

Technical data

Insulation fault location system

Device components

Device type	EDS470-12	PRC470	PGH471
Insulation coordination acc. to IEC 60664-1:			
Rated insulation voltage	AC 250 V	AC 250 V	AC 500 V
Rated impulse withstand voltage/contamination level	4 kV/3	4 kV/3	4 kV/3
Voltage range			
Nominal voltage range U_n	-	-	AC 20 ... 575 V / DC 20 ... 500 V
Supply voltage U_s	up to 230 V ^{*1)}	up to 230 V ^{*1)}	up to 230V ^{*1)}
Operating range of U_s	0.85 ... 1.15 x U_s	0.85 ... 1.15 x U_s	0.85 ... 1.15 x U_s
Max. selfconsumption	3 VA	3 VA	3 VA
Response values			
Response value R_{an1}	DC, AC, 3AC, 5 mA	-	-
Outputs			
Interface	RS 485	RS 485	RS 485
Contact circuit	1 alarm relay	1 alarm relay	1 alarm relay
Switching components	1 change-over contact	2 change-over contact	1 NO contact
Contact class acc. to DIN IEC 60255 part 0-20	IIB	IIB	IIB
Rated contact voltage	AC 250 V / DC 300 V	AC 250 V / DC 300 V	AC 250 V / DC 300 V
Admissible number of operations	12000 cycles	12000 cycles	12000 cycles
Making capacity	UC 5 A	UC 5 A	UC 5 A
Breaking capacity			
AC 230 V and $\cos \phi = 0.4$	2 A	2 A	2 A
DC 220 V and $L/R = 0.04$ s	0.2 A	0.2 A	0.2 A
Tests of the Electromagnetic Compatibility -EMC- acc. to EC directives, test data see chapter "Standards"	Yes	Yes	Yes
General data			
Ambient temperature, during operation	-10°C to +55°C	-10°C to +55°C	-10°C to +55°C
Storage temperature range	-40°C to +70°C	-40°C to +70°C	-40°C to +70°C
Climatic class acc. to IEC 60721 (except condensation and formation of ice)	3K5	3K5	3K5
Operation class	continuous operation	continuous operation	continuous operation
Mounting	any position	any position	any position
Connection	modular terminals	modular terminals	modular terminals
Cross sectional area of connecting cable, single wire	0.2...4 mm ²	0.2...4 mm ²	0.2...4 mm ²
Cross sectional area of connecting cable, flexible	0.2...2.5 mm ²	0.2...2.5 mm ²	0.2...2.5 mm ²
Protection class acc. to DIN EN 60529			
Built-in components	IP 30	IP 30	IP 30
Terminals/with terminal covers	IP 20	IP 20	IP 20
Type of enclosure / dimension diagram	X470	X470	X470
Screw fixing	Yes	Yes	Yes
DIN rail mounting	DIN EN 50022	DIN EN 50022	DIN EN 50022
Flammability class	UL94V-0	UL94V-0	UL94V-0
Data sheet No.	108003	108001	108002
Weight max.	400 g	350 g	350 g

*1) see device description "ordering details"

*2) see device description "response values" and "measuring circuit"

*4) SKMP = scale centre point

	AGE470	EDS165
Device type		
Insulation coordination acc. to IEC 60664-1:		
Rated insulation voltage	AC 630 V	-
Rated impulse withstand voltage/contamination level	6 kV/3	-
Voltage range		
Nominal voltage range Un	AC 45...65 Hz 0...790 V / DC 0...960 V *1)	-
Supply voltage U _s	-	DC 6 V (battery)
Operating range of U _s	-	DC 4.2 ... 6.2 V
Max. selfconsumption	-	0.6 W
Response values		
Response value R _{on1}	-	-
Outputs		
Interface	-	RS 232
Contact circuit	-	-
Switching components	-	-
Contact class acc. to DIN IEC 60255 part 0-20	-	-
Rated contact voltage	-	-
Admissible number of operations	-	-
Making capacity	-	-
Breaking capacity	-	-
AC 230 V and cos phi = 0.4	-	-
DC 220 V and L/R = 0.04 s	-	-
Tests of the Electromagnetic Compatibility -EMC- acc. to EC directives, test data see chapter "Standards"	Yes	Yes
General data		
Ambient temperature, during operation	-10°C to +55°C	-10°C to +55°C
Storage temperature range	-40°C to +70°C	-40°C to +70°C
Climatic class acc. to IEC 60721 (except condensation and formation of ice)	3K5	-
Operation class	continuous operation	-
Mounting	any position	-
Connection	modular terminals	-
Cross sectional area of connecting cable, single wire	0.2...4 mm ²	-
Cross sectional area of connecting cable, flexible	0.2...2.5 mm ²	-
Protection class acc. to DIN EN 60529		
Built-in components	IP 30	IP 40
Terminals/with terminal covers	IP 20	IP 30
Type of enclosure/dimension diagram	X470	portable enclosure
Screw fixing	Yes	-
DIN rail mounting	DIN EN 50022	-
Flammability class	UL94V-0	-
Technical manual	TGH 1243	TGH 1265
Weight max.	350 g	400 g

*1) see device description "ordering details"

*2) see device description "response values" and "measuring circuit"

*4) SKMP = scale centre point

General description

The insulation fault location system EDS470 is designed for IT systems. Fast fault location, during operation, immediately after the occurrence of an insulation fault, without disconnecting the system.

Advantages of the EDS470 system

- Insulation fault location without disconnecting the system
- Reduction in costs because of reduced production stoppages
- Reduced maintenance costs due to fast localisation of insulation faults
- Improved preventive and scheduled maintenance
- Higher availability of power supply thanks to diminished interruption

System characteristics

- universal system concept for all IT-systems AC/DC 20...790 V
- modular design, therefore easily adaptable to the individual conditions of the system
- Measuring current transformers in various sizes and types of construction
- Monitors and controls up to 360 CT branches
- Information exchange between the individual components takes place via the RS485 interface (two-wire)
- Indication of the faulty branch
- Indication of the test current flowing in each branch

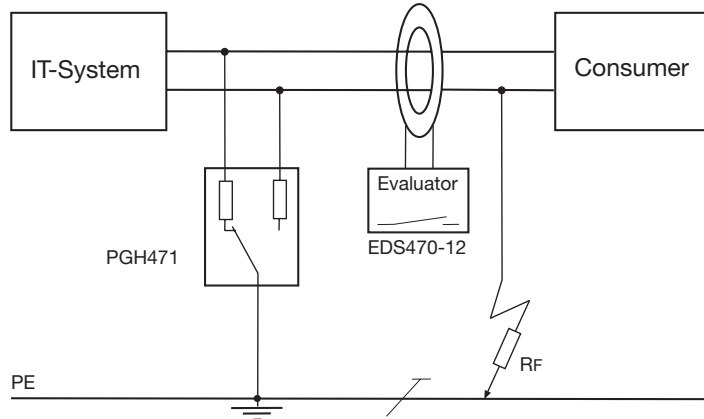
Basic components of the system

An EDS470 system consists of:

- Control and indicating device PRC470
- Insulation fault test device PGH471
- 1 to 30 insulation fault evaluators EDS470-12
- respective number of measuring current transformers of the series W1-S35...W5-S210, W1-P23...W4-P100, WR... or WS...

Function

The EDS470 system works together with a central insulation monitoring device. When an insulation fault is signalled by this insulation monitoring device, the EDS system starts fault location (automatically or manually).



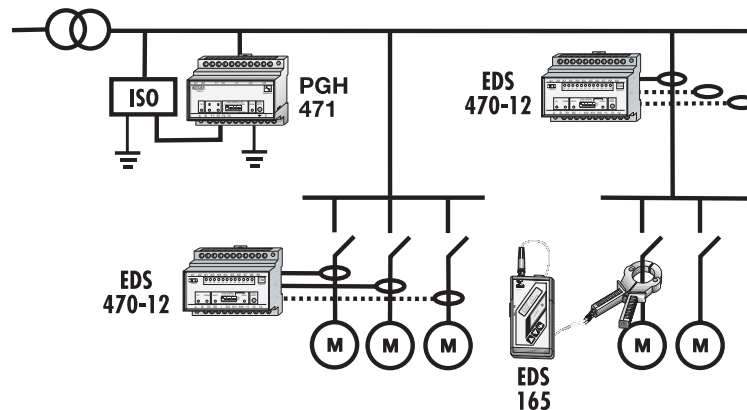
When the first insulation fault occurs, there is a fault current in IT systems which mainly depends on the system leakage capacitances. For this reason, the principal idea of fault location is to close the fault current circuit momentarily via a defined resistance. By means of this principle, a test current which can be detected by the evaluator is driven by the supply voltage itself.

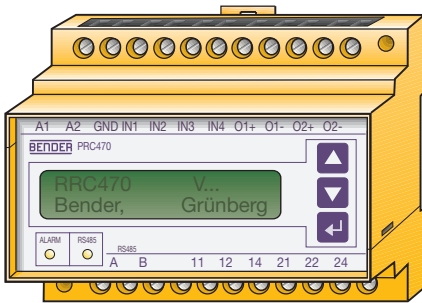
The test current is periodically generated by the insulation fault test device PGH471. Its amplitude and duration are limited. Thereby, the phase conductors are alternately connected via a defined resistance. The test signal flows from the insulation fault test device directly to the location of the insulation fault via the live conductors. From there, it flows back via the insulation fault and the earth conductor (PE conductor) to the test device. This test signal is detected through the measuring current transformers lying in the insulation fault path and is evaluated by the connected electronic evaluator.

By means of filters and electronic, leakage currents up to 10 A are acceptable. The measuring current transformers are used as residual current transformers, i.e. the PE conductor is not led through the current transformer.

The response value is determined by the sensitivity of the insulation fault evaluators EDS470-12 or EDS165. The response value is 5 mA arithmetic mean value in DC, AC as well as in 3AC systems.

System basic components



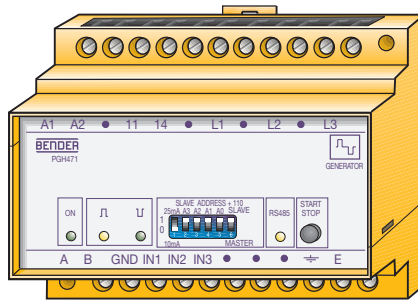


Control and indicating device PRC470

The control and indicating device PRC470 performs the central control and monitoring function. The information exchange between the individual components of the EDS470 system takes place via the RS485 interface. Apart from the control functions and the extended interrogation possibilities, the PRC470 is used to setup the EDS470 system to different system parameters. The PRC470 also may be set to operation with system interferences, e.g. caused by frequency converters with low-frequency leakage currents or switch gear and controls producing transient leakage currents. Additional problems may arise through EMC suppression capacitors which are more and more used to comply with the EMC requirements.

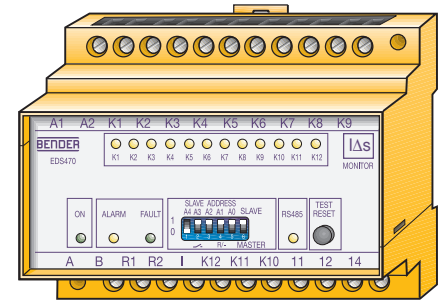
Essential functions are:

- Control and synchronization of the test cycle of the test device PGH471
- Indication via LC display
- Display of the respective test current in each CT circuit
- Display of the connections between current transformer and insulation fault evaluator EDS470-12
- Test function for testing all devices connected
- Setting of the operating principle for each insulation fault evaluator
- Setting of the different measuring current transformer types used
- Setting of the elongation of the measuring time
- Specific scanning of individual CT circuits



Insulation fault test device PGH471

After detecting the insulation fault through the insulation monitoring device, insulation fault location is started via the control and indicating device PRC470. Once the insulation fault test device PRC471 is started, it produces a defined test current signal. To drive the test current, the existing mains voltage is used. The value of the produced test current depends on the size of the existing insulation fault and the system voltage. The test current is limited to max. 25 mA. The maximum test current can be limited to 10 mA via a DIP switch. This limitation is recommended when using the system in control voltage systems with sensitive relays or programmable controllers. If the PGH471 is active, both cycle LEDs light up alternately during the respective cycle.



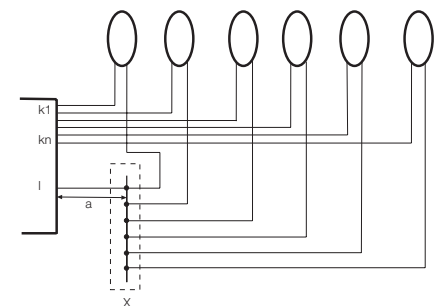
Insulation fault evaluator EDS470-12

The insulation fault evaluator EDS470-12 is controlled by means of a microcontroller. Together with the measuring current transformers it is used to evaluate test current signals generated by the insulation fault test device.

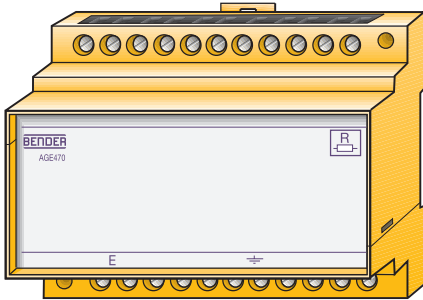
The device subsequently evaluates the signals from all measuring current transformers. If the fault current detected by a measuring current transformer exceeds the response value, the respective alarm LED of the LED line and the alarm LED light up and the alarm relay switches. The alarm relay outputs a common alarm for all measuring channels.

Up to 12 measuring current transformers can be connected to one insulation fault evaluator EDS470-12.

Connection I of the measuring current transformers must be wired in a star connection to terminal I of the evaluator EDS470-12.



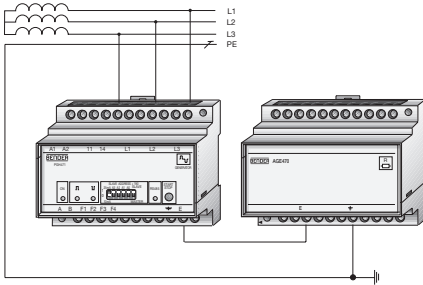
All settings within an EDS system are carried out at the control and indicating device PRC470.



Coupling device AGE470

The EDS470 system is suitable for monitoring and scanning IT systems of AC 45..65 Hz, 20...575 V and DC 20...500V.

The voltage range of AC and DC IT systems can be extended AC 0...790 V, DC 0...960 V by means of the coupling device AGE470.



Connection between the insulation fault test device PGH471 and coupling device AGE470.

Measuring current transformers for EDS470 systems

To meet the precise conditions of an electrical system, different types of measuring current transformers are available for insulation fault location systems EDS470. Measuring current transformers which are commercially available are not suitable for the EDS470 system and must not be used.

Suitable measuring current transformers are listed in the table below.

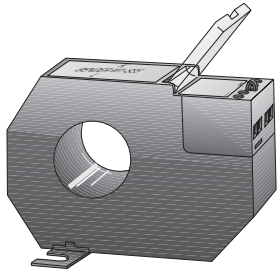
All measuring current transformers listed in the table are highly sensitive and convert even very small residual currents into evaluable signals. Connection to the insulation fault evaluator is carried out via two connecting leads. When installing please make sure that all current-carrying leads of the respective branch are passed through the current transformer. **The PE conductor must not be passed through the current transformer.** The measuring current transformers comply with IEC60185 and DIN VDE 0414.

Measuring current transformers for EDS470 systems

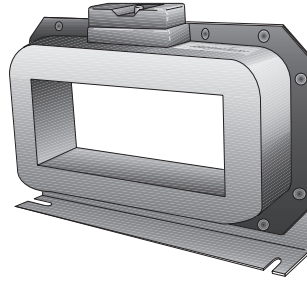
Type	Internal diameter (mm)	Design	Setting	Connection PRC470 menu
W1-S35	35	circular	Standard	screw terminals
W2-S70	70	circular	Standard	screw terminals
W3-S105	105	circular	Standard	screw terminals
W4-S140	140	circular	Standard	screw terminals
W5-S210	210	circular	Standard	screw terminals
W1-P23	23	circular	Standard	6.3 mm Faston
W2-P40	40	circular	Standard	6.3 mm Faston
W3-P60	60	circular	Standard	6.3 mm Faston
W4-P100	100	circular	Standard	6.3 mm Faston
WR70x175	70x175	rectangular	Standard	screw terminals
WR115x305	115x305	rectangular	Standard	screw terminals
WR150x350	150x350	rectangular	Standard	screw terminals
WS50x80	50x80	split-core	split-core	screw terminals
WS80x80	80x80	split-core	split-core	screw terminals
WS80x120	80x120	split-core	split-core	screw terminals

Technical data

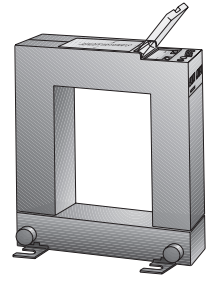
Rated insulation voltage:	AC 690 V
Rated impulse withstand voltage:	6 kV
Contamination level:	3
Dielectric test acc. to IEC 255:	AC 3 kV
Rated transformation ratio:	600:1
Rated burden:	180 Ω
Rated primary current:	10 A
Continuous overload capacity:	20 A
Rated short-time thermal current I (sec.):	14 kA
Nominal power:	50 mVA
Accuracy class:	5
Ambient temperature:	-10°C... + 55°C
Flammability class:	UL94V-0
Length of the connecting leads	
Single wires 0.75 mm ²	up to 1 m
Single wires 0.75 mm ² , twisted	up to 10 m
Shielded cable 0.75 mm ² (shield to terminal I)	up to 25 m



Measuring current transformers series W1-S35 ... W5-S210

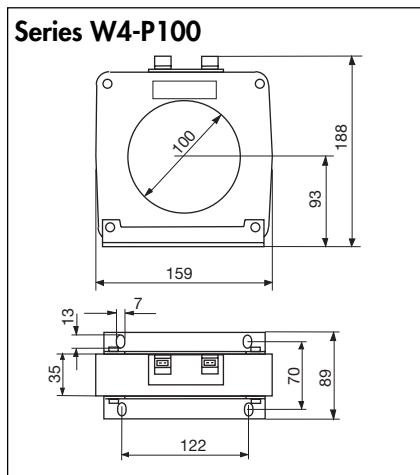
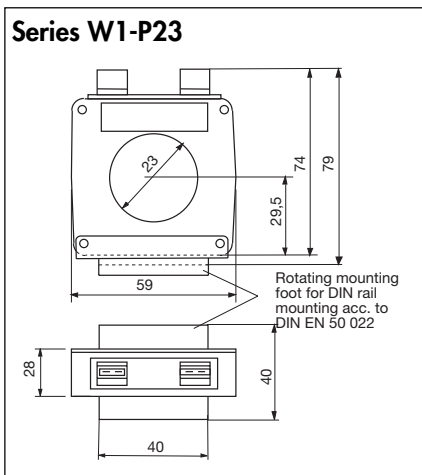


Measuring current transformers series WR...



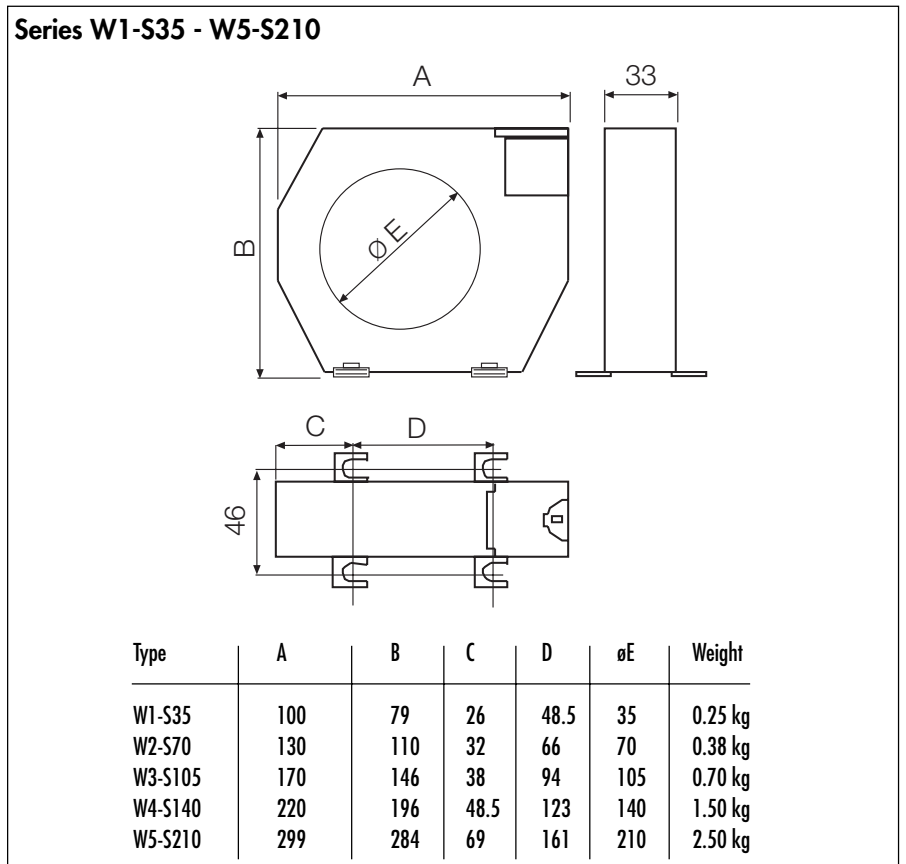
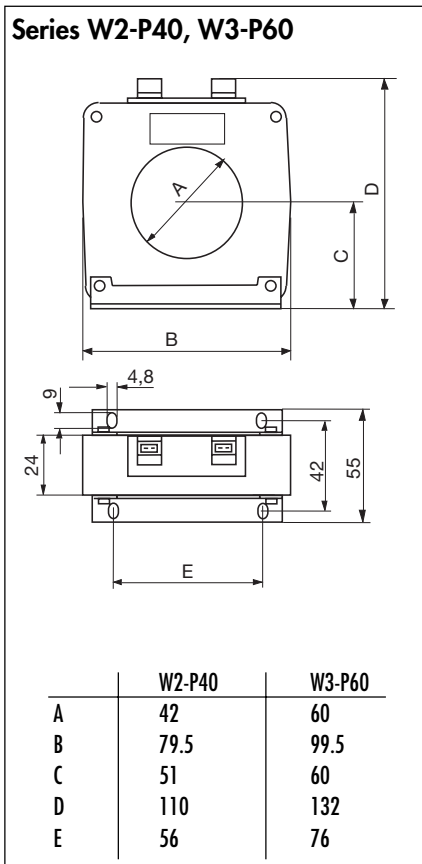
Split-core measuring current transformers series WS...

Dimensions (in mm) and weights (in kg)

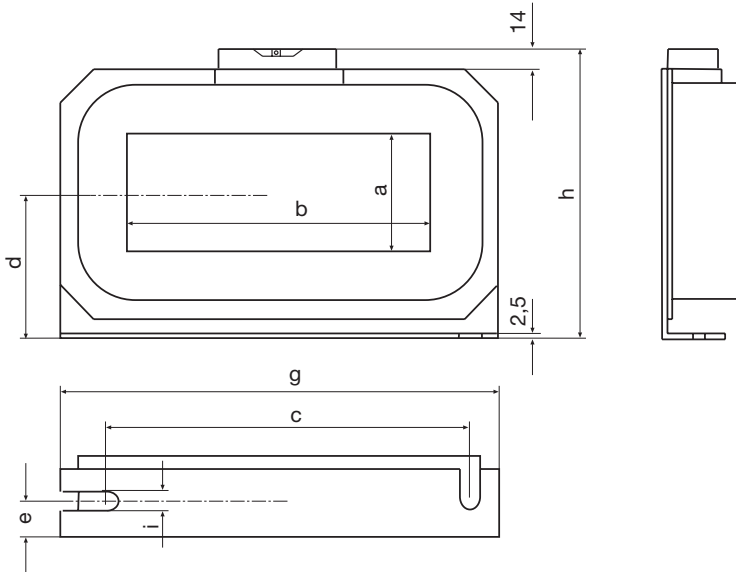


Weights W1-P23 bis W4-P100

W1-P23	0.18 kg
W2-P40	0.35 kg
W3-P60	0.40 kg
W4-P100	1.35 kg



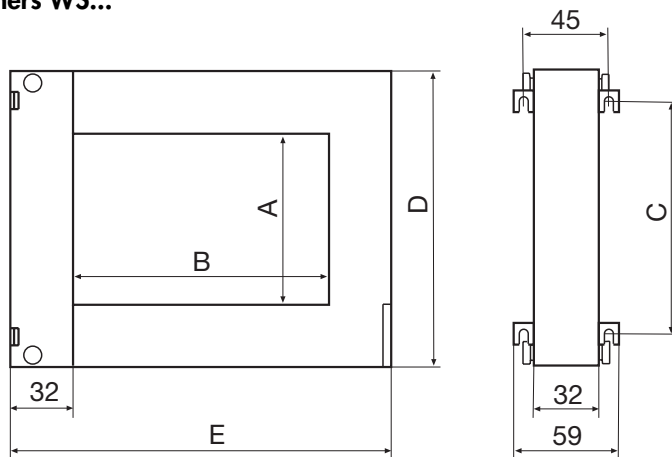
Rectangular measuring current transformers WR...



Type	a	b	c	d	e	f	g	h	i	Weight
WR 70 x 175 S	70	175	225	85	22	46	261	176	7.7	2.40 kg
WR 115 x 305 S	115	305	360	116	25	55	402	240	8	5.45 kg
WR 150 x 350 S	150	350	415	140	28	55	460	285	8	7.40 kg

All dimensions in mm.

Split-core measuring current transformers WS...



Type	A	B	C	D	E	Weight
WS 50x80S	50	80	78	114	145	0.90 kg
WS 80x80S	80	80	108	144	145	1.05 kg
WS 80x120S	80	120	105	144	185	1.25 kg
WS 80x160S	80	160	108	144	225	3.50 kg

All dimensions in mm.

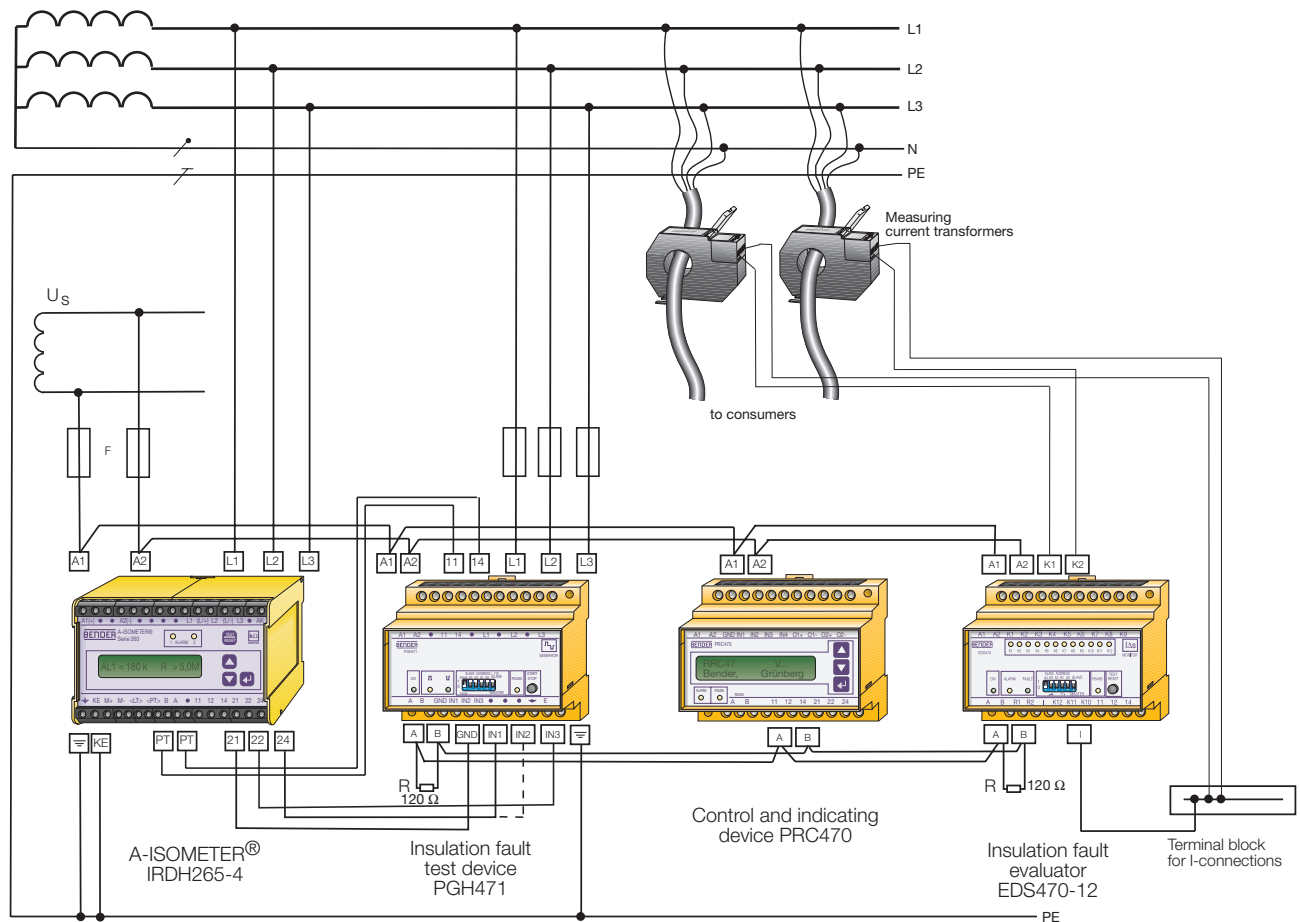
Construction of an EDS470 system

The example of an interconnection diagram opposite shows a central insulation monitoring device IRDH265 monitoring a three-phase IT system. If the insulation value falls below the pre-set response value, the control and indicating device PRC470 will be activated by the insulation monitoring device via the relay contacts 11/14. The control and indicating device is connected to the insulation fault evaluator EDS470-12 and the insulation fault test device PGH471 via the RS485 bus (terminals A and B). After the PGH471 is activated from the PRC470 via the bus, the EDS470-12 starts scanning the connected measuring current transformers. The serial RS485 bus has to be terminated at both ends with a resistor of 120 Ω.

The common connection I to the measuring current transformers must be kept as short as possible. For that reason, a terminal block is used as a starpoint from which the I-lines are connected to the measuring current transformers.

The control and indicating device PRC470, insulation fault test device PGH471, the insulation fault evaluator EDS470-12 and the coupling device AGE470 are incorporated in the enclosure X470 (refer to chapter „Annex“). The devices are suitable for installation into standard distribution panels acc. to DIN 43 871, for DIN rail mounting acc. to DIN EN 50 022 and for screw fixing. All devices are suitable for panel mounting into standard 45 mm cutouts. For frontpanel mounting suitable adaptors are available.

Example of an interconnection diagram of an EDS system



Ordering details

Device components

Type	Supply voltage U_s	Art. No.
EDS470-12	AC 230 V	B 9501 2002 ²⁾
EDS470-1213	AC 90 - 132 V*	B 9501 2005 ²⁾
EDS470-1221	DC 9.6 - 84 V*	B 9501 2006 ¹⁾
PRC470	AC 230 V	B 9501 2001 ²⁾
PRC470-13	AC 90 - 132 V*	B 9501 2004 ²⁾
PRC470-21	DC 9.6 - 84 V*	B 9501 2007 ¹⁾
PGH471	AC 230 V	B 9501 8004 ²⁾
PGH471-13	AC 90 - 132 V*	B 9501 8005 ²⁾
PGH471-21	DC 9.6 - 84 V*	B 9501 8006 ¹⁾
AGE470	-	B 9801 8002

Other supply voltages on request

* This information represents absolute values for the supply voltage, to which the working range is not applicable.

¹⁾ For use in industrial areas

²⁾ Suitable for household and industrial use

Measuring current transformers

Type	Internal diameter in mm	Art. No.
W1 - S35	35	B 911 731
W2 - S70	70	B 911 732
W3 - S105	105	B 911 733
W4 - S140	140	B 911 734
W5 - S210	210	B 911 735
W1 - P23	23	B 911 710
W2 - P40	40	B 911 726
W3 - P60	60	B 911 727
W4 - P100	100	B 911 728
WR70 x 175S	70 x 175	B 911 738
WR115 x 305S	115 x 305	B 911 739
WR150 x 350S	150 x 350	B 911 740
WS50 x 80S	50 x 80	B 911 741
WS80 x 80S	80 x 80	B 911 742
WS80 x 120S	80 x 120	B 911 743
WS80 x 160S	80 x 160	B 911 755

Accessories, system extensions

Type	Remarks	Art. No.
EDS165	Akku 6 V	B 9108 2001
PSA3012	Internal Ø 12mm	B 980 749
PSA3054	Internal Ø 54mm	B 980 698
PSA3165	Internal Ø 100mm	B 980 697

Description see next page.

Standards

The standard IEC 61557-9. This part specifies the requirements for insulation fault locations.

Certifications:



EDS470 system

Insulation fault location system
for IT AC and DC systems

System extensions, accessories

The portable insulation fault evaluator EDS165 represents an ideal complement to the EDS470 system.

This device can be used to track the fault location or to check additional branches manually.

The EDS165 is used in combination with clamp-on probes.

It detects the test current signal of the insulation fault test device PGH471 and works well with an existing EDS 470.

The EDS165 is supplied via batteries. The operation and setting of the EDS165 are carried out by means of the function keys and the LC display.

The EDS165 in combination with three clamp-on probes PSA3012 (with an internal diameter of 12 mm), PSA3054 (with an internal diameter of

54 mm) and PSA3165 (with an internal diameter of 100 mm) meet the precise conditions of the individual system.

The clearly legible LC display indicates the actual test current flowing in the respective branch

and indicates if the alarm value has been exceeded. Furthermore it indicates which clamp-on probe has been selected, the battery charge the selected system frequency and the mode of the buzzer.



The EDS165 in combination with the clamp-on probes PSA3012, PSA3054 resp. PSA3165 can be used as a portable residual current monitoring device in TT and TN systems (earthed systems). The operating mode can be changed by means of a selector.

