LINETRAXX® CMS460-D

Multi-channel AC and pulsed DC sensitive load current evaluators for AC systems (TN, TT and IT systems)



LINETRAXX® CMS460-D

Device features

- Optional AC or pulsed DC sensitive measurements for each channel
- r.m.s. value measurement
- 12 measuring channels per individual device for load current
- Up to 90 evaluators CMS460-D in the system (1080 measuring channels)
- Fast parallel scanning for all channels
- Response ranges 100 mA…125 A (42…2000 Hz)
- Preset function
- Adjustable time delays
- Adjustable frequency behaviour (e.g. fire and plant protection)
- History memory with date and time stamp for 300 data records/channel
- Data logger for 300 data records/channel
- Analysis of the harmonics, THD
- Two alarm relays with one changeover contact each
- N/O or N/C operation and fault memory selectable
- Connection external test and reset button
- Backlit graphical display (7-segment display) and alarm LEDs
- Data exchange via BMS bus
- Password protection for device setting
- RoHS compliant

Certifications

Product description

The CMS460 system consists of one or several CMS460-D load current evaluators which are able to detect and evaluate load currents in earthed and unearthed power supplies via the associated measuring current transformers. The maximum voltage of the system to be monitored depends on the nominal insulation voltage of the measuring current transformer used in the case of busbar systems, or on the cables or conductors that are routed through.

W… (closed), WR… (rectangular) and WS… (split-core) and WF… (flexible) measuring current transformers are used for alternating and pulsating currents. Any combination of the various measuring current transformer series can be connected to the evaluator measuring channels. Each CMS460-D utilises 12 measuring channels. Up to 90 load current evaluators can be connected via a BMS bus (RS-485 interface with BMS protocol), thereby up to 1080 measuring channels (sub-circuits) can be monitored.

If this product is to be used for fire or plant protection, the frequency response can be set accordingly. The measured currents can be analysed for harmonics.

Typical applications

- Monitoring of loads and installations for load currents in the frequency range of 42…2000 Hz (measuring current transformers W…, WR…, WS…, WF…)
- Monitoring of currents regarded as fire hazards in flammable atmospheres
- EMC monitoring of TN systems for “stray currents” and additional N-PE connections
- Monitoring of N conductors for overload caused by harmonics
- Monitoring of PE and equipotential bonding conductors to ensure they are free of current

Function

The currents are detected and evaluated as true r.m.s. values in the frequency range of 42…2000 Hz. All channels are scanned simultaneously so that the maximum scanning time for all channels is ≤ 180 ms if 1x the response value is exceeded and ≤ 30 ms if 5x the response value is exceeded.

The current values of all channels are shown on the LC display in bar graph format. If one of both values falls below or exceeds the set response value, the response delay t_{on} begins. Once the response delay has expired, the common alarm relays “K1/K2” switch and the alarm LEDs 1/2 light up.

Two response values/common alarm relays, which can be set separately, allow a distinction to be made between “prewarning” and “alarm”. The faulty channel(s) and the associated measured value are shown on the LC display. If the current exceeds or falls below the release value (response value plus hysteresis), the delay on release t_{off} begins. Once the delay has expired, the common alarm relays return to their original position.

If the fault memory is enabled, the common alarm relays remain in the alarm position until the reset button is pressed or a reset command is sent via the BMS bus. The device function can be tested using the test button. Parameters are assigned to the device via the LCD and the control buttons on the front of the connected CMS460-D or via connected panels and protocol converters (e.g. FTC470XET).

The preset function allows the response values to be set for all channels considering the currently measured value for each channel.

The CMS460-D utilises a backlit graphical display where detailed information of all devices connected to the bus are displayed. This device is capable of assigning parameters to all CMS460-D devices connected to the bus (e.g. RCMS460-D/-L, RCMS490-D/-L, CMS460-D) and displaying all measurement details. Several CMS460-D devices can be used in one system.

History memory

The device utilises a history memory for failsafe storing of up to 300 data records (date, time, channel, event code, measured value), so that all data about an outgoing circuit or an area can be traced back at any time (what happened when).

Analysis of harmonics

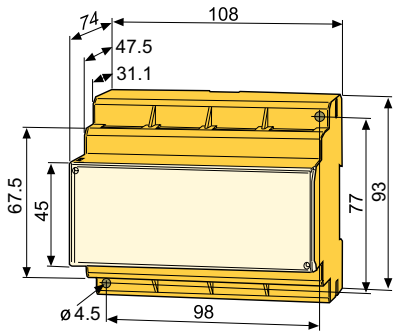
The analysis of the harmonics of the measured currents can be selected via a menu item in CMS460-D. There the THD factor and the current value of the harmonics (1…40 at 50/60 Hz, 1…5 at 400 Hz) is displayed numerically and graphically.

Overview of device features

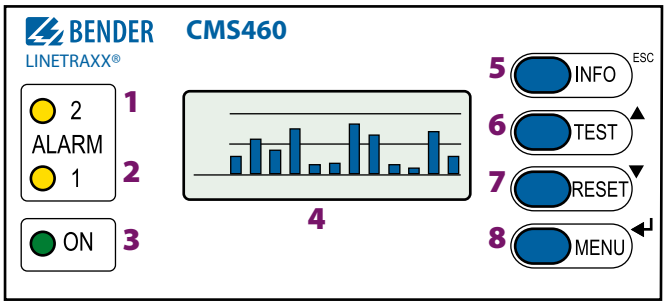
Distinctive device features	CMS460-D
Rated operating current pulsed DC sensitive Type A	100 mA…125 A
Backlit graphics display	■
Parameter setting function	■
Password	■
Error code indication	■
Address range	1…90
Master/slave	■
Internal clock	■
Common alarm relay for all channels	2 x 1 changeover contact
Analysis of the harmonics I_{Δ}, THD	■
History memory 300 data records	■
Data logger for 300 data records/ channel	■
PRESET	■
Number of measuring channels	12
Enclosure	XM460

Dimension diagram

Dimensions in mm



Operating and display elements CMS460-D



1 - ALARM 2 LED lights up when the measured value exceeds or falls below the response value "Alarm".

2 - ALARM 1 LED lights up when the measured value exceeds or falls below the response value "Prewarning". In the event of a device error, the LED lights up.

3 - ON LED lights up when the device is switched on and flashes during power on until the device is ready for operation.

4 - Backlit graphics LC display

5 - INFO to query standard information

ESC to exit the menu function without changing parameters

6 - TEST to call up automatic self test

▲ to change parameters, scroll

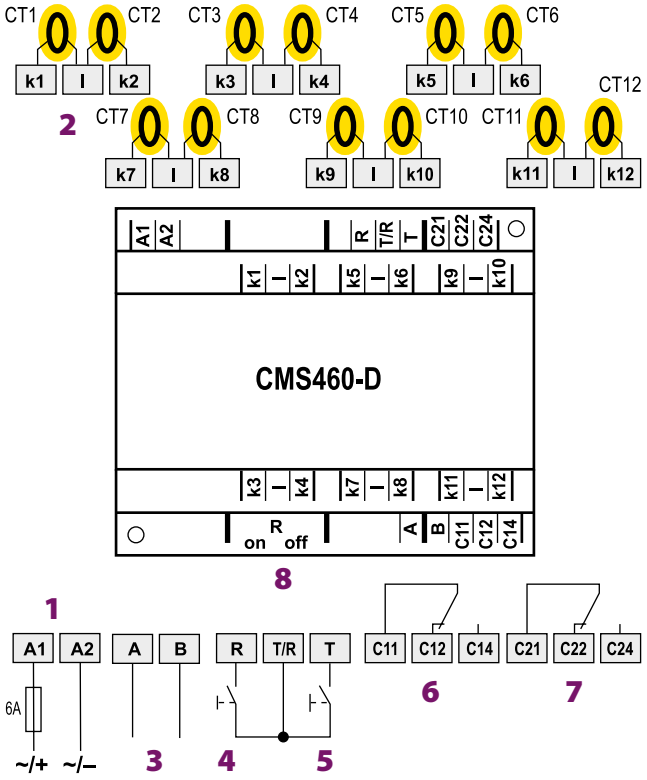
7 - RESET to delete alarm and fault messages

▼ to change parameters, scroll

8 - MENU to toggle between the standard display, menu and alarm display

↵ to confirm parameter changes

Wiring diagram



1 - Connection of supply voltage U_S (see ordering information), 6 A fuse recommended.

2 - Connection of measuring current transformers CT1…CT12

3 - RS-485 interface with BMS protocol

4 - External reset button “R” (N/O contact)*

5 - External test button “T” (N/O contact). The external “T/R” buttons of several devices must not be connected to one another.

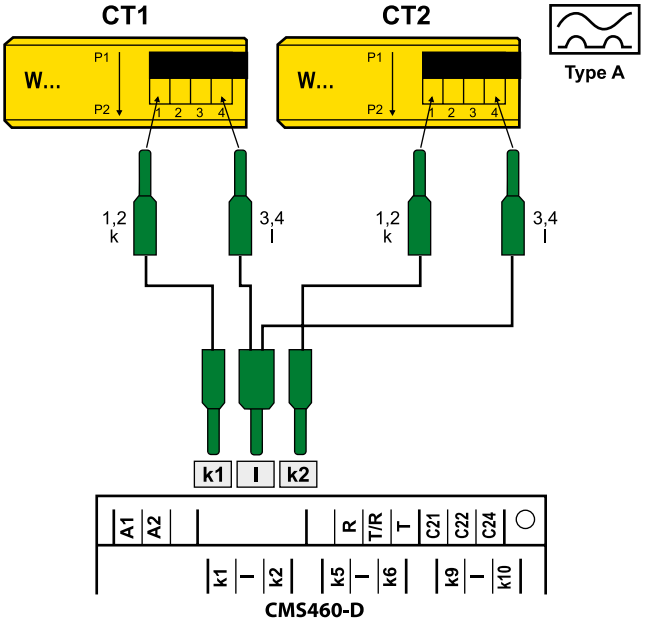
6 - Alarm relay “K1”: Alarm 1, common alarm for alarm, prewarning, device error, ext. alarm (adjustable)

7 - Alarm relay “K2”: Alarm 2, common alarm for alarm, prewarning, device error, ext. alarm (adjustable)

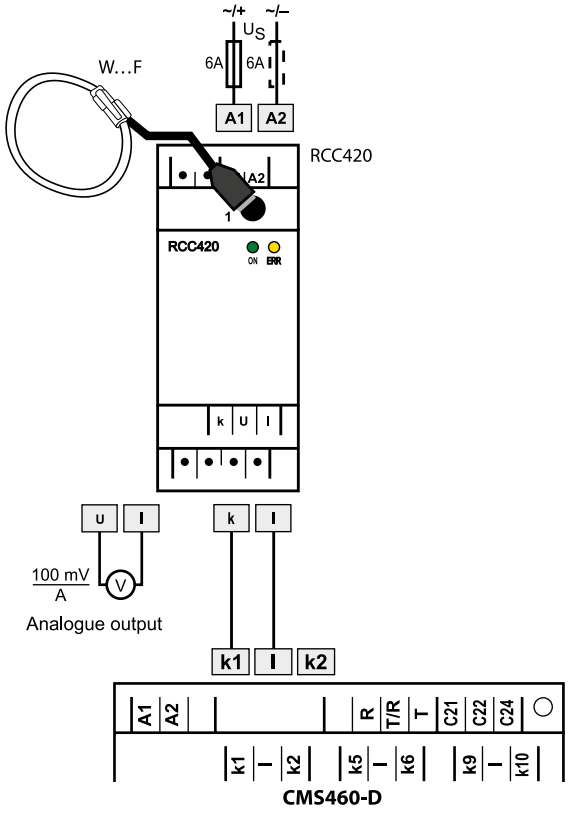
8 - $R_{on/off}$: Activate or deactivate the BMS bus terminating resistor (120 Ω)

Connection W…, WR…, WS… series measuring current transformers (pulsed current sensitive)

Example: W…



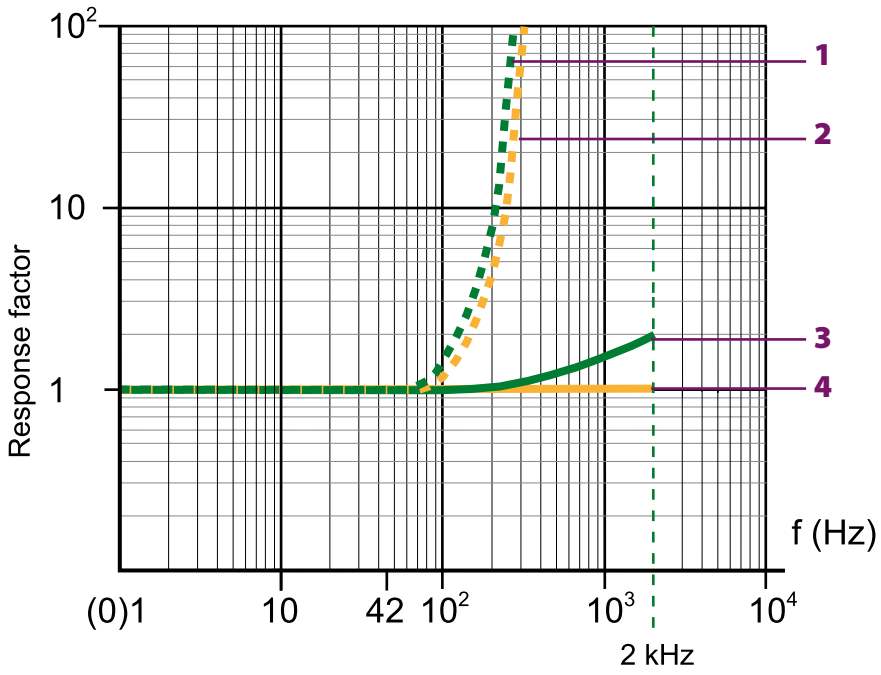
Connection WF... series measuring current transformer (pulsed DC sensitive)



Frequency settings

The frequency response of the equipment can be set for a linear frequency response (up to the maximum frequency of 2000 Hz) if used for fire protection or for a frequency response in accordance with IEC 60990. For plant protection, the load current is measured up to the rated system frequency. The figure below shows the corresponding frequency response.

Frequency curves



Response factor = $I_\Delta/I_{\Delta n}$

(I_Δ) Response current: Measured value at which the CMS responds.

($I_{\Delta n}$) Rated operating current: Set response value

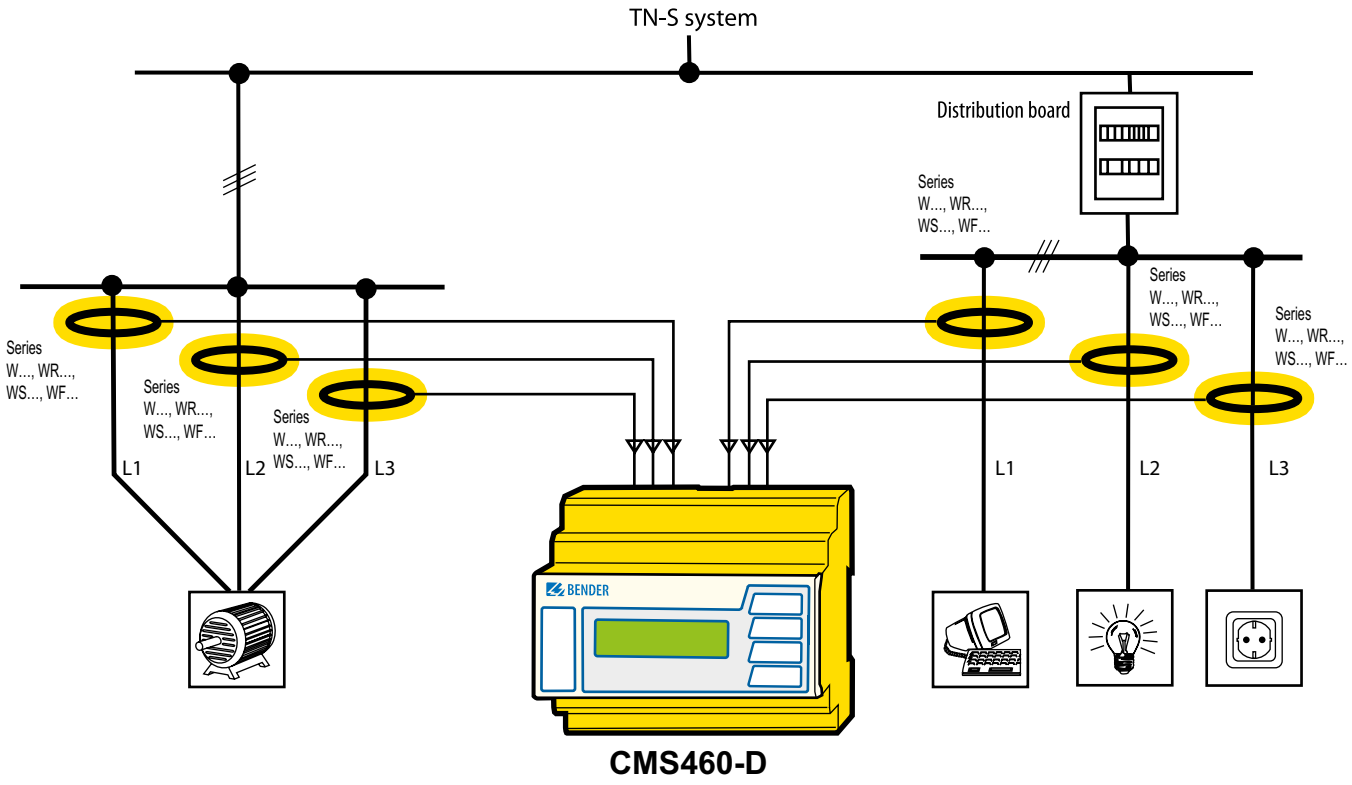
1 - Menu option “50 Hz”
– plant protection: Only evaluates the fundamental component of the current.

2 - Menu option “60 Hz”
– plant protection: Only evaluates the fundamental component of the current.

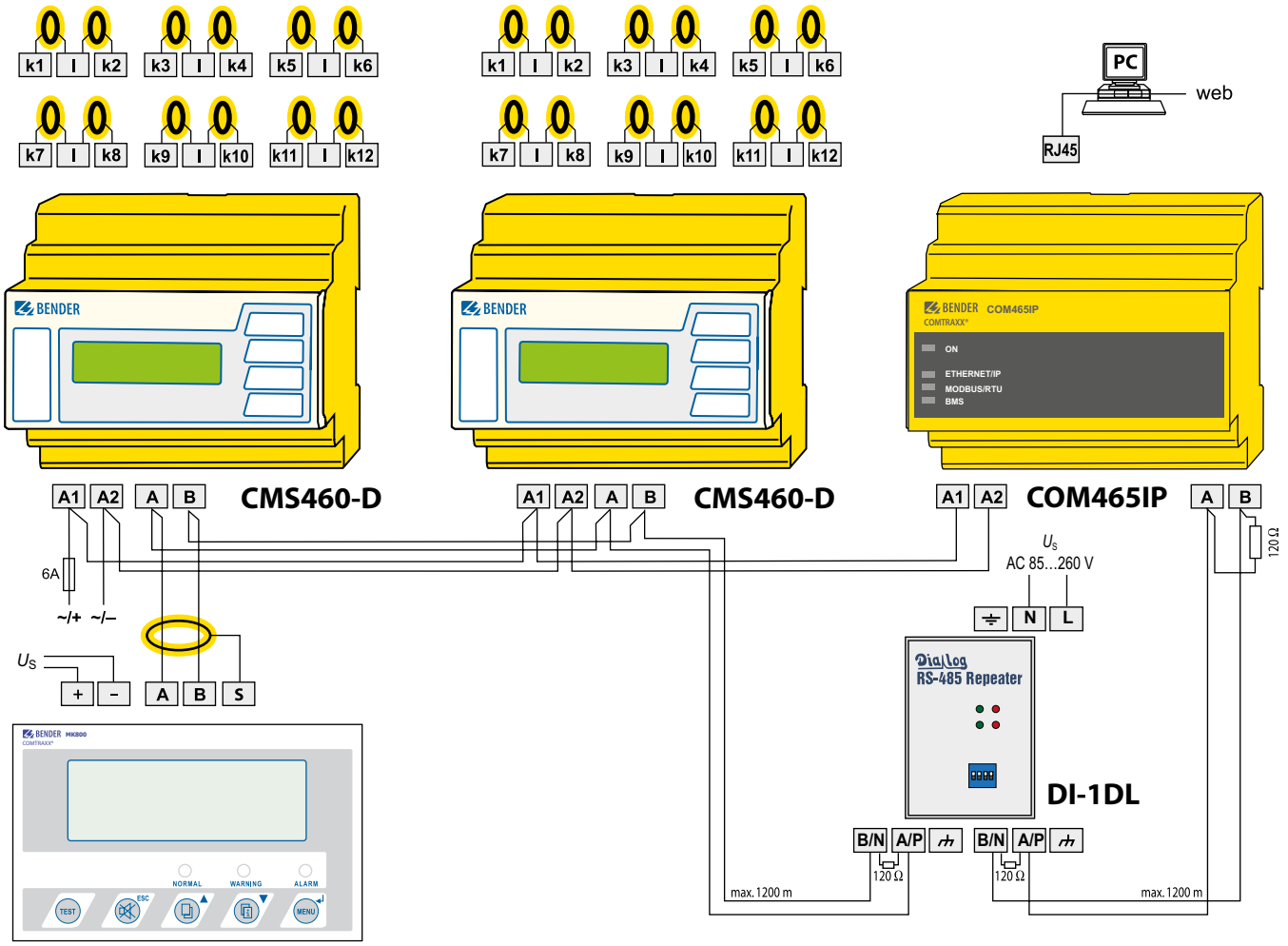
3 - Menu option “IEC” Touch current for let go in accordance with IEC 60990

4 - Menu option “None”
– fire protection: Response factor remains the same over the entire frequency range.

Example for the design of a standard system consisting of an CMS460-D with up to 12 measuring points



Example for the design of a standard system consisting of two CMS460-D and one COM460IP BMS-Ethernet gateway



Technical data

Insulation coordination acc. to IEC 60664-1/IEC 60664-3 for the versions:

a) CMS460-D1

Supply voltage U_S	DC 24…75V/AC 24…60 V (AC/DC ±20 %)
Supply voltage frequency	DC, 50/60 Hz
Rated insulation voltage	100 V
Overvoltage category/pollution degree	III/3
Rated impulse voltage	2.5 kV
Protective separation (reinforced insulation) between	(A1, A2) - (k1, I…k12, R, T/R, T, A, B)
Voltage test acc. to IEC 61010-1	1.344 kV
Rated insulation voltage	250 V
Overvoltage category/pollution degree	III/3
Rated impulse voltage	4 kV
Basic insulation between:	(A1, A2), (k1, I…k12, R, T/R, T, A, B) - (C11, C12, C14), (C21, C22, C24), (11,14), (21,24), (31,34), (41,44), (51,54), (61,64), (71,74), (81,84), (91,94),(101,104), (111,114), (121,124)
Basic insulation between:	(11, 14) - (21, 24) - (31, 34) - (41, 44) - (51, 54) - (61, 64)
Voltage test acc. to IEC 61010-1	2.21 kV
Rated insulation voltage	250 V
Overvoltage category/pollution degree	III/3
Rated impulse voltage	6 kV
Protective separation (reinforced insulation) between	(C11, C12, C14) - (C21, C22, C24) - (11, 14, 21, 24, 31, 34) - (41, 44, 51, 54, 61, 64) - (71,74) - (81,84) - (91,94) - (101,104) - (111,114) - (121,124)
Voltage test acc. to IEC 61010-1	3.536 kV

b) CMS460-D2

Supply voltage U_S	AC/DC 100…240 V (-20…+15 %)
Supply voltage frequency	DC, 50/60 Hz
Rated insulation voltage	250 V
Overvoltage category/pollution degree	III/3
Rated impulse voltage	6 kV
Protective separation (reinforced insulation) between	(A1, A2) - (k1, I…k12, R, T/R, T, A, B), (C11, C12, C14), (C21, C22, C24), (11,14), (21,24), (31,34), (41,44), (51,54), (61,64), (71,74), (81,84), (91,94),(101,104), (111,114), (121,124)
Protective separation (reinforced insulation) between	(C11, C12, C14) - (C21, C22, C24) - (11, 14, 21, 24, 31, 34) - (41, 44, 51, 54, 61, 64) - (71,74) - (81,84) - (91,94) - (101,104) - (111,114) - (121,124)
Voltage test acc. to IEC 61010-1	3.536 kV
Rated insulation voltage	250 V
Overvoltage category/pollution degree	III/3
Rated impulse voltage	4 kV
Basic insulation between:	k1, I…k12, R, T/R, T, A, B) - (C11, C12, C14), (C21, C22, C24)
Basic insulation between:	(11, 14) - (21, 24) - (31, 34) - (41, 44) - (51, 54) - (61, 64)
Voltage test acc. to IEC 61010-1	2.21 kV

Measuring circuit

External measuring current transformers	W…, WR…, WS…, WF… series (type A)
Load	1 Ω
Rated insulation voltage (measuring current transformer)	800 V
Operating characteristics acc. to IEC 60755	type A
	depending on measuring current transformer series (type A)*
Rated frequency	42…2000 Hz (type A)
Cut-off frequency	none, IEC, 50 Hz, 60 Hz (none)*
Measuring range	100 mA…125 A (measuring current transformer type A)
	100 mA…30 A (measuring current transformer Flex)
	Crest factor up to 10 A = 4, up to 125 A = 2
Rated operating current In2 (alarm)	100 mA…125 A (16 A overcurrent)*
Rated operating current In1 (prewarning)	10…100 % x In2*
Preset for alarm	offset: 0…20 A (1 A)* and I x factor 1…99 (3)*
Relative uncertainty	+10…-20 %
Hysteresis	2…40% (20 %)*
Factor for additional CT	/2…10; x 1…10 (x 1)*
Number of measuring channels (per device/system)	12/1080

Time response

Start-up delay t(start-up) per device	0…99 s (0 ms)*
Response delay t_{on} per channel	0…999 s (200 ms)*
Delay on release t_{off} per channel	0…999 s (200 ms)*
Operating time t_{ae} at $I_n = 1$ x $I_{n1/2}$	≤ 180 ms
Operating time t_{ae} at $I_n = 5$ x $I_{n1/2}$	≤ 30 ms
Response time t_{an} for current measurement	$t_{an} = t_{ae} + t_{on1/2}$
Scanning time for all measuring channels (current measurement)	≤ 180 ms
Recovery time t_b	500…600 ms

Displays, memory

Display range, measuring value	< 10 mA…125 A (CT type A)
	< 10 mA…30 A (measuring current transformer Flex)
Operating uncertainty	± 10 %
LEDs	ON/ALARM
LC display	backlit graphical display
History memory	300 data records
Data logger	300 data records per measuring channel
Password	off/0…999 (off)*
Language	D, GB, F (GB)*
Fault memory alarm relay	on/off (off)*

Inputs/outputs

Test/reset button	internal/external
Cable length for external test/reset button	0…10 m

Interface

Interface/protocol	RS-485/BMS
Baud rate	9.6 kbit/s
Cable length	0…1200 m
Recommended cable (shielded, shield connected to PE on one side)	
	min. J-Y(St) min. 2x0.8
For UL applications:	Copper lines at least 60/70 °C
Terminating resistor	120 Ω (0.25 W) connectable via DIP switch
Device address, BMS bus	1…90 (2)*

Cable lengths for W…, WR…, WS…, WF… series measuring current transformers

Single wire ≥ 0.75 mm2	0…1 m
Single wire, twisted ≥ 0.75 mm2	0…10 m
Shielded cable ≥ 0.5 mm2	0…40 m
Recommended cable (shielded, shield connected to terminal l at one end, must not be earthed)	
	J-Y(St)Y min. 2x0.8

Switching elements

Number of changeover contacts	2 x 1 changeover contacts
Operating principle	N/C or N/O operation (N/O operation)*
Electrical endurance, number of cycles	10,000

Contact data acc. to IEC 60947-5-1

Utilisation category	AC-13	AC-14	DC-12	DC-12	DC-12
Rated operational voltage	230 V	230 V	24 V	110 V	220 V
Rated operational current (common alarm relay)	5 A	3 A	1 A	0.2 A	0.1 A
Rated operational current (alarm relay)	2 A	0.5 A	5 A	0.2 A	0.1 A
Minimum contact rating	1 mA at AC/DC ≥ 10 V				

Technical data (continued)

Environment/EMC

EMC	IEC 61326-1
Operating temperature	-25 °C
Climatic class acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3K5 (except condensation and formation of ice)
Transport (IEC 60721-3-2)	2K3 (except condensation and formation of ice)
Long-term storage (IEC 60721-3-1)	1K4 (except condensation and formation of ice)
Classification of mechanical conditions acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3M4
Transport (IEC 60721-3-2)	2M2
Long-term storage (IEC 60721-3-1)	1M3

Connection

Connection	screw-type terminals
Connection properties:	
Rigid/flexible/conductor sizes	0.2…4/0.2…2.5 mm²/AWG 24…12
Multi-conductor connection (2 conductors with the same cross section):	
Rigid/flexible	0.2…1.5/0.2…1.5 mm²
Stripping 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
Enclosure material	polycarbonate
Flammability class	UL94V-0
Screw fixing	2 x M4
DIN rail mounting acc. to	IEC 60715
Power consumption	≤ 10 VA
Weight	≤ 360 g

( )* Factory setting

Ordering information

Supply voltage [1] U_S		Type	Art. No.	
AC	DC		Screw-type terminal	Push-wire terminal
24…60 V, 50/60 Hz	24…75 V	CMS460-D-1	B94053017	B74053017
100…240 V, 50/60 Hz	100…240 V	CMS460-D-2	B94053018	B74053018

[1] For UL applications: Us max = DC 250 V/AC 250 V, 50/60 Hz

Accessories

Description	Art. No.
XM460 mounting frame, 144 x 82 mm	B990995

Suitable system components

Description	Version	Type	Art. No.
Power supply unit	RS-485 repeater	DI-1	B95012015
		DI-1PSM	B95012044
	for DI-1	AN471	B924189
Condition Monitor	Condition Monitor with integrated gateway: Bender system/Ethernet AC/DC 24…240 V, DC, 50…60 Hz	COM465IP	B95061065
	Condition Monitor with integrated gateway: Bender system/Ethernet DC 24 V	COM465IP-24 V	B95061066
	Individual text messages for all devices/channels, device failure monitoring, email in the event of an alarm	COM465IP Function package A	B75061011
	Modbus TCP server for max. 98 * 139 BMS nodes as well as BCOM and universal measuring devices, SNMP server	COM465IP Function package B	B75061012
	Parameter setting of BMS devices as well as BCOM and universal measuring devices	COM465IP Function package C	B75061013
	Visualisation of Bender systems, System visualisation	COM465IP Function package D	B75061014
	Condition Monitor for the connection of Bender BMS devices and universal measuring devices to TCP/IP networks	CP700	B95061030
	BMS Modbus RTU gateway AC/DC 76…276 V[1]/ AC 42…460 Hz/DC	COM462RTU	B95061022
Alarm indicator and test combination	Alarm indicator and test combination in accordance with IEC 60364-7-710, with BMS bus and USB interface, 16 digital inputs, one relay output, alarm texts programmable via interfaces and personal computer, standard text display. Version: surfacemounting enclosure; menu languages: German English.	MK800A-11 [2]	B95100102
	Alarm indicator and test combination in accordance with IEC 60364-7-710, with BMS bus and USB interface, alarm texts programmable via interfaces and personal computer, standard text display. Version: surfacemounting enclosure; Menu languages: German, English.	MK800A-12 [2]	B95100103
	Alarm indicator and test combination in accordance with IEC 60364-7-710, with BMS bus and USB interface, 12 digital inputs, one relay output, alarm texts programmable via interfaces and personal computer, standard text display. Version: Flush-mounting enclosure	MK2430-11	B95100001
	Alarm indicator and test combination in accordance with IEC 60364-7-710, with BMS bus and USB interface, alarm texts programmable via interfaces and personal computer, standard text display. Version: Flush-mounting enclosure	MK2430-12	B95100002
	As MK2430-11, but factory-programmed	MK2430P-11	B95100003
	As MK2430-12, but factory-programmed	MK2430P-12	B95100004
	As MK2430-11, but with surfacemounting enclosure	MK2430A-11	B95100005
	As MK2430-12, but with surfacemounting enclosure	MK2430A-12	B95100006
	As MK2430A-11, but factory-programmed, surface-mounting enclosure version	MK2430PA-11	B95100007
	As MK2430A-12, but factory-programmed, surface-mounting enclosure version	MK2430PA-12	B95100008
	As MK2430-11, but front plate with screw fixing	MK2430S-11	B95100011
	As MK2430-12, but front plate with screw fixing	MK2430S-12	B95100012

[1] Absolute values
[2] Other versions on request