

LINETRAXX® CMS460-D

Multi-channel AC, pulsed DC sensitive load current evaluator
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

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

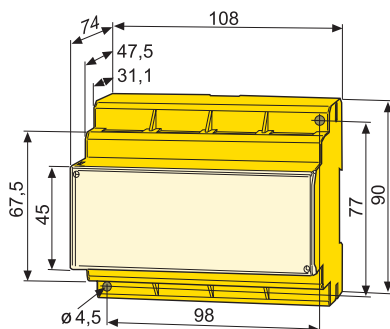
The analysis of the harmonics of the measured currents can be selected via a menu item in CMS460-D. There the THD factor and the current value of the harmonics (1...40 at 50/60 Hz, 1...5 at 400 Hz) is displayed numerically and graphically.

Overview of device features

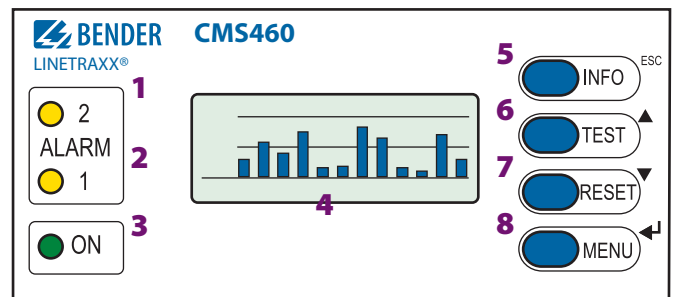
Distinctive device features	CMS460-D
Rated operating current pulsed DC sensitive Type A	100 mA...125 A
Backlit graphics display	■
Parameter setting function	■
Password	■
Error code indication	■
Address range	1...90
Master/slave	■
Internal clock	■
Common alarm relay for all channels	2 x 1 changeover contact
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

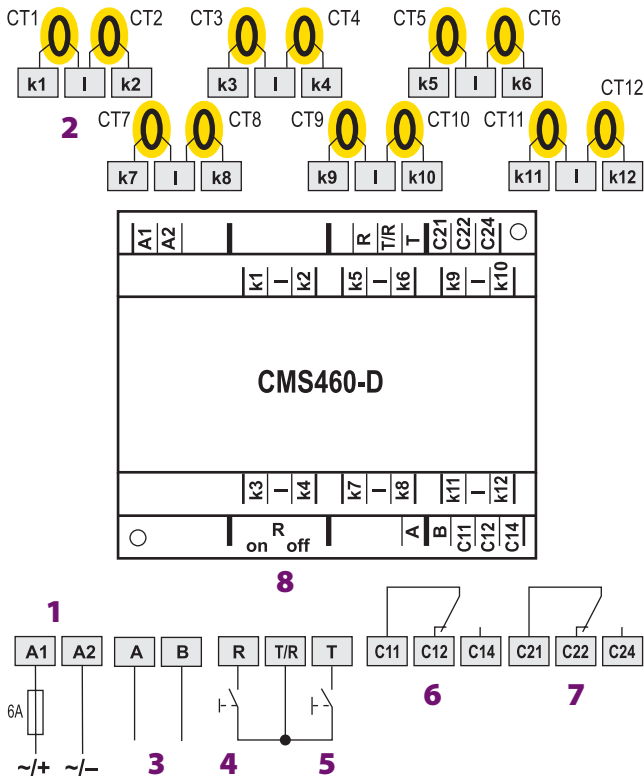


Operating and display elements CMS460-D



- 1 - LED "ALARM 2" lights up if the measured value falls below or exceeds the "Alarm" response value in a measuring channel.
- 2 - LED "ALARM 1" lights up if the measured value falls below or exceeds the "Alarm" response value in a measuring channel. In the event of a device error, the LED lights up.
- 3 - The LED "ON" 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" button: to call up standard information
ESC button: to exit the menu function without changing parameters
- 6 - "TEST" button: to call up the automatic self test
Arrow up button: Parameter changes, scroll
- 7 - "RESET" button: to delete alarm and fault messages
Arrow down button: Parameter changes, scroll
- 8 - "MENU" button: to toggle between the standard display, MENU and alarm display
Enter button: to confirm parameter changes

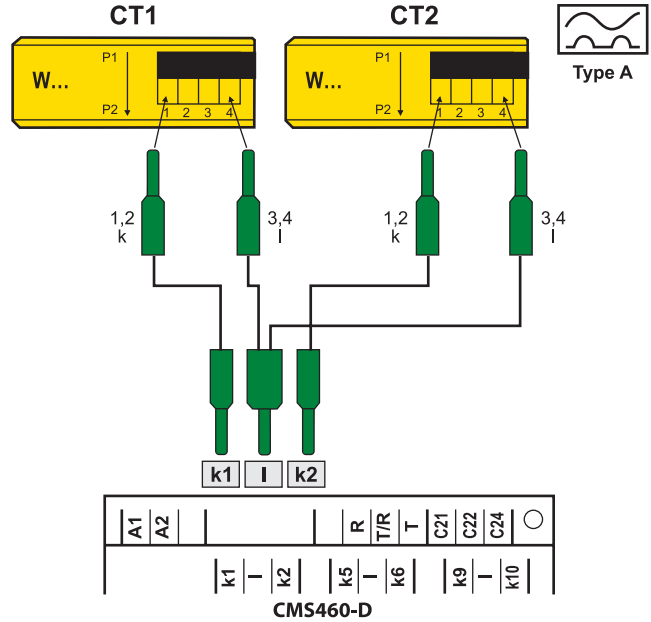
Wiring diagram



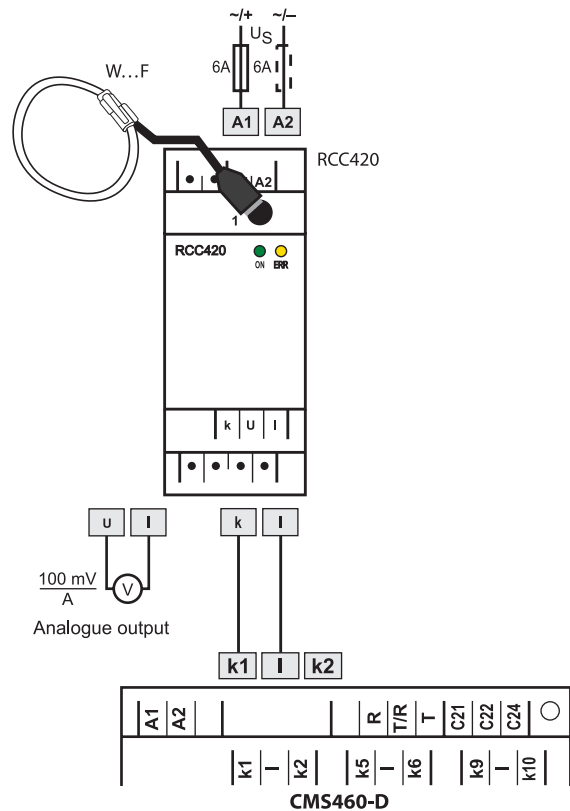
- 1 - Connection of supply voltage U_S (see ordering information), 6 A fuse recommended.
- 2 - Connection of measuring current transformers CT1...CT12
- 3 - RS-485 interface with BMS protocol
- 4 - External reset button "R" (N/O contact)*
- 5 - External test button "T" (N/O contact). The external "T/R" 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...



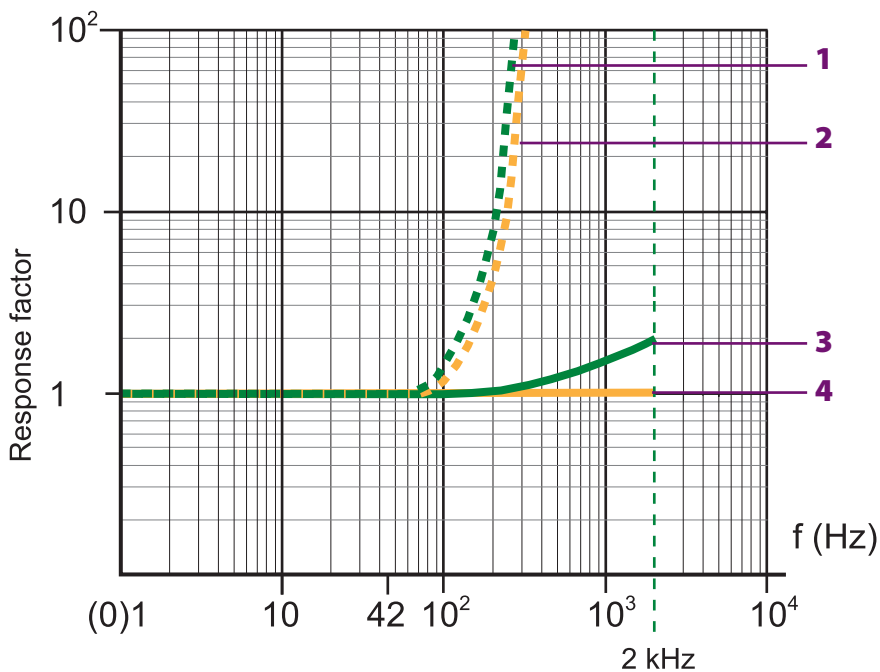
Connection WF... series measuring current transformer (pulsed DC sensitive)



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



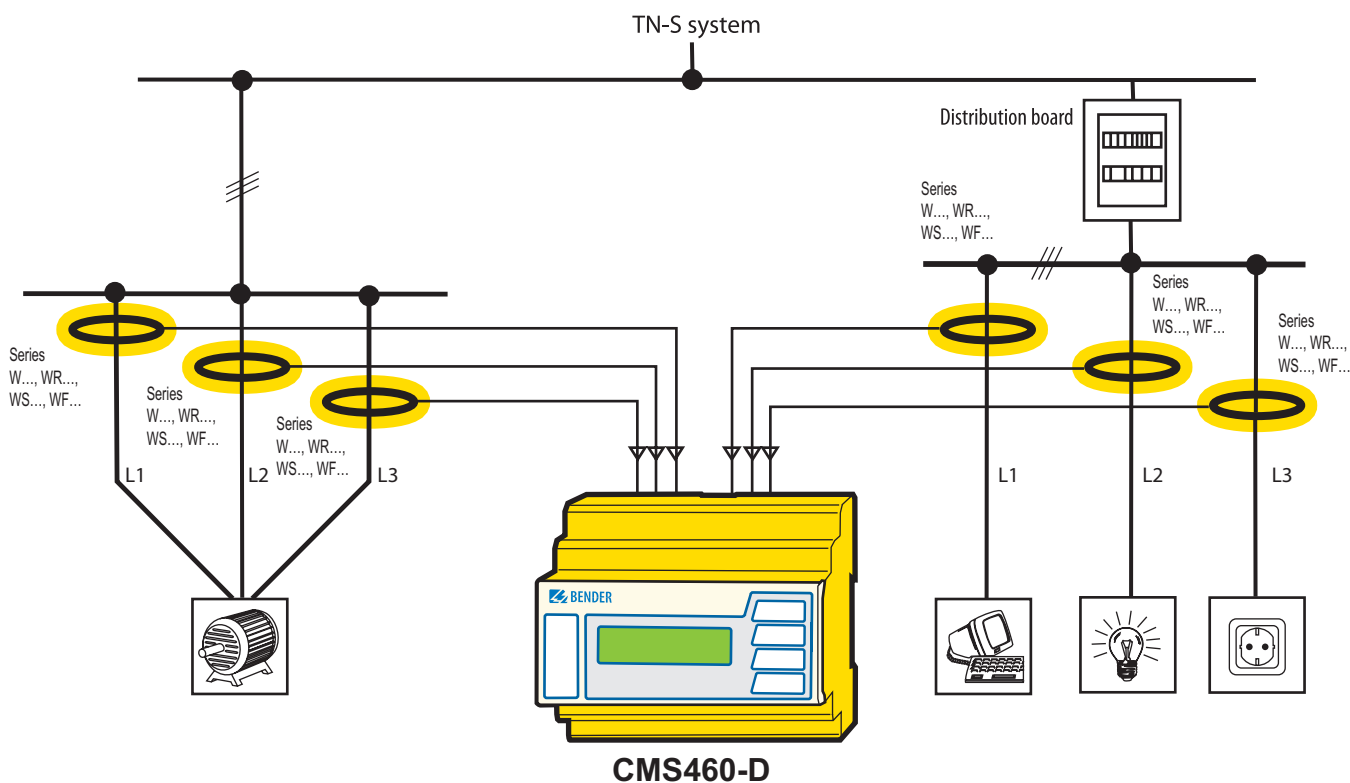
Response factor = $I_{\Delta} / I_{\Delta n}$

(I_{Δ}) Response current: Measured value at which the CMS responds.

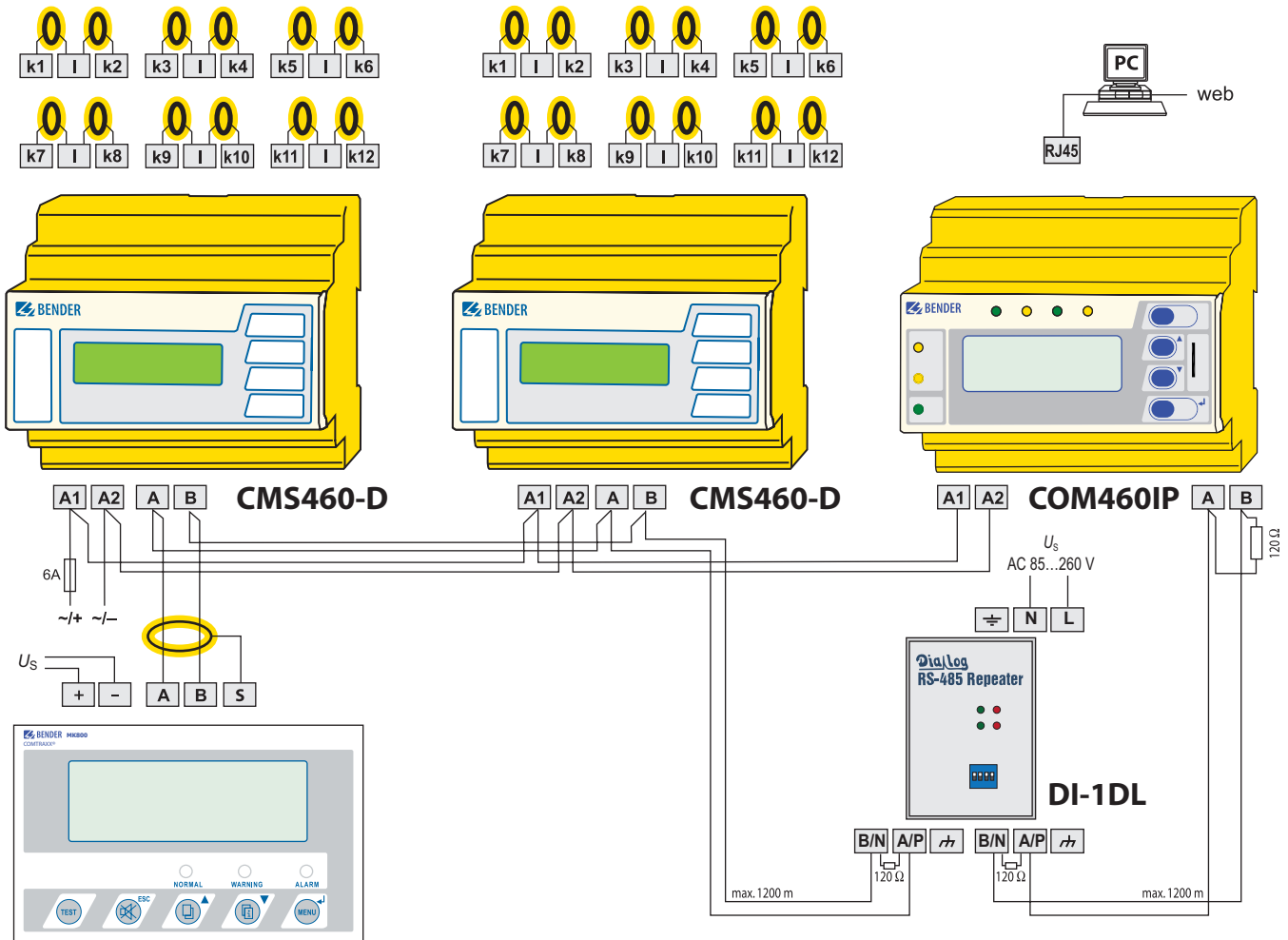
($I_{\Delta n}$) Rated operating current: Set response value

- 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

Rated insulation voltage	AC 250 V
Rated impulse voltage/pollution degree	6 kV/3
Protective separation (reinforced insulation) between: (A1, A2) - (k1, l...k12, R, T/R, T, A, B), (C11, C12, C14), (C21, C22, C24)	
Protective separation (reinforced insulation) between	(C11, C12, C14) - (C21, C22, C24)
Voltage test acc. to IEC 61010-1	3.536 kV
Rated insulation voltage	AC 250 V
Rated impulse voltage/pollution degree	4 kV/3
Basic insulation between: (k1, l...k12, R, T/R, T, A, B) - (C11, C12, C14), (C21, C22, C24)	
Voltage test acc. to IEC 61010-1	2.21 kV

Supply voltage

Rated supply voltage U_S	see ordering information
Frequency range of U_S	see ordering information
Power consumption	≤ 10 VA

Measuring circuit

External measuring current transformer	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 the type of current transformer (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 I_{n2} (alarm)	100 mA...125 A (16 A overcurrent)*
Rated operating current I_{n1} (prewarning)	10...100 % $\times I_{n2}$ *
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 $I_{\Delta n} = 1 \times I_n 1/2$	≤ 180 ms
Operating time t_{ae} at $I_{\Delta n} = 5 \times I_n 1/2$	≤ 30 ms
Response time t_{an} for current measurement	$t_{an} = t_{ae} + t_{on} 1/2$
Scanning time for all measuring channels (current measurement)	≤ 180 ms
Recovery time t_b	500...600 ms

Displays, memory

Display range measured value	< 10 mA...125 A (measuring current transformer 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
Cable (twisted in pairs, one end of shield connected to PE)	recommended: J-Y(St)Y min. 2x0.8
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 mm ²	0...1 m
Single wire, twisted ≥ 0.75 mm ²	0...10 m
Shielded cable ≥ 0.5 mm ²	0...40 m
Shielded cable (shield connected to terminal I at one end, not connected to earth)	recommended: J-Y(St)Y min. 2x0.8

Switching elements

Number	2 x 1 changeover contact
Operating principle	NC/N/O operation (N/O operation)*
Electrical endurance, number of cycles	10000
Contact data acc. to IEC 60947-5-1	
Utilisation category	AC-13 AC-14 DC-12 DC-12 DC-12
Rated operational voltage	230V 230V 24V 110V 220V
Rated operational current (common alarm relays)	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

Environment/EMC

EMC	IEC 61326-1
Operating temperature	-25...+55 $^{\circ}$ 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-time storage (IEC 60721-3-1)	1K4 (except condensation and formation of ice)
Climatic class acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3M4
Transport (IEC 60721-3-2)	2M2
Long-time storage (IEC 60721-3-1)	1M3

Connection

Connection	screw-type terminals
Connection	
rigid/flexible/conductor sizes	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
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 mounting	2 x M4
DIN rail mounting acc. to	IEC 60715
Documentation number	D00045
Weight	≤ 360 g

() * factory setting

Ordering information

Supply voltage ¹⁾ U _S		Type	Art. No.
DC	AC		
16...94 V	16...72 V, 42...460 Hz	CMS460-D-1	B 9405 3017
70...276 V	70...276 V, 42...460 Hz	CMS460-D-2	B 9405 3018

¹⁾ Absolut values

Accessories

Type designation	Art. No.
XM460 mounting frame, 144 x 82 mm	B 990 995

Suitable system components

Type designation	Version	Type	Art. No.
RS-485 repeater	Bus repeater	DI-1DL	B 9501 2047
	Supplied by the USB port, no additional power supply required	DI-2USB	B 9501 2045
	Power supply unit for DI-1 or DI-2	AN471	B 924 189
Protocol converters	BMS bus – TCP IP via Ethernet	COM460IP	B 9506 1010
	BMS bus – Modbus/RTU	FTC470XMB	B 9506 1002
	BMS bus – PROFIBUS DP	FTC470XDP	B 9506 1000
Alarm indicator and test combination	–	MK800A-11 ¹⁾	B 9510 0102
	–	MK800A-12 ¹⁾	B 9510 0103

¹⁾ Other versions on request

Measuring current transformer

Pulsed current sensitive measuring current transformer

Type of construction	Inside diameter/mm	Type	Art. No.
circular	20	W20	B 9808 0003
	35	W35	B 9808 0010
	60	W60	B 9808 0018
	120	W120	B 9808 0028
	210	W210	B 9808 0034
rectangular	70 x 175	WR70x175	B 9808 0609
	115 x 305	WR115x305	B 9808 0610
split-core	20 x 30	WS20x30	B 9808 0601
	50 x 80	WS50x80	B 9808 0603
	80 x 80	WS80x80	B 9808 0605
	80 x 120	WS80x120	B 9808 0606
	80 x 160	WS80x160	B 9808 0608

Other measuring current transformer types on request

Flexible measuring current transformers (pulsed current sensitive)

Inside diameter/mm	Type	Art. No.
170	WF170-1	B 7808 0201
	WF170-2	B 7808 0202
250	WF250-1	B 7808 0203
	WF250-2	B 7808 0204
500	WF500-1	B 7808 0205
	WF500-2	B 7808 0206
800	WF800-1	B 7808 0207
	WF800-2	B 7808 0208
1200	WF1200-1	B 7808 0209
	WF1200-2	B 7808 0210
1800	WF1800-1	B 7808 0221
	WF1800-2	B 7808 0222

WF... series measuring current transformers consist of one flexible W...F series measuring current transformer and one RCC420 signal converter.



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