



EDS44x-L-CN /-S-CN



绝缘故障定位仪

ZH

这本快速入门指南适用于下列型号：EDS440/441-L-CN，W-L-CN，-S-CN，W-S-CN，EDS441-LAB-4-CN 和 W-CN 设备。

这本快速入门手册不能替代操作手册。

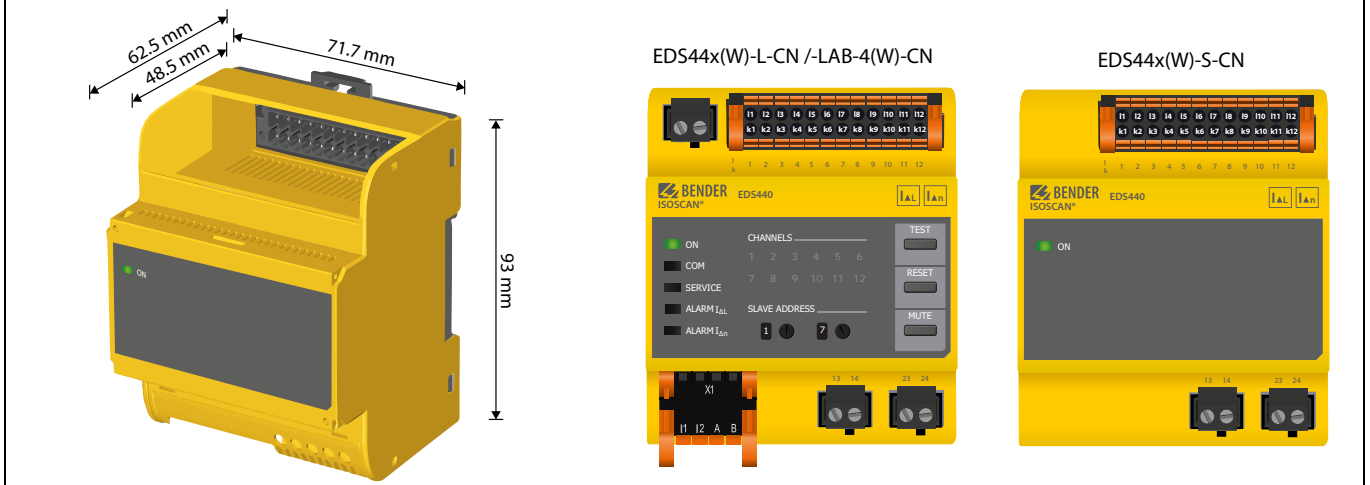
您可以在我们的主页 www.bender.de/manuals 上找到操作手册。

Insulation fault locator

EN

This quick-start guide applies to the EDS440/441-L-CN, W-L-CN, -S-CN, W-S-CN, EDS441-LAB-4-CN and W-CN devices. It does not replace the operating manual.

The operating manual can be found on our homepage under www.bender.de/manuals.



使用目的

绝缘故障定位仪 EDS44x 能够定位不接地直流、交流和三相交流系统中的绝缘故障 (IT 系统)。

通过故障定位电流发射器 (PGH)，根据 PGH 的型号来监视交流和三相交流 AC 0...1000V 以及直流 DC 0...1500V 范围的系统。可以显示 42Hz...1kHz, 100mA...20A (EDS440) 或 50/60 Hz...1kHz, 100mA...2A (EDS441) 范围内的交流剩余电流。



网络配置、电源电压、电源频率、泄露电容和测试电流会影响 EDS 系统的响应。请参考手册中的响应灵敏度曲线。



危险

电击危险！

在安装设备之前，请确保系统是断电的。否则可能会发生电击。此外，电气装置可能会损坏并且设备可能会被损坏无法修复。

Intended use

The insulation fault locator EDS44x locates insulation faults in ungrounded DC, AC and three-phase supplies (IT systems).

With an active test current generator (PGH), AC and three-phase networks in the range AC 0...1000 V and DC networks in the range DC 0...1500 V can, depending on the PGH type, be monitored. An AC residual current in the range 42 Hz...1 kHz, 100 mA...20 A (EDS440) or 50/60 Hz, 100 mA...2 A (EDS441) can be displayed.



Network configuration, mains voltage, mains frequency, leakage capacitance and test current influence the responsiveness of the EDS system. Please refer to the response sensitivity curve in the manual.



DANGER

Risk of electric shock!

Make sure the system is de-energized before installing the device. Otherwise there is a risk of electric shock. Furthermore, the electrical installation may be damaged and the device may be destroyed beyond repair.

DIN 导轨安装

1. 提供一组安装夹，无论是手动或通过工具的手段，如下图所示安装到合适的位置。
2. 仅 ED44x-S-CN：把 BB 总线接入设备。请参考 BB 总线安装介绍。
3. 把 EDS44x 安装到 DIN 导轨上。

螺丝安装

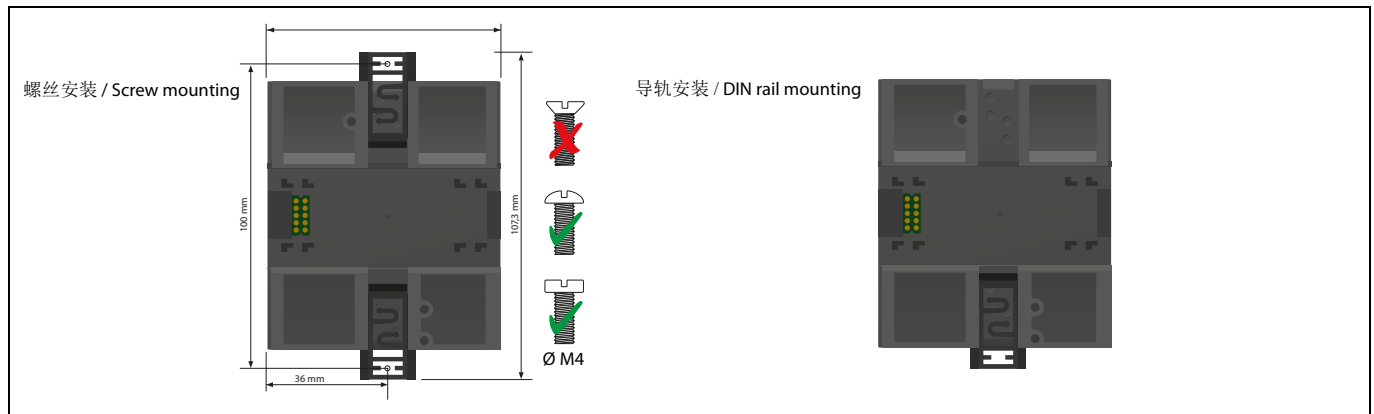
1. 如下图所示，手动或者使用工具安装 2 个配套的安装夹把设备安装到合适的位置。
2. 根据尺寸的钻模板，为 M4 螺丝钻安装孔。
3. 然后使用 2 个 M4 螺丝固定 EDS44x。

DIN rail mounting

1. Fix one of the mounting clips supplied, either manually or by means of a tool, into position as shown in the illustration below.
2. ED44x-S-CN only: Attach the BB bus to the device. To do this, refer to the BB bus mounting instructions supplied.
3. Snap the EDS44x device onto the DIN rail.

Screw mounting

1. Fix the two mounting clips supplied, either manually or by means of a tool, into position as shown in the illustration below.
2. Drill the mounting holes for the M4 thread according to the dimensioned drilling template.
3. Then fix the EDS44x using two (2) M4 screws.



连接

参考接线图连接设备。同时也请参考技术参数。在连接设备之后，安装上下盖板。

Connection

Connect the device according to the wiring diagram. Also refer to the technical data. After connecting the device, install the upper and lower terminal cover.



危险

电击危险！

在安装设备之前，请确保系统是断电的。否则可能会发生电击。此外，电气装置可能会损坏并且设备可能会被损坏无法修复。



DANGER

Risk of electric shock!

Make sure the system is de-energized before installing the device. Otherwise there is a risk of electric shock. Furthermore, the electrical installation may be damaged and the device may be destroyed beyond repair.



警告

提供线路保护！

符合标准 DIN VDE 0100-430，线路保护将用于电源电压。



CAUTION

Provide line protection!

According to DIN VDE 0100-430, a line protection shall be provided for the supply voltage.



对于 UL 应用：

仅使用 60/75 °C 的铜线！对于 UL 和 CSA 应用，电源电压必须通过 5A 的保险丝进行保护。



For UL applications:

Use 60/75 °C copper wires only! For UL and CSA applications, the supply voltage must be protected via 5 A fuses.



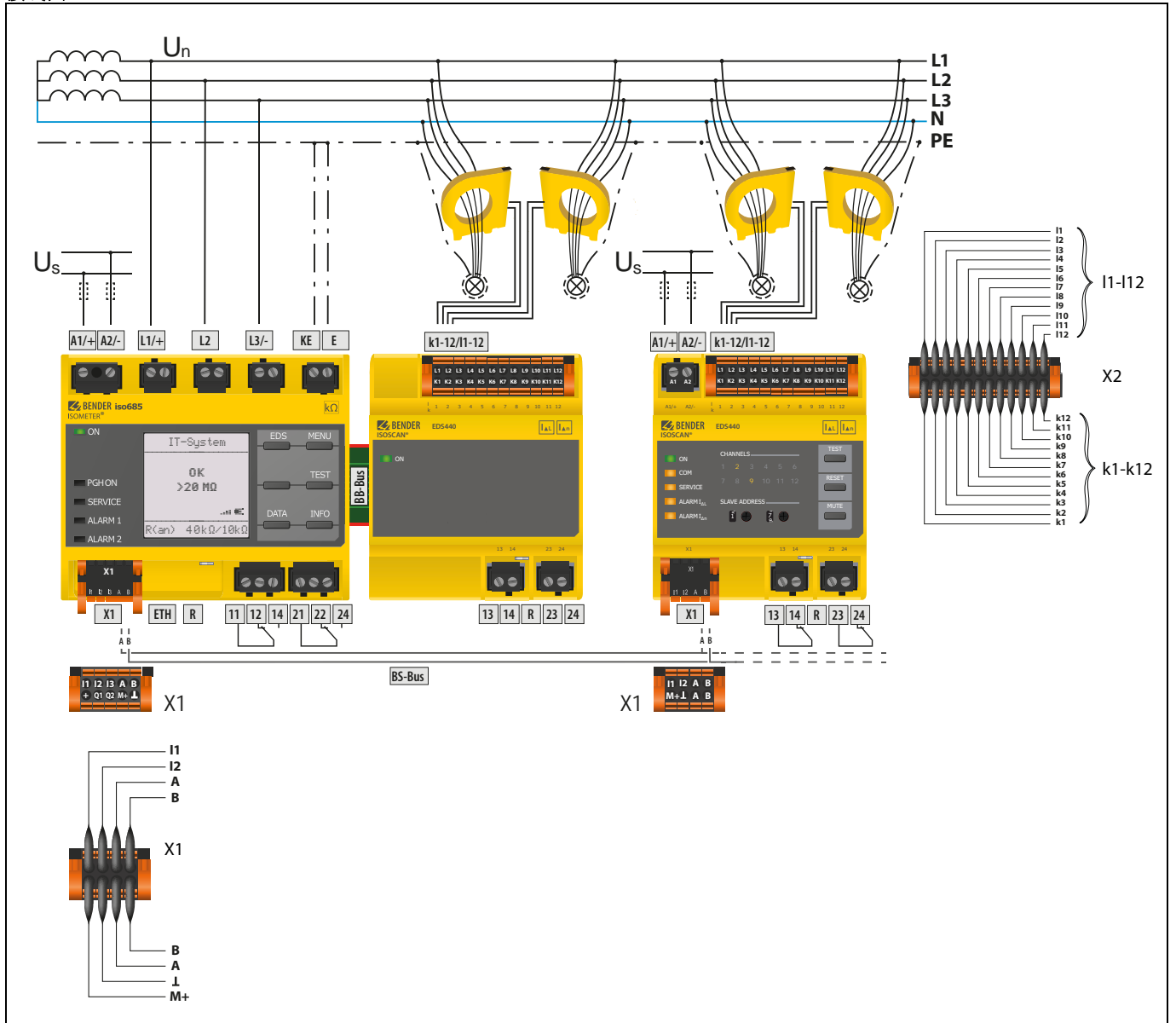
被监视网络的最大电压不得大于所有使用中组件的额定绝缘电压。根据技术参数选择电缆和电缆长度。



The maximum voltage of the monitored network must not be greater than the rated insulation voltage of all components used. Select cables and cable lengths according to the technical data.

接线图

Wiring diagram



接线图例

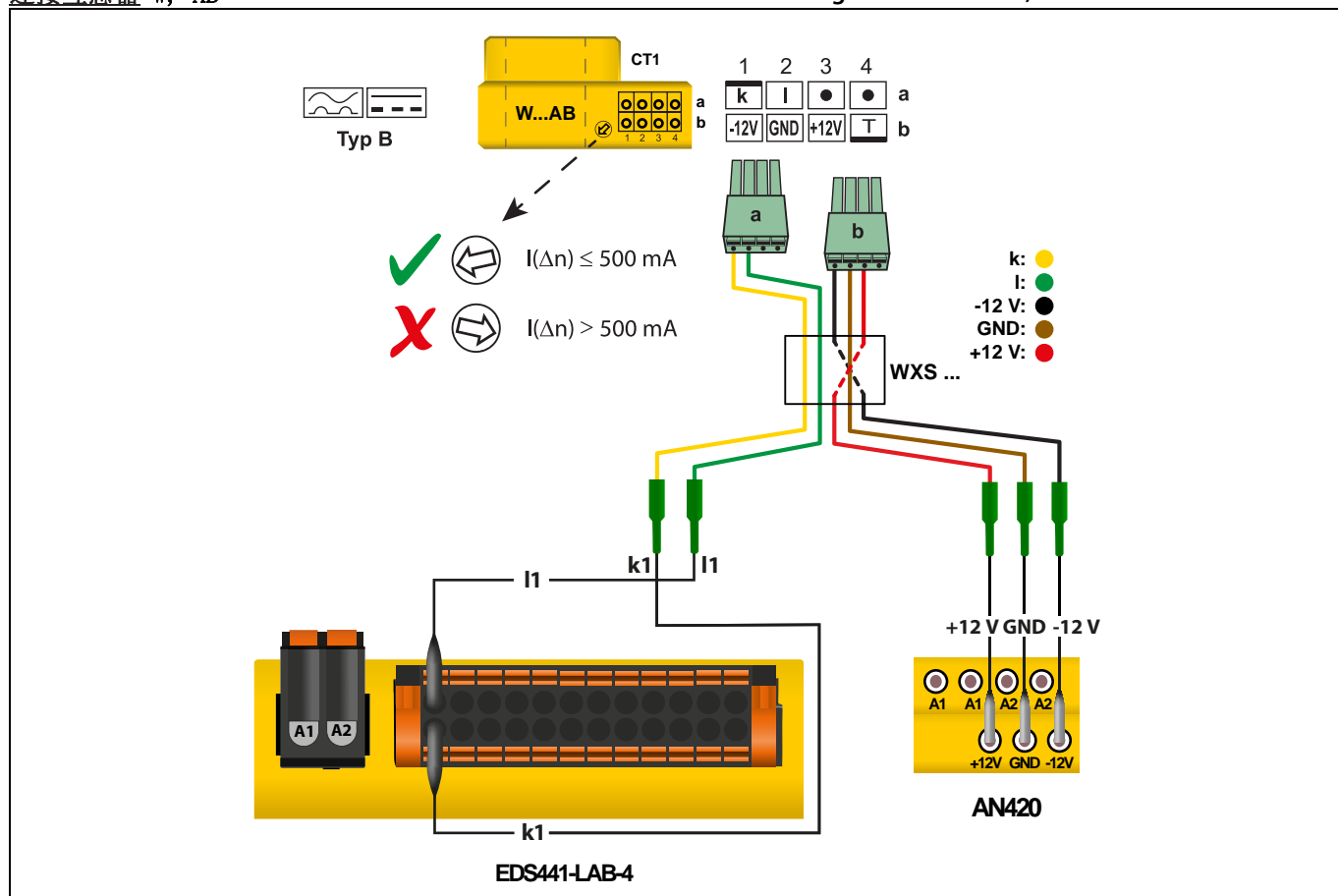
端子	连接
A1/+, A2/-	连接到电源电压 U_s
k1-12/11-12	连接测量电流互感器
I1, I2 (X1)	可配置数字输入 (例如, 测试, 重置)
A, B (X1)	串行接口 RS-485 (BS 总线) 输入或输出接口 (任意分配)
\perp (X1)	可配置的模拟输出 (例如: 测量仪器)
M+ (X1)	可配置的数字电流输出 0 或 20 mA, 例如, 用于 PLC 电流输入
13-14 / 23-24	报警继电器 可选不同的功能
R	终端电阻器来终止 RS-485 接口 (BS 总线)
BB 总线	Bender 产品的通讯接口

Legend to wiring diagram

Terminal	Connections
A1/+, A2/-	Connection to supply voltage U_s
k1-12/11-12	Measuring current transformer connection
I1, I2 (X1)	Configurable digital inputs (e.g. Test, Reset)
A, B (X1)	Serial interface RS-485 (BS bus), Input or output interface (assignment is arbitrary)
\perp (X1)	Reference potential ground
M+ (X1)	Configurable digital current output 0 or 20 mA, e.g. for PLC current input
13-14 / 23-24	Alarm relay Different functions can be selected
R	Terminating resistor to terminate the RS-485 interface (BS bus)
BB-Bus	Communications interface for Bender products

连接互感器 W, AB

Connecting transformers W, AB



EDS441-LAB-4-CN 专门工作于最大 5 毫安的测试电流。因此，选择电流范围 >500 毫安的测量电流互感器来测量 < 5 毫安的测试电流是不可行的。



The EDS441-LAB-4 works exclusively with a maximum test current of 5 mA. Therefore, selecting the current range > 500 mA for the measuring current transformer to measure test currents < 5 mA is not practicable.

设备的启动

首次启动之前

确保 ...

- PE 线没有通过测量电流互感器传导。
- 在电流互感器周围没有干扰磁场。
- 最大允许电缆长度符合测量电流互感器的长度的要求。
- 在 BS 总线的首尾两端终止，例如：R (= ON)。
- 在总线系统 (21) 中，BS 总线电缆所允许的长度（最大 1200 m）以及 EDS44x 设备的数量不能超过（最大 252 测量通道）。
- 一个地址不能被分配 2 次。

首次启动

- 连接设备和电流互感器。
- 通过 BS 总线 (EDS44x-L-CN) 或 BB 总线 (EDS44x-S-CN) 互相连接设备。
- 打开电源电压。LED 灯 "ON" 在通电后闪烁，直到设备准备就绪。
- 设置适合的 BS 总线地址。
- EDS44x-L-CN: 通过使用 EDS 旋转开关。通过亮着的 LED 灯指示选择的通道地址。
- 通过 ISOMETER® 或 EDS44x-L-CN 重置按钮消除所有可能显示的绝缘和设备故障。
- 确保 EDS44x 是正确连接的。
- 互感器连接测试每 10 分钟执行一次。在每个测试期间，"ON" LED 灯闪烁。

参考 ISOMETER® 手册，启动 ISOMETER® 和来自 EDS44x 和 ISOMETER® 的系统。

工作

ED44x-S-CN 只能通过 ISOMETER® 进行操作。

ED44x-L-CN 可以通过下列三个按键以及 ISOMETER® 进行操作。

TEST	开始自检
RESET	重置故障记忆
MUTE	禁用用于当前报警消息的蜂鸣器

Commissioning of the device

Prior to initial commissioning

Make sure that...

- The PE line is not conducted through a measuring current transformer.
- There are no interfering magnetic fields located near the current transformer.
- The maximum permissible cable length is in compliance to the measuring current transformers.
- The beginning and end of the BS bus is terminated, i.e. R (= ON).
- The permissible length of the BS bus line (max. 1200 m) and the number of EDS44x devices in the bus system (21) is not exceeded (max. 252 measuring channels).
- An address is not assigned twice.

Initial commissioning

- Connect the device and the current transformer.
- Connect the devices to each other via the BS bus (EDS44x-L-CN) or BB-Bus (EDS44x-S-CN).
- Switch the supply voltage on. The LED "ON" flashes during power up until the device is ready for operation.
- Set the appropriate BS bus address.
- EDS44x-L-CN: by using the EDS rotary switches. The selected channel address is indicated by a lighting LED.
- Eliminate all possible displayed insulation and device faults via the ISOMETER® or the EDS44x-L-CN RESET button.
- Ensure the EDS44x is properly connected.
- A transformer connection test is carried out every 10 minutes. During each test, the "ON" LED flashes.

To commission the ISOMETER® and the system from the EDS44x and ISOMETER®, refer to the ISOMETER® documentation.

Operation

The ED44x-S-CN can only be operated via the ISOMETER®.

The ED44x-L-CN is operated via the following three keys and otherwise via the ISOMETER®.

TEST	Initiate self test
RESET	Reset fault memory
MUTE	Disable buzzer for the current alarm message

报警和它的作用

报警信息的通用排序

- 如果需要，ISOMETER® 显示故障，测量值或通道。
- 仅用于 EDS44x-L:
 - 相应的 LED 灯亮或者闪烁。
 - 如果启动，蜂鸣器的声音是断断续续的。
 - 分配的报警继电器动作 (EDS44x-L-CN/-S-CN)。
 - 分配的数字输出动作。
- 然后报警信息通过 BB 总线 (EDS44x-S-CN) 或 BS 总线 (EDS44x-L-CN) 发送。

报警信息 (EDS44x-S-CN)

EDS44x-S-CN 报警系统通过继电器报告并且通过 ISOMETER® 显示。

报警信息 (EDS44x-L)

- 绝缘故障: LED „ALARM $I_{\Delta L}$ “ (主报警) 和测量通道 LED 灯所对应的灯同时亮起，就可找到对应的错误。
- 如果超过剩余电流阈值: LED „ALARM $I_{\Delta n}$ “ 和测量通道 LED 灯所对应的灯同时亮起，就可找到对应的错误。
- 设备故障, 互感器连接故障: “SERVICE” LED 灯亮。此外，相应通道的 LED 灯闪烁。
- 报警信息: 受影响的测量通道的通道 LED 闪烁。
- 如果几个错误信息同时输出，单独信息可以通过观察报警或服务 LED 灯或闪烁的通道 LED 来区分。

声音报警 (蜂鸣器) 可以被分配用于下列故障信息并且用过 MUTE (静音) 按钮停用。

Alarm $I_{\Delta L}$ 、Alarm $I_{\Delta n}$ 、设备故障、连接故障、普通报警、主动绝缘故障定位。

重置报警信息 (Reset)

要求: 重置故障记忆，同时故障不再存在。

执行 RESET 来重置报警。有 3 中可能性:

- 按下 EDS44x-L-CN 的 RESET 的按钮持续至少 1 秒。
 - 按下外部重置按钮连接到 EDS44x
 - 在 BS 总线或 BB 总线上，从 ISOMETER® 发送 RESET 命令。
- 按下 ISOMETER® 上的 “ESC” 按钮 退出当前告警信息的显示。

Alarm and its effect

General sequence of an alarm message

- The ISOMETER® display indicates a fault and, if applicable, a measured value or channel.

EDS44x-L only:

- The corresponding LEDs light or flash.
- The buzzer sounds intermittently if activated.
- Assigned alarm relays will switch (EDS44x-L-CN/-S-CN).
- Assigned digital outputs will switch.
- An alarm message is then sent over the BB bus (EDS44x-S-CN) or BS bus (EDS44x-L-CN).

Alarm messages (EDS44x-S-CN)

EDS44x-S-CN alarm messages are reported via the relays and are displayed via the ISOMETER®.

Alarm messages (EDS44x-L)

- Insulation fault: Both the LED „ALARM $I_{\Delta L}$ “ (main alarm) and the measuring channel LED, corresponding to where the error was found, light.
- If the residual current threshold is exceeded: Both the LED „ALARM $I_{\Delta n}$ “ and the measuring channel LED, corresponding to where the error was found, light.
- Device fault, transformer connection fault: The "SERVICE" LED lights. In addition, the corresponding channel LED flashes.
- Alarm messages: The channel LED of the affected measuring channel flashes.
- If several error messages are simultaneously output, individual messages can be distinguished by observing which alarm or service LED lights or flashes with which channel LED.

The audible alarm (buzzer) can be assigned the following error messages and deactivated with the MUTE button:

Alarm $I_{\Delta L}$, Alarm $I_{\Delta n}$, device fault, connection fault, common alarm, active insulation fault location.

Reset alarm messages (Reset)

Requirement: The fault memory has been activated and the error is no longer active.

Execute a RESET to reset the alarms. There are 3 possibilities:

- Press the EDS44x-L-CN RESET button for at least 1s.
- Press an external reset button connected to the EDS44x
- Transmit a RESET command from an ISOMETER® over the BS bus or BB bus.

Press the "ESC" button on the ISOMETER® to exit the display of the current alarm message.

技术参数

(*) = 出厂设置

绝缘协调性

额定电压 (IEC 60664-1)	AC 250 V
额定脉冲电压 (IEC 60664-1)	4 kV
过电压分类	III
污染等级	2
保护隔离 (增强绝缘) 介于	(A1, A2)-(13, 14)-(23, 24)-(X1, X2, X3)
电压测试符合 IEC 61010-1	2.2 kV

电源电压

电源电压范围 U_s	AC/DC 24...240 V
公差 U_s	-20...+15 %
频率范围 f_s	DC, 50...400 Hz ^{1) 2)}

响应值

绝缘故障定位响应值 ($I_{\Delta L}$)	EDS440: 2...10 mA (5 mA)*
	EDS441: 0.2...1 mA (0.5 mA)*
相对不确定性 ($I_{\Delta L}$)	EDS440: ± 30 %, min. ± 2 mA ³⁾
	EDS441: ± 30 %, min. ± 0.2 mA ³⁾
剩余电流测量响应值 ($I_{\Delta n}$)	EDS440: 100 mA...10 A (10 A)*
	EDS441: 100 mA...1 A (1 A)*
相对不确定性 ($I_{\Delta n}$) EDS440	(42...60 Hz) ± 5 %
相对不确定性 ($I_{\Delta n}$) EDS440	(61...1000 Hz) -20...0 %

测量电路

标称系统电压 U_n EDS440	参考测试电流发射器
	(例如: ISOMETER® iso685-D-P-CN)
标称系统电压 U_n EDS441	AC 20...276 V, DC 20...308 V

绝缘故障定位 $I_{\Delta L}$ 的测量范围

额定频率范围	DC, 16, 7...1000 Hz
绝缘故障定位测量范围 ($I_{\Delta L}$)	
EDS440-x	1.5...50 mA
EDS440-x (SN < 1712xxxxxx)	1.5...25 mA (50 mA 在直流系统)
EDS441-x	0.15...5 mA
最大剩余电流	看图纸

剩余电流测量 $I_{\Delta n}$ 的测量范围

剩余电流定位测量范围 ($I_{\Delta n}$) EDS440-x	100 mA...20 A
EDS440-x 的额定频率范围	50...1000 Hz
剩余电流定位测量范围 ($I_{\Delta n}$) EDS441-x	100 mA...2 A
EDS441-x 的额定频率范围	50...60 Hz

接口

接口 / 协议	RS-485/BS
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开关元件

开关元件	2 组转换触点
工作模式	常闭 / 常开*
功能触点 13, 14/23, 24	无, Alarm $I_{\Delta L}$, Alarm $I_{\Delta n}$, 设备故障, 互感器连接故障, 普通报警
额定工况下的电气耐久性	30,000 周期
额定工作电压	250 VAC
额定工作电流	7 A
额定绝缘电压	4 kV
最大开关容量	300 W / 2770 VA
最大开关电压	30 VDC / 277 VAC

其它

EMC	IEC 61326-2-4
防护等级、内置元件 (DIN EN 60529)	IP40
防护等级、端子 (DIN EN 60529)	IP20

- 1) 当频率 >60 Hz, k1...12, 11...12, M+, GND, I1 和 I2 的连接必须是安全接触的。至少符合过电压等级 2 (300 V)。
- 2) 仅 50/60 Hz 允许应用于 UL。
- 3) 剩余电流 >100 mA 的影响会导致一个更大的相对不确定性。

服务

服务热线: 0700-BenderHelp (电话和传真)
 Carl-Benz-Straße 8 • 35305 Gruenberg • Germany
 电话: +49 6401 807-760 • 传真: +49 6401 807-629
 电子邮件: info@bender-service.com • www.bender.de

Technical data

(*) = factory setting

Insulation co-ordination

Rated insulation voltage (IEC 60664-1)	AC 250 V
Rated impulse voltage (IEC 60664-1)	4 kV
Overvoltage category	III
Pollution degree	2
Protective separation (reinforced insulation) between	(A1,A2)-(13,14)-(23,24)-(X1,X2,X3)
Voltage test acc. to IEC 61010-1	2.2 kV

Supply voltage

Supply voltage range U_s	AC/DC 24...240 V
Tolerance of U_s	-20...+15 %
Frequency range of f_s	DC, 50...400 Hz ^{1) 2)}

Response values

Insulation fault location response value ($I_{\Delta L}$)	EDS440: 2...10 mA (5 mA)*
	EDS441: 0.2...1 mA (0.5 mA)*
Response uncertainty ($I_{\Delta L}$)	EDS440: ± 30 %, min. ± 2 mA ³⁾
	EDS441: ± 30 %, min. ± 0.2 mA ³⁾
Residual current measurement response value ($I_{\Delta n}$)	EDS440: 100 mA...10 A (10 A)*
	EDS441: 100 mA...1 A (1 A)*
Response uncertainty ($I_{\Delta n}$) EDS440	(42...60 Hz) ± 5 %
Response uncertainty ($I_{\Delta n}$) EDS440	(61...1000 Hz) -20...0 %

Measuring circuit

Nominal system voltage U_n EDS440	see test current generator
	(e.g. ISOMETER® iso685-D-P-CN)
Nominal system voltage U_n EDS441	AC 20...276 V, DC 20...308 V

Measuring ranges insulation fault location $I_{\Delta L}$

Rated frequency range	DC, 16, 7...1000 Hz
Measuring range insulation fault location ($I_{\Delta L}$)	
EDS440-x	1.5...50 mA
EDS440-x (SN < 1712xxxxxx)	1.5...25 mA (50 mA in DC systems only)
EDS441-x	0.15...5 mA
Max. residual current	see diagrams

Measuring ranges residual current measurement $I_{\Delta n}$

Measuring range residual current measurement ($I_{\Delta n}$) EDS440-x	100 mA...20 A
Rated frequency range EDS440-x	50...1000 Hz
Measuring range residual current measurement ($I_{\Delta n}$) EDS441-x	100 mA...2 A
Rated frequency range EDS441-x	50...60 Hz

Interfaces

Interface/protocol	RS-485/BS
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Switching elements

Switching elements	2 changeover contacts
Operating mode	N/C operation / N/O operation*
Function contacts 13,14/23,24	None, Alarm $I_{\Delta L}$, Alarm $I_{\Delta n}$, device fault, transformer connection fault, common alarm
Electrical endurance under rated operating conditions	30,000 cycles
Rated operating voltage	250 VAC
Rated operational current	7 A
Rated insulation voltage	4 kV
Max. switching capacity	300 W / 2770 VA
Max. switching voltage	30 VDC / 277 VAC

Other

EMC	IEC 61326-2-4
Degree of protection, built-in components (DIN EN 60529)	IP40
Degree of protection, terminals (DIN EN 60529)	IP20

- 1) For frequencies >60 Hz, the k1...12, 11...12, M+, GND, I1 and I2 connections must be safe to touch. Min. acc. to the overvoltage category 2 (300 V).
- 2) only 50/60 Hz are permitted for UL applications.
- 3) Impact of a residual current >100 mA results in a greater response uncertainty.

Service

Service hotline: 0700-BenderHelp (Phone and fax)
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 E-Mail: info@bender-service.com • www.bender.de

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文件 /Documentation:

