
Unused	0x96FF	0xFFFF	0x6900

In some cases, an offset of 1 has to be added to the register addresses of the Modbus clients. Example: Start address process image = 0x0101.

The assignment of the memory addresses and the associated memory content is described below.

8.2 Memory scheme of the process image

8.2.1 BMS device address assignment within the Modbus

As illustrated in the table, the Modbus start address for the respective process image is derived from the BMS device address. 256 (0x100) Words resp. 512 bytes are reserved for each BMS device containing. all the information requested and transmitted from the BMS bus.

	Modbus address ranges of the process images in the memory			
BMS Device address	**Word**			
	HiByte	**LoByte**		
		00	**…**	**FF**
1	0x**01**	Device 1		
2	0x**02**	Device 2		
3	0x**03**	Device 3		
…	…	…		
32	0x**20**	Device 32		
…	…	…		
150	0x**96**	Device 150		

Table 8.1: Modbus start addresses for every BMS device to be queried.

8.2.2 Memory scheme of an individual BMS device

BMS devices feature various types of analogue and/or digital channels. Please note the device-specific differences:

- BMS devices usually feature 12 channels
- MK800/TM800 support up to 64 digital channels in the master mode
- The channels 33 to 64 transmit digital messages only

Use the tables on page 124 and page 125 to determine the start address for querying the following device parameters:

- Device type
- Timestamp
- Common alarm
- Device error
- BMS channel

Example:
In our example, channel 2 of the device with BMS address 3 is queried. How is the start address determined for querying the channel? In our example, the relevant cells in the table are marked bold.

1. The first part of the address 0x03 (High-Byte) is applied from A:Table 8.1: for BMS device address 3.
2. The second part of the address 0x14 (Low-Byte) is applied from A:Table 8.2: for channel 2. Apply number 4 from the same table for the number of words to be queried: (0x14 to 0x17 = 0x04).
3. The start address 0x0314 is made up of the High and Low-Byte.

Memory image of a BMS device																																	
LoByte	**0**		**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**A**		**B**		**C**		**D**		**E**		**F**	
0x**0**0	---------- Device type ----------																				------ Time stamp ------						C	D	R.	
0x**1**0	Channel 1								Channel 2								Channel 3								Channel 4							
0x**2**0	Channel 5								Channel 6								Channel 7								Channel 8							
0x**3**0	Channel 9								Channel 10								Channel 11								Channel 12							
0x**4**0	Channel 13								Channel 14								Channel 15								Channel 16							
0x**5**0	Channel 17								Channel 18								Channel 19								Channel 20							
0x**6**0	Channel 21								Channel 22								Channel 23								Channel 24							
0x**7**0	Channel 25								Channel 26								Channel 27								Channel 28							
0x**8**0	Channel 29								Channel 30								Channel 31								Channel 32							
0x**9**0	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64		
0x**A**0	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.		
0x**B**0	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.		
0x**C**0	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.		
0x**D**0	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.		
0x**E**0	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.		
0x**F**0	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.		

Table 8.2: Modbus address assignment of the BMS device channels;
Hex representation: horizontal = units, vertical = sixteens

Abbreviations for memory contents:
C = Common alarm
D = Device lost (device failure)
R. = Reserved

A detailed description of the data formats for the device type, timestamp etc. is given below.

8.2.3 Device type

Word 0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09
ASCII text, 10 Words/20 bytes									

The device type is set by a BMS bus scan.

8.2.4 Timestamp

Word 0x0A		0x0B		0x0C		0x0D	
HiByte	LoByte	HiByte	LoByte	HiByte	LoByte	HiByte	LoByte
Year YY		Month MM	Day DD	Hour hh	Minute MM	Second ss	Reserved

The timestamp is set according to a datagram received from a transmitting device.

8.2.5 C = Common alarm and D = Device lost (device failure)

Word 0x0E	
HiByte	LoByte
C	D
Common alarm, 1byte: LSB = 0 or 1	Device error, 1 byte: LSB = 0 or 1

The common alarm bit is set as soon as the respective BMS device records an alarm status.
The device error bit when communication with the respective BMS device is no longer possible.

8.2.6 Channels 1 to 32 with analogue and/or digital values

Word 0x00		0x01		0x02		0x03	
HiByte	LoByte	HiByte	LoByte	HiByte	LoByte	HiByte	LoByte
Floating point value (Float)				AT&T	R&U	Channel description	

Every analogue BMS device channel can contain alarm messages, operating messages, measured values, test messages and descriptive text. Both analogue and digital information can be transmitted.
AT&T = Alarm type and test type (internal)
R&U = Range and unit
For details about channel description refer to chapter "8.4 ".

8.2.6.1 Float = Floating point value of the BMS channels

Word	0x00																0x01															
Byte	HiByte								LoByte								HiByte								LoByte							
Bit	31	30						24	23	22						16	15							8	7							0
	S	E	E	E	E	E	E	E	E	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M

Presentation of the bit order for processing analogue measured values according to IEEE 754
S = Sign
E = Exponent
M = Mantissa

8.2.6.2 A&T = Alarm type and test type (internal)

Bit	7	6	5	4	3	2	1	0	Meaning
	Test external	Test internal	Status	Reserved	Reserved	Alarm	Errors		
Alarm type	x	x	x	x	x	0	0	0	No alarm
	x	x	x	x	x	0	0	1	Prewarning
	0	0	x	x	x	0	1	0	Device error
	x	x	x	x	x	0	1	1	Reserved
	x	x	x	x	x	1	0	0	Alarm (yellow LED), e.g. insulation fault
	x	x	x	x	x	1	0	1	Alarm (red LED)
	x	x	x	x	x	1	1	0	Reserved
	x	x	x	x	x	…	…	…	Reserved
	x	x	x	x	x	1	1	1	Reserved
Test	0	0	x	x	x	x	x	x	No test
	0	1	x	x	x	x	x	x	Internal test
	1	0	x	x	x	x	x	x	External test

The alarm type is coded by the bits 0 to 2.
The bits 3 and 4 are reserved and always have the value 0.
Bit 5 usually has the value 0 and represents the digital value of the status.
This column is relevant for SMI devices only.
Bit 6 or 7 are usually set when an internal or external test has been completed.
Other values are reserved.
The complete byte is calculated from the sum of the alarm type and the test type.

8.2.6.3 R&U = Range and unit

Bit	7	6	5	4	3	2	1	0	Meaning
Unit	x	x	x	0	0	0	0	0	Invalid (init)
	x	x	x	0	0	0	0	1	No unit
	x	x	x	0	0	0	1	0	Ω
	x	x	x	0	0	0	1	1	A
	x	x	x	0	0	1	0	0	V
	x	x	x	0	0	1	0	1	%
	x	x	x	0	0	1	1	0	Hz
	x	x	x	0	0	1	1	1	Baud
	x	x	x	0	1	0	0	0	F
	x	x	x	0	1	0	0	1	H
	x	x	x	0	1	0	1	0	°C
	x	x	x	0	1	0	1	1	°F
	x	x	x	0	1	1	0	0	Second
	x	x	x	0	1	1	0	1	Minute
	x	x	x	0	1	1	1	0	Hour
	x	x	x	0	1	1	1	1	Day
	x	x	x	1	0	0	0	0	Month
	x	x	x	…	…	…	…	…	Reserved
	x	x	x	1	1	1	1	0	CODE
	x	x	x	1	1	1	1	1	Reserved
	x	x	x	…	…	…	…	…	Reserved
	x	x	x	1	1	1	1	1	Reserved
Range of validity	0	0	x	x	x	x	x	x	True value
	0	1	x	x	x	x	x	x	Actual value less than
	1	0	x	x	x	x	x	x	Actual value greater than
	1	1	x	x	x	x	x	x	Invalid value

The units of the bits 0 to 4 are coded.
The bits 6 and 7 describe the range of validity of a value. Bit 5 is reserved.
The whole byte is calculated from the sum of the unit and the range of validity..

Note!
If the unit byte refers to CODE, the recorded value or status will result in a text message. The content of this text message is described on the table on page 129 or page 133. The floating point value contains an internal CODE but no valid measured value.

8.2.6.4 Channel description

Word	0x03																decimal	Meaning
Byte	HiByte								LoByte									
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
Alarms and Warnings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Reserved
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	Insulation fault
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	Overload
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	Overtemperature
	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4	Failure line 1
	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5	Failure line 2
	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	6	Insulation OP light
	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	7	Reserved
	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	8	Failure distribution board
	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	9	Oxygen
	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	10	Vacuum
	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	11	Anaesthetic gas
	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	12	Compressed air 5 bar
	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

A code with the associated descriptive text is available for each channel. The table above only shows a small selection of the list. For a complete list of the available codes resp. texts refer to page 133.

8.2.6.5 Channel 33 to 64

Bit	7	6	5	4	3	2	1	0	Meaning
	Test external	Test internal	Status	Reserved	Reserved	Alarm	Errors		
Alarm type	x	x	x	x	x	0	0	0	No alarm
	x	x	x	x	x	0	0	1	Prewarning
	0	0	0	x	x	0	1	0	Device error
	x	x	x	x	x	0	1	1	Reserved
	x	x	x	x	x	1	0	0	Alarm (yellow LED), e.g. insulation fault
	x	x	x	x	x	1	0	1	Alarm (red LED)
	x	x	x	x	x	1	1	0	Reserved
	x	x	x	x	x	…	…	…	Reserved
	x	x	x	x	x	1	1	1	Reserved
Test	0	0	x	x	x	x	x	x	No test
	0	1	x	x	x	x	x	x	Internal test
	1	0	x	x	x	x	x	x	External test

The BMS channels 33 to 64 only provide digital information. The information is coded as alarm or message type or test type (internal, external).
The coding is similar to the data format AT&T for the channels 1 to 32, with the exception of the additional bit 4, which is used for coding device errors, e.g. connection faults or internal device errors.

8.3 Reference data records of the process image

In order to make it easier to check the configuration and the Modbus/TCP data access to BMS devices, CP700 provides a reference data record under the **virtual** BMS address 0.

A real BMS device cannot have address 0!
Address 0 only serves to simulate the data access.

Special features of the Modbus communication are the Byte-Offset and the Word and Byte order in the memory (Big Endian). At the end of this chapter, a few examples of correct configuration are given, which might be helpful.

8.3.1 Address assignment of the reference data record

As shown in the following table, the Modbus start address for access to the reference data record is derived from BMS device address 0.

	Modbus addresses for the reference data record				
Virtual BMS Device address	**Word**	LoByte			
		00	**0E**	**10**	**14**
0	HiByte 0x**00**	Device type	Common Alarm	Channel 1	Channel 2

Table 8.3: Start addresses for querying the reference data record

The start addresses provide the following reference values:

- 0x0000: TEST (device type)
- 0x000E: 1 (common alarm, LSB of the High-Byte is set)
- 0x0010: 230 V undervoltage (reference value on channel 1)
- 0x0014: 12.34 A overcurrent (reference value on channel 2)

8.3.2 Reference value on channel 1

The following reference value is stored in this channel: 230.0 V undervoltage

Word 0x10		0x11		0x12		0x13	
HiByte	LoByte	HiByte	LoByte	HiByte	LoByte	HiByte	LoByte
0x43	0x66	0x00	0x00	0x00	0x04	0x00	0x4D
Floating point value (Float)				AT&T	R&U	Description	
230,0				No/No	Volt	Undervoltage	

Table 8.4: Reference data stored in channel 1

8.3.3 Reference value on channel 2

The following reference value is stored in this channel: 12.34 A

Word 0x14		0x15		0x16		0x17	
HiByte	LoByte	HiByte	LoByte	HiByte	LoByte	HiByte	LoByte
0x41	0x45	0x70	0xA4	0x00	0x03	0x00	0x4A
Floating point value (Float)				AT&T	R&U	Description	
12,34				No/No	Ampere	Overcurrent	

Table 8.5: Reference data stored in channel 2

8.3.4 Explanation of how to access floating point values

The test value12.34 can be read out via Modbus/TCP using Modbus function 4 under the address 0x0014. The test value has a size of 2 Words.

Proceed as follows:

1. Determining the correct byte offsets.
   When both Words are interpreted as unsigned integer values, the following values should be obtained:
   Word 1 with address 0x14: unsigned integer value => 16709 (0x4145)
   Word 2 with address 0x15: unsigned integer value => 28836 (0x70A4)

2. Determining the correct byte resp. Word swap.
   There are four different combinations of swapping. The only correct value is 12.34.
   All swapping combinations are represented in the following table.

Hex value sequence	**Word 1**		**Word 2**		**Floating point value**
	Byte 1	Byte 2	Byte 3	Byte 4	
CORRECT	**A 41**	**B 45**	**C 70**	**D A4**	**12,34**
Word swapping	C 70	D A4	A 41	B 45	4.066E+29
Byte swapping	B 45	A 41	D A4	C 70	3098,27
Word and byte swapping	D A4	C 70	B 45	A 41	-5.21E-17

8.4 Channel descriptions for the process image

Value	Description of measured values, Alarm message, Operating message	Note
0		
1 (0x01)	Insulation fault	
2 (0x02)	Overload	
3 (0x03)	Overtemperature	
4 (0x04)	Failure line 1	
5 (0x05)	Failure line 2	
6 (0x06)	Ins.fault OPlight	Insulation fault operating theatre light
7 (0x07)		
8 (0x08)	Failure distribution board	
9 (0x09)	Failure oxygen	
10 (0x0A)	Failure vacuum	
11 (0x0B)	Anaesthetic gas	
12 (0x0C)	Compressed air 5 bar	
13 (0x0D)	Compressed air 10 bar	
14 (0x0E)	Failure nitrogen	
15 (0x0F)	Failure CO2	
16 (0x10)	Insulation UPS	Insulation fault UPS
17 (0x11)	Overload UPS	
18 (0x12)	Converter UPS	
19 (0x13)	UPS fault	
20 (0x14)	UPS emergency operation	
21 (0x15)	UPS test run	
22 (0x16)	Failure air conditioning	
23 (0x17)	Batt.op. OP-L	Battery operated operating theatre light
24 (0x18)	Batt.op. OP-S	Battery operated Sat OP light
25 (0x19)	Fail.norm.supply	Failure normal power supply source
26 (0x1A)	Fail.safet.supply	Failure safety power supply
27 (0x1B)	Failure UPS	Failure additional power supply
28 (0x1C)	Ins.safety supply	
29 (0x1D)	Fail.N conductor	
30 (0x1E)	Short distr.panel	Short-circuit distribution board
31 (0x1F)		
32 (0x20)		
33 (0x21)		
34 (0x22)		
35 (0x23)	Standby function	Measuring function switched off (standby)
36 (0x24)		

Value	Description of measured values, Alarm message, Operating message	Note
37 (0x25)		
38 (0x26)	Batt.op. UPS	Battery operation, special safety power supply source
39 (0x27)	Phase sequ. left	
40 (0x28)	Failure UPS	Failure battery-supported safety power supply
41 (0x29)		
66 (0x42)		
67 (0x43)	Function test by:	Date
68 (0x44)	Service by:	Date
69 (0x45)	Ins.fault locat	Insulation fault location
70 (0x46)	Peak	Fault EDS system
71 (0x47)	Insulation fault	Insulation resistance in Ω
72 (0x48)	Current	Measured value in A
73 (0x49)	Undercurrent	
74 (0x4A)	Overcurrent	
75 (0x4B)	Residual current	Measured value in A
76 (0x4C)	Voltage	Measured value in V
77 (0x4D)	Undervoltage	
78 (0x4E)	Overvoltage	
79 (0x4F)	Frequency	Measured value in Hz
80 (0x50)		
81 (0x51)	Asymmetry	
82 (0x52)	Capacitance	Measured value in F
83 (0x53)	Temperature	Measured value in °C
84 (0x54)	Overload	Measured value in %
85 (0x55)	Digital input	State 0 or 1
86 (0x56)	Insulation fault	Impedance
87 (0x57)	Insulation fault	Alarm by an insulation fault locator
88 (0x58)	Load	Measured value in %
89 (0x59)	Total Hazard Current	THC
90 (0x5A)	Inductance	Measured value in H
97 (0x61)	Service code	Information about service intervals
101 (0x65)	Connection, mains	
102 (0x66)	Earth connection	
103 (0x67)	Short circuit CT	Short circuit current transformer

Value	Description of measured values, Alarm message, Operating message	Note
104 (0x68)	No CT connected	
105 (0x69)	Short temp.sensor	Short-circuit temperature sensor
106 (0x6A)	Tempsensor open	Connection temperature sensor
107 (0x6B)	K1	Fault contactor K1
108 (0x6C)	K2	Fault contactor K2
109 (0x6D)		
110 (0x6E)		
111 (0x6F)	No address	Failure BMS device
112 (0x70)		
113 (0x71)	Failure K1/Q1	Failure contactor K1/Q1
114 (0x72)	Failure K2/Q2	Failure contactor K2/Q2
115 (0x73)	Device error	Fault ISOMETER
116 (0x74)	Manual mode	K1/2 manual mode
117 (0x75)	Open circuit K1on	Line to K1 on interrupted
118 (0x76)	Open circ. K1off	Line to K1 off interrupted
119 (0x77)	Open circuit K2 on	Line to K2 on interrupted
120 (0x78)	Open circ. K2 off	Line to K2 off interrupted
121 (0x79)	K/Q1on	Fault
122 (0x7A)	K/Q1off	Fault
123 (0x7B)	K/Q2on	Fault
124 (0x7C)	K/Q2off	Fault
125 (0x7D)	Failure K3	
126 (0x7E)	Q1	Fault
127 (0x7F)	Q2	Fault
128 (0x80)	No Master	
129 (0x81)	Device error	
130 (0x82)		
131 (0x83)	Fault RS-485	
132 (0x84)		
133 (0x85)		
134 (0x86)		
135 (0x87)		
136 (0x88)		
137 (0x89)	Short-circuit Q1	
138 (0x8A)	Short-circuit Q2	
139 (0x8B)	CV460	Fault CV460
140 (0x8C)	RK4xx	Fault RK4xx
141 (0x8D)	Address collision	BMS address has been assigned several times
142 (0x8E)	Invalid address	
143 (0x8F)	Several masters	
144 (0x90)	No menu available	

Value	Description of measured values, Alarm message, Operating message	Note
145 (0x91)	Own address	
201 (0xC9)	Line 1 normal op	
202 (0xCA)	Line 2 normal op	
203 (0xCB)	Switch. el. 1 on	
204 (0xCC)	Switch. el. 2 on	
205 (0xCD)		
206 (0xCE)	Auto mode	
207 (0xCF)	Manual mode	
208 (0xD0)		
209 (0xD1)		
210 (0xD2)	Line AV on	
211 (0xD3)	Line SV on	
212 (0xD4)	Line UPS on	
213 (0xD5)	Channel disabled	
214 (0xD6)	SwitchBackLock	Switching back interlocking function active
215 (0xD7)	Phase sequ. right	
216 (0xD8)	Switch. el. pos.0	
217 (0xD9)	Line BSV on	
218 (0xDA)	on	SMO48x: alarm via relay

To convert the data of parameters, you will need data type descriptions.
Text representation is not necessary in this case.

Value	Description of parameters:
1023 (0x3FF)	Parameter/measured value invalid. The menu item of this parameter is not displayed
1022 (0x3FE)	No measured value/no message
1021 (0x3FD)	Measured value/parameter inactive
1020 (0x3FC)	Measured value/parameter only temporarily inactive (e.g. while transmitting a new parameter) menu display "…".
1019 (0x3FB)	Parameter/measured value (unit not displayed)
1018 (0x3FA)	Parameter (code selection menu) without unit
1017 (0x3F9)	String max. 18 characters (e.g. device type, - variant, …)
1016 (0x3F8)	
1015 (0x3F7)	Time
1014 (0x3F6)	Date day
1013 (0x3F5)	Date month
1012 (0x3F4)	Date year
1011 (0x3F3)	Register address (unit not displayed)
1010 (0x3F2)	Time
1009 (0x3F1)	Factor multiplication [*]
1008 (0x3F0)	Factor division [/]
1007 (0x3EF)	Baud rate

8.5 Modbus control commands for BMS devices

From an external application (e.g. visualisation software) commands can be sent to BMS devices.

The control function via Modbus can be activated in the "Settings" > 3. Modbus > 1. Control" menu (see chapter "6.7.3 ").

Command structure

Write				Read
Word 0xFC00	0xFC01	0xFC02	0xFC03	0xFC04
1	**Internal BMS bus address**	**BMS channel**	**Command**	**Status**

Writing into register:

- For this purpose, use function code 0x10 "Write Multiple registers".
- Start address: 0xFC00
- Number: 4 registers
- Always set all four registers (Word 0xFC00…0xFC03) at the same time, even when individual registers remain unchanged.
- When no BMS channel number is required, write the value "0" (zero) into this register.

You can also generate control commands in the "Tools" > "Modbus" > "Control commands" menu (refer to page 95).

Read register:

- Use the function code 0x04 "Read Input Registers".

Possible answers in the "Status" register" :

0	Busy	Command is being processed.
1	Error	An error has occurred.
2	Ready	Command was successfully processed.

Control commands for the internal BMS bus

int/ext BMS bus	Register Ext	Register Int	Register Channel	Register Command	Function
Int	1	1-150	0	1	Test Isometer
Int	1	1-150	0	2	Test changeover device PRC
Int	1	1-150	0	3	Start automatic test changeover 1->2 End after time T(test)
Int	1	1-150	0	4	Start Test generator without changing over
Int	1	1-150	0	5	Changeover to line 1
Int	1	1-150	0	6	Changeover to line 2
Int	1	0	0	7	RESET alarm (broadcast)
Int	1	0	0	8	RESET alarm EDS (broadcast)
Int	1	1-150	0	9	Buzzer off [for alarm address] (BC)
Int	1	1-150	1-12	10	Switch on relay/switch
Int	1	1-150	1-12	11	Switch off relay/switch

9. Monitor for Power quality

The CP700 can also be used for displaying measured values for Bender universal measuring devices PEM..3 and PEM..5. The measuring values can also be displayed in tabular form or in diagrams.

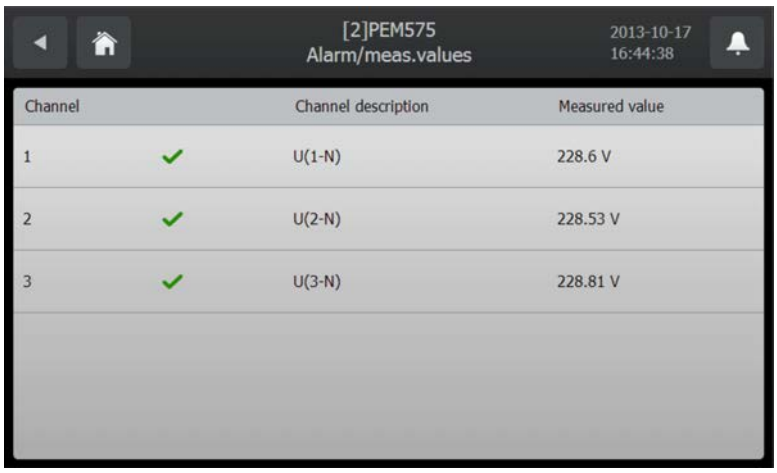
This chapter describes the operation via the web user interface considering the universal measuring device PEM575 as example. The operating manual of the universal measuring device PEM575 provides detailed information on the functions described here.

9.1 Displaying alarms/measured values

The current measured values are displayed. The display is updated after approx. 3...5 seconds in each case. A rotating arrow appears in the header during the update .

Templates can be created where the measuring values to be displayed are defined using the menu "Tools" > "Modbus" > "Manage devices" via the web user interface (also refer to "Creating, editing or deleting templates" on page 115). This setting applies to the touchscreen and the web user interface.

Operation via touchscreen
Select "Bus overview" > "PEM575 " > "Alarm/meas. values". When the template "PEM575 default template" is selected, the following display will appear.



Operation via the web user interface
Select "Bus overview" > "PEM575".

9.2 Triggering alarm messages in the case of events

Can only be operated via the web user interface. The PEM575's event log can store up to 512 events.
Possible events:

- Failure supply voltage
- Setpoint status change
- Relay actions
- Digital input status changes
- Setup changes

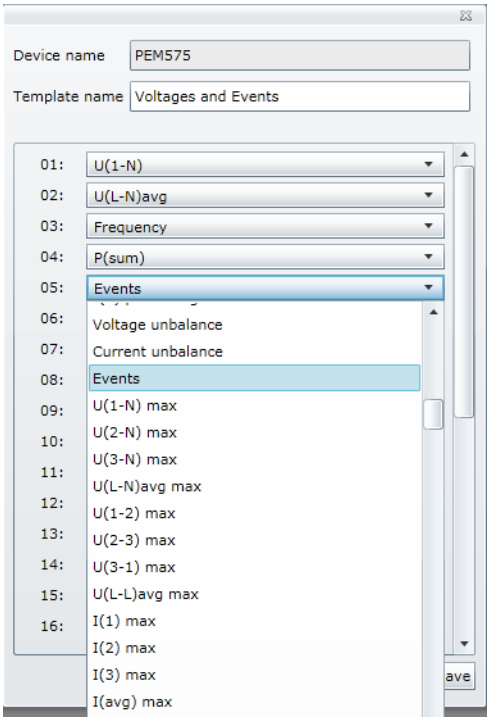
An alarm message or e-mail notification is to be triggered in the case of an event.

9.2.1 Making settings for events

Login to the menu bar. 

9.2.1.1 Creating template for events

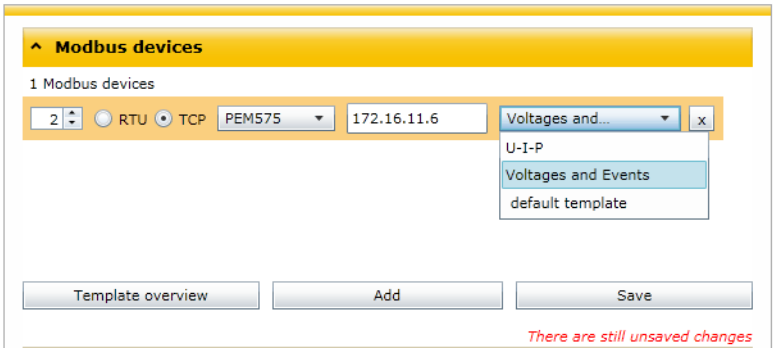
1. Select "Tools" > "Modbus" > "Manage devices" > "Template overview".
2. Select the appropriate Modbus device by clicking on the "Device name".
3. Click on "New template" to add a new template
4. Enter a "Template name".
5. Specify which of the various measurements of a Modbus device are to be displayed on the CP700 touch screen or via the web user interface. Also select Events".



6. Click "Save" to save the entries.

9.2.1.2 Activate template for events

1. Select "Tools" > "Modbus" > "Manage devices".
2. Select the template that contains the entry "Events" as an active template.



3. Click "Save" to save the entries.

9.2.2 Acknowledging alarm messages for events

An alarm is being displayed on the touch screen of the CP700 and an alarm is being displayed on the web user interface.

1. Select "Alarms" from the web user interface to find out which device has triggered the alarm.
2. The type of event is stored in the history memory of this device. Select "Bus overview" > "PEM575" > "Load menu" resp. "Reload menu" > "History/logger“ > "History".

9.2.3 Acknowledging alarm messages for events

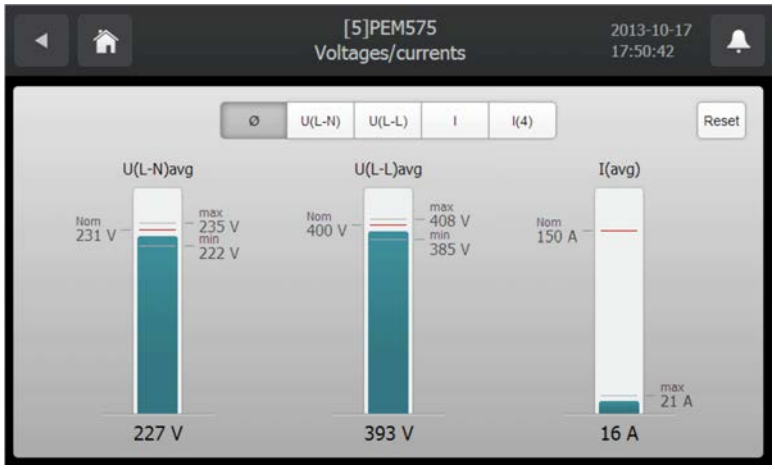
1. Login to the menu bar. 

2. Select "Bus overview" > "PEM575" > "Load menu" resp. "Reload menu" > "History/logger“ > "History".
3. Click on "Acknowledge alarm".

9.3 Displaying a PEM…'s voltages/currents

Operation via touchscreen

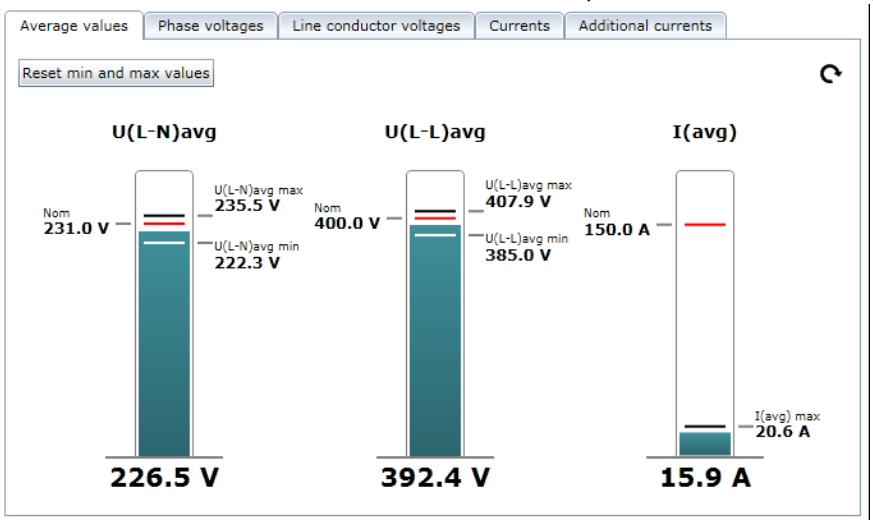
Select "Bus overview" > "PEM575 ▶" > "Voltages/currents".



	Description
ø	Average values
U(L-N)	Phase voltages
U(L-L)	Line conductor voltages
I	Currents
I(4)	Additional currents: I(0) Neutral conductor current (calculated) I(4) Neutral conductor current (measured)
RESET	Resetting Min and Max values

Operation via the web user interface

Select "Bus overview" > "PEM575" > "Load menu" resp. "Reload menu" > "Voltages/currents".



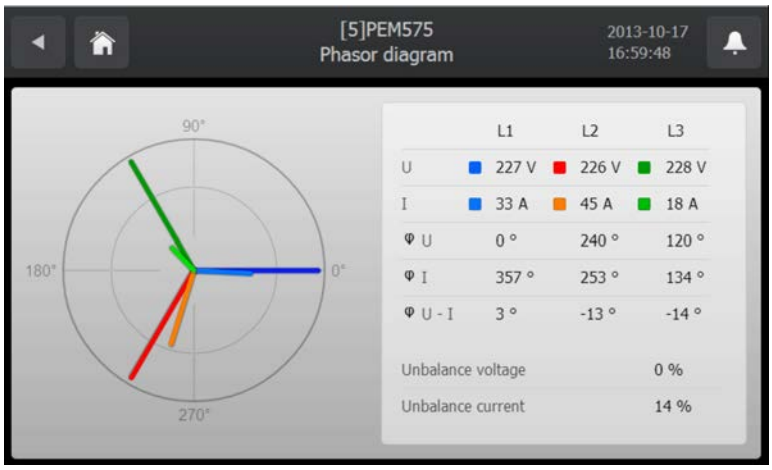
9.4 Displaying the phasor diagram of a PEM…

The phasor diagram shows:

- the phase voltages UL1, UL2, UL3, the currents I1, I2, I3
- the angle between the phases, the angle between the currents,
- the phase displacement between voltages and currents
- voltage and current unbalance

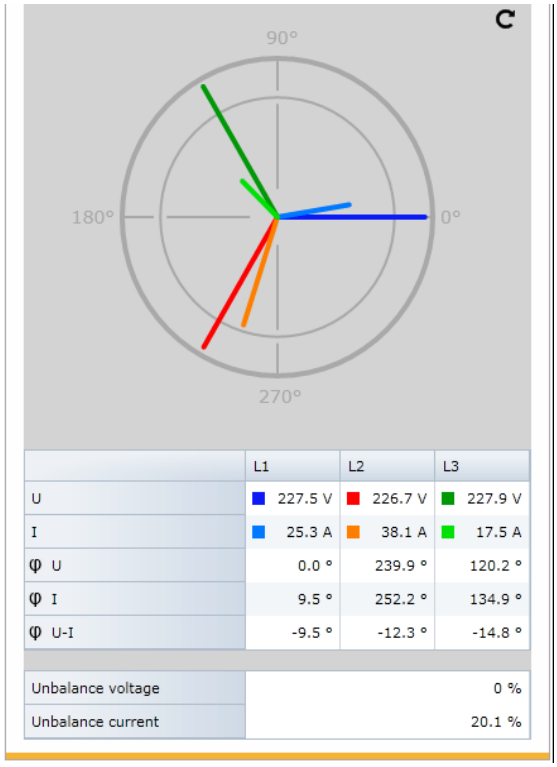
Operation via touchscreen

Select Bus overview" > "PEM575 ▸" > "Phasor diagram".



Operation via the web user interface

Select "Bus overview" > "PEM575" > "Load menu" resp. "Reload menu" > "Phasor diagram".

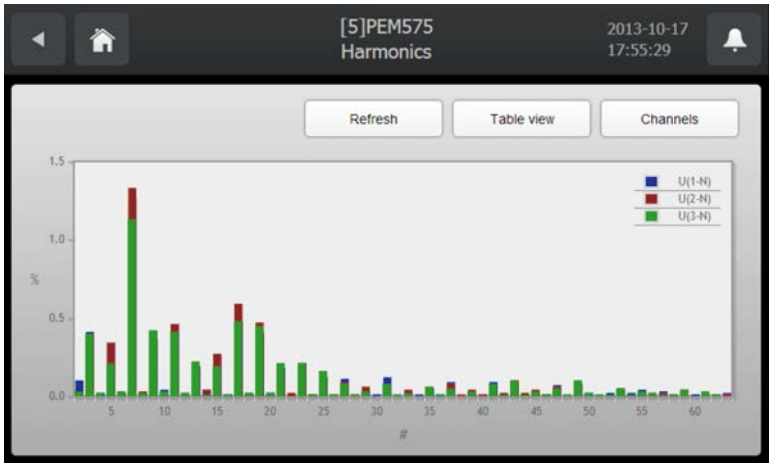


9.5 Displaying harmonics by means of PEM…

Harmonics are caused, among others, by fluorescent lamps, power supply units in PCs and consumer electronics. Harmonics can cause many problems in electrical systems.

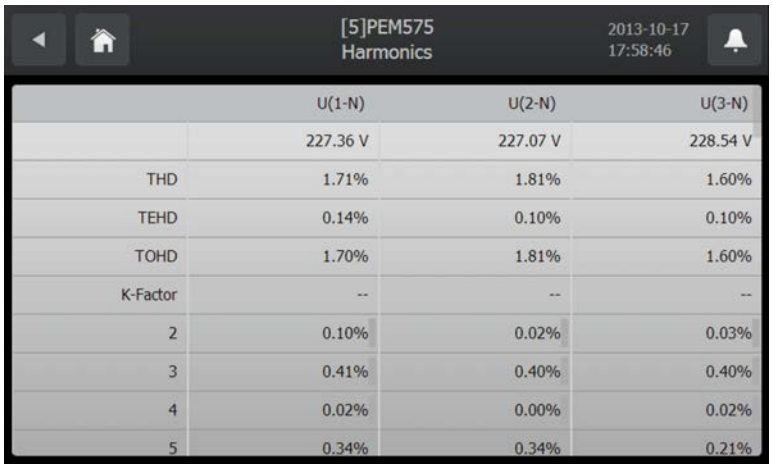
The analysis of the harmonics of the measured currents is displayed as a bar and a current value. Harmonics are whole-number multiples of the rated frequency. Example: Rated frequency = 50 Hz, 2nd harmonics = 100 Hz.

Operation via touchscreen
Select "Bus overview" > "PEM575 ▸" > "Harmonics". The bar graph of the channel resp. of the channels will be displayed.



Tap on the "Channels" button to select the channels to be displayed.

Click the "Table view" button to display the measured values of the selected channels in tabular form. Each measured value is represented as a number and as a small bar graph. The bar graph allows unusual measured values to be identified.

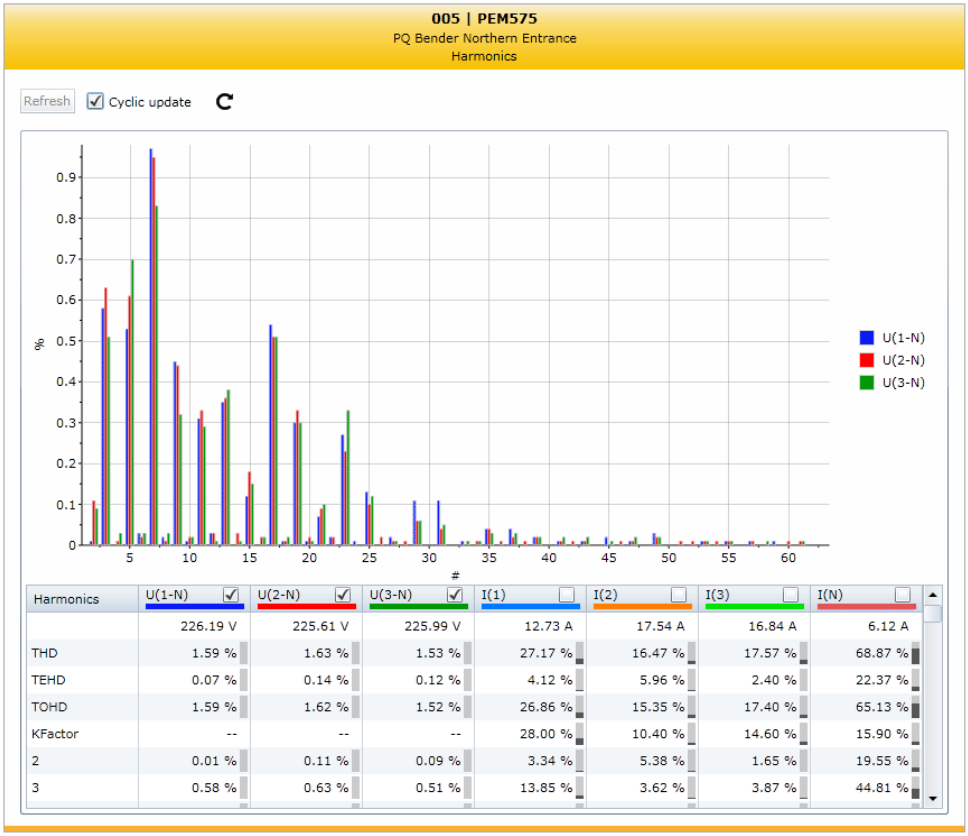


	U(1-N)	U(2-N)	U(3-N)
	227.36 V	227.07 V	228.54 V
THD	1.71%	1.81%	1.60%
TEHD	0.14%	0.10%	0.10%
TOHD	1.70%	1.81%	1.60%
K-Factor	--	--	--
2	0.10%	0.02%	0.03%
3	0.41%	0.40%	0.40%
4	0.02%	0.00%	0.02%
5	0.34%	0.34%	0.21%

The scroll bar on the right of the touch screen shows that more information is given below. Move the presently displayed content upwards to display the rest of the information.

Operation via the web user interface

Select "Bus overview" > "PEM575" > "Load menu" resp. "Reload menu" > "Harmonics"



Harmonics	U(1-N)	U(2-N)	U(3-N)	I(1)	I(2)	I(3)	I(N)
	226.19 V	225.61 V	225.99 V	12.73 A	17.54 A	16.84 A	6.12 A
THD	1.59 %	1.63 %	1.53 %	27.17 %	16.47 %	17.57 %	68.87 %
TEHD	0.07 %	0.14 %	0.12 %	4.12 %	5.96 %	2.40 %	22.37 %
TOHD	1.59 %	1.62 %	1.52 %	26.86 %	15.35 %	17.40 %	65.13 %
KFactor	--	--	--	28.00 %	10.40 %	14.60 %	15.90 %
2	0.01 %	0.11 %	0.09 %	3.34 %	5.38 %	1.65 %	19.55 %
3	0.58 %	0.63 %	0.51 %	13.85 %	3.62 %	3.87 %	44.81 %

Select the voltages and currents to be displayed

First, all harmonics are shown. In order to achieve a more transparent and clear representation, the harmonics should not be displayed on the screen simultaneously. The representation of a voltage or current curve can be activated resp. deactivated by clicking on the associated button.

9.6 Waveform recorder of a PEM575 universal measuring device

The PEM575 provides two waveform recorders (WFR) capable of saving a total of 32 recordings. Each waveform recorder can simultaneously record 3-phase voltage and current signals at a maximum resolution of 256 samples per cycle.

Recordings can be started manually or triggered by specified events (e.g. transient events, logic module, undervoltage/overvoltage (SAG/SWELL) or Setpoints). The measured values are prepared by the CP700 so that they can be presented in a clear and demonstrative way.

Settings for the waveform recorder can be made in the "Bus overview" > "PEM575" > "Settings" menu“ via the web user interface.

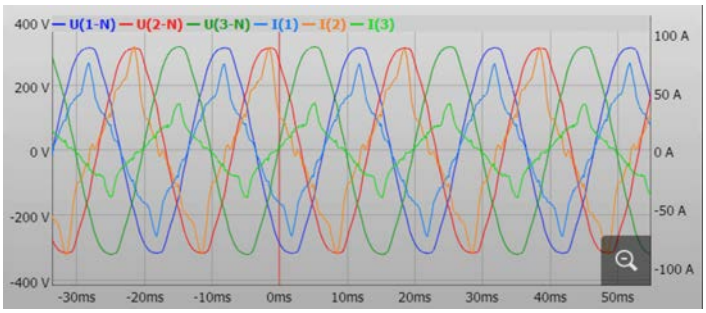
9.6.1 Using the waveform recorder

Operation via touchscreen
Select "Bus overview" > "PEM575 ▸" > "Waveform recorder".

	Description
1 2	Recorder 1 resp. 2: Start recording manually.
List	Shows a list of all recordings. One record can be selected for being displayed.

Increasing a specific part of the curve

1. Click on the beginning of the section to be viewed and hold the mouse button.
2. Drag the mouse pointer to the end of the section to be viewed (grey shaded) and release.

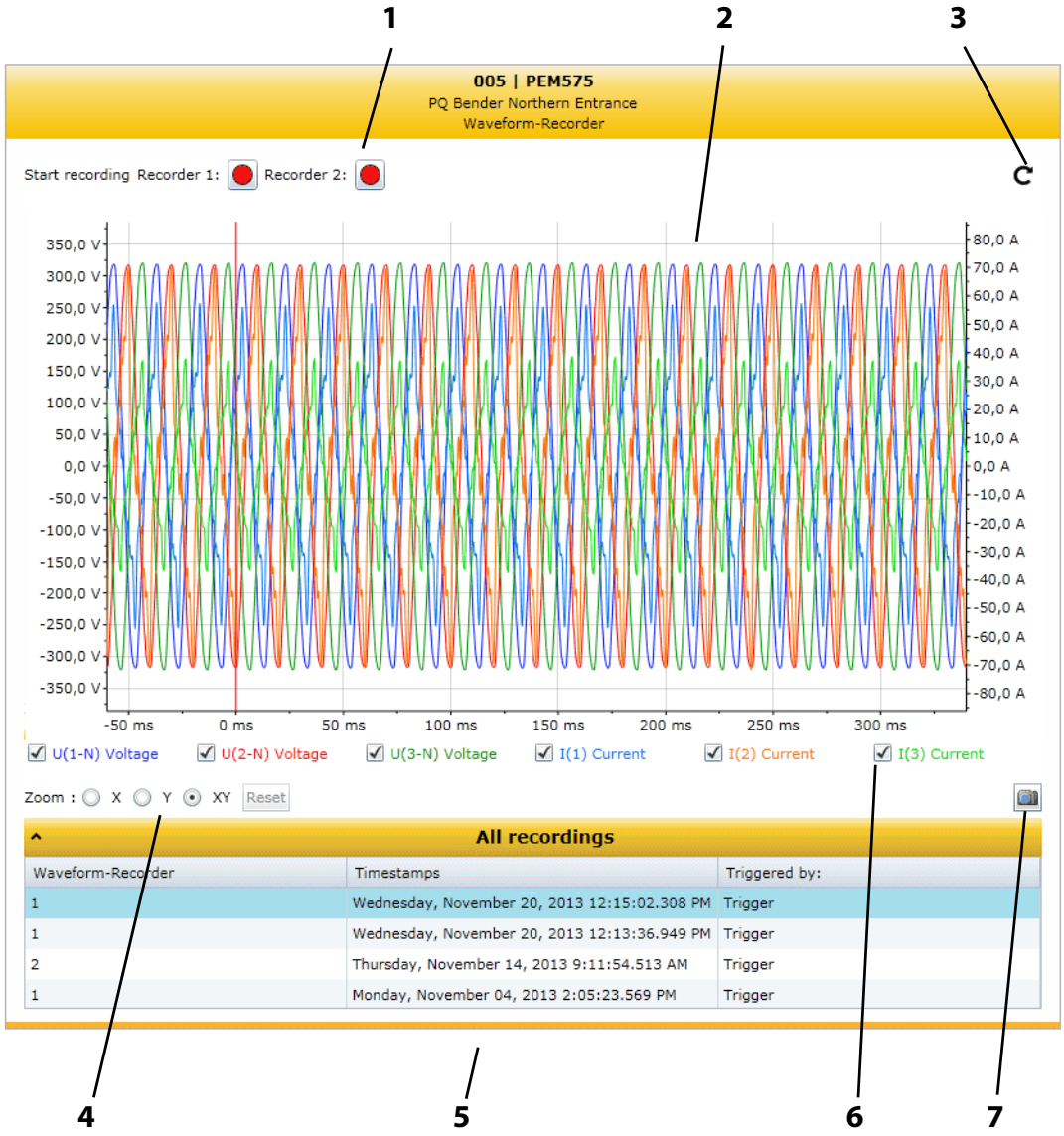


A close-up view of the selected section will appear immediately.

– The section can be zoomed in horizontal or vertical direction.
– To enlarge the section even more, proceed as described in step 1 and 3.
– Tap  , to return to the original size.

Operation via the web user interface

Select "Bus overview" > "PEM575" > "Load menu" resp. ""Reload menu" > "History/logger" >



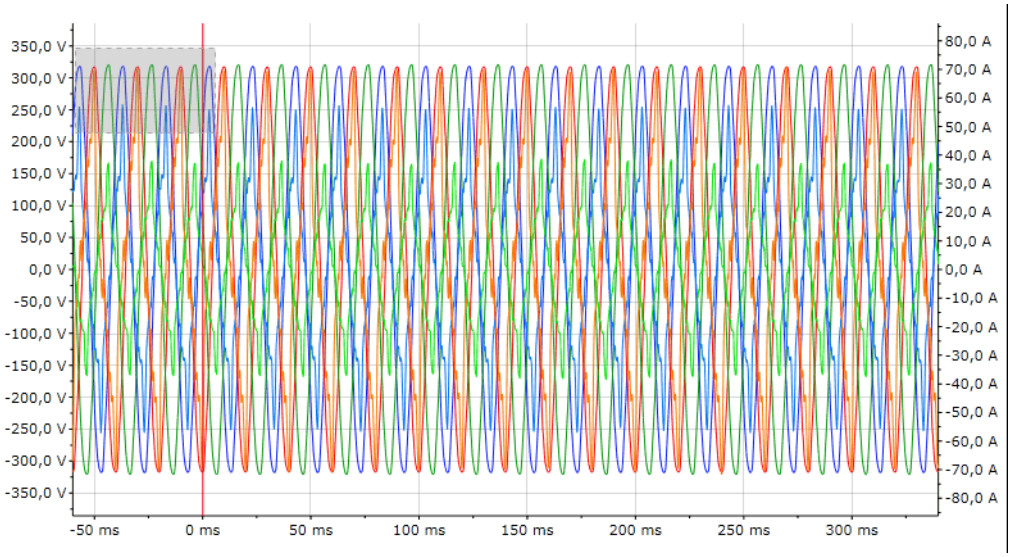
	Key
1	Recorder 1 resp. 2: Start recording manually.
2	Represent the measured values as curves.
3	The list of all existing recordings is updated approximately every 3...5 seconds. A rotating arrow is shown on the display during the update.
4	Select zoom in mode.
5	Shows a list of all recordings. One record can be selected for being displayed. The list can be minimised by clicking the button "All recordings". Clicking the button again will enlarge the list again.
6	Select the voltages and currents to be represented.
7	Save the waveform as an image (jpg file).

Increasing a specific part of the curve

1. Select zoom in mode:

   X = the section can be zoomed in in horizontal direction
   Y = the section can be zoomed in in vertical direction
   XY = the section can be zoomed in in horizontal as well as in vertical direction

2. Click the beginning of the section to be zoomed in and hold the mouse button.
3. Drag the mouse pointer to the end of the section to be viewed (grey shaded) and release.

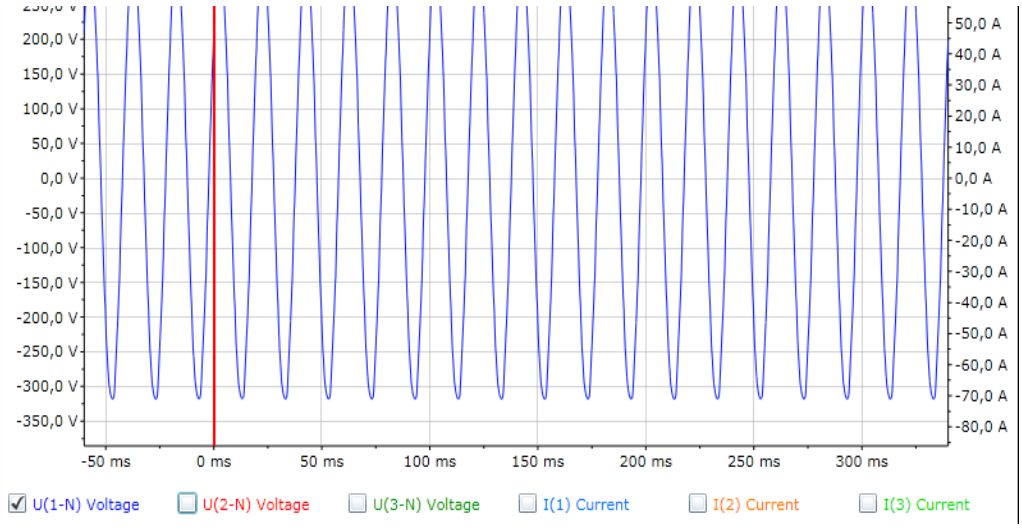


A close-up view of the selected section will appear immediately.

– To enlarge the section even more, proceed as described in step 2 and 3.
– Click "Reset" to return to the original size.

Select the voltages and currents to be displayed

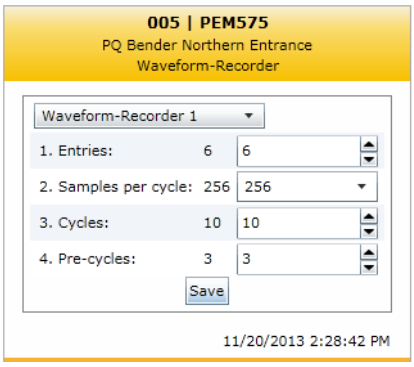
First, all curves are shown. In order to achieve a more transparent and clear representation, the curves should not be displayed on the screen simultaneously. The representation of a voltage or current curve can be activated resp. deactivated by clicking on the associated button.



9.6.2 Setting the waveform recorder

1. Login to the menu bar. 

2. Select "Bus overview > "PEM575" > "Load menu" resp. "Reload menu" > "Settings" > "Waveform recorder" on the user interface.
3. There are two possibilities either to set each waveform recorder individually or (to use the same settings) for both of them. Select:
   - how many recordings are to be saved.
   - how precisely the recordings are to be depicted (number of samples per cycle).
   - how many cycles are to be recorded.
   - how many cycles are to be recorded prior to the triggering event (manual triggering, trigger by setpoint or similar).



4. Click "Save" to save the entries.

If impermissble values have been selected, an error message will appear.
- Set the lowest possible values save them.
- Repeat the entry with corrected values.

For information about the determination of permissible values refer to the manual "PEM575" under the keyword "Waveform recorder".

Data loss by changing the settings
The waveform recordings will be deleted if its settings are changed.

If many cycles or samples are to be displayed, the curves are indicated via the web user interface very slowly.

9.6.3 Setting the trigger event for the waveform recorder

Undervoltage/overvoltage (SAG/SWELL) and transients can be set.

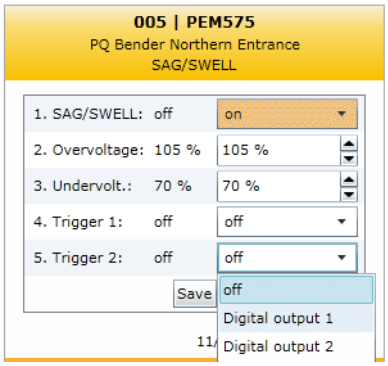
9.6.3.1 Setting the trigger event undervoltage/overvoltage (SAG/SWELL)

CAUTION

CAUTION: Malfunction due to incorrect setting of the nominal voltage!
The setting of the undervoltage and overvoltage will only lead to correct results when the nominal voltage (line conductor voltage) is correctly set.
Select "Bus overview" > "PEM575" > "Load menu" resp. "Reload menu" > "Settings" > "General" > "Nominal voltage" and enter the respective value (e.g. 400 V).

1. Login to the menu bar. 

2. Select "Bus overview > "PEM575" > "Load menu" resp. "Reload menu" > "Settings" > "SAG/SWELL" on the user interface.



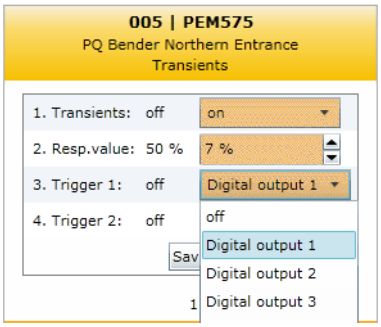
	Description
SAG/SWELL	Activating or deactivating an action in response to undervoltage/overvoltage (SAG/SWELL).
Overvolt.	Setting the limit for overvoltage.
Undervolt.	Setting the limit for undervoltage.
Trigger	Setting two triggers (action in response to a trigger event): – off — No reaction – Digital output 1…3 — Selected digital output switches. – Highspeed data recorder 1…4 — Selected high-speed data recorder starts recording.. – Data recorder1…12 — Selected data recorder starts recording. – Waveform recorder 1…2 — Selected waveform recorder starts recording. Both triggers can be set simultaneously. Example: Digital input 1 switches and waveform recorder 1 starts.

3. Click "Save" to save the entries.

9.6.3.2 Setting the trigger event transients

1. Login to the menu bar. 

2. Select "Bus overview > "PEM575" > "Load menu" resp. "Reload menu" > "Settings" > "Transients" on the user interface.



	Description
Transients	Activate or deactivate the response to transients.
Resp. value.	Set the response value.
Trigger	Setting two triggers (action in response to a trigger event): – off — No reaction – Digital output 1…3 — Selected digital output switches. – Highspeed data recorder 1…4. Selected high-speed data recorder starts recording.. – Data recorder1…12 — Selected data recorder starts recording. – Waveform recorder 1…2 — Selected waveform recorder starts recording. Both triggers can be set simultaneously. Example: Digital input 1 switches and waveform recorder 1 starts.

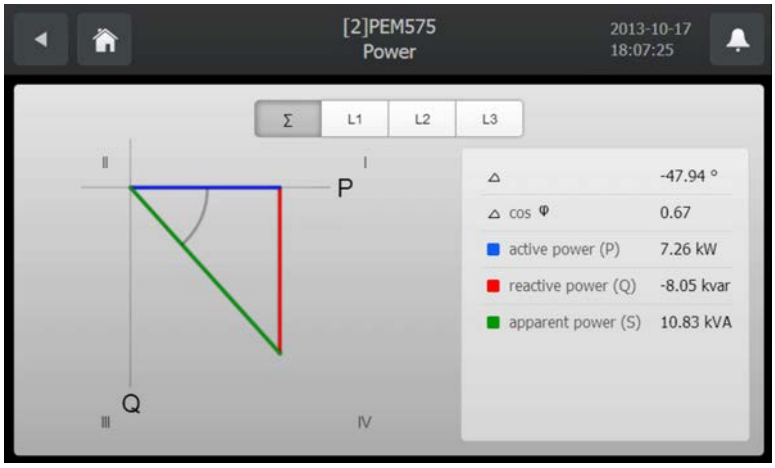
3. Click "Save" to save the entries.

9.7 Displaying the power diagram of a PEM…

Settings for the power triangle can be carried out in the "Bus overview" > "PEM575" > "Settings" > "Options" menu via the web user interface.

Operation via touchscreen

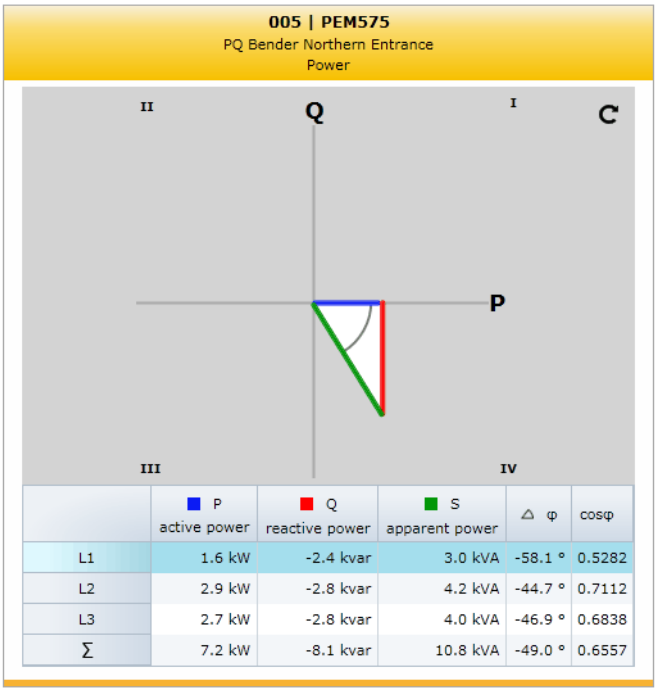
Select "Bus overview" > "PEM575 ▸" > "Power".



Select the representation for the total power (Σ) or for one of the phases L1, L2 or L3.

Operation via the web user interface

Select "Bus overview" > "PEM575" > "Load menu" resp. "Reload menu" > "Power".



	P active power	Q reactive power	S apparent power	△ φ	cosφ
L1	1.6 kW	-2.4 kvar	3.0 kVA	-58.1 °	0.5282
L2	2.9 kW	-2.8 kvar	4.2 kVA	-44.7 °	0.7112
L3	2.7 kW	-2.8 kvar	4.0 kVA	-46.9 °	0.6838
Σ	7.2 kW	-8.1 kvar	10.8 kVA	-49.0 °	0.6557

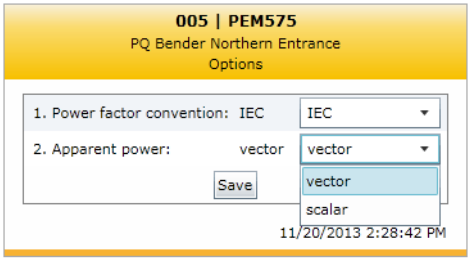
Select the representation for the total power (Σ) or for one of the phases L1, L2 or L3.

9.7.1 Set the options

The power factor rule and the method for the calculation of the apparent power can be set.

1. Login to the menu bar. 

2. Select "Bus overview > "PEM575" > "Load menu" resp. "Reload menu" > "Settings" > "Options" on the user interface.



	Description
Power factor	Power factor rule: Select IEC, IEEE or -IEEE.
Apparent power	Method for the calculation of the apparent power: Select vector or scalar.

3. Click "Save" to save the entries.

9.8 Data recorders and high-speed data recorders

Various Bender universal PEM series devices are equipped with data recorders and high-speed data recorders. These recorders can be used as described in chapter "Waveform recorder of a PEM575 universal measuring device" on page 148. Operating the recorders is only possible via the web user interface.

Example: PEM575 has an internal memory of 4 MB and has

- 4 high-speed data recorders
- 12 standard data recorders

Each of these recorders can record 16 parameters.

Recordings can be started by a timer (set by the internal clock) or by setpoints. The measured values are processed by the CP700 so that they can be graphically displayed.

Setting data recorders and high-speed data recorders

Login to the menu bar. 

Settings for the data recorders and high-speed data recorders and the associated setpoints can be entered via "Bus overview" > "PEM575" > "Load menu" resp. "Reload menu" > "Settings" on the web user interface.

Displaying data recorders and high-speed data recorders

Select "Bus overview > "PEM575" > "Load menu" resp. "Reload menu" > "History/logger" and then the appropriate data recorder on the web user interface.

10. Technical data

( )* = factory setting

10.1 Data in tabular form

Insulation coordination acc. to IEC 60664-1

Rated insulation voltage ..... AC 250 V
Rated impulse withstand voltage/pollution degree 4 kV/3

Supply voltage

Supply voltage U_S ..... see ordering information
Frequency range U_S ..... see ordering information
Power consumption ..... see ordering information

Displays, memory

Display ..... 7" TFT WVGA Colour
LEDs ..... Power, CF, Link, Run, Master/Slave
Button ..... Power, Reset
Buzzer ..... no
Memory card for special device functions (CF card) ..... 4 GB
E-mail configuration and device failure monitoring ..... max. 250 entries
Individual texts ..... max. 1200 texts with 100 characters each
Devices that can be displayed ..... max. 247

Interfaces

BMS bus**

Interface/protocol ..... RS-485/BMS internal
Operating mode (max. one CP700 per bus) ..... master/slave (slave)*
Device address, BMS bus ..... 1 . . . 99 (2)*
Baud rate BMS ..... 9.6 kbit/s

Modbus/RTU

Interface/protocol RS-485/Modbus/RTU
Operating mode ..... master
Baud rate Modbus/RTU ..... 9.6 kbit/s . . . 57.6 kbit/s

Cable length ..... 1200 m
Cable (twisted pairs, shielded, shield connected to PE on one side) J-Y(St)Y min. 2 x 0,8
Connection BMS ..... terminals A/B
Connection Modbus/RTU ..... terminals D+, D-
Terminating resistor ..... 120 Ω (0.25 W)

Ethernet

Connection RJ45
Data rate ..... 10/100/1000 Mbit/s, autodetect
DHCP ..... on/off (on)*
toff (DHCP) ..... 5 . . . 60 s (30 s)*
IP address ..... nnn.nnn.nnn.nnn (192.168.0.254)*
Netmask ..... nnn.nnn.nnn.nnn (255.255.0.0)*
Protocols ..... TCP/IP, Modbus/TCP, DHCP, SMTP, NTP

Environment/EMC

EMC ..... EN61000-6-2 and EN61000-6-4
Classification of climatic conditions acc. to IEC 60721:
Stationary use 3K5
Transport 2K3
Long-term storage 1K4
Operating temperature ..... 0 . . . +55 °C
Ventilation ..... fanless
Classification of mechanical conditions acc. to IEC 60721:
Stationary use 3M4
Temperature, storage and transport: ..... -20 . . . 60 °C
Max. height above sea level (NN) during operation ..... 3000 m (component dependent)
Derating of the maximum ambient temperature typically 1 °C per 1000 meters at 500 meters above sea level.

Connection

Connection ..... plug connectors

General data

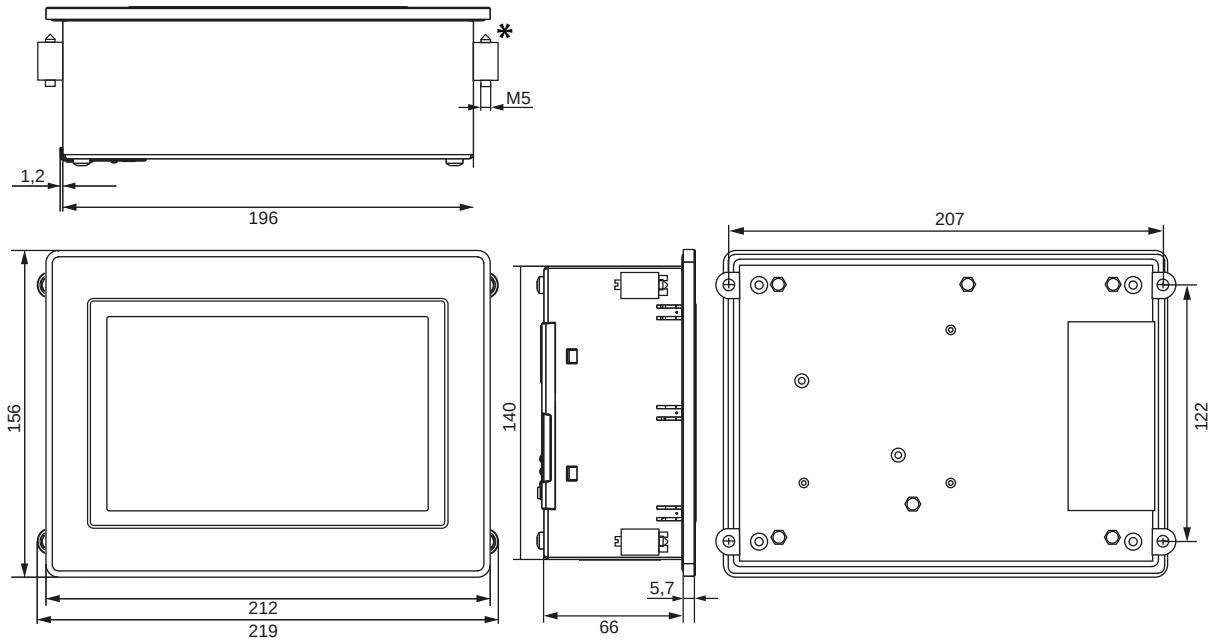
Operating mode ..... continuous operation
Mounting ..... display oriented
Degree of protection, on the front (IEC 60529) IP65
Degree of protection, on the rear (IEC 60529) IP20
Type of enclosure ..... panel mounting
Screw mounting ..... with mounting brackets
Flammability class UL94V-0
Weight ..... ≤ 1200 g

( )* = factory setting
** Only **one** CP700 each may be connected to an internal bus.

Other interface protocols

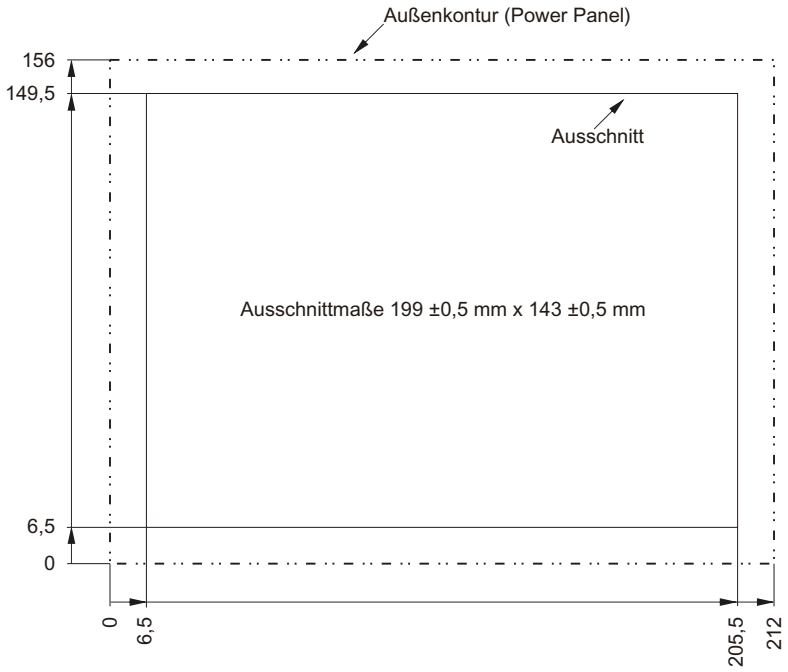
Connection to SCADA systems (Supervisory Control and Data Acquisition) and/or PLCs via OPC, BACnet or other protocols on request.

10.2 Dimension diagram



All dimensions in mm.
* Strength of the material to be clamped: minimum 2 mm, maximum 6 mm

10.3 Control panel cut-out



10.4 Standards, approvals, certifications

10.5 Ordering information

Type	Supply voltage U_S	Power consumption	Art. No.
CP700 Condition Monitor	DC 24 V/± 25 %	Typical 11 W, max. 26 W	B 9506 1030

10.6 Disposal

Abide by the national regulations and laws governing the disposal of this device. Ask your supplier if you are not sure how to dispose of the old equipment.

Directive 2002/96/EG on waste electrical and electronic equipment and Directive 2002/95/EG on the restriction of certain hazardous substances in electrical and electronic equipment apply in the European Community.
In Germany, these policies are implemented through the "Electrical and Electronic Equipment Act" of 16 March 2005. According to this, the following applies:

- Electric and electronic equipment are not to be included in household waste. This is indicated by the symbol:

- Batteries and accumulators are not to be included in household waste but must be disposed of in accordance with the regulations.
- Old electrical and electronic equipment from users other than private households which was introduced to the market after 13th August 2005. must be taken back by the manufacturer and disposed of properly.

For more information on the disposal of Bender devices, see our homepage.

11. Troubleshooting

11.1 Damage in transit

Damage in transit must be confirmed directly by the carrier. In case of doubt, please contact:
Bender GmbH & Co.KG
Londorfer Straße 65
35305 Grünberg
Tel.: +49 6401 807-0
Fax: +49 6401 807-259

11.2 Malfunctions

If disturbances occur in the connected networks which might result from the use of CP700, please refer to this operating manual.

11.2.1 What should be checked?

Check whether..

- the device is supplied with the correct supply voltage
- the BMS bus cable is correctly connected and terminated (120 Ω);
- the appropriate Ethernet cable (RJ45) is correctly connected;
- the BMS address is correctly set;
- the IP address is correctly set resp. whether the DHCP function is activated
- the start page of the CP700 web server can be reached via a web browser
- the current version of the Silverlight™ plug-in (at least version 5.0) is installed on the PC you are using and JavaScript is activated
- the network parameters are correctly set and at least the IP address and netmask or the DHCP function are activated.
- the sockets in the firewall of the network are activated

11.2.2 Fault messages with error code

Error code	Description/action
E.9.11	The MODBUSCONF.JSON file is invalid. Remove, rename or delete the "USER/PQ/MODBUSCONF.JSON" file. However, in this case, the PQ devices must be reconfigured.
E.9.12	No appropriate template file found. Reconfigure the respective device using the menu "Modbus" > "Manage devices" on the web user interface.
E.9.13	Validation error: This error signifies that a wrong device has been connected.
E.9.14	Channel error: Occurs when a device on the channel does not respond.
E.9.15	No suitable register files found.
E.9.16	Register file invalid: Occurs when a register file is defective.

11.2.3 Frequently asked questions

The time of the CP700 and the PEM… are not identical.
The time of the PEM… is set by each CP700 once an hour. If a PEM… is coupled to several CP700 via Modbus TCP, all the CPs should be set to the same time.

Unbalances above 100 % occur.
The phases might be reversed.

The device name is displayed incorrectly in the device info.
This may be the case when the operating language of the web user interface has been changed. After changing the language, call up the menu item again that has led to the device info display. The problem no longer exists with versions COM460IP > V3.0 and CP700 V1.5 or higher.

11.2.4 Where do you get help?

If, after thorough reading of the technical manual and intensive fault location in your installation, you cannot clear the fault related to the Condition Monitor CP700, please contact our Technical Service department:

Tel.: **+49 6401 807-760 or 0700BENDERHELP**
Fax: **+49 6401 807-259**
E-mail: **info@bender-service.com**

11.2.5 Battery change

Warning

Fire or explosion risk

The battery must only be replaced by a Renata battery, type CR2477N. Use of another battery may present a risk of fire and explosion. Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

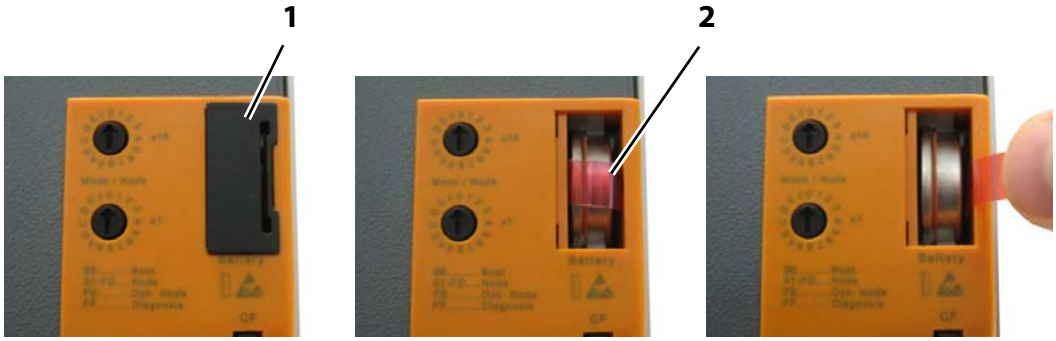
The lithium battery is required for buffering the BIOS CMOS data and for the real-time clock (RTC). If the capacity is insufficient, the battery must be replaced.

When changing the battery while the device is in de-energised state, the BIOS settings are retained (are stored in an EEPROM). Date and time are to be set again since data get lost during battery change. While changing the battery, data will be buffered by a gold leaf capacitor for approx.10 minutes.

Battery data	
Type	RENATA CR2477N, lithium battery 3 V/950 mAh
Can be exchanged	Yes, accessible from the outside
Service life	4/2.5 years

Removing the old battery

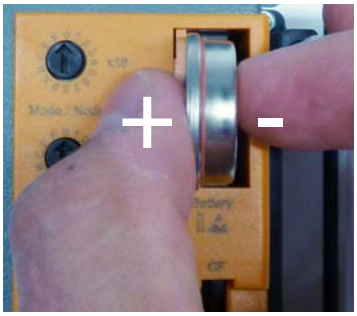
1. Disconnect the connecting cable from CP700 (unplug power cable).
2. Touch the enclosure or the earth connection terminal to discharge static electricity.
3. Remove the cover of the battery compartment (1) and slide the batter out using the pulling band.



Insert new battery

1. Remove the battery from the packaging. Only touch the battery with your hands at the end faces. The battery can also be inserted with an insulated forceps.

2. Ensure correct polarity when inserting the new battery. When inserting the battery ensure proper seating of the pulling band to facilitate the next battery replacement!



3. Reconnect the CP700 to the power supply.
4. Set the time and date again.
5. Dispose of the old battery in compliance with statutory regulations (see chapter "Disposal" on page 162).

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