Insulation fault locators EDS460/490 – EDS461/491

Insulation fault locators with control and display function for insulation fault location systems

Insulation fault locator EDS460-L

Device features

- Insulation fault location in IT systems
- For AC, 3AC, DC and IT systems
- Control and display function in a single device (EDS…-D)
- 12 measuring channels (circuits) for measuring current transformers of the W, WR, WS series
- Up to 90 EDS insulation fault locators in the system (1080 measuring channels)
- Scanning time max. 10 s for all measuring channels (parallel scanning)
- Response sensitivity
  EDS460/490 2…10 mA
  EDS461/491 0,2…1 mA
- History memory to store 300 events
- Two alarm relays with one changeover contact each
- N/O or N/C operation, selectable
- Connection external test/reset button
- Indication via graphical display resp. 7-segment display and alarm LEDs
- BMS address range 1…90
- Serial interface RS-485
- Continuous CT connection monitoring
- Fault memory behaviour selectable
- Device version EDS490/491 with one alarm contactor per channel
- Additional AC residual current measurement

Standards, approvals and certifications

Product description

The insulation fault locators EDS460/490 in combination with the A-ISOMETER® IRDH575 or the locating current injector PGH are applied for localising insulation faults in unearthed systems (IT systems). The locating current signals generated by the insulation monitoring device IRDH575 or the locating current injector PGH are detected by measuring current transformers and evaluated by the insulation fault locators. Up to 12 measuring current transformers can be connected to one EDS460 / 490. A total of 90 EDS insulation fault locators can be connected via one RS-485 interface (BMS protocol). Hence, up to 1080 circuits can be monitored. The maximum scanning time is …10 s, see TGH1394.

Application

- Insulation fault location in AC, AC / DC and DC IT systems
- Main and control circuits in industrial installations and ships
- Diode-decoupled DC IT systems in power stations
- Systems for medical locations

Function

Insulation fault location is started manually or automatically via the A-ISOMETER® IRDH575 or the PGH. Once started, the insulation fault locator EDS simultaneously scans all measuring current transformers (channels). If several EDS exist, these devices are also scanned simultaneously.

When the locating current detected by a measuring current transformer exceeds the set response value, the alarm LED 2 lights up, the common alarm relay switches and the faulty circuit is indicated as plain text on the graphical display. Version EDS…L indicates faulty outgoing circuits via alarm LEDs. The connection between the measuring current transformer and the insulation fault locator is continuously monitored. In the event of wire interruption, the alarm LED 1 lights up and the alarm relay switches.

With the fault memory activated, the alarm messages of the individual channels remains stored until the reset button is pressed or until a reset command is given via the RS-485 interface. When the fault memory is deactivated, the alarm message remains stored until the insulation fault is eliminated.

History memory in EDS460/461-D/EDS490/491-D

The device utilises a history memory for failsafe storing of up to 300 measured values/events (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 happend when).

AC residual current measurement

EDS insulation fault locators can also be used for the indication of AC residual currents in unearthed power supplies (IT systems). This is essential when also AC residual currents are to be localised in the circuits.

Device variants

EDS460-D

Device version EDS460-DG features a backlit graphical display where information can be displayed in various ways. This version is applied when detailed information about all devices in the switchboard cabinet, connected to the bus, are to be displayed locally. This device is capable of assigning parameters to all devices connected to the BMS bus and displaying all measurement details. Several EDS460-DG devices can be used in one system.

EDS460-L

Device version EDS490D/EDS490L utilises a two-digit 7-segment display where the address of this device is displayed within the BMS bus. Various error codes are displayed too. The alarm LEDs indicate in which measuring channel the response value has been exceeded. Parameter setting is only possible via an EDS…D, an A-ISOMETER® IRDH575, the alarm and test combination MK2430 or the protocol converter FTC470XET.

EDS490-D/EDS490-L

In comparison to the device version described before, EDS490-D / EDS490-L feature a galvanically isolated alarm contact (N/O contact), for example, to trigger a circuit breaker in this subcircuit when a response value has been exceeded.

EDS461-D/-L and EDS491-D/-L

In comparison to the device versions described above, these versions provide a higher response sensitivity. They are preferrably used in control circuits or in medical locations up to AC 230 (DC 220) V.

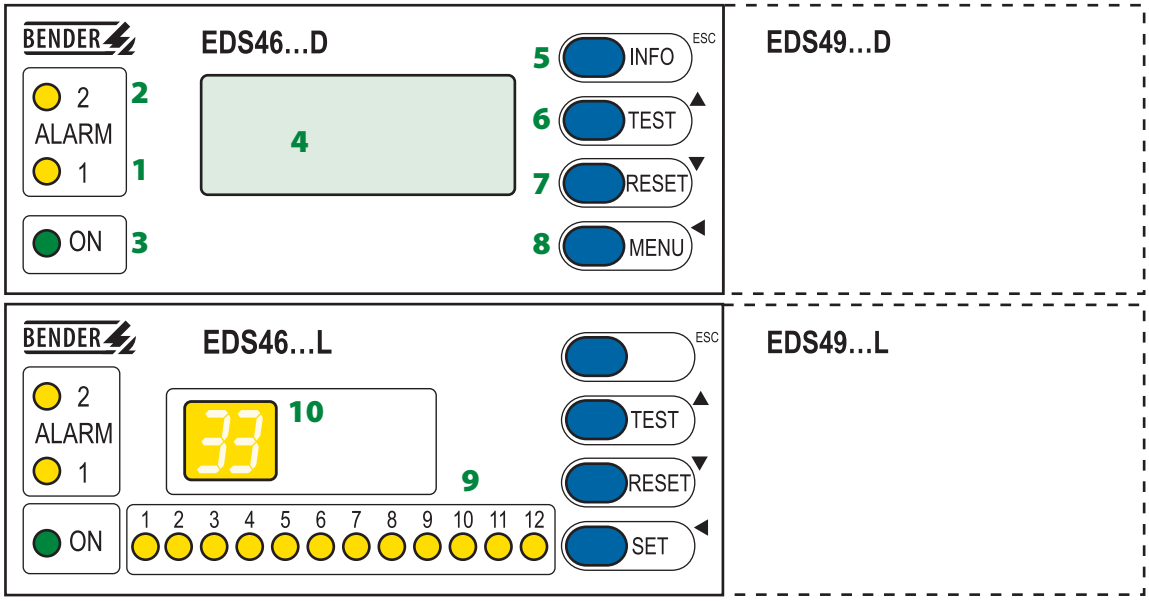
Standards

The device was designed according to the following standards: IEC 61557-8, IEC 61326-2-4, IEC 60664-1, IEC 60664-3, IEC 61557-9, ASTM F1669M-96 (2007), ASTM F1207M-96 (2007).

Overview of device types

Distinctive device features	EDS460-D/EDS461-D	EDS460-L/EDS461 -L	EDS490-D/EDS491 -D	EDS490-L/EDS491 -L
Response value	EDS460: 2…10 mA EDS461: 0.2…1 mA		EDS490: 2…10 mA EDS491: 0.2…1 mA	
Residual current indication	EDS460: 100 mA…10 A EDS461: 10 mA…1 A		EDS490: 100 mA…10 A EDS491: 10 mA…1 A	
Backlit graphics LC display	×	--	×	--
7-segment display and LED line	--	×	--	×
Parameter setting function	×	--	×	--
Error code indication	×		×	
Address range	1…90	1…90	1…90	1…90
Internal clock	×	--	×	--
History memory	×	--	×	--
Alarm contact "Common alarm" for all channels	2 x 1 changeover contact	2 x 1 changeover contact	2 x 1 changeover contact	2 x 1 changeover contact
Alarm contact per channel	--		12 x 1 N/O contact	
Enclosure	XM460		XM490	

Wiring diagram – Operating elements EDS46…-D/-L und EDS49…-D/-L



1 - LED "ALARM 1" lights up in case of the following system faults:
- when the residual current exceeds > 10 A (EDS460/490) or > 1 A (EDS461/EDS491) (RCM function)
- when there is a loss of power or short circuit in a measuring current transformer circuit (this function can be deactivated)

2 - LED "ALARM 2" lights up when an insulation fault is detected on a channel (EDS function)

3 - Power On LED "ON"

4 - LC graphical display

5 - "INFO" button: to query standard information (does not apply to EDS…L).
ESC button: back to menu function.

6 - "TEST" button: to call up the self test.
Arrow up button: parameter change, scroll

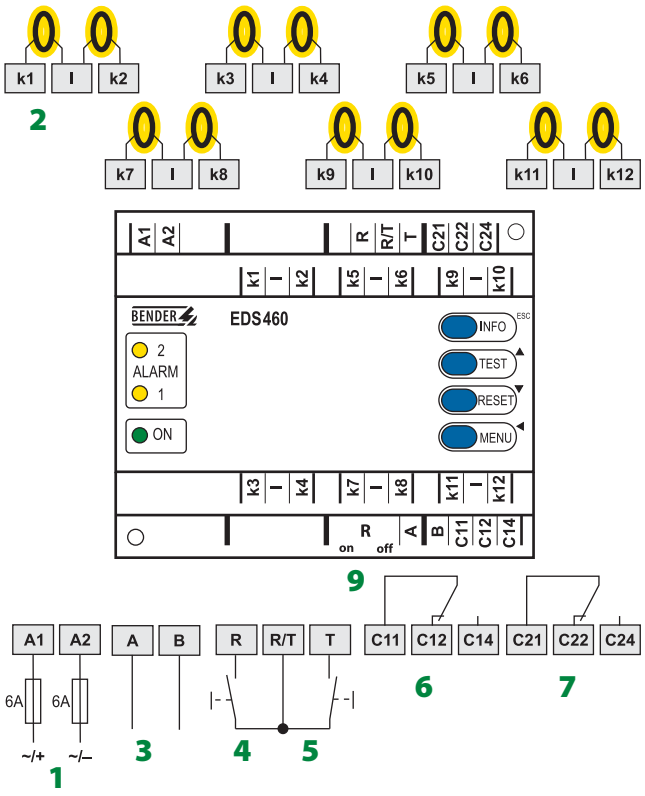
7 - "RESET" button: to acknowledge insulation and fault messages
Arrow down button: parameter change, scroll

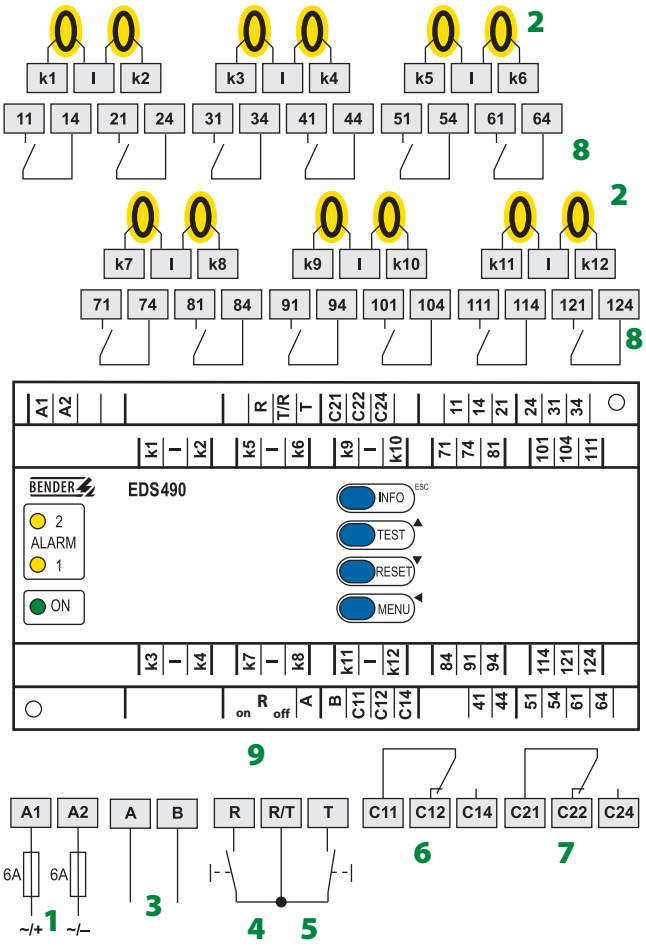
8 - "MENU" button: EDS…-D: to toggle between the standard display, menu and alarm indication
EDS…-L: to set the BMS address
Enter button: to confirm parameter change

9 - Alarm LEDs "1…12", light up if an insulation fault has been detected in the relevant channel.

10 - Digital indication for device address and error codes (parameter setting (EDS460/490-D only).

Wiring diagram – Mains connection EDS460/461-D/-L and EDS490/491-D/-L





1 - Supply voltage U_S, see ordering information, 6 A fuse recommended. Two fuses are required for IT systems.

2 - Connection measuring current transformers k1…k12

3 - Serial interface RS-485

4 - External reset button "R/T" (N/O contact)*

5 - External test button "R/T" (N/O contact)*

6 - Alarm relay 1

7 - Alarm relay 2

8 - Alarm relay: one N/O contact per channel (EDS490/491 only)

9 - "$R_{on\,/\,off}$": Termination of the serial RS-485 interface (A/B) with 120 Ω

* The external test/reset buttons of several devices must not be connected to one another.

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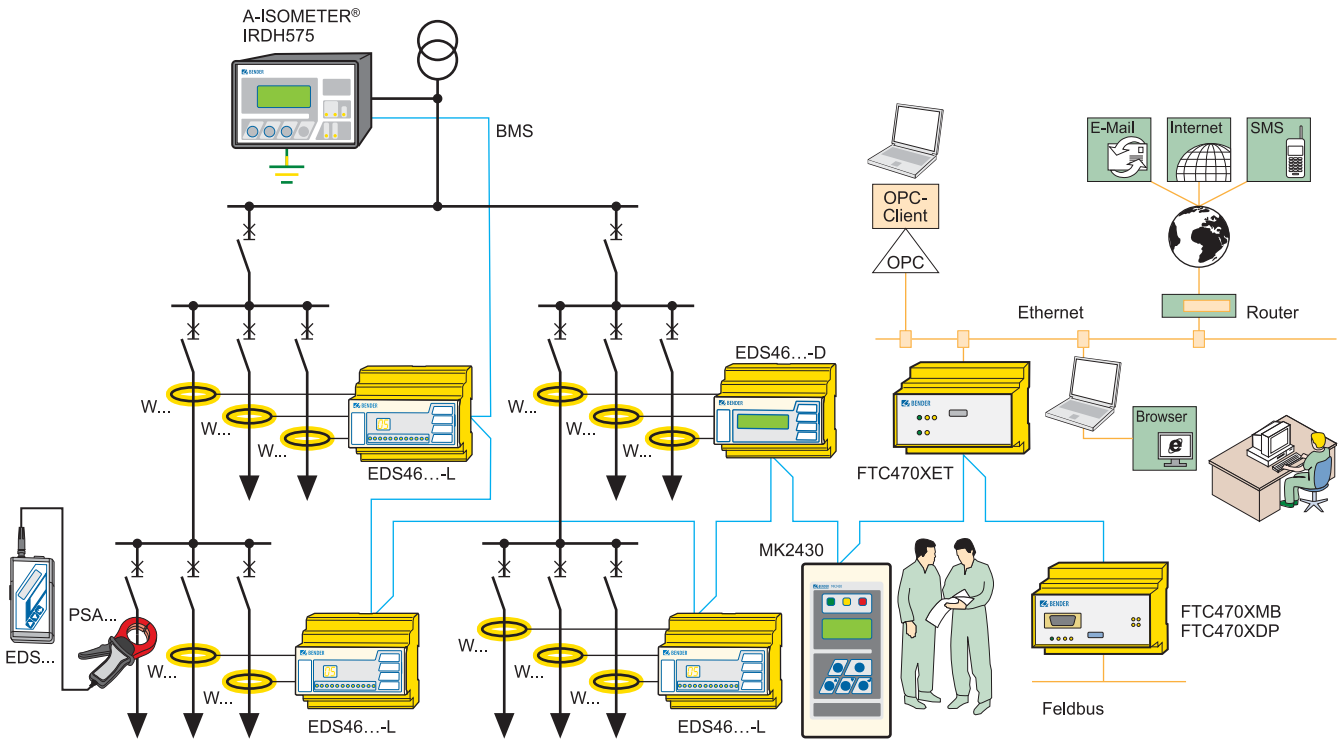
Example for system set-up



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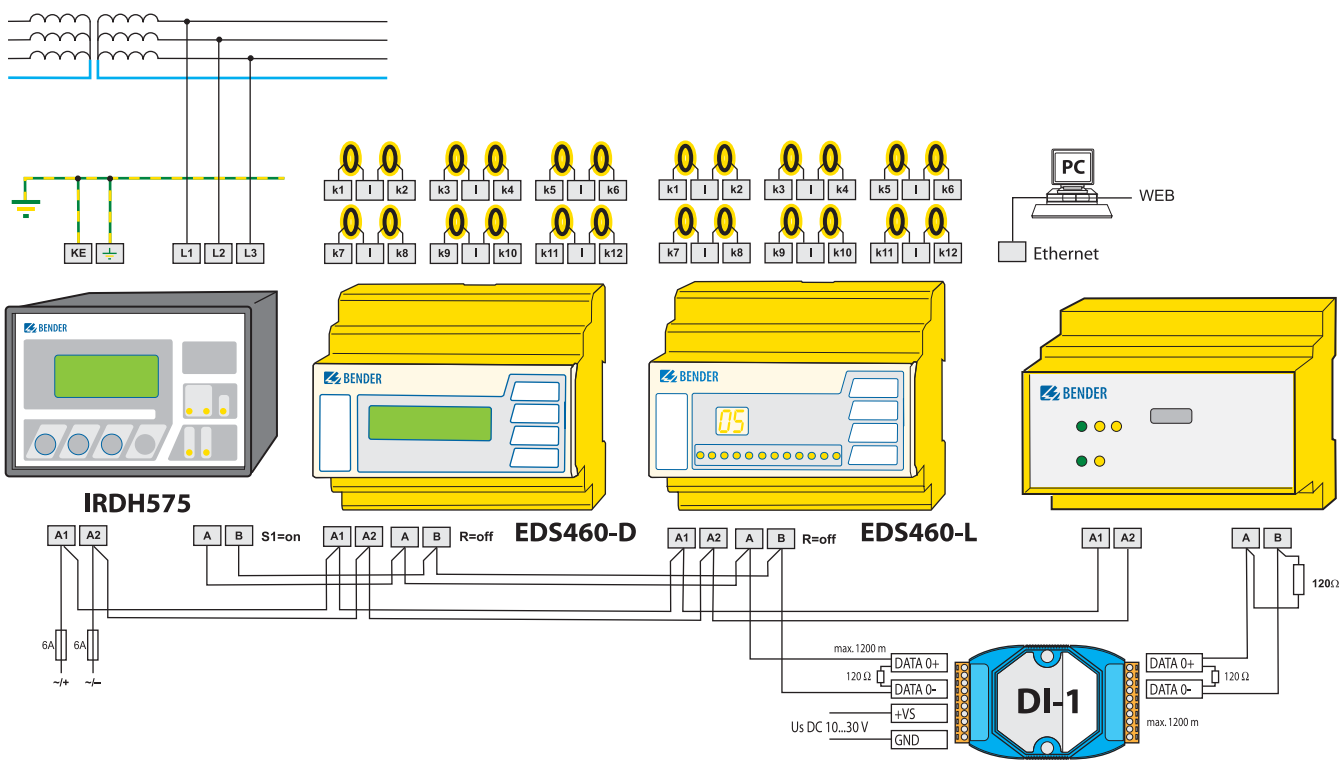


Note:
The DI-1 repeater only is required when the length of the cable exceeds 1200 m or when more than 32 devices are connected to the bus.

Technical data

Insulation coordination acc. to IEC 60664-1 / IEC 60664-3 for versions with a supply voltage of AC/DC 70…276 V AC 42…460 Hz

Rated insulation voltage	AC 250 V
Rated impulse voltage/pollution degree	6 kV / III
Protective separation (reinforced insulation) between	(A1, A2) - (k1, l…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	AC 250 V
Rated impulse voltage/pollution degree	4 kV / III
Basic insulation between:	k1, l…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

Insulation coordination acc. to IEC 60664-1 / IEC 60664-3 for versions with a supply voltage of DC 16…94 V, AC 42…460 Hz 16…72 V

Rated insulation voltage	AC 100 V
Rated impulse voltage/pollution degree	2.5 kV / III
Protective separation (reinforced insulation) between	(A1, A2) - (k1, l…k12, R, T/R, T, A, B)
Voltage test acc. to IEC 61010-1	1.344 kV
Rated insulation voltage	AC 250 V
Rated impulse voltage/pollution degree	4 kV / III
Basic insulation between	(A1, A2), (k1, l…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	AC 250 V
Rated impulse voltage/pollution degree	6 kV / III
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

Supply voltage

Supply voltage U_S	see ordering information
Frequency range U_S	AC 42…460 Hz
Power consumption	≤ 10 VA (EDS460/461) ≤ 14 VA (EDS490/491)

Measuring circuit

Nominal system voltage U_n	see IRDH575, PGH (EDS460, EDS490) AC 20…276 V, DC 20…308 V (EDS461, EDS491)
External measuring current transformers type	W…, WR…, WS… (EDS460, EDS490) W…/8000, WS…/8000 (EDS461, EDS491)
CT monitoring	on/off (on)*
Load	10 Ω (EDS460/490), 1.5 kΩ (EDS461/491)
Rated insulation voltage (measuring current transformer)	800 V
Response sensitivity	2…10 mA (EDS460/EDS490) 0.2…1 mA (EDS461/EDS491)
Rated frequency	DC, AC 50 / 60 / 400 Hz
Measuring range EDS function	1,5…50 mA (EDS460/EDS490) 0.15…5 mA (EDS461/EDS491)
Measuring range RCM function	100 mA…10 A (EDS460/EDS490) 10 mA…1 A (EDS461/EDS491)
Number of measuring channels (per device/system)	12 / 1080

Time response

Response delay t_{on}	0…24 s
Delay on release t_{off}	0…24 s
Scanning time for all channels	approx. 8…24 s (EDS460 / EDS490) ca. 14…30 s (EDS461 / EDS491)

Displays, memory

LEDs	ON / ALARM (EDS4…-D) ON / ALARM / measuring channel 1…12 (EDS4…-L)
LC display	backlit graphical display (EDS4…-D)
7-segment display	2 x 7.62 mm (EDS4…-L)
History memory	300 data records (EDS4…-D)
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)Y 2x0.8
Terminating resistor	120 Ω (0.25 W) connectable via DIP switch
Device address, BMS bus	1…90 (2)*

EDS - measuring current transformer connection

Single wire ≥ 0.75 mm²	0…1 m
Single wire, twisted ≥ 0.75 mm²	1…10 m
Shielded cable ≥ 0.5 mm²	10…40 m
Recommended cable (shielded, shield on one side connected to l-conductor , not connected to earth)	min. J-Y(St)Y 2x0.8

Switching elements

Number	2 relays with one changeover contact each (EDS46.) 2 relays with one changeover contact each , 12 relays with one N/O contact each (EDS49.)				
Operating principle	NC / 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 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 61326-2-4
Operating temperature	-25 °C…+ 55 °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)
Classification of mechanical conditions IEC 60721	
Stationary use (IEC 60721-3-3)	3M4
Transport (IEC 60721-3-2)	2M2
Long-time storage (IEC 60721-3-1)	1M3

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
Position of normal use	any
Degree of protection, terminals (IEC 60529)	IP20
Enclosure material	polycarbonate
Flammability class	UL94 V-0
Screw mounting	2 x M4
DIN rail mounting acc. to	IEC 60715
Weight	< 360 g (EDS460) < 530 g (EDS490)

( )* factory setting

Ordering information

Type	Supply voltage U_S*	Response value	Art. No.
EDS460-D-1	AC 42…460 Hz 16…72 V / DC 16…94 V	2…10 mA	B 9108 0001
EDS460-D-2	AC/DC 70…276 V, AC 42…460 Hz	2…10 mA	B 9108 0002
EDS460-L-1	AC 42…460 Hz 16…72 V / DC 16…94 V	2…10 mA	B 9108 0003
EDS460-L-2	AC/DC 70…276 V, AC 42…460 Hz	2…10 mA	B 9108 0004
EDS461-D-1	AC 42…460 Hz 16…72 V / DC 16…94 V	0.2…1 mA	B 9108 0005
EDS461-D-2	AC/DC 70…276 V, AC 425…460 Hz	0.2…1 mA	B 9108 0006
EDS461-L-1	AC 42…460 Hz 16…72 V / DC 16…94 V	0.2…1 mA	B 9108 0007
EDS461-L-2	AC/DC 70…276 V, AC 42…460 Hz	0.2…1 mA	B 9108 0008
EDS490-D-1	AC 42…460 Hz 16…72 V / DC 16…94 V	2…10 mA	B 9108 0009
EDS490-D-2	AC/DC 70…276 V, AC 42…460 Hz	2…10 mA	B 9108 0010
EDS490-L-1	AC 42…460 Hz 16…72 V / DC 16…94 V	2…10 mA	B 9108 0011
EDS490-L-2	AC/DC 70…276 V, AC 42…460 Hz	2…10 mA	B 9108 0012
EDS491-D-1	AC 42…460 Hz 16…72 V / DC 16…94 V	0.2…1 mA	B 9108 0013
EDS491-D-2	AC/DC 70…276 V, AC 42…460 Hz	0.2…1 mA	B 9108 0014
EDS491-L-1	AC 42…460 Hz 16…72 V / DC 16…94 V	0.2…1 mA	B 9108 0015
EDS491-L-2	AC/DC 70…276 V, AC 42…460 Hz	0.2…1 mA	B 9108 0016

Accessories

Type	Supply voltage U_S*	Art. No.
DI-1PSM (RS-485 interface repeater)	AC / DC 24 V ± 20 %	B 9501 2044
DI-2USB (interface converter RS-485/USB)	supplied by USB interface	B 9501 2045
AN471 (power supply unit for DI-1 or DI-2)	AC 230 V 50/60 Hz /AC, DC 20 V	B 924 189
Snap-on mounting W20…/35…		B 9808 0501
Snap-on mounting W60…		B 9808 0502

Repeaters and interface converters

Type	Supply voltage U_S*	Art. No.
FTC470XDP	DC 85…276 V / AC 50…400 Hz 85…276 V	B 9506 1000
FTC470XMB	DC 85…276 V / AC 50…400 Hz 85…276 V	B 9506 1002
FTC470XET	DC 85…276 V / AC 50…400 Hz 85…276 V	B 9506 1001

* Absolute values

Measuring current transformers for EDS460/490

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

Alternative measuring current transformers from the Bender range

Type	Internal diameter/mm	Type of construction	Art. No.
W10/600	10	circular	B 911 761
W0-S20	20	circular	B 911 787
W1-S35	35	circular	B 911 731
W2-S70	70	circular	B 911 732
W3-S105	105	circular	B 911 733
W4-S140	140	circular	B 911 734
W5-S210	210	circular	B 911 735
WR 70x175S	70x175	rectangular	B 911 738
WR 115x305S	115x305	rectangular	B 911 739
WR 150x350S	150x350	rectangular	B 911 740
WR 200x500S	200x500	rectangular	B 911 763
WS 50x80S	50x80	split-core type	B 911 741
WS 80x80S	80x80	split-core type	B 911 742
WS 80x120S	80x120	split-core type	B 911 743
WS 80x160S	80x160	split-core type	B 911 755

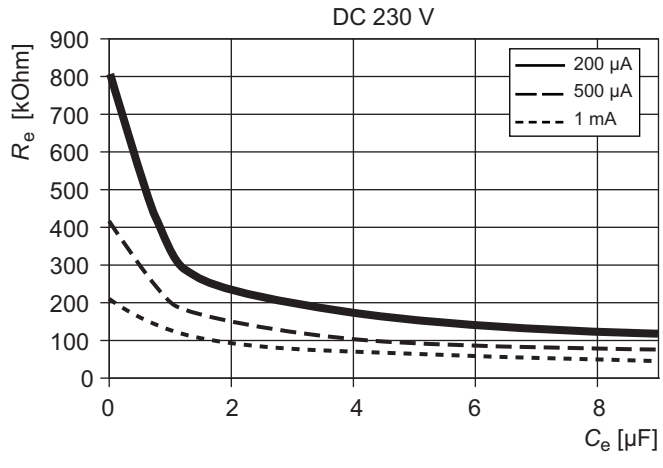
Measuring current transformers for EDS461/491

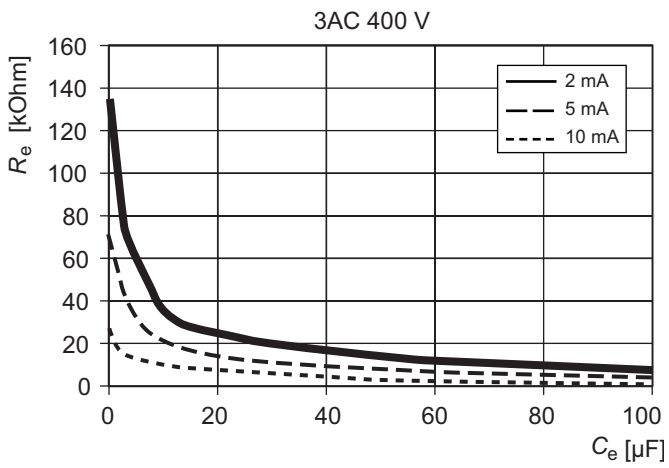
Type	Internal diameter/mm	Type of construction	Art. No.
W20-8000	20	circular	B 9808 0009
W35-8000	35	circular	B 9808 0017
W60-8000	60	circular	B 9808 0027
WS20x30-8000	20 x 30	split-core type	B 9808 0602
WS50x80-8000	50 x 80	split-core type	B 9808 0604

Alternative measuring current transformers from the Bender range

Type	Internal diameter/mm	Type of construction	Art. No.
W10/8000	10	circular	B 911 759
W1-35/8000	35	circular	B 911 756
WS20x30/8000	20 x 30	split-core type	B 911 764
WS50x80/8000	50 x 80	split-core type	B 911 757
W10/8000-6	10	circular, 6x	B 911 900

Response sensitivity in relation to the system capacitance





Explanatory notes on the response sensitivity

The value of the maximum response sensitivity decreases in relation to the system leakage capacitance. The following maximum response values can be reached:
30 Ω / V with a system voltage of max. 20000 µFV
(product of the nominal voltage and system leakage capacitance)

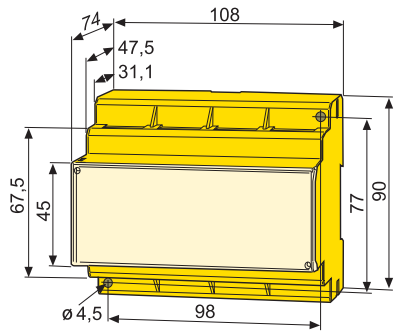
Example: system voltage 230 V

20000 µFV / 230 V = 87 µF
230 V x 30 Ω/V = 6.9 kΩ minimum response value at 87 µF system leakage capacitance

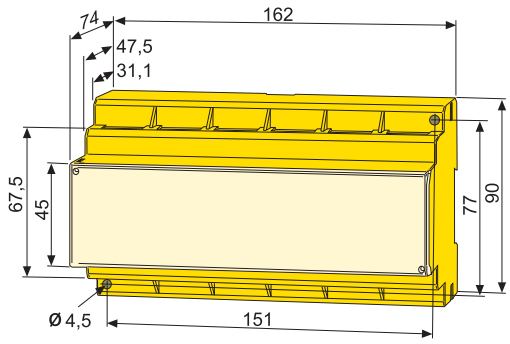
Dimension diagrams XM460 and XM490

Dimensions in mm

EDS46…-D/-L – XM460



EDS49…-D/-L – XM490



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