

MCBs 60 V DC according to UL 489 for Branch Circuit Protection

System pro *M* compact



MCB 60 V DC according to UL 489 for Branch Circuit Protection

Series type S 201 DC-K and S 201 DC-Z with or without integrated auxiliary switch

This series - 1-pole with K- and Z-type characteristics for 60 V AC/DC - has been designed for **control circuits** in machinery and plant that have to meet the requirements provided for in **UL 489**, i.e. **branch circuit protection**.

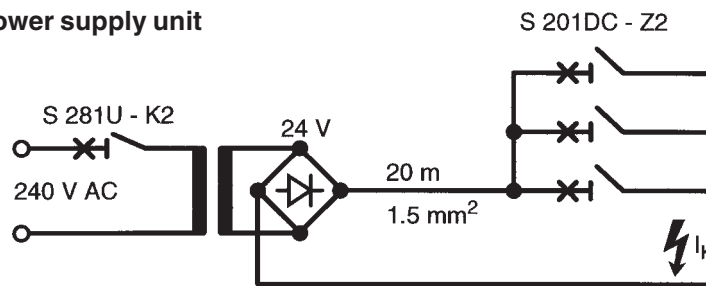
Planning notes

Overcurrent protection according to EN 60 204-1, protection of damageable components: A high degree of protection is only possible if the delayed release trips.

The parameters to be taken into account are:

- loop resistance ($R_i + R_L$)
 - (R_i = internal resistance MCB at 20 °C/63 °F and R_L = output resistance at 20 °C/63 °F)
- copper temperature: 80 °C/176 °F in the case of a short circuit/voltage drop, contact resistance
- **Result: a total derating factor of 2/3**

example 1: standard power supply unit



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$$R_i = 0.62 \Omega$$

$$R_L = \frac{40 \text{ m}}{1.5 \times 56} = 0.48 \Omega$$

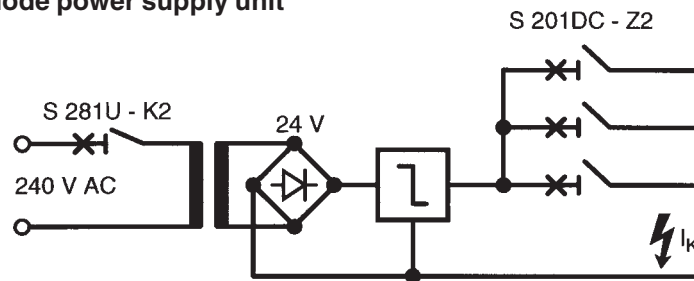
$$R = (0.62 + 0.48) \Omega = 1.1 \Omega$$

$$I_k = \frac{24 \text{ V} \times 2/3}{1.1 \Omega} = 14.5 \text{ A}$$

response value unchanged of S 201 DC-Z2 = $4.5 I_n = 9 \text{ A}$

result: trips within milliseconds

example 2: switched mode power supply unit



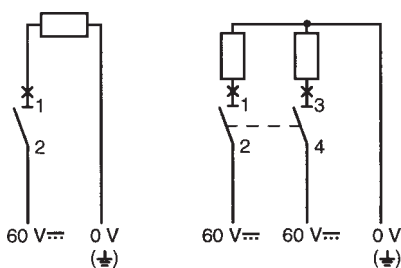
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MCB S 201 needs < 100 ms for undelayed tripping. If the switched mode power supply unit adjusts downwards undelayed when a short circuit occurs, the PSU adjusts quicker than the S 201-... is able to respond.

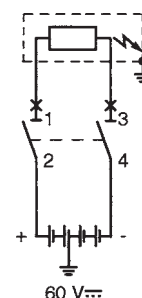
consequence: no selective fault recognition.

result: The output of the switched mode PSU must adjust in a delayed mode (> 100 ms) and the protection device must be adapted to this delayed reduced value in order to ensure selective fault recognition.

example for admissible voltages between conductors



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2CDC022416F0003

Technical Data

specifications:	DIN VDE 0641 -11, IEC 60898, EN 60898, VDE 0660 -101 IEC 60947-2, EN 60 947 -2, UL 489
No. of poles:	1
trip characteristics:	K, Z
rated current I_n :	K and Z 1 ... 25 A
rated voltage U_n :	1-pole 60 V DC/60 V AC
min. operating voltage U_{Omin} :	12 V-
rated switching capacity:	14 kA
insulation coordination:	according to DIN VDE 0110 Part 1 und 2
- overvoltage category:	III
- pollution degree:	2
- surge voltage U_{imp} (1.2/50 μ s):	4 kV (test voltage 6.2 kV at N.N., 5 kV at 2000 m)
- power-frequency voltage strength:	2.5 kV (50/60 Hz)
housing:	insul. mat. group I (CTI \geq 600) acc. to DIN IEC 112/VDE 0303 Part 1, RAL 7035
operating lever:	insulating material group II (400 \leq CTI < 600) black, sealable
protection according to DIN VDE 0100:	IP 20, in the consumer unit IP 40
degree of protection:	IP XXB
design:	according to DIN 43880, size code 1
depth:	68 mm
overall dimensions b x w x d:	17.5 x 85 x 69 mm (with auxiliary contact 17.5 x 102.5 x 69)
mounting position:	optional
fixing:	snap-on on top-hat rail EN 60 715, 35 mm screw fixing onto mounting rail
connection:	bi-directional cylinder lift terminal (two-terminal chamber) at top and bottom. Suitable for the connection of single, multi- or finely stranded conductors up to 16 mm ² (if also connected to rails)
tightening torque:	2.5 Nm
mechanical service life :	20.000 switchovers
service life at rated load	20.000 switchovers
climatic resistance	constant climate 23/73/83, 40/104/93, 55/131/20 [°C/°F/RH]
according to DIN IEC 68 Part 2-30:	alternating climate 25/77/95 - 40/104/93 [°C/°F/RH]
storage temperature:	$T_{max} + 70$ °C/158 °F, $T_{min} - 40$ °C/- 40 °F
ambient temperature:	$T_{max} + 55$ °C/131 °F, $T_{min} - 25$ °C/- 13 °F
shock protection:	30 g, at least 2 impacts impact duration 13 ms
vibration resistance	
according to DIN IEC 68-2-6:	5 g, 20 frequency cycles 5 ... 150 ... 5 Hz at 0.8 I_n

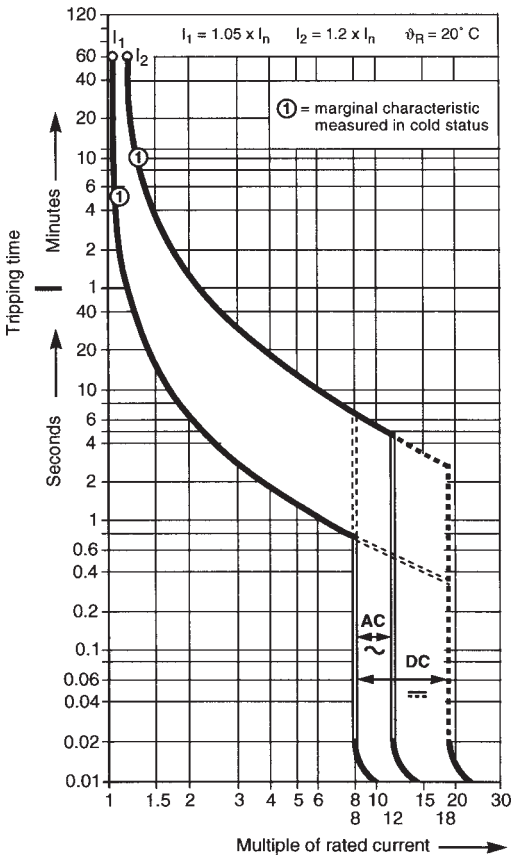
Technical data of the integrated auxiliary contact

contact complement:	1NO (1 normally open) 1NC (1 normally closed)
contact rating:	DC 12 identical DC 13 DC 13 30 V 2 A, 50 V 1 A
min. contact load:	24 V, 4 mA
min. rated voltage:	12 V AC/DC at 0.1 VA
short circuit protection:	with S 201 DC-K2 or -Z2
electrical service life:	> 4000 switchovers
safe disconnection of auxiliary circuit and main circuit according to VDE 0106 Part 101	
connection capacity:	0.75 up to 2.5 mm ² (use connector sleeves for finely-stranded conductors)
tightening torque:	0.5 Nm

Note: busbar system according to UL 489 under preparation

K-type trip characteristic

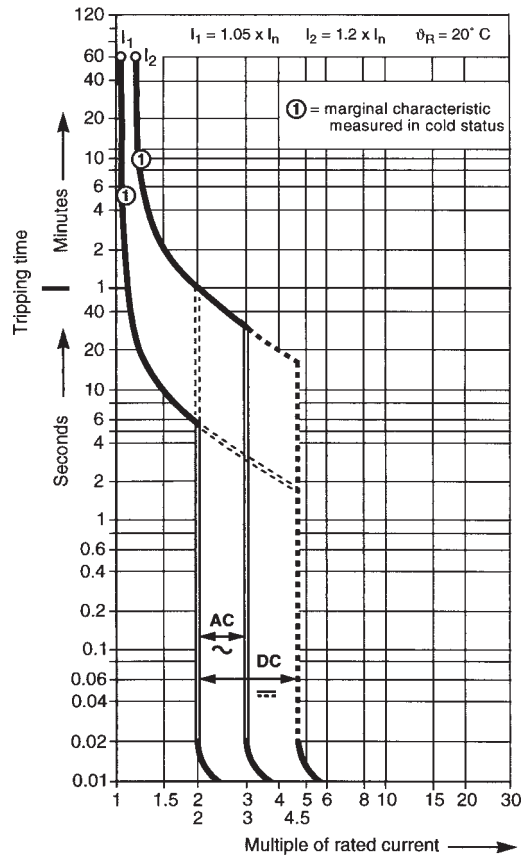
Reference temperature 20 °C/68 °F
 Deviating ambient temperatures influence the tripping behaviour by 6 % per 10 °C/50 °F



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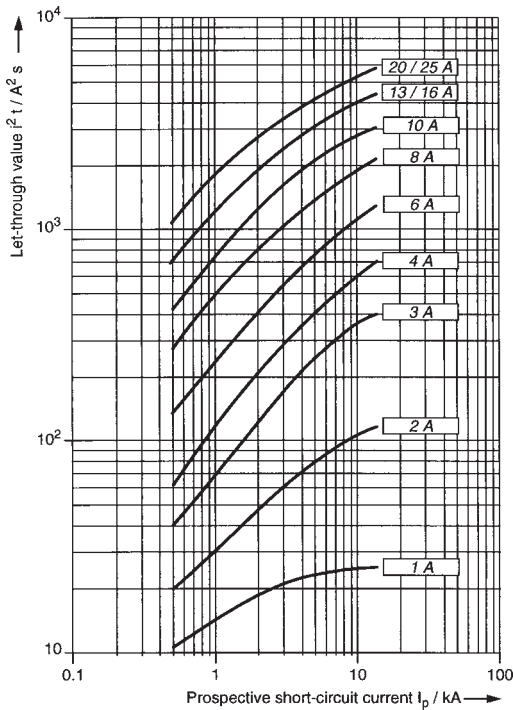
Z-type trip characteristic

Reference temperature 20 °C/68 °F
 Deviating ambient temperatures influence the tripping behaviour by 6 % per 10 °C/50 °F



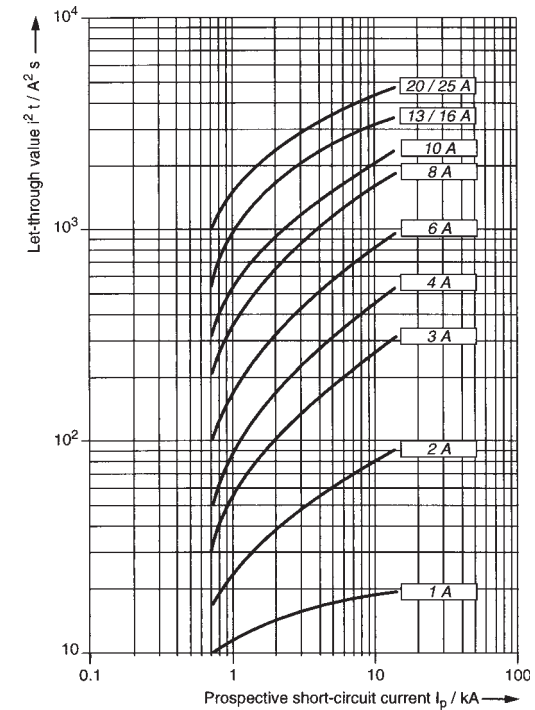
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Diagram of let-through values I²t of S 200-K



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Diagram of let-through values I²t of S 200-Z



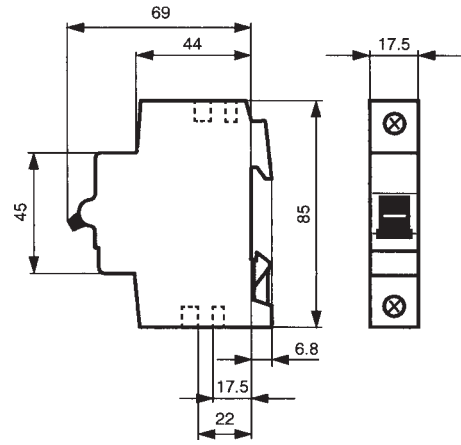
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Internal resistance and power loss of MCBs

Internal resistance per pole in mΩ, power loss per pole in W

type	rated current I_n , A	cb series K		Z	
		mΩ	W	mΩ	W
S 200 DC	1	1550	1.6	2270	2.3
	1.6	695	1.8	1100	2.8
	2	460	1.9	619	2.5
	3	165	1.5	202	1.8
	4	120	2.0	149	2.4
	6	52	1.9	104	3.7
	8	38	2.5	53.9	3.45
	10	12.6	1.26	17.5	1.7
	13	12.6	1.26	–	–
	16	7.7	2.0	10.9	2.8
	20	6.7	2.7	6.0	2.4
	25	4.6	2.9	4.1	2.6

Dimensions of S 201 DC



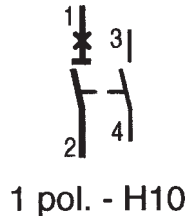
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Connection

Feeder optional from top or bottom, terminals designated according to EN 50 005

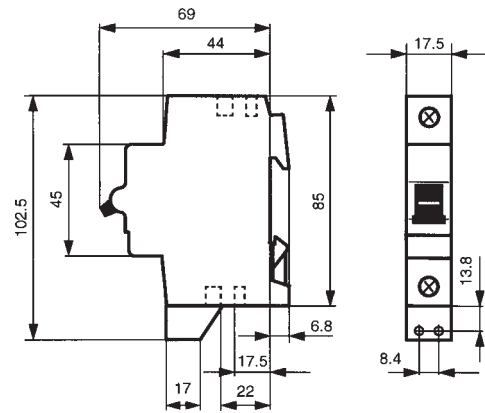


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Dimensions of S 201 DC.. H10



SK0045 Z01

Max. operating current values depending on the ambient temperature for a circuit-breaker in load circuit of characteristics type K and Z

I_n (A)	ambient temperature T (°C/°F)											
	-40	-30	-20	-10	0	10	20	30	40	50	60	70
0.5	0.66	0.64	0.61	0.59	0.56	0.53	0.50	0.47	0.43	0.40	0.35	0.31
1.0	1.32	1.27	1.22	1.17	1.12	1.06	1.00	0.94	0.87	0.79	0.71	0.61
1.6	2.12	2.04	1.96	1.88	1.79	1.70	1.60	1.50	1.39	1.26	1.13	0.98
2.0	2.65	2.55	2.45	2.35	2.24	2.12	2.00	1.87	1.73	1.58	1.41	1.22
3.0	4.0	3.8	3.7	3.5	3.4	3.2	3.0	2.8	2.6	2.4	2.1	1.8
4.0	5.3	5.1	4.9	4.7	4.5	4.2	4.0	3.7	3.5	3.2	2.8	2.4
6.0	7.9	7.6	7.3	7.0	6.7	6.4	6.0	5.6	5.2	4.7	4.2	3.7
8.0	10.8	10.2	9.8	9.4	8.9	8.5	8.0	7.5	6.9	6.3	5.7	4.9
10.0	13.2	12.7	12.2	11.7	11.2	10.6	10.0	9.4	8.7	7.9	7.1	6.1
13.0	17.2	16.6	15.9	15.2	14.5	13.8	13.0	12.2	11.3	10.3	9.2	8.0
16.0	21.2	20.4	19.6	18.8	17.9	17.0	16.0	15.0	13.9	12.6	11.3	9.8
20.0	26.5	25.5	24.5	23.5	22.4	21.2	20.0	18.7	17.3	15.8	14.1	12.2
25.0	33.1	31.9	30.6	29.3	28.0	26.5	25.0	23.4	21.7	19.8	17.7	15.3
32.0	42.3	40.8	39.2	37.5	35.8	33.9	32.0	29.9	27.7	25.3	22.6	19.6
40.0	52.9	51.0	49.0	46.9	44.7	42.4	40.0	37.4	34.6	31.6	28.3	24.5
50.0	66.1	63.7	61.2	58.6	55.9	53.0	50.0	46.8	43.3	39.5	35.4	30.6
63.0	83.3	80.3	77.2	73.9	70.4	66.8	63.0	58.9	54.6	49.8	44.5	38.6

Mutual thermal interference when an even load is applied at the same time.

A correction factor must be taken into account in the case of butt-mounted MCBs and an evenly applied, high load: 2 and 3 MCBs multiply with factor 0.9/4 and 5 MCBs with factor 0.8/6 and more MCBs with factor 0.75

The interdependency becomes irrelevant if filling pieces or packing blocks FST...(9mm width) are used.

Selection table Accessories



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S201 DC-K 25



2CDC021409F0003

S201 DC-Z 4 H10

No. of poles	rated current I_n A	order details type code	product code -Nr.	bbn 40 12233 EAN	price 1 piece €	price group	wght. 1 pc. kg	pack. unit pc's	
1	1	S201 DC-K 1	2CDS271217R0217				0.125	10	
	1.6	S201 DC-K 1.6	2CDS271217R0257				0.125	10	
	2	S201 DC-K 2	2CDS271217R0277				0.125	10	
	3	S201 DC-K 3	2CDS271217R0317				0.125	10	
	4	S201 DC-K 4	2CDS271217R0337				0.125	10	
	6	S201 DC-K 6	2CDS271217R0377				0.125	10	
	8	S201 DC-K 8	2CDS271217R0407				0.125	10	
	10	S201 DC-K 10	2CDS271217R0427				0.125	10	
	13	S201 DC-K 13	2CDS271217R0447				0.125	10	
	16	S201 DC-K 16	2CDS271217R0467				0.125	10	
	20	S201 DC-K 20	2CDS271217R0487				0.125	10	
	25	S201 DC-K 25	2CDS271217R0517				0.125	10	
	U_{Bmax} 60 V DC 60 V AC								
1	1	S201 DC-Z 1	2CDS271217R0218				0.125	10	
	1.6	S201 DC-Z 1.6	2CDS271217R0258				0.125	10	
	2	S201 DC-Z 2	2CDS271217R0278				0.125	10	
	3	S201 DC-Z 3	2CDS271217R0318				0.125	10	
	4	S201 DC-Z 4	2CDS271217R0338				0.125	10	
	6	S201 DC-Z 6	2CDS271217R0378				0.125	10	
	8	S201 DC-Z 8	2CDS271217R0408				0.125	10	
	10	S201 DC-Z 10	2CDS271217R0428				0.125	10	
	16	S201 DC-Z 16	2CDS271217R0468				0.125	10	
	20	S201 DC-Z 20	2CDS271217R0488				0.125	10	
	25	S201 DC-Z 25	2CDS271217R0518				0.125	10	
	U_{Bmax} 60 V DC 60 V AC								
	1	1	S201 DC-K 1 H10	2CDV271217R0217				0.125	6
1.6		S201 DC-K 1.6 H10	2CDV271217R0257				0.125	6	
2		S201 DC-K 2 H10	2CDV271217R0277				0.125	6	
3		S201 DC-K 3 H10	2CDV271217R0317				0.125	6	
4		S201 DC-K 4 H10	2CDV271217R0337				0.125	6	
6		S201 DC-K 6 H10	2CDV271217R0377				0.125	6	
8		S201 DC-K 8 H10	2CDV271217R0407				0.125	6	
10		S201 DC-K 10 H10	2CDV271217R0427				0.125	6	
13		S201 DC-K 13 H10	2CDV271217R0447				0.125	6	
16		S201 DC-K 16 H10	2CDV271217R0467				0.125	6	
20		S201 DC-K 20 H10	2CDV271217R0487				0.125	6	
25		S201 DC-K 25 H10	2CDV271217R0517				0.125	6	
U_{Bmax} 60 V DC 60 V AC									
1	1	S201 DC-Z1 H10	2CDV271217R0218				0.125	6	
	1.6	S201 DC-Z 1.6 H10	2CDV271217R0258				0.125	6	
	2	S201 DC-Z 2 H10	2CDV271217R0278				0.125	6	
	3	S201 DC-Z 3 H10	2CDV271217R0318				0.125	6	
	4	S201 DC-Z 4 H10	2CDV271217R0338				0.125	6	
	6	S201 DC-Z 6 H10	2CDV271217R0378				0.125	6	
	8	S201 DC-Z 8 H10	2CDV271217R0408				0.125	6	
	10	S201 DC-Z 10 H10	2CDV271217R0428				0.125	6	
	16	S201 DC-Z16 H10	2CDV271217R0468				0.125	6	
	20	S201 DC-Z 20 H10	2CDV271217R0488				0.125	6	
	25	S201 DC-Z 25 H10	2CDV271217R0518				0.125	6	
	U_{Bmax} 60 V DC 60 V AC								



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