



Residual-current-operated circuit-breaker with miniature circuit-breaker for universal current F 220 range

The benefits:

- Compact design
- MCB with K characteristic
- Resistant to nuisance tripping





For electronic equipment
with residual Type B currents  
DIN VDE 0160/DIN EN 50 178

Residual-current-operated circuit-breaker with overcurrent release for universal current, F 220 range for residual currents of type B

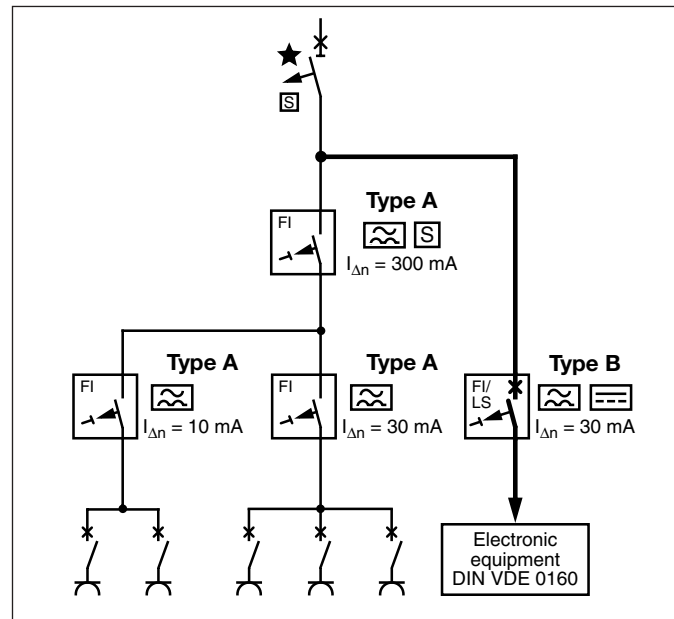


Application:

In areas of electrical equipment where RCCB's or RCBO's (RCD's) are planned or are present, there are special requirements concerning the installation/commissioning of electronic equipment (EE).

Manufacturers of electronic equipment must check their electrical equipment in accordance with VDE 0160/EN 50178 to establish whether residual currents of type A  or type B  are flowing via the filter.

In the case of type B, the documentation for the equipment must include a note on the configuration which states that an RCD of type B for universal current must be connected on the supply side in front of the existing RCD of type A.



SK 0117 Z01

Important notice to the buyer:

Only RCD-well tolerated electronic equipment (EE) must be applied!

Main objective of any RCD, is, depending on its sensitivity, to ensure the following protection:

• To protect against:

- the lethal effects of direct contact with live parts
- electrical shock in the case of indirect contact with live parts
- electrical ignited fires due to earth leakage currents

The level of discharge currents via filter of the EE in normal operation might cause nuisance tripping of the RCD. This can be prevented by using high quality EE filters. This is under the responsibility of the EE supplier.

Selection of relevant areas with EE

(EE: Electronic equipment, i.e frequency converter, converter...)




Distribution board for construction sites	Cranes Pumps Mixers
Buildings	lift / elevator control
Rooms for medical use	Tomographs X-ray devices
Sewage plants	Pumps
Air conditioning/ventilation	Fans
Machines	particularly for export to countries with common use of RCCB's
Temporary buildings, showrooms	Carousel
Photovoltaic supply systems	after the power inverter

Selection table

Rated residual current $I_{\Delta n}$ mA	Rated current I_n A	Ordering information		bbn 40 16779 EAN	Unit price €	Price group	Unit weight kg	Pack units
		Short description	Order no.					





Universal Residual-current-operated circuit-breaker with overcurrent protection (RCBO)

Range F 220 BF for residual currents of type B

30	16	F 224 BF-K16/0.03	GH F224 0268 R2467	50421 8				1
30	32	F 224 BF-K32/0.03	GH F224 0268 R2537	50427 0				1
30	63	F 224 BF-K63/0.03	GH F224 0268 R2607	50447 8				1
300 	16	F 224 S-K16/0.3	GH F224 0368 R4467	50425 6				1
300 	32	F 224 S-K32/0.3	GH F224 0368 R4537	50429 4				1
300 	63	F 224 S-K63/0.3	GH F224 0368 R4607	50445 4				1

Technical data

Specifications:	Based on VDE 0664-20, EN 61009, IEC 1009, IEC 755, EN 60947-2, IEC 947-2
Number of poles:	4 poles
Rated currents I_n:	16, 32 and 63 A
Rated residual-currents $I_{\Delta n}$:	30 and 300 mA
Tripping characteristic:	K in accordance with DIN VDE 0660-101, IEC 947-2

	at 	at 	at 
Tripping range:	0.50 ... 1.0 x $I_{\Delta n}$	0.11 ... 1.4 x $I_{\Delta n}$	0.50 ... 2.0 x $I_{\Delta n}$
Tripping times:			
– 30 mA version ($t_v = 10$ ms)	1 x 1.0 x $I_{\Delta n}$: ≤ 200 ms 5 x 1.0 x $I_{\Delta n}$: ≤ 40 ms	1 x 1.4 x $I_{\Delta n}$: ≤ 200 ms 5 x 1.4 x $I_{\Delta n}$: ≤ 40 ms	1 x 2.0 x $I_{\Delta n}$: ≤ 200 ms 5 x 2.0 x $I_{\Delta n}$: ≤ 40 ms
– 300 mA version 	1 x 1.0 x $I_{\Delta n}$: 0.13 ... 0.5 s 2 x 1.0 x $I_{\Delta n}$: 0.06 ... 0.2 s 5 x 1.0 x $I_{\Delta n}$: 0.05 ... 0.15 s 500 A: 0.04 ... 0.15 s	1 x 1.4 x $I_{\Delta n}$: 0.13 ... 0.5 s 2 x 1.4 x $I_{\Delta n}$: 0.06 ... 0.2 s 5 x 1.4 x $I_{\Delta n}$: 0.05 ... 0.15 s 500 A: 0.04 ... 0.15 s	1 x 2.0 x $I_{\Delta n}$: 0.13 ... 0.5 s 2 x 2.0 x $I_{\Delta n}$: 0.06 ... 0.2 s 5 x 2.0 x $I_{\Delta n}$: 0.05 ... 0.15 s 500 A: 0.04 ... 0.15 s

Surge current withstand capacity:

- 30 mA version 250 A (pulse waveshape 8/20) and 200 A (ring wave) according to EN 61009
- 300 mA version 3000 A (pulse waveshape 8/20) and 200 A (ring wave) according to EN 61009

Rated voltage U_n : 230/400 V~

Max. operating voltage U_{Bmax} : $U_n + 10\%$

Frequency range: 50 ... 60 Hz

Operating voltage of test device U_T : 195 ... 264 V~ between L-N or with 3 wire connection between L-L 400 V~

Insulation co-ordination:

- overvoltage category III
- degree of pollution 2
- rated impulse withstand strength U_{imp} 4 kV
- test impulse voltage (1,2/50 μ s) 6 kV

Insulation resistance (50/60 Hz): 2.5 kV

Housing: grey plastic material (RAL 7035)

Operating handle: black

Test button: white

Reset handle (fault-current indicator): blue

Degree of protection: IP 20, IP 40 in the distribution board

Protection against unintentional touch: in accordance with DIN VDE 0106, part 100

Cover dimensions: in accordance with DIN VDE 43 880, size 1

Device depth: 68 mm

Mounting position: optional

Fixing: Snap-on fixing onto DIN rail, 35 mm

Cable cross action of MCB and RCCB block: 0.75 – 16 mm²/1 – 25 mm²

Connection: Single connection or group connection via busbar
RCCB's with overcurrent release can be switched on or off with the black operating handle. The black handle can only be switched on if the blue handle is in the "I-ON" position.

Terminal for MCB: Combination box terminal with screw M5

RCCB: Frame terminal with screw M5

Service live of device: > 5.000 switching cycles

Climatic withstand capability according to EN 61009 or IEC 68 part 2-30: Resistant to heat and humidity, cyclical

Ambient temperature: $T_{min} - 25$ °C, $T_{max} +55$ °C

Storage temperature: $T_{min} - 35$ °C, $T_{max} +60$ °C

Vibration resistance: in accordance with DIN VDE 0664-20, IEC 1009, EN 61009

Trip-free mechanism: yes

Tripping behaviour of the circuit-breaker:

According to specification	Tripping characteristic and rated current range	Thermal tripping device ①			Electromechanical tripping device ②		
		Test currents: non tripping current I_1	tripping current I_2	Tripping times	Test currents: Maintain impulse current of $8 \cdot I_n$	Switch off at latest for $12 \cdot I_n$	Trigger times
DIN VDE 0660 section 101	K 16, 32 and 63 A	$1.05 \cdot I_n$	$1.2 \cdot I_n$ $1.5 \cdot I_n$ $6.0 \cdot I_n$	$> 2 \text{ h}$ $< 2 \text{ h}$ ③ $< 2 \text{ min.}$ ③ $> 2 \text{ s (T 1)}$	$8 \cdot I_n$	$12 \cdot I_n$	$> 0.2 \text{ s}$ $< 0.2 \text{ s}$

① See below for effect produced by ambient temperature

② The tripping values for the electromagnetic tripping device apply for alternating current 50...60 Hz

③ At operating temperature (after $I_n > 1 \text{ h}$ or 2 h)

Effect of the ambient temperature on the tripping behaviour

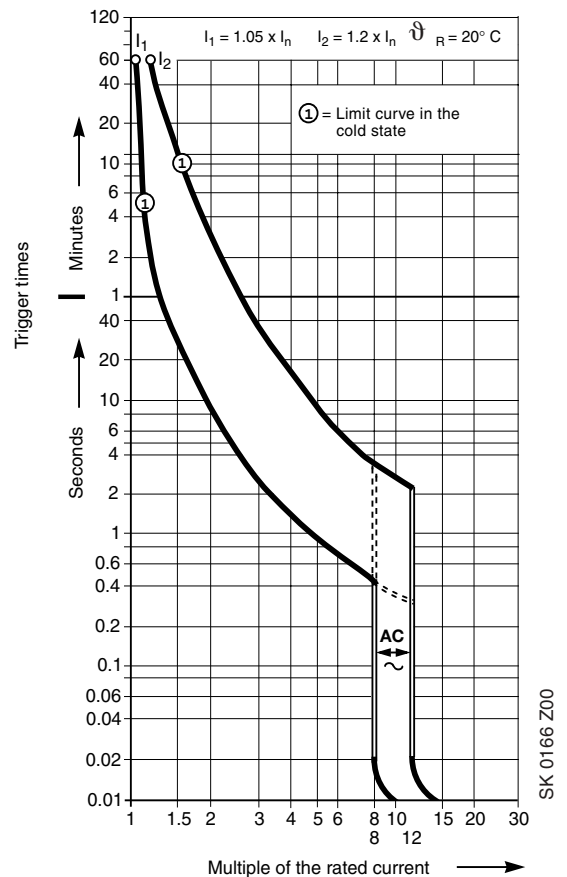
The thermal tripping devices are set to a nominal ambient temperature of 20°C for K. If temperature variations occur, the values for I_n in the table above are

- reduced by approx. 5% per 10 °C if the temperature rises
- increased by approx. 5% per 10 °C if the temperature drops

The electromechanical tripping devices operate independently of the ambient temperature.

Internal resistance and power loss per pole

Type	Rated current/A	R_i mΩ	P_{vmax} W
F 220 BF	16/0.03	14	3.5
	32/0.03	5.2	5.4
	63/0.03	1.8	7.3
	16/0.3	21	5.5
	32/0.3	7.2	7.4
	63/0.3	2.3	9.3



Short-circuit rupturing capacity and maximum back-up protection ④

Operating sequence according to DIN VDE 0660 part101 or IEC 947-2 ($I_{\Delta n}$)

Tripping characteristic and rated current	kA/cos φ 230/400 V	Max. back-up fuse	
		Main circuit-breaker S 700	Fuse gL
K 16, 32 und 63 A	6/0.7	100 A	100 A

④ Back-up protection is only required if the short-circuit current expected at the installation site may exceed the given short-circuit capacity

Accessories

For miniature circuit-breakers from the ranges S 260®, S 270® and S 280® as well as residual-current-operated circuit-breakers "multi-STOTZ" from the ranges F 270/6, F 271, F 172, F 224

Selection table

Ordering information		bbn 40 12233 EAN	Unit price €	Price group	Unit weight kg	Pack units
Short description	Order no.					

Auxiliary contact

1 NO + 1 NC	S2-H11	GH S270 1916 R0001	61500 1	5	0,04	1
2 NO	S2-H20	GH S270 1916 R0002	61510 0	5	0,04	1
2 NC	S2-H02	GH S270 1916 R0003	61520 9	5	0,04	1

Auxiliary contact (Plug connection) 2 x (2,8 x 0,8)

1 NO + 1 NC	S2-H11 X	GH S270 1917 R0001	61530 8	5	0,04	1
2 NO	S2-H20 X	GH S270 1917 R0002	61540 7	5	0,04	1
2 NO	S2-H02 X	GH S270 1917 R0003	61550 6	5	0,04	1

Auxiliary contact

2 NO + 1 NC	S2-H21	GH S270 1936 R0001	01370 3 ①	5	0,05	1
1 NO + 2 NC	S2-H12	GH S270 1936 R0002	01380 2 ①	5	0,05	1
3 NO	S2-H30	GH S270 1936 R0003	01390 1 ①	5	0,05	1
3 NC	S2-H03	GH S270 1936 R0004	01400 7 ①	5	0,05	1

Auxiliary contact, low power

2 NO + 1 NC	S2-H21 kL	GH S270 1937 R0001	12810 0 ①	5	0,05	1
1 NO + 2 NC	S2-H12 kL	GH S270 1937 R0002	12820 9 ①	5	0,05	1
3 NO	S2-H30 kL	GH S270 1937 R0003	12830 8 ①	5	0,05	1
3 NC	S2-H03 kL	GH S270 1937 R0004	12840 7 ①	5	0,05	1
1 NO	S2-H10 kL	GH S270 1937 R0005	33140 1 ①	5	0,05	1

Signal contact

S2-S	GH S280 1902 R0008	42920 2	5	0,05	1
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Signal contact/Auxiliary contact

with screw connection	S2-S/H	GH S280 1901 R0008	42900 4	5	0,05	1
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Undervoltage release

12 V DC	S2-UA 12	GH S280 1911 R0001	42970 7	5	0,09	1
24 V AC/DC	S2-UA 24	GH S280 1911 R0002	42980 6	5	0,09	1
48 V AC/DC	S2-UA 48	GH S280 1911 R0003	79360 0	5	0,09	1
110 V AC/DC	S2-UA 110	GH S280 1911 R0004	43000 0	5	0,09	1
220 V AC/DC	S2-UA 220	GH S280 1911 R0005	43010 9	5	0,09	1
380 V AC	S2-UA 380	GH S280 1911 R0006	79370 9	5	0,09	1

Shunt trip

12... 60 V=	S2-A1	GH S280 1909 R0001	42930 1	5	0,145	1
100...415 V~ and 110...250 V=	S2-A2	GH S280 1909 R0002	42940 0	5	0,145	1

① bbn-no.: 40 16779



SK 0328 B 91

S 2-H 11



SK 0329 B 91

S 2-H 11 X



SK 0332 B 91

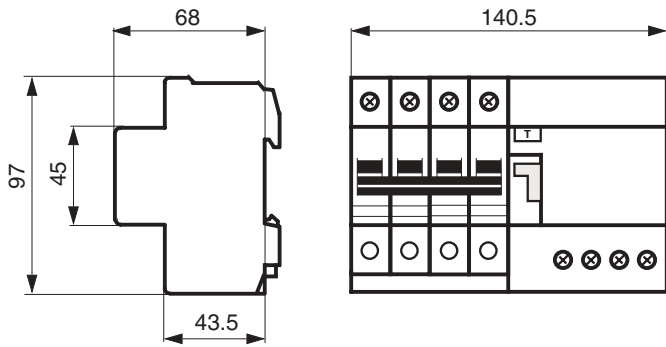
S 2-S/H



SK 0330 B 91

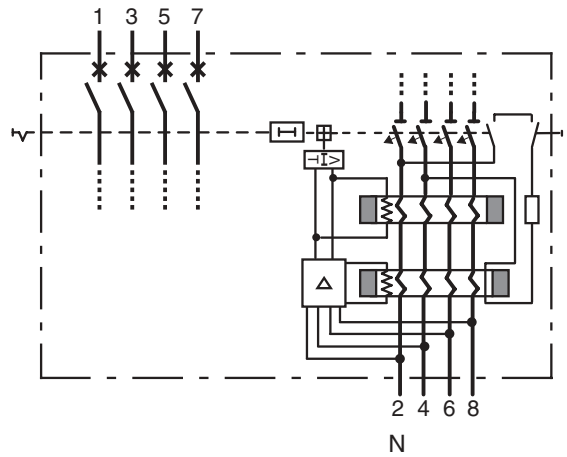
S 2-A ...

Dimensions



SK 0116 Z00

Wiring diagram



In the case of 3-wire connection, connect terminals 4, 6 and 8; insert a jumper between 2/N and 6 to guarantee the function of the test button.

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