EN Manual

BENDER
The Power in Electrical Safety©

COMTRAXX® COM460IP

BMS Ethernet Gateway for the connection of the Bender measuring interface to the TCP/IP network
Software version: D271 V3.0x, D278 V3.0x

COM460IP_D00023_01_M_XXEN/01.2016

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Photos: Bender archives.

Table of Contents

1. Making effective use of this documentation

1.1 How to use this manual

This manual describes the gateway COMTRAXX® COM460IP with the software version stated on the front page. The functions and processes described may vary from those featured in other versions. **The manual is aimed at qualified experts in electrical engineering and communications technology!**

Before using the devices please read this manual, the sheet "Important safety instructions for BENDER products" as well as the manuals for the system components. This document must be kept in an easily accessible location near to the device.

If you have any questions, please do not hesitate to contact us. For this purpose contact our Technical Sales Department. We are also happy to provide on-site service. Please contact our Service Department for more information.

Although great care has been taken in drafting this manual, it may nevertheless contain errors and mistakes. The Bender Group cannot accept any liability for injury to persons or damage to property resulting from errors or mistakes in this manual.

COMTRAXX® COM460IP is also referred to in this manual as "gateway" or "COM465IP" for short. COMTRAXX® is a registered trademark of Bender GmbH & Co. KG.

1.2 Explanations of symbols and notes

The following terms and symbols are used to denote hazards and instructions in Bender documentation:

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

1.3 Overview of chapters

- Making effective use of this document:
  This chapter gives you instructions on how to use this documentation
- Safety instructions
  This chapter describes the dangers during installation and when operating the device
- Product description:
  This describes the scope of delivery and function packages
- Standard application:
  This chapter deals with the normal use of this product
- Installation, connection and commissioning:
  This chapter shows the steps to take up to commissioning
- The BMS-Ethernet Gateway COM460IP:
  This chapter describes the display and operating elements and the device operation by means of the device's own menu
- COM460IP web user interface:
  This chapter describes how to operate the COM460IP conveniently using the web browser and how to query and parameterise the bus devices connected to the COM460IP
- Display function for mobile Web applications:
  This chapter provides a presentation of the bus overview by means of a smart phone
- Data access using Modbus TCP protocol:
  This chapter deals with the protocol main features
- Modbus process image in the COM460IP's memory
  In this chapter, the representation of BMS data on Modbus TCP structures is described in detail
- Technical data:
  In addition to the technical data you will find here ordering details and characteristics of device variants (function packages)
- Troubleshooting:
  This chapter offers service and support in case of malfunction. In addition you will also find here information on our Technical Service department
- INDEX:
  The key word index assists you in finding the term you are searching for.

1.4 Quick reference guide

Connection of the COM460IP
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 page 21.
It may also be helpful to refer to block diagrams representing an application example with an internal BMS bus on page 16.

Using the web user interface
You can easily access the COM460IP using a standard web browser. For details refer to page 33.

Using the Modbus TCP functions
Information about this field can be found from page 115 onwards.

2. Safety instructions

2.1 Work on electrical installations

DANGER

Risk of fatal injury from electric shock

Any work on electrical installations that 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 used in a location outside the Federal Republic of Germany, the applicable local standards and regulations must be observed. European standard EN 50110 can be used as a guide.

2.2 Intended use

The BMS-Ethernet gateway COM460IP connects the serial Bender BMS bus to Ethernet TCP/IP networks. The gateway converts alarms, measured values and statuses from the BMS bus into Modbus TCP protocol. That allows connection to Modbus networks and visualisation and evaluation using standard web browsers with Silverlight plugin.
If the gateway is operated on the **internal** BMS bus, the other devices on the internal BMS bus can be parameterised.

2.3 Address configuration and termination

To ensure the correct function of the COM465…, correct address assignment and termination is of utmost importance.

CAUTION

Malfunction due to duplicated addresses!

The duplicate assignment of addresses can cause serious malfunctions in the bus systems affected.

► *Ensure the COM460IP is correctly addressed and terminated.*

2.4 Delivery conditions, guarantee, warranty and liability

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

3. Product description

3.1 Scope of delivery

You will receive:

- the COM460IP
- an operating manual as pdf file in the device memory, accessible via the web user interface under "Tools" > "Manual"
- a short description

3.2 Short description

The BMS-Ethernet gateway COM460IP converts data from the Bender BMS bus into TCP/IP protocols. The device utilises an integrated web server which can easily be used for displaying data from BMS systems on any PC via a web browser with Silverlight plug-in.
In addition, a Modbus TCP server is integrated to convert BMS data for Modbus clients.
In addition, COM460IP provides an FTP server for file access.

Ethernet-TCP/IP interface:
The coupling is performed via the internal Layer-2 switch. Two Ethernet ports are available.

Interface on the BMS side:
COM460IP can be operated as master or slave. In master mode requests can be answered faster.
If, in addition to the basic device, function packages (software licences) have been purchased, an extended scope of functions is available for each additional function package.
The basic device can be used as a stand-alone device or in combination with function packages.
The characteristics, which depend on the individual configuration of the package, are described in the following chapters.

3.3 Basic device

- Representation of BMS data using a standard web browser with Silverlight™ plug in
- Representation of current measured values, operational and alarm messages
- Time synchronisation for all BMS bus devices
- Integrated Ethernet switch: 2 x RJ45, 10/100 Mbit/s
- LCD for simple address setting
- Operation possible optionally via the internal BMS bus
- Access to **all devices connected to the BMS bus** using the web server
- Modbus TCP data access to BMS addresses 1...10 of the first internal BMS bus
- Password-protected device menu
- History memory for 1000 entries
- 12 data loggers, freely configurable with 1000 entries each.

3.4 Function package A – Individual messages

- Assignment of individual texts for devices and measuring points (channels).
- E-mail notification to various user groups in the event of alarms and system faults. The e-mail address of the sender being displayed can be entered.
- Device failure monitoring
- Report function saves measured values and settings. Saved settings can be compared with the current settings made on the COM460IP.

3.5 Function package B – Modbus TCP expansion

- Up to 150 BMS devices can be monitored on the internal bus
- From an external application (e.g. visualisation software) commands can be sent to BMS devices.

3.6 Function package C – Parameter setting

- Fast, simple parameter setting of BMS devices using the web browser,
also see "List of devices compatible with COM460IP" on page 15.
- BMS devices, other than COM460IP, can only be parameterised when the gateway is operated on the **internal** BMS bus
- Report function saves measured values and settings when the gateway is operated on the **internal** BMS bus. Saved settings can be compared with the current settings made on the COM460IP. The saved settings can be reloaded into the COM460IP.

3.7 Function package D – Visualisation

- Fast and simple visualisation without any programming. For example, measured values or alarms can be arranged on a floor plan and visualised.
- Displaying an overview the contents of which takes up more than one page. Jump to another view page and back to the overview page.
- A graphical representation with the scaling of the time axis for the data logger of COM460IP and compatible Bender devices (see "List of devices compatible with COM460IP" on page 15).
- 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.

3.8 Possible applications

- Commissioning and diagnostics of BMS bus systems
- Optimum representation and visualisation of device and system statuses supported by silverlight functions in the web browser
- Specific system overview according to individual system description
- Selective notification to various user groups in the event of alarms
- The use of professional visualisation programs permits conversion of BMS data to Modbus TCP protocols
- Observing and analysing communication-capable Bender products, such as RCMS, EDS and MEDICS® systems
- Simple and fast parameterisation of BMS systems, storage and documentation of settings

3.9 List of devices compatible with COM460IP

A current list of the devices that can be parameterised is available under the address:

http://www.bender-de.com/de/products/system components/com460ip-compatible devices.html

3.10 Software products used for COM460IP

- FJCore under the MIT licence (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 licenced under a Creative Commons Attribution 2.5 licence.
  [http://creativecommons.org/licenses/by/2.5/]

3.11 Standard application

3.11.1 COM460IP on the internal BMS bus

Bender systems such as EDS46x/49x, RCMS46x/49x and MEDICS communicate with each other via the Bender measuring device interface BMS.
The BMS-Ethernet gateway COM460IP serves as a coupling between the BMS bus and TCP/IP networks. The internal Modbus TCP server of the COM460IP communicates with the Modbus TCP client via these networks.
The integrated web server allows BMS data to be queried using standard browsers with installed Microsoft Silverlight.
The following block diagram illustrates the operation of the gateway in an internal BMS bus.

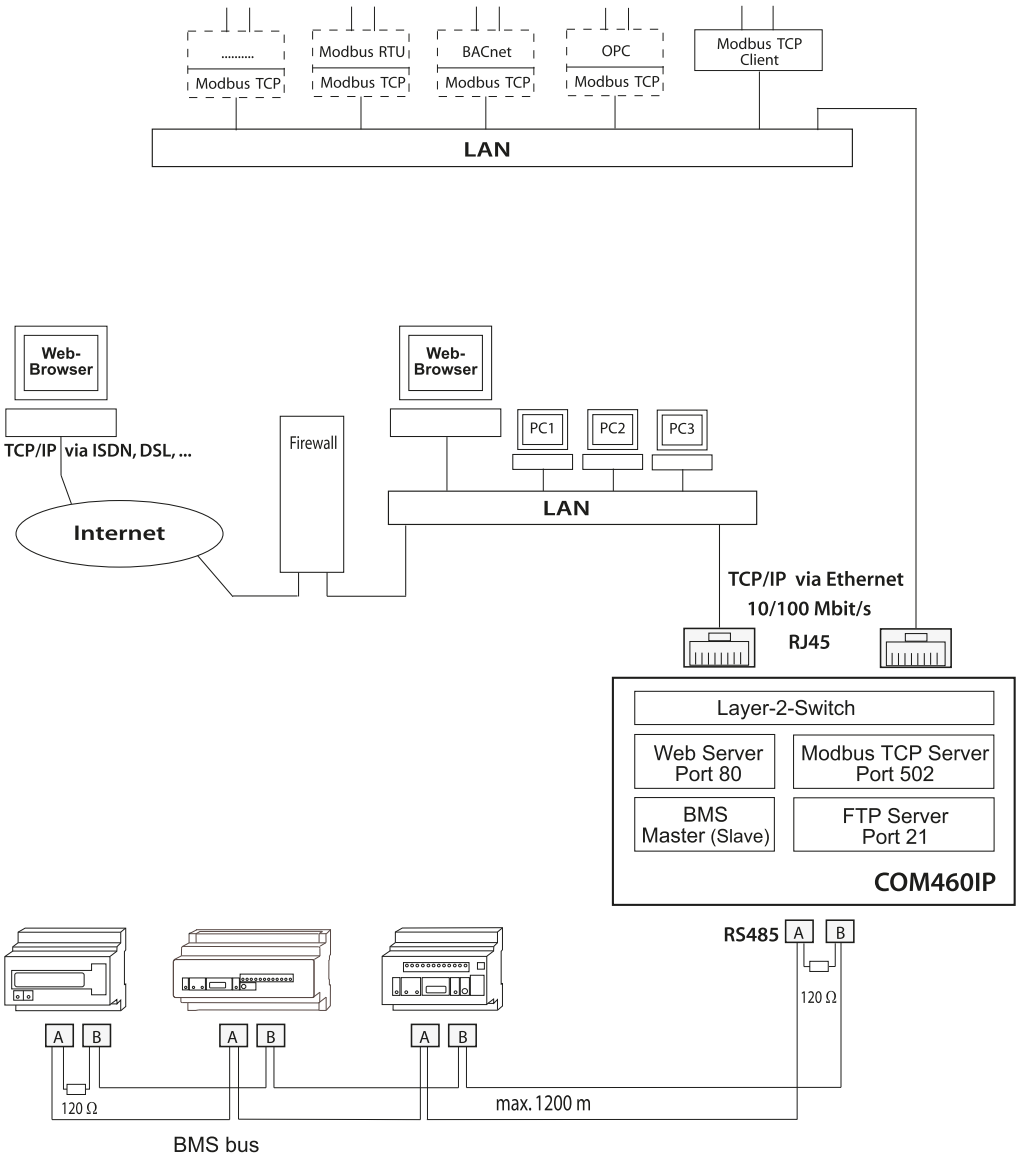


*Fig. 3.1: Block diagram of a coupling between an **internal** BMS bus and TCP/IP networks*

3.12 Internal and external BMS bus

COM460IP communicates via the internal BMS bus. Individual devices, such as MK800, TM800 or Bender panels can communicate via both the internal BMS bus (BMS i) **and** the external BMS bus (BMS e).

4. Installation, connection and commissioning

The BMS-Ethernet gateway can usually be integrated into existing LAN structures, but can also be operated via a single PC on the Ethernet side.

If you are familiar with the configuration of computer networks, you can carry out the connection of the COM460IP by 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. The device is operated on the internal BMS bus.
   Is the BMS address to be set known?
   Can COM460IP be operated as the master (BMS address 1)? If apart from the COM460IP, an alarm indicator and test combination MK800 is connected to the internal bus, the COM460IP **must 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.com`.
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 processor/512 MB RAM /
   Windows XP/Vista/7/Web browser with Microsoft Silverlight (version 5.0 or higher).

For initial connection, a basic configuration of the COM460IP depending on the specifics determined is required, which is to be carried out outside the installation.

For information about the ports used please refer to the Web user interface "Tools" > "Network" > "Socket status".

4.2 Basic configuration

The COM460IP will be delivered with the following address-relevant factory settings:

Parameters	Factory setting	Submenu in the device menu
IP address:	192.168.0.254	1. IP > 1. IP
Netmask:	255.255.0.0	1. IP > 2. SN
Standard gateway:	192.168.0.1	2. Standard gateway > 1. IP
DHCP:	on	3. DHCP > 1. DHCP
t_{off}:	30 s	3. DHCP > 2. t(off)
BMS address:	2	4. Interface > 1. Address
BMS protocol:	BMS i	4. Interface > 2. Protocol
t_{off} = max. IP-address assignment time		

Proceed as follows:

1. Connect the COM460IP to supply voltage.
2. Set the agreed BMS address in the menu of the COM460IP; see chapter "4.2.3 ".
3. If the computer network of the installation comprises a DHCP server, you don't need to assign an IP address in the COM460IP menu, the IP address will be assigned automatically.
4. If the computer network does not comprise a DHCP server, the IP address and netmask are to be set as determined by the EDP administrator, see chapter "4.2.2 ".

4.2.1 Automatic retrieval of the IP address

If the existing EDP structure comprises a DHCP server, the COM460IP can automatically negotiate an address after connecting to the LAN. The device is factory set to DHCP = on.

4.2.2 Manual setting of the IP address and the subnetmask, where appropriate

The setting on the COM460IP display is described here as an example:

1. Press the "MENU" button on the COM460IP.
2. Select "1. Settings" > "1. Server" > "1. IP" > "1. IP". The factory-set IP address will be displayed and can be changed now.
3. Modify the addresses block by block using the buttons "▲" or "▼".
4. Confirm each address block with the "↵" button.

If the netmask is to be changed, navigation is performed in the same way as for the IP address. Any other settings can be carried out easily with a browser via the graphical user interface of the COM460IP once the gateway has accessed a PC via TCP/IP. Details about the user interface can be found from page 33 onwards.

A fixed IP address was assigned to the device. Therefore it is necessary to switch off the DHCP function of the COM460IP:

1. Select "1. Settings" > "1. Server" > "3. DHCP" > "1. DHCP".
2. Select "off" using the "▲" or "▼" button.
3. Confirm the change with "↵".

4.2.3 Setting the BMS address

The following description is based on the assumption that the device is operated on the internal BMS bus.
Factory setting: "1. Settings" > "2. Interface" > "3. Protocol"= "BMS i". Also refer to page 29.

First of all, you need to clarify whether the COM460IP can be operated as BMS master. If possible, assign BMS address 1. This is the standard setting allowing for a higher data rate throughput. In this case, a new address has to be assigned to the present master. If slave operation is required, there should be no gaps between addresses. These may reduce data throughput.

1. Press the "MENU" button on the COM460IP.
2. Select "1. Settings" > "2. Interface" > "1. Address". The factory-set BMS address will be displayed and can be changed now.
3. Modify the addresses block by block using the buttons "▲" or "▼".
4. Confirm the modified BMS address with "Enter".

4.3 Installing the device

Possible methods of mounting:

- DIN rail mounting
- Screw mounting with 2 x M4 (dimension diagram on page 136)

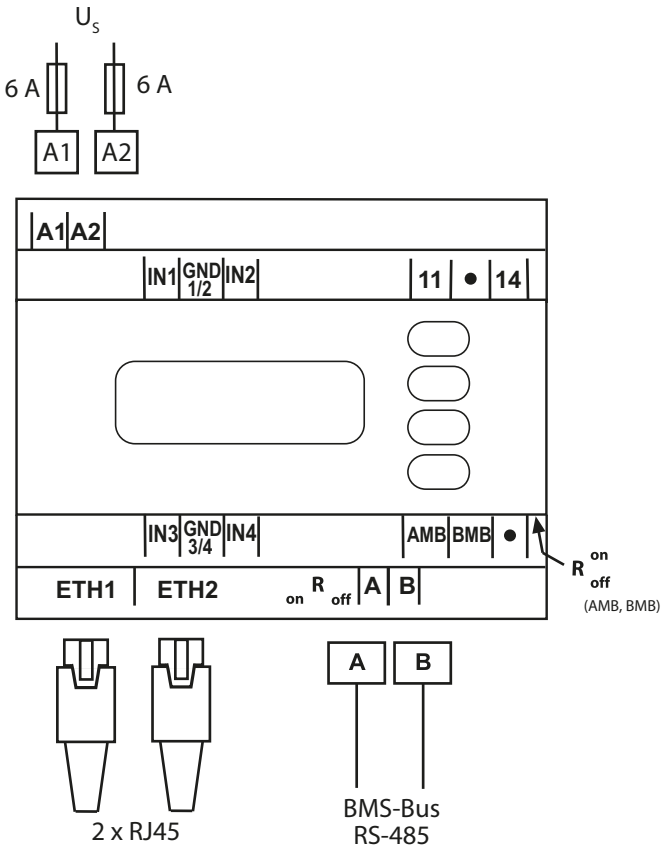
When installing the device, please take into consideration that the device is only to be used in locations that are protected from unauthorised entry!
This can be installation works in a switchboard cabinet, for example.

4.4 Connecting the device

For UL application, the following is to be observed:

- Supply voltage U_s see nameplate and ordering information
- Maximum ambient temperature 55 °C
- For use in pollution degree 2 environments
- Only 60/75-°C copper wires are to be used
- Tightening torque for terminals 0.5…0.6 Nm

Connect the terminals and the sockets of the COM460IP according to the wiring diagram.



Terminal	Description
A1, A2	Connection to the supply voltage, 6 A fuse recommended, two-pole fuses should be used on IT systems. For UL and CSA applications, it is mandatory to use 5 A fuses.
IN1, GND1/2, IN2	Currently has no function (digital inputs)
11, 14	Currently has no function (alarm relay K1)
IN3, GND3/4, IN4	Currently has no function (digital inputs)
AMB, BMB	Currently has no function
Ron/off (AMB,BMB)	Currently has no function
ETH1, ETH2	Two connections for connection to a personal computer or connection to the local network (Hub, Switch, Router). Connection using a CAT5 cable; internal Layer-2-Switch with cable autodetect.
A, B	Connection BMS bus (internal) with cable: twisted pair, shielded, shield connected to PE on one side, recommended: J-Y(St)Y min. 2 x 0.8.
Ron/off (A,B)	Switch for BMS bus termination. When the device is installed at the end of the bus, set the termination switch to "on".

4.5 Commissioning

1. After making the first address settings, the installation and the connection of the device, start a standard browser to access the graphical user interface of the internal web server.
2. Enter the current IP address (visible on the COM460IP LC display) to call up the start page of the graphical user interface.
   You can tell from the DCHP status "Active" appearing in the first line of the device display that the current address has been assigned by the DCHP server, unless you have not changed the factory setting.
3. Click on the "Bus overview" menu on the web-user interface to display the bus devices.
4. 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 until all accessible devices on the internal BMS bus (COM460IP = MASTER) are recorded.
5. If, nevertheless, malfunctions occur at the bus devices, please check whether the respective device is provided with the current software version.
   A current list of parameterisable devices is available under "List of devices compatible with COM460IP" on page 15.

4.5.1 Determining address data

The IP address and subnet mask must be known for the operation of the COM460IP. If these data have been changed without making a note of the modified address data, the following options are feasible:

- Press the "Menu" button. Read or change the address from menu "1. Server > 1.IP".
- Enter NetBIOS name in the web browser: "http://com460ip" or "com460ip" (dependant on the browser). Requirement: COM460IP and PC must lie in the same address range.

5. The BMS-Ethernet gateway COM460IP

5.1 Display and operating elements

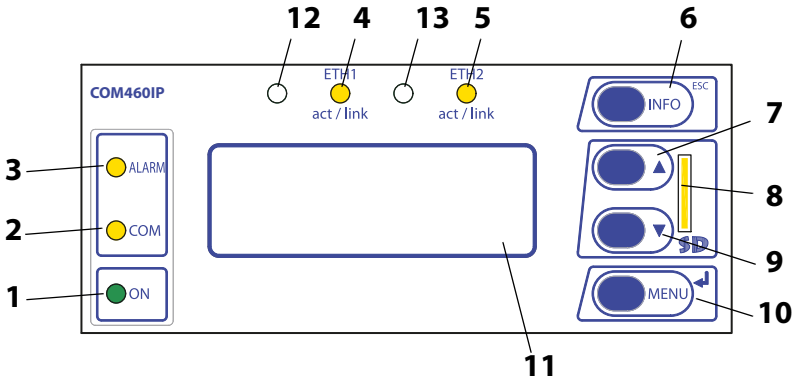


Fig. 5.1: COM460IP front plate

	Key
1	"ON" LED, lights when supply voltage is applied.
2	"COM" LED, lights when the gateway is responding to BMS requests.
3	"ALARM" LED, lights when an internal device error occurs.
4	LED "ETH1 act/link" flashes when data is being transmitted.
5	LED "ETH2 act/link" flashes when data is being transmitted.
6	"INFO" button to query the COM460IP for device-specific information. "ESC" button to leave the menu function without changing the parameters.
7	"▲" button: to move up in the menu, to increase the parameter value.
8	Micro-SD card
9	"▼" button: to move down in the menu, to decrease values.
10	"MENU" button for starting and exiting the menu. "↵" button to confirm parameter change.
11	LC display for standard and menu mode
12,13	No function (reserve)

*Do not remove the Micro-SD card to ensure that **all** device features are retained!*

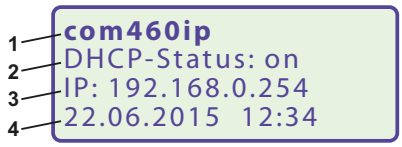
5.1.1 Automatic contrast setting for the display

The display contrast is factory set to an optimum value. In exceptional cases, it may be necessary to adjust the contrast manually.

Simultaneously press and hold down the "ESC" and "↵" buttons. All available contrast modes are continuously indicated in an infinite loop: minimum contrast, maximum contrast, no contrast (lasting some seconds), then the same cycle starts again. If the button "▼" is additionally pressed, the contrast modes will be displayed in the opposite direction.
Release the button as soon as the desired level of contrast is reached.

5.1.2 Display in standard mode

Network-related parameters will be indicated.



Key

1 Device type

2 DHCP status: Active ==>DHCP server found or DHCP activated in the menu.
DHCP status: off ==> DHCP server not found or DHCP deactivated in the menu

3 IP address of COM460IP

4 Current date and time

5.1.3 Display in menu mode

Use the "MENU" button to switch to the Menu mode.

A blinking cursor supports menu navigation.

- You can access the individual menus by means of the "▲" or "▼" button.
- Press the "↵" button to confirm the selection of a menu or any setting you changed.
- To leave the respective menu level or discard a setting which is not confirmed yet, press the "ESC" button.

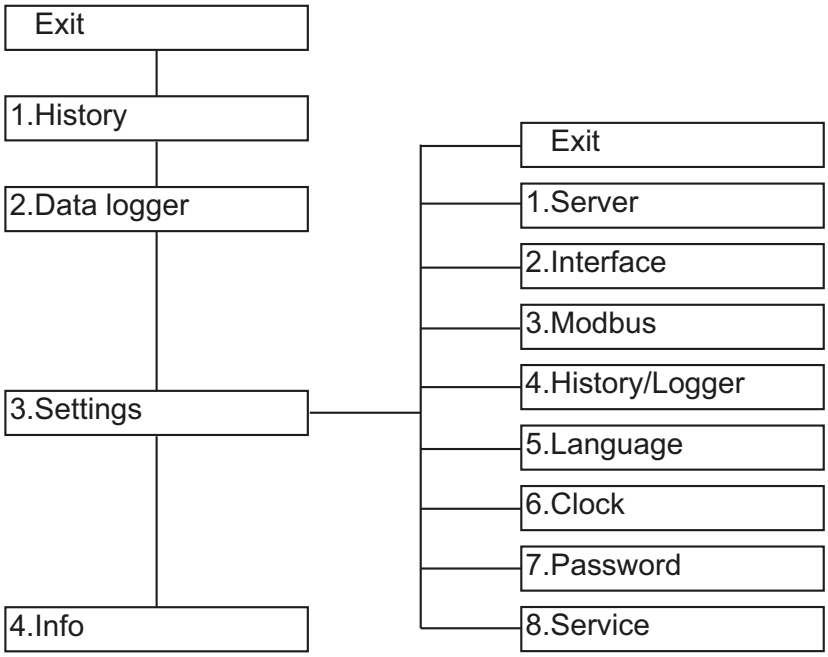
Menu mode is exited if no button is pressed for longer than five minutes.

5.2 Factory setting

All factory settings you will find in the table on page 29.

5.3 Menu overview diagram

The following diagram will help you to familiarise yourself with the menu:



5.4 Main menu functions

Menu	Function	Page
Exit	Exit menu mode	
1. History	Display of the history memory (1000 entries) with information about alarms, warnings as well as acknowledgements and associated times. Display of the minimum and maximum measured value after an alarm has occurred, incl. address and channel.	27
2. Data logger	Display of the12 data loggers. Shows measured values of individual channels with date and time (max. 1000 entries per data logger).	28
3. Settings	Make the necessary settings for this device.	29
4. Info	Display information on device type and firmware versions. The same information as indicated in the standard mode when pressing the "INFO" button.	32

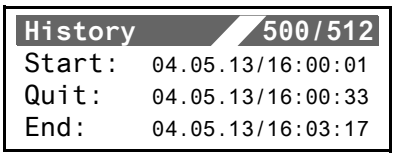
5.4.1 Menu 1: History

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.

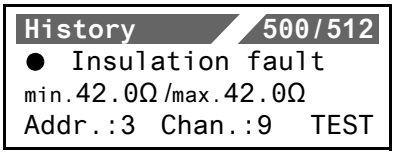
If the history memory is full, the oldest entry will be deleted in the event of an alarm to create space for the new entry.

5.4.1.1 Displaying the history memory

1. Use the arrow buttons to select the entry you require. The most recent entry appears first on the display. Older entries can be selected with the Up/Down buttons.



2. Press "↵" to call up the message text for the selected entry. In the last line, the path the message took to reach the device (In this case: insulation , BMS bus address 3, channel 9) is displayed. When the message "TEST" appears in the last line of the alarm text presentation, it shows that the current history entry results from a test at this device.



3. Press "↵" again to go back to the entry selection screen.

Repeat these operating steps for all required messages. Then press "ESC" to exit the menu.

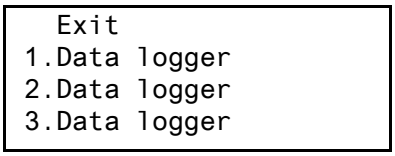
5.4.1.2 Delete the history memory

Select "3. Settings" > "4. History/Logger" > "1. History" > "1. Delete". This entry must be confirmed once again. Also refer to the description in table "1. History" on page 30.

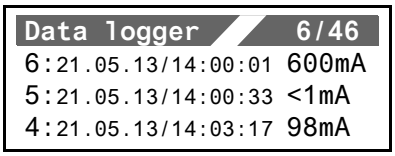
5.4.2 Menu 2: Data logger

Up to 1000 entries can be recorded for each of the 12 data loggers. A new measured value will be entered when the conditions set in the "3.Settings" > "4.History/Logger" > "2.Data logger" menu are met. You also make settings for overwriting and deleting measured values here (also refer to table "2. Data logger" on page 30).

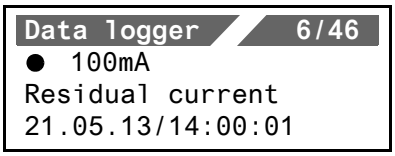
1. Use the arrow buttons to select the required data logger.



2. Use the "↵" button to call up the stored measured values for this data logger.



3. Use the "↵" button to display the selected entry.



4. Press "↵" again to go back to the entry selection screen.

Repeat these operating steps for all required entries. Then press "ESC" to exit the menu.

5.4.3 Menu 3: Settings on the device

The menu is divided into maximum four levels. All menus listed in the table can be called up via the main menu "3. Settings" in the uppermost menu level.
All control buttons are explained on page 25.

Menu level 2	Menu level 3	Menu level 4	Factory setting	Description
1. Server	1. IP	1. IP	192.168.0.254	Set the IP address of COM460IP
		2. SN	255.255.0.0	Set the subnet mask of COM460IP
		3. Name	COM460IP	DNS name of the COM460IP in the network
	2. Standard gateway	1. IP	192.168.0.1	Set the IP address of the gateway
	3. DHCP	1. DHCP	on	Activate/deactivate automatic IP address assignment using the DHCP server.
		2. t(off)	30 s	COM460IP connects to the DHCP server for up to 30 s to obtain an IP address. The communication time is 5...60 s adjustable in steps of five seconds. If no DHCP server can be reached, COM460IP will use the currently set IP address.
2. Interface	1. Address	—	2	Set the internal BMS address of COM460IP: 1…99.
	2. Interval	—	2 s	Set the cycle time 1…3 s for the sequence: - Querying alarms on the BMS bus - Querying new bus devices - Offering the BMS master function
	3. Protocol	—	BMS i	BMS i COM460IP on the **internal** bus (the external BMS address of the COM460IP always is 1). BMS e unpermissible setting.
	4. Baud rate	—	__	Adjustable for protocol BMS e only
3. Modbus	1. Control	—	off	Switch on or switch off the control via Modbus.

Menu level 2	Menu level 3	Menu level 4	Factory setting	Description
4. History/ Logger	1. History	1. Delete	—	Delete the history memory. The entry must be confirmed once again.
	2. Data logger	—	1	Use the arrow button "▲" to select the data logger to be set. Confirm with "↵". 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, is always "1"
		3. Address	2	Internal BMS bus address
		4. Channel	1	Channel of the BMS device
		A new entry will be saved when one of the three following conditions (modification, trigger, modification) are met (OR operation).		
		5.Modific.	2%	A new measured value is saved if it differs from the previous measured value by the percentage 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 entries then stops.
		9. Delete	—	Delete data logger. The entry must be confirmed once again.
	3. Interface	—	off	Recording of the BMS bus traffic, adjustable for 1...7 days or deactivation of the log function.
5.Language	1. English	—	Deutsch	Selection of the operating language
	2. Deutsch	—		
	3. Français	—		

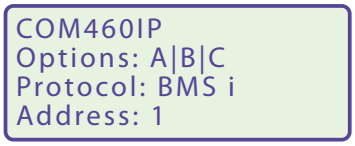
Menu level 2	Menu level 3	Menu level 4	Factory setting	Description
6. Clock	1. Format	—	d.m.y	Date format: m-d-y/d.m.y
	2. Date	—	01.01.2010	Date
	3. Time	—	00:00	Time
	4. CEST	—	off	Select Central European Summer Time: **off** = Function switched off, no offset **DST** = Automatic switchover, USA, CDN. During the summertime +1 h offset, during the wintertime no offset. **CEST** = Automat. switchover, Central Europe. During the summertime +1 h offset, during the wintertime no offset. **on** = set time zone + 1 h offset
	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 + 2 h = … UTC + 3 h = …
7. Password	1. Device	1. Password	000	Enter/change password: 0…999
		2. Status	off	Enable/disable password protection for **Parameter setting via the buttons of the COM460IP.**
	2. 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 COM460IP web server.**
	3. 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.**
	4. 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 COM460IP.**
8. SERVICE	—	—	—	Reserved for settings to be made by authorised Bender Service personnel.

Table 5.1: Menu 3 "Settings" of the COM460IP

5.4.4 Display INFO list

Open the "INFO" menu:

- In the standard mode: press the "INFO" button.
- In the menu mode: select function "2. Info".



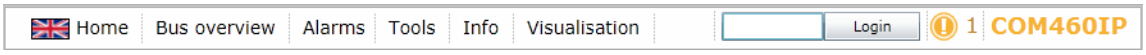
This menu displays information about the device and the software. Navigate in the list using the "▼" resp. the "▲" button.

1. Name of the gateway
2. Activated function packages
3. Type of BMS protocol
4. BMS address
5. MAC address
6. Order number
7. Serial number
8. Software version
9. Manufacturer's address

Please have this information to hand if you need to contact us for assistance by telephone.

6. Web user interface of the COM460IP

6.1 Menu structure of the graphical user interface



Menu bar	Submenu:	Description	Page
Start	Deutsch	Indication and selection of the operating language	35
	English		
	Other languages.		
Bus overview	List of bus devices for - Selection - Query - Parameter setting (Function package C)	– Representation of the bus structure with BMS addresses	37
		– Colour coding of the bus devices according their alarm or operating condition	40
		– Displaying additional data of the bus device selected via the "Device info" button	40
		– Menu representation of the selected bus device	42
		– Parameter setting for the bus device selected	57
		– Create, export or import a report including all parameters of the respective device	43
		– Enter individual texts for devices and channels (Function package A)	62
		– Configure e-mail notification which is to be sent if an alarm occurs (Function package A)	68, 71
		– Activate/deactivate monitoring function for device failure	74
		– History memory and data logger	47, 50
Alarms	Alarm window	Representation of all pending alarms and data of devices sending an alarm	77
Tools	BMS recording	Manual recording of the BMS bus activity, saving of the records to a storage media outside the COM460IP	79
	BMS analyser	Evaluation of the BMS recording	80
	BMS log files	Selection and indication of the recorded BMS-log files in the browser window*	83
	Network parameters	Displaying and changing network parameters*	83
	Socket state	Indication of the socket status in the browser window*	84

	Software update	Update of the system software of COM460IP*	85
	Function packages	Displaying the range of functions and the licencing of additional function package.s	87
	Modbus register	Modbus register representation of the connected BMS devices.	90
	Modbus control commands	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 PC's clipboard and then included in the programming for the external application.	92
	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.	64
	Device failure monitoring	Overview of all devices for which device failure monitoring has been activated.	75
	Overview of e-mails	Overview of all devices and channels for which an e-mail notification has been configured in the event of an alarm.	72
	E-mail configuration	Set up e-mail templates: days of the week, time of day, e-mail addressee and texts.	68
	Visualisation	Fast and simple visualisation without any programming.	94
	Manual	Function, connection, operation etc.*	87
	System visualisation	Several gatways (COM460IP, CP700) on one website. Displaying common alarms of the devices.	108
Info	Software D271 V3.0x Software D278 V3.0x	Displaying the current software versions	86
Visualisation		Carrying out visualisation	105

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

6.2 Browser configuration

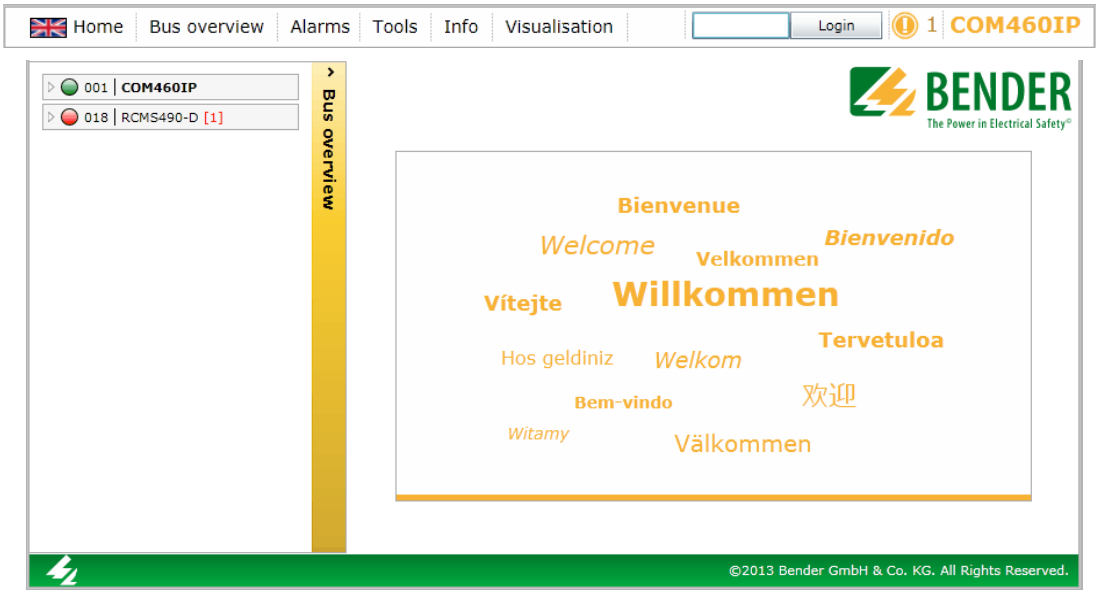
In order to fully benefit from all functions of the web user interface, Silverlight has to be installed on your computer and JavaScript has to be activated. In addition, the pop-up blocker has to be deactivated so that all functions are available to you.

Silverlight	Microsoft Silverlight (version 5.0 or higher) must be installed
JavaScript	Should be activated; required for report, software update etc.
Pop-up blocker	Should be deactivated for the IP address of the COM460IP; otherwise there is no access to the manual , software updates, network settings etc.
ActiveX	Not required

6.3 Start page and operating language

6.3.1 Opening the start page

1. Open an Internet browser.
2. Enter the IP address of the COM460IP into the address line (Example: http://162.18.22.18/). The start screen will appear:



6.3.2 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 .

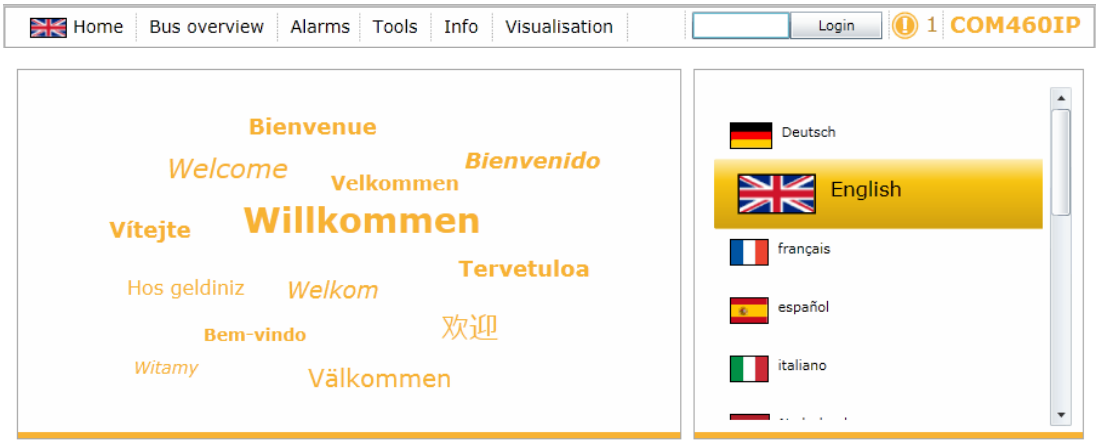


Fig. 6.1: Menu bar and language selection by mouse click

6.4 Menu bar

The user interface can largely be controlled per mouse click.

	Key
1	Menus and functions. Example: Home = 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 COM460IP and the password protection has been activated before.
3	Button "Login" resp. "Logout". **Logging in is the precondition for:** - the parameter setting of the recorded bus devices (Function package C) - the settings for device failure monitoring, e-mail notification and individual texts (Function package A) and visualisation (Function package D) 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 57.
4	Common alarm indication. In the example illustrated above, two alarms exist. Click this button to open the indication of the alarms (the same effect as menu item "Alarm").

6.5 Bus overview and device information

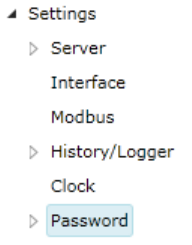
6.5.1 Activating a password protection for COM460IP

CAUTION

Risk of damage to the system due to unauthorised access
The password protection for the COM460IP protects against unauthorised access only to a limited extent. Attackers from the Internet may nevertheless be able to read data and to change settings.
It is absolutely necessary to ensure
- that the network is separated from the Internet
- or common security mechanisms (firewall, VPN access) are applied.

The device allows a staggered password protection. The necessary settings can be carried out optionally:

- in the device menu (see page 29)
- or via the web user interface. Select
  "Bus overview" > "COM460IP" > "Settings" > "Password".



Password for	Protection ex factory	Password ex factory	Function of the password types Character pool for passwords
Device	off	000	Parameter setting via the COM460IP buttons; Password: 000…999
Server	off	default	Access to the web server of the COM460IP 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 COM460IP; Password: a...z, 0...9, minus sign, underscore

Prior to logging on with the password types "Server" and "FTP", the username "user" has to be entered!

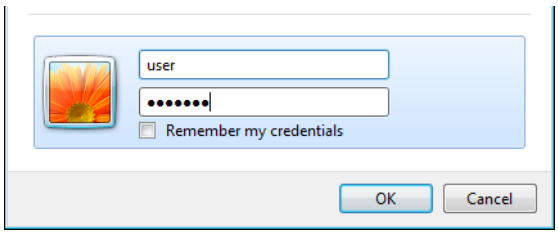
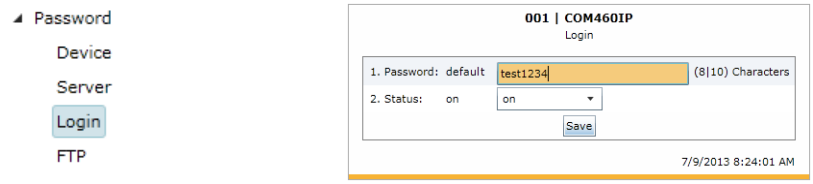


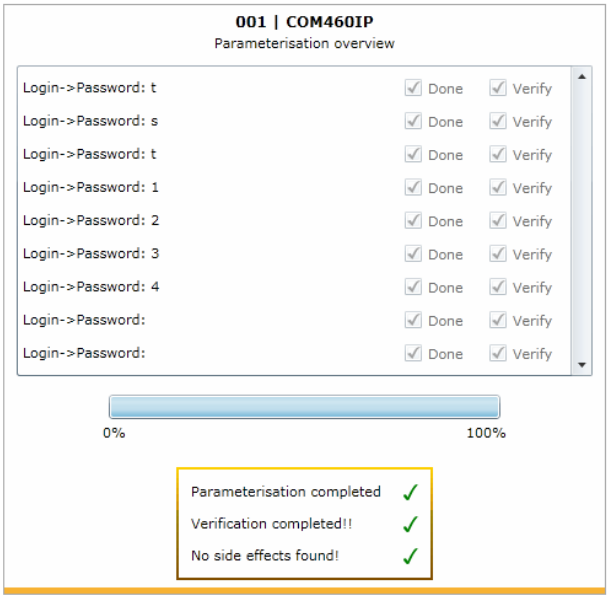
Fig. 6.2: The standard user "user" logs on to the web server or FTP server with "default" or by entering his password

Example:
The parameter setting function of the COM460IP is to be protected by a new password. A login password from the table above has to be assigned. The password protection must also be activated!

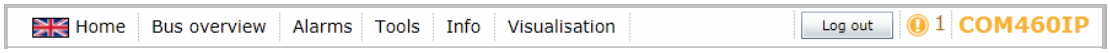
1. Select "Bus overview" > "COM460IP" > "Settings" > "Password" > "Login".
   In the first line, the appropriate edit field appears after which the maximum number of characters is displayed. Double-click the current password and overwrite it with your new password. After entering the first character, the colour of the edit field changes.



2. Click on 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.

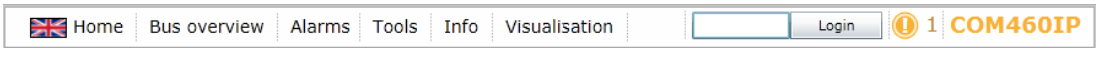


4. Click the "Logout" button in the menu bar.



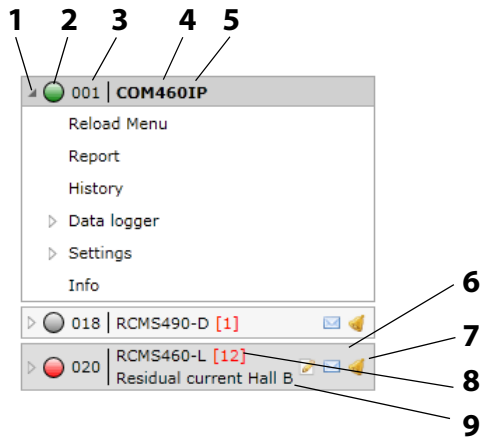
   As of now, parameter setting of the COM460IP can only be carried out after logging in with the new login password.

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.

6.5.2 Buttons for the list of bus devices

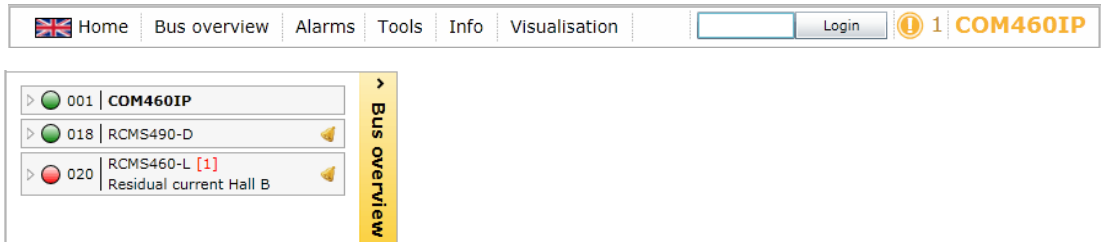


COM460IP on the internal BMS bus

	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 on the bus devices' button resp.on the sub menus underneath.
2	Alarm status of the BMS device Green Operating message Red Alarm message Grey Bus device has not responded for a long period of time. 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	BMS device type Click this button to open the device window indicating the measured values and alarms. For details refer to chapter "6.5.4 Querying device information"
5	Marking of the COM460IP the web server of which was used to set up a connection (font type "bold" and dark background)
6	Dark background marks the selected bus device or menu item.
7	Function package A only: Edit buttons for individual texts, configure e-mail and activate device failure monitoring function. The buttons will only be active when you have logged in before. For details refer to chapter "6.4 Menu bar".
8	Number of alarms of this BMS device
9	Function package A only: Individual test "Residual current monitoring"

6.5.3 COM460IP on the internal BMS bus

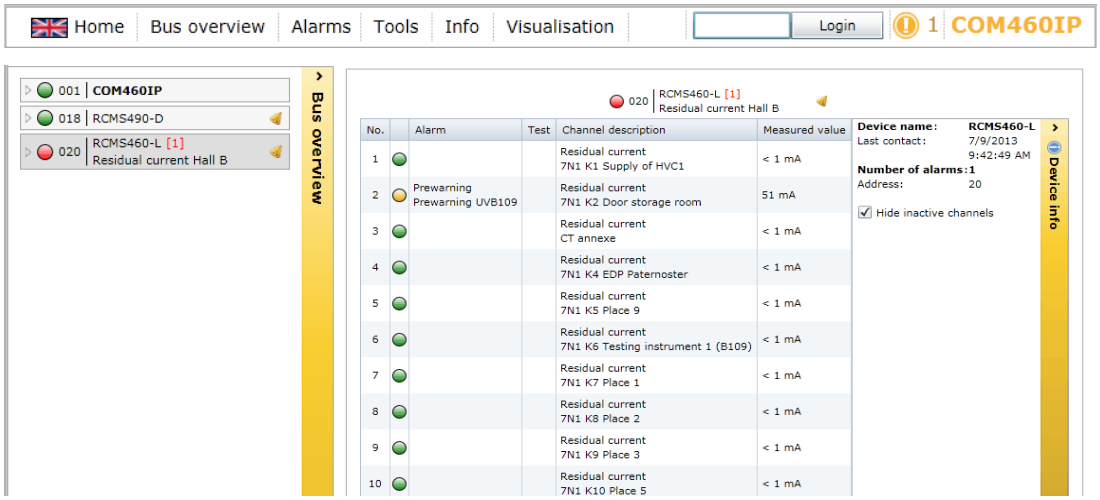
If the device is operated on the internal bus, only the internal addresses and bus devices are presented.



6.5.4 Querying device information

1. Click on "Bus overview" in the menu bar to open the menu of the same name.
   An enlarged form of the bus overview will be displayed.

2. After loading all devices, you can select the respective device from the list.
   In addition, the device window will open indicating measured values and alarms.
3. Click on the "Device info" button" to obtain more information.
   In addition to the basic data, additional data are indicated.



4. 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 on 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	All possible alarm messages are indicated: "Alarm" or "Fault" or "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:

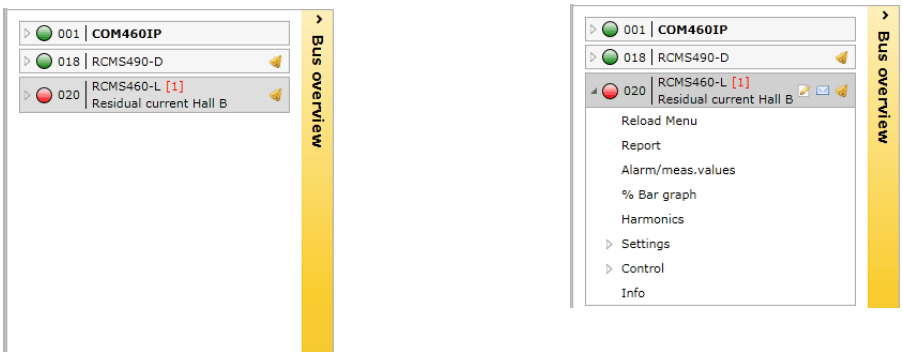
Device type	Example: isoMED427P
Last contact	Last BMS bus connection: Date and time
Number of alarms	Number of alarms
Internal address	Internal BMS address

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

6.5.5 Loading the menu of a bus device

An RCMS460-L 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.

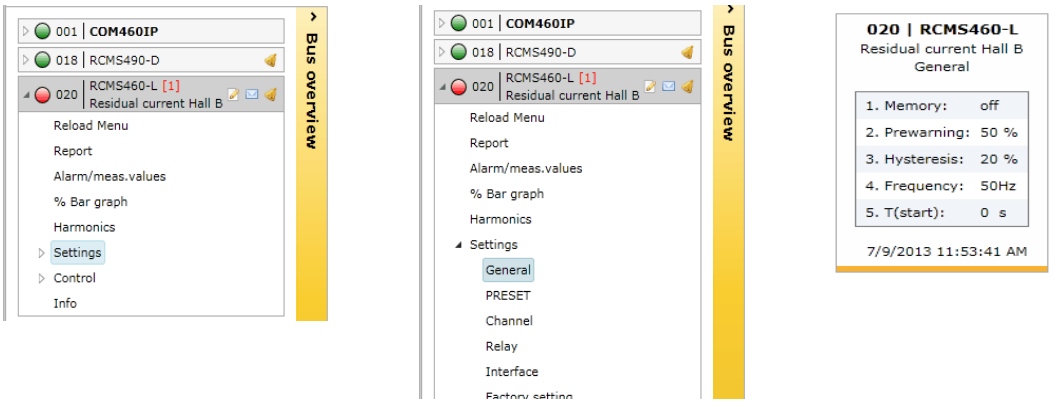


The menu of the bus device is loaded. The menu of the bus device in the browser largely corresponds to the menu structure of the bus device in the device display.

6.5.6 Querying bus device settings

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

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



6.5.7 Generation and further processing of a bus device report

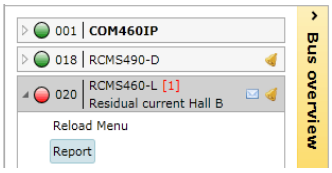
The current settings of all parameters of a bus device including the individual texts can be stored in a HTML file, and optionally the currently measured values too, using the "Report" menu (function package A or C). In addition, the contents of the "Info" menu are recorded.
The report file can be displayed and evaluated using a standard browser. In order to display all the elements of a report file, JavaScript must be activated.

The following actions are described chapter by chapter using an RCMS460:

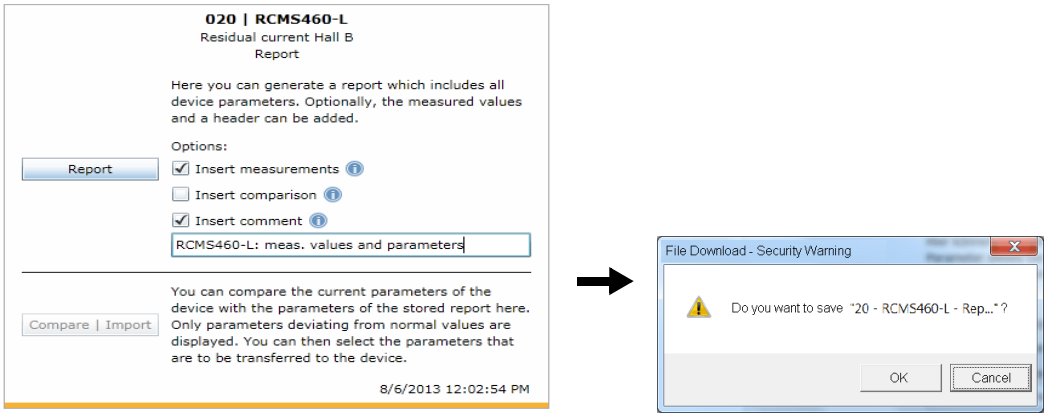
- Generating a report
- Displaying a report
- Comparison of two reports
- Using a report comparison for parameter setting

6.5.7.1 Generating a report

1. Select "Bus overview" > "RCMS460" > "Report".



2. Activate the respective selection box:

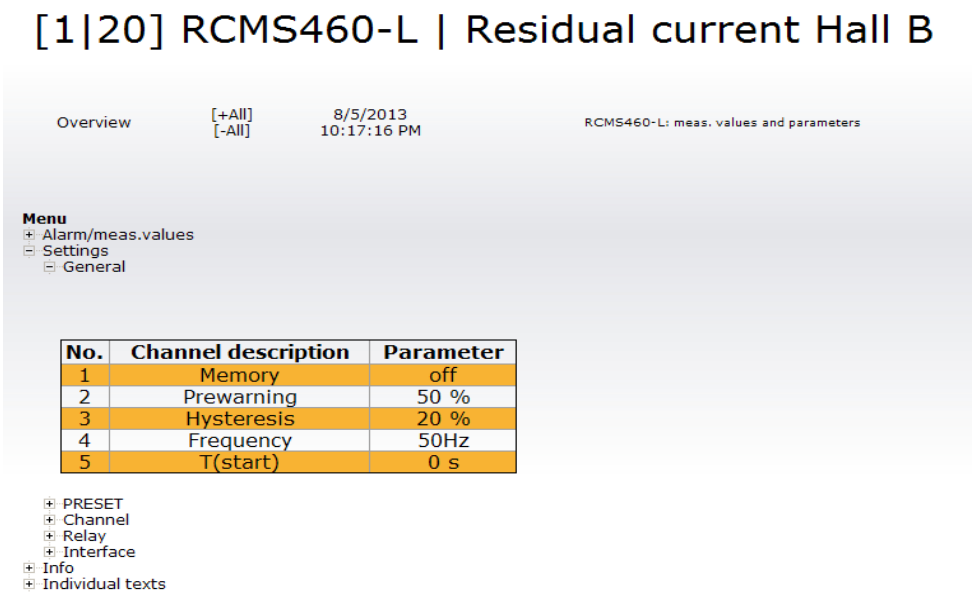


Insert the measured values	Add the currently measured values to the report.
Insert comparison	Load a stored report to compare the parameters of an existing report with a new report to be generated.
Insert header text	An edit field will appear. Enter the respective text (max. 70 characters).

3. Click on the "Report" button. Confirm the subsequent security query with OK. You can accept the file name appearing in the subsequent window or specifiy an individual name. After storing the file, report generation is completed.

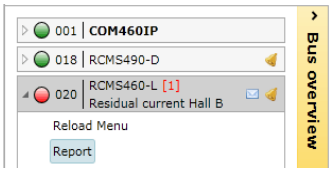
6.5.7.2 Displaying a report

1. Double-click on the report file in the memory location. 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.
   On the right next to the date setting, the header text assigned during the report generation is displayed.
3. Click on the "General" menu button. to open the associated parameters and its values.

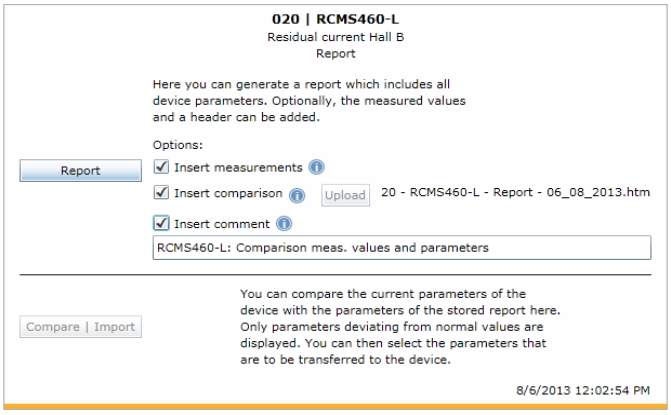


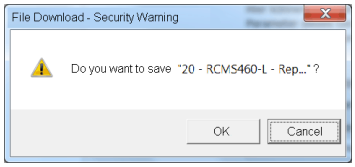
6.5.7.3 Generate new report using a comparison of the device parameters

1. Select "Bus overview" > "RCMS460" > "Report".



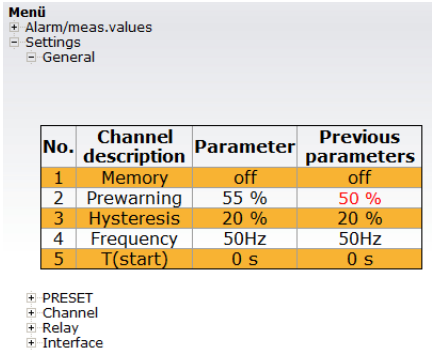
2. Activate the respective selection box:





Insert the measured values	Add the currently measured values to the report.
Insert comparison	Load a stored report to compare the parameters of an existing report with a new report to be generated. Click on the "Upload" button to load the previous report to which the current parameters are to be compared. After uploading the existing report file, the name of this file will appear next to the "Upload" button.
Insert header text	An edit field will appear. Enter the respective text (max. 70 characters).

3. Click on the "Report" button. Confirm the subsequent safety query with OK. You can accept the file name appearing in the subsequent window appearing or specifiy an individual name. After storing the file, report generation is completed.
4. Double-click on the new report file in the memory location. In the new report, the values and states to be compared are displayed side by side. Deviating parameters will appear in red.



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

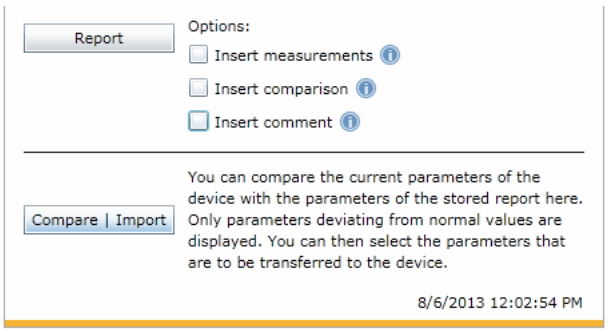
6.5.7.4 Using a report for parameter setting

The parameter settings stored in a report can be transferred to a bus device of the same type using the function "Compare - Import".
On the one hand settings stored in a report can be written back after experimental parameter setting of a bus device. On the other hand parameter setting can be carried out using the report file in a convenient manner after device replacement.

1. Select "Bus overview" > "RCMS460" > "Report".
   The "Compare/Import" button is inactive.

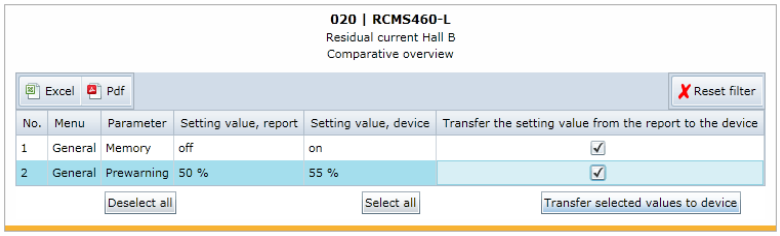
2. Login to the menu bar. 

   After logging in, the "Compare/Import" button is displayed as being active.



   The check boxes above the line are not required for the comparison.

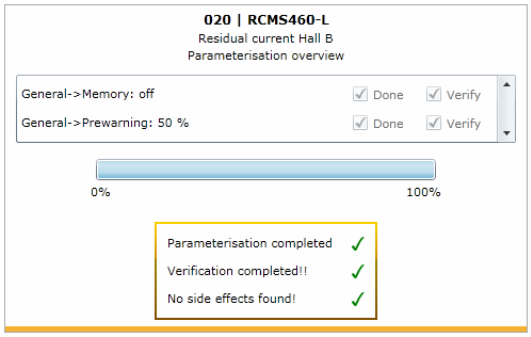
3. Click on the "Compare/Import" button to open the report file containing the parameter settings. The "Comparative overview" window will then open. By means of the "Excel" or "PDF" button. The table can be exported for documentation purposes.



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

   – Select the parameters to be transferred either individually or using the respective check box.
   – In case of longer lists, select via the "Select all" button or cancel the selection with the "Deselect all" button.
   – Click on "Transfer selected values to device" to start the parameter transfer to the bus devices.

4. Once transmission is completed, the "Parameterisation overview" window appears. Transmission and parameterisation successfully completed.



If the parameterisation procedure proves unsuccessful in some cases, repeat the procedure.

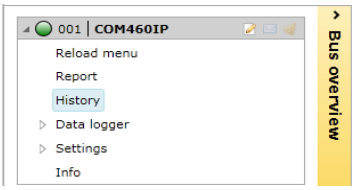
6.5.8 History memory

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.

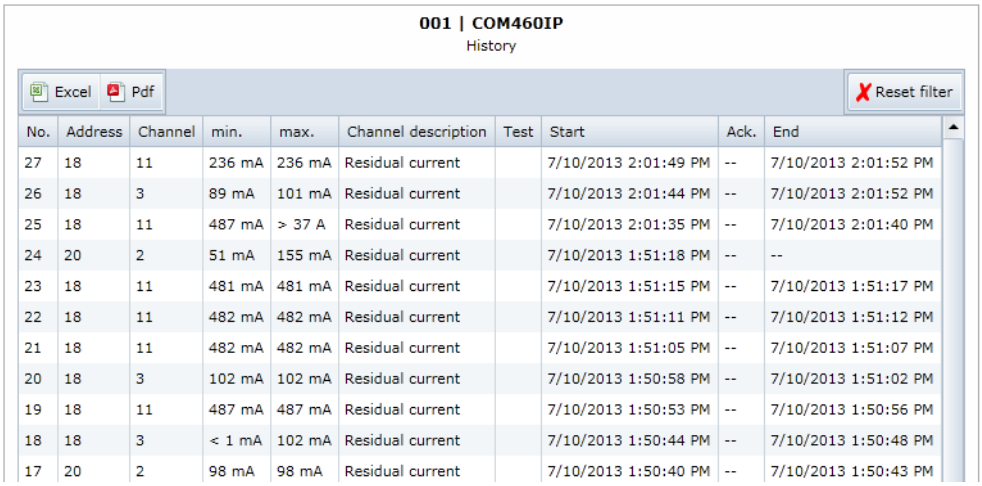
If the history memory is full, the oldest entry will be deleted in each case in the event of an alarm, to create space for the new entry.

6.5.8.1 Displaying the history memory

Select "Bus overview" > "COM460IP" > "History".



The history memory will be displayed:



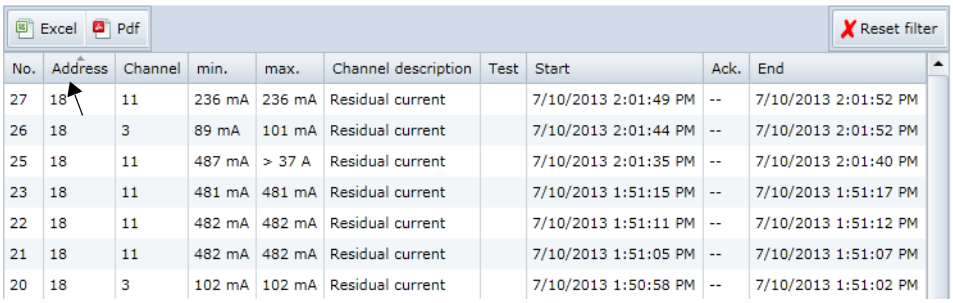
No.	Address	Channel	min.	max.	Channel description	Test	Start	Ack.	End
27	18	11	236 mA	236 mA	Residual current		7/10/2013 2:01:49 PM	--	7/10/2013 2:01:52 PM
26	18	3	89 mA	101 mA	Residual current		7/10/2013 2:01:44 PM	--	7/10/2013 2:01:52 PM
25	18	11	487 mA	> 37 A	Residual current		7/10/2013 2:01:35 PM	--	7/10/2013 2:01:40 PM
24	20	2	51 mA	155 mA	Residual current		7/10/2013 1:51:18 PM	--	--
23	18	11	481 mA	481 mA	Residual current		7/10/2013 1:51:15 PM	--	7/10/2013 1:51:17 PM
22	18	11	482 mA	482 mA	Residual current		7/10/2013 1:51:11 PM	--	7/10/2013 1:51:12 PM
21	18	11	482 mA	482 mA	Residual current		7/10/2013 1:51:05 PM	--	7/10/2013 1:51:07 PM
20	18	3	102 mA	102 mA	Residual current		7/10/2013 1:50:58 PM	--	7/10/2013 1:51:02 PM
19	18	11	487 mA	487 mA	Residual current		7/10/2013 1:50:53 PM	--	7/10/2013 1:50:56 PM
18	18	3	< 1 mA	102 mA	Residual current		7/10/2013 1:50:44 PM	--	7/10/2013 1:50:48 PM
17	20	2	98 mA	98 mA	Residual current		7/10/2013 1:50:40 PM	--	7/10/2013 1:50:43 PM

6.5.8.2 Evaluating the history memory

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

Sorting entries

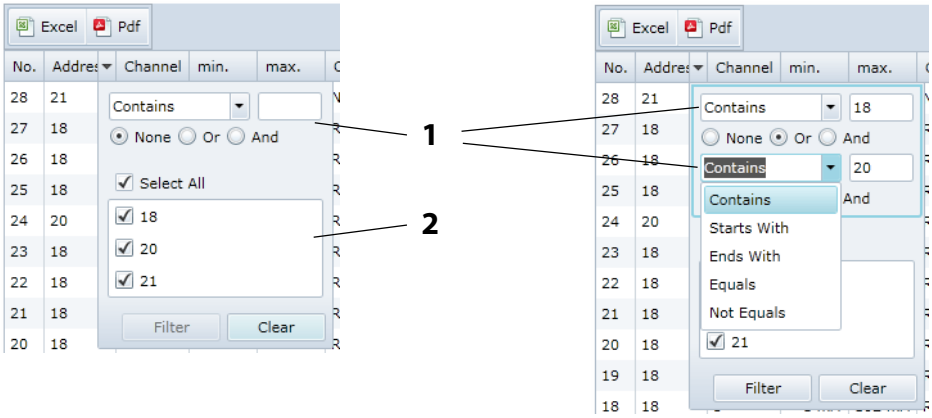
Click on the column heading. Each time you click on the column heading, you can choose whether you want to sort in ascending or descending order.



No.	Address	Channel	min.	max.	Channel description	Test	Start	Ack.	End
27	18	11	236 mA	236 mA	Residual current		7/10/2013 2:01:49 PM	--	7/10/2013 2:01:52 PM
26	18	3	89 mA	101 mA	Residual current		7/10/2013 2:01:44 PM	--	7/10/2013 2:01:52 PM
25	18	11	487 mA	> 37 A	Residual current		7/10/2013 2:01:35 PM	--	7/10/2013 2:01:40 PM
23	18	11	481 mA	481 mA	Residual current		7/10/2013 1:51:15 PM	--	7/10/2013 1:51:17 PM
22	18	11	482 mA	482 mA	Residual current		7/10/2013 1:51:11 PM	--	7/10/2013 1:51:12 PM
21	18	11	482 mA	482 mA	Residual current		7/10/2013 1:51:05 PM	--	7/10/2013 1:51:07 PM
20	18	3	102 mA	102 mA	Residual current		7/10/2013 1:50:58 PM	--	7/10/2013 1:51:02 PM

Filtering entries

1. Move the mouse without clicking near to the required column heading.
2. Click on 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 on 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.

Deleting filters

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

6.5.8.3 Exporting the history memory

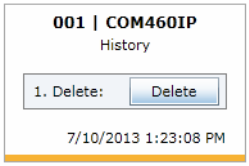
The current representation of the history memory will be exported (if required, sorted and/or filtered).

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.).

6.5.8.4 Delete the history memory

1. Login to the menu bar. 

2. Select "Bus overview" > "COM460IP" > "Settings" > "History/Logger" > "History" > "1. "Delete".

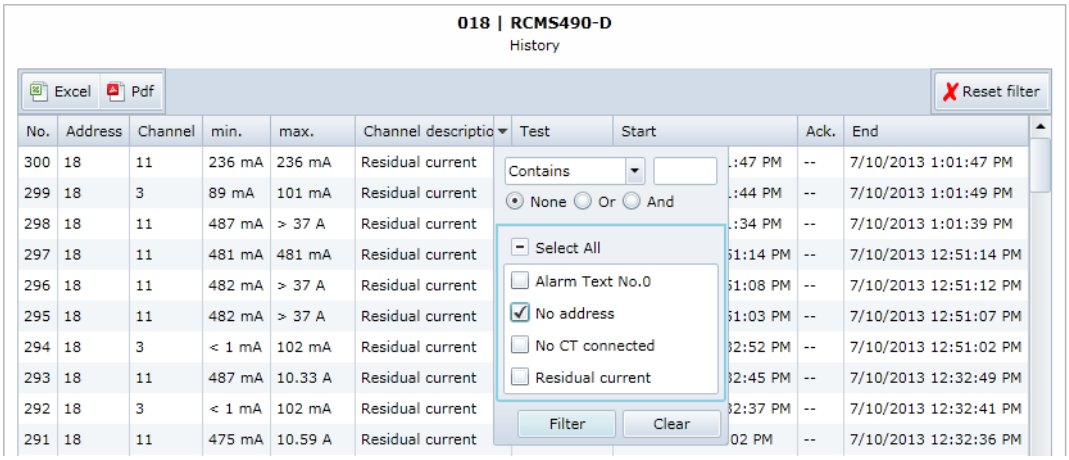


3. Click on the "Delete" button. This entry must be confirmed once again.

Also refer to the description in table "History" on page 60.

6.5.8.5 Displaying the history memory of BMS devices

If a BMS device features a history memory, its entries can also be sorted and/or filtered.

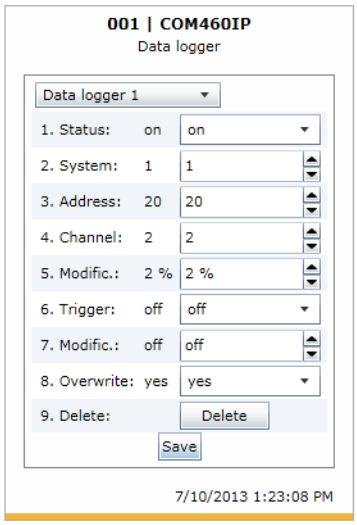


6.5.9 Data logger

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

6.5.9.1 Data logger setting

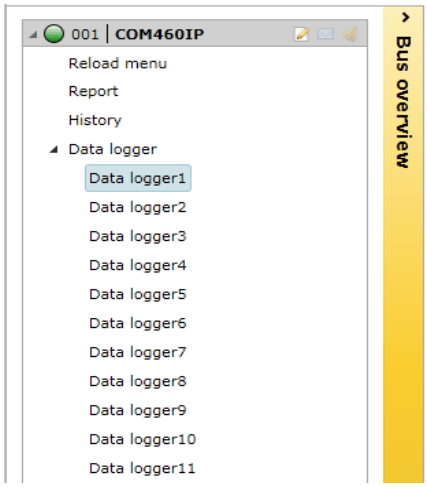
A new measured value will be saved when the conditions set in the "Bus overview" > "COM460IP" >"Settings" > "History/Logger" > "Data logger" menu are fulfilled (refer to the description of settings in the table "Data logger" on page 60). You also make settings for overwriting and deleting measured values here.



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

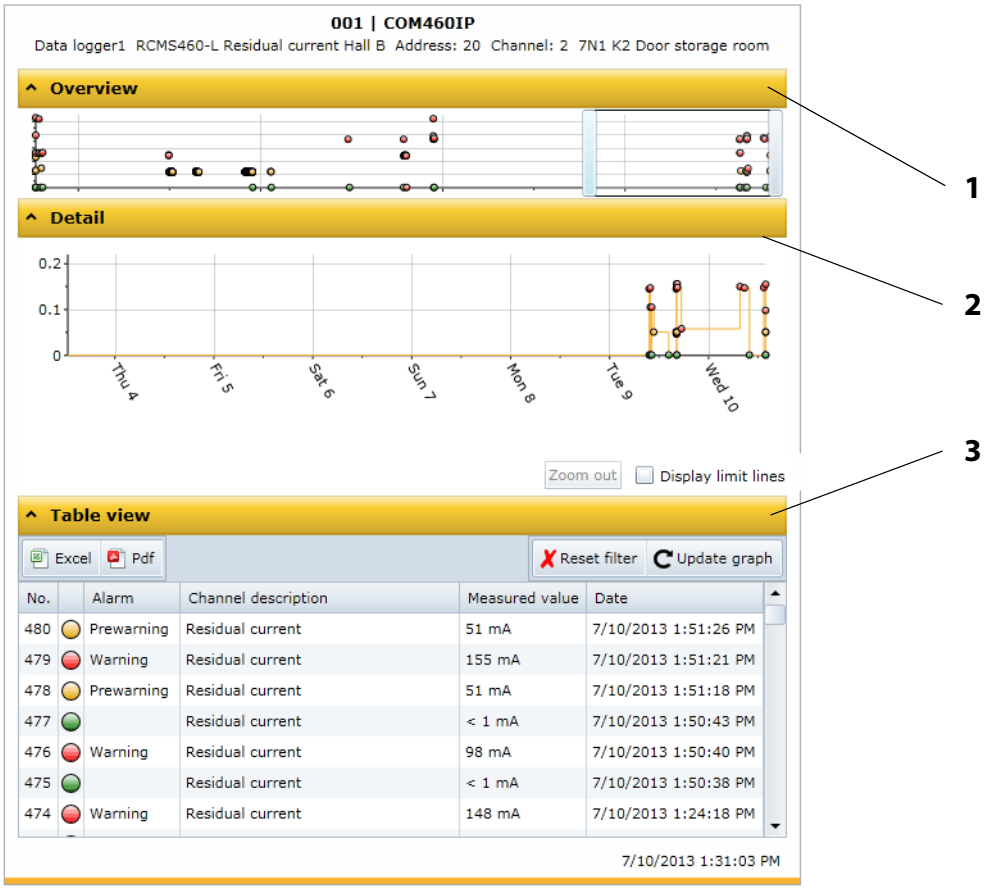
6.5.9.2 Displaying the data logger

Select "Bus overview" > "COM460IP" > "Data logger" > "Data logger..".



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

The selected data logger will be displayed:



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

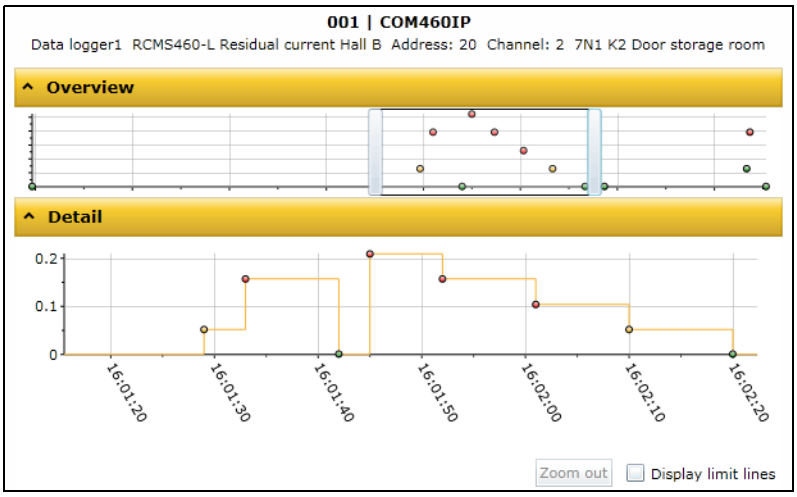
Each of the three representations can be reduced by clicking the associated orange bar. This provides more space for other representations. Clicking the orange bar again will maximise the representation again.

6.5.9.3 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

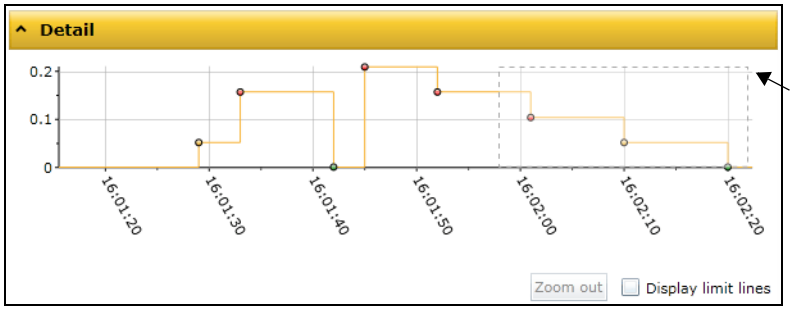
Determine the section to be zoomed in by moving the grey slider on the time axis to get a close-up view of your document.



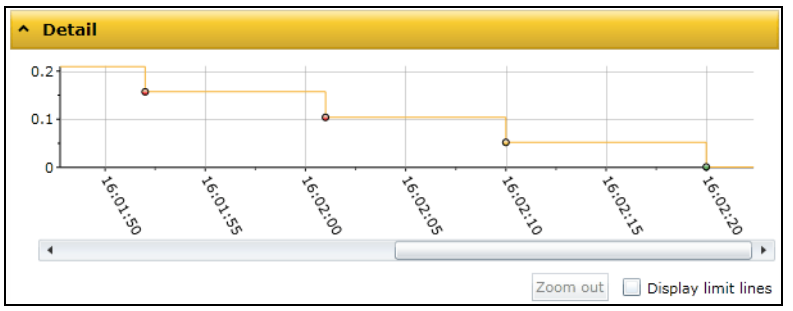
View details

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

1. Click on 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.

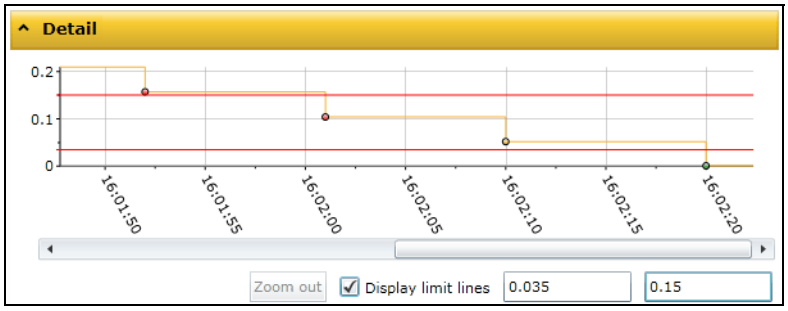


A close-up view of the selected section will appear immediately.



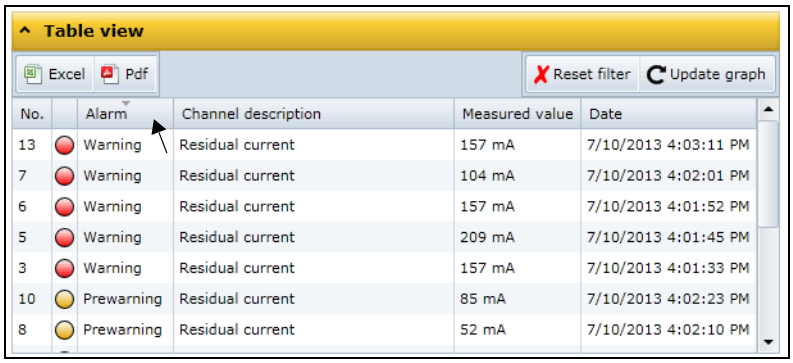
- If you want to zoom in the current presentation even more, repeat the previous procedure as described in step 1 and 2.
- Select "Zoom out" to restore the original presentation.

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



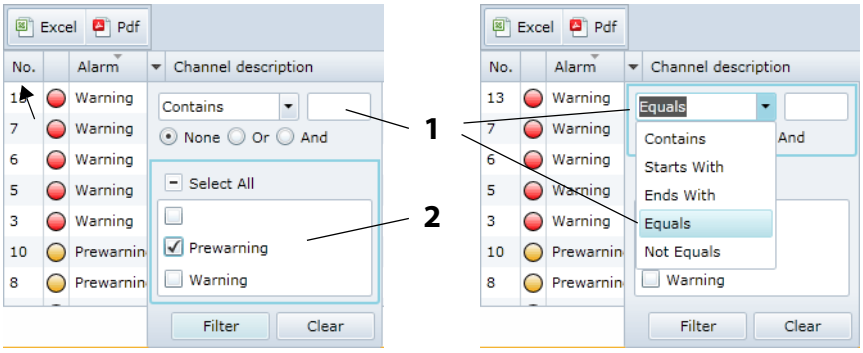
Sorting entries of the table view

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



Filtering entries

1. Move the mouse without clicking near to the required column heading.
2. Click on 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".

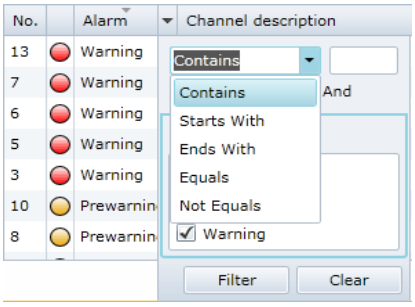
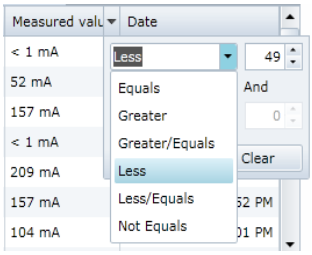


4. Click on the "Filter" button. The " " symbol will appear next to the column heading. The filter is set.

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

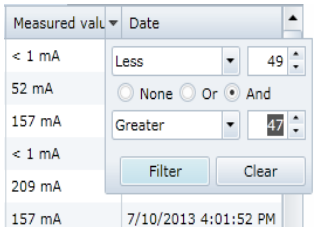
Information on the use of the filter

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 COM460IP and are reduced to a meaningful representation. The "Equal" therefore might not provide the appropriate numerical value. Use the filter criteria "Greater" and "Less" to narrow down the numerical value.

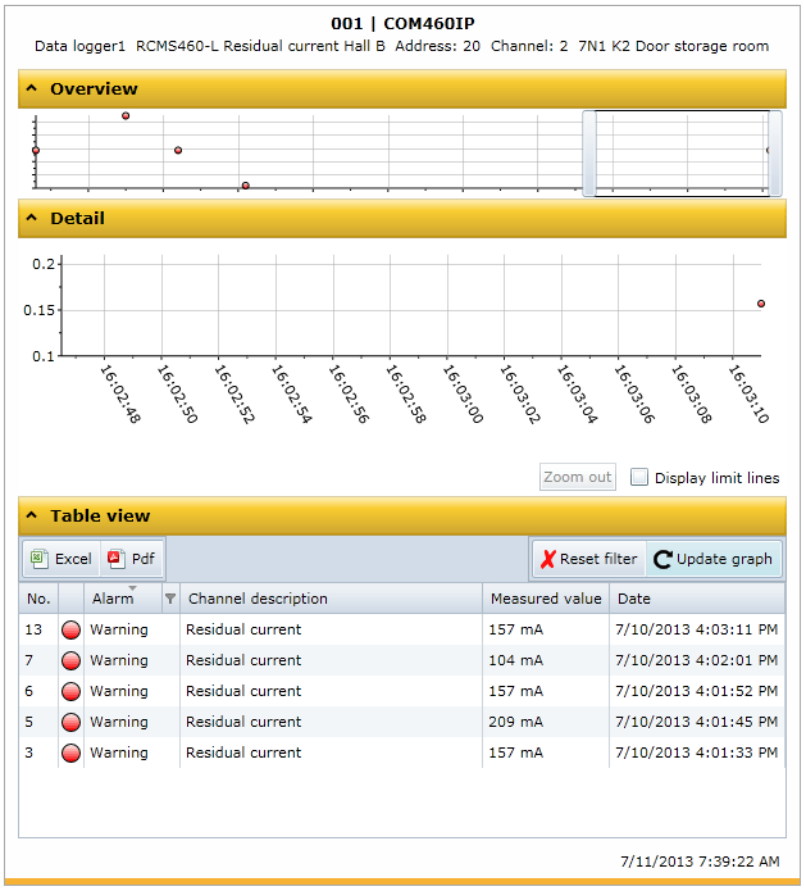


Deleting filters

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

6.5.9.4 Apply the filter to the graphical representation

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



6.5.9.5 Exporting the data logger

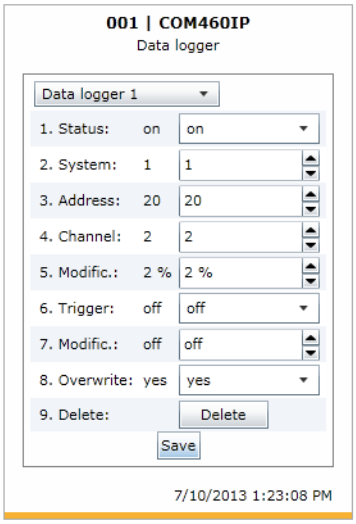
The current representation of the data logger (where applicable sorted and/or filtered) will be exported.

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.).

6.5.9.6 Deleting the data logger

1. Login to the menu bar. 

2. Select "Bus overview" > "COM460IP" > "Settings" > "History logger" > "Data logger".
3. Select one data logger or all data loggers (1…12).

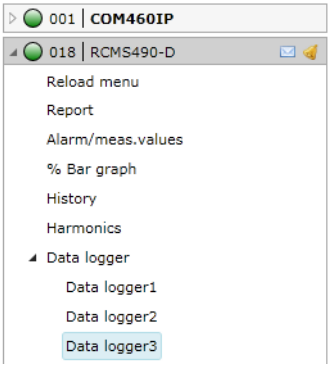


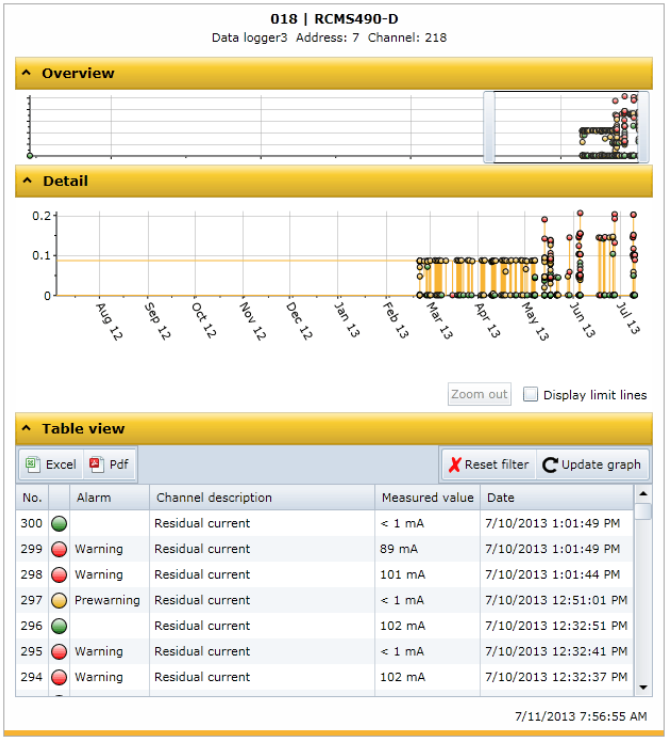
4. Click on the "9. Delete" button. This entry must be confirmed once again.

Also refer to the description in table "Data logger" on page 60.

6.5.9.7 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.





6.6 Parameter setting for bus devices

The COM460IP must include function package C in order to support parameter setting for bus devices.

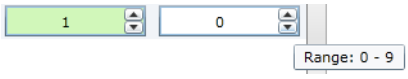
CAUTION

Incorrect parameter setting on bus devices may result in malfunctions! Therefore, the COM460IP is to be protected by passwords against unauthorised access!

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

The current list of parameterisable BMS devices can be found in chapter "List of devices compatible with COM460IP" on page 15.

6.6.1 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 on the button to open the list.
	Corresponding function of the button

6.6.2 Setting the parameters for RCMS460-L

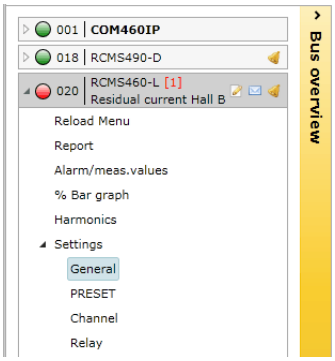
Click "Login" prior to parameterisation even if password protection is deactivated! Logging in ensures that only one user can change parameters at a given point of time.

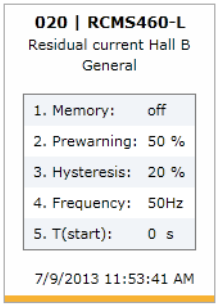
If a user has already logged on via the COM460IP, it will also be displayed to the other users.

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

1. Double-click on the "RCMS460-L" to select the bus device from the "Bus overview".
2. Click "Menu". As soon as the text "Loading complete" appears, the COM460IP knows the menu and the current parameters of the RCMS460-L.

3. Double-click "Settings" and then the "General" submenu to open the "General" window. The current setting of the prewarning level will be displayed.

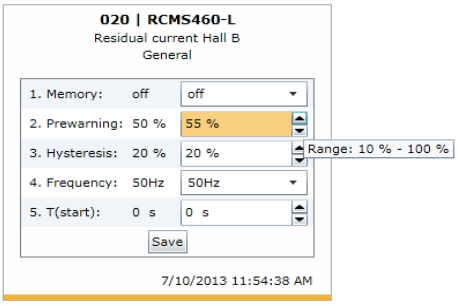




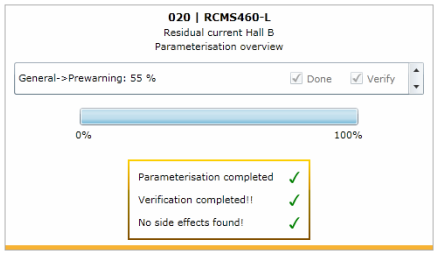
4. Login to the menu bar for setting the parameters. 

The "General" window will then show additional input fields.

5. In the line "2. Prewarning", you can increase the response value to 55% using the "▲" button. The colour of the edit field changes as soon as a change is made. The percentage prewarning threshold has been changed.



6. Press "Save". The result of the changes will appear in the "Parameter setting overview" window. Side effects which may be displayed provide information about indirect impact of parameter setting on other device functions.



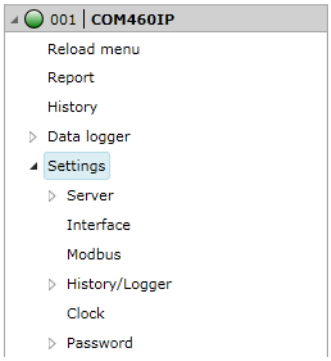
7. Click the "Logout" button in the menu bar, if no other settings are to be changed. Further parameter setting is only possible after logging on again.

6.6.3 Parameter setting for COM460IP using the "Settings" menu

After the installation of the COM460IP and setting the parameters via the device display and connection to the web server of the gateway, additional settings or changes can be carried out comfortably using the browser. For this purpose the COM460IP provides its own menu.

1. Login to the menu bar. 

2. Select "Bus overview" > "COM460IP" > "Settings".



Menu level 2	Menu level 3	Menu level 4	Factory setting	Description
Server	1. IP	1. IP	192.168.0.254	Set the IP address of COM460IP
		2. SN	255.255.0.0	Set the subnet mask of COM460IP
		3. Name	COM460IP	DNS name of the COM460IP in the network
	2. Standard gateway	1. IP	192.168.0.1	Set the IP address of the gateway
	3. DHCP	1. DHCP	on	Activate/deactivate automatic IP address assignment using the DHCP server
		2. T(off)	30 s	COM460IP connects to the DHCP server for up to 30 s to obtain an IP address. The communication time is 5...60 s adjustable in steps of five seconds. If no DHCP server can be reached, COM460IP will use the currently set IP address.
Interface	1. Address	—	2	Set the internal BMS address of COM460IP: 1…99
	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
	3. Protocol	—	BMS i	BMS i COM460IP on the **internal** bus (the externalBMS address of the COM460IP is always 1). BMS e unpermissible setting.
	4. Baud rate	—	__	Adjustable for protocol BMS e only
Modbus	1. Control	—	off	Switch on or switch off the control via Modbus

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 on 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, is always "1"
		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 entries 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.

Menu level 2	Menu level 3	Menu level 4	Factory setting	Description
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, no offset **DST** = Automatic switchover, USA, CDN. During the summertime +1 h offset, during the wintertime no offset. **CEST** = Automat. switchover, Central Europe. During the summertime +1 h offset, during the wintertime no offset. **on** = set time zone + 1 h offset
	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 = …
Password	1. Device	1. Password	000	Enter/change password: 0…999
		2. Status	off	Enable/disable password protection for **Parameter setting via the buttons of the COM460IP.**
	2. 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 COM460IP web server.**
	3. 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.**
	4. 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 COM460IP.**

The setting of the password protection is described on page 37, the parameter setting of a bus device by the example of an RCMS490-D from page 57 onwards.

6.7 Entering individual texts

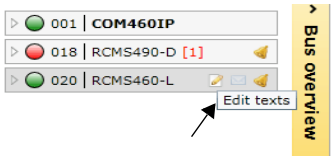
Individual texts allow unique identification of devices and measuring points (channels). The texts appear on the web user interface, in exported files (reports) or in a visualisation. For using the individual texts, the COM460IP must include function package A.

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.

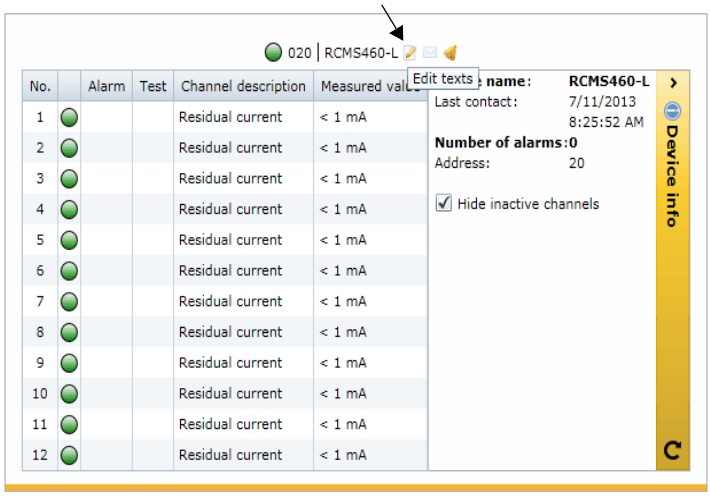
6.7.1 Enter individual texts for an RCMS460-L

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

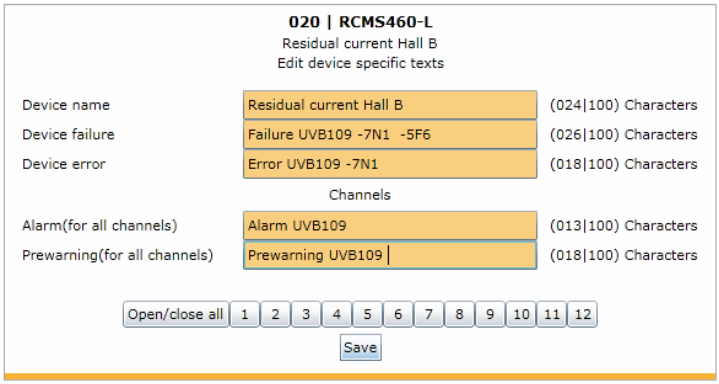
1. Login to the menu bar. Login
2. Click the "Edit texts" field of the "RCMS460-L" bus device. This is optionally available in the bus overview or in the device information.



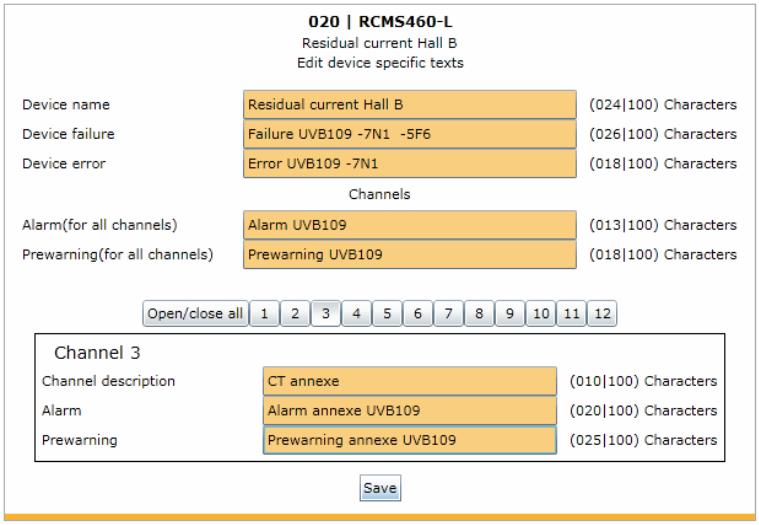
or



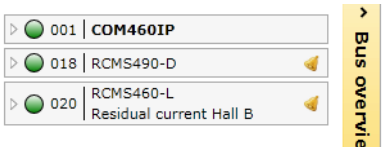
3. Complete all text fields which are to be applied for the whole "RCMS460-L" device. It is also possible to leave fields unused.



4. Proceed as follows to enter texts which are to be used for one or 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 text fields that are to be valid for each of the selected channels. (Example: channel 3). It is also possible to leave fields unused.



5. Press "Save". Changes take effect immediately. The bus overview shows the RCMS460-L and the associated text.

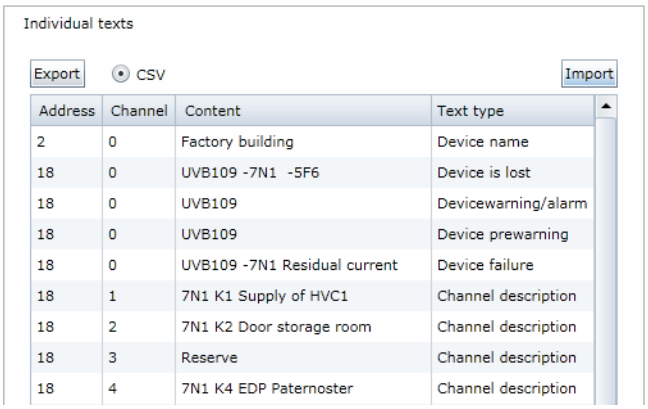


6. Click the "Logout" button in the menu bar, if no other settings are to be changed.

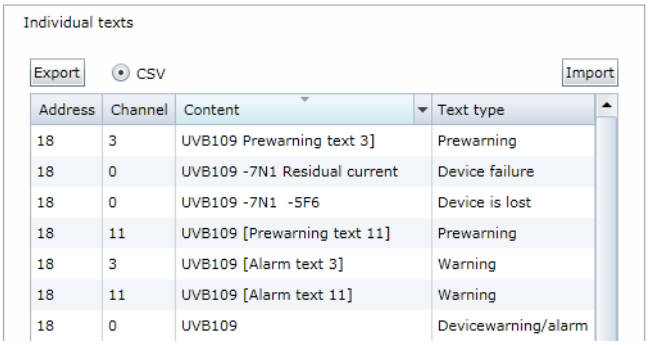
6.7.2 Displaying, filtering, exporting and importing individual texts

6.7.2.1 Displaying individual texts

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

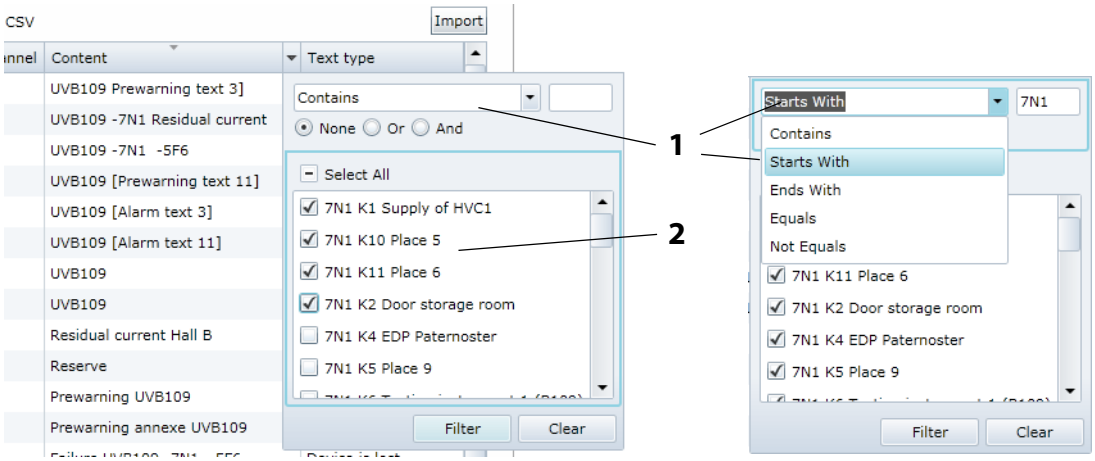


2. Click or double-click on the column heading. The data will be sorted according to the column heading in ascending or descending order.



6.7.2.2 Filtering entries

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



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

4. Click on 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 on the " " symbol and then on the "Delete" button.

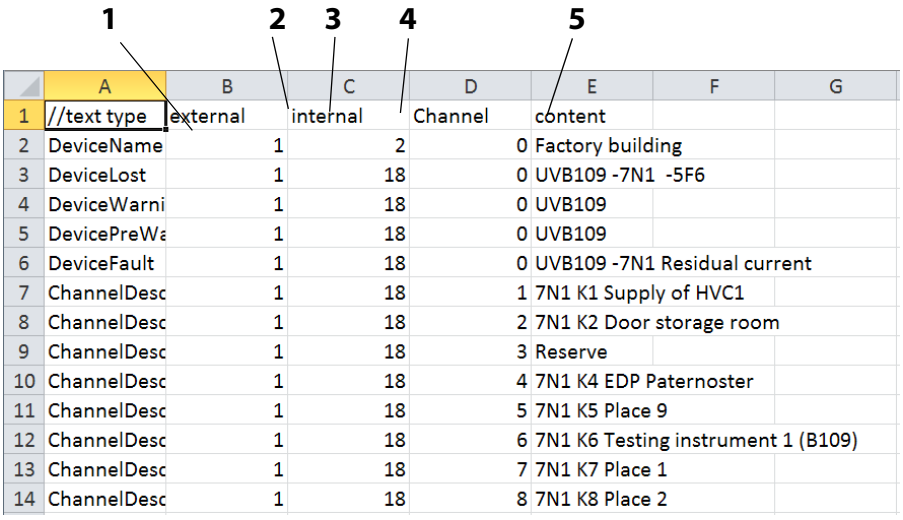
6.7.2.3 Exporting individual texts

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

	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		

6.7.2.4 Editing and importing individual texts

Individual texts can be externally created in CSV format (character encoding: UTF-8), edited and imported to the COM460IP.
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	Identification allowing the COM460IP 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.

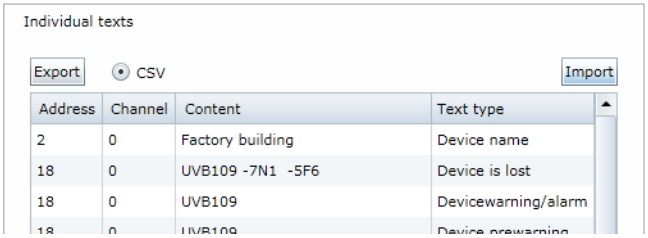
Description of identification in column A

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

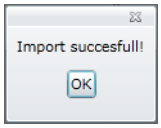
If individual texts are to be assigned to many BMS devices, we recommend to proceed as follows:

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.
5. Select "Tools" > "Configuration" > "Individual texts".
6. The window "Individual texts" will appear. Klick "Import" and select the file to be imported.



7. After successful import, the message appears.



Click "OK"

8. Click the "Logout" 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.

6.8 E-mail notification in the event of an alarm

COM460IP 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 COM460IP must include function package A.

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

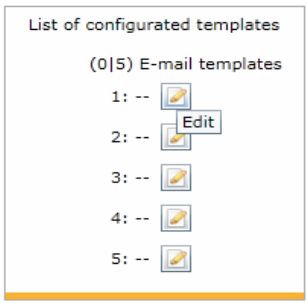
1. Create templates: To whom and when is an e-mail to be sent
2. Select devices and channels which are to trigger an e-mail notification

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

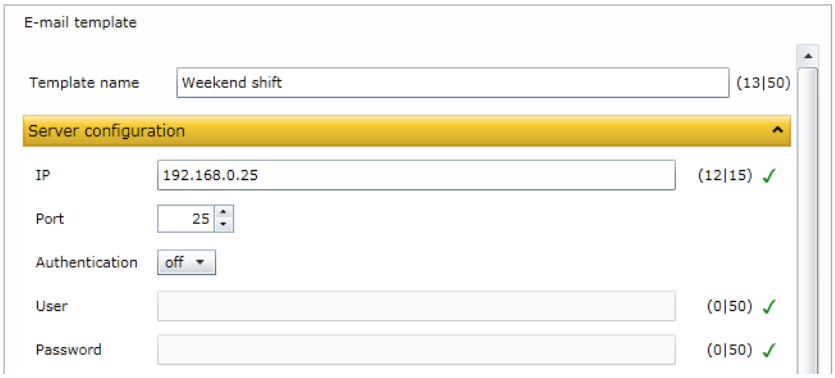
A maximum of five templates can be created.
Example: A template for the weekend emergency service is to be created.

1. Login to the menu bar. 

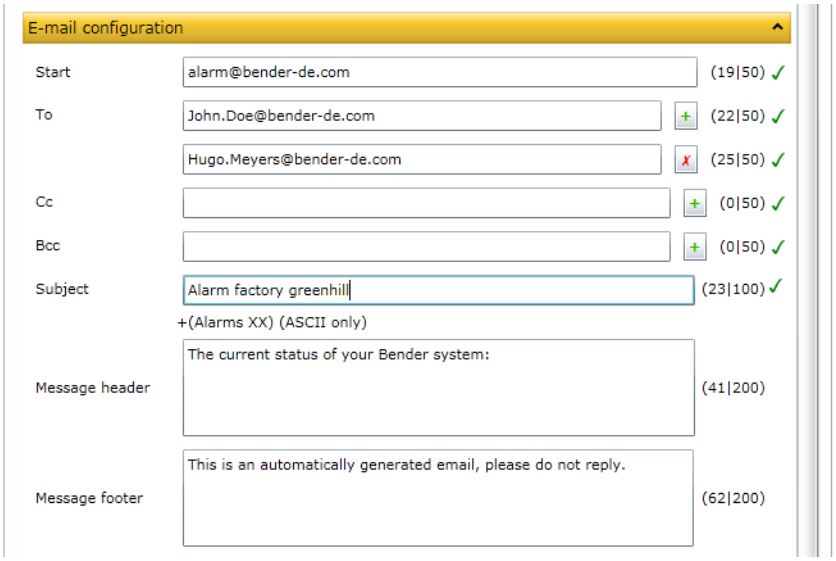
2. Select "Tools" > "Configuration" > "E-mail configuration".
3. Click "  " to edit this template.



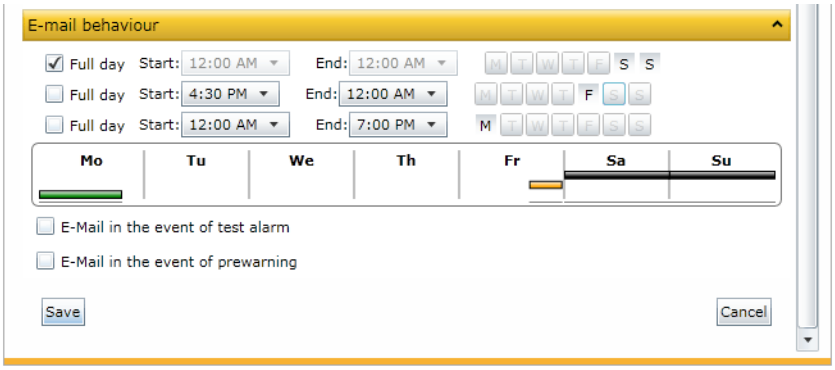
4. Enter the template name and the server settings.
   The COM460IP uses the e-mail server from the network in which it is located. Enter the IP address and the port **of the e-mail server**. Enter the name of the user and the password for SMTP authentication.



5. E-mail settings
   - Enter the sender's 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.

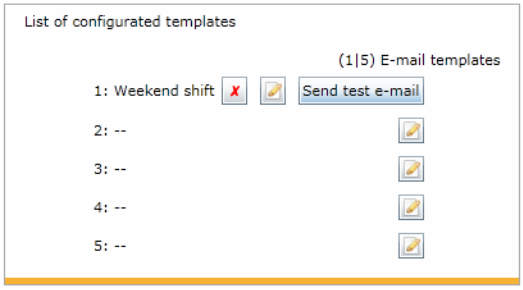


6. E-mail behaviour:
   - Select days and hours to be applied for the template .
   - Activate or deactivate "E-mail in the event of a test alarm" resp. "E-mail in the event of pre-warning".



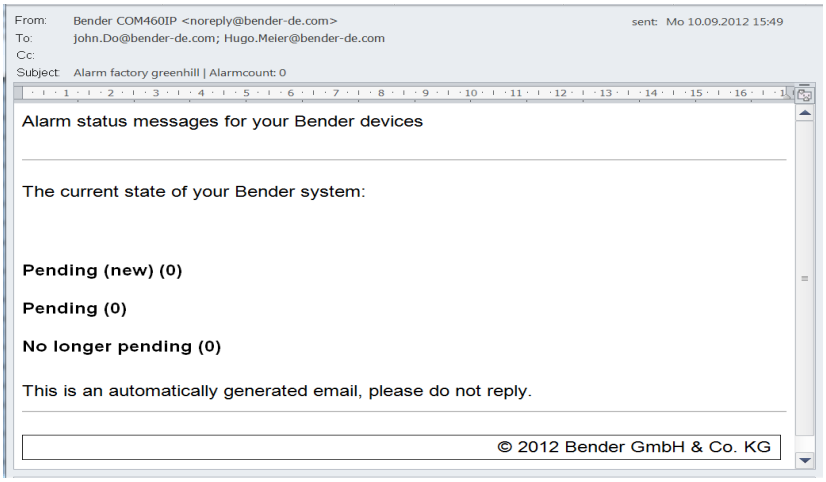
7. Click "Save" to save the entries.

8. The list of configurated 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".

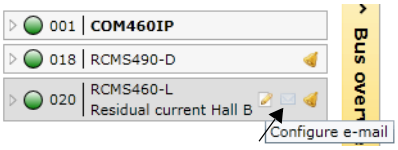


10. Click the "Logout" button in the menu bar, if no other settings are to be changed.

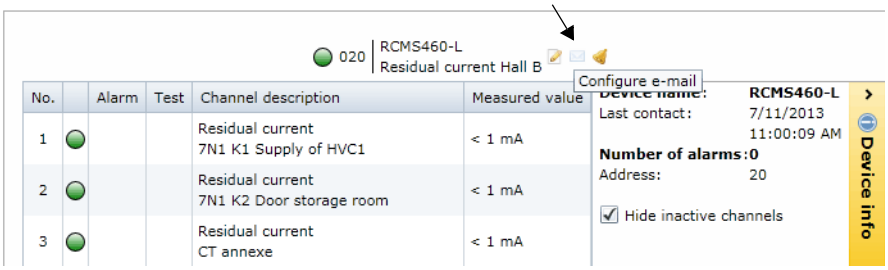
6.8.2 Select devices and channels that are to trigger an e-mail notification

1. Login to the menu bar. 

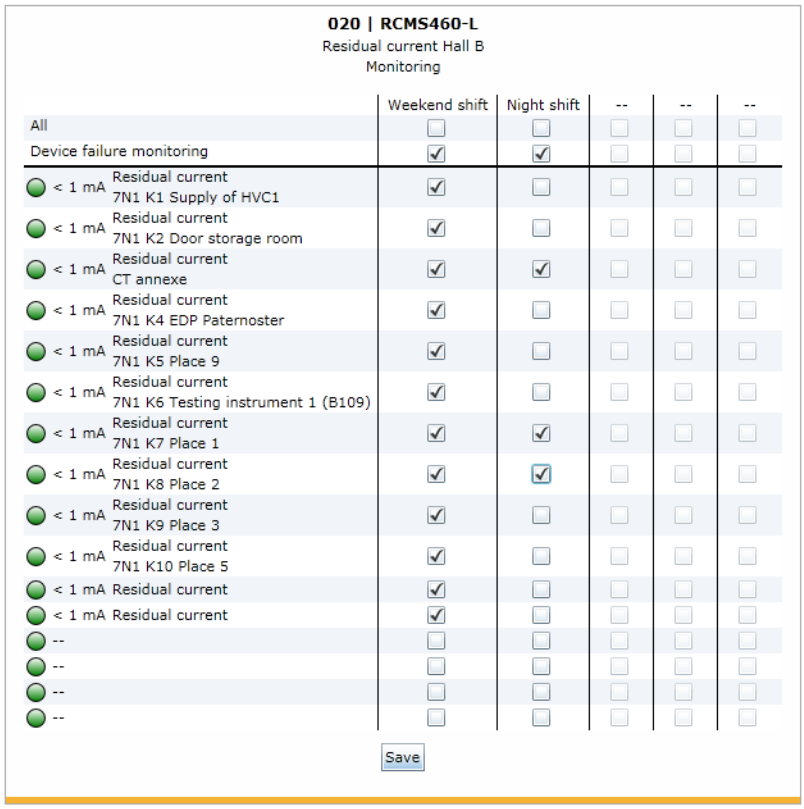
2. Click the "Configure e-mail" field of the "RCMS460-L" bus device. This is optionally available in the bus overview or in the device information.

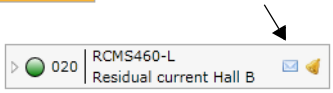


or



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 set up.

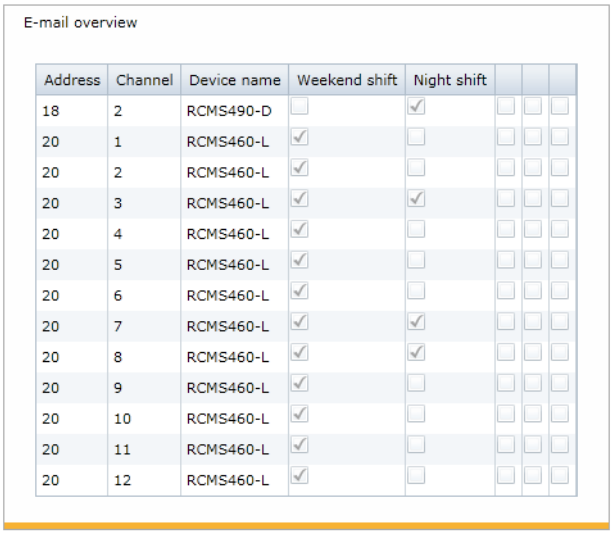
4. Repeat steps 2 and 3 for all BMS devices you want to trigger an e-mail notification.

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 "Logout" button in the menu bar, if no other settings are to be changed.

6.8.3 Displaying an e-mail overview

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

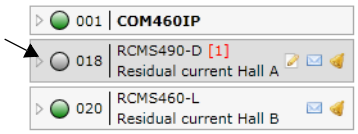

E-mail overview

Address	Channel	Device name	Weekend shift	Night shift			
18	2	RCMS490-D	☐	☑	☐	☐	☐
20	1	RCMS460-L	☑	☐	☐	☐	☐
20	2	RCMS460-L	☑	☐	☐	☐	☐
20	3	RCMS460-L	☑	☑	☐	☐	☐
20	4	RCMS460-L	☑	☐	☐	☐	☐
20	5	RCMS460-L	☑	☐	☐	☐	☐
20	6	RCMS460-L	☑	☐	☐	☐	☐
20	7	RCMS460-L	☑	☑	☐	☐	☐
20	8	RCMS460-L	☑	☑	☐	☐	☐
20	9	RCMS460-L	☑	☐	☐	☐	☐
20	10	RCMS460-L	☑	☐	☐	☐	☐
20	11	RCMS460-L	☑	☐	☐	☐	☐
20	12	RCMS460-L	☑	☐	☐	☐	☐

6.9 Using the device failure monitoring function

Devices connected to the BMS bus can be monitored for failure.

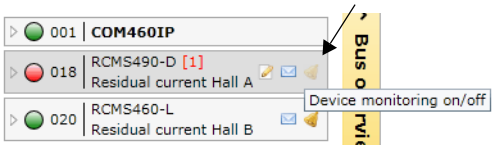
Behaviour when device failure monitoring is activated
If the device failure monitoring is activated, the "Alarm status" field in the bus overview is grey-shaded out.



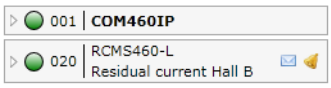
Although the device is currently not available, it is treated as if it were available:

- 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 RCMS490-D fails, it will be deleted from the bus overview. **No** alarm will be signalled.

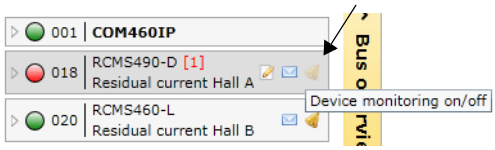


6.9.1 Activating/deactivating device failure monitoring function in the bus overview

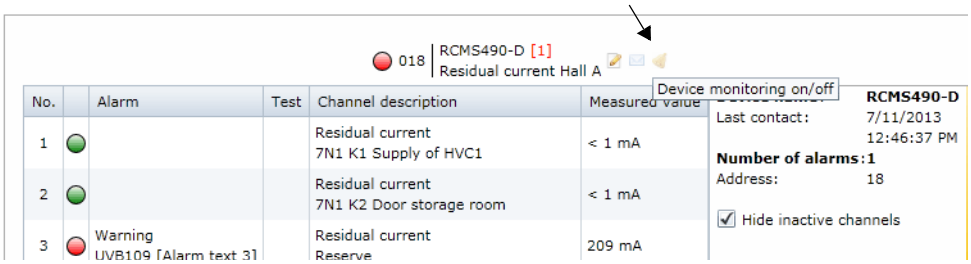
Activiating device failure monitoring function
Example: The RCMS490-D is to be monitored for failure.

1. Login to the menu bar. 

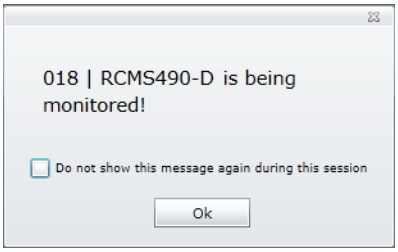
2. Click "Device monitoring on/off" of the bus device "RCMS490-D". This is optionally available in the bus overview or in the device information.



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.

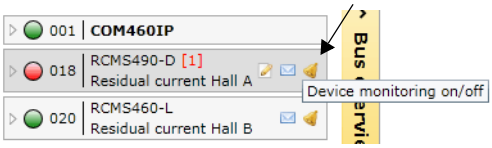
4. Click the "Logout" button in the menu bar, if no other settings are to be changed.

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

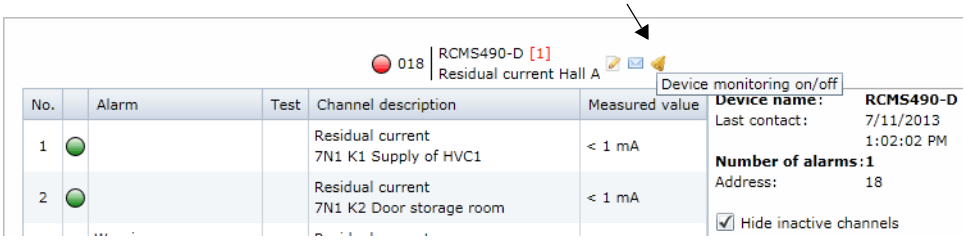
1. Login to the menu bar. 

2. Click the "Device monitoring on/off" field of the bus device "RCMS460-L".

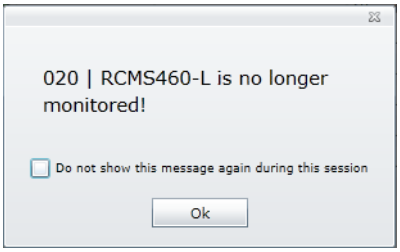
This is optionally available in the bus overview or in the device information.



or



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



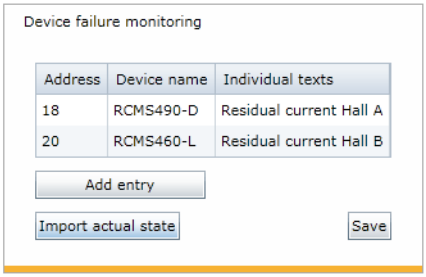
Click the "Logout" button in the menu bar, if no other settings are to be changed. Further parameter setting is only possible after logging on again.

6.9.2 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.

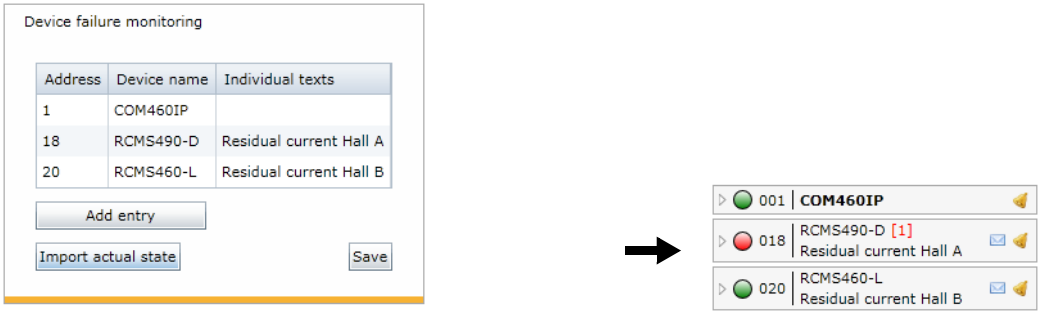
1. Login to the menu bar. 

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



Monitoring all BMS devices

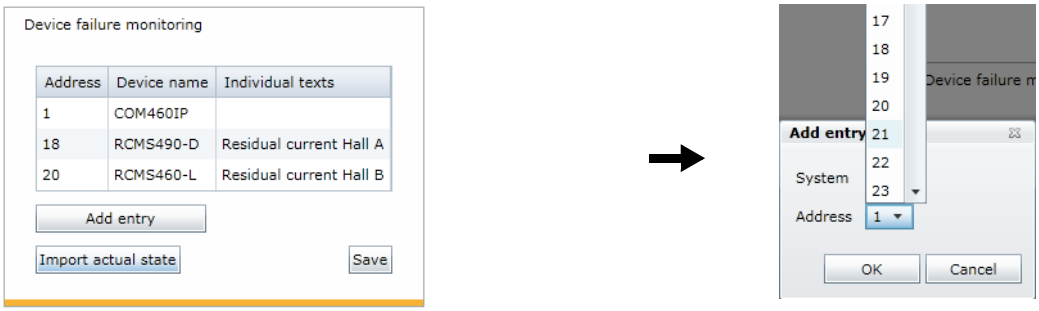
Select "Tools" > "Configuration" >"Device failure monitoring". Click on "Import actual state" and then click "Save" to monitor all active devices currently connected to the BMS bus for failure.



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

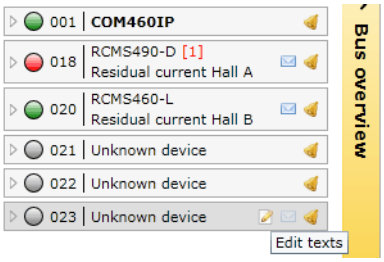
Adding a device not yet connected to the BMS bus

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



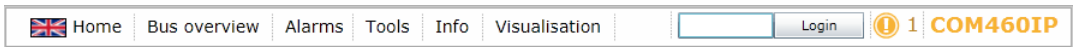
Repeat step 2 for all devices to be added. Once all devices are added, click "Save". Although the devices are currently not available, they are treated as if they were available:

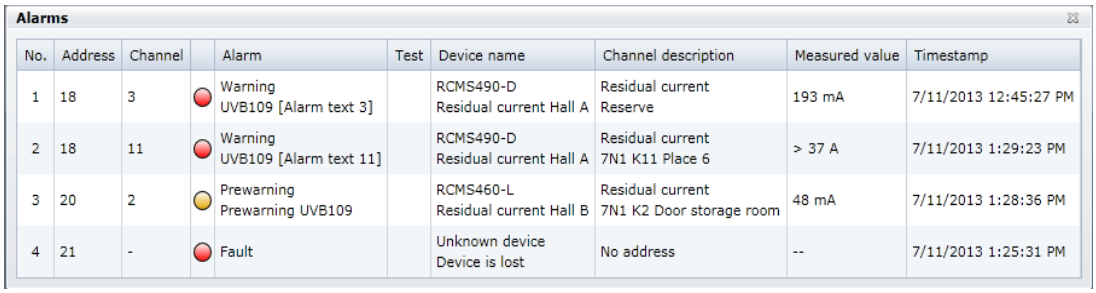
- In the event of failure of these devices an alarm is signalled for each device.
- They will be displayed in the bus overview.
- Individual texts can be entered
- E-mail notifications can be configured
- They can be visualised



6.10 Alarms

1. Click on 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.





No.	Address	Channel		Alarm	Test	Device name	Channel description	Measured value	Timestamp
1	18	3		Warning UVB109 [Alarm text 3]		RCMS490-D Residual current Hall A	Residual current Reserve	193 mA	7/11/2013 12:45:27 PM
2	18	11		Warning UVB109 [Alarm text 11]		RCMS490-D Residual current Hall A	Residual current 7N1 K11 Place 6	> 37 A	7/11/2013 1:29:23 PM
3	20	2		Prewarning Prewarning UVB109		RCMS460-L Residual current Hall B	Residual current 7N1 K2 Door storage room	48 mA	7/11/2013 1:28:36 PM
4	21	-		Fault		Unknown device Device is lost	No address	--	7/11/2013 1:25:31 PM

2. In order to return to the main menu, press the "ESC" button or close the alarm window by clicking the close symbol in the top right corner.

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" or "External 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

6.11 Tools

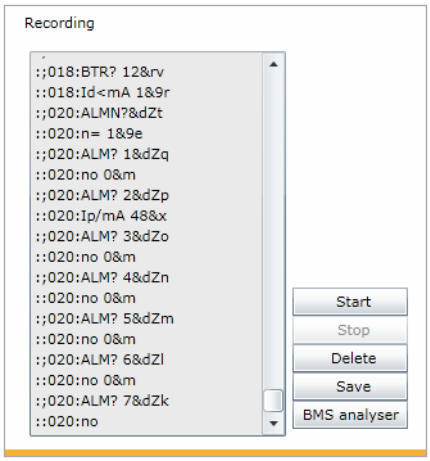
Select "Bus overview" > "Tools".

Menu	Menu item	Page
BMS	Recording	79
	Analyser	80
	Log files	83
Network	Parameters	83
	Socket state	84
Software	Update	85
	Function packages	85
Modbus	Register	90
	Control commands	92
Configuration	Individual texts	64, 93
	Device failure monitoring	75, 93
	Overview of e-mails	72, 93
	E-mail configuration	68, 93
	Visualisation	94
Other	Manual	107
	System visualisation	108

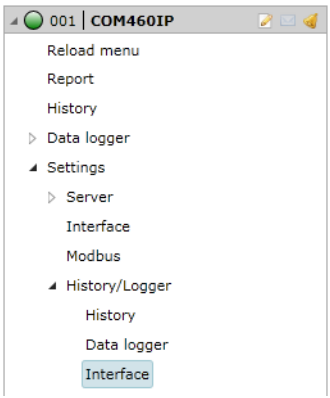
6.11.1 BMS recording

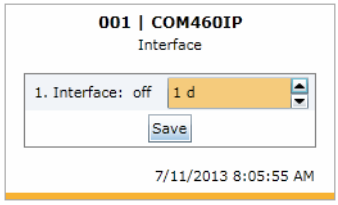
You can record the current BMS bus traffic for control and analysing purposes and save it in a separate file on an external medium. For accessing and analysing recordings, use the BMS analyser.

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 on the respective button to carry out one of the activities listed above.



In addition to the method described above, it is possible to record the BMS traffic (BMS logger) for a defined period of 1…7 days.
Select "Bus overview" > "COM460IP" > "Settings" > "History logger" > "Interface". Select the preferred duration by mouse click.





6.11.2 BMS analyser

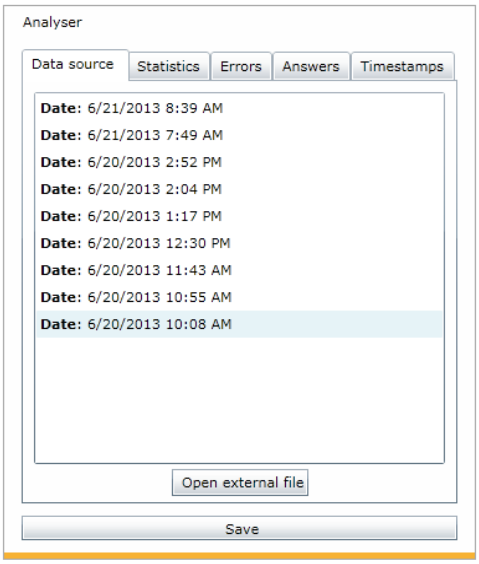
With this tool, you can select the log file you need, open this file and analyse the recorded data of the BMS bus using the different submenus. The log files either come:

- from the **BMS logger** previously activated in COM460IP ("COM460IP" > "Settings" > "History/ Logger"> "Interface"). The recorded files of the history memory are listed in the "Data source" submenu. Approximately one hour after activating the BMS logger, the first entry will be displayed.
- or from the **BMS recording**. These data files can be imported using the "Open external file" button.

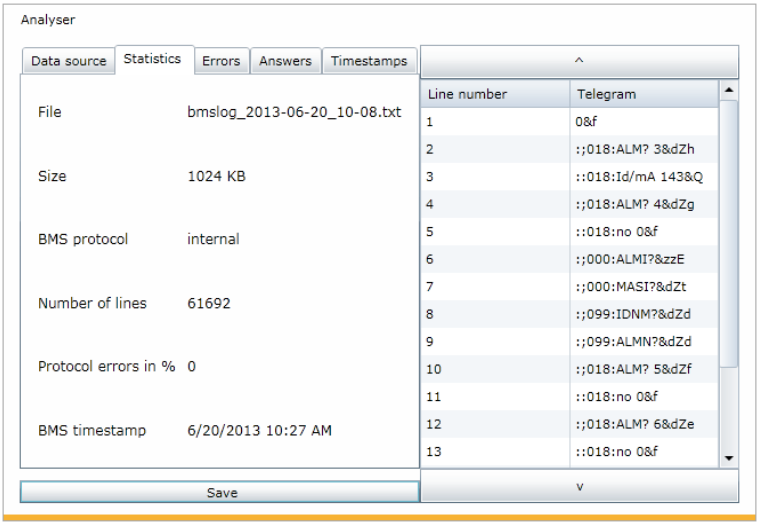
In the following example, data of the BMS logger is used.

Open recorded log files:

1. Click on the date of the file you need to open the "Statistics" data field.
2. 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.



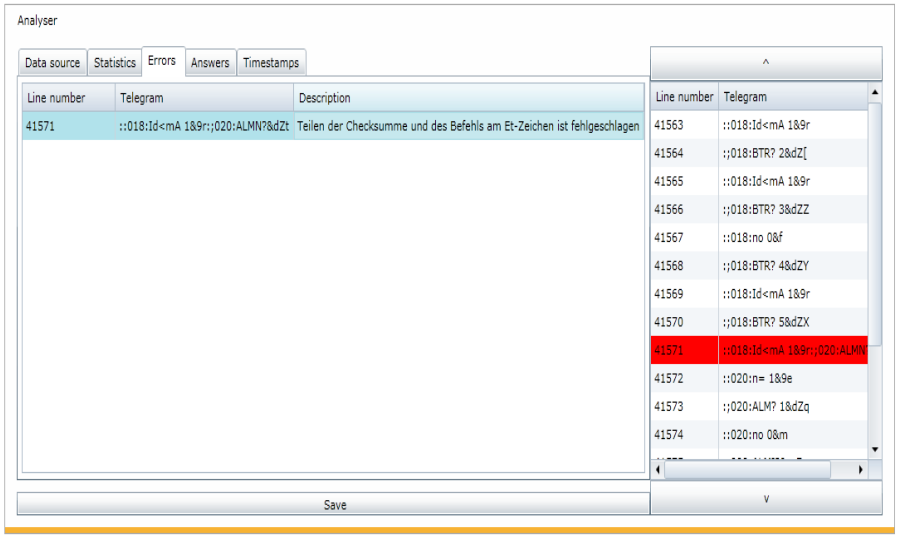
BMS analysis, statistics



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.

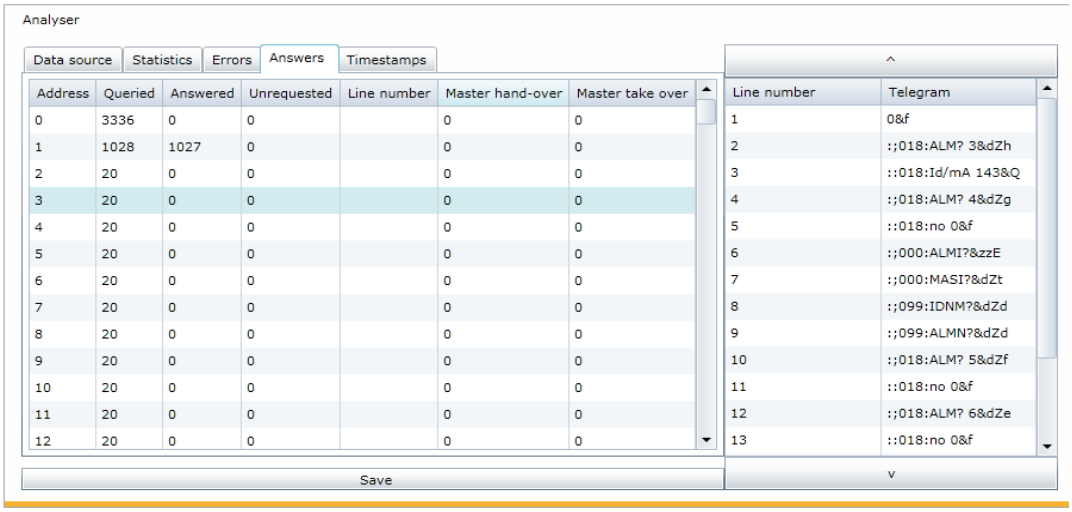
1. Click on the first line of the list in the "Errors" list field. As a result, the first faulty line in the right protocol field will appear red marked.
2. Proceed accordingly with the next and the other lines in the "Errors" list field. The selected line of the protocol field will be highlighted.



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.

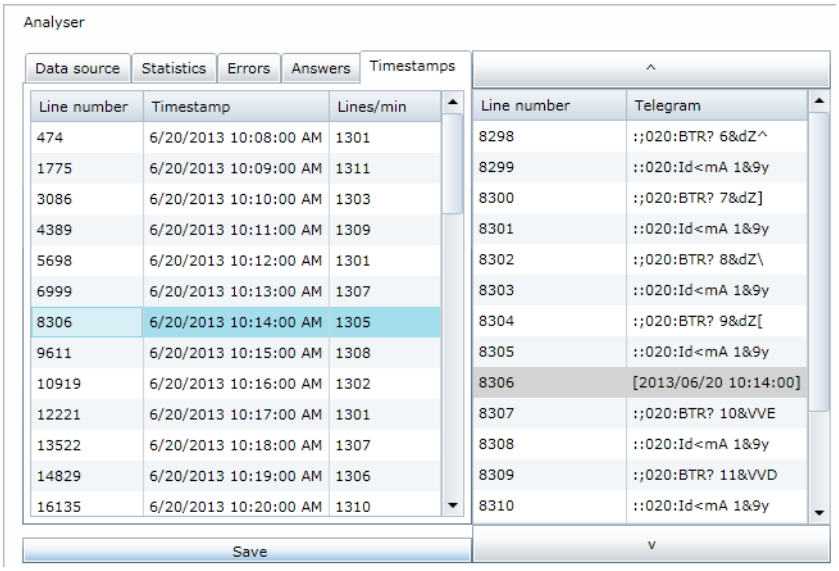
1. Click on the "Answers" tab", to open the list field of the same name and to get information about the answering behaviour of the recorded bus devices.



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.

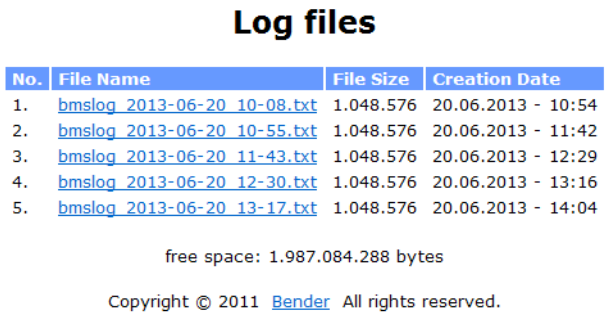
1. Click on the "Timestamps" tab. The timestamps will appear in the list box in chronological order.
2. Click on one of the other timestamps in the list field on the left. In parallel, the associated timestamp of the recorded BMS traffic will be highlighted in the protocol field.



6.11.3 BMS log files

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

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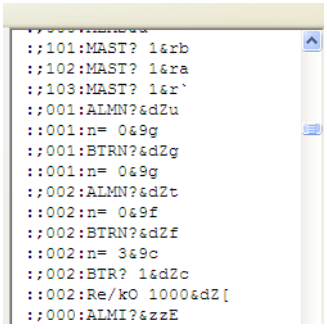
2. Click on the required log file in the "File name" column. The recorded BMS lines appear in text format in a separate window.



```
:;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
```

6.11.4 Network parameters

You can change the network parameters of the COM460IP in this menu.
Only change parameters after careful planning!

CAUTION

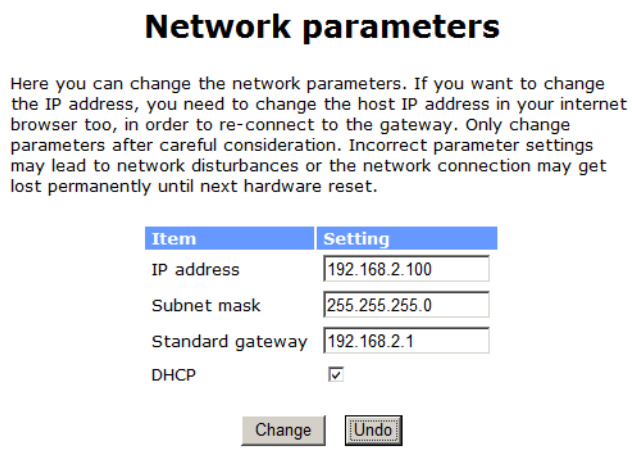
Incorrect settings may lead to serious disturbances in the network or the network can get lost!

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.

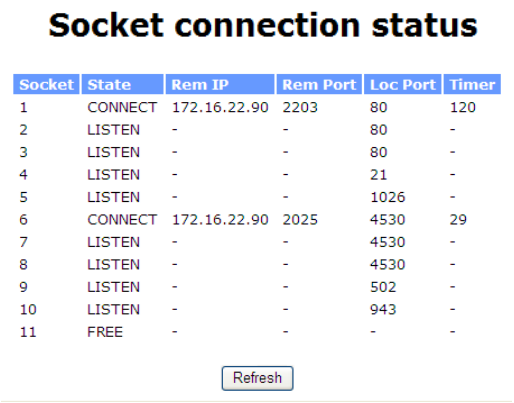


Carry out your changes and enter them into the input fields intended for this purpose and confirm with "Change".
If you do not want the entries to be saved, select "Undo" to maintain the previous value.

6.11.5 Network socket status

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.



6.11.6 Software update

You can update the operating software for COM460IP as soon as Bender provides a new software version.
The "Software Update" menu allows you to comfortably:

- load the update file from your computer to the COM460IP Micro-SD card
- 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. Select "Bender download area" from the "Software Update" window.
   Alternatively you can also enter the address
   `http://www.bender-de.com/de/service-support/downloadbereich.html`
   into the address line of your web browser
2. Load the update file `COM460 Vx.xx.BUF` from the category software
   The category software will be visible as soon as the login procedure has elapsed.
3. Click on the respective icon in the software list and specify a place to save the update when you are prompted to do so.

Uploading the update file to the COM460IP

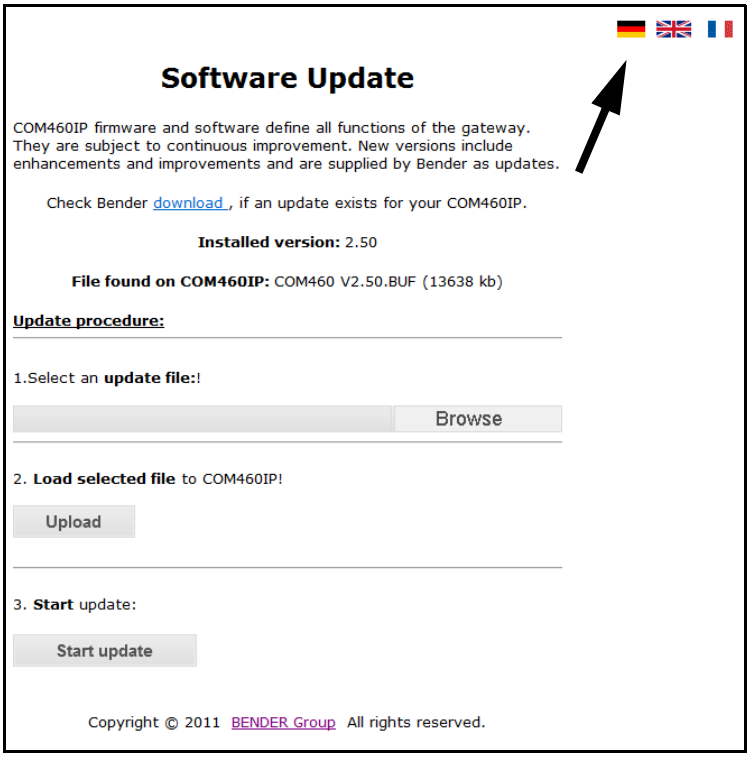
1. Click on "Browse" in the "Software update" menu to select the loaded update file. In the window "Software update" the respective path will appear.
2. Click on "Upload" to copy the update file `COM460 Vx.xx.BUF` to COM460IP. Once the file transfer is completed the file path is blanked out.

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 COM460IP. Once the update is completed, after approximately 10 minutes, the device can be operated again.

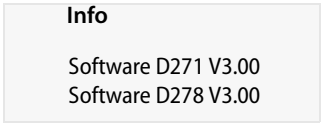
During the software update, the following directories are deleted and renamed:
\DEVICES
\IMAGES
\JS
\BIN
\HELP
\MISC
\LANG

Select language:



Testing the updated status of the 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 deleted and the request for the software version should be repeated.

6.11.7 Function packages and licencing

6.11.7.1 Identifying activated function packages

Click on the menu item "Function packages", to make the currently enabled function packages visible. In the "Function packages" window in the line "Activated" a check mark is assigned to each function package, a confirming green check mark is assigned to activated function packages, a red X to deactivated function packages.

Proceed as follows to identify activated function packages:

1. Select "Tools" > "Software" > "Function packages".
2. Line "Activated" shows the activated function packages.

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	•				
Web server for displaying the system overview on mobile phones	•				
Can be operated on the internal and external bus (max. 99 x 139 addresses)	•				
Multilingual menu structure	•				
IPaddress setting manually or via DHCP	•				
Time synchronisation for the BMS bus system via NTP	•				
Built-in switch with 2x RJ45, cable auto detection	•				
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 function packages A, B, C and D are activated

When not all function packages are activated, other function packages can be acquired and can be imported using a licence file.

6.11.7.2 Acquiring licences for additional function packages and loading the licence file

After acquiring a licence from our sales department for one or several function packages, the corresponding licence `*.BLF` will be available under the address

`http://www.bender-de.com/en/licences/licence-download.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 COM460IP, 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.

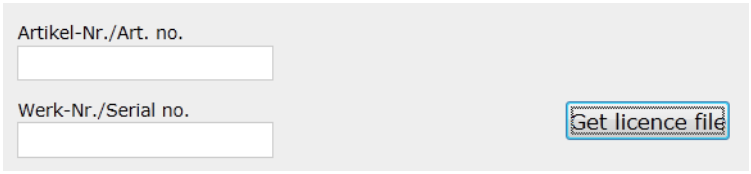


Fig. 6.4: Enter the article number and serial number into the licence window

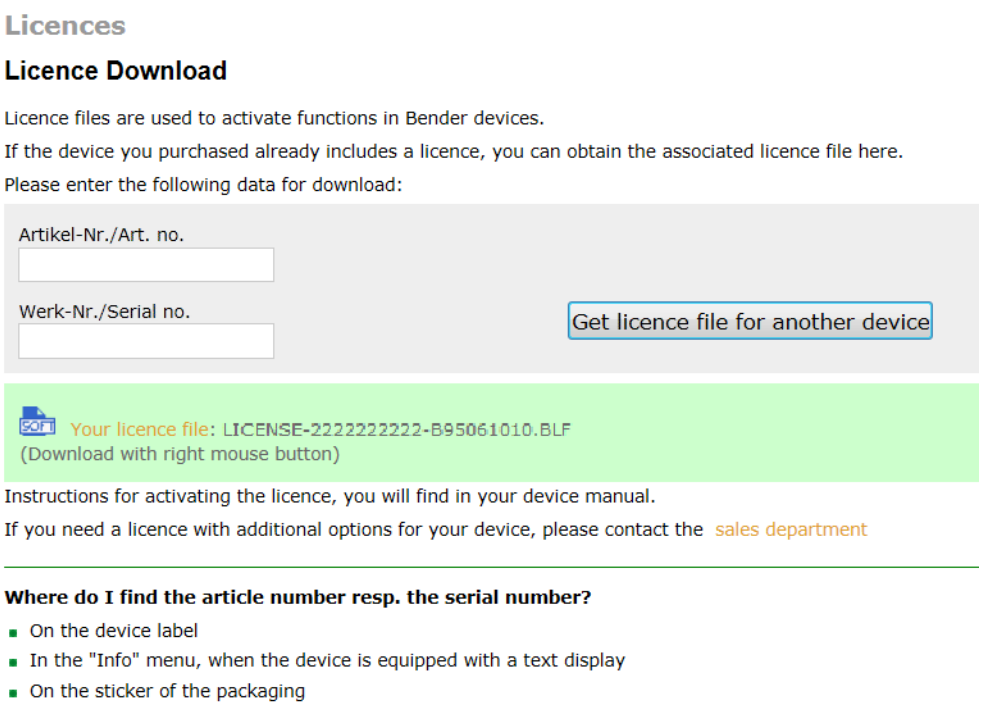
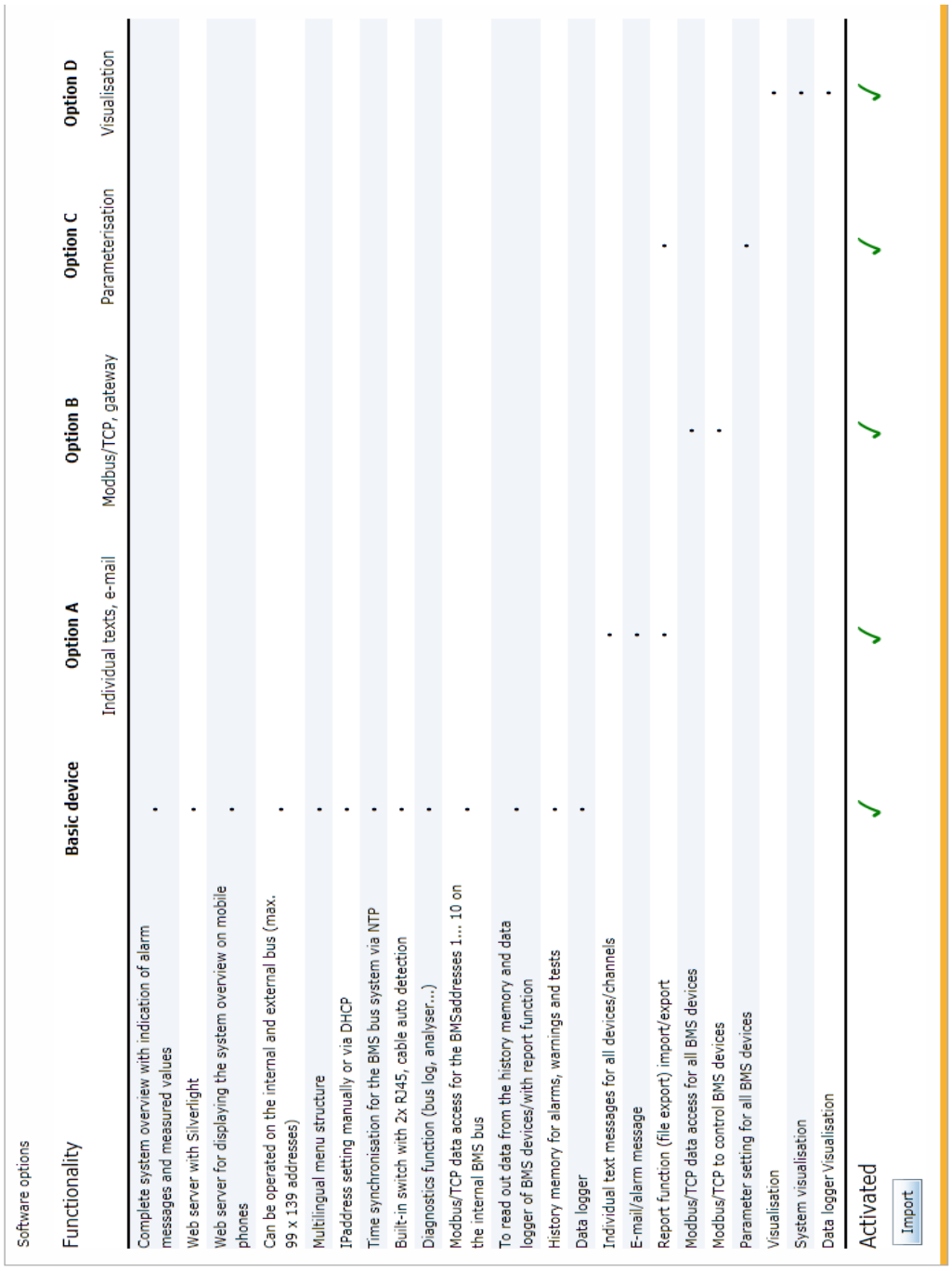


Fig. 6.5: The licence file was generated and must be saved

6.11.7.3 Activate acquired function packages

In order to activate additional function packages, you have to import the licence file `*.BLF` loaded from the Bender server to the COM460IP.

1. Select "Tools" > "Function packages".



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".
   Then confirm all available function packages in the "Function packages" window by a green check mark in the line "Activated".

6.11.8 Modbus register

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. A detailed description of the Modbus data structure can be found on page 115 onwards.

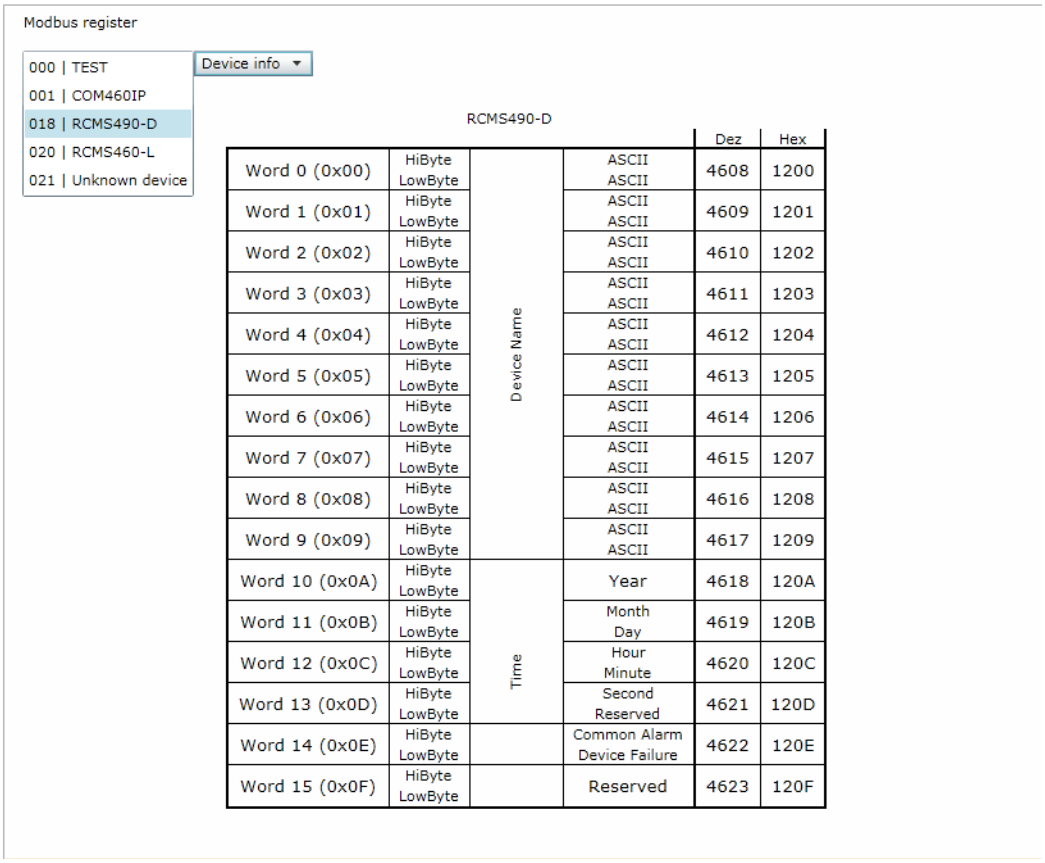
6.11.8.1 Modbus representation of device information

In the example below details about an RCMS490 device with BMS address 18 are shown.

1. Select "Tools" > "Modbus" > "Register".
2. First click on RCMS490-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



RCMS490-D

				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

Do not assign BMS address 0 to a real BMS device!
Address 000/TEST only serves to simulate data access
(siehe "Reference data records of the process image" on page 125).

6.11.8.2 Modbus representation of a BMS channel

In the following example, BMS channel 1 of an RCMS490 with BMS address 18 is shown.

1. Select "Tools" > "Modbus" > "Register".
2. First click on RCMS490-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 start 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

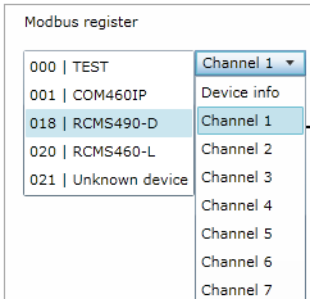


Fig. 6.7: Selection of the BMS device and of an BMS channel

	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

6.11.9 Modbus control commands

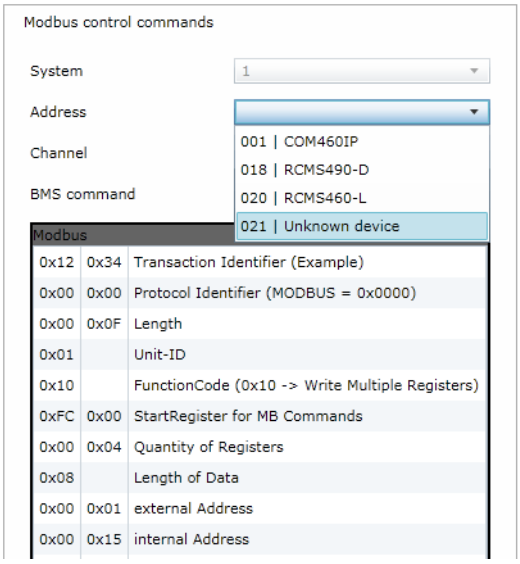
From an external application (e.g. visualisation software) commands can be sent to BMS devices. This menu item provides the Modbus control commands for special BMS commands.
The Modbus control can be activated or deactivated in the Settings" > 3. Modbus > 1. Control" menu. (refer to chapter "5.4.3 " or chapter "6.6.3 ").

Control commands for the internal BMS bus

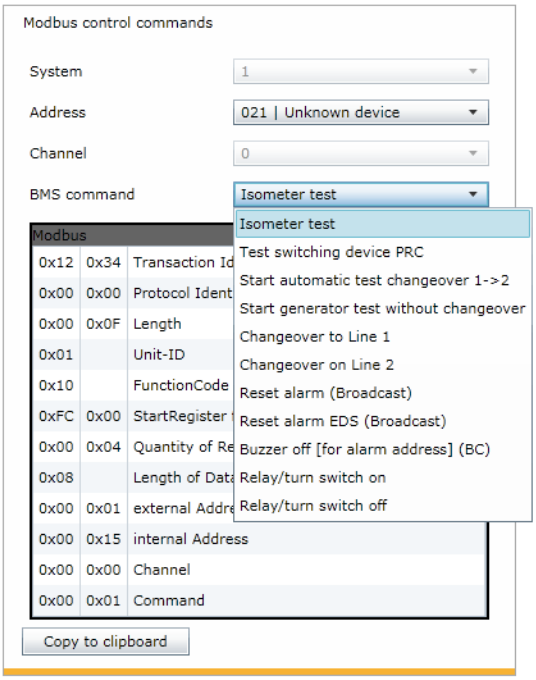
- Test Isometer
- Test changeover device PRC
- Start automatic test changeover 1->2, end after T(test)
- Start test generator without changeover
- Switchover to line 1
- Switchover to line 2
- RESET alarm (broadcast)
- RESET alarm EDS (broadcast)
- Buzzer off [for alarm address] (broadcast)
- Switch 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.



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 "Copy to clipboard". This command can now be inserted into the programming of an external application (e.g. visualisation software).

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

The following functions are described elsewhere in 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.	64
Device failure monitoring	Overview of all devices for which device failure monitoring has been activated.	75
Overview of e-mails	Overview of all devices and channels for which an e-mail notification has been configured in the event of an alarm.	72
E-mail configuration	Setting e-mail templates: days of the week, time of day, e-mail addressee and texts.	68

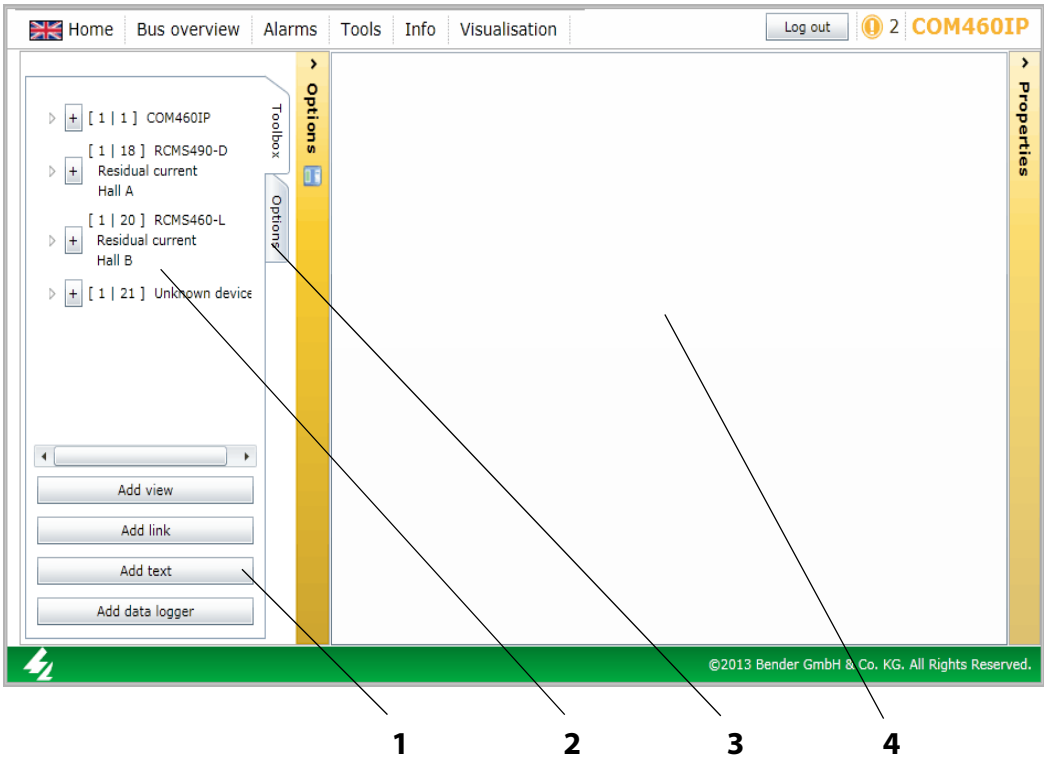
6.12 Visualisation

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.

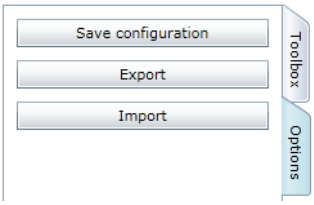
6.12.1 Create visualisation

1. Login to the menu bar. 

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



	Key
1	Tools for configuration: - Add viewCreate a new view page - Add a linkAdd a jump to another view page - Add textAdd a text line with max. 100 characters - Add data loggerAdd 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	Optionen:  - Save configurationSaves the current configuration to the Micro-SD card in COM460IP. - ExportExports 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 COM460IP.
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 configuration on the Micro-SD card in the COM460IP (see "Save and exit configuration" on page 103).

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 103). In this way, you can avoid data loss (such as accidentally 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.

6.12.1.1 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:

- NameChanging the name of the view page.
- Load imageAdds a new background image. Existing back ground images will be replaced.
- Delete elementDeletes this view page.

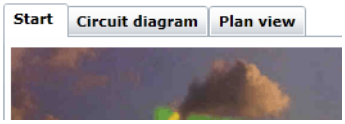
Loading a background image

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, COM460IP optimises storage requirement which may result in blurred images.

Adding additional view pages

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



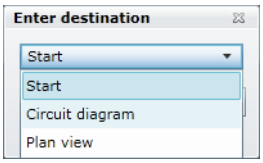
6.12.1.2 Adding a link to view pages

Links allow jump to other view pages.

Adding a link

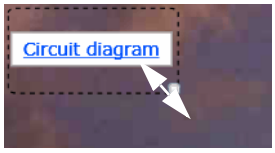
On the view page "Start" two links are to be added which prodvide access to the view pages "Circuit diagram" and "Plan view".

6. Click on 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. .

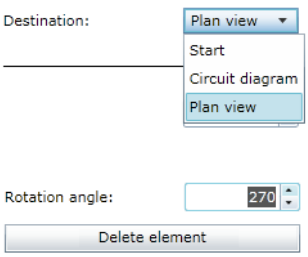


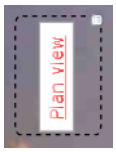
Delete/modify/edit a link

7. Click on 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

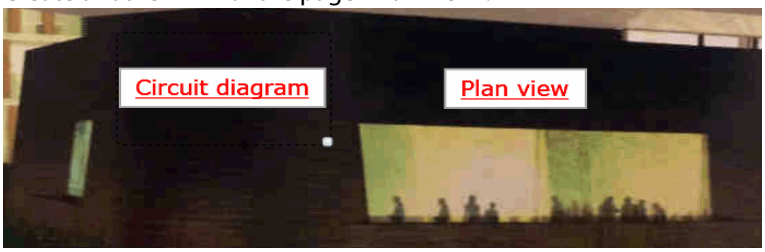




   - or "Delete element"

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".

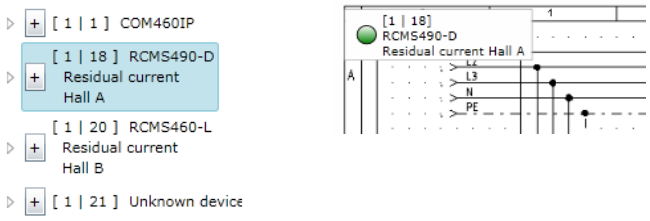


6.12.1.3 Adding new elements

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.

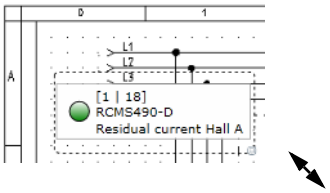
Adding elements
Two elements are to be added to the view page "Circuit diagram".

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 on the "+" sign in front of the element you want to display. The element will appear in the upper left corner of the page.

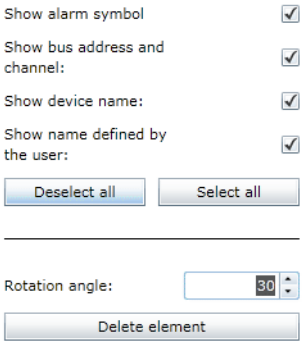


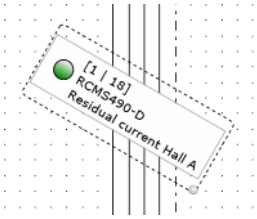
Delete/modify/edit an element

11. Click on 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



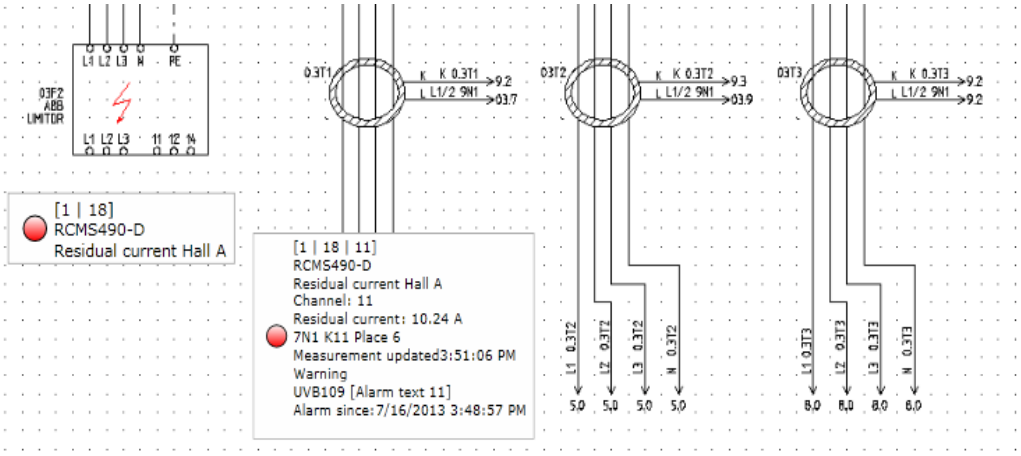
    - activate/deactivate display options: Alarm marker (alarm status), BMS bus address and channel, device type, individual text
    - change the rotation angle of the element





    - or "Delete element"

12. Insert the second element in the same way.



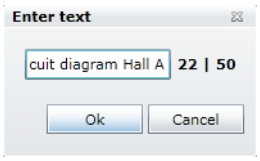
The current values and the alarm status of the elements (here: red = alarm) are displayed.

6.12.1.4 Adding a new text line

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

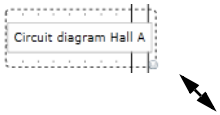
Adding text
A heading is to be inserted into the view page "Circuit diagram".

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

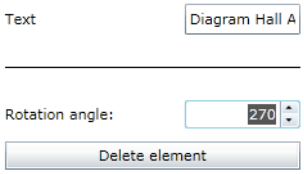


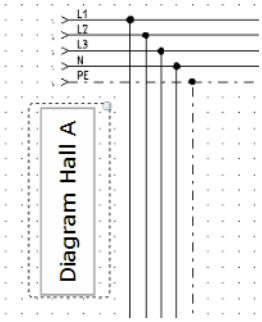
Delete/modify/edit a text

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 text to any position on this page
    - Resize the text by dragging the lower right-hand corner of the frame



    - change text
    - change the rotation angle of the text





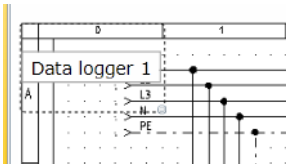
15. or "Delete element"

6.12.1.5 Adding a new data logger

Places an icon for a data logger on 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 50).

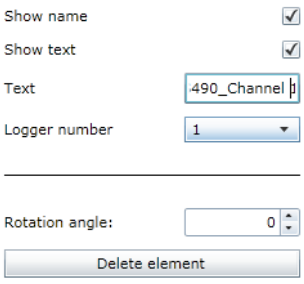
Adding a data logger
A data logger is to be inserted into the view page "Circuit diagram".

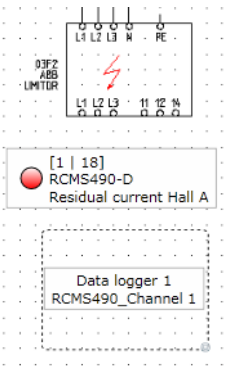
16. Click on the view page "Circuit diagram" and then click "Add data logger".



Editing/modifying/deleting 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 link 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

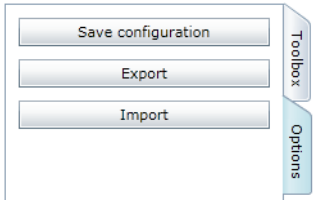




18. or "Delete element"

6.12.2 Save, export, import and exit configuration

Click on "Options".



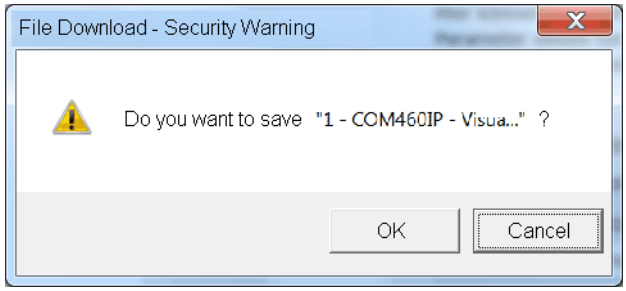
6.12.2.1 Save and exit configuration

1. Select "Save configuration". Now the configuration is saved to the COM460IP 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 "Logout" button in the menu bar, if no other settings are to be changed.

6.12.2.2 Export configuration

You can save the visualisation to a file on the PC by clicking "Export". In this way, you can avoid data loss (such as accidentally deleting a page).
In addition, the configuration can be imported to another COM460IP. This can be necessary when a COM460IP is to be replaced or when several COM460IP devices are to be configured with similar tasks.

1. Select "Export". The following message will appear.

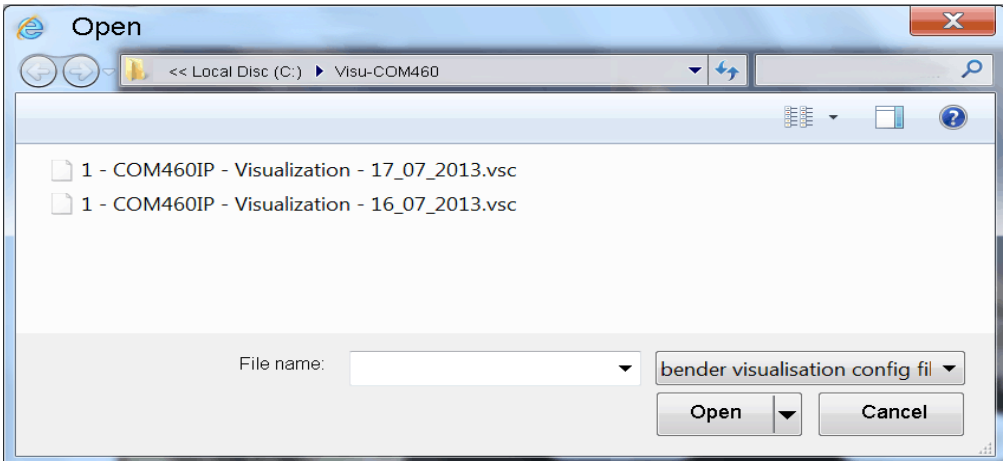


2. Click "OK". Select the storage location on your PC and then click "Save".

6.12.2.3 Import configuration

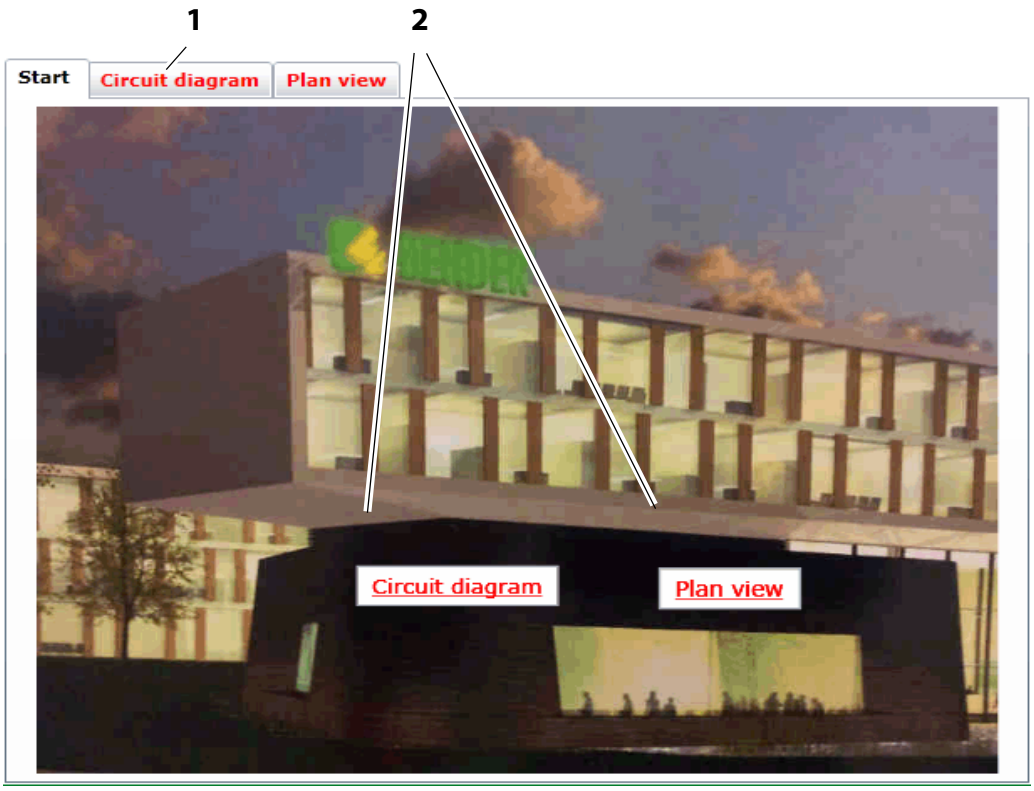
Imports the configuration file stored on the PC to the COM460IP.

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

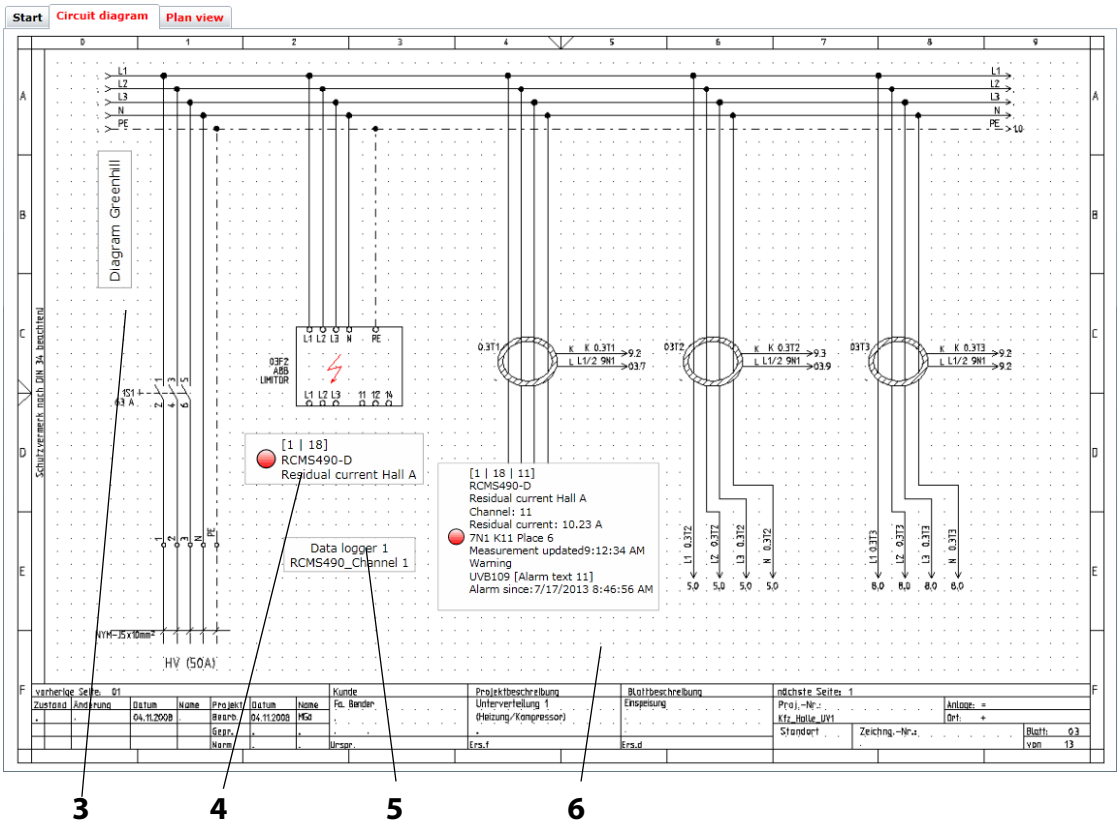


6.12.3 Using the visualisation function

Select "Visualisation" from the menu bar.

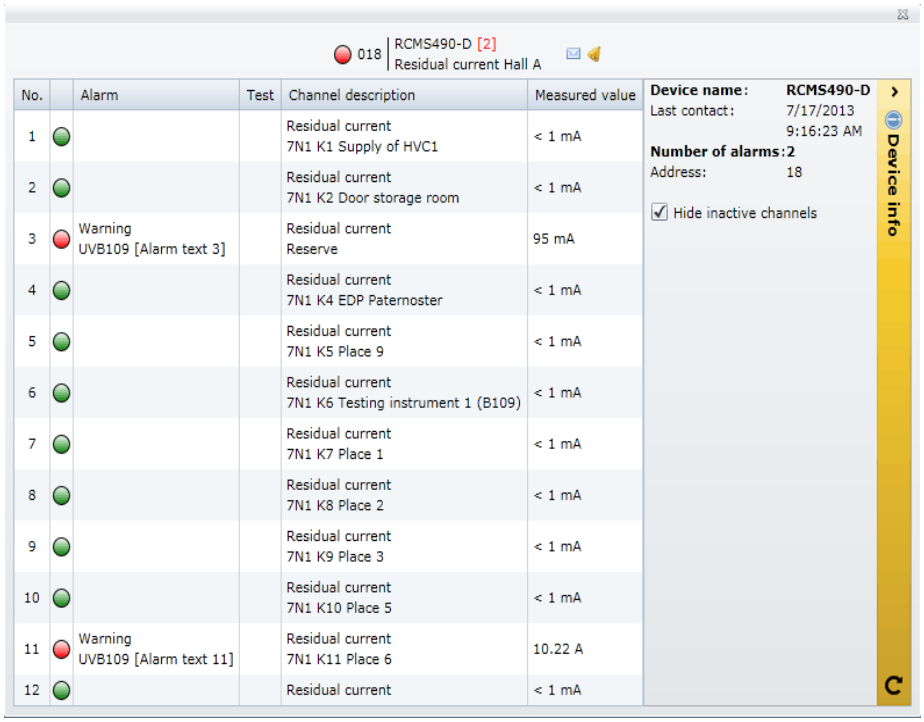


	Key
1	Open the view page by clicking the name on the respective page. The names will be shown in red lettering when an element with an alarm exists on the page.
2	Links to other view pages. Click on the name of the respective page. The names will be shown in red lettering when an element with an alarm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



	Key
3	Text entered
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 50.
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 timestamp, and the alarm status of the element.

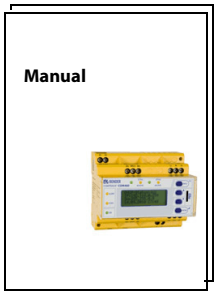
Clicking an element provides details on the channels of this device. Requirement: Configuration must be closed.



No.		Alarm	Test	Channel description	Measured value
1				Residual current 7N1 K1 Supply of HVC1	< 1 mA
2				Residual current 7N1 K2 Door storage room	< 1 mA
3		Warning UVB109 [Alarm text 3]		Residual current Reserve	95 mA
4				Residual current 7N1 K4 EDP Paternoster	< 1 mA
5				Residual current 7N1 K5 Place 9	< 1 mA
6				Residual current 7N1 K6 Testing instrument 1 (B109)	< 1 mA
7				Residual current 7N1 K7 Place 1	< 1 mA
8				Residual current 7N1 K8 Place 2	< 1 mA
9				Residual current 7N1 K9 Place 3	< 1 mA
10				Residual current 7N1 K10 Place 5	< 1 mA
11		Warning UVB109 [Alarm text 11]		Residual current 7N1 K11 Place 6	10.22 A
12				Residual current	< 1 mA

6.12.4 Open the operating manual as PDF file

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



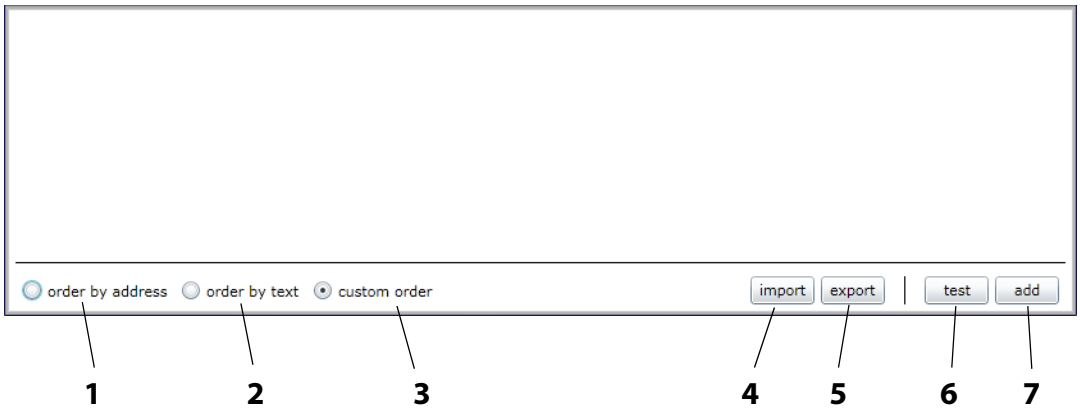
6.12.5 System visualisation

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. A copie can be exported and imported to another computer.

6.12.5.1 Start system visualisation

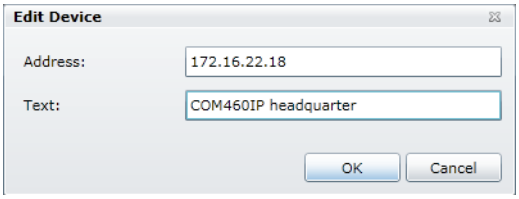
Select "Tools" > "General data" > "System visualisation". A new register card will be opened in the Internet browser.



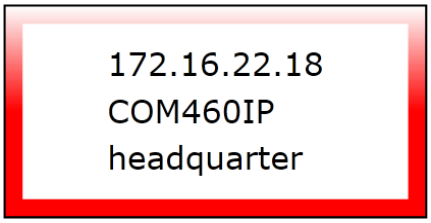
	Key
1	Sort tiles: by address
2	Sort tiles: by text
3	Sort tiles: by your own order
4	Load stored system visualisation from PC (import)
5	Save system visualisation on PC (export)
6	Open the web user interface of all linked devices.
7	Add new device to system visualisation

6.12.5.2 Add new device to system visualisation

1. Click on "add".
2. Enter the IP address and the respective text. Then click on "OK".



A new tile appears on the system visualisation surface.



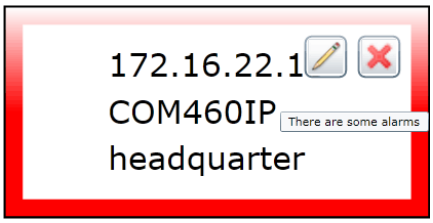
The colour of the frame shows the alarm status of the linked device:

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.

6.12.5.3 Change or delete the device

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



2. Click on the respective icon:

	Change IP address and text
	Delete device

6.12.5.4 Export system visualisation

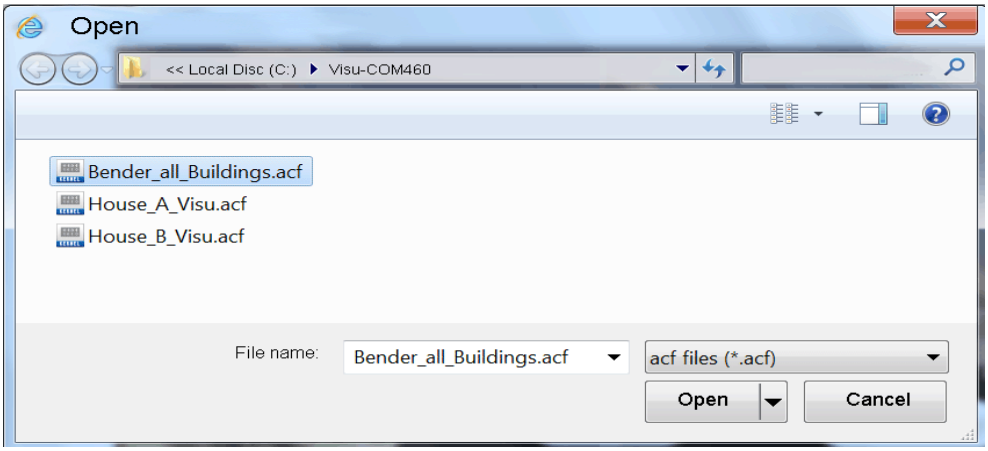
You can save the visualisation to a file on the PC by clicking "Export". In this way, you can avoid data loss (such as accidentally deleting a system visualisation).
In addition, the system visualisation can be imported to another COM460IP. This can be necessary when a COM460IP is to be replaced or when several COM460IP devices are to be configured with similar tasks.

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

6.12.5.5 Import system visualisation

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

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



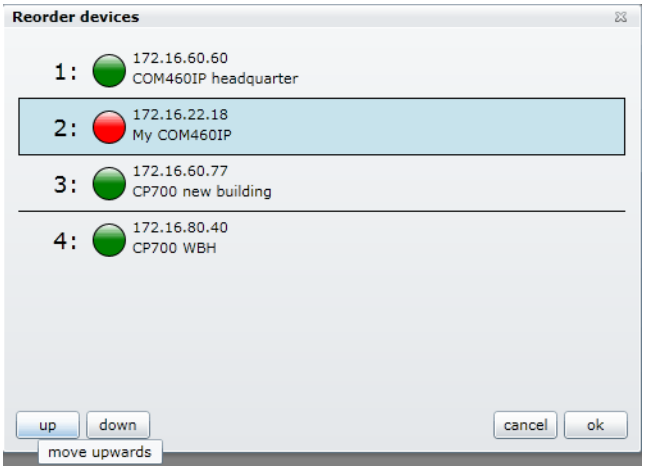
6.12.5.6 Sort system visualisation

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

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

Select your own order

1. Click on 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.



6.12.5.7 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 viualisation
2	System visualisation
3	Web user interface of the device, that is called up using the system visualisation

7. Display function for mobile Web applications

7.1 System requirements

The necessary precondition for communication with a smartphone is a WLAN router connected to the COM460IP. A mobile, web-enabled device with WLAN connection is required. The browser of the mobile device must be able to process HTML and Javascript. The COM460IP provides up to 3 ports.

7.2 Bus overview and BMS channels

COM460IP provides a "Bus overview" representation that is optimised for smartphones.
The bus overview representation can be reached under the address `http://<IP address>/bus.html`
The IP address is identical for all COM460IP applications.
The bus devices accessed, the device name and their status are displayed:
Red = Alarm
Green = Normal operation
Grey= Bus device has not responded for quite some time.

After tapping on one of the bus devices, details about the BMS channels will be displayed. These may be alarms, measured values and statuses. In addition, the language is selectable.

In mobile web application parameter setting is not possible.

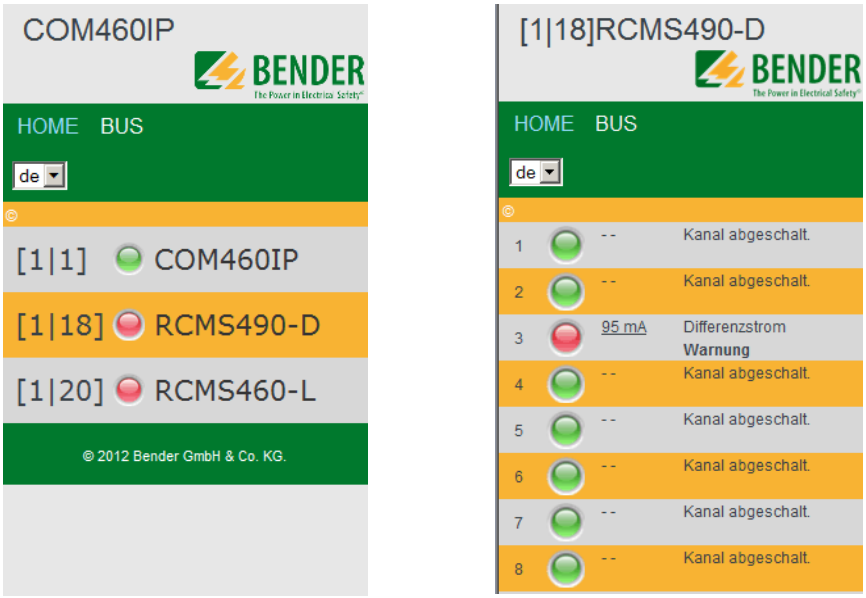


Fig. 7.1: Bus overview with device list and channel information

8. Data access using the Modbus TCP protocol

Requests to the Modbus TCP server of the COM460IP 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.

8.1 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

8.2 Modbus requests

The required words of the process image can be read out from the input registers of the COM460IP 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 and 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	0x01 (corresponds to the external BMS address 1), address assignment of the external BMS bus
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

8.3 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)

8.4 Structure of the exception code

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

8.5 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

9. Modbus process image in the memory of COM460IP

The device holds a process image in the memory. It represents the current statuses and values of up to 150 BMS devices for each monitored internal BMS bus.

9.1 Requesting data

9.1.1 Modbus function code

The memory of the COM460IP 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.

9.1.2 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 Modbus clients, an offset of 1 must be added to the register addresses. Example: Process image start address = 0x0101.

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

9.2 Memory scheme of the process image

9.2.1 BMS device address assignment on 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 or 512 bytes are reserved for each BMS device. They contain all the information requested and transmitted from the 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 9.1: Modbus start address for each BMS device for which a request is to be sent.

9.2.2 Memory scheme of an individual BMS device

BMS devices can feature various types of analogue and/or digital channels. Please take into consideration that there are device-specific differences:

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

Use the tables on page 118 and page 119 to determine the start address to request the following device parameters:

- Device type
- Timestamp
- Common alarm
- Device failure
- 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. For BMS device address 3, the first part of the address 0x03 (High-Byte) is taken from table 9.1,
2. The second part of the address 0x14 (Low-Byte) is taken from table 9.2 for channel 2. Take 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 ----------																				------ Timestamp ------						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 9.2: Modbus address assignment of the channels in a BMS device;
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.

9.2.3 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.

9.2.4 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.

9.2.5 C = Common alarm und 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 an alarm status from the respective BMS device is detected.
The device error bit is set when communication with the respective BMS device is no longer possible.

9.2.6 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/external)
R&U = Range and unit
For details on the channel description refer to chapter "9.4 ".

9.2.6.1 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

9.2.6.2 A&T = Alarm type and test type (internal/external)

Bit	7	6	5	4	3	2	1	0	Meaning
	Test external	Test internal	Status	Reserved	Reserved	Alarm	Error		
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.

9.2.6.3 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	True value is smaller
	1	0	x	x	x	x	x	x	True value is larger
	1	1	x	x	x	x	x	x	Invalid value

The unit is coded in the bits 0 to 4.
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 in the table on page 123 or page 127 . The floating point value contains an internal CODE but no valid measured value.

9.2.6.4 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 an extract from the texts. For a complete list of the available codes or texts refer to page 127.

9.2.6.5 Channel 33 to 64

Bit	7	6	5	4	3	2	1	0	Meaning
	Test external	Test internal	Status	Reserved	Reserved	Alarm	Error		
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.

9.3 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, COM460IP provides a reference data record under the **virtual** BMS address 0.

Do not assign BMS address 0 to a real BMS device!
Address 0 only serves to simulate 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.

9.3.1 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 9.3: The start addresses for the reference data record request

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)

9.3.2 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 9.4: Reference data stored in channel 1

9.3.3 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 9.5: Reference data stored in channel 2

9.3.4 Explanation of how to access floating point values

The test value 12.34 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. Determine the correct byte offset
   Interpreting both Words as unsigned integer values should result in the following values:
   Word 1 with address 0x14: unsigned integer value => 16709 (0x4145)
   Word 2 with address 0x15: unsigned integer value => 28836 (0x70A4)

2. Determine 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

9.4 Channel descriptions for the process image

Value	Measured value description 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
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	Measured value description alarm message operating message	Note
37 (0x25)		
38 (0x26)	Batt.op. UPS	Battery operation, special safety power supply
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 from 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)	Mains power connection	
102 (0x66)	Earth connection	

Value	Measured value description alarm message operating message	Note
103 (0x67)	Short CT	CT short-circuit
104 (0x68)	No CT connected	
105 (0x69)	Short temp.sensor	Short-circuit temperature sensor
106 (0x6A)	Temp.sensor 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	CV460 fault
140 (0x8C)	RK4xx	Fault RK4xx
141 (0x8D)	Address collission	BMS address has been assigned several times
142 (0x8E)	Invalid address	
143 (0x8F)	Several masters	

Value	Measured value description alarm message operating message	Note
144 (0x90)	No menu access	
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 from 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. during the transfer of a new parameter) Display in the menu "..." .
1019 (0x3FB)	Parameter/measured value (unit not displayed)
1018 (0x3FA)	Parameter (Code selection menu) units not indicated
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

9.5 Modbus control commands

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

The Modbus control can be activated resp.deactivated in the "Settings" > 3. Modbus > 1. Control" menu (refer to chapter "5.4.3 " or chapter "6.6.3 ").

Command structure

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

Writing to 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.
- Write the value "1" into this register.
- 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 (see page 92).

Read register:

- For this purpose, use the function code 0x04 "Read input registers".

Possible response in the register "Status":

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

Control commands for the internal BMS bus

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

10. Technical data

( )* = factory setting

10.1 Tabular data

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 ..... four lines, backlit, for operating data and device menu
LEDs:
2 x Ethernet ETH1, ETH2 act/link ..... lights when connected to the network, flashes during data transmission
ALARM ..... internal device error
COM ..... data traffic BMS bus
ON ..... operation indicator
Memory card for special device functions (micro SD card) ..... 2 GB
E-mail configurations (Function package A only) and device failure monitorings ..... max. 250 entries
Individual texts (Function package A only) ..... max. 1200 texts with 100 characters each

Interfaces

BMS bus (internal):
Interface/protocol ..... RS-485/BMS internal (BMS internal)*
Operating mode ..... master/slave (slave)*
Baudrate BMS (internal) ..... 9.6 kbit/s
Cable length ..... ≤ 1200 m
Cable: twisted pair, shielded, shield connected to PE on one side ..... recommended: J-Y(St)Y min. 2 x 0.8
Connection, BMS internal ..... terminals A, B
Terminating resistor ..... 120 Ω (0.25 W)
Device address, BMS bus (internal) ..... 1...99 (2)*
Ethernet:
Connection ..... 2 x RJ45
Data rate ..... 10/100 Mbit/s, autodetect
DHCP ..... on/off (on)*
t_{off} (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 (depending on the function package selected) ..... TCP/IP, Modbus TCP, DHCP, SMTP, NTP

Environment/EMC

EMC ..... EN 61326-1
Classification of climatic conditions acc. to IEC 60721:
Stationary use ..... 3K5 (no condensation, no formation of ice)
Transport 2K3
Long-term storage 1K4
Operating temperature ..... -10...+55 °C

Classification of mechanical conditions acc. to IEC 60721:
Stationary use 3M4
Transport 2M2
Long-term storage 1M3

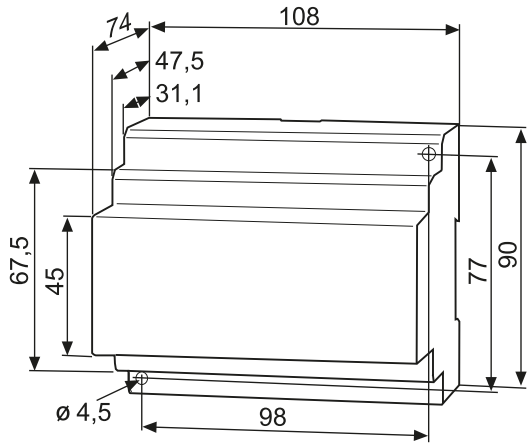
Connection

Connection type ..... screw-type terminals
Connection properties:
rigid/flexible ..... 0.2 . . . 4/0.2 . . . 2.5 mm^2 (AWG 24 . . . 12)
Multi-conductor connection (2 conductors with the same cross section):
Rigid/flexible ..... 0.2 . . . 1.5/0.2 . . . 1.5 mm^2
Stripped length ..... 8 . . . 9 mm
Tightening torque ..... 0.5 . . . 0.6 Nm

Other

Operating mode ..... continuous operation
Mounting ..... display oriented
Degree of protection, internal components (IEC 60529) IP30
Degree of protection, terminals (IEC 60529) IP20
Type of enclosure X460
Screw mounting ..... 2 x M4
DIN rail mounting acc. to ..... IEC 60715
Flammability class UL94V-0
Weight ..... ≤ 310 g
( )* = factory setting

10.2 Dimension diagram



10.3 Standards, approvals, certifications

For information about UL applications refer to page 21.

10.4 Features of the device variants

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	•				
Web server for displaying the system overview on mobile phones	•				
Can be operated on the internal and external bus (max. 99 x 139 addresses)	•				
Multilingual menu structure	•				
IPaddress setting manually or via DHCP	•				
Time synchronisation for the BMS bus system via NTP	•				
Built-in switch with 2x RJ45, cable auto detection	•				
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

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

10.5 Ordering information

Type	Function package (software licence)	Supply voltage/ frequency range U_S	Power consumption	Lloyd's Register TYPE APPROVED / c UL us LISTED	Art. No.
COM460IP BMS-Ethernet gateway	--------	AC/DC 76…276 V */ AC 42…460 Hz/DC For UL application: U_S AC = 76…250 V, 40…150 mA, 42…460 Hz U_S DC = 76…250 V, 10…35 mA	5…40 VA/ 3.8 W	Approvals available	B 9506 1010
COM460IP-24V BMS-Ethernet gateway	--------	DC 16…94 V AC 16…72 V, 50…60 Hz	≤ 4 VA	Approvals available	B 9506 1020
	Function package A: Individual texts for devices/channels, e-mail in the event of an alarm				B 7506 1011
	Function package B: Modbus TCP server with max. 14700 BMS nodes				B 7506 1012
	Function package C: Parameter setting for BMS devices				B 7506 1013
	Function package D: Visualisation of BMS devices				B 7506 1014

*Absolute values

11. Troubleshooting

11.1 Frequently asked questions

Not all devices connected to the BMS bus show the same time. This leads to different time stamps in the loggers. Which settings have to be made?

- In a BMS system only one device (COM460IP) may have the following setting: "NTP = on, Summertime = CEST, UTC Offset = +1 (Germany)". The time of all other devices connected to the bus is synchronised via BMS.
- Set the BMS devices EDS, RCMS, ATICS, IRDH, MK…, TM… to "Summertime = off".
- If an additional COMTRAXX device (COM46xxP, CP700) is connected, select "Summertime = CEST, UTC Offset = +1 (Germany)".
- Time setting for PEM… devices connected via Modbus is also carried out via the gateway COM460IP. If the PEM… and the gateway are located in different time zones, please contact the service address mentioned in this manual.

11.2 Damage in transit

If you find transport damage on the receipt of delivery, have the damage confirmed by the delivery agent on handover. In case of doubt, please contact:
Bender GmbH & Co.KG
Londorfer Straße 65
35305 Gruenberg, Germany
06401 807-0

11.3 Malfunctions

If disturbances occur in the connected networks which might result from the use of COM460IP, please refer to this operating manual.

11.3.1 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 COM460IP 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.

11.3.2 Where do you get help?

If, after thorough reading of the technical manual and intensive fault location in your installation, you cannot delete the fault related to the BMS-Ethernet gateway COM460IP, please contact our Technical Service department:

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

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