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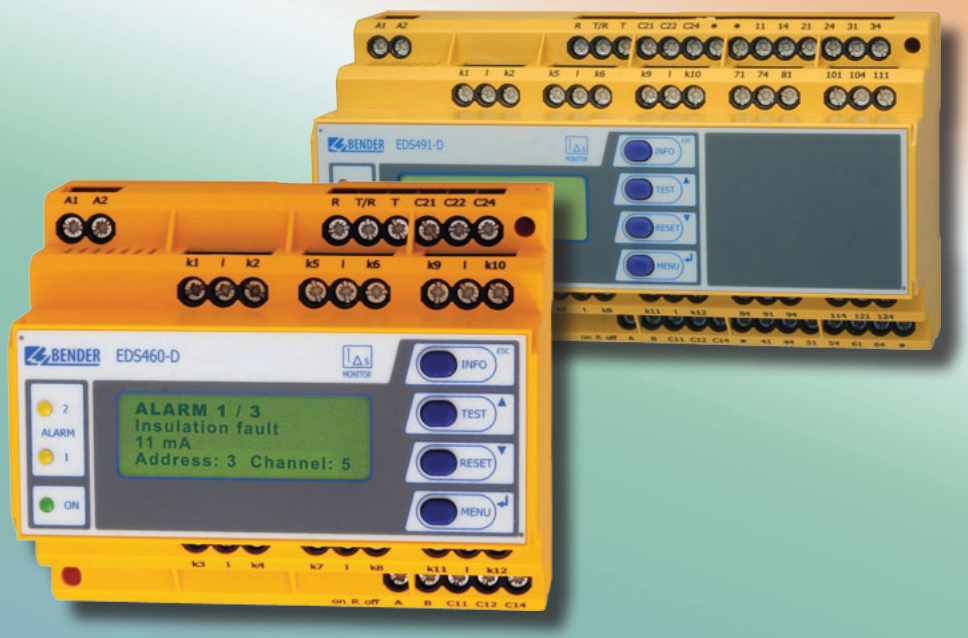
EDS460 and EDS490 Series

Ground Fault Location Modules
Ungrounded (Floating) AC/DC Systems



Technical Bulletin

NAE1012070 / 03.2011

Ground Fault Location Evaluators
EDS460/490 – EDS461/491

Ground Fault Location Modules for Ungrounded AC/DC Systems

Insulation fault evaluators EDS460/490 – EDS461/491

Device features

- Ground fault location for ungrounded systems
- For single-phase AC, three-phase AC, and DC systems
- Control and display through one digital device (D versions)
- Monitor up to 12 separate branches via one module and current transformers
- Up to 90 EDS evaluators may be interconnected in one system
- Parallel channel scanning
- Response sensitivity
  EDS460/490 2…10 mA
  EDS461/491 0.2…1 mA
- History memory to store 300 events
- Two DPDT contact outputs
- Normally energized or normally de energized operation
- 490 model features separate contact out puts for each channel
- Onboard and external connection for TEST / RESET
- RS-485 communication interface
- Continuous CT connection monitoring
- Latching or non-latching operation
- Additional option to measure AC leakage current

Description

The EDS460 / EDS490 series of ground fault location modules, combined with the IRDH575 ground fault detector, create an installed ground fault location system for ungrounded AC and DC systems. Once a ground fault is detected. The test pulse generated by the IRDH575 is scanned by the EDS460 / 490 to locate a ground fault down to the load level. Up to 12 separate current transformers may be connected to the device. A total of 90 EDS devices may be interconnected via RS-485. EDS series devices locate ground faults in ungrounded systems, before leakage current may even be present.

Applications

- Ground fault location in ungrounded AC and DC systems
- Motor control centers
- Ships
- General distribution and control systems

Function

Ground fault location may be started automatically or manually by the IRDH575 ground fault detector. Once started the EDS device simultaneously scans all channels in parallel. All interconnected EDS devices also scan in parallel.
When the test current generated 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 evaluator is continuously monitored. In the event of wire interruption, the alarm LED 1 lights up and the alarm relay switches.

When fault memory is set to on, alarms will latch until the device is manually reset or a reset command is given across the RS-485 interface. When fault memory is off, alarms will automatically reset when the fault is cleared.

EDS devices feature a history memory, storing up to 300 timestamped evens in non-volatile memory.

Additional feature: AC fault current measurements

Additionally, EDS devices may be used to measure any possible leakage current in an AC system. This value may be displayed on the screen of the "D" versions.

Device versions

EDS460-D and EDS490-D

The "D" versions utilize a backlit, detailed LCD display showing detailed information on the current status of the system. Settings are carried out via the device's easy-to-use onboard menu system. A "D" device can also assign settings to other EDS devices interconnected via RS-485.

The "460" series has two common DPDT outputs. The "490" series additionally features separate contact outputs for each channel.

EDS460-L and EDS490-L

The "L" versions utilize a two-digit seven segment display which displays the address of the EDS in the system. An LED bar graph indicates which channel(s) contain the ground fault. This device is recommended when multiple EDS devices will be interconnected.

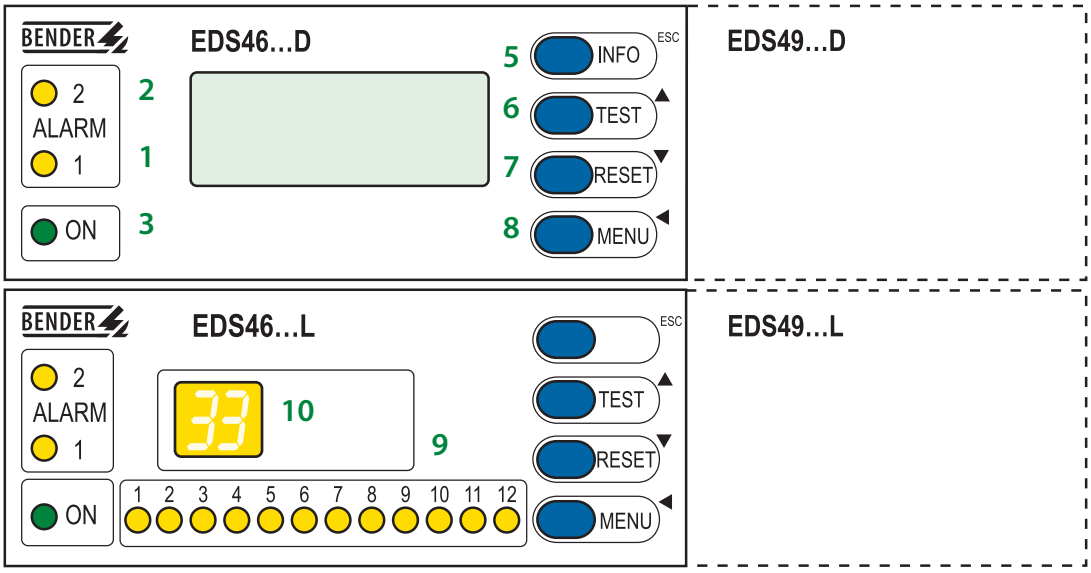
EDS461-D/-L and EDS491-D/-L
These models contain the same features as above, but are designed to detect a smaller test current. These devices are recommended for smaller, low-voltage circuits where ground fault location is necessary.

Approvals

Overview of device types

Distinctive device features	EDS460-D/EDS461-D	EDS460-L/EDS461 -L	EDS490-D/EDS491 -D	EDS490-L/EDS491 -L
Response values for test current	EDS460: 2…10 mA EDS461: 0.2…1 mA		EDS490: 2…10 mA EDS491: 0.2…1 mA	
Leakage current detection range	EDS460: 100 mA…10 A EDS461: 10 mA…1 A		EDS490: 100 mA…10 A EDS491: 10 mA…1 A	
Display - backlit LCD	×	--	×	--
Seven segment display and LED line	--	×	--	×
Onboard menu to change settings	×	--	×	--
Error code display	×		×	
Address range	1…90	1…90	1…90	1…90
Internal clock	×	--	×	--
History memory	×	--	×	--
Alarm contact - Common alarm for all channels	DPDT contact	DPDT contact	DPDT contact	DPDT contact
Alarm contacts - For each individual channel	--		12 SPST contacts	
Enclosure	XM460		XM490	

Front display: EDS46…-D/-L and EDS49…-D/-L



1 - Alarm LED 1: Lights in the event of the following alarms:
- Alarm utilizing optional leakage current monitoring
- Connection alarm

2 - Alarm LED 2: Lights when the ground fault location alarm is active

3 - Power On LED "ON"

4 - LCD display

5 - INFO key: opens system information menu (does not apply to EDS…L). ESC key: Goes back a step in device's menu

6 - TEST button: Activates self-test.
Arrow up key: Goes up in device's internal menu.

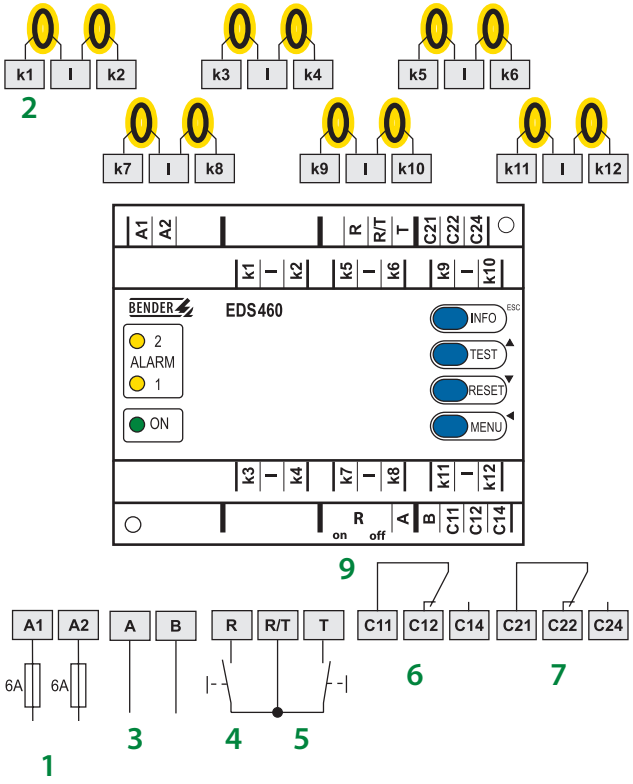
7 - RESET button: Resets device.
Arrow down key: Goes down in device's internal menu.

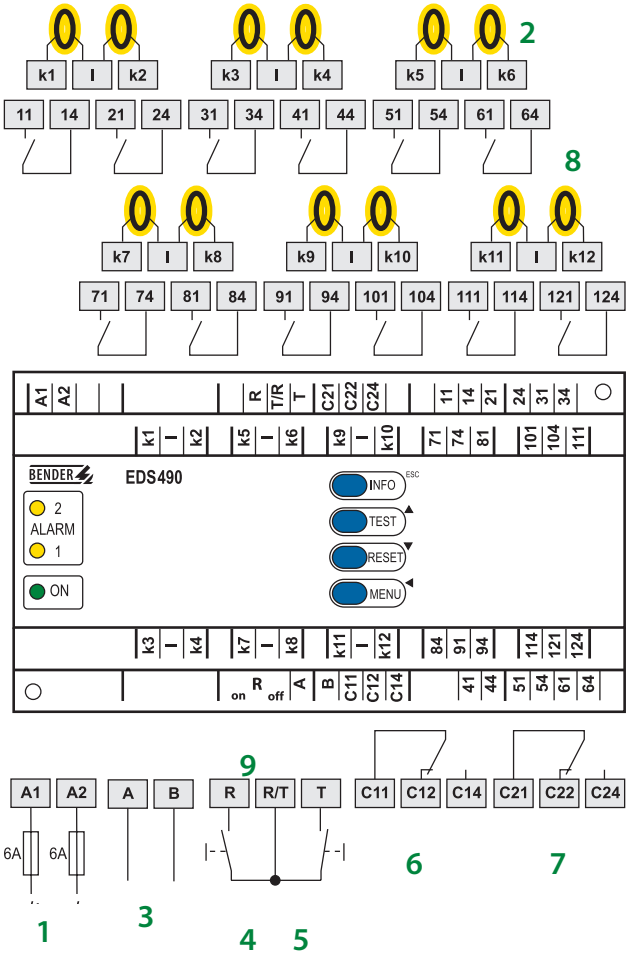
8 - MENU key: EDS…-D: Opens device's internal menu.
EDS…-L: sets the BMS address.
ENTER key: Confirms parameter change

9 - Alarm LEDs: Light based on the channel where the ground fault is detected

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

Wiring diagram: EDS460/461-D/-L and EDS490/491-D/-L





1 - Supply voltage U_S, see ordering information. Fuse recommended.

2 - Connections for current transformers

3 - Serial RS-485 interface

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

5 - External test button: “T” (N/O contact)*

6 - Alarm relay 1

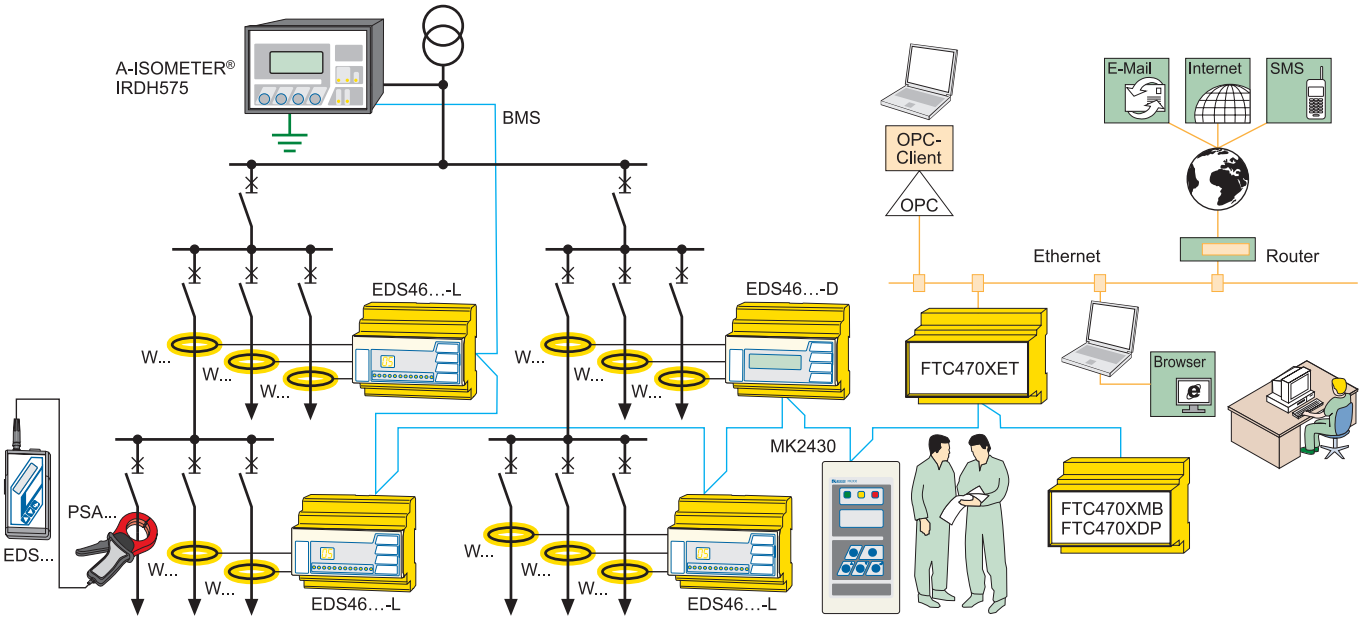
7 - Alarm relay 2

8 - Alarm relay: One contact per channel (EDS490/491 only)

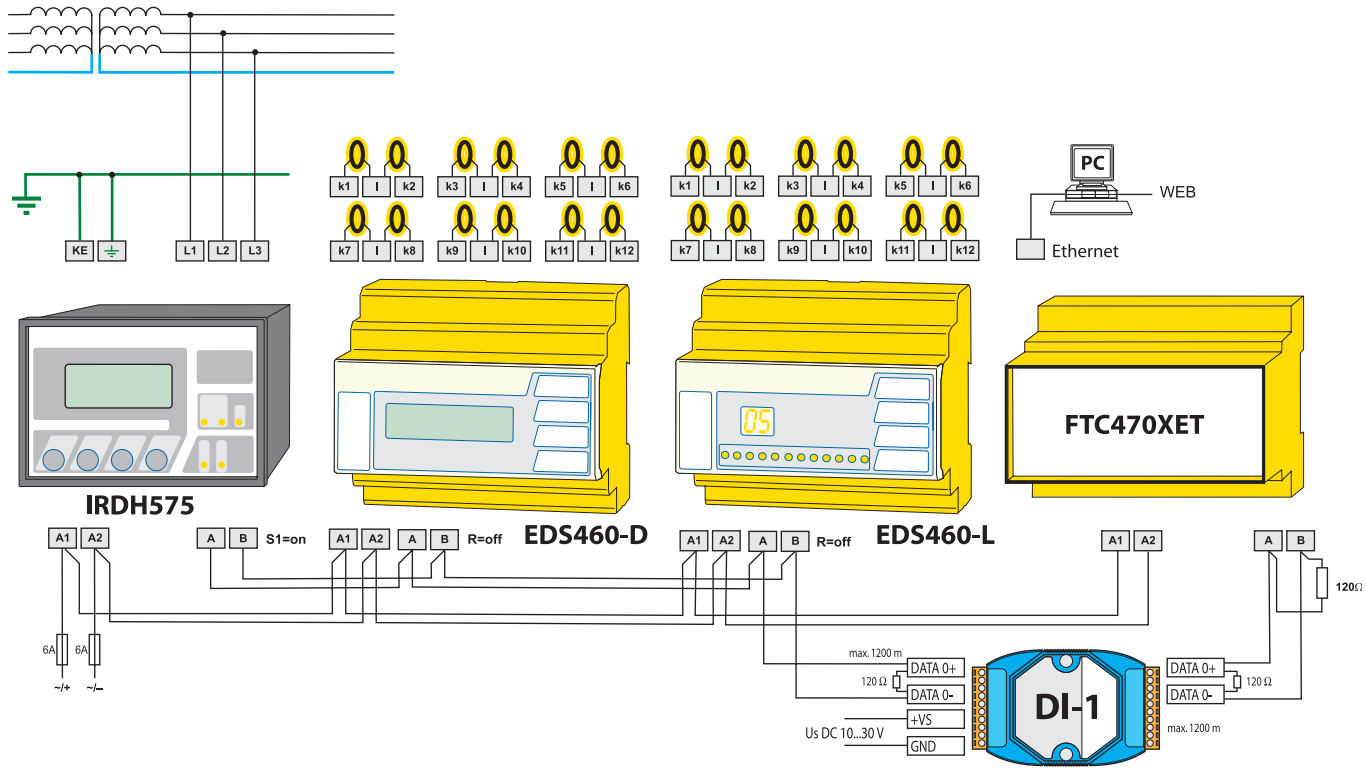
9 - $R_{on/off}$: Termination of the serial RS-485 interface (A/B) with 120 Ω

* If the external TEST / RESET terminals are being used, they may not be interconnected to each other when using multiple EDS devices.

Example application: System setup



Example application: Communication setup using Ethernet gateway



Note:
The DI-1 repeater only is required when the length of the cable exceeds 3900 ft (1200 m) or when more than 32 devices are connected to the bus.

Technical data

Insulation coordination acc. to IEC 60664-1

Rated insulation voltage	AC 250 V
Rated impulse voltage/pollution degree	4 kV / III
Protective separation (reinforced insulation) between	
(A1, A2) – (K1, L…K12, R/RT/T, AB) – (11, 12, 14) – (21, 22, 24)	
Voltage test according to IEC 61010-1	2.21 kV

Supply voltage

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

Measuring circuit

Nominal system voltage U_n	see IRDH575, PGH
External measuring current transformers type	W…, WR…, WS… (EDS460, EDS490)
	W…/8000, WS…/8000 (EDS461, EDS491)
CT monitoring	on/off (on)*
Load	10 Ω
Rated insulation voltage (measuring current transformer)	800 V
Response sensitivity	2…10 mA (EDS460/EDS490)
	0.2…1 mA (EDS461/EDS491)
Rated frequency	50/60/400 Hz
Measuring range EDS function	2…50 mA (EDS460/EDS490)
	0.2…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

Specified time

Response delay t_{on}	0…24 s
Release delay t_{off}	0…24 s
Scanning time for all channels	approximately 4…10 s see TGH1394

EDS - measuring current transformer connection

Single wire ≥ 0.75 mm² (AWG 18)	0…3.2 ft (0…1 m)
Single wire, twisted ≥ 0.75 mm² (AWG 18)	3.2…32.8 ft (1…10 m)
Shielded cable ≥ 0.5 mm² (AWG 20)	32.8…131 ft (10…40 m)
Recommended cable	J-Y (ST) Y min. 2 x 0.8
(shielded, shield on one side connected to L-conductor , not connected to ground)	

Displays, memory

LEDs	ON/ALARM (EDS…-D)
	ON/ALARM/Channel 1…12 (EDS…-L)
LC display	backlit graphical display (EDS…-D)
7-segment display	2 x 7.62 mm (EDS…-L)
History memory	300 data records (EDS…-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…32.8 ft (0…10 m)

Interface

Interface/protocol	RS-485/BMS
Cable length	0…3900 ft (0…1200 m)
Recommended cable (shielded, shield on one side connected to PE)	J-Y(ST)Y 2 x 0.8
Terminating resistor	120 Ω (0.25 W) via DIP switch connectable
Device address, BMS bus	DIP switch 1…90

Switching elements

Number of switching elements	Two relays with one changeover contact each (EDS460/461)
	Two relays with one changeover contact each, 12 relays with one N/D contact each (EDS490/491)
Operating principle	Normally energized or de-energized operation
Electrical service life, number of cycles	10.000

Contact data acc. to IEC 60947-5-1

Utilization 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	5 A	3 A	1 A	0.2 A	0.1 A

Minimum contact load	1 mA at AC / DC 10 V

EMC

EMC	IEC 61326
Operating temperature	- 13°F…+ 131°F (- 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 60731	
Stationary use (IEC 60721-3-3)	3M4
Transport (IEC 60721-3-2)	2M2
Long-time storage (IEC 60721-3-1)	1M3

Connection

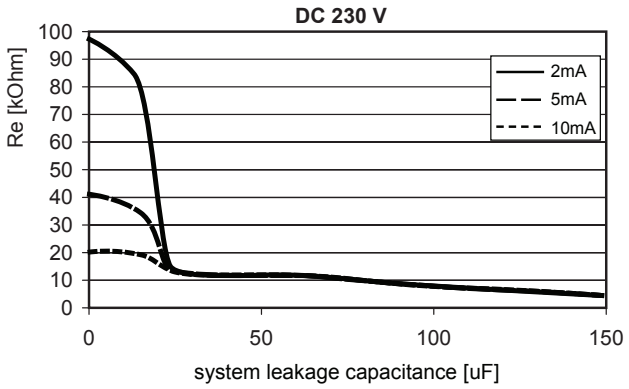
Connection type	screwless-type terminals
Connection properties:	
rigid / flexible	0.2…2.5 mm² (AWG 24…14)
flexible with connector sleeve	0.2…1.5 mm² (AWG 24…16)
Stripping length	10 mm
Release force	50 N
Test aperture, diameter	2.1 mm

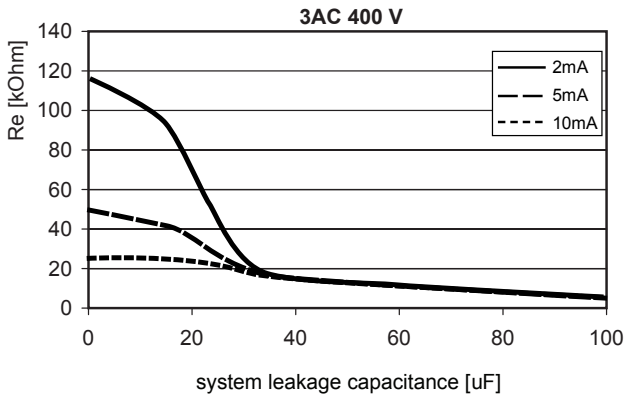
General Data

Operating mode	continuous operation
Position of normal use	any
Degree of protection, terminals (IEC 60529)	IP20 (NEMA 1)
Enclosure material	polycarbonate
Flammability class	UL94V-0
Screw mounting	2 x M4
DIN rail mounting acc. to	IEC 60715
Product standards	DIN EN 61557-9: 2000-08
	EN 61557-9: 1999-11, IEC 61557-9: 1999-09
Operating manual	BP108017/TGH1394
Weight	≤ 360 g (EDS46…)
	≤ 510 g (EDS49…)

( )* factory setting

Response sensitivity in relation to system leakage capacitance





Details:

The value of the maximum response sensitivity decreases is relative to the system leakage capacitance. The maximum response values an EDS device can reach are:

30 Ω/V at maximum at system voltage of 20000 µFV
(product of system voltage and system leakage capacitances)

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.

Ordering information

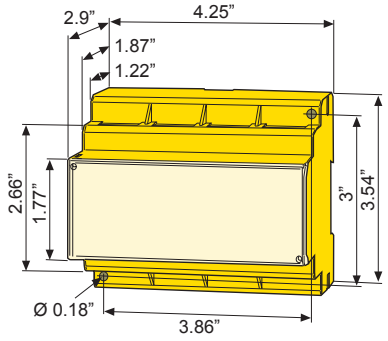
Type	Supply voltage U_s*	Response value	Display Type	Onboard Menu	Art. No.
EDS460-D-1	DC 16…94 V AC 42…460 Hz 16…72 V	2…10 mA	Digital	Yes	B 9108 0001
EDS460-D-2	AC / DC 70…276 V AC 42…460 Hz	2…10 mA	Digital	Yes	B 9108 0002
EDS460-L-1	DC 16…94 V AC 42…460 Hz 16…72 V	2…10 mA	Seven-Segment and LED	No	B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

* absolute values

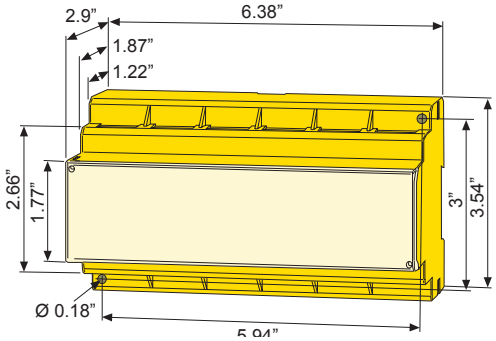
Dimensions

Dimensions in inches

EDS46…-D / -L – XM460



EDS49…-D / -L – XM490



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North American Headquarters • Coatesville, PA
Toll-Free: 800.356.4266 • Fax: 610.383.7100

Canada • Brampton, ON
Toll-Free: 800-243-2438 • Fax: 905-799-3051

www.bender.org • E-mail: info@bender.org

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