

Where you should use an Capacitor Protection Relay? Why you need an Capacitor Protection Relay?

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In compensation systems of energy suppliers or industrial plants

MV (10 kV / 20 kV / 30 kV)

HV (60 kV / 110 kV)

The oil in the capacitors, which serves as dielectric, can inflame at a **temperature of 130-180°C**.

You also can protect your cabinet with an simple Relay, but doesn't come with the features of natural unbalance compensation, two monitoring levels (alarm / trip)

The Protection Relay from Beluk comes with
Detection → **Alarm** → **Trip**

RMS values of fundamental waves without harmonics is measured.

The unbalance current is measured in the **star point connection of two stages**.

The KSR-Z uses the measured phase angle between the measured voltage value **L1-N** and measured current value L1 to determine the **phase offset** between voltage and current.

The connection of N can be omitted, in this case an star point is imitation formed in the device.

In case of exceeding the adjusted thresholds for unbalance or other monitored values the KSR gives an alarm or an trip

(RESET)

Alarm relays can be reset **automatically**,

when the activation signals disappear or it can remain activated until **manually** reset by the user.



Product selection

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Differences:

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KSR 1

Asymmetry monitoring via external voltage or current transformer (0,1 - 20 V AC or 15 mA – 5A)

1-phase measurement

Power supply:
through wide range power supply unit
40 – 250 V AC (45 – 65 Hz) and
40 – 300 V DC

Option:

Modbus
TTL-USB converter
VT Full view door IP54

Software:

01.02.02

Order number:

6KSR1-BEL-H

KSR

Unbalance monitoring
Power input 4
via external current transformer

3-phase measurement
Integrated temperature sensor

Power supply:
AC Typ: B 110V; C 220V;
DC Typ: S 24V; T 48V; U 60V; V 110V; W 220V

Option:

MB Modbus
DM Flash memory + Digital input
TTL-USB converter
VT Full view door IP54

Software:

01.17.xx

Order number:

6KSR-BEL-B-EDM55 (KSR a m DM)
6KSR-BEL-C-E11 (KSR)
6KSR-BEL-E11 oder 55 (KSR a m)
6KSR-BEL-V-EMB11 (KSR MB)

Power supply selectable
E = Overloadable (current max. 200 A / 1 sec.)
Option selectable
Current measurement input selectable

KSR-Z

Unbalance monitoring
Power input 4
via external current transformer

3-phase measurement
Integrated temperature sensor

Power supply :
AC Typ: B 110V; C 220V;
DC Typ: S 24V; T 48V; U 60V; V 110V; W 220V

Configured alarm system for fast commissioning
Tripping according to time or IEC characteristics
Extended equipment:
Error memory
Modbus
1 DI additional

Option:

TTL-USB converter
VT Full view door IP54

Software:

02.00.xx

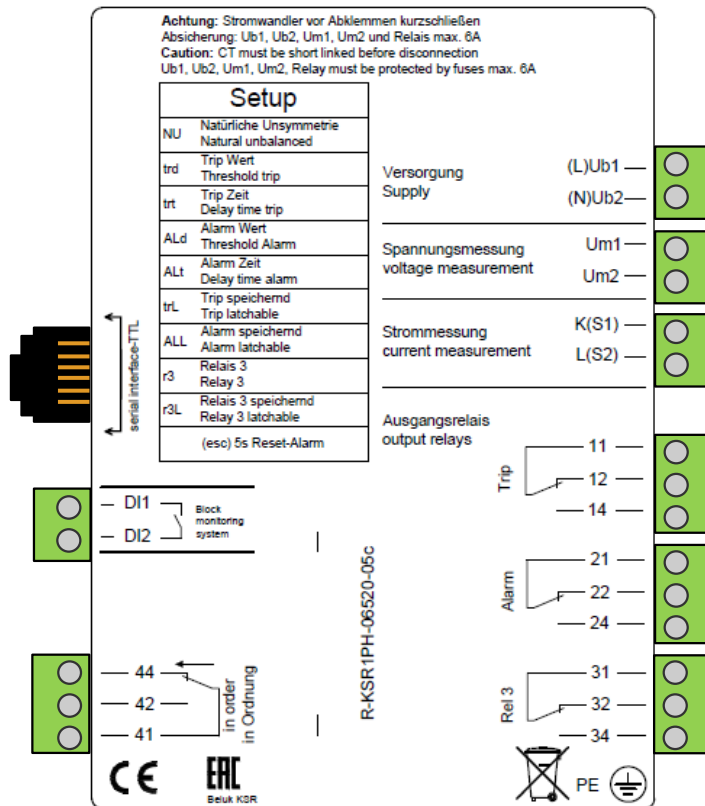
Order number:

6KSR-BEL-B-Z11,15 oder 55

Power supply selectable
Current measurement input selectable

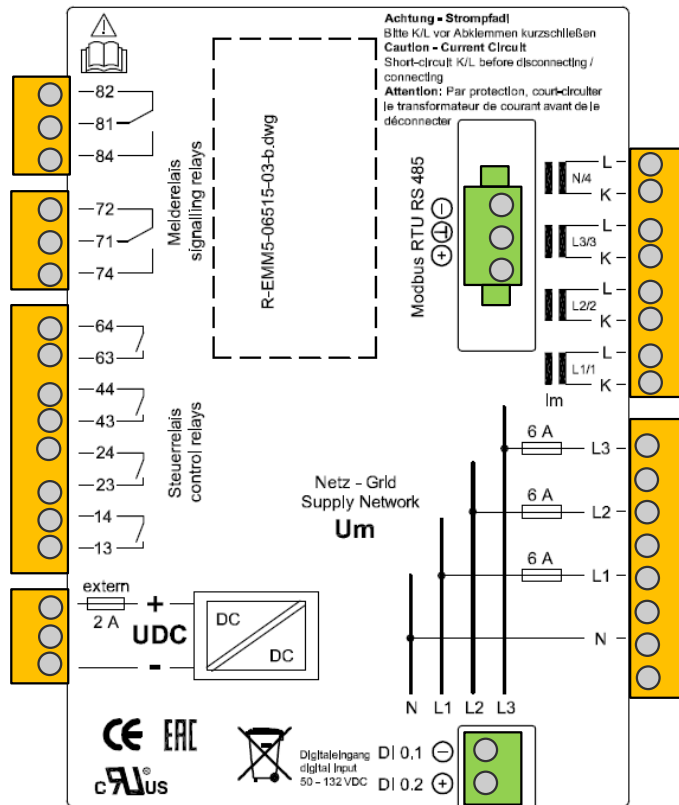
KSR-1

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Current or voltage transformer necessary!

Power supply	wide-range power supply 40 – 250 V AC (45 – 65 Hz) 40 – 300 V DC
Fuse	Max. 6 A
Voltage measure	0,1 – 20 V; Burden 240 kΩ VT ratio adjustable: 1 – 350 Overload: 120 V (continuous), 500 V (10 s) Accuracy: 0,5 % from upper range value
Current measure	15 mA – 5 A; Burden 20 mΩ CT ratio adjustable: 1 – 4000 Overload: 25 A (continuous), 100 A (1 s) Accuracy: 0,5 % from upper range value
Switching outputs	4 change-over contacts potential-free; max. fuse 6 A, max. switching rating AC: 1250 VA; max. switching voltage: 440 V AC Max. switching rating DC (ohmsch): 30 V / 5 A 60 V / 1 A 110 V / 0,5 A 220 V / 0,3 A
Digital input	10-30 VCD / Function: Blocking alarm /trip
Interface	TTL; Rear
Conformity and listing	CE; UL; EAC
Terminals	screw terminal, max. 4 mm ² starr, 2,5 mm ² flexibel
Protection class	Front: IP50, (IP54 by using a gasket) Backside: IP20
Ambient temperatur	Operation: -20°C -70°C; Storage: -40°C - 85°C
Dimensions	144 x 144 x 58mm (H x B x T), cut-out: 138+0,5 x 138+0,5 mm
Standards	DIN VDE 0110 Teil 1 (IEC 60664-1:1992) VDE 0411 Teil 1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843 Teil 20 (DIN EN 61326 / IEC 61326: 1997 + A1:1998 +A2: 2000)

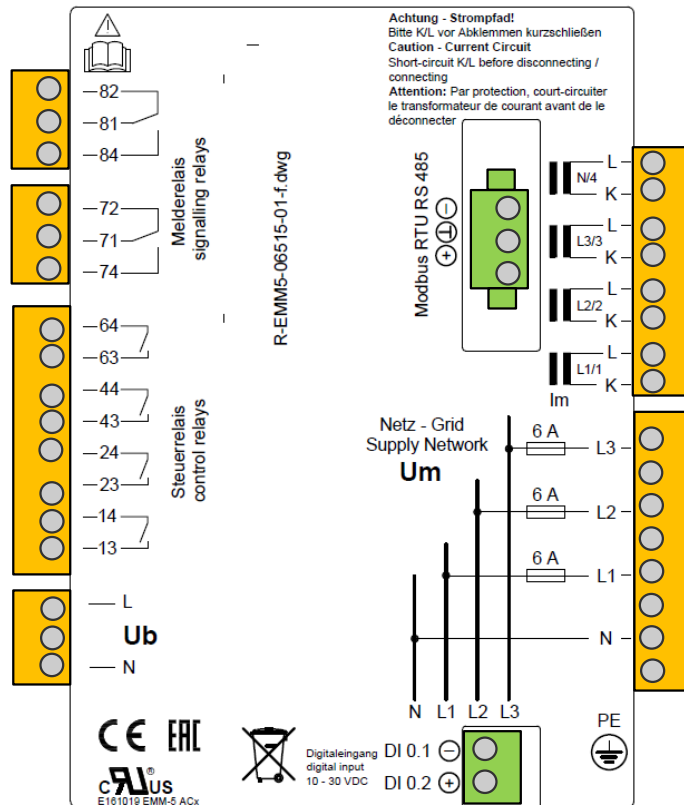


Current transformer necessary!

Power supply	AC Typ: B 110V; C 220V; DC Typ: S 24V; T 48V; U 60V; V 110V; W 220V
Fuse	Max. 6 A
Voltage measure	L-N 55V - 318V, L-L 95V - 550V, 45 - 65Hz, VT ratio adjustable: 1 - 4000
Current measure	0,05A - 5A (Type 55) or 0,02A - 1A (Type 11) Power consumption < 1VA Burden: 15 mΩ CT ratio adjustable: 1 - 10000 Overload: 20% (continuous), 50A for 1 Sec. (5A-Type), 10A for 1 Sec. (1A-Type)
Switching outputs	2 changeover contacts, potential-free, switching rating: 250V AC / 5A, 30V DC / 5A (ohmsch)
Switching outputs	4 normally open contacts, potential-free switching rating: 250V AC / 3A, 30V DC / 3A (ohmsch) alternatively: 4 Opto-couplers, potential-free, Open-collector switching rating: 250V DC / 0,1A
Integrated temperature sensor	NTC 30°C - 50°C
Conformity and listing	CE; UL; EAC
Terminals	screw terminal, max. 6 mm ² starr, 4 mm ² flexibel
Protection class	Front: IP 54, Backside: IP 20
Ambient temperatur	Operation: 0°C - 70°C; Storage: -20°C - 85°C
Dimensions	144 x 144 x 58mm (H x B x T), cut-out 138+0,5 x 138+0,5 mm
Standards	DIN VDE 0110 Teil 1 (IEC 60664-1:1992) VDE 0411 Teil 1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843 Teil 20 (DIN EN 61326 / IEC 61326:1997 + A1:1998 + A2:2000)

KSR-Z

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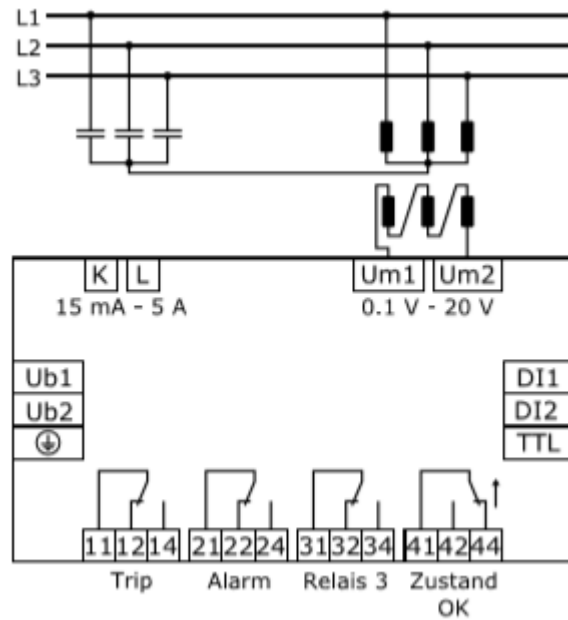
Current transformer necessary!

Power supply	AC Typ: B 110V; C 220V; DC Typ: S 24V; T 48V; U 60V; V 110V; W 220V
Fuse	Max. 6 A
Voltage measure	L-N 55V - 318V, L-L 95V - 550V, 45 - 65Hz, Burden: 3 mΩ VT ratio adjustable: 1 - 4000
Current measure	1A -Typ: 20mA...1A 5A -Typ: 50mA...5A Burden: 15 mΩ CT ratio adjustable 1 - 10000 Overload: 20% (continuous), Burden: 100 mΩ (1A Typ); 30mΩ (5A Typ)
Switching outputs	2 changeover contacts, potential-free, switching rating: 250V AC / 5A, 30V DC / 5A (ohmsch)
Switching outputs	4 normally open contacts, potential-free switching rating: 250V AC / 3A, 30V DC / 3A (ohmsch)
Digital input	10-30 VCD or 50-132 VCD
Integrated temperature sensor	NTC 30°C - 50°C
Conformity and listing	CE; UL; EAC
Terminals	screw terminal, max. 6 mm ² starr, 4 mm ² flexibel
Protection class	Front: IP 52, Backside: IP 20
Ambient temperatur	Operation: 0°C -70°C; Storage: -20°C - 85°C
Dimensions	144 x 144 x 58mm (H x B x T), cut-out: 138+0,5 x 138+0,5 mm
Standards	DIN VDE 0110 Teil 1 (IEC 60664-1:1992) VDE 0411 Teil 1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843 Teil 20 (DIN EN 61326 / IEC 61326:1997 + A1:1998 + A2:2000))

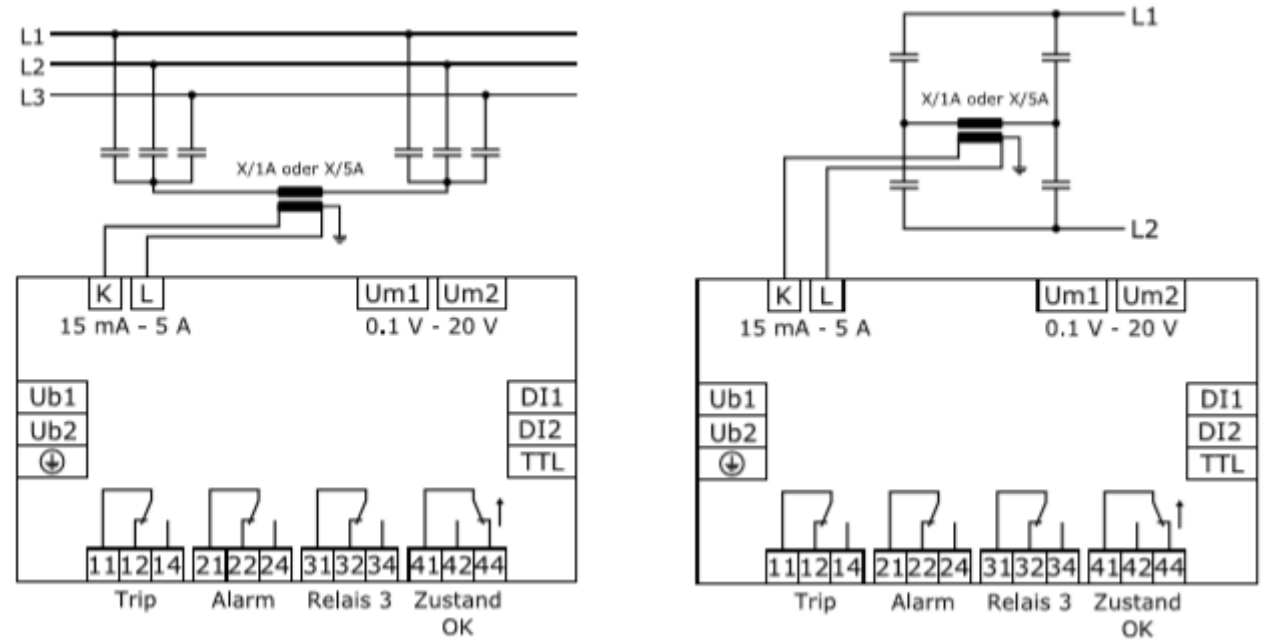
KSR1

Connection diagram

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Unbalance voltage monitoring

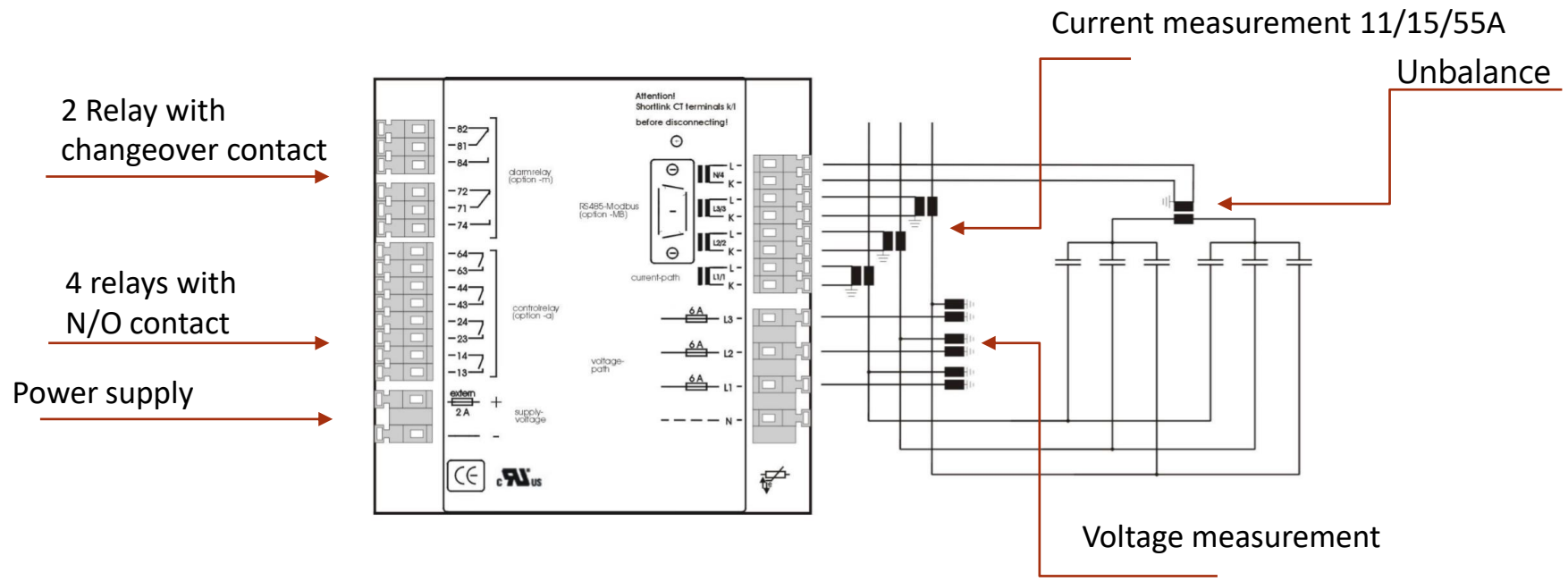


Unbalanced current monitoring

KSR / KSR-Z

Connection diagram

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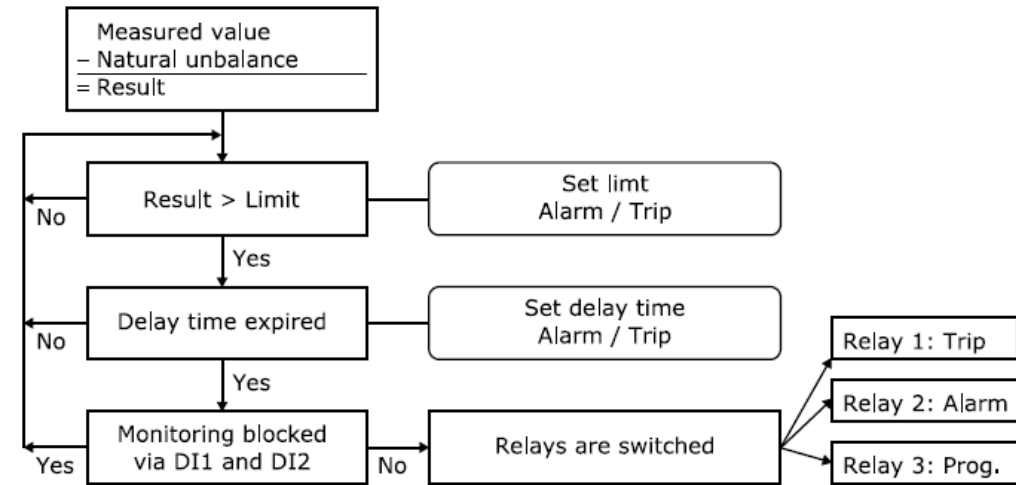
Relay switching outputs
e.g. for alarm signaling,
Triggering a safety shutdown,
Self-monitoring function as live contact (Watchdog)

How does an Capacitor Protection Relay work?

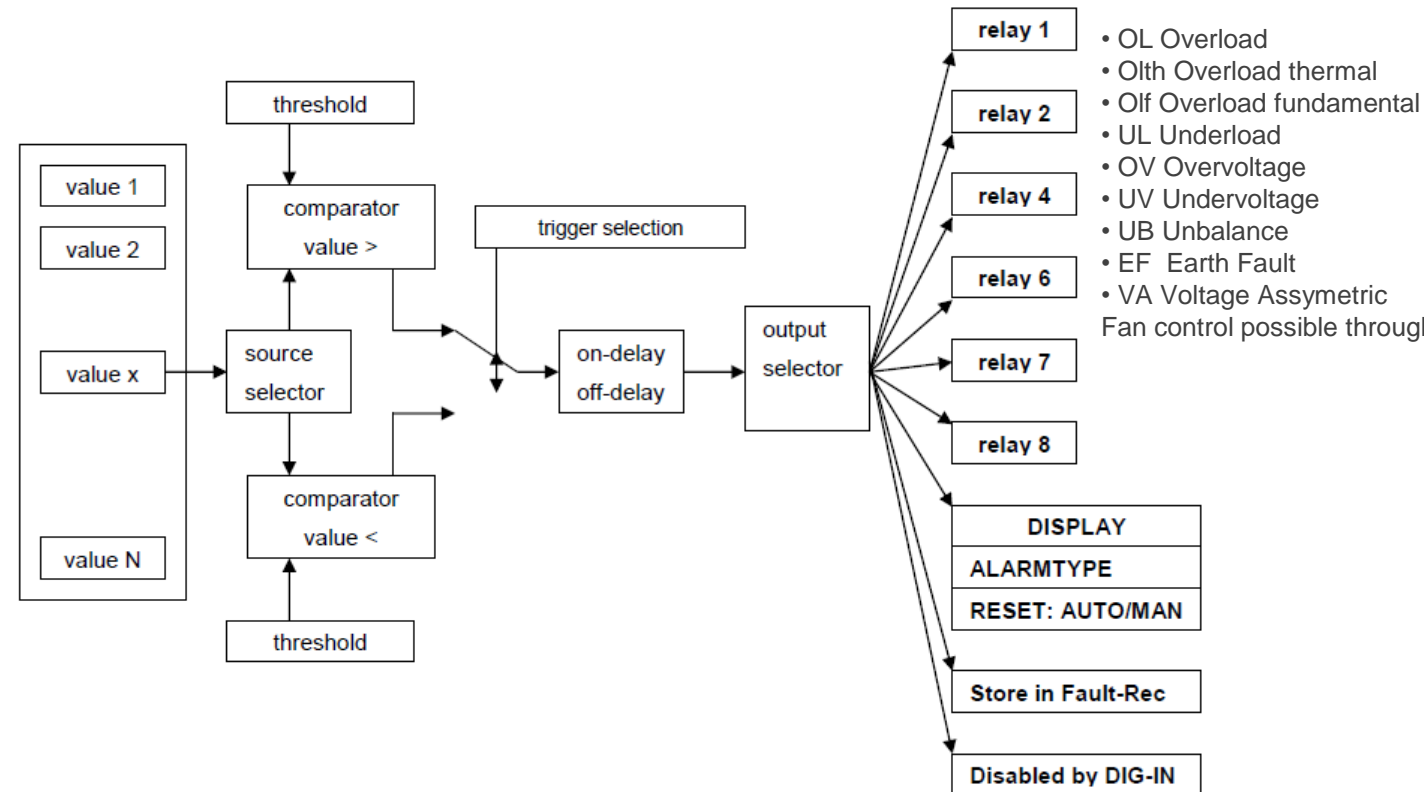
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Schematic diagramm:

KSR 1



KSR /KSR-Z



Defined Alarms for KSR-Z

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Protection setting:	Monitored values:	Operated Relay	Relay N/C	Store in FR	Blocked by DI	Display message	Display	
							Auto reset	Man. reset
OL Alarm	TRMS current L1, L2, L3	Relay 1	*	*	*	*	*	
OL Trip		Relay 4	*	*	*	*		*
UL Alarm	TRMS current L1, L2, L3	Relay 2	*	*	*	*	*	
UL Trip		Relay 4	*	*	*	*		*
OL _{th} Alarm	Thermal damped current L1, L2, L3	Relay 1	*	*	*	*	*	
OL _{th} Trip		Relay 4	*	*	*	*		*
OL _f Alarm	Fundamental current L1, L2, L3	Relay 1	*	*	*	*	*	
OL _f Trip		Relay 4	*	*	*	*		*
UB Alarm	Current channel 4	Relay 2	*	*	*	*	*	
UB Trip		Relay 4	*	*	*	*		*
EF Alarm	Calculated earth fault current	Relay 8	*	*	*	*	*	
EF Trip		Relay 4	*	*	*	*		*
VA Alarm	Voltage asymmetry between all phases	Relay 7	*	*	*	*	*	
VA Trip		Relay 4	*	*	*	*		*
OV Alarm	TRMS voltage L1-L2, L2-L3, L1-L3	Relay 7	*	*	*	*	*	
OV Trip		Relay 4	*	*	*	*		*
UV Alarm	TRMS voltage L1-L2, L2-L3, L1-L3	Relay 7	*	*	*	*	*	
UV Trip		Relay 4	*	*	*	*		*

Trip Example:

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KSR1 und KSR

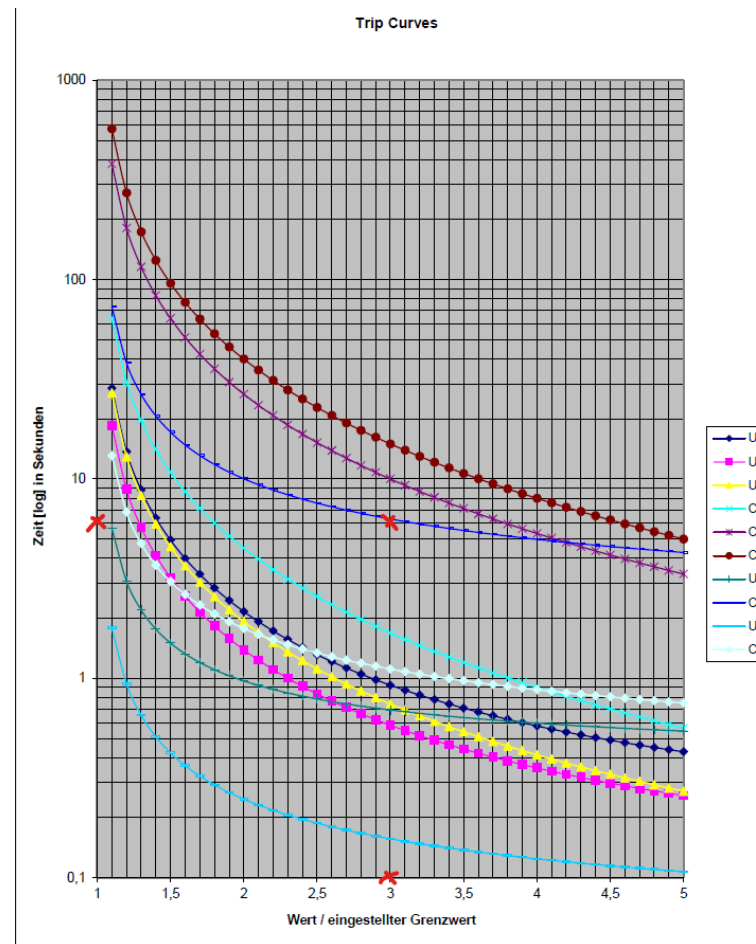
Limit value monitoring / Triggering after time X

for example:

Limit value 3A is set.

Alarm after 2 sec

Trigger/ trip after 5 sec.



Tripping according to IEC and VDE standard

KSR-Z

Limit value monitoring according to IEC tripping depending on the current intensity!

Trip / Alarm time depends on the exceeding level of the adjusted threshold!

for example:

limit value 3A

Alarm after fixed 3 sec

Trigger/ trip after 8 sec.

Triggering / Trip U2 -> at 3A after 6 sec

The higher the current, the faster the relay reacts!

The following tripping characteristics are available:

U1 = U.S. Moderately inverse

U2 = U.S. Inverse

U3 = U.S. Very inverse

U4 = U.S. Extremely inverse

U5 = U.S. Short-time inverse

C1 = I.E.C. Class A – Standard inverse

C2 = I.E.C. Class B – Very inverse

C3 = I.E.C. Class C – Extremely inverse

C4 = I.E.C. Long-time inverse

C5 = I.E.C. Short-time inverse

Which settings do you have to do?

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Set parameters:										
voltage transformer:		1								
current transformer IL1-IL3:		1								
current transformer IL4:		1								
Tau:	300 Sec.									
Relay settings:										
Output	Terminal	without Message	Reset							
1	13/14	open	manual							
2	23/24	open	manual							
4	43/44	closed	manual							
6	63/64	closed	manual							
7	71/72/74	open	automaticlly							
8	81/82/84	open	automaticlly							
Monitoring system settings:										
Alarm ID	Source	Trigger	Limit	T-on	T-off	Output	Text	Text-Reset	Memory	Disable by DI
1	If1	>	0,65A	0,4s	0,1s	1, 4, D	UB ALARM	manual	n. V.	n. V.
2	If2	>	0,65A	0,4s	0,1s	1, 4, D	UB ALARM	manual	n. V.	n. V.
3	If3	>	0,65A	0,4s	0,1s	1, 4, D	UB ALARM	manual	n. V.	n. V.
4	If4	>	0,65A	0,4s	0,1s	1, 4, D	UB ALARM	manual	n. V.	n. V.
5	If1	>	1,15A	0,2s	0,1s	2, 6, D	UB TRIP	manual	n. V.	n. V.
6	If2	>	1,15A	0,2s	0,1s	2, 6, D	UB TRIP	manual	n. V.	n. V.
7	If3	>	1,15A	0,2s	0,1s	2, 6, D	UB TRIP	manual	n. V.	n. V.
8	If4	>	1,15A	0,2s	0,1s	2, 6, D	UB TRIP	manual	n. V.	n. V.

Relay characteristics / alarm text freely configurable

- Overload (OL)
- Overvoltage (OV)
- Undervoltage (UV)
- Protection of capacitors against harmonic overload (OL th)
- Unbalance protection capacitor stages (UB)
- Asymmetry detection in double star and H-bridge circuits
- Unbalance protection Protection against recurring overload and overvoltage peaks (OL f)
- Earth fault detection (EF)
- Voltage unbalance monitoring (VA)
- Change contacts for safe switch-off
- Fan control possible through integrated temperature sensor

Capacitor Protection Relay

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Order now!

You have questions about our products, we are happy to help.

Contact us by mail
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Our team will also be happy to advise you at
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