

ISOSCAN® EDS460/490 – EDS461/491

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



ISOSCAN® EDS460/490 – EDS461/491

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



ISOSCAN® 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

Approvals



Product description

The insulation fault locators ISOSCAN® EDS460/490 in combination with the 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 plants 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 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 happened 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 ISOMETER® IRDH575, the alarm and test combination MK2430 or the protocol converter COM460IP.

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 preferably used in control circuits or in medical locations up to AC 230 (DC 220) V.

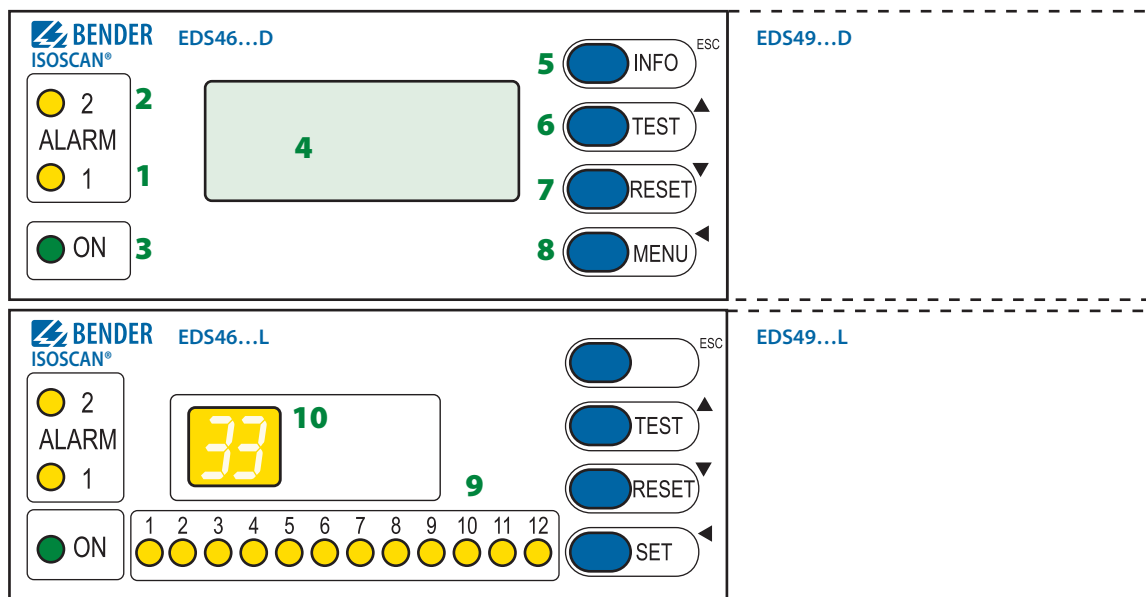
Standards

The ISOSCAN® EDS46... series complies with the requirements of the device standards: DIN EN 61557-8 (VDE 0413-8), EN 61557-8, IEC 61557-8, IEC 61326-2-4, DIN EN 60664-1 (VDE 0110-1), DIN EN 60664-3, DIN EN 61557-9, VDE 0413-9, IEC 61557-9, ASTM F1669M-96 (2007), ASTM F1207M-96 (2007)

Overview of device types

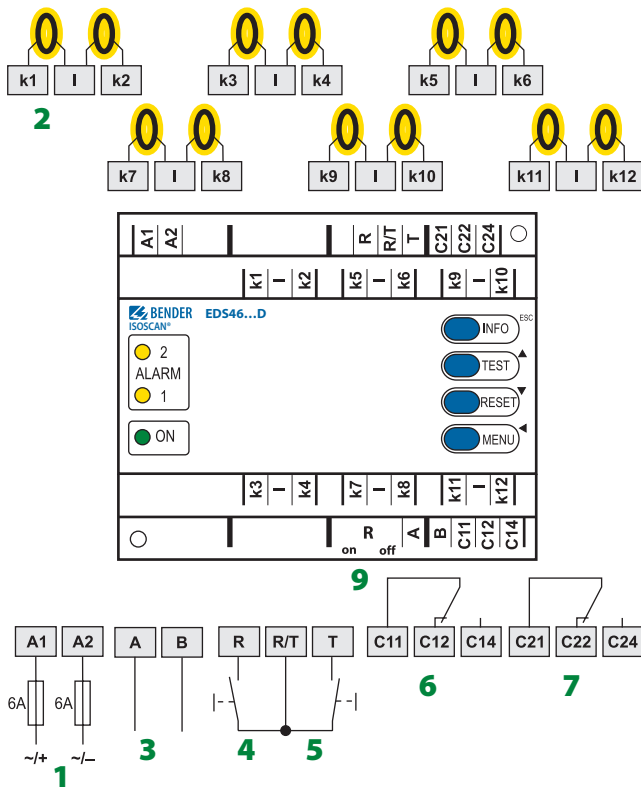
Distinctive device features	EDS460-D/EDS461-D	EDS460-L/EDS461-L	EDS490-D/EDS491-D	EDS490-L/EDS491-L
Response value	EDS460: 2...10 mA		EDS490: 2...10 mA	
	EDS461: 0.2...1 mA		EDS491: 0.2...1 mA	
Residual current indication	EDS460: 100 mA...10 A		EDS490: 100 mA...10 A	
	EDS461: 10 mA...1 A		EDS491: 10 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	

Operating elements EDS46...-D/-L und EDS49...-D/-L

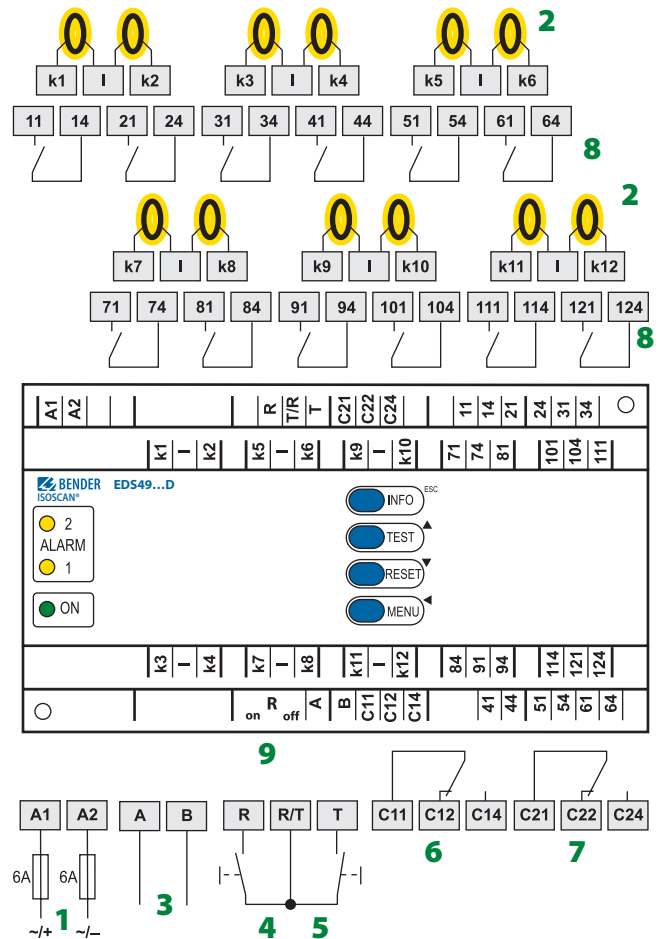


- 1 - LED "ALARM 1" lights up in case of the following system faults:
 - when the residual current exceeds > 10 A (EDS460/490) or > 1 A (EDS461/EDS491) (RCM function)
 - when there is a loss of power or short circuit in a measuring current transformer circuit (this function can be deactivated)
- 2 - 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 changes, scroll
- 7 - "RESET" button: to acknowledge insulation and fault messages
Arrow down button: Parameter changes, 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 changes
- 9 - Alarm LEDs "1...12", light up if an insulation fault has been detected in the relevant channel
- 10 - Digital display 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-pole fuses are required on IT systems
- 2 - Connection measuring current transformers k1...k12
- 3 - Serial interface RS-485
- 4 - External reset button "R" (N/O contact)*
- 5 - External test button "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

The diagram illustrates a power distribution system with various monitoring and control components. At the top, an ISOMETER® IRDH575 device is connected to a BMS (Building Management System) and a power line. The power line branches into several feeders, each equipped with a switch and a fuse. The feeders are labeled with 'W...' and 'W...' indicating different phases or sections. The system includes several EDS46...-L and EDS46...-D devices, which are connected to the feeders. A PSA... (Power Supply Analyzer) is also connected to the system. The system is connected to a network via an OPC-Client and OPC (Open Process Control) interface. The network includes a laptop, a browser, and a router. The system is also connected to a Fieldbus network via a COM460IP device. The Fieldbus network includes a PLC (Programmable Logic Controller) and a power supply unit (FTC470XMB/FTC470XDP). The system is also connected to a power supply unit (EDS...) and a power supply unit (EDS46...-L).

The diagram illustrates a power distribution system. At the top left, a transformer with three secondary windings is shown. Below it, a busbar system is depicted with three phases labeled L1, L2, and L3, and a ground connection labeled KE. To the right, a series of terminal blocks are shown, each containing two terminals labeled k1 through k12, with a central terminal labeled I. Further right, a PC is connected to a network switch labeled Ethernet, which is also connected to a WEB interface. Below the busbar system, four BENDER relays are shown: IRDH575, EDS460-D, EDS460-L, and COM460IP. The IRDH575 is a digital relay with a green display. The EDS460-D and EDS460-L are digital relays with yellow displays showing '05'. The COM460IP is a digital relay with a green display. The relays are connected to a power source via a 6A fuse. The EDS460-D and EDS460-L are also connected to a 120 Ω termination resistor. A DI-1DL RS-485 Repeater is shown at the bottom, connected to the relays and the 120 Ω termination resistor. The repeater has a green display and a USB port. The diagram also shows a power source with a 6A fuse and a 120 Ω termination resistor.

The DI-1 interface 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/3
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/3
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 16...72 V/42...460 Hz

Rated insulation voltage	AC 100 V
Rated impulse voltage/pollution degree	2.5 kV/3
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/3
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/3
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	
EDS460/490	2...10 mA
EDS461/491	0.2...1 mA
Rated frequency	DC, AC 400, 60, 50 Hz
Measuring range EDS function	1.5...50 mA (EDS460/490) 0.15...5 mA (EDS461/491)
Measuring range RCM function	100 mA...10 A (EDS460/490) 10 mA...1 A (EDS461/491)
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 490/) approx. 14...30 s (EDS461/491)

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
Cable (twisted pair, one end of shield connected to PE)	recommended: J-Y(St)Y min. 2 x 0.8
Terminating resistor	120 Ω (0.25 W) connectable via DIP switch
Device address, BMS bus	1...90 (2)*

Connection: EDS - measuring current transformer

Single wire ≥ 0.75 mm ²	0...1 m
Single wire, twisted ≥ 0.75 mm ²	1...10 m
Shielded cable ≥ 0.5 mm ²	10...40 m
Shielded cable (shield on one side connected to L-conductor, not connected to earth)	recommended: J-Y(St)Y min. 2 x 0.8

Switching elements

Number	two relays, each with one changeover contact (EDS46.) two relays, each with one changeover contact, 12 relays, each with one N/O contact (EDS49.)
Operating principle	NC or 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	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 Ed. 1.0
Operating temperature	-25...+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 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	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
Position of normal use	any
Degree of protection, terminals (DIN EN 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 (EDS46.)
	≤ 530 g (EDS49.)

() * factory setting

Ordering information EDS460/490-D, EDS461/491-D

Measuring range		Common alarm relay for all channels	Alarm relay per channel	Supply voltage ¹⁾ U _S			Type	Art. No.
EDS-Funktion	RCM-Funktion			AC	DC	AC/DC		
2...10 mA	100 mA...10 A	2 x 1 Wechsler	—	16...72 V, 42...460 Hz	16...94 V	—	EDS460-D-1	B 9108 0001
				42...460 Hz	—	70...276 V	EDS460-D-2	B 9108 0002
0.2...1 mA	10 mA...1 A	2 x 1 Wechsler	—	16...72 V, 42...460 Hz	16...94 V	—	EDS461-D-1	B 9108 0005
				42...460 Hz	—	70...276 V	EDS461-D-2	B 9108 0006
2...10 mA	100 mA...10 A	2 x 1 Wechsler	12 x 1 Schließer	16...72 V, 42...460 Hz	16...94 V	—	EDS490-D-1	B 9108 0009
				42...460 Hz	—	70...276 V	EDS490-D-2	B 9108 0010
0.2...1 mA	10 mA...1 A	2 x 1 Wechsler	12 x 1 Schließer	16...72 V, 42...460 Hz	16...94 V	—	EDS491-D-1	B 9108 0013
				42...460 Hz	—	70...276 V	EDS491-D-2	B 9108 0014

¹⁾ Absolute values

Ordering information EDS460/490-L, EDS461/491-L

Measuring range		Common alarm relay for all channels	Alarm relay per channel	Supply voltage ¹⁾ U _S			Type	Art. No.
EDS-Funktion	RCM-Funktion			AC	DC	AC/DC		
2...10 mA	100 mA...10 A	2 x 1 Wechsler	—	16...72 V, 42...460 Hz	16...94 V	—	EDS460-L-1	B 9108 0003
				42...460 Hz	—	70...276 V	EDS460-L-2	B 9108 0004
0.2...1 mA	10 mA...1 A	2 x 1 Wechsler	—	16...72 V, 42...460 Hz	16...94 V	—	EDS461-L-1	B 9108 0007
				42...460 Hz	—	70...276 V	EDS461-L-2	B 9108 0008
2...10 mA	100 mA...10 A	2 x 1 Wechsler	12 x 1 Schließer	16...72 V, 42...460 Hz	16...94 V	—	EDS490-L-1	B 9108 0011
				42...460 Hz	—	70...276 V	EDS490-L-2	B 9108 0012
0.2...1 mA	10 mA...1 A	2 x 1 Wechsler	12 x 1 Schließer	16...72 V, 42...460 Hz	16...94 V	—	EDS491-L-1	B 9108 0015
				42...460 Hz	—	70...276 V	EDS491-L-2	B 9108 0016

¹⁾ Absolute values

Suitable system components

Type designation	Design	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

Measuring current transformers for EDS460/490

Type of construction	Internal 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

Alternative measuring current transformers from the Bender range

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

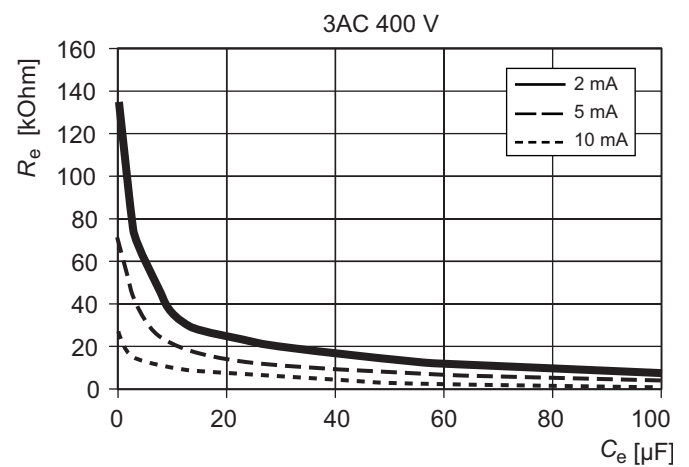
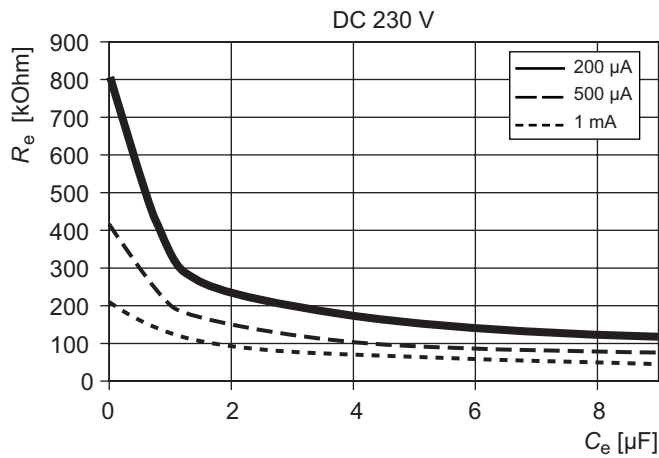
Measuring current transformers for EDS461/491

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

Alternative measuring current transformers from the Bender range

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

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 μ FV
(product of the nominal voltage and system leakage capacitance)

Example: system voltage 230 V

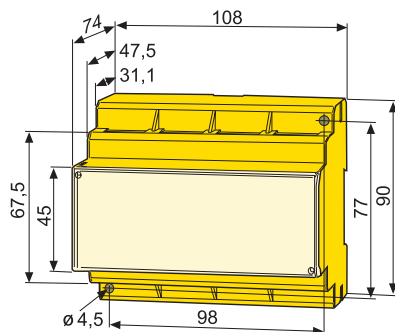
$$20000 \mu\text{FV}/230 \text{ V} = 87 \mu\text{F}$$

$$230 \text{ V} \times 30 \Omega/\text{V} = 6.9 \text{ k}\Omega \text{ minimum response value at } 87 \mu\text{F system leakage capacitance}$$

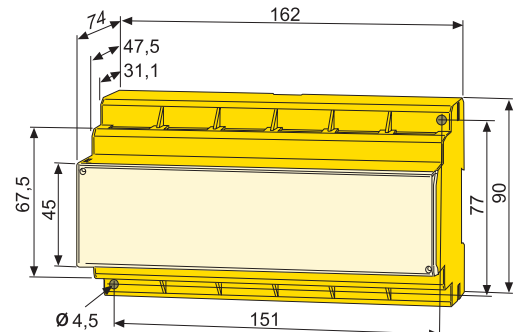
Dimension diagrams XM460 and XM490

Dimensions in mm

EDS46...-D/-L – XM460



EDS49...-D/-L – XM490





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