



RADE KONČAR

KONTAKTORI I RELEI



GENERAL CATALOG

Safe and affordable



Contactors

Thermal Overload Relays

Rotary Cam Switches

Pushbuttons and Indicator Lights

Motor Protection Circuit Breakers

Molded Case Circuit Breakers

Air Type Circuit Breakers

Miniature Circuit Breakers

Electronic Time Relays

Power Factor Correction Units

Industrial Products



КОНТАКТОРЫ

1

ТЕРМИЧЕСКИЕ РЕЛЕ

2

ПОВОРОТНЫЕ ВЫКЛЮЧАТЕЛИ

3

АВТОМАТЫ ЗАЩИТЫ ДВИГАТЕЛЯ

4

**АВТОМАТЫ ЗАЩИТЫ ДВИГАТЕЛЯ
В ЛИТОМ КОРПУСЕ**

5

CONTACTORS

Mini motor contactor type CM1, AC control circuit	1/1
Motor contactors type CNN 9 - CNN 12, AC control circuit	1/1
Motor contactors type CNN 18 - CNN 40, AC control circuit	1/2
Motor contactors type CNNB 9 - CNNB 30, with DC solenoid system	1/3
Motor contactors type CNN 50 - CNN 100, CNM 110, CNM 110ST, AC control circuit	1/4
Motor contactors type CNM 140 - CNM 400, AC control circuit	1/5
Motor contactors type CNM 450 - CNM 1000, AC control circuit	1/6
Motor contactors type CNN 9 - CNN 70 with DC control circuit	1/7
Motor contactors type CNN 80 - CNN 100; CNM 110; CNM 110ST with DC control circuit	1/8
Motor contactors type CNM 140 - CNM 400 with DC control circuit	1/9
Contactor assemblies in enclosures and direct - on line starters for contactors CNN 9 - CNN 40.....	1/10
Enclosures -type PNN and PNNT from insulation material.....	1/11
Star - Delta Starters - Type SDS 7,5 - SDS 30	1/12
Star - Delta Starters in Enclosures - Type PNSDS 7,5 - PNSDS 55	1/13
Reversing contactors type MBCM1 - MBCNN/CNNB 9 - MBCNN/CNNB 40.....	1/14
Reversing contactors type MBCNN 50 - MBCNN 100, MBCNM 110 - MBCNM 400...	1/15
Contactors type TKN 65 - TK 175 for switching resistive loads	1/16
Four-pole contactors; 2NO + 2NC main poles with AC control circuit	1/17
Capacitor contactors type CNNK 2,5 - CNNK 16	1/18
Capacitor contactors type CNNK 10 - CNNK 30	1/19
Capacitor contactors type CNNK 40 - CNKM 80	1/20
Capacitor contactors type CNNK 10..N - CNNK 30..N	1/21
Capacitor contactors type CNNK 40..N - CNKM 75..N	1/22
DC CONTACTORS type CNO 30 - CNO 250, with AC CONTROL CIRCUIT.....	1/23
DC CONTACTORS type CNO 30 - CNO 250, with DC CONTROL CIRCUIT.....	1/24
Contactor relays type CP0 for auxiliary circuit switching, AC control circuit.....	1/25
Contactor relays type CNNP for auxiliary circuit switching, AC control circuit	1/25
Contactor relays with FAST-ON terminals	1/26
Contactor relays type CNNPB, DC solenoid system	1/26
Order for contactors	1/27
Accessories for contactors and contactor relays	1/28,1/29, 1/30
Spare parts for contactors and contactor relays.....	1/31,1/32

TECHNICAL INFORMATION

1

Contactors, Application, Installation, Standards,	1/33
Electrical endurance of contacts.....	1/34, 1/35
Utilization categories of contactors	1/36
Degrees of Protection of enclosed equipment.....	1/37
Over voltage limiter.....	1/38
Voltage drop in main circuits and current transformers	1/39
Auxiliary current circuits.....	1/40
Cable capacity	1/41
Squirrel-cage induction motors rated motor current	1/42
Motor contactors type CM1 and type CNN 9 - 40	1/43
Auxiliary contact blocks BP0, BP1, BP2, BP3 and BP4	1/44
Motor contactors type CNNB 9 - 30.....	1/45, 1/46
Motor contactors type CNN 50 - 100; CNM 110 - 400 AC operated or DC operated	1/47, 1/48, 1/49, 1/50
Contactors type TK for switching resistive loads	1/51
Control of lighting circuits	1/52
Table of technical characteristics for lighting switching	1/53, 1/54
Capacitor contactors type CNNK 2,5 - CNNK 7,5	1/55
Capacitor contactors type CNNK 10 - CNNK 30	1/56
Capacitor contactors type CNNK 40 - CNKM 80	1/57
Capacitor contactors type CNNK 10..N - CNNK 30..N	1/58
Capacitor contactors type CNNK 40..N - CNKM 75..N	1/59
Connection diagrams and terminal marking for single compensation	1/60
DC contactors type CNO 30 - 250, AC control circuit or DC control circuit	1/61
Mini contactor relay type CPO	1/62
Contactor relays type CNNP and type CNNPB	1/63
Wiring diagrams.....	1/64
Schematic diagrams for AC operated contactors	1/65
Schematic diagrams for DC operated contactors.....	1/66
Schematic diagrams for DC contactors.....	1/67
Dimension drawings	1/68 - 1/77

MINI MOTOR CONTACTOR type CM1 WITH AC CONTROL CIRCUIT

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Small mounting dimensions and overall size
- 5,5 kW rating 400 V AC3
- Snap-on auxiliaries

Selection and ordering data



Rated operational current I_e at 400 V A	Max. Ratings of three-phase motor at 50 Hz and			Rated operational current I_e/AC1 at 55 °C 400 V A	Auxiliary contacts		Type	Weights kg
	230 V kW	400 V kW	690 V kW		NO	NC		
9	3	4	4	20	0	0	CM1 00 CM1 10 CM1 01 CM1 004 (4 main contacts)	0.175
12	3.2	5.5	5.5	20	1	0	CM1 10N	

* Number of auxiliary contacts can be extended up to 5 for CM1 10;01 (see page 1/28)

MOTOR CONTACTORS type CNN 9 - CNN 12 WITH AC CONTROL CIRCUIT

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Small mounting dimensions and overall size
- Snap-on auxiliaries
- Other control voltages are available

Selection and ordering data



Rated operational current I_e at 400 V A	Max. Ratings of three-phase motor at 50 Hz and			Rated operational current I_e/AC1 at 55 °C 400 V A	Auxiliary contacts		Type	Weights kg
	230 V kW	400 V kW	690 V kW		NO	NC		
9	3.2	4.5	5.5	25	1	0	CNN 9 10 CNN 9 01 CNN 9 004* (4 main contacts)	0.26
12	3.5	5.7	7.5	25	1	0	CNN 12 10 CNN 12 01 CNN 12 004* (4 main contacts)	

* See page 1/67 for dimensions.

MOTOR CONTACTORS type CNN 18 - CNN 40 WITH AC CONTROL CIRCUIT

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Small mounting dimensions and overall size
- Snap-on auxiliaries
- Other control voltages are available

1

Selection and ordering data

	Motor switching AC2 and AC3 duty			Rated operational current I_e/AC1 at 55 °C 400 V A	Auxiliary contacts		Type	Weights kg
	Rated operational current I_e at 400 V A	Max. Ratings of three-phase motor at 50 Hz and 230 V 400 V 690 V kW kW kW			 NO	 NC		
	18	4	7.5	10	30	1 0 0 1	CNN 18 10 CNN 18 01	0.265
	22	5.5	11	11	30	1 0 0 1	CNN 22 10 CNN 22 01	0.27
	25	5.5	11	15	40	0 0	CNN 25 00	0.28
	30	7.5	15	15	40	0 0	CNN 30 00	0.285
	32	7.5	15	18.5	50	0 0	CNN 32* 00	0.395
	38	11	18.5	22	50	0 0	CNN 40* 00	0.40
	32	7.5	15	18.5	50	0 0	CNN 32N 00	0.415
	38	11	18.5	22	50	0 0	CNN 40N 00	0.42

* For connecting multi-wired conductor up to 25 mm² must be ordered additional terminal blocks with Part No. 601478 (see 1/30).

** Number of auxiliary contacts can be extended up to 5 for CNN 9 10;01; CNN 12 10;01; CNN 18 10;01; CNN 22 10;01 and 4 for CNN 25; CNN 32/32N; CNN 40/40N (see 1/28).

MOTOR CONTACTORS type CNNB 9-30 WITH DC SOLENOID SYSTEM

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Snap-on auxiliaries
- Other control voltages are available

Selection and ordering data

1

	Motor switching AC2 and AC3 duty			Rated operational current I_e/AC1 at 45 °C 400 V A	Auxiliary contacts		Type	Weights kg
	Rated operational current I_e at 400 V A	Max. Ratings of three-phase motor at 50 Hz and 230 V kW	400 V kW		690 V kW	 NO		
	9	3.2	4,2	5.5	25	1 0 0 1	CNNB 9 10 CNNB 9 01	0.58
	12	3.5	5.7	7.5	25	1 0 0 1	CNNB 12 10 CNNB 12 01	0.58
	18	4.5	7.5	10	30	1 0 0 1	CNNB 18 10 CNNB 18 01	0.59
	22	5.5	11	15	30	1 0 0 1	CNNB 22 10 CNNB 22 01	0.6
	25	5.5	11	11	40	0 0	CNNB 25 00	0.64
	30	7.5	15	15	40	0 0	CNNB 30 00	0.65
	32	8	16	16	50	0 0	CNNB 40L 00	0.66

* Number of auxiliary contacts can be extended up to 5 for CNNB 9 10; 01; CNNB 12 10; 01; CNNB 18 10; 01 and 4 for CNNB 25; CNNB 30 and CNNB40L

MOTOR CONTACTORS type CNN 50 - CNN 100, CNM 110, CNM 110ST WITH AC CONTROL CIRCUIT

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- With fixed auxiliary contacts for CNM
- Rugged construction
- Other control voltages are available

1

Selection and ordering data

	Motor switching AC2 and AC3 duty				Rated operational current I_e/AC1 at 55°C 400 V A	Auxiliary contacts		Type	Weights kg
	Rated operational current I_e at 400 V A	Max. Ratings of three-phase motor at 50 Hz				NO	NC		
		230 V kW	400 V kW	690 V kW					
	50	15	22	33	85	0	0	CNN 50 00	0.875
	60	18.5	30	37	85	0	0	CNN 60 00	0.877
	65	18.5	33	37	90	0	0	CNN 70 00	0.897
	80	22	37	55	95	0	0	CNN 80 00	1,295
	90	26	45	67	105	0	0	CNN 90 00	1.305
	100	30	55	67	105	0	0	CNN 100 00	1.325
	110	37	55	90	115	2	2	CNM 110 22	2.29
						4	4	CNM 110 44	2.39
	110	37	55	90	115	2	2	CNM 110ST* 22	2.33
						4	4	CNM 110ST* 44	2.43

* Technical information for Contactor CNM 110ST are same as CNM 110.

ST - Main conductors with box terminal max. 1x50mm² or 2x35mm²

** Number of auxiliary contacts can be extended up to 4 (BP4 or 2xBP3) for CNN 50-100

MOTOR CONTACTORS type CNM 140 - CNM 400 WITH AC CONTROL CIRCUIT

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- With fixed auxiliary contacts
- Rugged construction
- Other control voltages are available

Selection and ordering data

1

	Motor switching AC2 and AC3 duty				Rated operational current Ie/AC1 at 55°C 400 V A	Auxiliary contacts  NO NC	Type	Weights kg
	Rated operational current Ie at 400 V A	Max. Ratings of three-phase motor at 50 Hz						
	230 V kW	400 V kW	690 V kW					
	140	45	75	100	160	2 2	CNM 140 22	5.1
						4 4	CNM 140 44	5.5
	170	55	90	132	200	2 2	CNM 170 22	5.2
						4 4	CNM 170 44	5.6
	200	60	110	155	250	2 2	CNM 200 22	5.3
						4 4	CNM 200 44	5.7
	250	75	132	160	300	2 2	CNM 250 22	8.4
						4 4	CNM 250 44	8.9
	315	90	160	200	390	2 2	CNM 315 22	8.5
						4 4	CNM 315 44	8.9
	400	115	200	355	400	2 2	CNM 400 22	8.5
						4 4	CNM 400 44	8.9

MOTOR CONTACTORS type CNM 450 - CNM 1000

WITH AC CONTROL CIRCUIT and AC/DC for CNM 700 - CNM 1000

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- With fixed auxiliary contacts
- Rugged construction
- Other control voltages are available

1

Selection and ordering data

Motor switching AC2 and AC3 duty Rated operational current I_e at 400 V A	Max. Ratings of three-phase motor at 50 Hz			Rated operational current I_e/AC1 at 55°C 400 V A	Auxiliary contacts		Type	Weights kg
	230 V kW	400 V kW	690 V kW		 NO	 NC		
 450	132	250	375	700	2	2	CNM 450 22	13.5
 550	175	315	500	800	2	2	CNM 550 22	14
 700	225	400	630	1000	2	2	CNM 700 22	26.4
 860	280	500	710	1100	2	2	CNM 860 22	27.6
 1000	325	580	850	1200	1	2	CNM 1000 12	51

MOTOR CONTACTORS type CNN 9 - CNN 70 WITH DC CONTROL CIRCUIT

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Snap-on auxiliaries
- Other control voltages are available

Selection and ordering data

1

	Motor switching AC2 and AC3 duty				Rated operational current Ie/AC1 at 55°C 400 V A	Auxiliary contacts		Type	Weights kg
	Rated operational current Ie at 400 V A	Max. Ratings of three-phase motor at 50 Hz				 NO	 NC		
	230 V kW	400 V kW	690 V kW						
	9	3.2	4.5	5.5	25	1	0	CNN 9 10	0.275
	12	3.5	5.7	7.5	25	1	0	CNN 12 10	0.275
	18	4	7.5	10	30	1	0	CNN 18 10	0.285
	22	5.5	11	11	30	1	0	CNN 22 10	0.290
	25	5.5	11	15	40	1	0	CNN 25 10	0.305
	30	6.5	15	15	40	1	0	CNN 30 10	0.310
	32	7.5	15	18.5	50	1	0	CNN 32 10 *	0.42
	38	11	18.5	22	50	1	0	CNN 40 10 *	0.425
	50	15	22	33	85	1	0	CNN 50 10	0.895
	60	18.5	30	37	85	1	0	CNN 60 10	0.90
	65	18.5	33	37	90	1	0	CNN 70 10	0.92

* For connecting multi-wired conductor up to 25 mm² must be ordered additional terminal blocks with Part No. 601478 (see 1/30).

** Number of auxiliary contacts can be extended up to 5 for CNN 9 10;01; CNN 12 10;01; CNN 18 10;01; CNN 22 10;01 and 4 for CNN 25; CNN 32; CNN 40 (see 1/28).

*** On left side with BP3 01 DC for CNN 9 - 22, BP3 11 DC for CNN 25 - 40 and BP5 11 DC for CNN 50 - 70.

MOTOR CONTACTORS type CNN 80 - CNM 110ST WITH DC CONTROL CIRCUIT

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- With fixed auxiliary contacts for CNM contactors
- Rugged construction
- Other control voltages are available

1

Selection and ordering data



Rated operational current I_e at 400 V A	Max. Ratings of three-phase motor at 50 Hz			Rated operational current $I_e/AC1$ at 55°C 400 V A	Auxiliary contacts NO NC	Type	Weights kg
	230 V kW	400 V kW	690 V kW				
80	22	37	55	95	1 0	CNN 80 10	1.33
90	26	45	67	105	1 0	CNN 90 10	1.34
100	30	55	67	105	1 0	CNN 100 10	1.36
110	37	55	90	115	2 1	CNM 110 21	2.29
					4 3	CNM 110 43	2.39
110	37	55	90	115	2 1	CNM 110ST 21*	2.28
					4 3	CNM 110ST 43*	2.38

* Technical information for Contactor CNM 110ST are same as CNM 110.

ST - Main conductors with box terminal max. $1 \times 50 \text{mm}^2$ or $2 \times 35 \text{mm}^2$

** On left side with BP5 11 DC for CNN 80 - 100.

MOTOR CONTACTORS type CNM 140 - CNM 400 WITH DC CONTROL CIRCUIT

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- With fixed auxiliary contacts
- Rugged construction
- Other control voltages are available

Selection and ordering data

1

	Motor switching AC2 and AC3 duty			Rated operational current I_e/AC1 at 55°C 400 V A	Auxiliary contacts		Type	Weights kg	
	Rated operational current I_e at 400 V A	Max. Ratings of three-phase motor at 50 Hz			NO	NC			
		230 V kW	400 V kW	690 V kW					
	140	45	75	100	160	2	2	CNM 140 22	5.1
						4	4	CNM 140 44	5.5
	170	55	90	132	200	2	2	CNM 170 22	5.2
						4	4	CNM 170 44	5.6
	200	60	110	155	250	2	2	CNM 200 22	5.3
						4	4	CNM 200 44	5.7
	250	75	132	160	300	2	2	CNM 250 22	8.4
						4	4	CNM 250 44	8.9
	315	90	160	200	390	2	2	CNM 315 22	8.5
						4	4	CNM 315 44	8.9
	400	115	200	355	400	2	2	CNM 400 22	8.5
						4	4	CNM 400 44	8.9

CONTACTOR ASSEMBLIES IN ENCLOSURES and DIRECT - ON LINE STARTERS for contactors CNN 9 - 40

1

Selection and ordering data

Data for AC2 and AC3 utilization categories			Auxiliary contacts			Type		Weights kg
Rated operational current I_e/400V A	Motor rating at 50 Hz for V		  NO NC	Degree of protection	without relay	with relay		
	230 V kW	400V kW						

CONTACTORS IN ENCLOSURES



9	3.2	4.5	1	0	IP 65	PNN 9	PNNR 9	0.585/0.735
12	3.5	5.7	1	0	IP 65	PNN 12	PNNR 12	0.585/0.735
18	4	7.5	1	0	IP 65	PNN 18	PNNR 18	0.590/0.740
25	5.5	11	0	0	IP 65	PNN 25	PNNR 25	0.605/0.755
30	6.5	15	0	0	IP 65	PNN 30	PNNR 30	0.610/0.760
32	7.5	15	0	0	IP 65	PNN 32	PNNR 32	0.720/0.870
38	11	18.5	0	0	IP 65	PNN 40	PNNR 40	0.725/0.875

DIRECT - ON LINE STARTERS WITH (I - O) PUSH - BUTTON



9	3.2	4.5	-	-	IP 54	PNNT 9	PNNRT 9	0.710/0.860
12	3.5	5.7	-	-	IP 54	PNNT 12	PNNRT 12	0.710/0.860
18	4	7.5	-	-	IP 54	PNNT 18	PNNRT 18	0.715/0.865
25	5.5	11	1	2	IP 54	PNNT 25	PNNRT 25	0.730/0.880
30	6.5	15	1	2	IP 54	PNNT 30	PNNRT 30	0.735/0.885
32	7.5	15	1	2	IP 54	PNNT 32	PNNRT 32	0.845/0.995
38	11	18.5	1	2	IP 54	PNNT 40	PNNRT 40	0.850/1.000

DIRECT - ON LINE STARTERS WITH PERMANENT CONTACTS



9	3.2	4.5	1	0	IP 54	PNG 9	PNNRG 9	0.720/0.870
12	3.5	5.7	1	0	IP 54	PNG 12	PNNRG 12	0.720/0.870
18	4	7.5	1	0	IP 54	PNG 18	PNNRG 18	0.725/0.875
25	5.5	11	0	0	IP 54	PNG 25	PNNRG 25	0.735/0.890
30	6.5	15	0	0	IP 54	PNG 30	PNNRG 30	0.745/0.895
32	7.5	15	0	0	IP 54	PNG 32	PNNRG 32	0.855/1.005
38	11	18.5	0	0	IP 54	PNG 40	PNNRG 40	0.860/1.010

ENCLOSURES - type PNN , PNNT and PNRG from insulation material

Selection and ordering data

1



Design	Degree of protection	Type	Weights kg
Enclosures without push-buttons	IP 65	PNN	0.325
Enclosures with push-buttons With "I" make and "O" break push button	IP 54	PNNT	0.450
Enclosures with permanent contacts	IP 54	PNNG	0.460

ORDER:

Type

Standard control voltages AC 24, 48, 110, 220/230,380/400 V

For AC control: 50 Hz or 60 Hz

Setting range for thermal overload relay (Upper value)

Example: Motorstarter type PNNT 18 control voltage 220/230 V, 50 Hz

PNNT 18 220/230 V 50 Hz

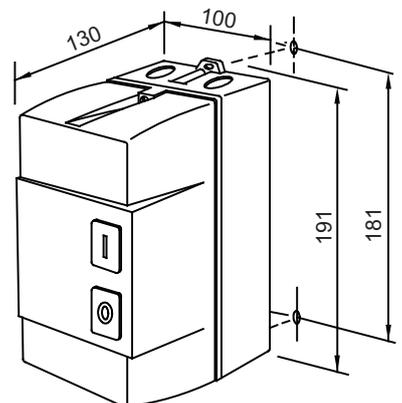
Example: Motorstarter type PNNRT 18 control voltage 220/230 V, 50 Hz, thermal overload relay type TM 40, current range (10-16)A

PNNRT 18 220/230 V 50 Hz 16A

Example: Motorstarter type PNRG 12 control voltage 220/230 V, 50 Hz, thermal overload relay type TM 40, current range (10-16)A

PNNRG 12 220/230 V 50 Hz 16A

Dimension Drawing (mm)



STAR - DELTA STARTERS - TYPE SDS

Star - delta starters are used for starting three-phase induction cage motors which are not overloaded during the starting. When starting, the windings of the stator are connected to the mains in a position of a start. After the starting operation they assume a delta position. Due to this change of the position of the windings the value of the starting current of the motor is 0,58 of the current of direct starting in delta position of the windings. When starting the motor in this way the starting moment is three times shorter, so this starters can only be used for motors whose starting moment, due to lack of overloading, is much shorter, and for those starting in idle or under light load. The windings can change their start position into a delta position after the motor achieves a nominal numbers of rotations. Motors which require an early change of the position of the windings cannot be started with SDS type of starters.

In table 1. quoted currents and capacities are valid only if special star-delta timer EVRK 40 is used.

The change of the windings from star position to delta position occurs automatically after the starting operations is over. Starting can be adjusted to last from 2-20 s with a switch delay of about 100ms by means of an embedded timer. The thermal overload relay can operate accurately during permanent duty if the number of starts per hour does not exceed 15, and during intermittent duty (with 40% working time) if the number of starts per hour does not exceed 60.

Overload protection

The thermal overload relay is set to cca 0,58 x motor rated current.

Technical data for current range of thermal overload relays are given in table 2.

Table 1 - Technical data for Star - Delta starters

	Star-Delta starter type SDS	In at 400 V A	Max. motor output at 50 Hz and			
			220 V	400 V	500 V	690 V
			kW	kW	kW	kW
SDS 7,5		16	4	7,5	7,5	10
SDS 11		22	5,5	11	11	15
SDS 15		29	7,5	15	15	18,5
SDS 18,5		37	11	18,5	22	22
SDS 22		44	15	22	25	34
SDS 25		50	15	25	25	34
SDS 30		60	15	30	30	37

Table 2 - Current range of thermal overload relays and selection of components for SDS

Type of starter	Pn kW	K1	K2	K3	EVR	TM	Range A	Ir A
SDS 7,5	7,5	CNN 9	CNN 9	CNN 9	EVR 40	TM 40	6,3-10	9
SDS 11	11	CNN 12	CNN 12	CNN 9	EVR 40	TM 40	10-16	12,7
SDS 15	15	CNN 18	CNN 18	CNN 12	EVR 40	TM 40	12,5-20	16,8
SDS 18,5	18,5	CNN 25	CNN 25	CNN 25	EVR 40	TM 40	16-25	20,3
SDS 22	22	CNN 30	CNN 30	CNN 25	EVR 40	TM 40	16-25	23,7
SDS 25	25	CNN 32	CNN 32	CNN 32	EVR 40	TM 40	22-30	29
SDS 30	30	CNN 40	CNN 40	CNN 32	EVR 40	TM 40	28-38	31,9

ORDER:

Example: Motorstarter type SDS 18,5 control voltage 220/230 V, 50 Hz

SDS 18,5 **220/230 V** **50 Hz**

Example: Star - Delta Starters type SDS 18,5 control voltage 220/230 V, 50 Hz, thermal overload relay type TM 40, current range (10-16)A

SDS 18,5 **220/230V** **50 Hz** **16A**

STAR - DELTA STARTERS IN ENCLOSURES - TYPE PNSDS

Table 1 - Technical data for Star - Delta starters

	Star-Delta starter type PNSDS	In at 400 V A	220 V kW	400 V kW	500 V kW	690 V kW	Dimensions (axbxc) mm
	PNSDS 7,5	16	4	7,5	7,5	7,5	210x260x185
	PNSDS 11	22	5,5	11	11	7,5	
	PNSDS 15	29	7,5	15	15		
	PNSDS 18,5	37	11	18,5	22	15	
	PNSDS 22	44	15	22	22	15	240x320x205
	PNSDS 25	50	15	25	25	18,5	
	PNSDS 30	55	18,5	30	30	25	400x500x207
	PNSDS 37	72	22	37	37	37	
	PNSDS 45	85	26	45	45	45	400x600x217
PNSDS 55	105	37	55	55	55		

1

Table 2 - Current range of thermal overload relays and selection of components for PNSDS

Type of starter	Pn kW	K1	K2	K3	EVR	TM	Range A	Ir A	Max. starting time from cold state*
PNSDS 7,5	7,5	CNN 9	CNN 9	CNN 9	EVRK 40	TM 40	6,3-10	9	15
PNSDS 11	11	CNN 12	CNN 12	CNN 9	EVRK 40	TM 40	10-16	12,7	
PNSDS 15	15	CNN 18	CNN 18	CNN 12	EVRK 40	TM 40	12,5-20	16,8	
PNSDS 18,5	18,5	CNN 25	CNN 25	CNN 25	EVRK 40	TM 40	16-25	20,3	
PNSDS 22	22	CNN 30	CNN 30	CNN 25	EVRK 40	TM 40	16-25	23,7	
PNSDS 25	25	CNN 32	CNN 32	CNN 32	EVRK 40	TM 40	22-30	29	
PNSDS 30	30	CNN 40	CNN 40	CNN 32	EVRK 40	TM 40	28-38	31,9	30
PNSDS 37	37	CNN 50	CNN 50	CNN 32	EVRK 40	TRM 75-N60	32-50	41,6	
PNSDS 45	45	CNN 60	CNN 60	CNN 40	EVRK 40	TRM 75-N60	40-57	49	
PNSDS 55	55	CNN 70	CNN 70	CNN 40	EVRK 40	TRM 75-N60	50-63	61	

(*) Usual time value = 6.....10 s.

ORDER:

Example: Motorstarter type PNSDS 18,5 control voltage 220/230 V, 50 Hz

PNSDS 18,5 **220/230 V** **50 Hz**

Example: Star - Delta Starters type SDS 18,5 control voltage 220/230 V, 50 Hz, thermal overload relay type TM 40, current range (10-16)A

PNSDS 18,5 **230/230** **50 Hz** **16A**

REVERSING CONTACTOR ASSEMBLIES

type MBCM1 and MBCNN 9 - 40 (AC coil) and MBCNNB 9 - 30 (DC coil) for switching motors

Features

- Utilizing contactors with snap-on auxiliary contact blocks
- Includes power wiring
- Mechanically and electrically interlocked
- DIN rail mounting MBCM1, MBCNN 9 - 40, MBCNNB 9 - 30

1

Selection and ordering data

	Motor switching						le/AC1 at 55 °C 400 V A	Auxiliary contacts per contactor		Type	Wgt. kg
	AC2 / AC3 duty			AC4 duty				NO	NC		
	le at 400 V A	Max. Ratings of three-phase motor at 50 Hz									
	230V kW	400V kW	690V kW	230V kW	400V kW	690V kW					
	9	3	4	4	0.75	1.5	1.5	20	0 0 1 0	MBCM1 00 MBCM1 10*	0.40 0.41
	12	3.2	5.5	5.5	0.75	1.6	1.6	20	0 0	MBCM1 10N	0.42
	9	3.2	4.5	5.5	0.75	1.9	1.9	25	0 0 1 1	MBCNN 9 00 MBCNN 9 11*	0.54 0.58
	12	3.5	5.7	7.5	1.1	2.2	2.2	25	0 0 1 1	MBCNN 12 00 MBCNN 12 11*	0.54 0.58
	18	4	7.5	10	1.5	3	3	30	0 0 1 1	MBCNN 18 00 MBCNN 18 11*	0.56 0.6
	22	5.5	11	11	2.2	4	3	30	0 0 1 1	MBCNN 22 00 MBCNN 22 11*	0.57 0.61
	25	5.5	11	15	2.2	4	4	40	1 0	MBCNN 25 10	0.63
	30	6.5	15	15	2.5	4.4	4.4	40	1 0	MBCNN 30 10	0.63
	32	7.5	15	18.5	4	6.5	6.5	50	1 0	MBCNN 32 10	0.8
	38	11	18.5	22	5.5	7.5	7.5	50	1 0	MBCNN 40 10	0.82
	9	3.2	4.5	5.5	0.75	1.9	1.9	25	0 0 1 1	MBCNNB 9 00 MBCNNB 9 11*	1.26 1.30
	12	3.5	5.7	7.5	1.1	2.2	2.2	25	0 0 1 1	MBCNNB 12 00 MBCNNB 12 11*	1.26 1.30
	18	4	7.5	10	1.5	3	3	30	0 0 1 1	MBCNNB 18 00 MBCNNB 18 11*	1.27 1.31
	22	5.5	11	10	2.2	4	3	30	0 0 1 1	MBCNNB 22 00 MBCNNB 22 11*	1.28 1.32
	25	5.5	11	15	2.2	4	4	40	1 0	MBCNNB 25 10	1.31
	30	6.5	15	15	2.5	4.4	4.4	40	1 0	MBCNNB 30 10	1.35

* For Push button control

The main and control circuits are wired according to the circuit diagrams on page 64.

Note: Electrical endurance of contacts in AC4 utilization category is 120 000.

REVERSING CONTACTOR ASSEMBLIES

type MBCNN 50 - MBCNM 400 for switching motors

Features

- Utilizing contactors with snap-on auxiliary contact blocks for MBCNN
- Utilizing contactors with fixed auxiliaries for MBCNM
- Includes power wiring
- Mechanically and electrically interlocked

Selection and ordering data

1



Motor switching							le/AC1 at 55 °C	Auxiliary contacts per contactor 	Type	Weights kg
AC2 / AC3 duty			AC4 duty							
I _e at 400 V A	Max. Ratings of three-phase motor at 50 Hz						400 V A	NO NC		
	230 V kW	400 V kW	690 V kW	230 V kW	400 V kW	690 V kW				
50	15	22	33	6.9	12	20.8	85	1 0	MBCNN 50 10	2.80
60	18.5	30	37	8.1	14	24.3	85	1 0	MBCNN 60 10	2.82
65	18.5	33	37	8.5	15.1	24.3	90	1 0	MBCNN 70 10	2.88
80	22	37	55	8.7	17	27	95	1 0	MBCNN 80 10	3.78
90	26	45	67	10.4	18	30	105	1 0	MBCNN 90 10	3.81
100	30	55	67	11	19	32	105	1 0	MBCNN 100 10	3.84
110	37	55	90	15.6	27	45	115	2 1	MBCNM 110 21	5.78
140	45	75	100	20	35	60	160	2 1	MBCNM 140 21	14.2
170	55	90	132	21	37	64	200	2 1	MBCNM 170 21	14.4
200	60	105	155	23	40	69	250	2 1	MBCNM 200 21	14.6
250	75	132	160	31	55	92	300	2 1	MBCNM 250 21	23
315	90	160	200	35	65	100	390	2 1	MBCNM 315 21	23.2
400	115	200	355	37.5	69	106	400	2 1	MBCNM 400 21	23.4

The main and control circuits are wired according to the circuit diagrams on page 64.
Note: Electrical endurance of contacts in AC4 utilization category is 120 000.

CONTACTORS type TKN 65 - TKN 115; TK 130 - TK 175 for SWITCHING RESISTIVE LOADS

Features

- Rugged construction
- Other control voltage are available

1

Selection and ordering data

AC coil operation

Rating AC1 utilization category Switching resistive load at 55°C			Auxiliary contacts	Type	Weights
Operational current I_e/AC1 A	Ratings of three-phase loads at		  NO NC		kg
	230 V kW	400 V kW			
65	25	43	0 0	TKN 65 00	0.45
115	44	76	0 0	TKN 115 00	0.90
130	50	85	2 2	TK 130 22	2.42
175	67	115	2 2	TK 175 22	2.44



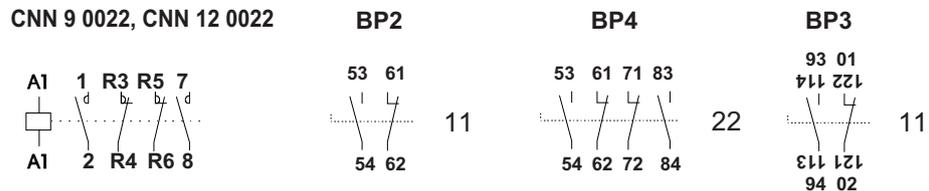
FOUR-POLE CONTACTORS 2NO + 2NC main poles with AC control circuit



1

I_e (Ith)	AC 1 ($\theta \leq 55^\circ\text{C}$)	A	25	25
I_e max	AC 3 ($U_e \leq 690\text{V}$)	A	9	12
Rated operational voltage U_e		V	690	690
Rated insulation voltage U_i		V	690	690
Sizes of Connecting conductors	rigid	mm ²	1,5 - 4	1,5 - 4
Main contacts	flexible	mm ²	1,5 - 2,5	1,5 - 2,5
Squirrel-cage induction motors				
Single phase	AC 3	230 V kW	1,1	1,5
	1 ~ 50 Hz	230 V HP	1,5	2
CONTACTORS WITH AC CONTROL CIRCUIT	TYPE		CNN 9 0022 --	CNN 12 0022 --
Coil voltages	A1 A2		24V, 48V, 110V, 230V, 400V	
			50Hz, 60Hz	
Electromagnet (coil) consumption		open / closed	VA	62 / 7
Weights			kg	0,25
Dimensions a x b x c				45x72,2x71
Drilling plan a1; b1; ϕ 1				60,65/35, 4,5

Wiring diagrams



Remark for (CNN 9 0022...CNN 12 0022) 4-pole contactors fitted with 2NO + 2NC main poles

These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK before MAKE.

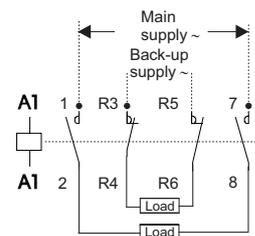
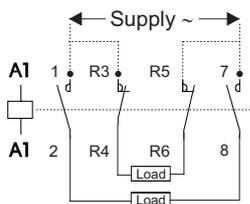


These contactors are not suitable for reversing starter or star-delta starter or for controlling a single load from 2 separate supplies.

Block diagrams

Single supply and 2 separate loads

2 separate supplies and 2 separate loads



CAPACITOR CONTACTORS type CNNK 2.5 - CNNK 16

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Switching of 3 phase capacitors
- Ambient temperature of 55 °C
- Available in other AC voltages on request
- Maximum permissible peak current $I \leq 100 I_e$

1

Selection and ordering data

AC-6b utilization category For switching three-phase capacitors	Capacitor rating at operating voltage 50 Hz			le (A) 400 V/50 Hz	Auxiliary contacts		Type	Weights kg
	230 V kVAr	400/440V kVAr	690 V kVAr		 NO	 NC		
	1,4	2,5	3,7	3,6	0	0	CNNK 2,5 00 CNNK 2,5 10 CNNK 2,5 01	0.24 0.25
					1	0		
					0	1		
	2,8	5	7,5	7,2	0	0	CNNK 5 00 CNNK 5 10 CNNK 5 01	0.25 0.26
					1	0		
					0	1		
	4	7,5	11	11	0	0	CNNK 7,5 00 CNNK 7,5 11*	0.27 0.29
					1	1		
	6.7	12,5	18	18	0	0	CNNK 16 00 CNNK 16 11*	0.395 0.415
					1	1		

Note:

Maximum permissible peak current $I \leq 100$ times the nominal rms current of the switched capacitor

* With BP3 11.

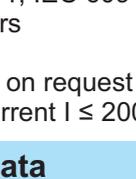
CAPACITOR CONTACTORS type CNNK 10 - CNNK 30

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Switching of 3 phase capacitors
- Ambient temperature of 55 °C
- Available in other AC voltages on request
- Maximum permissible peak current $I \leq 200 I_e$

Selection and ordering data

1

AC-6b utilization category For switching three-phase capacitors				Auxiliary contacts		Type	Weights kg
Capacitor rating at operating voltage 50 Hz			I_e (A) 400 V/50 Hz				
230 V kVAr	400/440V kVAr	690 V kVAr		NO	NC		
	5	10	15	14	2 0 1 1 0 2	CNNK 10 20 CNNK 10 11 CNNK 10 02	0.320
	6,7	12.5	18	18	2 0 1 1 0 2	CNNK 12 20 CNNK 12 11 CNNK 12 02	0.320
	8.5	15	22	22	2 0 1 1 0 2	CNNK 15 20 CNNK 15 11 CNNK 15 02	0.325
	11	20	30	29	1 0 0 1	CNNK 20 10 CNNK 20 01	0.333
	14	25	35	36	1 0 1 0 0 1	CNNK 25E 10* CNNK 25 10 CNNK 25 01	0.450 0.520
	20	30	40	44	1 0 0 1	CNNK 30 10 CNNK 30 01	0.525

* Without terminal blocks (see page 1/56 and 1/58)

These CNNK contactors are equipped with early-make contacts.

This special type of contact has the purpose of connecting for a very brief interval, 2-3ms, during the contactor closing, resistors which limit the connecting current of the capacitors. These resistors are then excluded when the closing operation is complete and the current capacity is conveyed to the main contacts. With this type of circuit, it is possible to obtain minor wear of all the components of the system especially fuses and capacitors ensuring a longer life and better reliability.

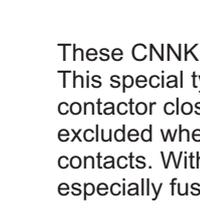
CAPACITOR CONTACTORS type CNNK 40 - CNKM 80

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Switching of 3 phase capacitors
- Ambient temperature of 55 °C
- Available in other AC voltages on request
- Maximum permissible peak current $I \leq 200 I_e$

1

Selection and ordering data

	AC-6b utilization category For switching three-phase capacitors				Auxiliary contacts		Type	Weights kg
	Capacitor rating at operating voltage 50 Hz			I _e (A) 400 V/50 Hz	 			
	230 V kVAr	400/440V kVAr	690 V kVAr					
	25	40	58	58	1 0 0 1	CNNK 40 10 CNNK 40 01	0.943	
	29	50	70	72	1 0 0 1	CNNK 50 10 CNNK 50 01	0.945	
	32	60	80	87	1 0 0 1	CNNK 60 10 CNNK 60 01	0.97	
	32	60	85	87	1 0 0 1	CNNK 60N 10 CNNK 60N 01	1.35	
	35	70	90	101	1 0 0 1	CNNK 70 10 CNNK 70 01	1.40	
	34	60	92	87	2 2	CNKM 60 22	2.4	
	45	80	115	116	2 2	CNKM 80 22	2.45	

These CNNK and CNKM contactors are equipped with early-make contacts.

This special type of contact has the purpose of connecting for a very brief interval, 2-3ms, during the contactor closing, resistors which limit the connecting current of the capacitors. These resistors are then excluded when the closing operation is complete and the current capacity is conveyed to the main contacts. With this type of circuit, it is possible to obtain minor wear of all the components of the system especially fuses and capacitors ensuring a longer life and better reliability.

CAPACITOR CONTACTORS type CNNK 10..N - CNNK 30..N - New Series

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Switching of 3 phase capacitors
- Ambient temperature of 55 °C
- Available in other AC voltages on request
- Maximum permissible peak current $I \leq 200 I_e$

New series

- 5 sizes up to: 15kVAr; 20kVAr; 30kVAr; 60kVAr; 75kVAr
- New precharging resistors for increased service life
- Space saving: 45mm width up to 30kVAr
55mm width up to 60kVAr
70mm width up to 75kVAr

Selection and ordering data



AC-6b utilization category For switching three-phase capacitors				Auxiliary contacts	Type	Weights
Capacitor rating at operating voltage 50 Hz			I_e (A)	 		kg
230 V kVAr	400/440V kVAr	690 V kVAr	400 V/50 Hz	NO	NC	
5	10	15	14	2 1 0	0 1 2	CNNK 10 20N CNNK 10 11N CNNK 10 02N 0.320
6,7	12.5	18	18	2 1 0	0 1 2	CNNK 12 20N CNNK 12 11N CNNK 12 02N 0.320
8.5	15	22	22	2 1 0	0 1 2	CNNK 15 20N CNNK 15 11N CNNK 15 02N 0.325
11	20	30	29	1 0	0 1	CNNK 20 10N CNNK 20 01N 0.333
14	25	35	36	1 1 0	0 0 1	CNNK 25E 10N* CNNK 25 10N CNNK 25 01N 0.450 0.520
20	30	40	44	1 0	0 1	CNNK 30 10N CNNK 30 01N 0.525

* Without terminal blocks (see page 1/54 and 1/56)

Precharging resistors are an integral component of the CNNK..N contactors, equipped with early-make contacts. This special type of contact has the purpose of connecting for a very brief interval, 2-3ms, during the contactor closing, resistors which limit the connecting current of the capacitors. These resistors are then excluded when the closing operation is complete and the current capacity is conveyed to the main contacts. With this type of circuit, it is possible to obtain minor wear of all the components of the system especially fuses and capacitors ensuring a longer life and better reliability. Suitable for capacitors with and without reactor protection.

CAPACITOR CONTACTORS type CNNK 40..N - CNNK 75..N - New Series

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Switching of 3 phase capacitors
- Ambient temperature of 55 °C
- Available in other AC voltages on request
- Maximum permissible peak current $I \leq 200 I_e$

New series

- 5 sizes up to: 15kVAr; 20kVAr; 30kVAr; 60kVAr; 75kVAr
- New precharging resistors for increased service life
- Space saving: 45mm width up to 30kVAr
55mm width up to 60kVAr
70mm width up to 75kVAr

1

Selection and ordering data

AC-6b utilization category For switching three-phase capacitors				Auxiliary contacts		Type	Weights kg
Capacitor rating at operating voltage 50 Hz			I_e (A) 400 V/50 Hz				
230 V kVAr	400/440V kVAr	690 V kVAr		NO	NC		
25	40	58	58	1 0	0 1	CNNK 40 10N CNNK 40 01N	0.943
29	50	70	72	1 0	0 1	CNNK 50 10N CNNK 50 01N	0.945
32	60	80	87	1 0	0 1	CNNK 60 10N CNNK 60 01N	0.97
32	60	85	87	1 0	0 1	CNNK 60N 10N CNNK 60N 01N	1.35
35	70	90	101	1 0	0 1	CNNK 70 10N CNNK 70 01N	1.40
38	75	105	108	1 0	0 1	CNNK 75 10N CNNK 75 01N	1.50



Precharging resistors are an integral component of the CNNK..N contactors, equipped with early-make contacts. This special type of contact has the purpose of connecting for a very brief interval, 2-3ms, during the contactor closing, resistors which limit the connecting current of the capacitors. These resistors are then excluded when the closing operation is complete and the current capacity is conveyed to the main contacts. With this type of circuit, it is possible to obtain minor wear of all the components of the system especially fuses and capacitors ensuring a longer life and better reliability. Suitable for capacitors with and without reactor protection.

DC CONTACTORS type CNO30 - CNO 250, with AC CONTROL CIRCUIT

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Specially designed for DC operation
- Suitable for use in traction vehicles
- Suitable for DC motor and distribution

1

Selection and ordering data

AC coil operation

	Motor switching DC3 and DC5 duty				Auxiliary contacts		Type	Weights
	Rated operational current I_e at 220 V A	440 V A	Rated outputs of DC motor at 220 V kW	440 V kW	 NO	 NC		kg
	30	22.5	5	9	2	2	CNO 30 22	0.97
	80	80	16	28	2	2	CNO 110 22	5.7
	170	140	32	56	2	2	CNO 250 22	9.7

DC CONTACTORS type CNO 30 - CNO 250, with DC CONTROL CIRCUIT

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Specially designed for DC operation
- Suitable for use in traction vehicles
- Suitable for DC motor and distribution

1

Selection and ordering data

DC coil operation

Motor switching DC3 and DC5 duty		Rated outputs of DC motor at		Auxiliary contacts		Type	Weights kg	
Rated operational current I_{ea} at 220 V A	440 V A	220 V kW	440 V kW	NO	NC			
	30	22.5	5	9	2	2	CNO 30 22*	0.97
	80	80	16	28	2	2	CNO 110 22*	5.7
	170	140	32	56	2	2	CNO 250 22*	9.7

(*)For DC control through push button the number of free auxiliary contacts are minus 1NO.
For DC control through permanent contact control the number of free auxiliary contacts is minus 1NO and 1NC

ORDER-CONTACTORS

Type

Version

Standard control voltages AC/DC 24, 48, 110, 220/230,380/400 V

For AC control: 50 or 60Hz

For DC control: DC, "UT" for Push button control or "UTKN" for Permanent contact control

Example: Motor contactor type CNO 30 with two NO and two NC auxiliary contacts, control voltage 220V DC, for push button control "UT"

CNO 30 | 22 | 220V DC | UT

CONTACTOR RELAYS type CP0 for auxiliary circuit switching WITH AC CONTROL CIRCUIT

Features

- In conformity with: IEC 60947-1, IEC 60947-5
- 35 mm DIN rail mounting
- Small size, ideal where space is at premium
- Snap-on auxiliaries

Selection and ordering data



Rated operational current I_e for AC 15/AC 14 utilization category for				Auxiliary contacts		Type	Weights kg
230 V	400 V	500	690 V				
A	A	A	A	NO	NC		
6	4	2.5	1.5	4	0	CP0 40	0.175
				3	1	CP0 31	
				2	2	CP0 22	

* Number of auxiliary contacts can be extended up to 6 (2BP1 + BP0) for CP0

CONTACTOR RELAYS type CNNP for auxiliary circuit switching WITH AC CONTROL CIRCUIT

Features

- In conformity with: IEC 60947-1, IEC 60947-5
- 35 mm DIN rail mounting
- Up to 8 auxiliary contacts
- Utilizes the same coils

Selection and ordering data



Rated operational current I_e for AC 15/AC 14 utilization category for				Auxiliary contacts		Type	Weights kg
230 V	400 V	500	690 V				
A	A	A	A	NO	NC		
6	4	4	1,5	4	0	CNNP 40	0.23
				3	1	CNNP 31	
				2	2	CNNP 22	
				1	3	CNNP 13	
				0	4	CNNP 04	

* Number of auxiliary contacts can be extended up to 8 (2BP3 or BP4) for CNNP

**CONTACTOR RELAYS with FAST-ON TERMINALS type CNNP .. F
for auxiliary circuit switching - DEFINITE PURPOSE CONTACTOR
WITH AC CONTROL CIRCUIT**

Selection and ordering data

1



Description	Type	Weights kg
<p>FAST-ON TERMINALS (spade terminals) comply to regulations DIN 46245 and DIN 46247. To each terminal can be attached 2 FAST-ON connectors 6.3 mm by means of multi-core wire 1.5-2.5 mm² or 4 FAST-ON connectors 2.8 mm by means of multi-core wire 0.25-1 mm². Contactors with FAST-ON terminals can be used for voltages up to 500 V A.C. Other characteristics of contactors are identical to those of contactors without FAST-ON terminals.</p>	CNNP F	0,265

**CONTACTOR RELAYS type CNNPB for auxiliary circuit switching
with DC SOLENOID SYSTEM**

Features

- In conformity with: IEC 60947-1, IEC 60947-5
- 35 mm DIN rail mounting
- Up to 8 auxiliary contacts
- Utilizes the same coils

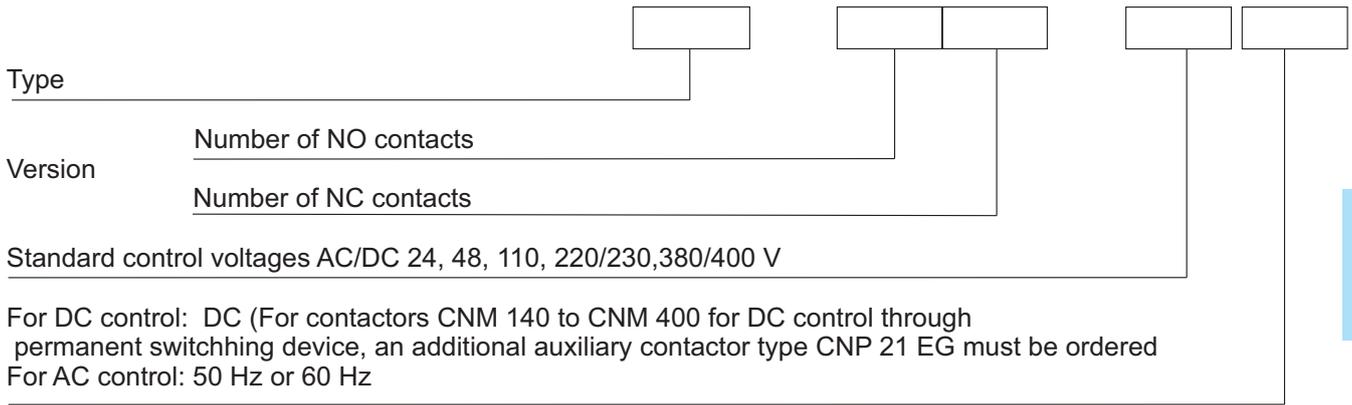
Selection and ordering data



Rated operational current for AC 15/AC 14 utilization category for				Auxiliary contacts		Type	Weights kg
230 V	400 V	500V	690 V				
A	A	A	A	NO	NC		
6	4	4	1.5	4	0	CNNPB 40	0.60
				3	1	CNNPB 31	
				2	2	CNNPB 22	
				1	3	CNNPB 13	
				0	4	CNNPB 04	

* Number of auxiliary contacts can be extended up to 8 (2BP3 or BP4) for CNNP

ORDER-CONTACTORS



1

Example: Motor contactor type CNN 18 with one NO and zero NC auxiliary contacts, control voltage 220/230 V, 50 Hz

CNN 18 | 1 | 0 | 220/230 V | 50 Hz

Example: Motor contactor type CNM 110 with two NO and two NC auxiliary contacts, control voltage 220/230 V, 50 Hz

CNM 110 | 2 | 2 | 220/230 V | 50 Hz

Example: Auxiliary contactor type CNNP with two NO and two NC auxiliary contacts, control voltage 220/230 V 50 Hz

CNNP | 2 | 2 | 220/230 V | 50 Hz

Example: Auxiliary contactor type CNNPB with two NO and two NC auxiliary contacts, control voltage 220 V, DC

CNNPB | 2 | 2 | 220 V | DC

ACCESSORIES for CONTACTORS and CONTACTOR RELAYS

ACCESSORIES for CONTACTOR type CM1 and CONTACTOR RELAYS type CP0

Selection and ordering data

1

Snap-on auxiliary contact blocks

Rated operational current at $I_e/AC15/AC14$				Auxiliary contacts		Type	Weights kg
230 V	400 V	500 V	690 V	NO	NC		
A	A	A	A				
6	3	1.8	1	4	0	BP0 40	0.04
				3	1	BP0 31	
				2	2	BP0 22	
				1	3	BP0 13	
				0	4	BP0 04	
6	3	1.8	1	1	0	BP1 10	0.013
				0	1	BP1 01	



Snap on surge suppressors

		Type	Weights kg
RC elements for control voltage 24 V...60 V for control voltage 72 V...220 V		RC0 - 60 RC0 - 220	0.01

Mechanical interlock

Set comprising mechanical interlock and contactor jointing parts. For use with CP0 and CM1		Type	Weights kg
		MB1	0.002



ACCESSORIES for CONTACTORS type CNN

Selection and ordering data

Snap-on auxiliary contact blocks

Rated operational current at $I_e/AC15/AC14$				Auxiliary contacts		Type	Weights kg
230 V	400 V	500 V	690 V	NO	NC		
A	A	A	A				
6	3	1.8	1	1	1	BP2 11 BP2N 11*	0.03
				2	2	BP4 22 BP4N 22*	
				4	0	BP4 40	0.04
6	3	1.8	1	1	1	BP3 11	0.02



(* BP2N 11; BP4N 22 only for CNN 80, CNN 90 and CNN 100
BP2 11; BP4 22 for CNN 9 to CNN 70, TKN and CNNP/B
BP4 40 only for CNNP and CNNPB

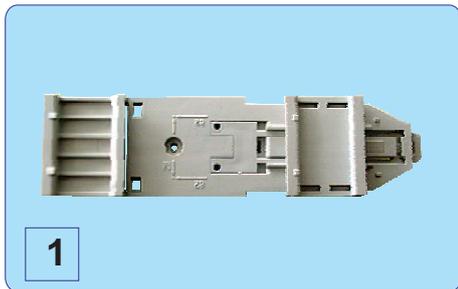
Mechanical interlock

Set comprising mechanical interlock and contactor jointing part. For use with CNN 9/18/22, CNN 25/30 and CNN 32/40		Type	Weights kg
		MB2	0.017



ACCESSORIES for CONTACTORS type CNN

Selection and ordering data



1

Type Width

RKUMP 45 45 mm
Adapter plate for Power switch
1 DIN-rail movable

RKUMP 45A 45mm
Adapter plate for Power switch
2 DIN-rail movable

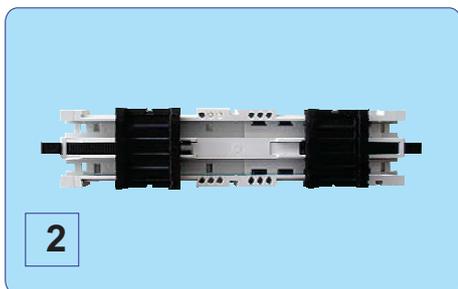
RKUMP 90 90 mm
Adapter plate for Reversing-Starter-
Combination
2x Power switches, 1 DIN-rail movable

RKUMP 90E 90 mm
Adapter for Star-Delta Wiring
3x Power switches, 1 DIN-rail movable



3

1



2

1 For direct-starter up to 38 A

2 For direct-starter up to 38 A

3 For reversing starter up to 38 A

4 For star-delta starter up to 38 A



4

RKWK WIRING SYSTEM



RKWK 1.1

Type Description

RKWK 1.1 For reversing switch, suitable for contactor: 4 kW
(for mini CM1) (max. current 16 A)
5 terminals in line, (3 main terminals, 1 auxiliary terminal, 1 coil terminal)

RKWK 5.1 For reversing switch, suitable for contactors: 4,5 - 7,5 kW
(for CNN 9 - CNN 22) (max. current 25 A)
(3 main terminals)

RKWK 4.1 For reversing switch, suitable for contactors: 11 - 18,5 kW
(for CNN 25 - CNN 40) (max. current 40 A)
(3 main terminals)

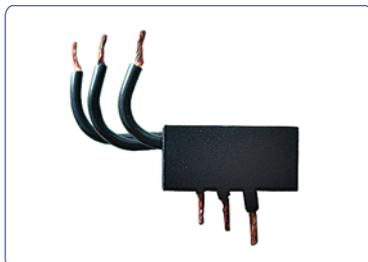


RKWK 5.1



RKWK 4.1

RKITCF CONNECTION BLOCK BETWEEN MOTOR-PROTECTION SWITCH AND CONTACTOR



Type	Cable length	Cross-section	Width	
RKITCF 20	50 mm	2,5mm ²	45mm	20A
RKITCF 35	50 mm	4mm ²	45mm	35A

ACCESSORIES for CONTACTORS type CNN and CNM

Selection and ordering data

Kits for assembling CNNK contactors

To optimise contactor stock management, a kit is available to transform normal three-pole contactors into CNNK types for power factor correction.

The table to the below indicates which kits to purchase depending on the standard contactor in stock.

1



BPK1

TYPE of CONTACTOR	TYPE of CAPACITOR BLOCK	TYPE of CAPACITOR CONTACTOR
CNN 9	BPK1	CNNK 10
CNN 12	BPK1	CNNK 12
CNN 18	BPK1	CNNK 15
CNN 25	BPK1	CNNK 20

Selection and ordering data

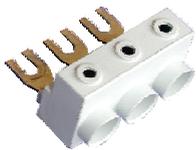
Surge suppressors



For contactor	Description	Part No.	Weights kg
CNNP CNN 9 - 40	RC elements for control voltage 24...60 V for mounting on the coil: A	739968	0.014
		739914	0.019
	for mounting on the front cover: B for control voltages 110...240 V for mounting on the coil: A	739913	0.015
		739908	0.020
CNNPB CNNB 9 - 30	Transil diode for control voltage 12-24V DC for control voltage 48-72 V DC for control voltage 110-120V DC for control voltage 200-220V DC	Code	0.005
		RKTD56CA	
		RKTD160CA	
		RKTD250CA	
RKTD440CA			



Additional terminal blocks



For contactor	Description	Part No.	Weights kg
CNN 32 - CNN 40	Set of 2 additional terminal blocks for connecting bare cables 25 mm ²	601478	0.070
CNM 110 CNM 140 - CNM 200	Set of 6 terminal covers for protection against inadvertent contact with the exposed busbar connections (DIN VDE 0106 Part 100)	603311	0.135
		604128	0.150



SPARE PARTS for CONTACTORS and CONTACTOR RELAYS

SPARE COILS for CONTACTOR type CM1 and CONTACTOR RELAYS type CP0

Selection and ordering data



AC coils for	Control voltage V	Rated frequency	Part No.		Weights kg
			50 Hz	60 Hz	
CM1 CP0	Coil	24	S32617S	503645S	0.042
		48	S32619S	503644S	
		110	S32620S	503643S	
		220/230	504124S	S32807S	
		380/400	S32806S	S32808S	

1

SPARE COILS for CONTACTORS type CNN

Selection and ordering data

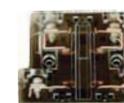


AC coils for	Control voltage V	Rated frequency	Part No.		Weights kg
			50 Hz	60 Hz	
CNN 9 -CNN 30; CNNP	Coil	24	603028	603029	0.050
		48	603030	603031	
		110	603032	603033	
		220/230	605227	605229	
		380/400	605231	605232	
CNN 32 - CNN 40; TKN65	Coil	24	603042	603043	0.08
		48	603044	603045	
		110	603046	603047	
		220/230	605228	605230	
		380/400	605233	605234	
CNN 50 - CNN 70; TKN 115	Coil	24	604795	604802	0.130
		48	604796	604801	
		110	604797	604800	
		220/230	604762	604803	
		380/400	604798	604799	
CNN 80 - CNN 100;	Coil	24	605564	605566	0.140
		48	605565	605567	
		110	605534	605568	
		220/230	605532	605569	
		380/400	605533	605571	

SPARE PARTS for CONTACTORS CNN 50 - CNN 100; CNM110 - CNM 400

Selection and ordering data

Auxiliary contact blocks



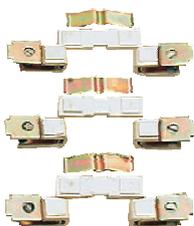
For contactor	Description	Part No.	Weights kg
CNN 50 - CNN 100	Block with auxiliary contacts 1NO+1NC	BP5 11	0.050
CNM 110	Block with auxiliary contacts left, 1NO+1NC	733889S	0.050
	Block with auxiliary contacts right, 1NO+1NC	733890S	
	Add.l block with auxiliary contacts left, 1NO+1NC	733891S	
	Add. block with auxiliary contacts right, 1NO+1NC	733892S	
CNM 110	Block with auxiliary DC contacts right, 1NO+1NC	733888S	0.075
	Block with auxiliary contacts left, 1NO+1NC	155129S	
CNM 140 - CNM 400	Block with auxiliary contacts right, 1NO+1NC	155113S	0.075
	Add. block with auxiliary contacts left, 1NO+1NC	155089S	
	Add. block with auxiliary contacts right, 1NO+1NC	155087S	

SPARE MAIN CONTACTS for CONTACTORS CNM 110 - 400

Selection and ordering data

Main contact set

1



For contactor	Description	Part No.	Weights kg
CNM 110	Set of: - 3 moving contacts and - 6 fixed contacts	733856S	0.195
CNM 140		155093S	0.39
CNM 170		155091S	0.40
CNM 200		155090S	0.41
CNM 250		155603S	0.700
CNM 315		155618S	0.710
CNM 400		155619S	0.720
For contactor	Description	Part No.	Weights kg
CNM 110	Arc chamber	733847S	0.48
CNM 140		155101S	1.16
CNM 170		155102S	1.16
CNM 200		155103S	1.16
CNM 250		155588S	1.88
CNM 315		155527S	1.88
CNM 400		155506S	1.88



SPARE COILS for CONTACTORS CNM 110 - 400 and TK 130 - TK 175

Selection and ordering data

AC coils for		Control voltage V	Rated frequency Hz	Part No.	Weights kg
CNM110 TK 130 - TK 175	Coil	24	50 / 60	158850S/158884S 158852S/158890S 158853S/158876S 158854S/158878S 158855S/158895S	0.230
		48 110 220/230 380/400			
CNM 140 - CNM 200	Coil	24	50 / 60	155117S/158814S 155119S/158817S 155120S/158838S 155195S/158803S 155122S/158822S	0.380
		48 110 220/230 380/400			
CNM 250 - CNM 400	Coil	24	50 / 60	155610S/158955S 155612S/158956S 155613S/158986S 155615S/158951S 155616S/158961S	0.650
		48 110 220/230 380/400			



TECHNICAL INFORMATION

Contactors

Application

Contactors type CPO, CNNP are used for closing and opening operations of the control circuit as well as for the control of small size motors and other a.c. and d.c. loads.

CM, CNN, CNM contactors are designed for switching and control of three-phase motors and other a.c. loads such as electric ovens, bulbs, electromagnets, capacitors etc.

Contactors type CNNB, CNNPB are suitable for d.c. operated (special electromagnet) and for particular conditions of application where reduced noise at closing operation and complete elimination of noise in closed position are required.

These noiseless contactors are particularly suitable for use in passenger lifts. Closing and opening operations are affected by an electromagnet thus the contactors are primarily suitable for remote control and automatic operation. Contactors should be installed in dry and clean areas.

Standards

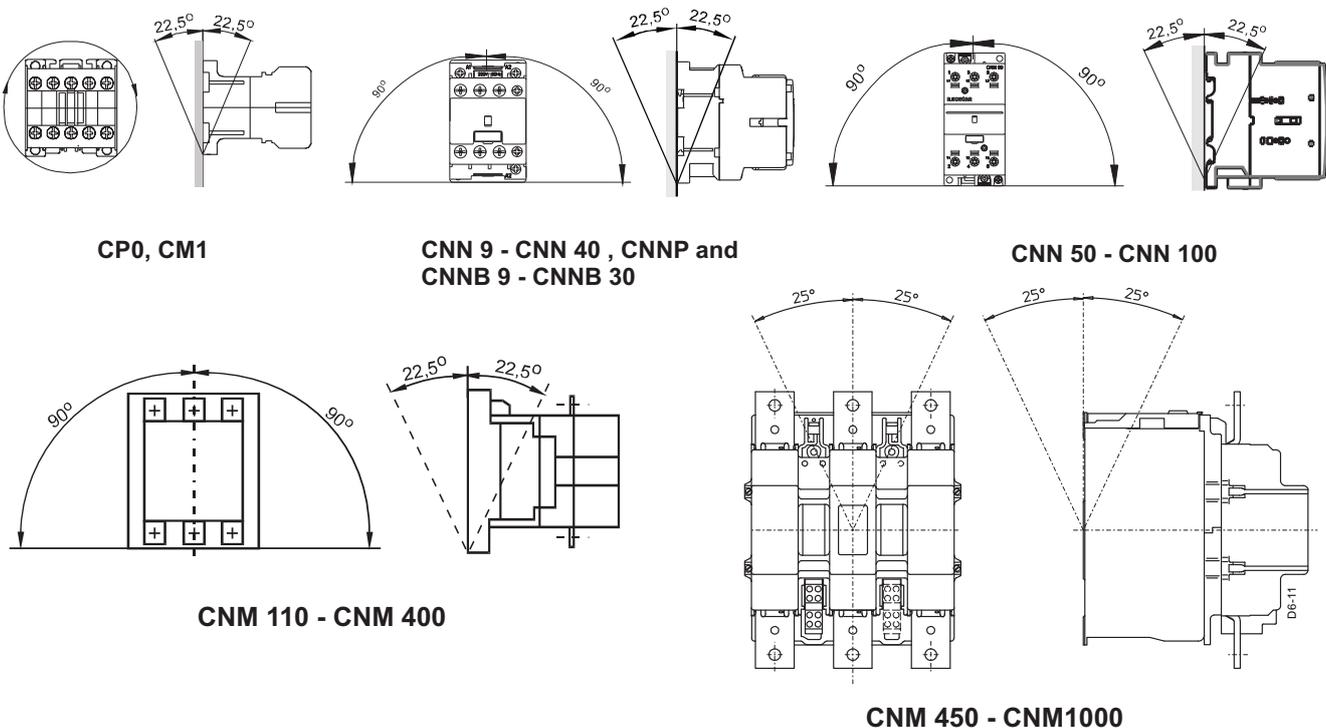
Contactors type CPO, CNNP are in conformity with International standard IEC 60947-5-1, EN 60947-5-1 and national standards VDE-0660. Contactors CM, CNN and CNM comply with IEC 60947-4-1, EN 60947-4-1 and VDE-0660. Designations of contactors, conform to EN 50 005, EN 50 012.

1

Installation

Contactors can be mounted on the baseplate with two or four screws. Contactors type CPO, CNNP, CNNB, CNB, CM1 and CNN 9 - 100 are designed for quick installation on vertical standard support 35 mm width and CNN 50 - 100 on 70 mm width according to DIN EN 50022.

Permissible deviations of mounting surfaces from the vertical base are shown on sketches:



Electrical endurance of the main contacts

The characteristic curves show the contact endurance of the contactors when used to switch resistive and inductive three-phase loads (AC1/AC3), depending on the breaking current and rated operational voltage it is assumed that the operating mechanisms are switched randomly, i.e. Not synchronized with the phase angle of the supply system.

The rated operational current I_e for the AC4 utilization category (breaking six times the rated operational current) is designed for a contact endurance of approximately 120 000 operating cycles if a shorter endurance is sufficient, the rated operational current $I_e/AC4$ can be increased.

For mixed operation, i.e. normal switching (breaking the rated operational current according to the AC3 utilization category) in combination with intermittent inching (breaking several times the rated operational current according to the AC4 utilization category),

the contact endurance can be calculated approximately from the following equation:

$$X = \frac{A}{1 + \frac{C}{100} \left[\frac{A}{B} - 1 \right]}$$

Where:

X - Contact endurance for mixed operation in operating cycles

A - Contact endurance for normal operation ($I_c=I_e$) in operating cycles

B - Contact endurance for inching ($I_c=$ multiple of I_e) in operating cycles

C - Inching operations as a percentage of total switching operations

Diagram of electrical endurance of CM, CNN contactors - AC3

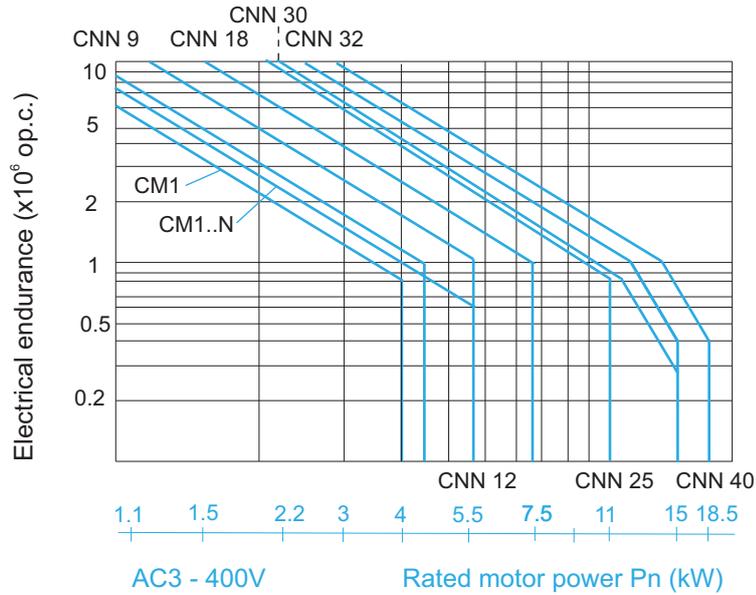


Diagram of electrical endurance of CM, CNN contactors - AC4

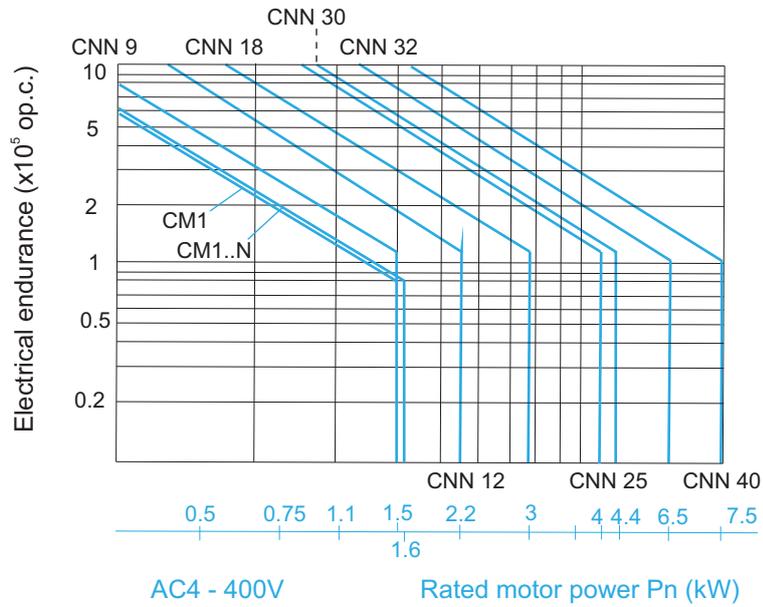


Diagram of electrical endurance of CP0 and CNNP contactor relays

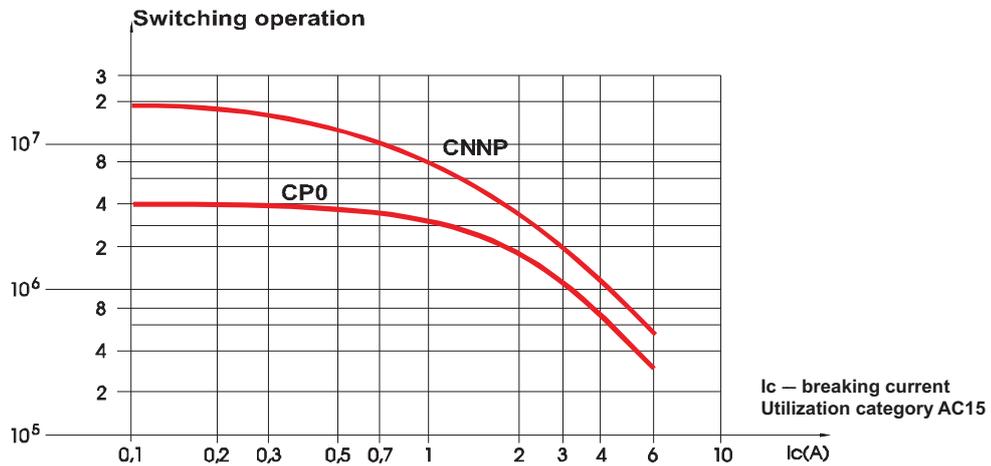
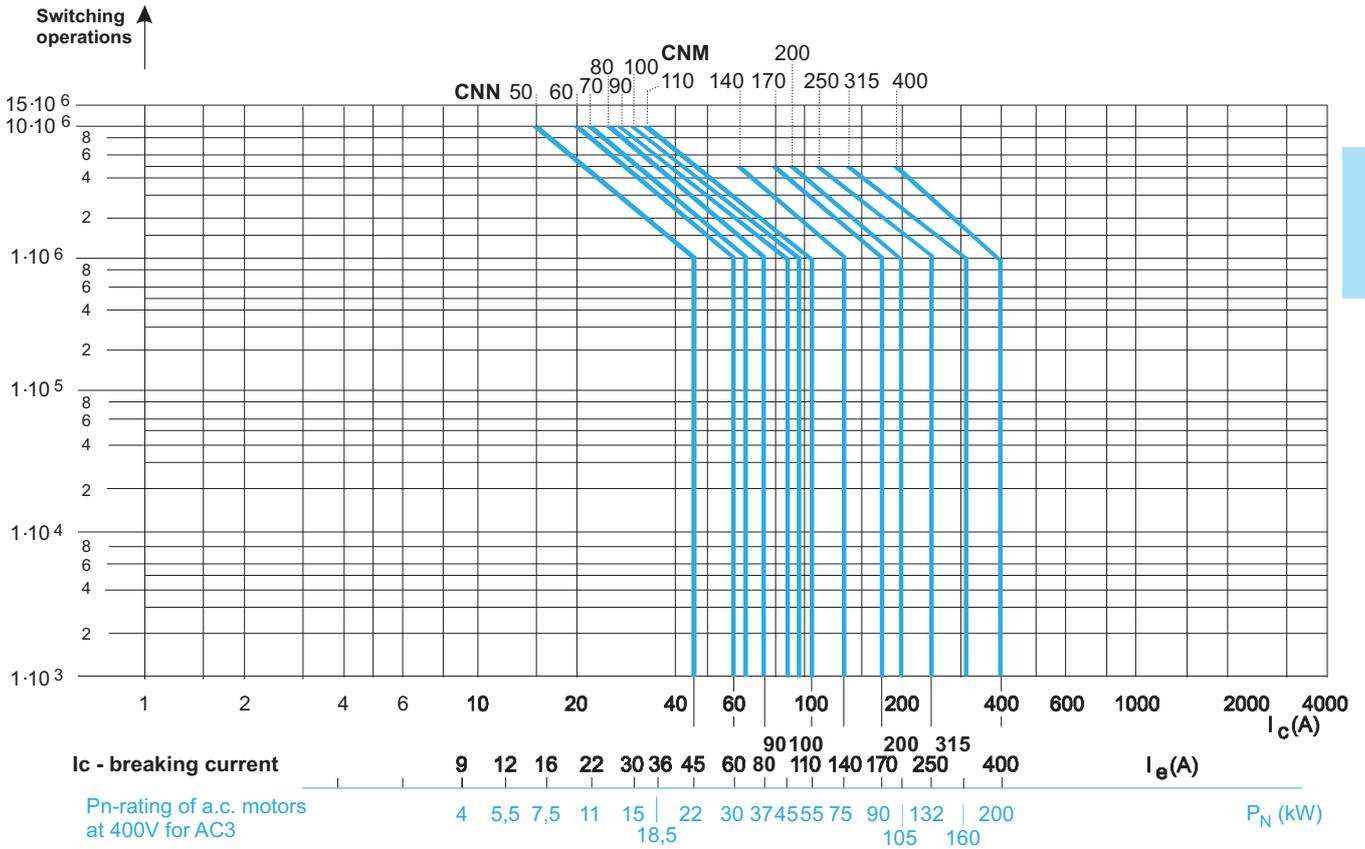
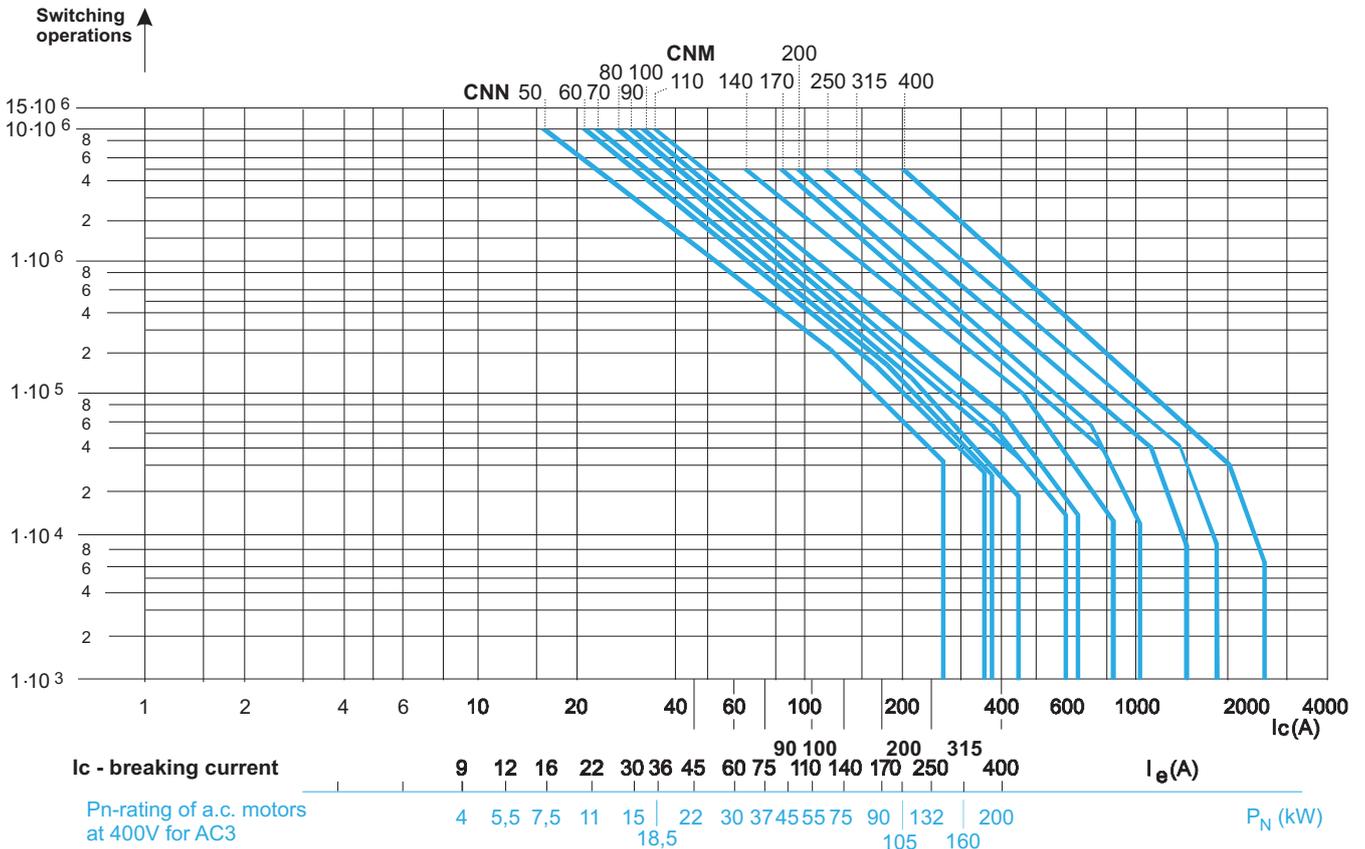


Diagram of electrical endurance of CNN and CNM contactors - AC3



1

Diagram of electrical endurance of CNN and CNM contactors - AC4



TECHNICAL INFORMATION

Utilization categories for contactors

IEC 60947-4-1, IEC 60947 -5-1 and VDE - 0660

ELECTRICAL DURABILITY

MAKE AND BREAK CONDITIONS

1

Category	Typical applications	ELECTRICAL DURABILITY						MAKE AND BREAK CONDITIONS					
		MAKE			BREAK			MAKE			BREAK		
		Current I/le	Voltage U/Ue	p.f.	Current Ic/le	Voltage Ur/Ue	p.f.	Current I/le	Voltage U/Ue	p.f.	Current Ic/le	Voltage Ur/Ue	p.f.
AC-1	Non-inductive or slightly inductive loads, electro-resistance furnaces	1	1	0,95	1	1	0,95	1,5	1,05	0,8	1,5	1,05	0,8
AC-2	Slip ring motors: Starting, switching off	2,5	1	0,65	2,5	1	0,65	4	1,05	0,65	4	1,05	0,65
AC-3	Squirrel-cage motors: $I_e(A) \leq 17$ Starting, switching off $17 < I_e \leq 100$ motors during running. $I_e > 100$	6	1	0,65	1	0,17	0,65	10	1,05	0,45	8	1,05	0,45
		6	1	0,35	1	0,17	0,35	10	1,05	0,45	8	1,05	0,45
		6	1	0,35	1	0,17	0,35	10	1,05	0,35	8	1,05	0,35
AC-4	Squirrel-cage motors: $I_e(A) < 17$ Starting, plugging ¹⁾ , $17 < I_e < 100$ inching ²⁾ . $I_e > 100$	6	1	0,65	6	1	0,65	12	1,05	0,45	10	1,05	0,45
		6	1	0,35	6	1	0,35	12	1,05	0,45	10	1,05	0,45
		6	1	0,35	6	1	0,35	12	1,05	0,35	10	1,05	0,35
AC-5a	Switching of electric discharge lamp control.							3	1,05	0,45	3	1,05	0,45
AC-5b	Switching of incandescent lamps.							1,5 ³⁾	1,05 ³⁾		1,5 ³⁾	1,05 ³⁾	
AC-6a	Switching of transformers.							To be derived from test values for AC-3 or AC-4					
AC-6b	Switching of capacitor banks.							1,5	1,05		1,5	1,05	
AC-7a	Slightly inductive loads in household appliances and similar applications.							1,5	1,05	0,8	1,5	1,05	0,8
AC-7b	Motor-loads for household applications.							8	1,05	⁴⁾	8	1,05	⁴⁾
AC-8a	Hermetic refrigerant compressor motor control with manual resetting of overload releases.							6	1,05	⁴⁾	6	1,05	⁴⁾
AC-8b	Hermetic refrigerant compressor motor control with automatic resetting of overload releases.							6	1,05	⁴⁾	6	1,05	⁴⁾
AC-12	Control of resistive loads and solid-state loads with isolation by optocouper.	1	1	0,9	1	1	0,9						
AC-13	Control of solid-state loads with transformer isolation.	2	1	0,65	2	1	0,65	10	1,1	0,65	1,1	1,1	0,65
AC-14	Control of small electro-magnetic loads (≤ 72 VA)	6	1	0,3	1	1	0,3	6	1,1	0,7	6	1,1	0,7
AC-15	Control of electro-magnetic loads (> 72 VA)	10	1	0,3	1	1	0,3	10	1,1	0,3	10	1,1	0,3
		I/le	U/Ue	L/R ms	I/le	U/Ue	L/R ms	I/le	U/Ue	L/R ms	I/le	U/Ue	L/R ms
DC-1	Non-inductive or slightly inductive loads, electro-resistance furnaces.	1	1	1	1	1	1	1,5	1,05	1	1,5	1,05	1
DC-3	Shunt motors: starting, plugging ¹⁾ , inching ²⁾ , dynamic breaking of motors.	2,5	1	2	2,5	1	2	4	1,05	2,5	4	1,05	2,5
DC-5	Series motors: starting, plugging ¹⁾ , inching ²⁾ , dynamic breaking of motors.	2,5	1	7,5	2,5	1	7,5	4	1,05	15	4	1,05	15
DC-6	Switching of incandescent lamps.							1,5	1,05	³⁾	1,5	1,05	³⁾
DC-13	Control of d.c. electromagnets.	1	1	6P	1	1	6P	1,1	1,1	6P	1,1	1,1	6P
DC-14	Control of d.c. electromagnetic loads having economy resistors in circuit.	1	1	15	1	1	15	10	1,1	15	10	1,1	15

- 1) By plugging is understood stopping or reversing the motor rapidly by reversing motor primary connections while the motor is running.
 2) By inching (jogging) is understood energizing a motor once or repeatedly for short periods to obtain small movements of the driven mechanism.
 3) Tests to be carried out with an incandescent light load.
 4) p.f.=0,45 for $I_e \leq 100$ A ; 0,35 for $I_e > 100$ A.

I - making current
 U - voltage before breaking

I_e - rated operational current
 U_e rated operational voltage

I_c - breaking current
 U_r - recovery voltage

P = U_e x I_e (W)

TECHNICAL INFORMATION

Degrees of Protection for enclosed equipment

In an installation, the degree of protection required for electrical equipment depends of the environmental characteristics. The degree of protection, ensured by the enclosure of equipment or by the cubicle containing the equipment is expressed by the IP code which gives the level of protection against access to hazardous parts, the ingress of foreign bodies and/or the ingress of water, in compliance with IEC 529, EN 60529, IEC 60947-1 and EN60947-1. Besides the IP symbol, the complete code has two figures followed (optionally) by two additional letters. A short description of the elements used in IP coding is given below.

Element	Figures or letters	Specifications for installation protection	Protection of personnel
Codes		IP	
First figure	0 1 2 3 4 5 6	Against ingress of foreign bodies No protection Diameter \geq 50 mm Diameter \geq 12,5 mm Diameter \geq 2,5 mm Diameter \geq 1 mm Limited protection against dust Total protection against dust	Against access to hazardous parts with Non-protected Back of hand Finger Tool Wire Wire Wire
Second figure	0 1 2 3 4 5 6 7 8	Against entrance of water having a harmful effect No protection Vertical dripping Dripping up to 15° from the vertical Rain at a vertical angle of \leq 60° Splashing from all directions Hosing jets from all directions Strong hosing jets from all directions Temporary immersion Permanent immersion	
Additional letter (opt.) for use with:		Against ingress of foreign bodies	Against access to hazardous parts with
First figure 0	A	Stopped by a barrier with a 50 mm ϕ sphere	Back of hand
First figure 0 or 1	B	Entrance of test finger limited to 80 mm	Finger
First figure 1 or 2	C	Wire with 2.5 mm ϕ and length of 100 mm	Tool
First figure 2 or 3	D	Wire with 1 mm ϕ and length of 100 mm	Wire
Additional letter (opt.)	H M S W	Specific additional information High voltage apparatus Moving parts which are moving during water test Moving parts which are stationary during water test Specified atmospheric conditions	

Note: The type of enclosure or cubicle in which the equipment must be installed prevails with respect to the degree of protection.

TECHNICAL INFORMATION

Over voltage limiter (surge suppressors)

1

When cutting off the inductive circuits the over voltage appears. The over voltage can damage used equipment that is why it is useful to limit the amplitudes and duration of the over voltage with some of the blocking systems. In practice this overvoltages may disconnect the coil of the contactor. Cutting off the coil (winding) is connected with high frequencies and remarkable amplitudes (several KV) but regularly with short duration. With reference to the place of the implementation, it is frequently necessary to limit the over voltage, because they can cause problems such as:

- Radio interference
- Interference with the electronic devices and components (programmable automation)
- Damage of the electronic systems and components (diodes, bridges, etc.)

The most often used systems for over voltage blockade are:

- R-C elements
- Varistors
- Diodes (with or without resistor in serial)

The advantages and disadvantages when using these elements are following:

R-C Advantages

- Theoretically can be used with AC and DC circuits
- Big limitation of voltage peaks
- Time stability of R-C elements

Disadvantages

- Resonance
- Limited influence on the period of activating contactor
- Contactors with DC magnet switch out current limiting resistor, difficulties with limiting overvoltage due to big powers.

Varistors Advantages

- Very short period of cutting off, so that there is no influence on the contactor activity
- Without resonance
- Usage in AC and DC circuits

Disadvantages

- Not enough limitation of voltage peaks
- Growing old equipment because of prolonged thermal loading

Diodes Advantages (see page 1/30)

- Optimal muffing

Disadvantages

- Delay when cutting off
- Only DC circuits

TECHNICAL INFORMATION

Voltage drop in main circuits and current transformers

Voltage drop in main circuits

When the distance between the energy source and the consumer is long, it is advisable to calculate the voltage drop for example at the moment of starting the motor (when tripping current gets peak value) and to check if the remaining voltage is in the consumers working limits.

For calculating the voltage drop the following formula has been used:

$$\Delta V = \Delta V_0 * L * I$$

Where ΔV = voltage drop in Volts

ΔV_0 = unit voltage drop from table

L = cable length in km

I = current

This formula is valid for calculating the voltage drop for motors, when insufficient voltage disable running up the motor.

In the table below are listed active and reactive resistances of the cables for calculating the voltage drop when the power factor is different from 0.8. In that case the following formulas should be used:

$$\text{Single phase } \Delta V = 2 I * L (\cos f + X_s \sin f)$$

$$\text{Three phase } \Delta V = \sqrt{3} I * L (\cos f + X_s \sin f)$$

Rated cross-section [mm ²]	Single wire cable					Two and three wire cable				
	active resistance	reactive resistance	DC	AC cos f = 0,8		active resistance	reactive resistance	DC	AC cos f = 0,8	
	r	x	ΔV	1 fase	3 fases	r	x	ΔV	1 fase	3 fases
	[Ω /km]	[Ω /km]	[V/Akm]	[V/Akm]	[V/Akm]	[Ω /km]	[Ω /km]	[V/Akm]	[V/Akm]	[V/Akm]
1	22.1	0.176	44.2	35.6	30.8	22.5	0.125	45.0	36.1	31.3
1.5	14.8	0.168	29.7	23.9	20.7	15.1	0.118	30.2	24.3	21.0
2.5	8.91	0.155	17.8	14.4	12.5	9.08	0.109	18.2	14.7	12.7
4	5.57	0.143	11.1	9.08	7.87	5.68	0.101	11.4	9.21	7.98
6	3.71	0.135	7.41	6.10	5.28	3.78	0.0955	7.56	6.16	5.34
10	2.24	0.119	4.47	3.72	3.22	2.27	0.0861	4.55	3.73	3.24
16	1.41	0.112	2.82	2.39	2.07	1.43	0.0817	2.87	2.39	2.07
25	0.889	0.106	1.78	1.55	1.34	0.907	0.0813	1.81	1.55	1.34
35	0.641	0.101	1.28	1.15	0.993	0.654	0.0783	1.31	1.14	0.988
50	0.473	0.101	0.947	0.878	0.760	0.483	0.0779	0.966	0.866	0.750
70	0.328	0.0965	0.655	0.641	0.555	0.334	0.0751	0.667	0.624	0.541
95	0.236	0.0975	0.472	0.494	0.428	0.241	0.0762	0.482	0.476	0.472
120	0.187	0.0939	0.373	0.413	0.358	0.190	0.0740	0.381	0.394	0.342
150	0.152	0.0928	0.304	0.356	0.308	0.156	0.0745	0.311	0.341	0.295
185	0.122	0.0908	0.243	0.306	0.265	0.124	0.0742	0.247	0.289	0.250
240	0.0933	0.0902	0.185	0.259	0.224	0.0954	0.0752	0.188	0.245	0.212

Current transformers

Typical for the current transformers is that the power on the secondary has got influence on the precision of the transmitting ratio as big as the phase angle.

The power of the secondary in the current transformer is made by the impedance of cables and attached instruments. The cable consumption is shown in the table below.

Secondary coil	Consumption per meter of the two-wire cable at 20 °C						
	for different cross section						
A	1 mm ²	1,5 mm ²	2,5 mm ²	4,5 mm ²	6 mm ²	10 mm ²	16 mm ²
	VA	VA	VA	VA	VA	VA	VA
5	1	0,685	0,41	0,254	0,169	0,0975	0,062
1	0,04	0,0274	0,0164	0,0102	0,0068	0,0039	0,0025

NOTE: Each temperature increased for 10°C is followed by increasing of the consumption in VA for 4%.

Consumption of instruments is defined by the producer. Here are listed just informative values for some instruments.

Electromagnetic ammeter	1,1 VA	Cos f - meter	0,5 VA	Counter	0,5 VA
Wattmeter - Varmeter	0,5 VA	Ammeter - printer	0,5-1,5-2,5 VA	Wattmeter - printer	0,5 VA

TECHNICAL INFORMATION

Auxiliary current circuits

1

Voltage drop in auxiliary current circuit

The maximal cable length with allowed maximal voltage drop of 5 % for AC and DC circuits is calculated from the formula:

$L = L_0 / P$ where is:

L = Maximal cable length in km

L_0 = Cable coefficient depending on the voltage drop and the cross section

P = Active load power when tripping (for AC=VA cosφ)

The maximal length of the cable depends on the allowed voltage drop and it is changing proportionally.

Ex. for 10 % voltage drop the cable length should be doubled.

NOTE: The voltage drop is not dependent only on the length and the cross section of the cable, but as well on all other resistances (clamps, contacts), which are connected in the auxiliary circuit.

Rated cross-section [mm ²]	Coefficient L_0					
	24V [kmW]	48V [kmW]	110V [kmW]	220/230V [kmW]	380/400V [kmW]	500V [kmW]
1,5	1,08	4,32	22,7	90,8	272	471
2,5	1,80	7,20	37,8	151	453	785
4	2,88	11,5	60,5	242	725	1260

TECHNICAL INFORMATION

Cable capacity

Cable Capacity

If the length of the cables in the auxiliary current circuits is excessive the voltage drop is not only the one that should be considered but the cable capacity as well. The cable capacity can get such a high value to hold the contactor closed even when the voltage is cut off.

1

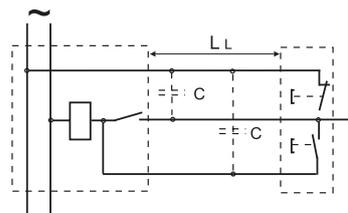
The control circuit configuration is shown below (permanent contact control) in the case of two-wire cable.

This effect is more expressed at small auxiliary relays where is required smaller energy for holding in closed position.

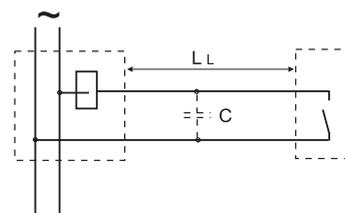
The conductor's critical capacity and appropriate critical length of the conductors for nominal control voltage

(coil voltage) 220 V, 50 Hz, at permissible 10% increase of control voltage.

Contractors (Type)	Critical conductor capacity (μF)	Critical conductor length (m)	
		Control with push button	Control with permanent
CNN 50 - CNN 70 TKN 115	0,137	228	455
CNN 80 - CNN 100, CNM 110 TK 130 - TK 175	0,222	370	740
CNM 140 - CNM 200	0,376	626	1252
CNM 250 - CNM 400	0,717	1195	2390



Control with push button



Control with permanent contact switch

TECHNICAL INFORMATION

Squirrel-cage induction motors rated motor current

Single phase				Three phase 4 Poles 50 and 60 Hz											
[kW]	[HP]	220V [A]	240V [A]	[kW]	[HP]	220V [A]	230V [A]	380V [A]	400V [A]	415V [A]	440V [A]	500V [A]	660V [A]	690V [A]	1000V [A]
0.37	0.5	3.9	3.6	0.37	0.5	1.8	1.7	1.04	0.9	0.9	0.9	0.8	0.6	0.6	0.4
0.55	0.75	5.2	4.8	0.55	0.75	2.5	2.4	1.5	1.4	1.4	1.3	1.1	0.9	0.9	0.6
0.75	1	6.6	6.1	0.75	1	3.4	3.2	2	1.9	1.8	1.7	1.5	1.1	1	0.75
1.1	1.5	9.6	8.8	1.1	1.5	4.5	4.3	2.6	2.5	2.4	2.3	2	1.5	1.4	1
1.5	2	12.7	11.7	1.5	2	6.1	5.8	3.5	3.5	3.3	3	2.7	2	1.9	1.35
1.8	2.5	15.7	14.4	2.2	3	8.8	8.4	5.1	4.8	4.7	4.4	3.8	3	2.9	2
2.2	3	18.6	17.1	3	4	11.4	10.9	6.6	6.3	6	5.7	5	3.8	3.6	2.5
3	4	24.3	22.2	3.7	5	14	13.3	8	7.6	7.4	7	6.1	4.6	4.4	3
3.5	5	29.6	27.1	4	5.5	14.8	14.1	8.6	8.1	8	7.5	6.5	5	4.8	3.3
4.4	6	34.7	31.8	5.5	7.5	20	19.1	11.7	11.1	11	10	9	6.7	6.4	4.5
5.2	7	39.8	36.5	7.5	10	27	25.8	15.5	14.7	14.3	13.5	12	9	8.6	6
5.5	7.5	42.2	38.7	9	12	32	30.6	18.7	17.7	17	16	14	10.7	10.2	7
6	8	44.5	40.8	10	13.5	36	34.4	20.5	19.5	19	18	15.6	12	11.5	8
7	9	49.5	45.4	11	15	38.5	36.8	22	20.9	20.5	19.5	17	13	12.4	9
7.5	10	54.4	50	15	20	52.5	50.2	30	28.5	28	26.5	23	17.5	16.7	12
				18.5	25	64	61.2	37	35.1	34	32	28	21.3	20.3	14
				22	30	76	72.6	44	42	40	38	33.5	25.3	24.2	17
				25	34	86	82.2	50	47.5	46	43	38	29	27.7	19
				30	40	102	97.5	59	56	54	51	45	34	32.5	23
				33	45	112	107	65	62	60	56	50	38	36.3	25
				37	50	124	119	72	68.4	66	62	55	42	40	28
				40	54	133	127	77	73	71	67	58.5	45	43	30
				45	60	146	140	85	81	78	73	65	49	47	33
				51	70	167	160	97	92	89	84	74	56	53	37
				55	75	179	171	104	99	95	90	79	60	57	40
				59	80	192	184	111	105	102	96	85	64	61	43
				63	85	204	195	118	112	109	103	90	69	66	45
				75	100	240	230	139	132	128	121	106	81	77	53
				80	110	257	246	149	141	136	129	113	86	82	57
				90	125	295	282	171	162	157	148	148	130	95	65
				100	136	321	307	186	177	171	161	142	107	102	71
				110	150	353	338	205	195	188	177	156	118	113	78
				129	175	415	397	240	228	220	207	183	138	132	92
				132	180	424	406	245	233	225	212	187	142	136	94
				140	190	450	430	260	247	239	225	198	150	143	99
				147	200	472	451	273	259	250	236	208	158	151	104
				150	204	482	461	280	266	256	241	212	161	154	106
				160	220	520	497	300	285	276	260	229	174	166	115
				180	245	578	553	335	318	306	289	254	193	185	128
				185	250	591	565	342	325	314	296	260	197	188	130
				200	270	637	609	372	353	341	321	283	214	205	142
				220	300	706	675	409	389	375	353	311	236	226	156
				250	340	803	768	465	442	426	402	353	268	256	177
				257	350	825	789	478	454	438	413	363	275	263	182
				280	380	900	861	520	494	476	450	396	300	287	200
				295	400	944	903	547	520	500	472	416	315	301	208
				300	408	963	921	558	530	511	482	424	321	307	212
				315	430	1000	956	580	551	530	500	440	334	319	220
				335	455	1065	1020	616	585	565	531	468	355	339	234
				358	480	1120	1070	650	617	594	560	493	374	358	247
				368	500	1170	1120	676	642	620	584	514	390	373	260
				400	545	1270	1115	735	698	673	635	560	423	405	280
				425	580	1350	1290	781	742	715	675	594	450	430	297
				440	600	1400	1340	810	769	742	700	616	467	447	308
				450	610	1430	1370	827	786	757	714	629	476	455	315
				475	645	1510	1445	873	829	800	754	664	503	481	332
				500	680	1590	1520	920	874	841	794	698	529	506	350
				530	720	1660	1590	950	902	870	825	720	545	521	360
				560	760	1760	1680	1000	950	920	870	760	575	550	380
				600	810	1880	1800	1090	1035	978	920	830	630	603	410

Stated current values are only indicative and can slightly vary depending on the type of motor and manufacturer.

NOTE: The choice of contactors and starters in this catalogue are based on current values indicated in this table.

TECHNICAL INFORMATION

MOTOR CONTACTORS type CM1 and type CNN WITH AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

Technical data										
Contactor type		CM1 / CM1..N	CNN 9	CNN 12	CNN 18	CNN 22	CNN 25	CNN 30	CNN 32	CNN 40
Mechanical endurance	make/break operations	x10 ⁶	5							
Insulation rating		V	690							
Permissible ambient temperature		°C	- 25 to +55							
Consumption of electromagnet in cold state with Un										
AC operated	closing	VA	26	62	62	62	62	62	65	65
	p.f.		0.8	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	closed	VA	4	7	7	7	7	7	8	8
DC operated	p.f.		0.35	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	closing	W	-	-	123	123	123	123	125	125
	closed	W	-	-	2.8	2.8	2.8	2.8	2.8	2.8
Coil voltage tolerances			0,85 – 1,1Un							
duration of making and breaking										
(values are also valid for voltages of electromagnet from 0,8 to 1,1 Un for each coil in cold and warm state). Total breaking time is addition of opening time and duration of electric arc.										
AC operated	closing time	ms	12 - 21	12 - 22	12 - 22	12 - 22	12 - 22	12 - 22	12 - 22	12 - 22
	opening time	ms	9 - 18	4 - 19	4 - 19	4 - 19	4 - 19	4 - 19	4 - 19	4 - 19
	duration of electric arc	ms	10	10	10	10	10	10	10	10
Frequency of switching operations										
without thermal relay										
	utilization category	AC1	s/h	1200	1000	1000	1000	1000	1000	1000
		AC2 ; AC3	s/h	1000	750	750	750	750	750	750
		AC4	s/h	250	250	250	250	250	250	250
with thermal relay			s/h	15	15	15	15	15	15	15
Resistivity to shocks	(square shock)	g/ms	7/5 and 4.2/10	7/5 and 4.2/10	7/5 and 4.2/10	7/5 and 4.2/10	8.2/5 and 4.9/10	8.2/5 and 4.9/10	8.2/5 and 4.9/10	8.2/5 and 4.9/10
Short-circuit protection of contactors without overload relays										
Main circuit										
With fuse links										
-acc. to IEC 60947-4-1 DIN VDE 0660 Part 102	Type of coord. "1" gL/gG	A	20	25	25	40	50	50	50	63
	Type of coord. "2"	A	16	20	20	25	35	35	35	40
Sizes of connecting conductors										
for contact without thermal relay										
main circuit	single-wire conductor	mm ²	1-2.5	1,5-6	1,5-6	1,5-6	2,5-10	2,5-10	2,5-10	2,5-10
	multi-wire conductor with cable shoe	mm ²	0,75-1,5	1,5-6	1,5-6	1,5-6	2,5-10	2,5-10	2,5-10	2,5-16
	Screw		M3.5	M4	M4	M4	M4	M4	M4	M4
auxiliary circuit	Screw head		PZ2	PZ2	PZ2	PZ2	PZ2	PZ2	PZ2	PZ2
	Tightening torque	Nm	1.2	1.2	1.2	1.2	1.4	1.4	1.4	1.6
	single-wire conductor	mm ²	1 - 2,5							
	multi-wire conductor with cable shoe	mm ²	0,75 - 1,5							
	Screw		M3.5							
	Screw head		PZ2							
	Tightening torque	Nm	0.8							
	Loadability of auxiliary contacts of contactors CM1 and CNN									
	rated continuous current I _{th} ; 35°C		A	10	10	10	10	-	-	-
rated operational current I _e /AC15	for 24 V	A	6	6	6	6	-	-	-	-
	230 V	A	6	6	6	6	-	-	-	-
	400 V	A	4	4	4	4	-	-	-	-
	500 V	A	2	2	2	2	-	-	-	-
	690 V	A	1	1	1	1	-	-	-	-
rated operational current I _e /DC13	for 24 V	A	4	4	4	4	-	-	-	-
	110 V	A	0.6	0.6	0.6	0.6	-	-	-	-
	230 V	A	0.2	0.3	0.3	0.3	-	-	-	-
Load carrying capacity of the main contacts										
rated continuous current I _{th} ; 55°C		A	20	25	25	30	40	40	40	50
AC1 utilization category										
rated operational current I _e /AC1; 55°C		A	20	25	25	30	40	40	40	50



TECHNICAL INFORMATION

MOTOR CONTACTORS type CM1 and type CNN WITH AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

1

Technical data											
Contactor type		CM1 / CM1..N	CNN 9	CNN 12	CNN 18	CNN 22	CNN 25	CNN 30	CNN 32	CNN 40	
AC2 and AC3 utilization categories (slip-ring and cage motors)		See tables for orders page 1/1 and 1/2									
AC4 utilization category (electrical endurance of contacts: 120.000 (80.000 for CM1)) rated current ratings of squirrel-cage motors at 50 Hz	(50.000 for CM1..N) le/AC4 for 230 V 400 V 500 V 690 V le/AC4 ; 400 V	A kW kW kW kW A	4/4.3 0.75 1.5/1.6 1.5/1.6 1.5/1.6 9	4.5 0.75 1.9 1.9 1.5 9	5 1.1 2.2 2.2 2.2 12	6.7 1.5 3 3 3 18	7 1.7 3.3 3.3 3.3 22	8.5 2.2 4 4 4 25	9 2.5 4.4 4.4 4.4 30	13.5 4 6.5 6.5 6.5 32	15.8 5.5 7.5 7.5 7.5 38
Loadability by direct current DC1 utilization category, non-inductive loads L/R ≤ 1 ms											
rated operational current I _e , 55°C through one pole	for 24 V 48 V 110 V 220 V 440 V 600 V	A A A A A A	12 10 1.5 0.6 0.42 0.42	20 20 2.1 0.8 0.6 0.6	20 20 2.1 0.8 0.6 0.6	20 20 2.1 0.8 0.6 0.6	20 20 2.1 0.8 0.6 0.6	35 20 4.5 1 0.6 0.6	35 20 4.5 1 0.6 0.6	45 20 4.5 1 0.4 0.25	50 23 4.5 1 0.4 0.25
through three poles connected in series	for 24 V 48 V 110 V 220 V 440 V 600 V	A A A A A A	16 16 10 15 0.9 0.7	20 20 20 20 1.3 1	20 20 20 20 1.3 1	20 20 20 20 1.3 1	20 20 20 20 2.9 1.4	35 35 35 35 2.9 1.4	35 35 35 35 2.9 1.4	45 45 45 45 2.9 1.4	50 45 45 45 2.9 1.4
utilization categories DC3 to DC5 series and shunt motors (L/R ≤ 15 ms)											
rated operational current I _e , 55°C through one pole	for 24 V 60 V 110 V 220 V 440 V 600 V	A A A A A A	7 4 1 - - -	20 5 1.5 0.75 - -	20 5 1.5 0.75 - -	20 5 1.5 0.75 0.09 0.06	20 5 1.5 0.75 0.09 0.06	20 5 2.5 1 0.09 0.06	20 5 2.5 1 0.09 0.06	35 6 2.5 1 0.1 0.06	35 6 2.5 1 0.1 0.06
through three poles connected in series	for 24 V 60 V 110 V 220 V 440 V 600 V	A A A A A A	10 10 5 1.2 0.14 0.14	20 20 20 6 0.2 0.2	20 20 20 6 0.2 0.2	20 20 20 6 0.2 0.2	20 20 20 10 0.6 0.3	35 35 35 10 0.6 0.3	35 35 35 10 0.6 0.3	50 50 50 25 0.6 0.35	50 50 50 25 0.6 0.35

AUXILIARY CONTACT BLOCKS BP0; BP1; BP2; BP3 and BP4

Technical data						
Block type		BP0	BP1	BP2; BP2N	BP3	BP4; BP4N
Insulation rating	V	690				
Permissible ambient temperature	°C	- 25 to +55				
Short-circuit protection - max. fuse rating gL		20				
Loadability of auxiliary contacts of blocks rated continuous current I _{th} ; 35°C	A	10				
AC rated operational current I _e /AC15	for 24V 230V 400V 690V	A A A A	6 6 4 1			
rated operational current I _e /DC13	for 24V 110V 230V 400V	A A A A	4 0.6 0.2 0.15			
Sizes of connecting conductors						
single-wire conductor	mm ₂	1 - 2,5				
multi-wire conductor with cable shoe	mm ²	0,75 - 1,5				
Screw		M3.5				
Screw head		PZ2				
Tightening torque	Nm	0.8				

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNNB WITH DC CONTROL CIRCUIT

Technical data										
Contactor type		CNNB 9	CNNB 12	CNNB 18	CNNB 22	CNNB 25	CNNB 30	CNNB 40L		
Mechanical endurance	make/break operations	x10 ⁶	5							
Insulation rating		V	690							
Permissible ambient temperature		°C	- 25 to +45							
Consumption of electromagnet in cold state with Un DC operated	inrush	W	6.5	6.5	6.5	6.5	6.5	6.5	6.5	
	sealed	W	6.5	6.5	6.5	6.5	6.5	6.5	6.5	
Coil voltage tolerances	operating drop out		0,85 to 1,1 Un 0,1 to 0,25 Un							
duration of making and breaking (values are also valid for voltages of electromagnet from 0,8 to 1,1 Un for each coil in cold and warm state). Total breaking time is addition of opening time and duration of electric arc.										
DC operated	closing time	ms	40 - 48	40 - 48	40 - 48	40 - 48	40 - 48	40 - 48	40 - 48	
	opening time	ms	6 - 14	6 - 14	6 - 14	6 - 14	6 - 14	6 - 14	6 - 14	
Frequency of switching operations without thermal relay	utilization category	s/h	1000	1000	1000	1000	1000	1000	1000	
	AC1	s/h	750	750	750	750	750	750	750	
	AC2 ; AC3	s/h	250	250	250	250	250	250	250	
	AC4	s/h	250	250	250	250	250	250	250	
Resistivity to shocks	(square shock)	g/ms	7/5 and 4.2/10	7/5 and 4.2/10	7/5 and 4.2/10	7/5 and 4.2/10	8.2/5 and 4.9/10	8.2/5 and 4.9/10	8.2/5 and 4.9/10	
Short-circuit protection of contactors without overload relays										
Main circuit With fuse links										
-acc. to IEC 60947-4-1	Type of coord. "1" gL/gG	A	25	25	40	40	50	50	50	
DIN VDE 0660 Part 102	Type of coord. "2"	A	20	20	25	25	35	35	35	
Sizes of connecting conductors for contact without thermal relay										
main circuit	single-wire conductor	mm ²	1,5-6	1,5-6	1,5-6	1,5-6	2,5-10	2,5-10	2,5-10	
	multi-wire conductor with cable shoe	mm ²	1,5-6	1,5-6	1,5-6	1,5-6	2,5-10	2,5-10	2,5-10	
	Screw		M4	M4	M4	M4	M4	M4	M4	
	Screw head		PZ2	PZ2	PZ2	PZ2	PZ2	PZ2	PZ2	
	Tightening torque	Nm	1.2	1.2	1.2	1.2	1.4	1.4	1.4	
auxiliary circuit	single-wire conductor	mm ²	1 - 2,5							
	multi-wire conductor with cable shoe	mm ²	0,75 - 1,5							
	Screw		M3.5							
	Screw head		PZ2							
	Tightening torque	Nm	0.8							
Loadability of auxiliary contacts of contactors CNNB										
rated continuous current I _{th} ; 35°C		A	10	10	10	10	-	-	-	
AC rated operational current I _e /AC15	for 24 V	A	6	6	6	6	-	-	-	
	230 V	A	6	6	6	6	-	-	-	
	400 V	A	4	4	4	4	-	-	-	
	500 V	A	2	2	2	2	-	-	-	
	690 V	A	1	1	1	1	-	-	-	
rated operational current I _e /DC13	for 24 V	A	4	4	4	4	-	-	-	
	110 V	A	0.6	0.6	0.6	0.6	-	-	-	
	230 V	A	0.3	0.3	0.3	0.3	-	-	-	
Load carrying capacity of the main contacts										
rated continuous current I _{th} ; 55°C		A	25	25	30	30	40	40	40	
AC1 utilization category		A	25	25	30	30	40	40	40	
rated operational current I _e /AC1; 55°C		A	25	25	30	30	40	40	40	

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNNB WITH DC CONTROL CIRCUIT

1

Technical data									
Contactor type			CNNB 9	CNNB 12	CNNB 18	CNNB 22	CNNB 25	CNNB 30	CNNB 40L
AC2 and AC3 utilization categories (slip-ring and cage motors)			See tables for orders page 1/3						
AC4 utilization category (electrical endurance of contacts 120.000) rated current ratings of squirrel-cage motors at 50 c/s	le/AC4 for 230 V 400 V 500 V 690 V max. permissible rated current le/AC4 ; 400 V	A kW kW kW kW A	4.5 0.75 1.5 1.5 1.5 9	5 1.1 2.2 2.2 2.2 12	6.7 1.5 3 3 3 18	6.7 1.5 3 3 3 18	8.5 2.2 4 4 4 25	8.5 2.2 4 4 4 25	9 2.5 4.4 4.4 4.4 30
Loadability by direct current DC1 utilization category, non-inductive loads L/R≤1 ms									
rated operational current I _e , 55°C through one pole	for 24 V 48 V 110 V 220 V 440 V 600 V	A A A A A A	20 20 2.1 0.8 0.4 0.25	20 20 2.1 0.8 0.4 0.25	20 20 2.1 0.8 0.4 0.25	20 20 2.1 0.8 0.4 0.25	35 20 4.5 1 0.6 0.6	35 20 4.5 1 0.6 0.6	35 20 4.5 1 0.6 0.6
through three poles connected in series	for 24 V 48 V 110 V 220 V 440 V 600 V	A A A A A A	20 20 20 20 1.3 1	20 20 20 20 1.3 1	20 20 20 20 1.3 1	20 20 20 20 1.3 1	35 35 35 35 2.9 1.4	35 35 35 35 2.9 1.4	35 35 35 35 2.9 1.4
utilization categories DC3 to DC5 series and shunt motors (L/R≤15 ms)									
rated operational current I _e , 55°C through one pole	for 24 V 60 V 110 V 220 V 440 V 600 V	A A A A A A	20 5 1.5 0.75 - -	20 5 1.5 0.75 - -	20 5 1.5 0.75 - -	20 5 1.5 0.75 - -	20 5 2.5 1 0.09 0.06	20 5 2.5 1 0.09 0.06	20 5 2.5 1 0.1 0.08
through three poles connected in series	for 24 V 60 V 110 V 220 V 440 V 600 V	A A A A A A	20 20 20 1.75 0.2 0.2	20 20 20 6 0.2 0.2	20 20 20 6 0.2 0.2	20 20 20 6 0.2 0.2	35 35 35 10 0.6 0.3	35 35 35 10 0.6 0.3	35 35 35 10 0.6 0.3

AUXILIARY CONTACT BLOCKS BP2; BP3 and BP4

Technical data				
Block type		BP2	BP3	BP4
Insulation rating	V	690		
Permissible ambient temperature	°C	- 25 to +55		
Short-circuit protection - max. fuse rating gL		20		
Loadability of auxiliary contacts of blocks rated continuous current I _{th} ; 35°C	A	10		
AC rated operational current I _e /AC15	for 24V 230V 400V 690V	A A A A		
		6 6 4 1		
rated operational current I _e /DC13	for 24V 110V 230V 400V	A A A A		
		4 0.6 0.2 0.15		
Sizes of connecting conductors				
single-wire conductor	mm ₂	1 - 2,5		
multi-wire conductor with cable shoe	mm ²	0,75 - 1,5		
Screw		M3,5		
Screw head		PZ2		
Tightening torque	Nm	0.8		

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNN, CNM AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

1

Technical data									
Contactor type			CNN 50 CNN 60 CNN 70	CNN 80 CNN 90 CNN 100	CNM 110	CNM 140 CNM 170 CNM 200	CNM 250	CNM 315 CNM 400	
Mechanical endurance	make/break operations	x10 ⁶	5			3			
Insulation rating		V	1000						
Permissible ambient temperature		°C	- 25 to +55						
Consumption of electromagnet in cold state with U_n									
AC operated	closing	VA	155	204	300	580	1340	1340	
	p.f.		0.6	0.54	0.5	0.45	0.46	0.41	
DC operated	closed	VA	12	16	26	44	84	84	
	p.f.		0.29	0.26	0.24	0.24	0.23	0.25	
DC operated	closing	W	90	200	690	550	1180	1180	
	closed	W	3.5	3.5	4	5	8	8	
Coil voltage tolerances			0,85 – 1,1 U _n						
Duration of making and breaking (values are also valid for voltages of electromagnet from 0,8 to 1,1 U _n for each coil in cold and warm state). Total breaking time is addition of opening time and duration of electric arc.									
AC operated	closing time	ms	10-24	9 - 35	20-50	20-50	20-50	20-50	
	opening time	ms	7-10	9 - 15	8-30	10-30	10-30	10-30	
DC operated	duration of electric arc	ms	10-15	10-15	10-15	10-15	10-15	10-15	
	closing time	ms	15-40	20-50	20-50	20-50	25-80	30-100	
	opening time	ms	100-120	120-150	150-190	22-35	15-30	15-30	
	duration of electric arc	ms	10-15	10-15	10-15	10-15	10-15	10-15	
Frequency of switching operations without thermal relay									
utilization category	AC1	s/h	1000	1000	1000	1000	1000	1000	
	AC2 ; AC3	s/h	750	600	500	500	500	500	
	AC4	s/h	250	200	250	250	250	250	
		s/h	15	15	15	15	15	15	
with thermal relay									
Resistivity to shocks (square shock)		g/ms	9,2/5 and 5,4/10	9,6/5 and 5,2/10	10/5 and 5/10	10/5,5 and 5/12	10/5,6 and 5/12	10/5,6 and 5/12	
Short-circuit protection of contactors without overload relays									
Main circuit With fuse links -acc. to IEC 60947-4-1, DIN VDE 0660 Part 102		Type of coord. "1" gL/gG Type of coord. "2"	A A	80/100/125 40/50/63	125/160/160 63/80/100	200 10	250/315/355 125/160/200	400 250	500/ 630 315/500
Sizes of connecting conductors for contact without thermal relay									
main circuit	Rigid: solid	mm ²	1 x 6 - 50						
	stranded	mm ²	2 x 6 - 25	25-70	–	–	–	–	
	multi-wire conductor with cable shoe	mm ²	1 x 6 - 35	–	–	–	–	–	
	stranded with cable lug	mm ²	2 x 6 - 16	25-50	6-35	25 -70	70 -150	2x150	
auxiliary circuit	flatbar	mm	–	–	25-50	50 -120	–	–	
	protective conductor with cable lug	mm ²	–	–	15x2,5	15x3	25x3	2x25x3	
	Screw	mm ²	–	–	15x3	20x3	35 -70	50 -120	
	Screw head	mm ²	–	–	–	25 -70	M10	M10	
Tightening torque		Nm	3-4	4-4,5	2,5	3,5	4	4	
single-wire conductor		mm ²	1 –2,5						
multi-wire conductor with cable shoe		mm ²	0,75 – 1,5						
Screw			M3,5						
Screw head			PZ2						
Tightening torque		Nm	0,8						

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNN, CNM AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

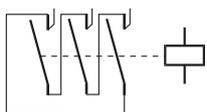
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Technical data							
Contactor type		CNN 50 CNN 60 CNN 70	CNN 80 CNN 90 CNN 100	CNM 110	CNM 140 CNM 170 CNM 200	CNM 250	CNM 315 CNM 400
Loadability of auxiliary contacts of contactors CNN + BP5; CNM rated continuous current I_{th} ; 35°C	A	16	16	16	16	16	16
AC rated operational current $I_e/AC15$	for 230 V	A 6	6	6	6	6	6
	400 V	A 4	4	4	4	4	4
	500 V	A 2.5	2.5	2.5	2.5	2.5	2.5
	690 V	A 2.5	2.5	2.5	2.5	2.5	2.5
DC rated operational current $I_e/DC1$; $L/R \leq 1ms$	for 24 V	A 10	10	10	10	10	10
	110 V	A 3.2	3.2	3.2	8	8	8
	220 V	A 0.9	0.9	0.9	2	2	2
	440 V	A 0.33	0.33	0.33	0.6	0.6	0.6
	600 V	A 0.22	0.22	0.22	0.4	0.4	0.4
rated operational current $I_e/DC13$	for 24 V	A 10	10	10	10	10	10
	110 V	A 1.8	1.8	1.8	2.4	2.4	2.4
	220 V	A 0.9	0.9	0.9	1.1	1.1	1.1
	440 V	A 0.27	0.27	0.27	0.32	0.32	0.32
	600 V	A 0.18	0.18	0.18	0.21	0.2	0.21
Load carrying capacity of the main contacts rated continuous current I_{th} ; 35°C	A	85/85/125	135/135/135	115	160/200/250	300	390/400
AC1 utilization category rated current $I_e/AC1$; 55°C	A	85/85/90	95/105/105	115	160/200/250	300	350/400
AC2 and AC3 utilization categories (slip-ring and cage motors)	See tables for orders page 1/4, 1/5, 1/6, 1/8 and 1/9						
AC4 utilization category (electrical endurance of contacts 120.000) rated current $I_e/AC4$	A	24/28/30	32/34/36	42	68/72/75	100	125/150
ratings of squirrel-cage motors at 50 c/s for	230 V	kW 6,9/7,3/8,5	8,7/10,4	12	20/21/23	31	35/ 37,5
	400 V	kW 12/14/15,1	17/18	22	35/37/40	55	65/69
	500 V	kW 15,8/16,2/18,4	21/24	27	46/48/50	72	76/85,5
	690 V	kW 20,8/21,8/24,3	20/30	36	60/64/69	92	100/106
max. permissible rated current $I_e/AC4$;	400 V	A 50/60/65	80/90	110	140/170/200	250	350/400
Load carrying capacity of contactors at switching on and off of a.c. capacitors (electrical endurance amounts to 0,1 million switching operations) ratings of individual capacitors at 50 c/s	I_e for 230 V	(A) kvar	-	-	58	87/116/144	216
	400 V	kvar	-	-	24	45/45/58	87
	500 V	kvar	-	-	40	60/80/100	150
	690 V	kvar	-	-	50	80/100/130	190
		kvar	-	-	40	50/80/100	150
ratings of capacitor banks (minimum inductive reactance between two capacitors switched on in parallel amounts to 6μH, 50 c/s)	for 230 V	kvar	-	-	24	30/37/40	66
	400 V	kvar	-	-	40	50/55/70	115
	500 V	kvar	-	-	50	66/75/90	145
	690 V	kvar	-	-	40	50/60/70	115
Application in stator circuit of motor intermittent operation, AC2 stator current ¹ at duty factor in intermittent periodic duty ²	20%	A	103	135	153	245/308/308	462
	40%	A	98	110	122	195/245/245	367
	60%	A	87	100	109	174/218/218	327
	80%	A	80	90	100	160/200/200	300

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNN, CNM AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

1

Technical data							
Contactor type		CNN 50 CNN 60 CNN 70	CNN 80 CNN 90 CNN 100	CNM 110	CNM 140 CNM 170 CNM 200	CNM 250	CNM 315 CNM 400
Application in rotor circuit of motor							
intermittent operation							
rotor current ¹ at duty factor in intermittent periodic duty ²							
	10%	A 163	193	293	395/560/560	759	864/1075
	20%	A 163	193	242	388/487/487	730	730/ 975
	40%	A 155	173	193	308/380/380	580	580/ 775
	60%	A 138	158	173	275/345/345	517	517/689
	80%	A 127	138	158	252/316/316	474	474/632
continuous operation		A 127	138	158	252/316/316	474	474/632
permissible voltage of motionless rotor							
	starting	V 1500	1800	2000	2000	2000	2000
	regulation	V 750	880	1000	1000	1000	1000
	counter current breaking	V 660	750	880	880	880	880
Loadability by direct current							
DC1 utilization category, non-inductive loads L/R ≤ 1 ms							
rated operational current I _e , 55°C							
through one pole	for 24 V	A 70	90	160	160/200/200	300	300/400
	60 V	A 30	75	80	160/200/200	300	300/330
	110 V	A 6	12	18	18/18/30	33	33/ 33
	220 V	A 1.2	2.5	3.4	3,4/3,4/3,4	3,8	3,8/ 3,8
	440 V	A 0.48	0,6	0,8	0,8/0,8/0,8	0,9	0,9/0,9
	600 V	A 0.35	0,48	0,5	0,5/0,5/0,5	0,6	0,6/ 0,6
through three poles connected in series	for 24 V	A 70	100	100	160/200/200	300	400
	60 V	A 70	100	100	160/200/200	300	400
	110 V	A 70	100	100	160/200/200	300	400
	220 V	A 70	100	100	160/200/200	300	400
	440 V	A 3	6	6	11,5	11	11
	600 V	A 1	3,4	3,4	4	5,2	5,2
utilization categories DC3 to DC5							
series and shunt motors (L/R ≤ 15 ms)							
rated operational current I _e , 55°C							
through one pole	for 24 V	A 5	6	16	16	35	35
	60 V	A 2	3	7.5	7.5	11	11
	110 V	A 0.75	1.25	2.5	2.5	3	3
	220 V	A 0.2	0.35	0.6	0.6	0.6	0.6
	440 V	A 0.1	0.15	0.17	0.17	0.18	0.18
	600 V	A 0.08	0.1	0.12	0.12	0.12	0.12
through three poles connected in series	for 24 V	A 70	90	100	200	300	400
	60 V	A 70	90	100	200	300	400
	110 V	A 70	90	100	200	300	400
	220 V	A 3.5	3.8	4	200	300	400
	440 V	A 0.6	0.7	0.8	1.4	1.4	1.4
	600 V	A 0.35	0.40	0.45	0.75	0.75	0.75
¹ Electrical endurance of contacts at these loads, see page 1/32. ² Intermittent periodic duty in % = $\frac{\text{on-load period}}{\text{duration of total cycle}} \times 100$. The total cycle duration can amount up to 10 minutes							

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNM 450 - CNM 1000 AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

Technical data

Permissible ambient temperature: -25 to +55°C

1

Contacteur type		CNM 450	CNM 550	CNM 700	CNM 860	CNM 1000	
MECHANICAL DATA							
Protection degree		IP00					
Mechanical endurance (make/brake oper.x 10 ⁶)		5				1	
Max. frequency of no load operation (op/h)		1200				300	
Fixing		Screws fixing					
ELECTRICAL DATA OF POWER CIRCUIT							
Number of main poles		3 (with facility to fit 4th add-on neutral switching pole)					
Rated insulation voltage U _i (V)		1000				690	
Thermal current I _{th} (A)		700	800	1000	1100	1200	
Rated operational current I _e AC1 U _e = 690V t.amb. = 40°C (A)		700	800	1000	1100	1200	
I _e AC3 U _e = 440V t.amb. = 55°C (A)		450	550	700	860	1000	
Max. Ratings of 3-fase motor at 400V 50 HZ in AC2, AC3 (kW)		250	315	400	500	580	
Rated short time withstand current t.amb. = 40°C	1 s (A)	4500	5500	7000	8000	10000	
	4 s (A)	4500	5500	7000	8000	10000	
	10 s (A)	3600	4400	5600	6900	8000	
	15 s (A)	3000	3800	5000	6000	7400	
	30 s (A)	2300	3000	3700	4500	5500	
Cooling time (without current)	1 min (A)	1800	2300	2800	3400	4000	
	2 min (A)	1400	1750	2200	2600	3000	
	6 min (A)	900	1150	1600	1800	2100	
	15 min (A)	720	850	1150	1350	1600	
	Short circuit protection fuses (U _e = 440V) coordination to IEC 60947-4-1	Type 1 gG (A) (A)	630	630	800	1000	1000
Type 2 gG (A) (A)		500	560	-	-	-	
Type 2 aM (A) (A)		-	-	-	-	-	
Making capacity coordination to EN 60947- 4-1 (A)	690V (A)	4500	5500	7000	8600	10000	
	max. values 1000V (A)	2000	2500	-	-	-	
Breaking capacity coordination to EN 60947- 4-1	8 x I _e in AC3						
	500V (A)	4500	5500	7000	8000	8000	
	690V (A)	3200	4400	5600	6900	7000	
	max. values 1000V (A)	1600	2000	-	-	-	
Main pole resistance (mΩ)		0.13	0.11	0.1	0.08	0.06	
Sizes of connecting conductors	Cables mm ²	2 x (40x5)		2 x (50x5)		2 x (60x5)	
	Bars mm	2 x (40x5)		2 x (50x5)		2 x (60x6)	
Tightening torque (Nm)		35	50	60	75	60	
Weight (kg)		13.5	14	26.4	27,6	51	
ELECTRICAL DATA OF CONTROL CIRCUIT							
Rated control voltage	a.c 50-60Hz (V)	24...600V				48...600V	
	d.c (V)	24...440V				48...440V	
Coil operation limits	a.c/d.c pick-up (V)	0,85 ... 1,1 U _c					
	a.c drop-out (V)	0,2 ... 0,75 U _c					
	d.c drop-out (V)	0,1 ... 0,6 U _c					
Average coil consumption	a.c/d.c pick-up (VA)	800 ... 950		1350 ... 1600		2400	
	d.c pick-up (W)	700 ... 850		1300 ... 1550		2100	
	a.c sealed (VA)/ (W)	9 ... 11 / (9...11)		21 ... 25 / (21...25)		70 (69)	
	d.c sealed (W)	8 ... 10		18 ... 22		60	

TECHNICAL INFORMATION

CONTACTORS TYPE TKN and TK for SWITCHING RESISTIVE LOADS

1

Technical data							
Contactor type		TKN65	TKN115	TK130	TK175		
Mechanical endurance	make/break operations	x10 ⁶	5				
Insulation rating		690					
Permissible ambient temperature		°C	- 25 to +55		- 25 to +40		
Consumption of electromagnet in cold state with Un							
AC operated	closing	VA	62	155	350	350	
	p.f.		0.75	0.6	0.5	0.5	
	closed	VA	7	12	26	26	
	p.f.		0.3	0.29	0.24	0.24	
Coil voltage tolerances		0,85 – 1,1 Un					
Degree of protection per IEC 60947 - 1		IP 20		IP 00			
Rated control voltages AC		V	24-500 at 50 Hz; standard voltages: 24, 48, 110, 220/230, 380/400				
Frequency of switching operations without thermal relay							
utilization category	AC1	s/h	650	650	650	650	
	AC2/ AC3	s/h	750	750	500	500	
Maximum permissible fuse ratings for contactors without relays							
main circuit	gL/gG	A	100	200	250	315	
Electrical endurance		x10 ⁶	0,5				
Sizes of connecting conductors							
for contact without thermal relay							
main circuit							
	multi-wire conductor	mm ²	6-16	16-35			
	multi-wire conductor with cable shoe	mm ²			50	70	
Terminal screw			M5	M6	M8	M8	
Screw head			Hexagon socket		-	-	
Tightening torque		Nm	2	3 - 4	4	4	
auxiliary circuit							
	single-wire conductor	mm ²	1 - 2,5				
	multi-wire conductor with cable shoe	mm ²	0,75 - 1,5				
Terminal screw			M3.5				
Screw head			PZ2				
Tightening torque		Nm	0.8				
AC-1 utilization category, switching resistive load							
Rated operational currents I_e at 40 °C		A	65	115	130	175	
Ratings of	230 /220 V	kW	25	44	50	67	
three-phase loads with	400 /380 V	kW	43	76	85	115	
p.f.=1							
AC-2 and AC-3 utilization categories							
Rated operational currents I_e at		A	32	60	90	110	
Ratings of motors	230 /220 V	kW	7.5	18.5	26	37	
	400 /380 V	kW	15	30	45	55	
	500 V	kW	15	37	59	75	
	690 /660 V	kW	18.5	37	67	90	

TECHNICAL INFORMATION

Control of lighting circuits

1

General

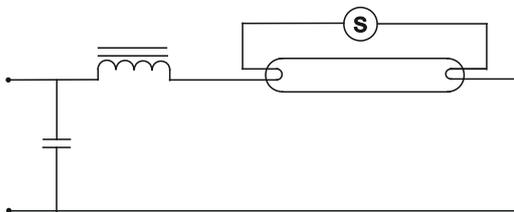
- Contactor choice criteria for control of lighting circuits are as follows:
- Type, power rating and number of lamps
- Connection mode
- Current values on closing and in steady state
- Power factor $\cos\phi$ of the lamps
- Presence or not of compensation capacitors

Lighting circuits

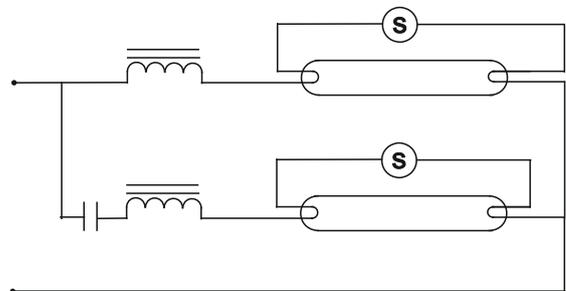
In a given circuit, the number and power rating of lamps are defined and cannot result in overload. Only short-circuit protection has to be provided. GG fuses or modular circuit-breakers will be chosen for this purpose. The lamps have very specific technical data, according to their construction type.

- Incandescent lamps have a very high current on closing: more than 15 times normal current. They do not introduce a large phase displacement between current and voltage.
- Fluorescent tubes are equipped with a ballast whose purpose is two-fold: contribute to ignition and limit current to nominal value once steady state is reached. This ballast is a reactor that considerably lowers the power factor. It may or may not be compensated.

Individual compensation mounting



Serial compensation in dual



Choice of contactors

The following tables indicate, for each contactor type, the maximum permissible number of lamps per phase.

Air temperature, near the contactor, must be limited to 55°C.

Number are given for a 230 V voltage distributed between phase and neutral: single-phase (phase + neutral) or three-phase (3 phases + neutral) distribution.

In the case of a three-phase supply without neutral, 230 V phase-to-phase, the permissible number of lamps per phase will be that given in the tables multiplied by 0,58.

TECHNICAL INFORMATION

Table of technical characteristics for lighting switching

Type of lamps	compensation	Start current x I _n ¹	cos φ	Starting time s	Important for choosing contactor type
Light gas lamp connection	without	1	0,5	-	Rated continuous current I _{th} ² (A)
	with	20	0,9	-	Start current I _e
Lamps with mercury vapour - High pressure lamps	without	1,6	0,4-0,6	< 5	Rated continuous current I _{th} ² (A)
	with	2	0,95	< 5	Start current I _e (A)
DUO-wiring (most frequent applied wiring)		1	1	-	Rated continuous current I _{th} ² (A)
Serial wiring (Tandem connection)	without	1	0,5		Rated continuous current I _{th} ² (A)
	with	20	0,9		Start current I _e (A)
Lighting gas lamps without starter	without	1	0,5	-	Rated continuous current I _{th} ² (A)
Halogen - metal vapour lamps	without	1	0,4-0,6	-	Rated continuous current I _{th} ² (A)
	with	1	0,4-0,6	-	Rated continuous current I _{th} ² (A)
215 W - High capacity lighting gas lamps 380 V (High pressure vapour lamps)	without	1,4	0,5	5...12	70% Rated continuous current I _{th} ² (A)
	with	20	0,95	5...12	
(Low pressure vapour lamps)	without	1	0,3	5...12	70% Rated Continuous current I _{th} ² (A)
	with	20	0,95	5...12	
High pressure sodium vapour lamps	without	1,6	0,4-0,6	5...8	70% Rated continuous current I _{th} ² (A)
	with	20	0,95	5..8	70% Rated continuous current I _{th} (A) and Start current I _e (A)

¹ I_n = Rated lamp current

² I_{th} = Rated continuous contactor current

TECHNICAL INFORMATION

1

Contactor with AC coil								
Type				TKN 65	TKN 115	TK 130	TK 175	
Switching incandescent lamps, per main conducting path at 220/230 V				kW	5,8	9	14,5	17,3
Type of lamp	W	A	μF	Maximum permissible number of lamps per phase				
Fluorescent lamps without compensatin								
220-240 V	18	0,37	-	121	216	243	270	
AC	36	0,43	-	104	186	209	232	
	58	0,67	-	67	119	134	149	
Fluorescent lamps with parallel compensation								
220-240 V	18	0,11	4,5	78	111	160	197	
AC	36	0,21	4,5	78	111	160	197	
	58	0,32	7	50	71	103	127	
Fluorescent lamps in dual mounting								
220-240 V	2x18	2x0,11	-	408	726	-	-	
AC	2x36	2x0,21	-	214	380	-	-	
	2x58	2x0,32	-	140	250	-	-	
High pressure sodium vapour lamps without compensation								
220-240 V	150	1,8	-	17	26	34	41	
AC	250	3	-	10	16	21	25	
	400	4,4	-	7	10	13	17	
	600	6,2	-	5	8	10	12	
	1000	10,3	-	3	5	5	7	
High pressure sodium vapour lamps with compensation								
220-240 V	150	1	20	30	58	73	88	
AC	250	1,5	36	20	38	48	59	
	400	2,5	48	12	23	29	36	
	600	3,3	65	9	17	21	27	
	1000	6,2	100	5	9	11	14	
High pressure mercury vapour lamps without compensation								
220-240 V	80	0,8	-	75	120	150	200	
AC	125	1,2	-	45	83	95	130	
	250	2,2	-	26	47	57	71	
	400	3,3	-	17	31	38	47	
	700	5,5	-	10	19	23	29	
	1000	7,5	-	7	14	17	21	
	2000	8	-	4	7	9	11	
High pressure mercury vapour lamps with compensation								
220-240 V	80	0,41	8	53	178	200	238	
AC	125	0,65	10	35	107	154	165	
	250	1,3	18	24	59	83	102	
	400	2	25	15	38	54	67	
	700	3,5	40	9	22	30	38	
	1000	5	64	6	15	21	26	
	2000	5	37	3	9	13	16	

TECHNICAL INFORMATION

CAPACITOR CONTACTORS type CNNK 2,5 - CNNK 16

In conformity with: IEC 60947-1, IEC 60947-4

Special contactors for power factor correction

Choice criteria

The contactor during the closing transition is influenced by electrical currents with high frequencies and high amplitudes. The frequencies of these currents have ranges between 1 and 10kHz and the amplitudes must have values lower than the maximum permissible peak current $I \leq 100$ times the nominal rms current of the switched capacitor.

Type designation	CNNK 2,5 10 CNNK 2,5 01	CNNK 5 10 CNNK 5 01	CNNK 7,5 00 CNNK 7,5 11	CNNK 16 00 CNNK 16 11
Capacitor rating at operating 230V kVAr	1,4	2.8	4	6.7
voltage 400-440V kVAr	2,5	5	7,5	12,5
50/60Hz 500-550V kVAr	3	5,5	9	15
660-690V kVAr	3,7	7,5	11	18
Rated operational current I_e/AC-6b et 400 V A	3,6	7,2	11	18
Insulation rating U _i V	690			
Permissible ambient temperature °C	- 25 to + 55			
Rated impuls withstand voltage U _{imp} kV	8			
Consumption of electromagnet in cold state with U _n AC operated				
closing VA	62		65	
p.f.	0,75		0,75	
closed VA	7		8	
p.f.	0,3		0,3	
Voltage tolerances	0,85 - 1,1 U _n			
Coil Tightening torque Nm	0,8			
Terminal screw/Screw head	M3,5/PZ2			
Degree of protection	IP 20			
Maximum permissible fuse ratings main circuit gL/gG A	20	25	40	50
auxilliary circuit A	16	16	16	16
Frequency of switching operations s/h	240			
Electrical endurance min.	150.000	120.000	100.000	100.000
Sizes of connecting conductors - main circuit				
multi-wire conductor mm ²	1.5-6	1.5-6	2.5-10	2.5-10
multi-wire conductor with cable shoe mm ²	1.5-6	1.5-6	2.5-10	2.5-10
Terminal screw	M4	M4	M4	M4
Screw head	PZ2	PZ2	PZ2	PZ2
Tightening torque Nm	1,2	1,2	1,4	1,6
- auxiliary circuit multi-wire conductor mm ²	1-2,5			
multi-wire conductor with cable shoe mm ²	0,75-1,5			
Terminal screw	M3,5			
Screw head	PZ2			
Tightening torque Nm	0,8			
Loadability of auxiliary contacts rated continuous current I _{th} ; 35°C A	10			
AC rated operational current I _e /AC15				
for 230V A	6			
400V A	4			
500V A	2			
690V A	1			

TECHNICAL INFORMATION

CAPACITOR CONTACTORS type CNNK 10 - CNNK 30

In conformity with: IEC 60947-1, IEC 60947-4

Special contactors for power factor correction

Main characteristics

These contactors are equipped with early - make contacts. This special type of contact has the purpose of connecting for a very brief interval, 2-3 ms, during the contactor closing, resistors which limit the connecting current of the capacitors. These resistors are then excluded when the closing operation is complete and the current capacity is conveyed to the main contacts. Maximum permissible peak current $1 \leq 200$ times the nominal rms current of the switched capacitor.

1

Type designation	CNNK 10 20 CNNK 10 11 CNNK 10 02	CNNK 12 20 CNNK 12 11 CNNK 12 02	CNNK 15 20 CNNK 15 11 CNNK 15 02	CNNK 20 10 CNNK 20 01	CNNK 25E 10 CNNK 25E 01	CNNK 25 10 CNNK 25 01	CNNK 30 10 CNNK 30 01
Capacitor rating 230V kVAr	5	6.7	8.5	11	14	14	20
at operating voltage 400-440V kVAr	10	12.5	15	20	25	25	30
500-550V kVAr	12.5	15	18	24	30	30	35
50/60Hz 660-690V kVAr	15	18	22	30	35	35	40
Rated operational current I _e /AC-6b at 400V A	14	18	22	29	36	36	44
Rated operational current I _{th} at 400V A	25	25	30	40	50	60	60
Insulation rating U _i V	690						
Permissible ambient temperature °C	- 25 to + 55						
Rated impulse withstand voltage U _{imp} kV	8						
Consumption of electromagnet in cold state with U _n AC operated							
closing VA	62			65			
p.f.	0,75			0,75			
closed VA	7			8			
p.f.	0,3			0,3			
Voltage tolerances	0,85 - 1,1 U _n						
Coil Tightening torque Nm	0,8						
Terminal screw/Screw head	M3,5/PZ2						
Degree of protection	IP 20						
Maximum permissible fuse ratings main circuit gL/gG A	25	35	50	50	63	63	80
auxiliary circuit A	16	16	16	16	16	16	16
Frequency of switching operations s/h	240			120			
Electrical endurance min.	200.000			150.000	100.000		
Sizes of connecting conductors - main circuit							
multi-wire conductor mm ²	1.5-6	1.5-6	1.5-6	2.5-10	2.5-10	6-25	6-25
multi-wire conductor with cable shoe mm ²							
Terminal screw	M4	M4	M4	M4	M4	M5	M5
Screw head	PZ2	PZ2	PZ2	PZ2	PZ2	Hexagon socket 2.5	
Tightening torque Nm	1,2	1,2	1,2	1,4	1,6	2	2
- auxiliary circuit							
multi-wire conductor mm ²	1-2,5						
multi-wire conductor with cable shoe mm ²	0,75-1,5						
Terminal screw	M3,5						
Screw head	PZ2						
Tightening torque Nm	0,8						
Loadability of auxiliary contacts rated continuous current 35°C							
AC rated operational current I _e /AC15 A	10						
for 230V A	6						
400V A	4						
500V A	2						
690V A	1						

TECHNICAL INFORMATION

CAPACITOR CONTACTORS type CNNK 40 - CNKM 80

In conformity with: IEC 60947-1, IEC 60947-4

Special contactors for power factor correction

1

Type designation	CNNK 40 10 CNNK 40 01	CNNK 50 10 CNNK 50 01	CNNK 60 10 CNNK 60 01	CNNK 60N 10 CNNK 60N 01	CNNK 70 10 CNNK 70 01	CNKM 80 22
Capacitor rating at operating voltage	25	29	32	32	35	45
230V kVA _r						
400-440V kVA_r	40	50	60	60	70	80
50/60Hz						
500-550V kVA _r	50	60	70	70	75	100
660-690V kVA _r	58	70	80	85	90	115
Rated operational current I_e/AC-6b et 400 V	A	58	72	87	101	116
Rated operational current I _{th} at 400V	A	85	100	125	135	165
Insulation rating U _i	V 1000					
Permissible ambient temperature	°C - 25 to + 55					
Rated impuls withstand voltage U _{imp}	kV 8					
Consumption of electromagnet in cold state with U _n AC operated						
closing VA		155			204	310
p.f.		0,6			0,54	0,5
closed VA		12			16	26
p.f.		0,29			0,26	0,24
Voltage tolerances	0,85 - 1,1 U _n					
Coil Tightening torque	Nm 0,8					
Terminal screw/Screw head	M3,5/PZ2					
Degree of protection	IP 20					IP 00 or IP 20
Maximum permissible fuse ratings main circuit gL/gG	A 100	A 125	A 160			
auxilliary circuit	A 16	A 16	A 16			
Frequency of switching operations	s/h 100					
Electrical endurance	min. 100.000			75.000		
Sizes of connecting conductors - main circuit						
multi-wire conductor	mm ² 16-35	16-35	16-35	25-50		35-50 (with IP 20)
multi-wire conductor with cable shoe	mm ²					50-70 (without IP 20)
Terminal screw	M6			M8		M6 (with IP 20)
Screw head	PZ2			◻4		M8 (without IP 20)
Tightening torque	Nm 3 - 4			4 - 4.5		3.5
- auxiliary circuit						
multi-wire conductor	mm ² 1-2,5					
multi-wire conductor with cable shoe	mm ² 0,75-1,5					
Terminal screw	M3,5					
Screw head	PZ2					
Tightening torque	Nm 0,8					
Loadability of auxiliary contacts rated continuous current I _{th} ; 35°C	A			16		
AC rated operational current I _e /AC15	A			10		
I _{th} ; for 230V	A			6		
400V	A			4		
500V	A			2		
690V	A					

TECHNICAL INFORMATION

CAPACITOR CONTACTORS type CNNK 10..N - CNNK 30..N

In conformity with: IEC 60947-1, IEC 60947-4

Special contactors for power factor correction

Main characteristics

These contactors are equipped with early - make contacts. This special type of contact has the purpose of connecting for a very brief interval, 2-3 ms, during the contactor closing, resistors which limit the connecting current of the capacitors. These resistors are then excluded when the closing operation is complete and the current capacity is conveyed to the main contacts. Maximum permissible peak current $1 \leq 200$ times the nominal rms current of the switched capacitor.

1

Type designation	CNNK 10 20N CNNK 10 11N CNNK 10 02N	CNNK 12 20N CNNK 12 11N CNNK 12 02N	CNNK 15 20N CNNK 15 11N CNNK 15 02N	CNNK 20 10N CNNK 20 01N	CNNK 25E 10N CNNK 25E 01N	CNNK 25 10N CNNK 25 01N	CNNK 30 10N CNNK 30 01N	
Capacitor rating 230V kVAr	5	6.7	8.5	11	14	14	20	
at operating voltage 400-440V kVAr	10	12.5	15	20	25	25	30	
500-550V kVAr	12.5	15	18	24	30	30	35	
50/60Hz 660-690V kVAr	15	18	22	30	35	35	40	
Rated operational current I _e /AC-6b at 400V	A	14	18	22	29	36	44	
Rated operational current I _{th} at 400V	A	25	25	30	40	50	60	
Insulation rating U _i	V	690						
Permissible ambient temperature	°C	- 25 to + 55						
Rated impulse withstand voltage U _{imp}	kV	8						
Consumption of electromagnet in cold state with U _n AC operated								
closing VA		62				65		
p.f.		0,75				0,75		
closed VA		7				8		
p.f.		0,3				0,3		
Voltage tolerances		0,85 - 1,1 U _n						
Coil Tightening torque	Nm	0,8						
Terminal screw/Screw head		M3,5/PZ2						
Degree of protection		IP 20						
Maximum permissible fuse ratings main circuit gL/gG	A	25	35	50	50	63	80	
auxiliary circuit	A	16	16	16	16	16	16	
Frequency of switching operations	s/h	240			120			
Electrical endurance	min.	250.000			175.000	125.000		
Sizes of connecting conductors - main circuit								
multi-wire conductor	mm ²	1.5-6	1.5-6	1.5-6	2.5-10	2.5-10	6-25	
multi-wire conductor with cable shoe	mm ²						6-25	
Terminal screw		M4	M4	M4	M4	M4	M5	
Screw head		PZ2	PZ2	PZ2	PZ2	PZ2	Hexagon socket 2.5	
Tightening torque	Nm	1,2	1,2	1,2	1,4	1,6	2	
- auxiliary circuit								
multi-wire conductor	mm ²	1-2,5						
multi-wire conductor with cable shoe	mm ²	0,75-1,5						
Terminal screw		M3,5						
Screw head		PZ2						
Tightening torque	Nm	0,8						
Loadability of auxiliary contacts rated continuous current 35°C								
AC rated operational current I _e /AC15	A	10						
for 230V	A	6						
400V	A	4						
500V	A	2						
690V	A	1						

TECHNICAL INFORMATION

CAPACITOR CONTACTORS type CNNK 40N - CNNK75N

In conformity with: IEC 60947-1, IEC 60947-4

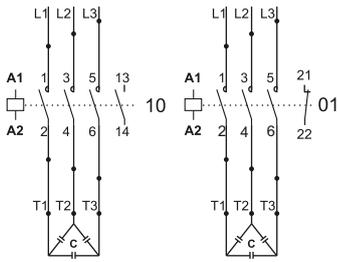
Special contactors for power factor correction

1

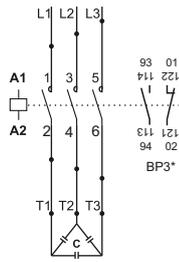
Type designation	CNNK 40 10N CNNK 40 01N	CNNK 50 10N CNNK 50 01N	CNNK 60 10N CNNK 60 01N	CNNK 60N 10N CNNK 60N 01N	CNNK 70 10N CNNK 70 01N	CNNK 75 10N CNNK 75 01N
Capacitor rating at operating voltage	25	29	32	32	35	38
230V kVA _r						
400-440V kVA_r	40	50	60	60	70	75
50/60Hz						
500-550V kVA _r	50	60	70	70	75	80
660-690V kVA _r	58	70	80	85	90	105
Rated operational current I_e/AC-6b et 400 V	A	58	72	87	87	101
Rated operational current I _{th} at 400V	A	85	100	125	135	137
Insulation rating U _i	V 1000					
Permissible ambient temperature	°C - 25 to + 55					
Rated impuls withstand voltage U _{imp}	kV 8					
Consumption of electromagnet in cold state with U _n AC operated						
closing VA		155			204	
p.f.		0,6			0,54	
closed VA		12			16	
p.f.		0,29			0,26	
Voltage tolerances	0,85 - 1,1 U _n					
Coil Tightening torque	Nm 0,8					
Terminal screw/Screw head	M3,5/PZ2					
Degree of protection	IP 20					
Maximum permissible fuse ratings main circuit gL/gG	A 100	A 125			A 160	
auxilliary circuit	A 16	A 16			A 16	
Frequency of switching operations	s/h 100					
Electrical endurance	min. 125.000			100.000		
Sizes of connecting conductors - main circuit						
multi-wire conductor	mm ² 16-35	16-35	16-35		25-50	
multi-wire conductor with cable shoe	mm ²					
Terminal screw	M6			M8		
Screw head	PZ2			□4		
Tightening torque	Nm 3 - 4			4 - 4.5		5 - 6
- auxiliary circuit						
multi-wire conductor	mm ² 1-2,5					
multi-wire conductor with cable shoe	mm ² 0,75-1,5					
Terminal screw	M3,5					
Screw head	PZ2					
Tightening torque	Nm 0,8					
Loadability of auxiliary contacts rated continuous current I _{th} ; 35°C	A			16		
AC rated operational current I _e /AC15	A			10		
I _{th} ; for 230V	A			6		
400V	A			4		
500V	A			2		
690V	A					

CONNECTION DIAGRAMS AND TERMINAL MARKINGS FOR SINGLE COMPENSATION

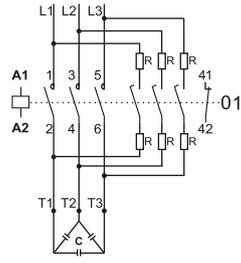
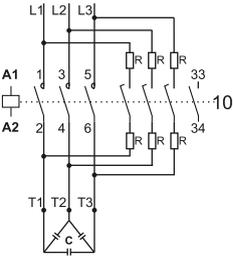
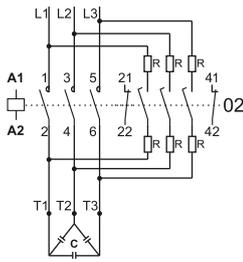
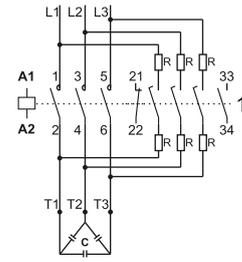
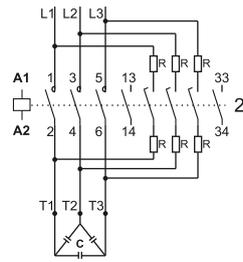
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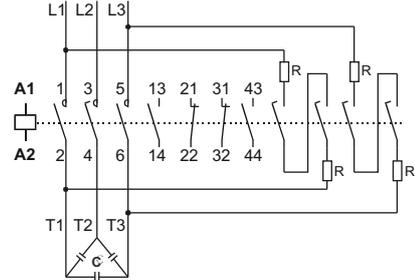
CANNK 2.5, CANNK 5



CANNK 7,5 00
CANNK 7,5 11*
CANNK 16 00
CANNK 16 11*



CANNK 20..(N), CANNK 25E..(N), CANNK 25..(N), CANNK 30..N, CANNK 40..(N)
CANNK 50..(N), CANNK 60..(N), CANNK 60N..(N), CANNK 70..(N), CANNK 75..N



CNKM 80

VERY IMPORTANT NOTES:

For single compensation air coils or 3 - phase reactors (coils with magnetic core and air gap) are not necessary.

When the contactor is used for group compensation it is recommendable to use appropriate 3-phase filter circuit reactors (coils with magnetic core and air gap). This will reduce the value of higher harmonics and will prevent resonant current to prevail.

For single compensation the power of selected contactor is according to capacitor rated power.

For group and central compensation, when reactors are not in use, one step higher rating of the contactor is recommendable.



Maximum permissible peak current $1 \leq 200$ times the nominal rms current of the switched capacitor.

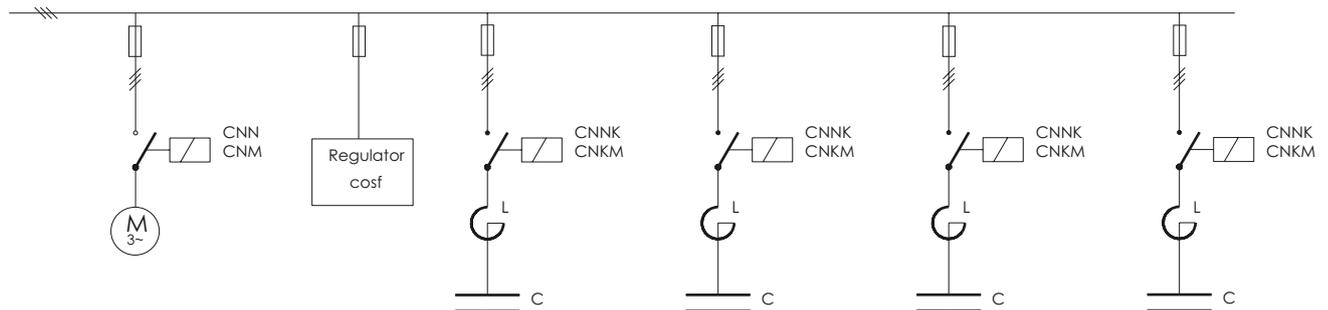
Switching onto discharged capacitors is permitted with CANNK contactors. (the voltage at the terminals must be < 50 V).



Manual operation for function tests is not permitted. The series resistors must not be removed. During exploitation, current value must not exceed the declared values.

CONNECTION DIAGRAM FOR GROUP (CENTRAL) COMPENSATION

380/400 V / 50Hz



TECHNICAL INFORMATION

DC CONTACTORS type CNO AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

Technical data					
Contactor type			CNO 30	CNO 110	CNO 250
Mechanical endurance	make/break operations	x10 ⁶	5		3
Insulation rating		V	690		
Permissible ambient temperature		°C	-25 to +55		
Consumption of electromagnet in cold state at Un					
AC operated	closing	VA	100	350	1150
	p.f.		0.5	0.42	0.31
DC operated	closed	VA	18	50	75
	p.f.		0.33	0.36	0.4
	closing	W	130	450	450
	closed	W	15	25	25
Coil voltage tolerances			0.85 - 1.1 Un		
Auxiliary contacts (making and breaking capacity)					
	Rated thermal current I _{th}	A	20	20	20
	Rated making capacity	A	50	50	50
	Alternating current				
	for voltages 24V to 380V	A	5	5	5
	for voltages 50V	A	3.5	3.5	3.5
	Rated breaking capacity AC 15				
	for voltages 24V to 380V	A	50	50	50
	for voltages 500V	A	35	35	35
	Direct current				
	Rated operational current DC1				
	for voltages 110V-	A	2.5	2.5	2.5
	220V-	A	0.8	0.8	0.8
	440V-	A	0.3	0.3	0.3
	Rated operational current DC13				
	for voltages 110V-	A	1.3	1.3	1.3
	220V-	A	0.55	0.55	0.55
	440V-	A	0.3	0.3	0.3
Short circuit protection of contactors without overload relays					
Main circuit					
With fuse links					
	- acc. to IEC 60947-4-1	Type of coord. "1" gL/gG	A	35	110
	DIN VDE 0660 Part 102	Type of coord. "2" aM	A	50	160
Sizes of connecting conductors for contact without thermal relays					
main circuit					
	single-wired conductor	mm ²	2.5 - 10	-	-
	multy-wired conductor with cable shoe	mm ²	-	16 - 50	50 - 120
	fatconductor	mm	-	20x3	25x4
auxiliary circuit					
	single-wired conductor	mm ²	1 - 2.5		
	multy-wired conductor with cable shoe	mm ²	0.75 - 1.5		

See page 1/23 and 1/24

TECHNICAL INFORMATION

MINI CONTACTOR RELAY type CP0

1

Technical data				
Contactor type			CP0	
Mechanical endurance	make/break operations	x10 ⁶	5	
Insulation rating		V	690	
Permissible ambient temperature		°C	- 25 to +55	
Consumption of electromagnet in cold state with U_n				
AC operated	closing	VA	26	
	p.f.		0,9	
	closed	VA	4	
	p.f.		0,34	
Coil voltage tolerances			0,8 - 1,1U _n	
Duration of making and breaking				
(values are also valid for voltages of electromagnet from 0,8 to 1,1 U _n for each coil in cold and warm state). Total breaking time is addition of opening time and duration of electric arc.				
AC operated	closing time	ms	7 - 12	
	opening time	ms	6 -10	
	duration of electric arc	ms	3	
Frequency of switching operations				
without thermal relay	utilization category AC 15	s/h	1200	
with thermal relay		s/h	15	
Resistivity to shocks	(square shock)	g/ms	7/5 and 4/10	
Maximum permissible fuse rating				
max short circuit current 10 kA				
main circuit	fuse-links, time-lagging	A	10	
	fuse-links, quick-acting	A	16	
Sizes of connecting conductors				
for contactors without thermal relay				
main circuit	single-wire conductor	mm ²	1 –2,5	
	multi-wire conductor with cable shoe	mm ²	0,75 –1,5	
Terminal screw			M3.5	
Screw head			PZ2	
Tightening torque		Nm	0.8	
Loadability of auxiliary contacts of contactor CP0				
rated continuous current I _{th} ; 35°C				
AC rated operational current I _e /AC15	for	230 V	A	16
		400 V	A	6
		500 V	A	4
		500 V	A	2,5
		690 V	A	1,5
rated operational current I _e /DC13	for	24 V	A	4
		110 V	A	0.6
		220 V	A	0,2

TECHNICAL INFORMATION

CONTACTOR RELAYS type CNNP and type CNNPB

Type CNNP WITH AC CONTROL CIRCUIT, type CNB DC SOLENOID SYSTEM

Technical data				
Contactor type			CNNP	CNNPB
Mechanical endurance	make/break operations	x10 ⁶	10	5
Insulation rating		V	690	
Permissible ambient temperature		°C	-25 to +55	-25 to +45
Consumption of electromagnet in cold state with U_n				
AC operated	closing	VA	62	–
	p.f.		0.75	–
DC operated	closed	VA	7	–
	p.f.		0.3	–
	closing	W	128	6.5
	closed	W	2.8	6.5
Coil voltage tolerances			0,8 - 1,1U _n	
Duration of making and breaking				
AC operated	closing time	ms	12 - 22	–
	opening time	ms	4 - 19	–
	duration of electric arc	ms	10	–
DC operated	closing time	ms	–	21 - 172
	opening time	ms	–	10 - 23
	duration of electric arc	ms	–	10
Frequency of switching operations				
without thermal relay				
utilization category	AC 15	s/h	3600	3600
	AC1	s/h	2000	1000
	AC2 ; AC3	s/h	1000	250
	AC4	s/h	250	250
with thermal relay		s/h	15	15
Resistivity to shocks		(square shock)	g/ms	10/4 and 5/8
Maximum permissible fuse rating for contactors without relays				
max short circuit current 1 kA				
main circuit fuse-links, time-lagging	fuse-links, quick-acting	A	16	16
	high-rupturing capacity fuses	A	20	20
		A	16	16
Sizes of connecting conductors				
for contactors without thermal relay				
main circuit	single-wire conductor	mm ²	1 - 2,5	
	multi-wire conductor with cable shoe	mm ²	0,75 - 1,5	
Loadability of auxiliary contacts of contactors CNNP and CNNPB				
rated continuous current I _{th} ; 35°C		A	16	16
AC rated operational current I _e /AC15	for 230 V	A	6	6
	400 V	A	4	4
	500 V	A	4	4
	690 V	A	2,5	2
		A	2,5	2
DC rated operational current I _e /DC1 ; L/R ≤ 1ms (with series connection of 3 current paths) ¹⁾	for 24 V	A	6 (6) ¹⁾	6 (6) ¹⁾
	110 V	A	2 (6) ¹⁾	2 (6) ¹⁾
	220 V	A	0.6 (6) ¹⁾	0.6 (6) ¹⁾
	440 V	A	0.3 (1,2) ¹⁾	0.3 (1,2) ¹⁾
	600 V	A	0.15 (0,8) ¹⁾	0.15 (0,8) ¹⁾
rated operational current I _e /DC13 (with series connection of 3 current paths) ¹⁾	for 24 V	A	4 (6) ¹⁾	4 (6) ¹⁾
	110 V	A	0.9 (3) ¹⁾	0.9 (3) ¹⁾
	220 V	A	0.2 (1,2) ¹⁾	0.2 (1,2) ¹⁾
	440 V	A	0.14 (0,5) ¹⁾	0.14 (0,5) ¹⁾
	600 V	A	0.15 (0,26) ¹⁾	0.15 (0,26) ¹⁾
Motor ratings for utilization categories AC2, AC3				
at	230 V	kW	2,2	
	400 V	kW	4	
	500 V	kW	4	
	690 V	kW	4	

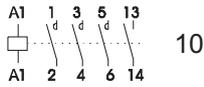
CONTACTORS

Wiring diagrams

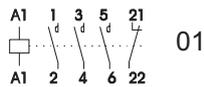
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Motor contactors

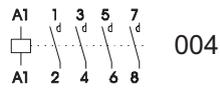
AC coil operation



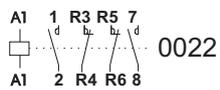
CM1, CNN 9, CNN 12
CNN 18, CNN 22



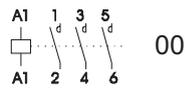
CM1, CNN 9, CNN 12
CNN 18, CNN 22



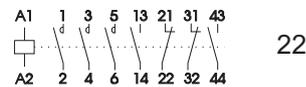
CM1, CNN 9, CNN 12



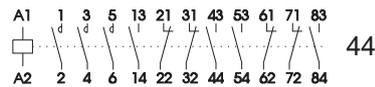
CNN 9, CNN 12



CM1, CNN 25, CNN 30, CNN 32,
CNN 40, CNN 50, CNN 60,
CNN 70, CNN 80, CNN 90, CNN 100

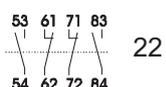
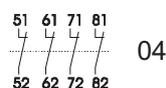
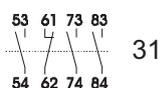
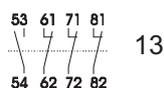
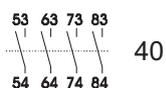


CNM 110, CNM 140, CNM 170, CNM 200,
CNM 250, CNM 315, CNM 400



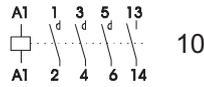
CNM 110, CNM 140,
CNM 170, CNM 200,
CNM 250, CNM 315, CNM 400

Snap-on auxiliary contact blocks

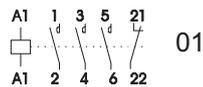


BP0

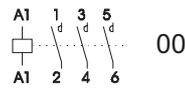
DC coil operation



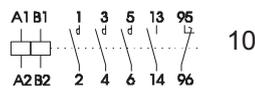
CNNB 9, CNNB 12,
CNNB 18, CNNB 22



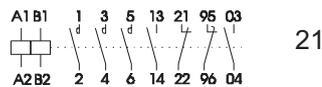
CNNB 9, CNNB 12,
CNNB 18, CNNB 22



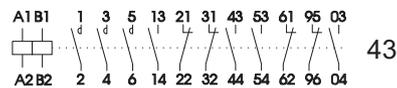
CNNB 25, CNNB 30, CNNB 40L



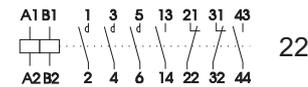
CNN 9, CNN 12, CNN 18, CNN 22,
CNN 25, CNN 30, CNN 32,
CNN 40, CNN 50, CNN 60,
CNN 70, CNN 80, CNN 90, CNN 100



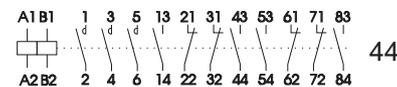
CNM 110



CNM 110



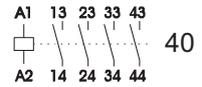
CNM 140, CNM 170, CNM 200,
CNM 250, CNM 315, CNM 400



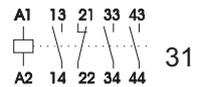
CNM 140, CNM 170, CNM 200,
CNM 250, CNM 315, CNM 400

Contactor relays

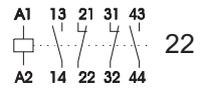
AC and DC coil operation



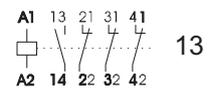
CP0, CNNP, CNNPB



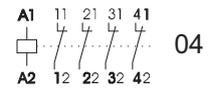
CP0, CNNP, CNNPB



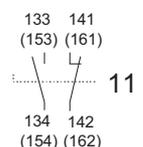
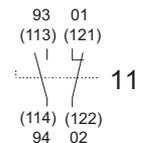
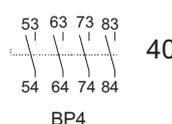
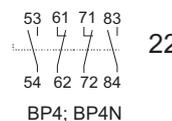
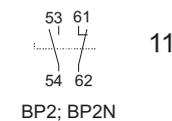
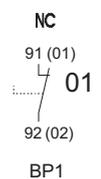
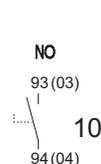
CP0, CNNP, CNNPB



CNNP, CNNPB

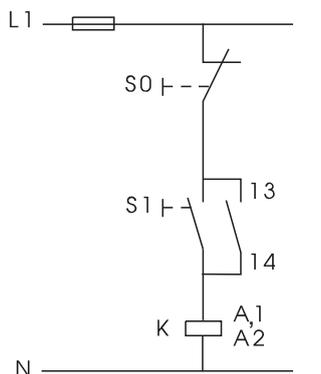


CNNP, CNNPB

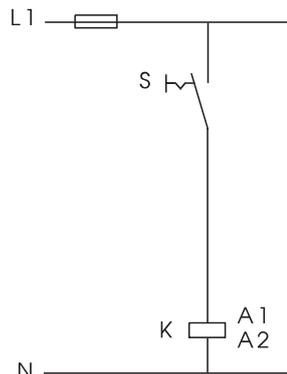


SCHEMATIC DIAGRAMS FOR AC OPERATED CONTACTORS

CPO, CNNP, CM1, CNN 9 - CNN 100, CNM 110 - CNM 400



With push button "S0, S1"

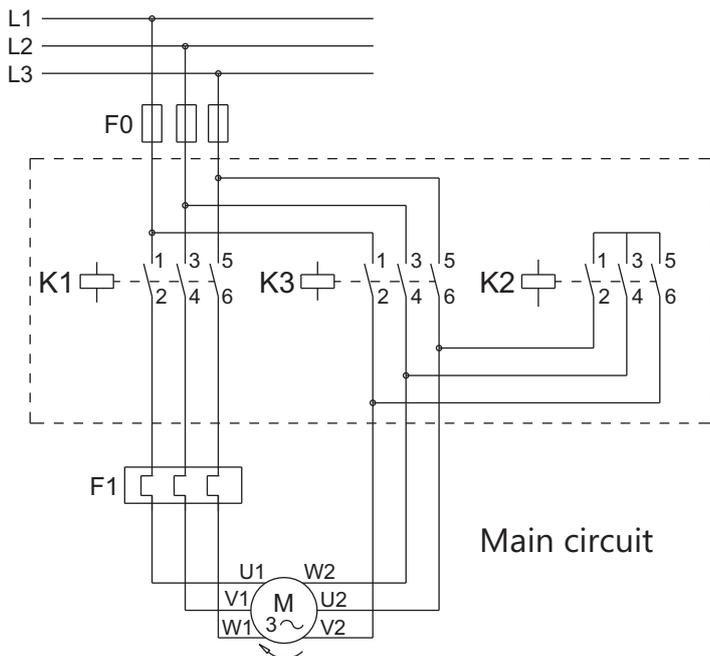


With permanent contact switch "S"

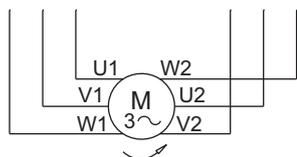
1

IMPORTANT:

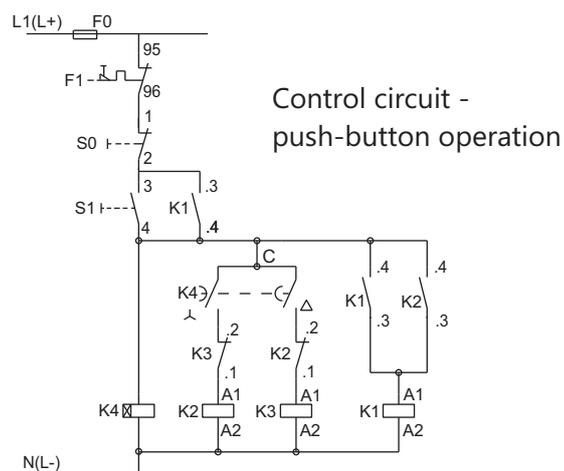
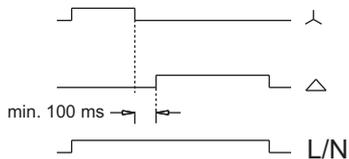
When used in **star-delta starters** the time between change over connection from star to delta must be bigger than 100ms which is achieved with electronic time relays (e.g. **Rade Koncar type EVRK 40**, see page 8/5).



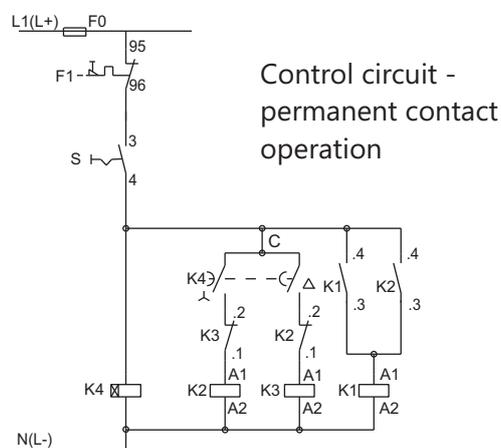
Main circuit



EVRK 40



Control circuit - push-button operation

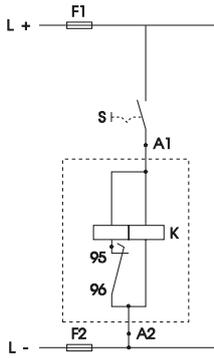


Control circuit - permanent contact operation

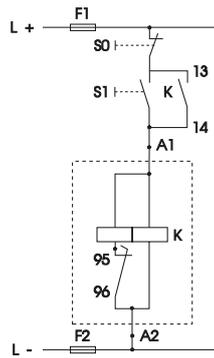
SCHEMATIC DIAGRAMS FOR DC OPERATED CONTACTORS

1

CNN 9 - CNN 40

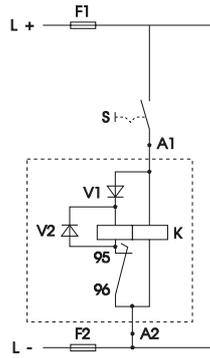


Permanent contact control

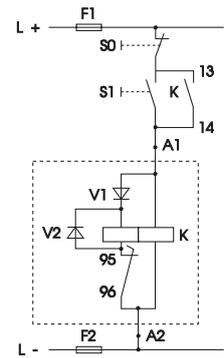


Push button control

CNN 50 - CNN 100

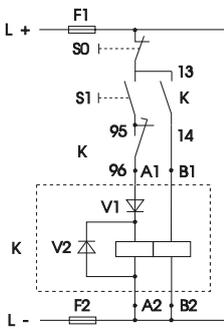


Permanent contact control

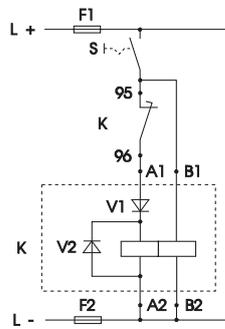


Push button control

CNM 110

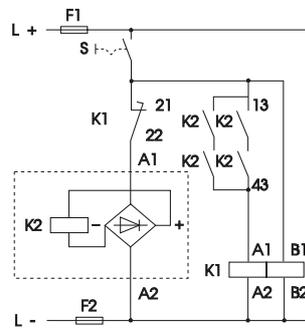


Push button control

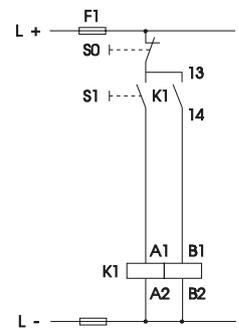


Permanent contact control

CNM 140 - CNM 200
CNM 250 - CNM 400



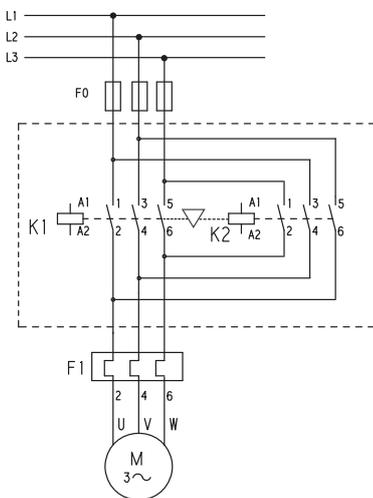
K1 = CNM 140, CNM 400
K2 = CNP 21 40 EG
Permanent contact control



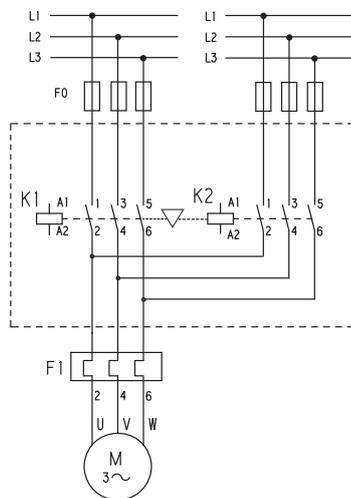
Push button control

SCHEMATIC DIAGRAMS FOR REVERSING CONTACTORS and "AVR"

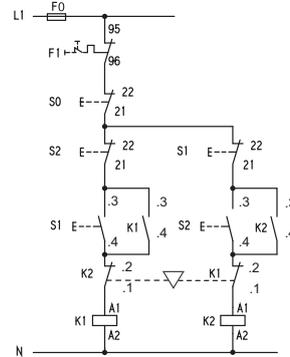
MBCM1, MBCNN 9 - MBCNN 100, MBCNM 110 -MBCNM 400



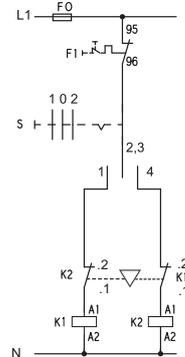
Main circuit



AVR



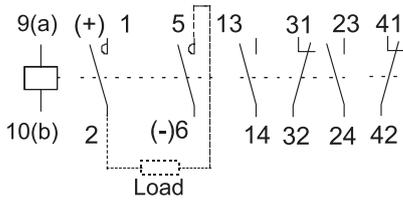
Control circuit -
push-button operation



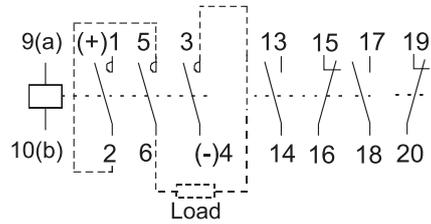
Control circuit -
permanent contact operation

DC CONTACTORS TYPE CNO

Wiring diagrams



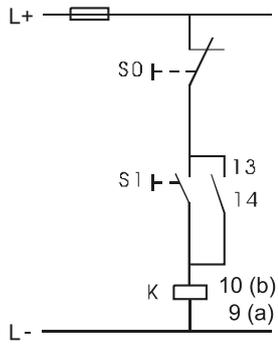
CNO 30



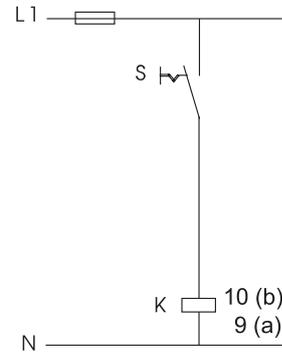
CNO 110, CNO 250

1

SCHEMATIC DIAGRAMS FOR AC OPERATED CONTACTORS

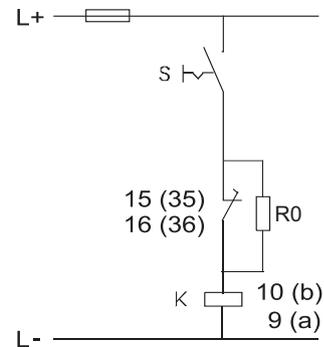
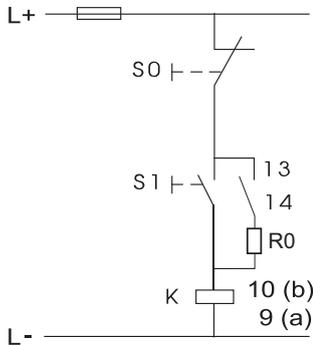


Push button control



Permanent contact control

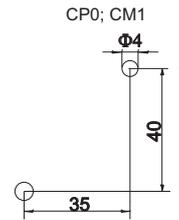
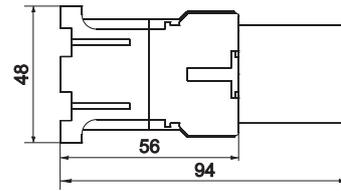
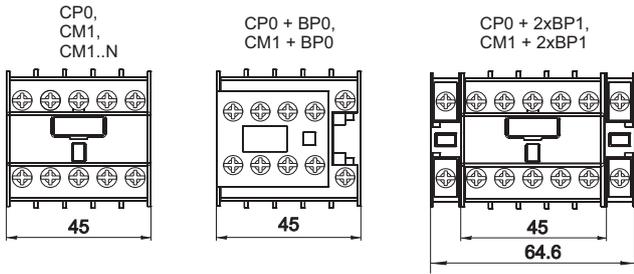
SCHEMATIC DIAGRAMS FOR DC OPERATED CONTACTORS



DIMENSION DRAWINGS (mm)

1

Drilling plan (mm)

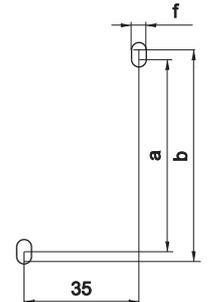
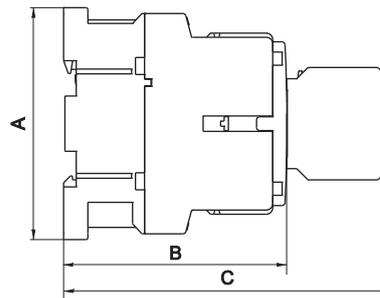
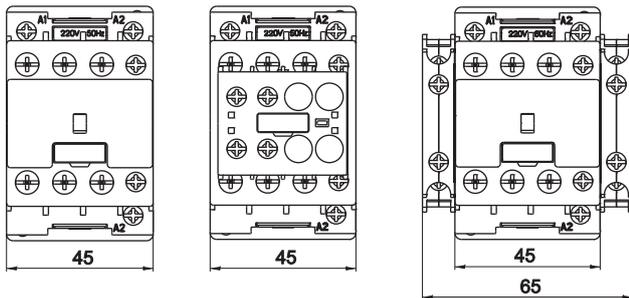


CNN 9; CNN 12; CNN 18; CNN 22
CNNB 9; CNNB 12; CNNB 18; CNNB 22

CNN 9 (CNNB 9) + BP2 (BP4)
CNN 12 (CNNB 12) + BP2 (BP4)
CNN 18 (CNNB 18) + BP2 (BP4)
CNN 22 (CNNB 22) + BP2 (BP4)

CNN 9 (CNNB 9) + 2xBP3
CNN 12 (CNNB 12) + 2xBP3
CNN 18 (CNNB 18) + 2xBP3
CNN 22 (CNNB 22) + 2xBP3

CNN 9; CNN 12; CNN 18;
CNNB 9; CNNB 12; CNNB 18



TYPE	CNN 9 - CNN 22	CNNB 9 - CNNB 22
A	72.2	74.2
B	71	114.5
C	101	146.8

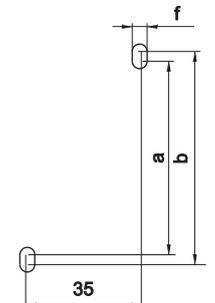
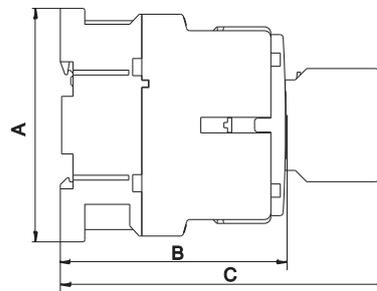
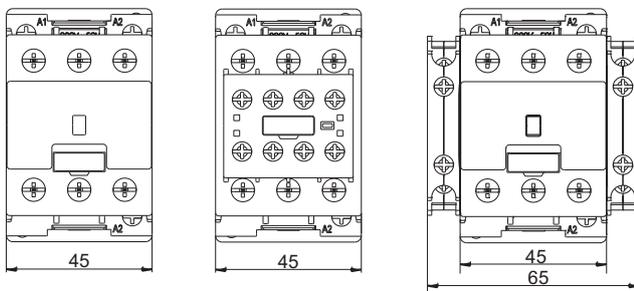
TYPE	CNN 9 - CNN 22	CNNB 9 - CNNB 22
a	60	50
b	65	60
f	4.5	4.6

CNN 25; CNN 30; CNNB 25; CNNB 30

CNN 25 (CNNB 25) + BP2 (BP4)
CNN 30 (CNNB 30) + BP2 (BP4)

CNN 25 (CNNB 25) + 2xBP3
CNN 30 (CNNB 30) + 2xBP3

CNN 25; CNN 30;
CNNB 25; CNNB 30



TYPE	CNN 25; CNN 30	CNNB 25; CNNB 30
A	72.2	74.2
B	71	114.5
C	100.5	146.1

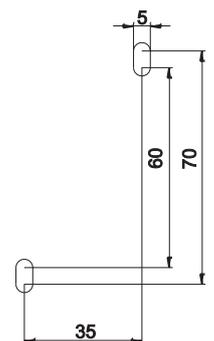
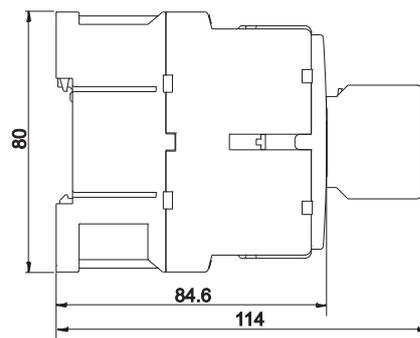
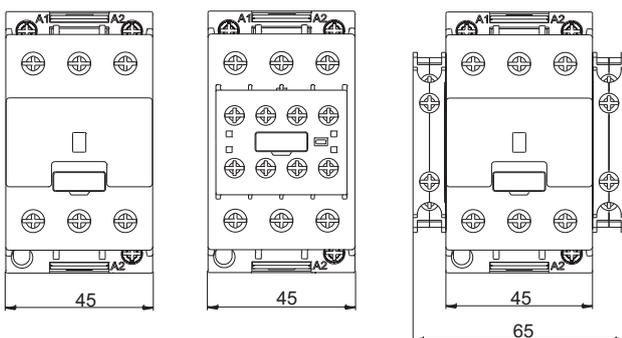
TYPE	CNN 25; CNN 30	CNNB 25; CNNB 30
a	60	50
b	65	60
f	4.5	4.6

CNN 32; CNN 40

CNN 32 + BP2 (BP4); CNN 40 + BP2 (BP4)

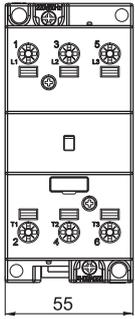
CNN 32 + 2xBP3; CNN 40 + 2xBP3

CNN 32; CNN 40

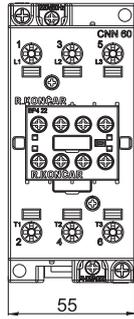


DIMENSION DRAWINGS (mm)

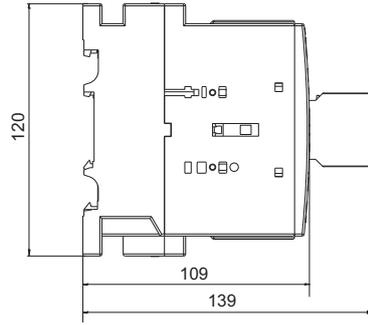
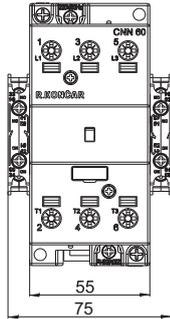
CNN 50;
CNN 60;
CNN 70



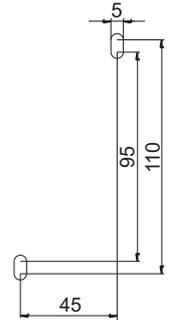
CNN 50 + BP2(BP4);
CNN 60 + BP2(BP4)
CNN 70 + BP2(BP4)



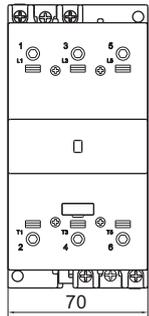
CNN 50 + 2BP3;
CNN 60 + 2BP3
CNN 70 + 2BP3



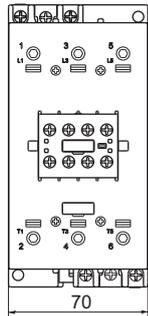
Drilling plan (mm)



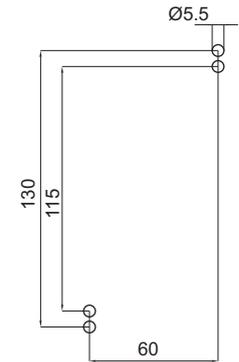
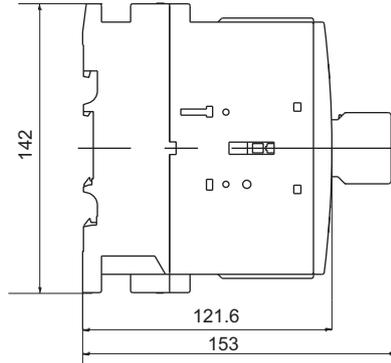
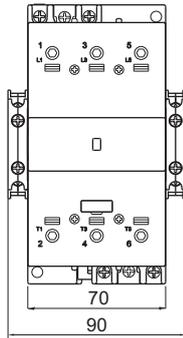
CNN 80;
CNN 90
CNN 100



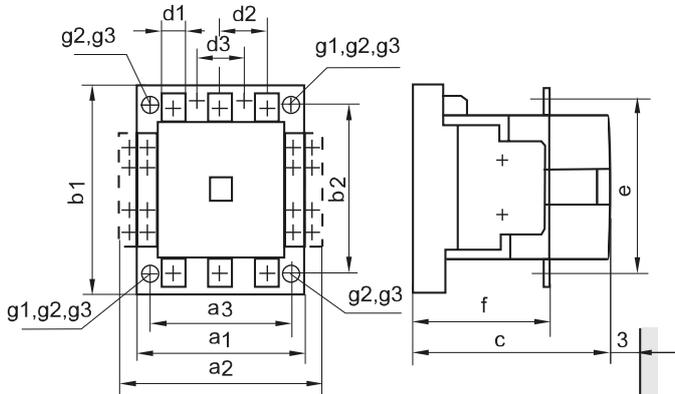
CNN 80 + BP2N(BP4N);
CNN 90 + BP2N(BP4N);
CNN 100 + BP2N(BP4N)



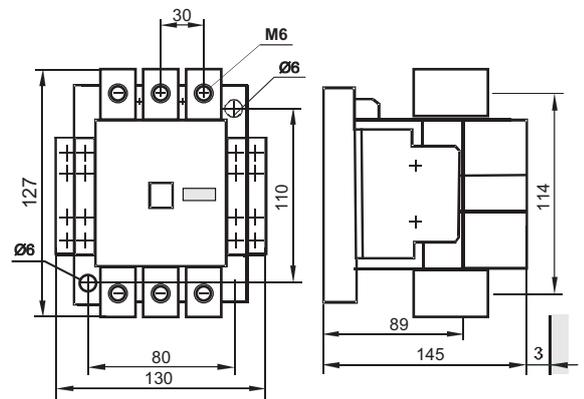
CNN 80 + 2BP3;
CNN 90 + 2BP3;
CNN 100 + 2BP3



CNM 110, CNM 140, CNM 170, CNM 250, CNM 400

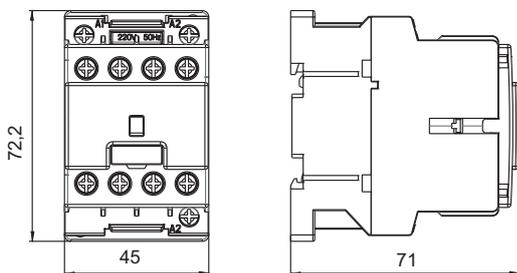


CNM 110ST

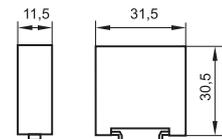
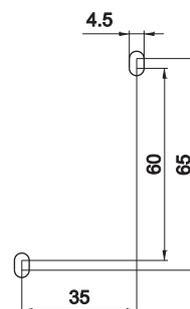


TYPE	a 1	a 2	a 3	b 1	b 2	c	d 1	d 2	d 3	e	f	g 1	g 2	g 3
CNM 110	100	125	80	132	110	142	15	30	44	113	86.5	Ø6		
CNM 140	135	162	110	180	160	189	20	42	44	162	116		Ø7	
CNM 170	135	162	110	180	160	189	20	42	44	162	116		Ø7	
CNM 200	135	162	110	180	160	189	20	42	44	162	116		Ø7	
CNM 250	160	187	130	200	180	226	25	48	44	178	141			Ø10,5
CNM 315	160	187	130	200	180	226	25	48	44	178	141			Ø10,5
CNM 400	160	187	130	200	180	226	25	48	44	178	141			Ø10,5

CNNP, CNN 9 004, CNN 12 004
CNN 9 0022, CNN 12 0022



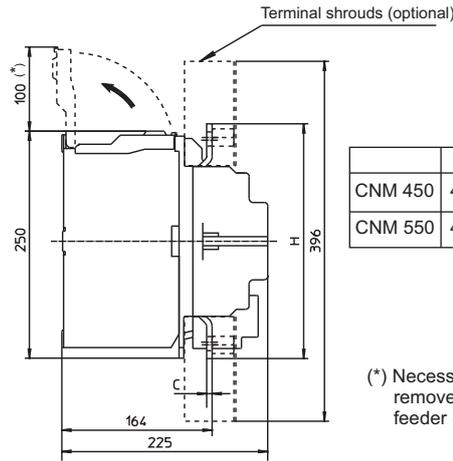
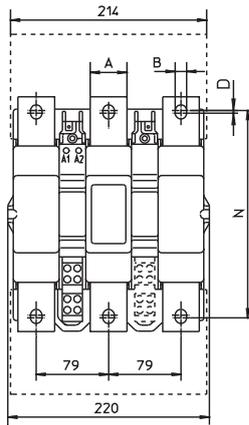
Drilling plan (mm)



RC 1

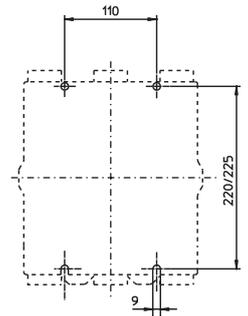
1

CNM 450; CNM 550;



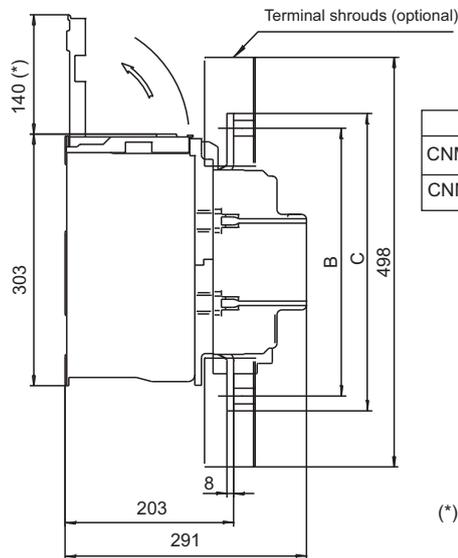
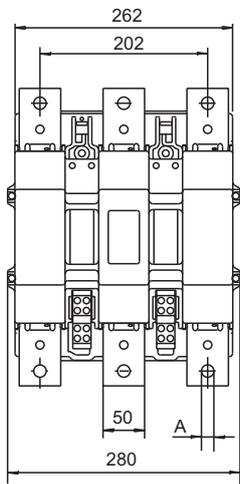
	A	B	C	D	N	H
CNM 450	40	10,5	4	4	208	235
CNM 550	40	12,5	6	3	228	258

Drilling plan (mm)

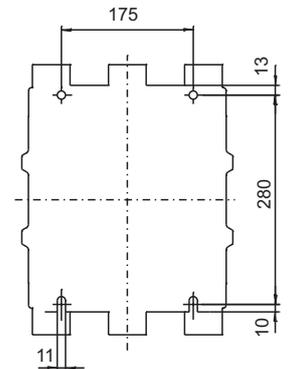


(*) Necessary distance to remove coil and/or feeder group.

CNM 700; CNM 860

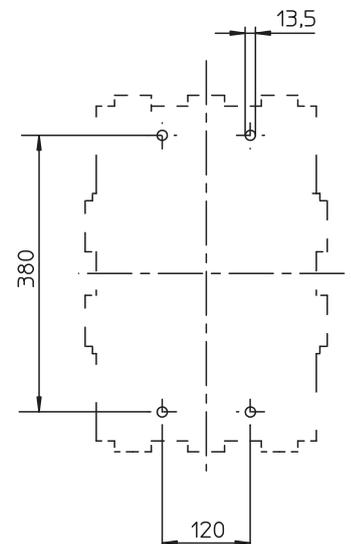
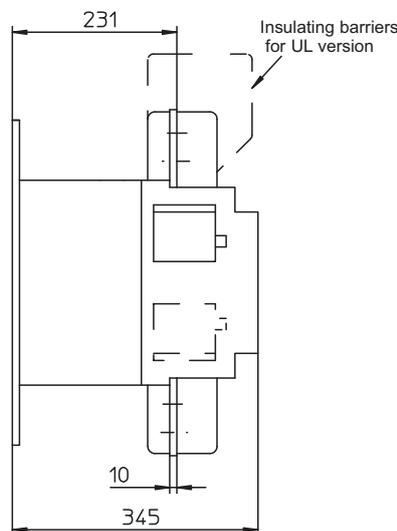
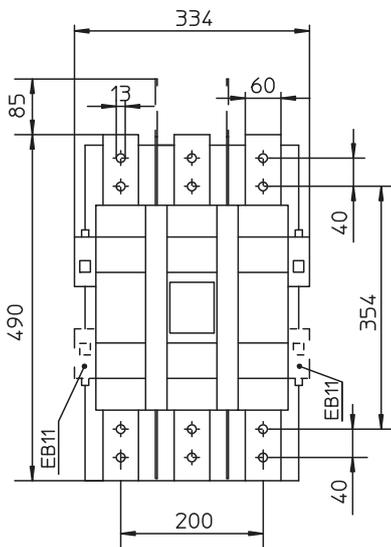


	A	B	C
CNM 700	13	277	307
CNM 860	15	325	361



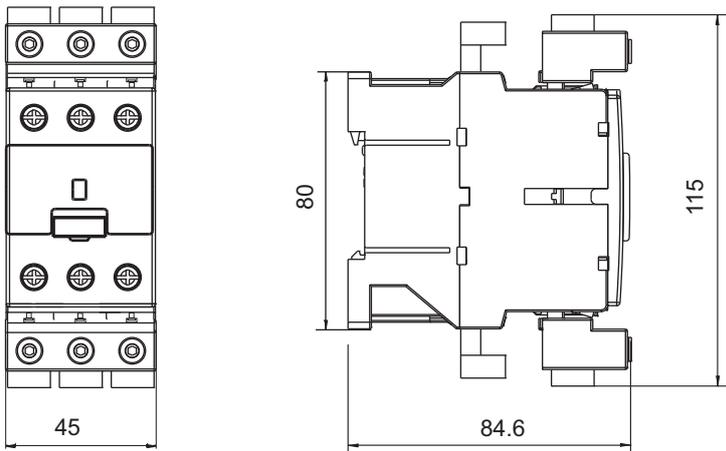
(*) Necessary distance to remove coil and/or feeder group.

CNM 1000

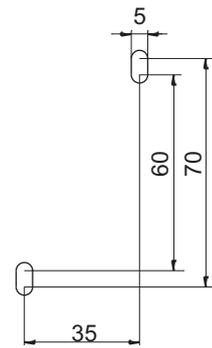


DIMENSION DRAWINGS (mm)

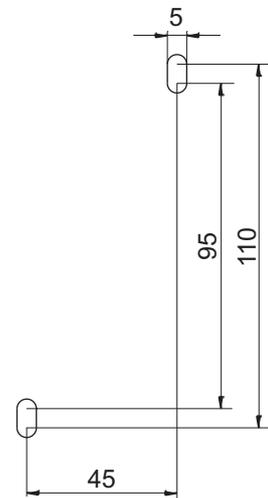
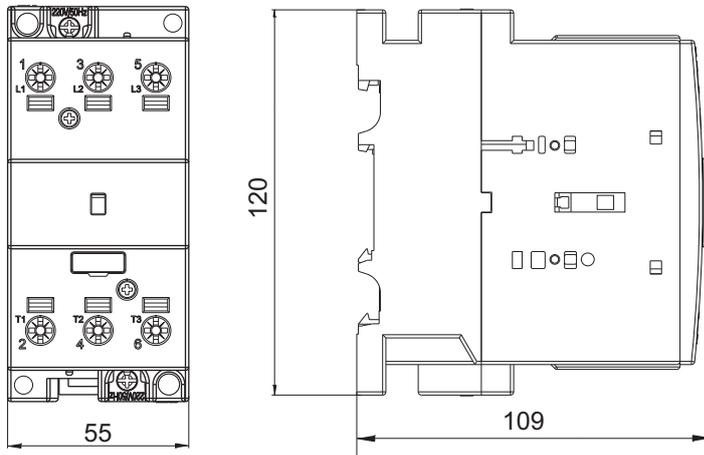
TKN 65



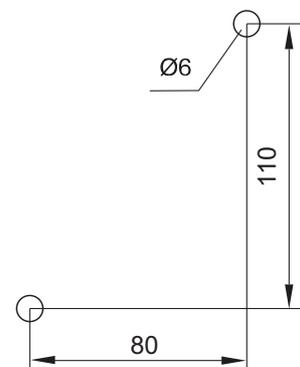
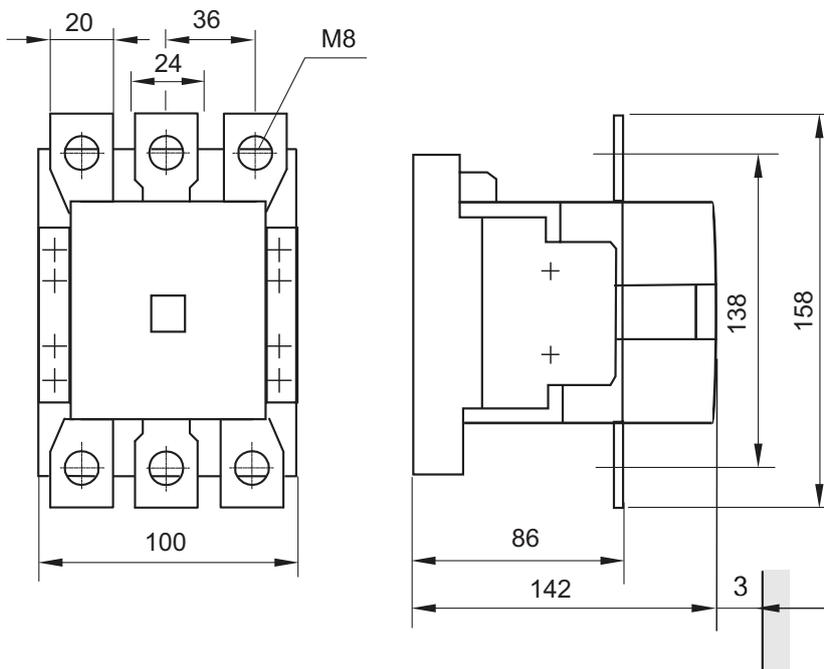
Drilling plan (mm)



TKN 115



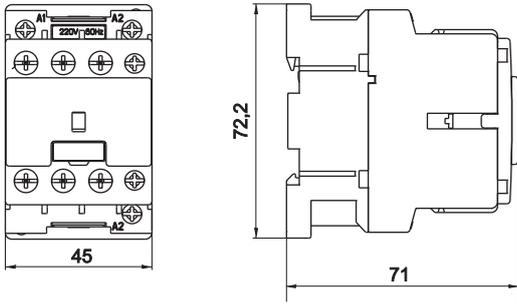
TK 130, TK 175



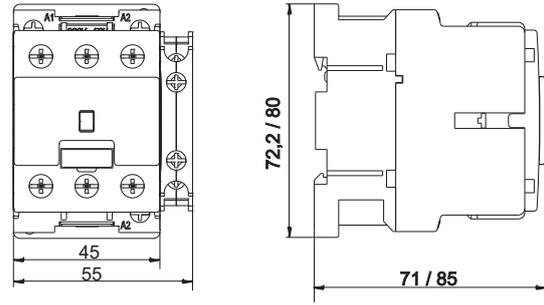
DIMENSION DRAWINGS (mm)

1

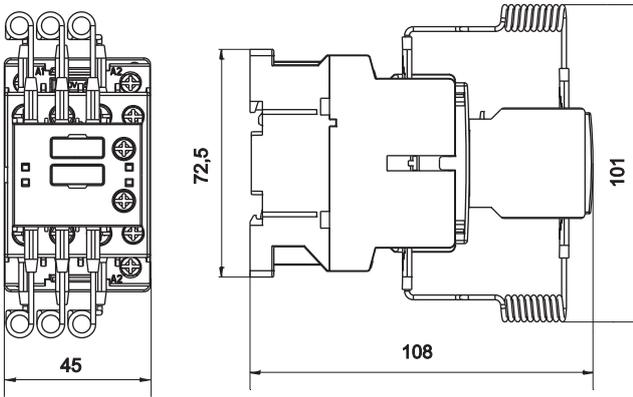
CNNK 2,5; CNNK 5



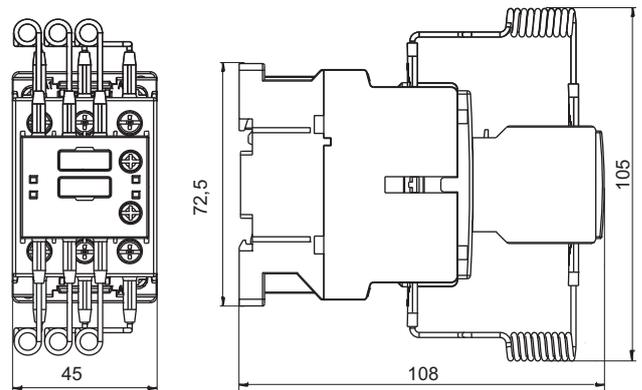
CNNK 7,5 / CNNK16



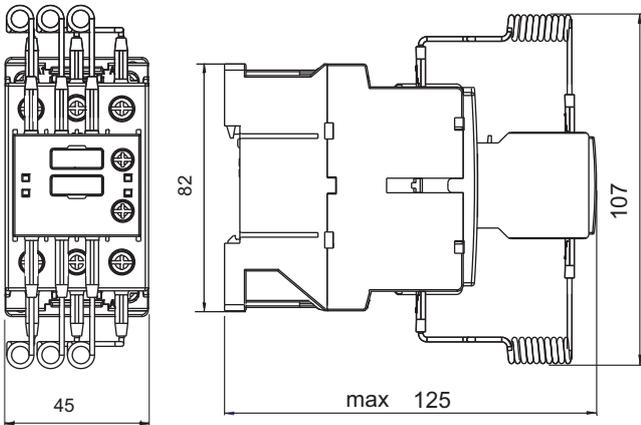
CNNK 10; CNNK 12; CNNK 15



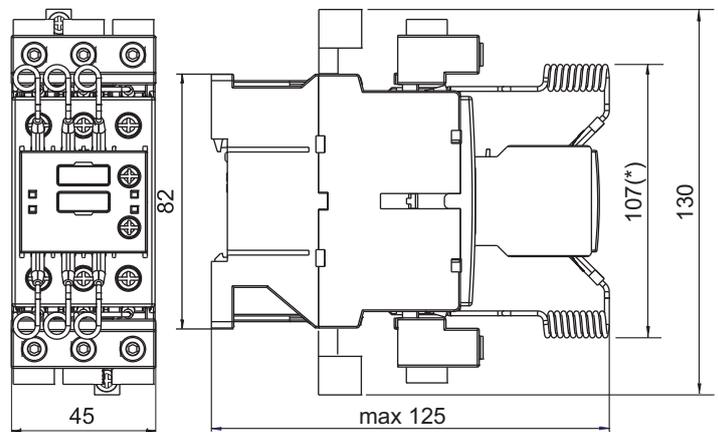
CNNK 20



CNNK 25E

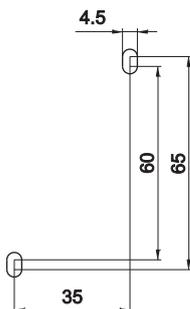


CNNK 25; CNNK 30

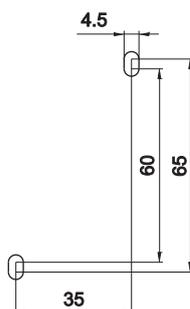


Drilling plan (mm)

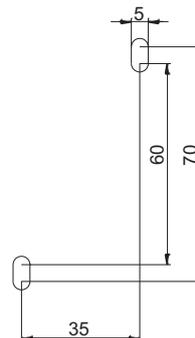
CNNK 2,5; CNNK 5
CNNK 7,5



CNNK 10; CNNK 12;
CNNK 15; CNNK 20

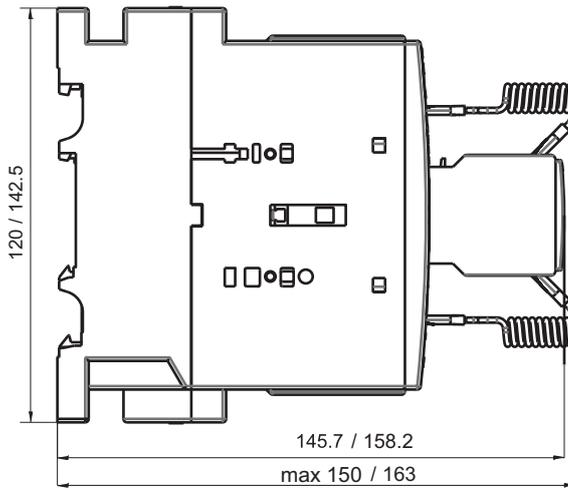
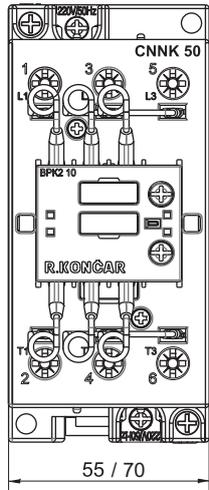


CNNK 25E; CNNK 25,
CNNK 30

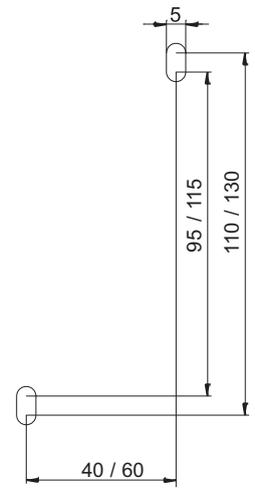


DIMENSION DRAWINGS (mm)

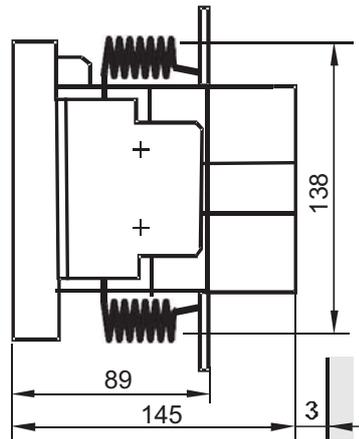
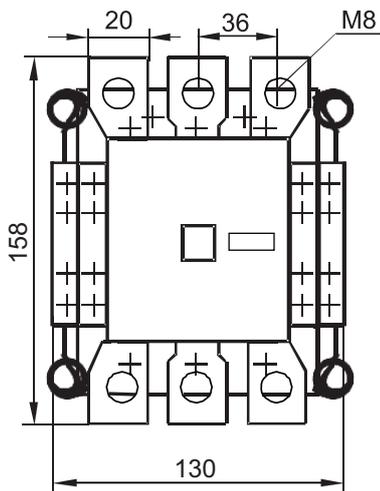
CNNK 40, CNNK 50, CNNK 60 / CNNK 60N, CNNK 70



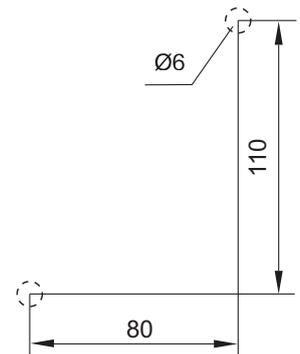
Drilling plan (mm)



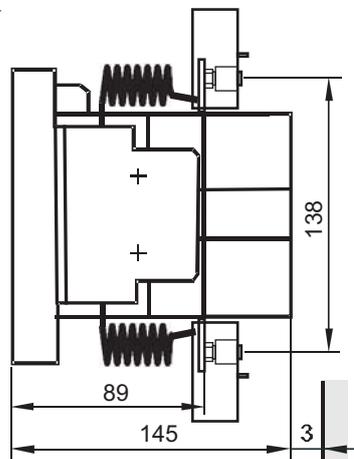
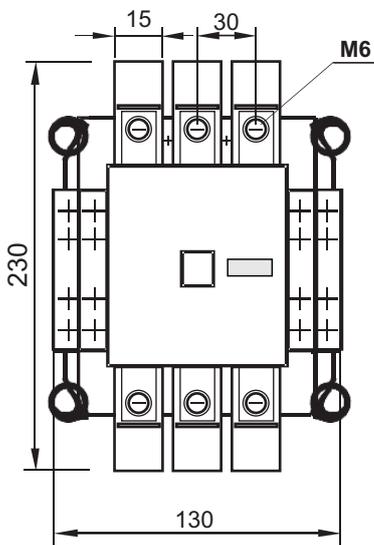
CNKM 60 and CNKM 80 without IP 20



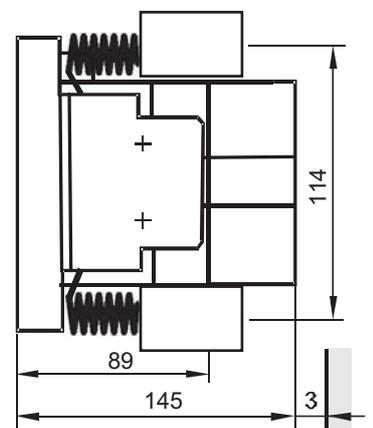
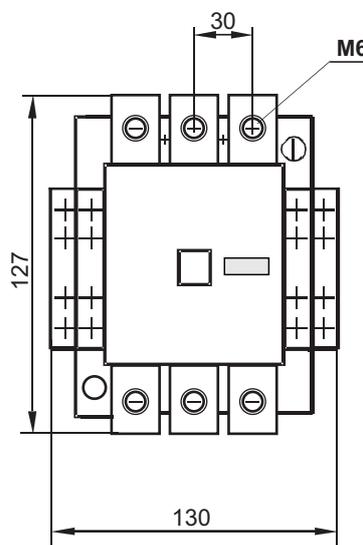
CNKM 60 and CNKM 80



CNKM 60 and CNKM 80 with IP 20



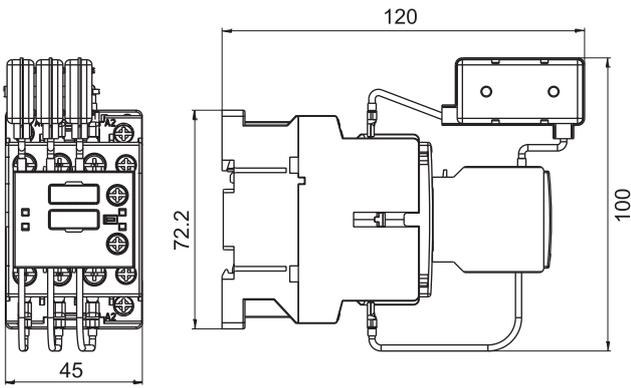
CNKM 60ST and CNKM 80ST



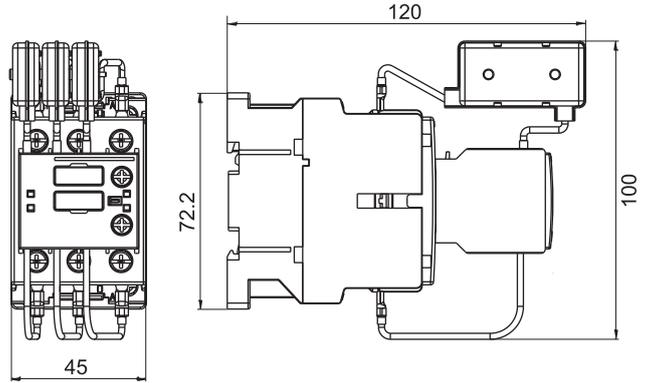
DIMENSION DRAWINGS (mm) - New Series

1

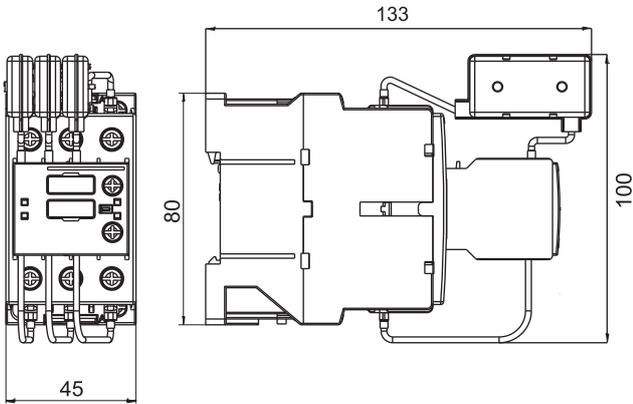
CNNK 10..N; CNNK 12..N; CNNK 15..N



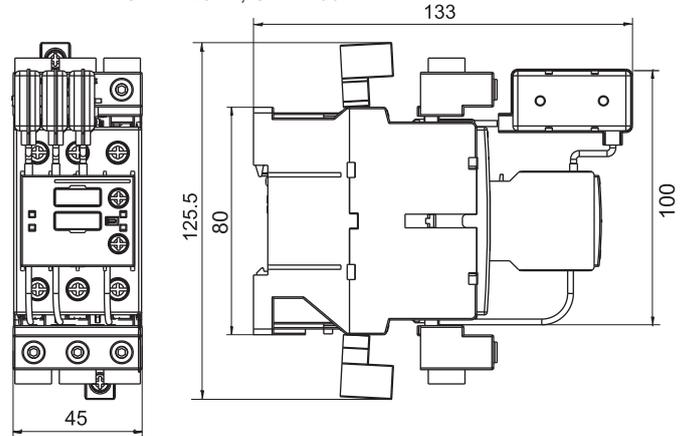
CNNK 20..N



CNNK 25E..N

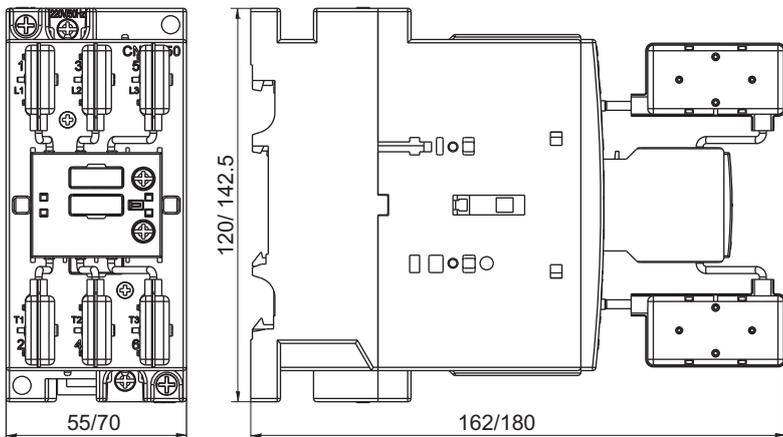


CNNK 25..N; CNNK 30..N

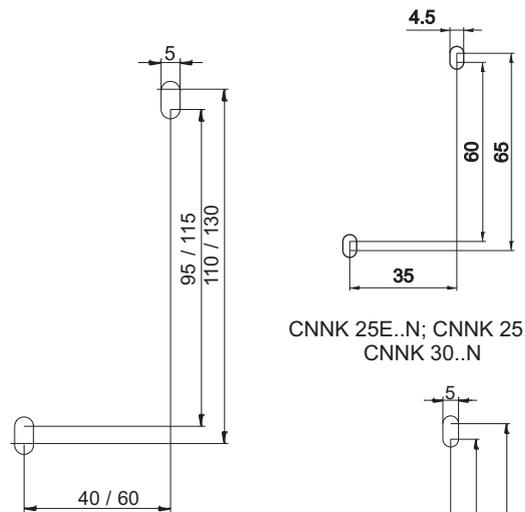


Drilling plan (mm)

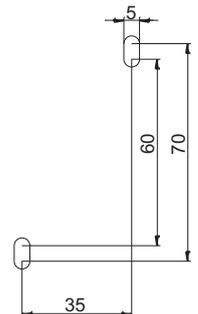
CNNK 40..N, CNNK 50..N, CNNK 60..N / CNNK 60N..N, CNNK 70..N, CNNK 75..N



CNNK 10..N; CNNK 12..N
CNNK 15..N; CNNK 20..N

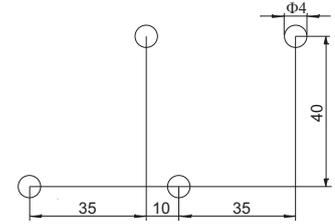
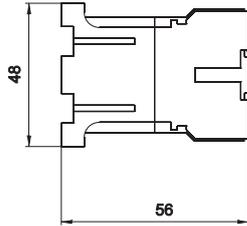
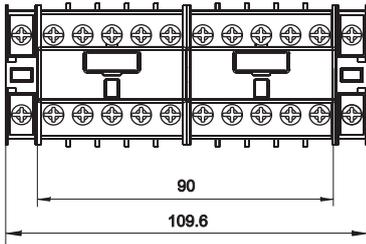


CNNK 25E..N; CNNK 25..N,
CNNK 30..N



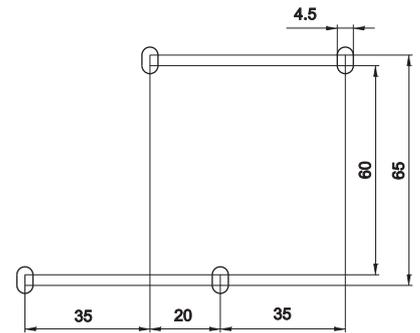
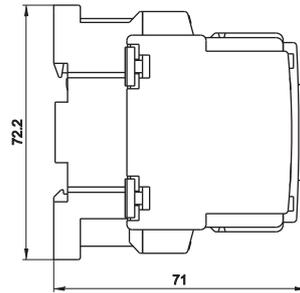
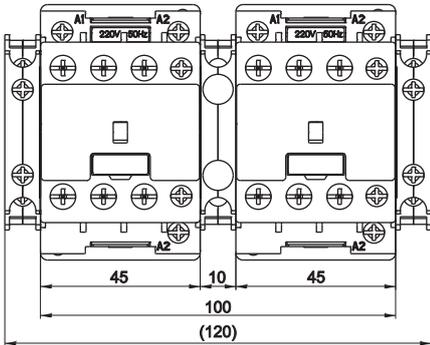
DIMENSION DRAWINGS (mm)

MBCM1 00; MBCM1 11
MBCM1..N 00; MBCM1..N 11

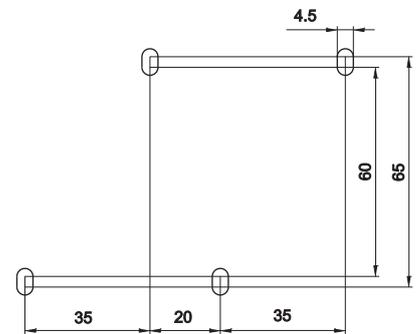
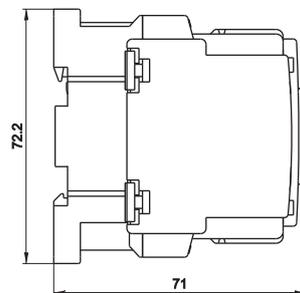
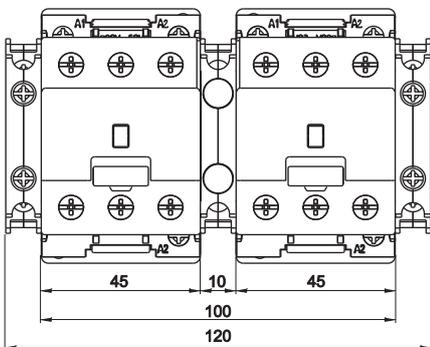


1

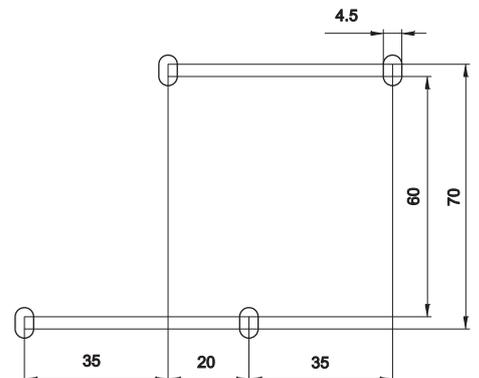
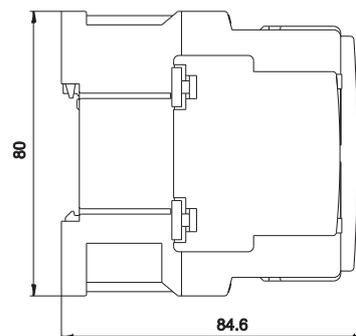
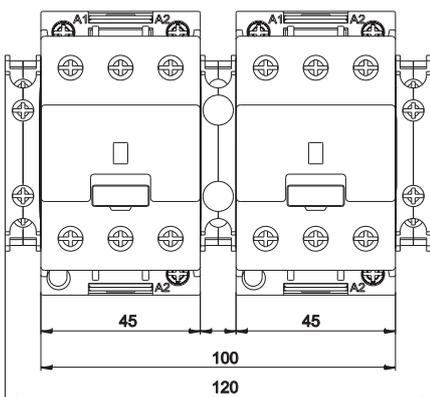
MBCNN 9 00 (11); MBCNN 12 00 (11);
MBCNN 18 00 (11); MBCNN 12 00 (11)



MBCNN 25 10; MBCNN 30 10

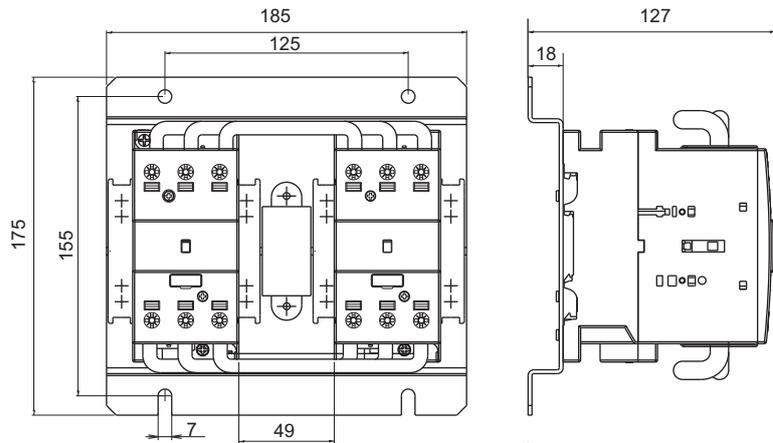


MBCNN 32 10; MBCNN 40 10

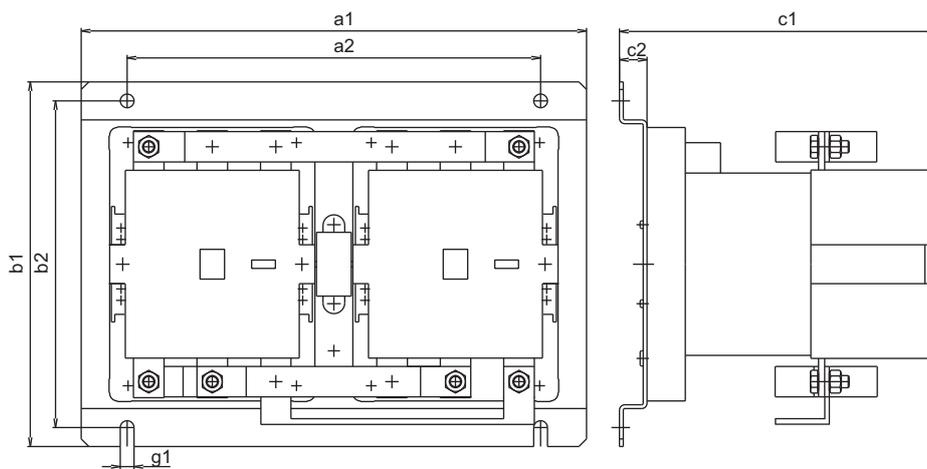
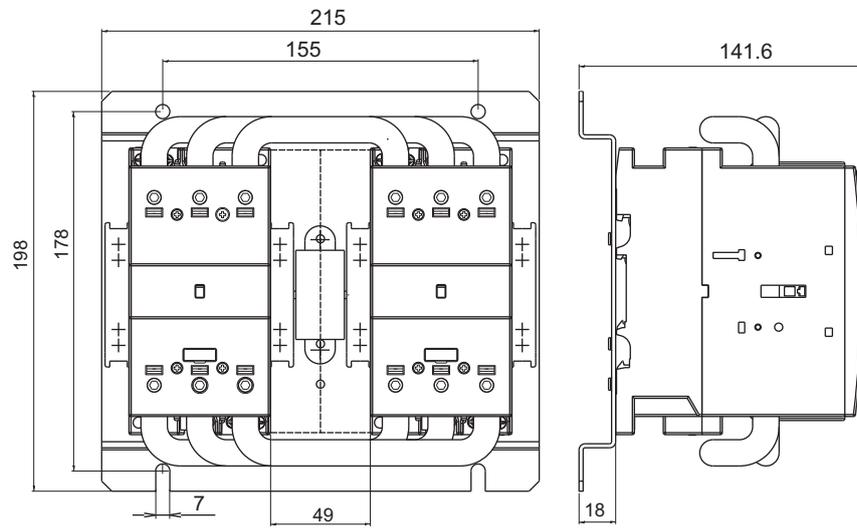


DIMENSION DRAWINGS (mm)

MBCNN 50 - MBCNN 70



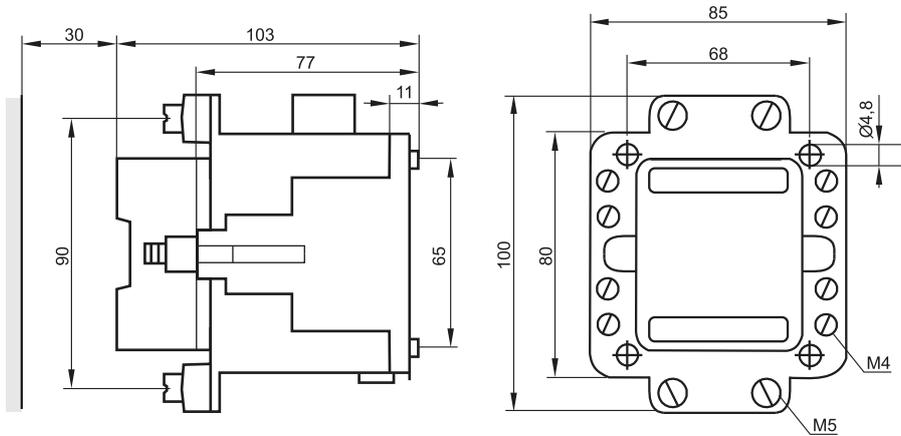
MBCNN 80 - MBCNN 100



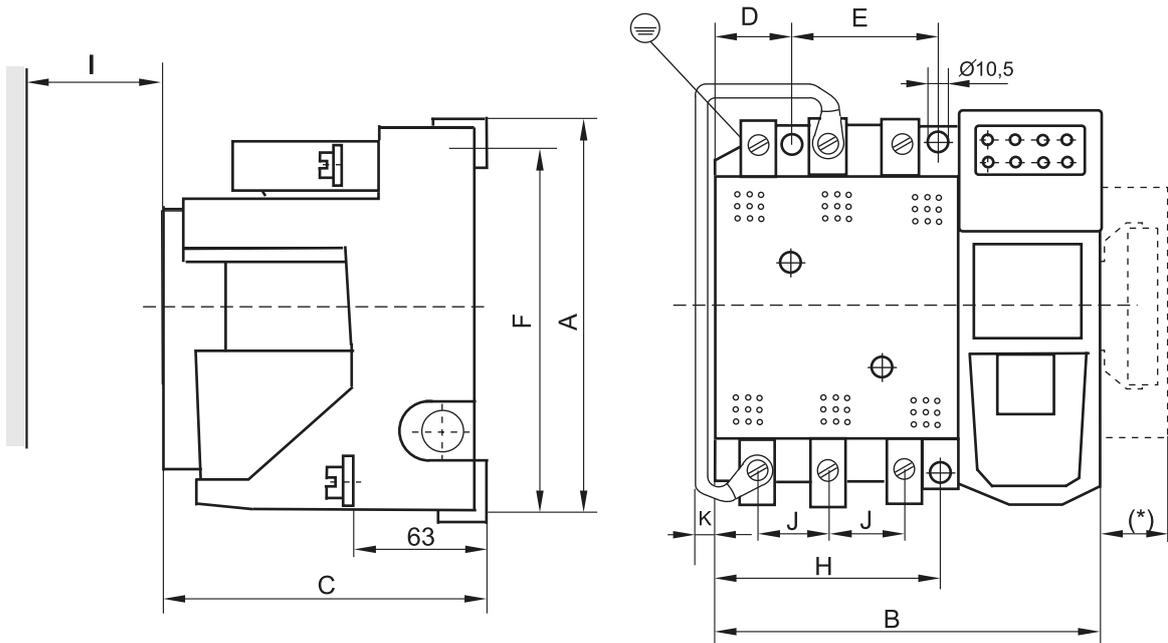
TYPE	a1	a2	b1	b2	c1	c2	g1
MBCNM 110	260	200	175	155	163	18	7
MBCNM 140 - MBCNM 200	330	270	240	215	210	18	9
MBCNM 250 - MBCNM 400	380	310	265	240	250	21	11

DIMENSION DRAWINGS (mm)

1



CNO 30



Contactor	A	B	C	D	E	F	G	H	I	J	K	(*) - Only for DC controlled contactors 0,25xB
CNO 110	190	192	130	40	70	175	7,5	110	40	35	20	
CNO 250	234	212	180	45	80	190	10.5	125	70	35	25	

THERMAL OVERLOAD RELAYS

Thermal overload relays TM	2/1
Thermal overload relays TRM	2/2
Adaptor for separate installation ASM 40, ASM 75	2/3
Order-thermal overload relays	2/3
Application, standards and installation	2/4
Current time curves,	2/4
Technical data	2/4
Contactors with thermal overload relays	2/5, 2/6
Dimension drawings	2/7, 2/8

THERMAL OVERLOAD RELAYS TYPE TM 40

Features

- In conformity with: IEC 60947-4
- Ambient temperature compensated
- Differential tripping
- With selectable manual or auto reset
- Trip indication
- 1NO + 1NC auxiliary contact

Selection and ordering data

Thermal overloads

2



For direct mounting on contactor	Overload setting range (A)	Type	Weights kg
CNN 9, CNN 12 CNN 18, CNN 22 CNN 25, CNN 30 CNN 32, CNN 40	0.1 - 0.16* 0.16 - 0.25* 0.25 - 0.4* 0.4 - 0.63 0.63 - 1.0 0.8 - 1.25 1.0 - 1.6 1.25 - 2.0 1.6 - 2.5 2.0 - 3.2 2.5 - 4.0 3.2 - 5.0 4.0 - 6.3 5.0 - 8.0 6.3 - 10.0 8.0 - 12.5 10 - 16 12.5 - 20 16 - 25	TM 40	0.15
CNN 25, CNN 30 CNN 32, CNN 40	22 - 30 28 - 38	TM 40	0.16



* On special request

THERMAL OVERLOAD RELAYS type TRM 75 - TRM 400

Selection and ordering data

Thermal overloads

2

	For direct mounting onto contactor	Overload setting range (A)	Type	Weights kg
	CNN 50 CNN 60 CNN 70	16 - 25 20 - 32 25 - 40 32 - 50 40 - 57 50 - 63 57 - 70	TRM 75 - N60	0.39
	CNN 80 CNN 90 CNN 100	16 - 25 20 - 32 25 - 40 32 - 50 40 - 57 50 - 63 57 - 70 63 - 80	TRM 75 - N90	0.40
	CNM 110	16 - 25 20 - 32 25 - 40 32 - 50 40 - 57 50 - 63 57 - 70 63 - 80	TRM 75 - 110	0.40
	For individual mounting CNM 110 CNM 140 CNM 170 CNM 200 CNM 250 CNM 315 CNM 400	70 - 100 80 - 125 100 - 160 125 - 200 160 - 250	TRM 400D (*)	1.58
	For individual mounting CNM 110 CNM 140 CNM 170 CNM 200 CNM 250 CNM 315 CNM 400	70 - 100 80 - 125 100 - 160 125 - 200 160 - 250 200 - 320 250 - 400	TRM 400	2.2

*TRM 400D with straight-through transformer.

ADAPTOR FOR SEPARATE INSTALLATION ASM 40, ASM 75



For thermal overload relays type	Type	Weights kg
TM 40	ASM 40	0.04
TRM 75	ASM 75	0.135

2

ORDER-THERMAL OVERLOAD RELAYS

Type

Setting range (Upper value)

Example: Thermal overload relay type TRM 75 -N60, current range (40 - 57) A

TRM 75 -N60 **57 A**

Example: Thermal overload relay with rail type TRM 400 160, current range (100 - 160) A

TRM 400 **160 A**

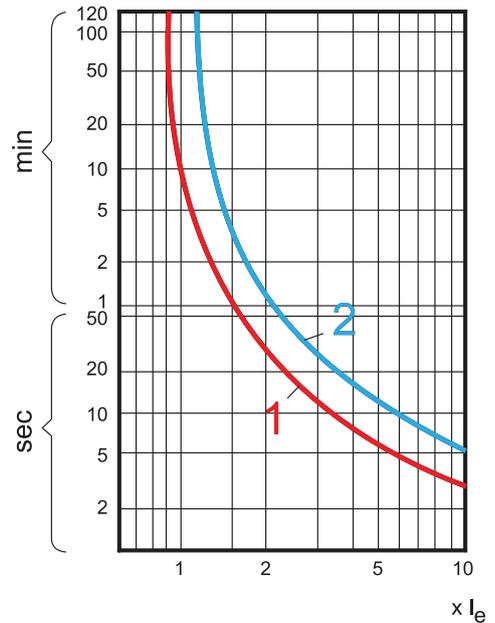
Example: Thermal overload relay with straight-through transformer type TRM 400D 160, current range (100 - 160) A

TRM 400D **160 A**

THERMAL OVERLOAD RELAYS TM and TRM

Application, standards and installation

Thermal overload relays TM and TRM are designed to protect low voltage motors and other consumers against nonpermissible overloads and phase-failure operation. Relays are in conformity with IEC 60947-4-1, EN 60947-4-1 and VDE 0660. They can be easily mounted on our contactors see ordering table. Individual screw mounting of the TM 40 and TRM relays on plane surface or snap-on fastening to 35 mm mounting rail (according to DIN EN 50022) is possible by using a special adaptor type ASM 40 and ASM 75. The relay TRM 400 is designed for individual screw mounting.



2

Current time curves

The current time curves give correlation between the tripping time and the multiplier of the present current I_e . They are presented for a cold initial state of the relay. For relays warmed by $1,0 \times I_e$ load, the tripping times are lower by 25%. The curve 2 is given for 3-phase operation. The curve 1 is given for 2-phase operation. For the protection of a 1-phase, or DC motor, serial connection of the main circuit of relays is necessary. For that connection the tripping curve 2 is valid.

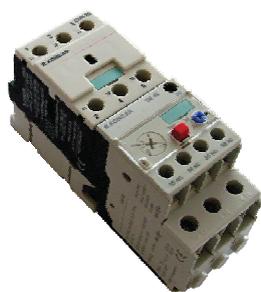
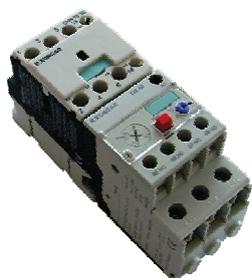
Technical data				
Relay type		TM 40	TRM 75	TRM 400/TRM 400D
Insulation rating U_i	V	690	1000	690
Permissible ambient temperature	°C	- 25 to +50	- 25 to +55	- 25 to +50
Degree of protection		IP00		
Release time classification		class 10 (release time 4 s ... 10 s at $7,2 \times I_e$ from cold state)		
Temperature compensation		+	+	+
Phase failure protection by differential phase shift		+	+	+
Test button		+	+	+
Reset button		+	-	+
Switch position indicator		+	+	+
Changeover to hand or automatic resetting		+	+	+
Vibration resistance	g	8	8	8
Main circuit				
rated operational current (AC 50 to 400 Hz or DC)	A	38	80	400/250
conductor cross - section				
solid or stranded	mm ²	2,5 - 10	2,5 - 35	240/120
finely stranded with end sleeve	mm ²	1,5 - 6	1,5 - 25	
Screw/Screw head		M4/PZ2	M6	M10/-
Tightening torque	Nm	1.6	2.5	
Power input per pole				
max. at setting range min.	W/VA	0,9	2,6	5
max. at setting range max.	W/VA	2,25	4	12
Auxiliary circuit		1 NO + 1 NC (galvanically separated)		
number and type of contacts				
conductor cross - section		2 x (1 - 2,5)		
solid or stranded	mm ²	2 x (0,75 - 1,5)		
finely stranded with end sleeve	mm ²	M3.5/PZ2		
Screw/Screw head		0.8		
Tightening torque	Nm	6		
rated thermal current	A			
rated insulation voltage AC:				
unequal potential	V	(NO + NC) 400		
equal potential	V	(NO + NC) 690		
rated current	A	$I_e/AC15$ for 24 V 2		
	A	60 V 1.5		
	A	230 V 1.15		
	A	400 V 1.1		
	A	500 V 1		
rated current	A	$I_e/DC13$ for 24 V 1		
	A	60 V 0.4		
	A	110 V 0.22		
	A	220 V 0.1		

CONTACTORS WITH THERMAL OVERLOAD RELAYS

In conformity with: IEC 60947-1, IEC 60947-4, VDE 0660

Selection and ordering data

Data for AC2 and AC3 utilization categories			Auxiliary contacts		Type of relay	Type	Weights kg
Rated operational current I_e/400V A	Motor rating at 50Hz		  NO NC	Overload setting range A			
	230 V kW	400V kW					
CONTACTORS WITH THERMAL RELAY							
					TM 40		
	9	3.2	4.5	1 0	0.1 - 0.16	CNNR 9 10	0.42
	9	3.2	4.5	0 1	0.16 - 0.25	CNNR 9 01	
	12	3.5	5.7	1 0	0.25 - 0.4	CNNR 12 10	
	12	3.5	5.7	0 1	0.4 - 0.63	CNNR 12 01	
	18	4	7.5	1 0	0.63 - 1.0	CNNR 18 10	
	18	4	7.5	0 1	0.8 - 1.25	CNNR 18 01	
	22	5.5	11	1 0	1.0 - 1.6	CNNR 22 10	
	22	5.5	11	0 1	1.25 - 2.0	CNNR 22 01	
					1.6 - 2.5		
					2.0 - 3.2		
					2.5 - 4.0		
					3.2 - 5.0		
					4.0 - 6.3		
					5.0 - 8.0		
					6.3 - 10.0		
					8.0 - 12.5		
					10 - 16		
					12.5 - 20		
					16 - 25		
	25	5.5	11	0 0	22 - 30	CNNR 25 00	0.44
	30	7.5	15	0 0	28 - 38	CNNR 30 00	
	32	7.5	15	0 0		CNNR 32 00	0.56
	38	11	18.5	0 0		CNNR 40 00	



CONTACTORS WITH THERMAL OVERLOAD RELAYS

In conformity with: IEC 60947-1, IEC 60947-4, VDE 0660

Selection and ordering data

2



Data for AC2 and AC3 utilization categories			Auxiliary contacts		Type of relay	Type	Weights kg
Rated operational current Ie/400V A	Motor rating at 50Hz		NO	NC	Overload setting range A		
	230 V kW	400V kW					
CONTACTORS WITH THERMAL RELAY							
50	15	22	0	0	TRM 75 -N60 16 - 25 20 - 32 32 - 50 40 - 57 50 - 63	CNNR 50 00	1.3
60	18.5	30	0	0			
65	18.5	33	0	0			
80	22	37	2	2	TRM 75 -N90 16 - 25 20 - 32 25 - 40 32 - 50 40 - 57 50 - 63 57 - 70 63 - 80	CNNR 80 00	1.7
90	26	45	2	2			
100	30	55	2	2			
110	37	55	2	2	TRM 75 -110 16 - 25 20 - 32 25 - 40 32 - 50 40 - 57 50 - 63 57 - 70 63 - 80	CNMR 110 22	2.7
110	37	55	4	4			

ORDER FOR CNMR:

Type

Standard control voltage AC/DC 24, 48, 110, 220/230,380/400 V

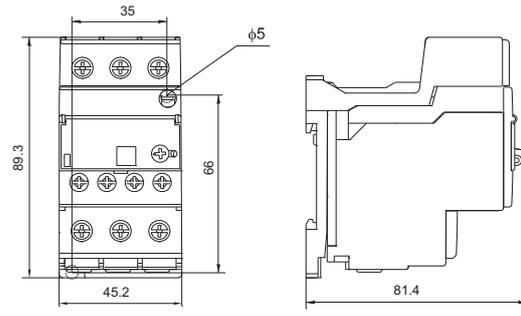
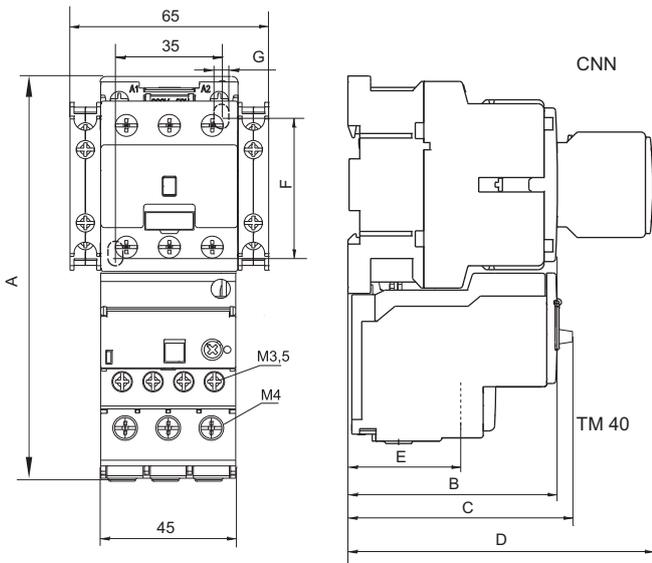
For AC control: 50 Hz or 60 Hz

Setting range (Upper value)

Example: Contactor with thermal relay type CNNR 18 10, control voltage 220/230 V, 50 Hz, thermal overload relay type TM 40, current range (10-16)A

CNNR 18 10	220/230 V	50 Hz	16A
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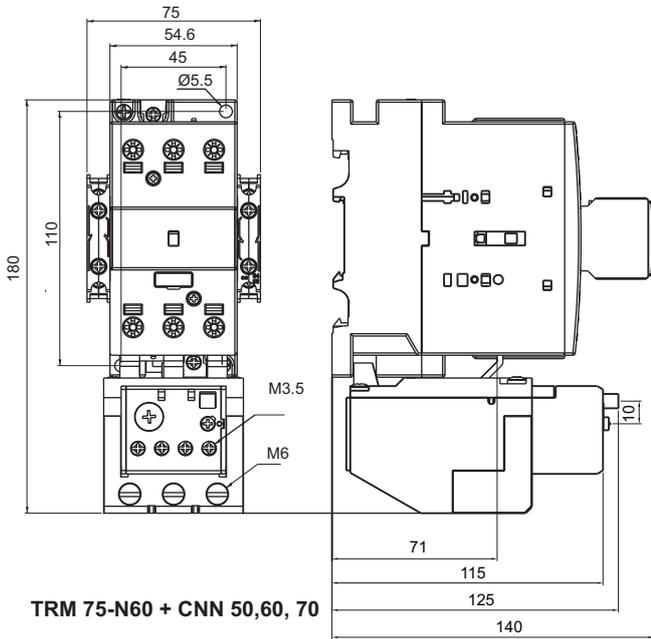
DIMENSION DRAWINGS (dimensions in mm)



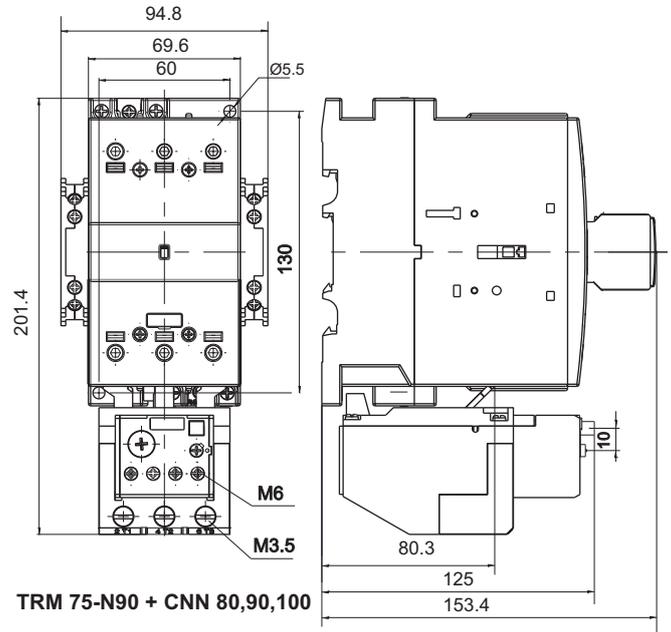
TM 40 + ASM 40

Type	A	B	C	D	E	F	G
TM 40 + CNN 9; 12; 18; 22	132.2	71	74	101	31	60-65	4.5
TM 40 + CNN 25; 30	134	71	75,5	101	32,8	60-65	4.5
TM 40 + CNN 32, 40	143.5	84.5	86	114	43.5	60-70	5

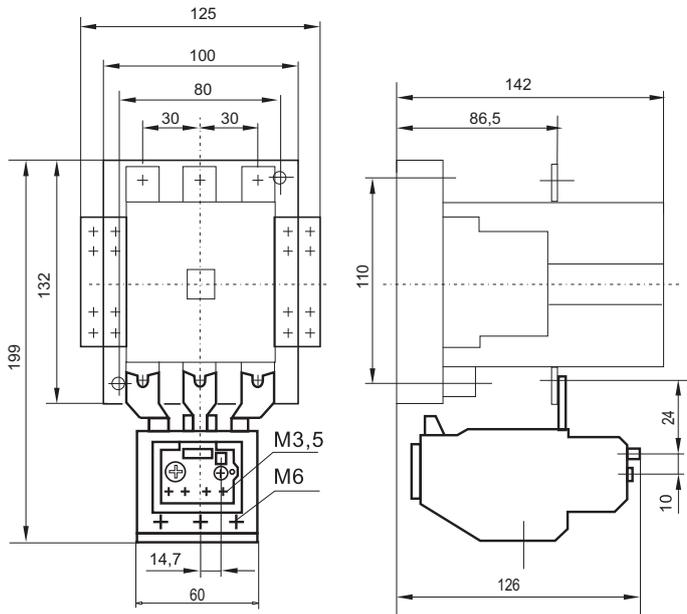
2



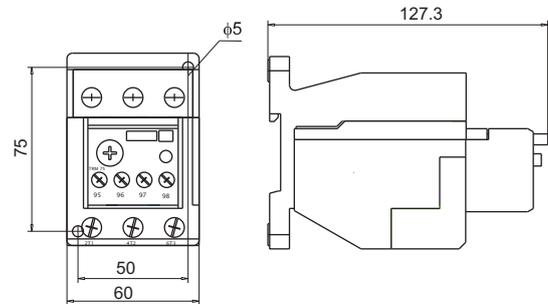
TRM 75-N60 + CNN 50,60,70



TRM 75-N90 + CNN 80,90,100



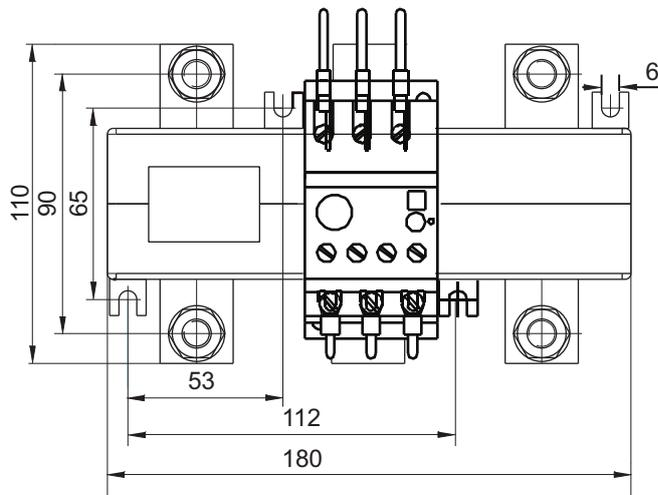
TRM 75-110 + CNN 110



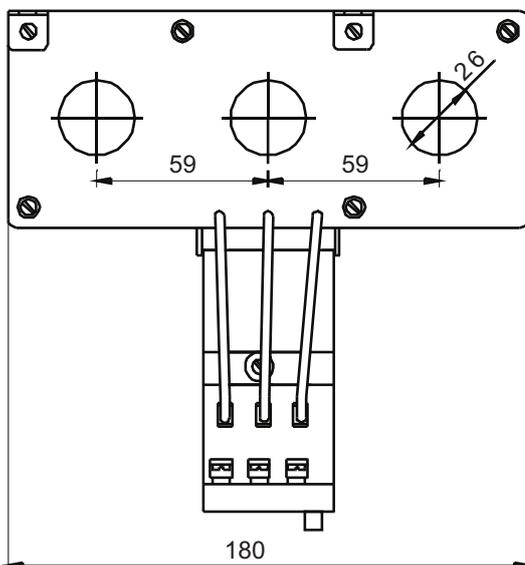
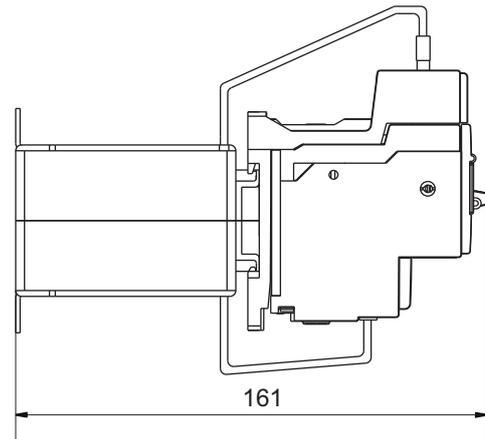
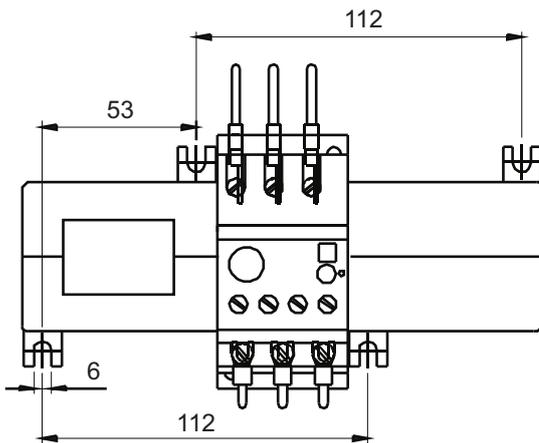
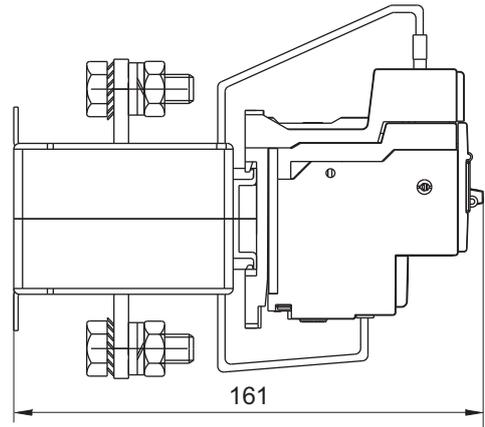
TRM 75 + ASM 75

DIMENSION DRAWINGS (dimensions in mm)

2



TRM 400



TRM 400D

ROTARY CAM SWITCHES

Cam Switches	3/1
Dimensional drawings	3/2
Order-Rotary cam switches	3/3
Technical data	3/4
Rotary cam switches in insulated enclosures type PN2BS, PN3BS, PN4BS	3/5
Dimensional drawings	3/5
Order form - Special version	3/6

TYPES



**BS 125
PS 125**



**BS 200
PS 200**



**BS 400
PS 400**



**BS 630
PS 630**

ROTARY CAM SWITCHES type BS/PS

Features

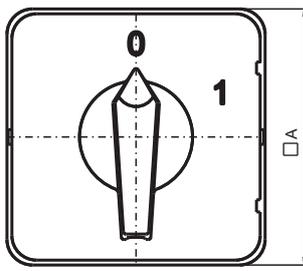
- In conformity with: IEC 60947-1, IEC 60947-3
- **Motor switching AC 3/ AC 23**
- High making and breaking capacities

Selection and ordering data

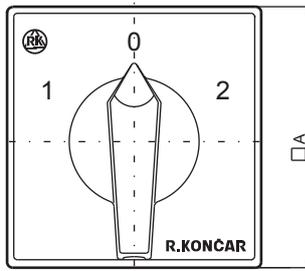


Rated thermal current I _{th} A	DIAGRAM	Printed plate	Type	No. of diagram
3 - poles - 2 elements (3 elements for BS 400; 5 elements for BS 630)				
125 200 400 630			BS/PS 125 BS/PS 200 BS/PS 400 BS/PS 630	10 U 10 U 10 U 10 U
4 - poles - 2 elements (4 elements for BS 400; 6 elements for BS 630)				
125 200 400 630			BS/PS 125 BS/PS 200 BS/PS 400 BS/PS 630	92 U 92 U 92 U 92 U
2-poles - 2 elements (4 elements for BS 400; 6 elements for BS 630)				
125 200 400 630			BS/PS 125 BS/PS 200 BS/PS 400 BS/PS 630	52 U 52 U 52 U 52 U
3 - poles - 3 elements (6 elements for BS 400; 9 elements for BS 630)				
125 200 400 630			BS/PS 125 BS/PS 200 BS/PS 400 BS/PS 630	53 U 53 U 53 U 53 U
3 - pole reversing switches - 3 elements				
125 200			BS/PS 125 BS/PS 200	11 U 11 U

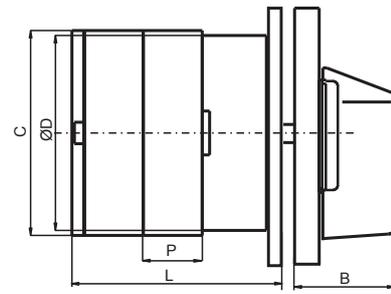
DIMENSIONAL DRAWINGS (mm)



BS - Version



PS - Version



TYPE	MARKING			NUMBER OF ELEMENTS (L/mm)																	
	A	B	C	ØD	P	1	2	3	4	5	6	7	8	9	10	11	12				
BS / PS 125	130	62	110	110	30	91	121	151	181												
BS / PS 200					39	100	139	178	217												
BS / PS 400					39	100	139	178	217	-	295										
BS / PS 630					39	-	139	178	-	256	295	-	-	412							

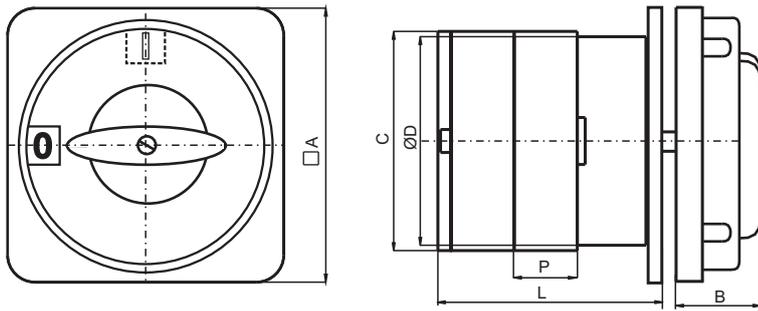
3

FRONT MOUNTING "U"

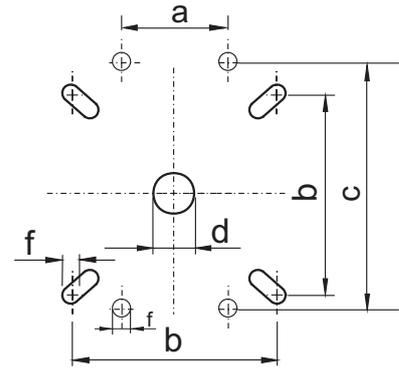
DRILLING PLAN

TYPE	a1	b1	d	f
BS / PS 125	90	30	18	5.3
BS / PS 200				
BS / PS 400				
BS / PS 630				

DIMENSIONAL DRAWINGS VERSION "LK" (mm)



DRILLING PLAN



TYPE	$\square A$	C	$\varnothing D$	P	B	$\frac{L}{2}$	b	d	f	a	c
BS / PS 125 LK BS / PS 200 LK	130		110	39	62	100		18	5.3	30	90



ORDER- ROTARY CAM SWITCHES

When ordering please define:

- 1.- Switch type
- 2.- Number of schematic diagram
- 3.- Mounting form (for front "U" or rear mounting "O")
- 4.- Front part:

- C - (handle and front plate - black) - standard.
- P - (handle and front plate - blue) - on request.
- N - Extended front plate with title. Standard color : black
- LK - (red knob and yellow plate for main emergency on - off switch).
- ES - (handle-red and front plate-yellow)

EXAMPLE:

BS125	10	U	C
-------	----	---	---

Type **BS125**, schematic diagram **10**, mounting from front plate **U**, with **black** front plate **C**.

BS125	10	N	U
-------	----	---	---

Type **BS125**, schematic diagram **10**, **N**- Extended front plate with title, mounting from front plate **U**

PS125	10	LK
-------	----	----

Type **PS125**, schematic diagram 10, Main emergency on-off switch with 3 padlock facility in "0" position - **LK**

TECHNICAL DATA

SWITCH TYPE			BS 125 PS 125	BS 200 PS 200	BS 400 PS 400	BS 630 PS 630
Rated insulation voltage	U_i	V	690			
Rated impulse withstand voltage	U_{imp}	kV	8			
Rated thermal current	I_{th}	A	125	200	400	630
Main switch (1) Max.value of rated operational voltage			690			
Rated impulse withstand voltage		kV	6			
Max. fuse size for short circuit protection gL 10 kA		A	125	200	400	630
Rated Short-time Withstand current	1 sek 3 sek 10 sek 30 sek 60 sek	A A A A A	2100 1300 700 400 300	3000 1700 850 500 400	- - - - -	- - - - -
Rated operational current	I_e AC1 / AC21	A	120	200	400	630
Motor switch in utilization category	AC3/AC23					
3- Phase	220/230 V	kW	26	37	37	37
	380/400 V	kW	41	60	60	60
	500/690	kW	55	75	75	75
1-phase 2 poles	110V	kW	-	-	-	-
	220/230V	kW	-	-	-	-
	380/400	kW	-	-	-	-
Motor switch in utilization category	AC4					
3-phase	220/230 V	kW	17	17	-	-
	380/400	kW	30	30	-	-
	500/690	kW	32	32	-	-
Mechanical endurance switching cycles			3×10^5	1×10^5	5×10^4	5×10^4
Terminal screw			M8	M10	M12	M16
Cable cross-section						
flexible	mm^2		16-35	70-95 ²	70-240	70-240
Flat connection	mm				△	△

3

(1) Valid for neutral earthed systems, overvoltage category III, pollution degree 3.

²Connections valid for lugs with cables having a section; min. 70 mm², max. 95 mm².

△ Connection valid to connect copper bars.

ROTARY CAM SWITCHES IN INSULATED ENCLOSURES

Selection and ordering data



PN4BS125, PN4BS200

PN4PS125, PN4PS200

	Degree of protection	Type
Number of elements 4 for BS / PS 80 Number of elements 4 for BS 100K / PS 100 Number of elements 1-3 for BS / PS 125 Number of elements 1-2 for BS / PS 200	IP 54	PN4BS 125 PN4BS 200 PN4PS 125 PN4PS 200

No. of diagram for PN4BS / PN4PS 125 - (10, 11, 51, 52, 53, 54, 55, 56, 92)

No. of diagram for PN4BS / PN4PS 200 - (10, 51, 52, 54, 55, 92)

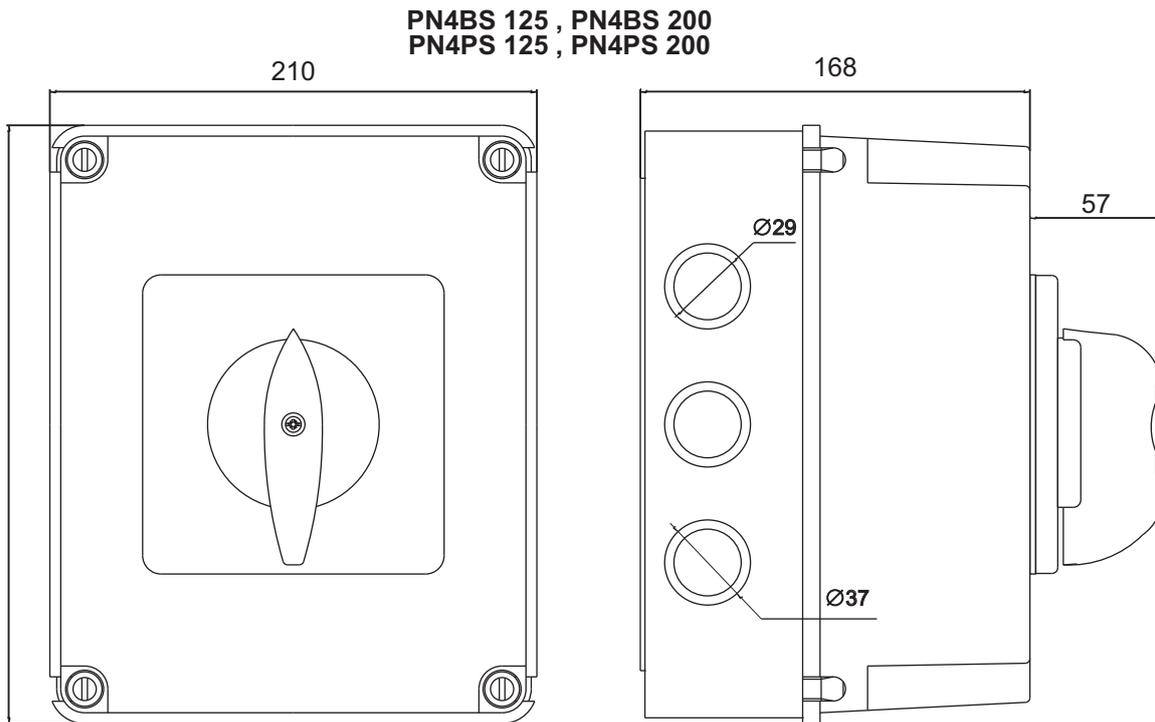
Front parts

P - (handle and front plate of rotary cam switches - blue)

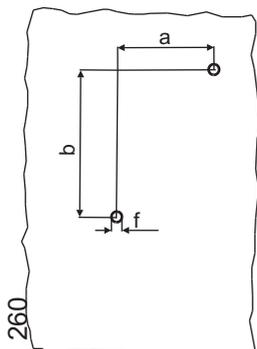
C - (handle and front plate of rotary cam switches - black)

3

DIMENSION DRAWINGS (mm)



DRILLING PLAN



TYPE	a	b	f
PN4BS/PN4PS 80 PN4BS 100K/ PN4PS 100	140	194	4,3
PN4BS/PN4PS 125 PN4BS/PN4PS 200			

MOTOR PROTECTION CIRCUIT BREAKERS

Motor protection circuit breakers - DMS 25.....4/1

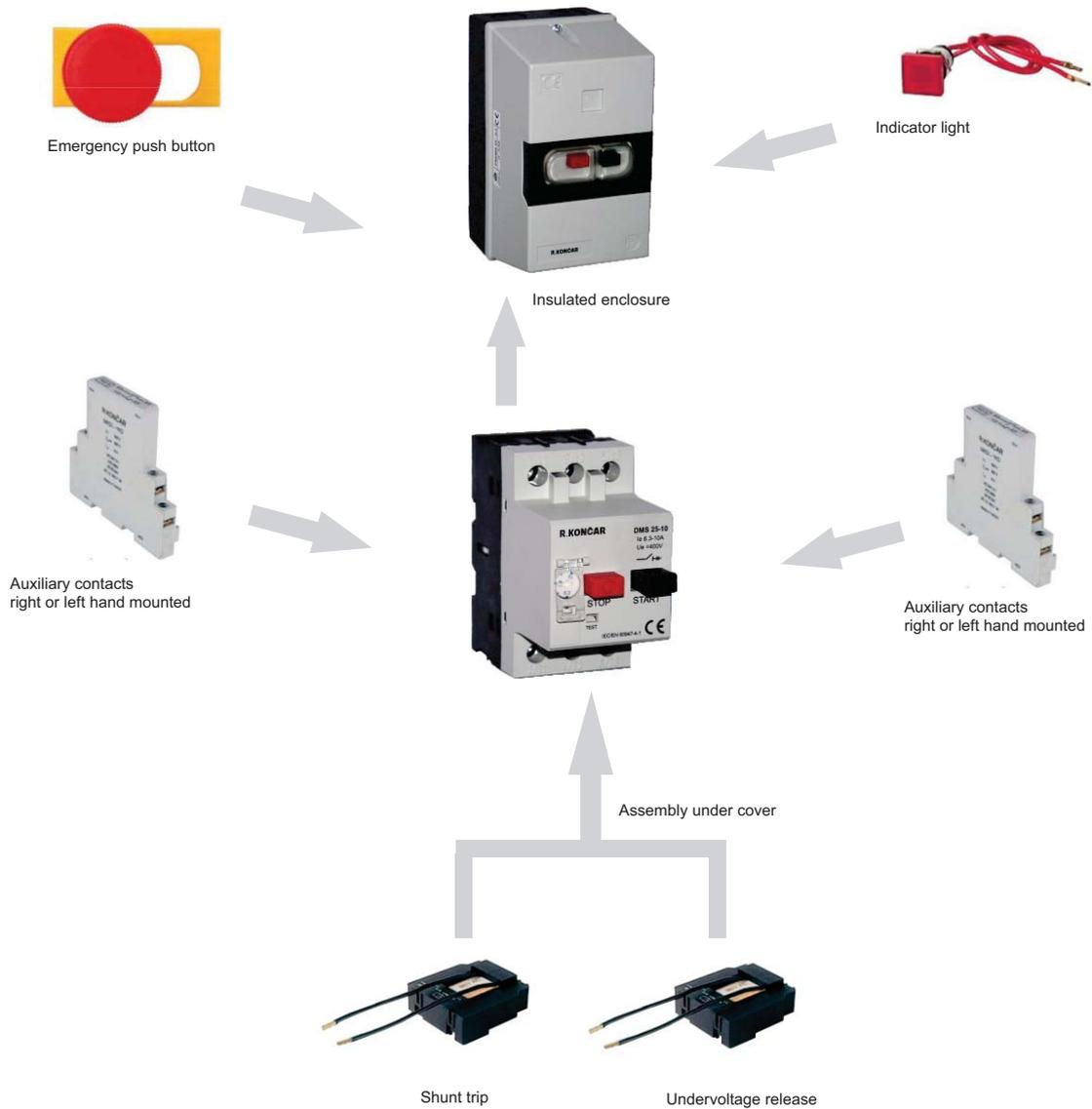
Technical data.....4/2

Technical data.....4/3

DMS 25 accessories.....4/4

Motor protection box - PNDMS 25 4/5

Drawing dimensions.....4/6



MOTOR PROTECTION CIRCUIT BREAKERS - DMS 25

Features

- With overload and short circuit releases
- Ambient temperature compensated
- Phase failure protection
- In conformity with: IEC/EN 60947-4-1
- Wide range from (0.1 - 25) A
- Compact dimensions, thus consumes less panel space

Selection and ordering data

DMS 25

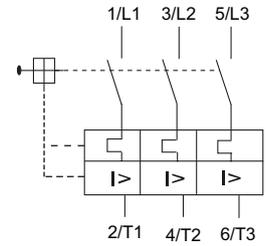
Rated continuous current (A)	Switching capacity I _{cu} /400V (kA)	Type	Weight Kg
0.1 - 0.16	100	DMS 25 - 0.16	0.22
0.16 - 0.25	100	DMS 25 - 0.25	
0.25 - 0.4	100	DMS 25 - 0.4	
0.4 - 0.63	100	DMS 25 - 0.63	
0.63 - 1	100	DMS 25 - 1	
1 - 1.6	6	DMS 25 - 1.6	0.22
1.6 - 2.5	6	DMS 25 - 2.5	
2.5 - 4	6	DMS 25 - 4	
4 - 6.3	6	DMS 25 - 6.3	
6.3 - 10	6	DMS 25 - 10	
10 - 16	6	DMS 25 - 16	
16 - 20	6	DMS 25 - 20	
20 - 25	6	DMS 25 - 25	



TECHNICAL DATA

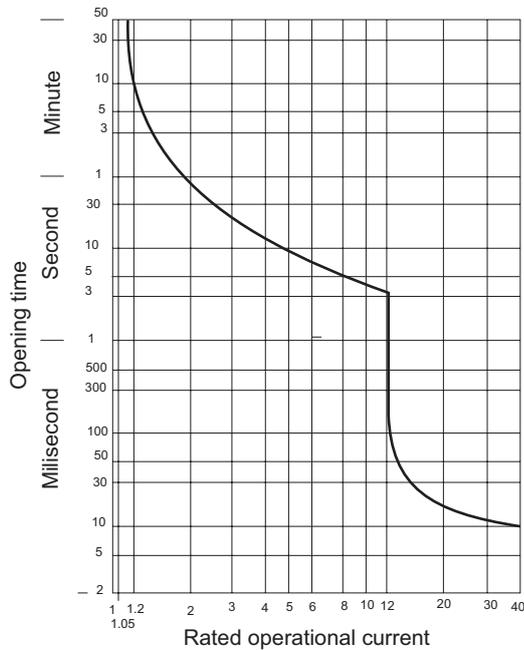
- Short circuit releases factor set at 12xIe
- Short circuit breaking capacity minimum 6 kA / 400V
- Fast and simple mounting feature to 35 mm mounting rail
- Rated impulse withstand voltage 6kV

Mechanical Life	100 000 operations min.
Electrical Life	100 000 operations min.
Operating Temperature	min./max. °C -5/+40
Operating Frequency	30 operations/hours
Operating Voltage Ue	400 V AC
Insulation Voltage Ui	690 V AC
Operating Current Ie	0.1-25 A acc. to setting range
Continuous Current Ith	32 A
Connection Cable Cross-Section	1.5-4 mm ²
Standard	IEC 60947-4-1; EN 60947-4-1
Protection degree	IP40



Schematic diagram DMS 25

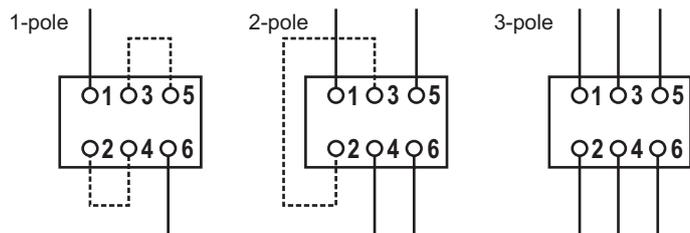
4



Tripping Characteristics

The tripping characteristics show the tripping time in relation to the response current. They show main values of the tolerance range at an ambient temperature of 20 °C, starting from cold. The tripping of overload releases at operational temperature is reduced to approximately 1/4 of the shown. Specific characteristics for each individual setting range are available on request.

Connection diagram



- Mounting position: normally any.
 Tightening torque for terminal screws:
- Main terminals: 1.2 Nm
 - Auxiliary terminals: 1 Nm
 - Pollution level III/3

- Rated frequency: 40...60 Hz
 Heating losses due to the current: 6 W
 Switching Times at Short Circuit DMS 25
- Minimum command Time ms 2
 - Opening Delay ms 2
 - Opening Time ms 7

Utilization Category AC 3 max. 690 V

Current Setting (A)	Fuse (A)	Current Setting (A)	Fuse (A)	Current Setting (A)	Fuse (A)
0.4 - 0.63	2	2.5 - 4	10	16 - 20	50
0.63 - 1	4	4 - 6.3	16	20 - 25	50
1 - 1.6	6	6.3 - 10	25		
1.6 - 2.5	6	10 - 16	35		

Thermic and Magnetic Protection

Order Code	Maximum Rating (kW) AC 3 3 phase					Thermal Current Calibration Interval [A]	Overload Release Setting Range (A)	Respondent Current of Short-Circuit Release
	220V 230V 240V	380V 400V 415V	440V	500V	600V 690V			
DMS 25 - 0.16	-	0.02	-	-	0.06	0.1 - 0.16	0.16	1.92
DMS 25 - 0.25	-	0.06	0.06	0.06	0.12	0.16 - 0.25	0.25	3
DMS 25 - 0.4	0.06	0.09	0.12	0.12	0.18	0.25 - 0.4	0.4	4.8
DMS 25 - 0.63	0.09	0.12	0.18	0.25	0.25	0.4 - 0.63	0.63	7.6
DMS 25 - 1	0.12	0.25	0.25	0.37	0.55	0.63 - 1	1	12
DMS 25 - 1.6	0.25	0.55	0.55	0.75	1.1	1 - 1.6	1.6	19.2
DMS 25 - 2.5	0.37	0.75	1.1	1.1	1.5	1.6 - 2.5	2.5	30
DMS 25 - 4	0.75	1.5	1.5	2.2	3	2.5 - 4	4	48
DMS 25 - 6.3	1.1	2.2	3	3	4	4 - 6.3	6.3	75.6
DMS 25 - 10	2.2	4	5	5.5	7.5	6.3 - 10	10	120
DMS 25 - 16	4	7.5	9	9	12.5	10 - 16	16	192
DMS 25 - 20	5.5	9	11	12.5	15	16 - 20	20	240
DMS 25 - 25	7.5	12.5	12.5	15	22	20 - 25	25	300

4

Switching Capacity and Fuse Selection

Order Code	Rated Continuous Current (A)	Back up-Fuse (required if the prospective fault current is greater than the short-circuit breaking capacity) Fuses(gl.aM)(a)				Switching Capacity Icu (kA)			
		230V	400V	500V	690V	230V	400V	500V	690V
DMS 25 - 0.16	0.1 - 0.16	-	-	-	-	100	100	100	100
DMS 25 - 0.25	0.16 - 0.25	-	-	-	-	100	100	100	100
DMS 25 - 0.4	0.25 - 0.4	-	-	-	-	100	100	100	100
DMS 25 - 0.63	0.4 - 0.63	-	-	-	-	100	100	100	100
DMS 25 - 1	0.63 - 1	-	-	-	-	100	100	100	100
DMS 25 - 1.6	1 - 1.6	-	-	-	-	6	6	3	2.5
DMS 25 - 2.5	1.6 - 2.5	-	-	25	20	6	6	3	2.5
DMS 25 - 4	2.5 - 4	-	-	35	25	6	6	3	2.5
DMS 25 - 6.3	4 - 6.3	-	-	50	35	6	6	2.5	2
DMS 25 - 10	6.3 - 10	-	80	50	35	6	6	2.5	2
DMS 25 - 16	10 - 16	80	80	63	35	6	6	2.5	2
DMS 25 - 20	16 - 20	80	80	63	50	6	6	2.5	2
DMS 25 - 25	20 - 25	80	80	60	50	6	6	2.5	2

DMS 25 ACCESSORIES

Selection and ordering data



Auxiliary contact

Voltage	Current Rating (Ie) AC15	NO Y	NC Z	Type
250V AC	3A	0 1 2	2 1 0	DMS -BP 02 DMS -BP 11 DMS -BP 20



Shunt trip

Voltage	Power	Type
230V 50Hz 400V 50Hz	2.7/1.8 VA/W	DMS - DO 230 DMS - DO 400

Pick up: 70% Ue

4



Undervoltage release

Voltage	Power	Type
230V 50Hz 400V 50Hz	2.7/1.8 VA/W	DMS - PO 230 DMS - PO 400

Pick up: 85% Ue
Drop out: (70% - 35%)Ue

MOTOR PROTECTION SWITCHES IN INSULATED ENCLOSURE - PNDMS 25

Features

- Protection degree IP 65

Selection and ordering data

PNDMS 25



Rated continuous current (A)	Switching capacity I _{cu} /400V (kA)	Type	Weight Kg
0.1 - 0.16	100	PNDMS 25 - 0.16	0.41
0.16 - 0.25	100	PNDMS 25 - 0.25	
0.25 - 0.4	100	PNDMS 25 - 0.4	
0.4 - 0.63	100	PNDMS 25 - 0.63	
0.63 - 1	100	PNDMS 25 - 1	
1 - 1.6	6	PNDMS 25 - 1.6	0.41
1.6 - 2.5	6	PNDMS 25 - 2.5	
2.5 - 4	6	PNDMS 25 - 4	
4 - 6.3	6	PNDMS 25 - 6.3	
6.3 - 10	6	PNDMS 25 - 10	
10 - 16	6	PNDMS 25 - 16	
16 - 20	6	PNDMS 25 - 20	
20 - 25	6	PNDMS 25 - 25	

4

ACCESSORIES

Cylindrical head emergency button



	Type
	DMS - G30

Mushroom emergency button



	Type
	DMS - G40

N-Terminal



	Type
	MKS1 - N

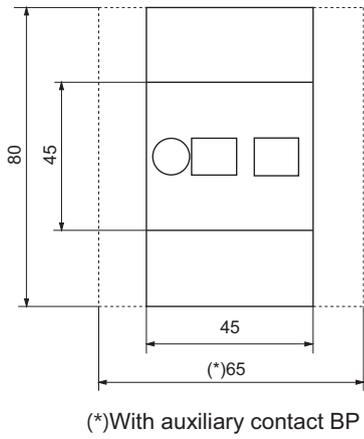
Indication light



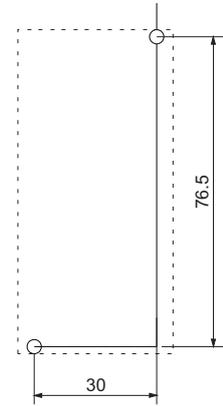
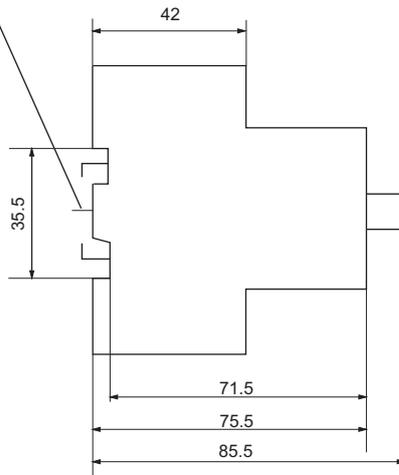
	Type
	MKS1 - S

DIMENSION DRAWINGS (mm)

DMS 25

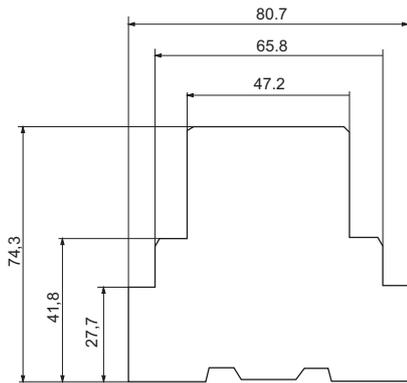


DIN rail EN 50022-35

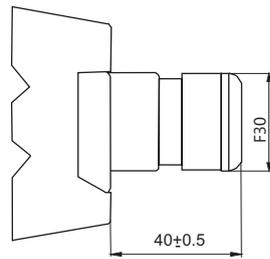


Drilling plan

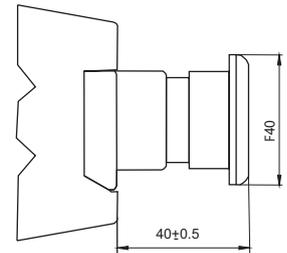
DMS-BP



DMS - G30

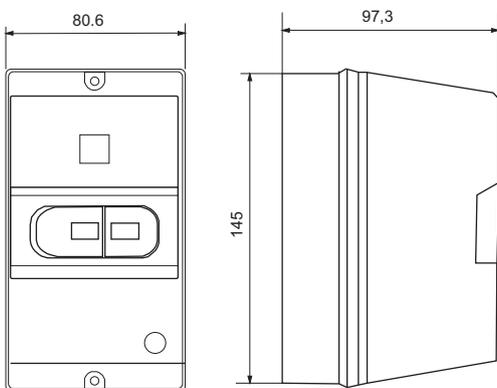


DMS - G40

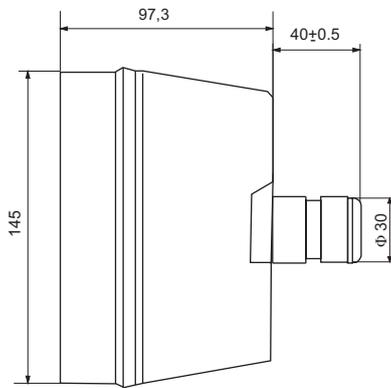


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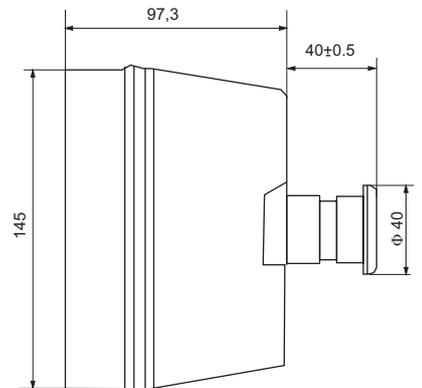
PNDMS 25



PNDMS 25 - G30



PNDMS 25 - G40



MOLDED CASE CIRCUIT BREAKERS

Type KP 125-F (16-125A) 3P.....	5/1
Type KP 250-F (160-250A) 3P.....	5/1
Type KP 800-F (300-630A) 3P.....	5/1
Type KP 800-F (800A) 3P.....	5/1
Type KP 1250-F (1000-1250A) 3P.....	5/2
Type KP 1600-F (1600A) 3P.....	5/2
Electrical accessories KP BPKF.....	5/3
Electrical accessories KP UF.....	5/4
Electrical accessories KP DF.....	5/5
Technical data	5/6
Technical data	5/7
Technical data	5/8
Technical data	5/9
Technical data	5/10
Technical data	5/11
Tripping characteristics.....	5/9
Dimensional drawings.....	5/10
Dimensional drawings.....	5/11

3 POLE MOLDED CASE CIRCUIT BREAKERS

Features

- In conformity with: IEC/EN 60947-2
- Wide range from (16 - 1600) A
- Compact dimensions, thus consumes less panel space

Selection and ordering data

Type KP 125-F (16 -125) A



Rated current at 40 °C A	No. of poles	Breaking capacity (Icu) kA at 415 V AC	Part No.	Weight Kg
16	3	25	KP 125-F 16A 3P	1.5
25	3	25	KP 125-F 25A 3P	
40	3	25	KP 125-F 40A 3P	
63	3	25	KP 125-F 63A 3P	
80	3	25	KP 125-F 80A 3P	
100	3	25	KP 125-F 100A 3P	
125	3	25	KP 125-F 125A 3P	

Type KP 250-F (160 - 250) A



160	3	35	KP 250-F 160A 3P	2.3
200	3	35	KP 250-F 200A 3P	
250	3	35	KP 250-F 250A 3P	

Type KP 800-F (300-630) A



300	3	50	KP 800-F 300A 3P	8
400	3	50	KP 800-F 400A 3P	
500	3	50	KP 800-F 500A 3P	
630	3	50	KP 800-F 630A 3P	

Type KP 800-F (800) A



800	3	50	KP 800-F 800A 3P	10
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3 POLE MOLDED CASE CIRCUIT BREAKERS

Features

- In conformity with: IEC/EN 60947-2
- Wide range from (16 - 1600) A
- Compact dimensions, thus consumes less panel space

Selection and ordering data



Type KP 1250-F (1000 - 1250) A

Rated current at 40 °C A	No. of poles	Breaking capacity (Icu) kA at 415 V AC	Part No.	Weight Kg
1000	3	50	KP 1250-F 1000A 3P	18.5
1250	3	50	KP 1250-F 1250A 3P	



Type KP 1600-F (1600) A

1600	3	50	KP 1600-F 1600A 3P	27
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ELECTRICAL ACCESSORIES

Selection and ordering data

Type KP 125-F

Auxiliary contact



Voltage	Current Rating (In)	Config.	Part No.
250V AC 250V DC	5A 3A		KP BPKF1

Type KP 250-F

Auxiliary contact



Voltage	Current Rating (In)	Config.	Part No.
250V AC 250V DC	5A 3A		KP BPKF2

Type KP 800-F

Auxiliary contact



Voltage	Current Rating (In)	Config.	Part No.
250V AC 250V DC	5A 3A		KP BPKF3

5

Type KP 1250-F

Auxiliary contact



Voltage	Current Rating (In)	Config.	Part No.
250V AC 250V DC	5A 3A		KP BPKF4

Type KP 1600-F

Auxiliary contact



Voltage	Current Rating (In)	Config.	Part No.
250V AC 250V DC	5A 3A		KP BPKF5

ELECTRICAL ACCESSORIES

Selection and ordering data



Type KP 250-F

Under voltage release

Voltage AC	Voltage DC	Config.	Part No.
220-250V	220-250V	D1—□—D2	KP UF2

Type KP 800-F (300-630A)

Under voltage release



Voltage AC	Voltage DC	Config.	Part No.
220-250V	220-250V	D1—□—D2	KP UF3

Type KP 800-F (800A)

Under voltage release

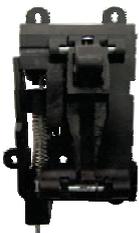


Voltage AC	Voltage DC	Config.	Part No.
220-250V	220-250V	D1—□—D2	KP UF4

5

Type KP 1250-F

Under voltage release



Voltage AC	Voltage DC	Config.	Part No.
220-250V	220-250V	D1—□—D2	KP UF5

Type KP 1600-F

Under voltage release



Voltage AC	Voltage DC	Config.	Part No.
220-250V	220-250V	D1—□—D2	KP UF6

ELECTRICAL ACCESSORIES

Selection and ordering data



Type KP 125-F
Shunt trip release

Voltage AC	Voltage DC	Config.	Part No.
110-250V	110-250V	B1—□—B2	KP DF1



Type KP 250-F
Shunt trip release

Voltage AC	Voltage DC	Config.	Part No.
110-250V	110-250V	B1—□—B2	KP DF2



Type KP 800-F (300-630A)
Shunt trip release

Voltage AC	Voltage DC	Config.	Part No.
110-250V	110-250V	B1—□—B2	KP DF3



Type KP 800-F (800A)
Shunt trip release

Voltage AC	Voltage DC	Config.	Part No.
110-250V	110-250V	B1—□—B2	KP DF4



Type KP 1250-F
Shunt trip release

Voltage AC	Voltage DC	Config.	Part No.
110-250V	110-250V	B1—□—B2	KP DF5



Type KP 1600-F
Shunt trip release

Voltage AC	Voltage DC	Config.	Part No.
110-250V	110-250V	B1—□—B2	KP DF6

TECHNICAL DATA

CAPACITOR CONTROL

When a capacitor circuit is opened, it exhibits characteristics distinctly differently from inductor loads due to the effects of residual electric charge in the capacitor. The recovery voltage appears across the contacts immediately after the circuit is opened is equal to the difference between the capacitor residual voltage and supply voltage. Therefore half a cycle after the circuit opens, the voltage between the contacts of the switch rises to twice the supply voltage or higher.

In a three phase circuit the recovery voltage appearing between the contacts in the first interrupted phase could rise to as high as 2.5 times the supply voltage. Unless the breaker contacts are fully open for at least ½ cycle after the capacitor current is interrupted, restrike of arc is likely to occur. If the restrike arc is repeated, the voltage could continue to rise to the dielectric breakdown point of the capacitor. Hence, fast interrupting, quick make, quick-break circuit breakers should be used for this type of circuit.

When a capacitor circuit is closed a condenser charge $q = CU$ which corresponds to the instantaneous value 'U' of the supply voltage at closing time, must be instantaneously supplied, causing a large inrush current to flow through it. If the capacitor circuit is closed in the voltage phase at which the inrush is maximum, the maximum value of the inrush current is approximately, $I_p = C/L \times U$.

The maximum time duration during which the maximum current flows is about 0.5 ms. Selection of a MCCB for capacitor circuit duty must therefore consider the effects of higher short circuit and inrush current. This will affect the choice of instantaneous trip current rating. In practice, an MCCB which satisfies the following equations should be chosen.

$$I_r > 1.5 \times I_c$$

$$I_{inst} > \frac{I_p^2}{2}$$

Where:

I_r = Rated current of MCCBs

I_c = Rated current of capacitor

I_{inst} = Short circuit pick - up settings of the MCCB

I_p = Maximum capacitor inrush current

It is therefore necessary to select a circuit breaker with current rating not less than 1.5 - 2.0 times the rated current of the capacitor.

DC CONTROL

MCCBs though not separately designed for DC applications are suitably modified to be able to operate on DC Systems also up to 500V DC/250V DC. This is achieved by modifying for:

- i) Current carrying capacity
- ii) Over current and short circuit protection
- iii) Short circuit breaking capacity (with L/R time constant limitations)

Current Carrying Capacity

The continuous current carrying capacity is generally a function limited by the temperature rise of various internal components of MCCBs.

The AC rating of MCCBs is expressed as "RMS" value. The DC rating is "Average" value. The RMS and average value can be related by a "Form Factor" which is 1.1.

Hence, an AC MCCB can be assigned a 10% higher DC current rating. But in practice the use of DC MCCB ratings are equal to AC ratings and thereby, temperature rise is restricted within limits.

Overload Release & Overload Protection

The overload release are generally thermal type with a Bimetal-Heater system. The heating effect which can be expressed by the factor integral I^2t varies for AC and DC. The integral (I^2t) for AC will be 1.21 times integral (I_{av}^2t) for DC, thus an AC MCCB when used in DC circuit will trip slower. For example a 100A AC MCCB when used in DC circuit for 100A will sense a 20% overload only from 133A onwards. To retain the same Overload characteristics as AC, it is important to separately calibrate the MCCBs for DC ratings and overload tripping characteristics need to be suitably modified.

Short Circuit Release & Short Circuit Protection

The short circuit release is actuated by the peak value of the AC sine wave. Since no such peak exists in DC, DC tripping will be slower. Hence to achieve the same short circuit pick up level in DC, the short circuit release will be calibrated specially.

Short Circuit Breaking Capacity

In AC the breaking of the short circuit current usually occurs within the first current zero, by the current limiting effect. No such current zero exists in DC. Arc breaking and ultimate quenching of arc depends on the rapid dissipation of the inductive Energy $1/2Li^2$.

This energy dissipation is dependent L/R or time constant of the circuit. The L/R value should be limited to 10 - 15milli seconds to achieve satisfactory performance. This is achieved usually by:

Splitting the DC arc voltage over 2 or 3 poles by connecting them in series, depending upon on the DC voltage.

TECHNICAL DATA

SELECTION & APPLICATION TRANSFORMER PROTECTION

Primary side

For the protection of transformer with a circuit breaker connected to the LT side (primary syde) the no load inrush current of the transformer must be considered.

The peak value of the first current wave often reaches 10-15 times the rated current and may sometimes reach as high as 20-25 times.

However, the transient decays very quickly (in a few m.sec.). Thus the MCCB selected should have a magnetic setting will not be actuated by he momentary inrush current.

Secondary side

KP MCCBs can be used for protection of transformer on the LT side (secondary side) as an outgoing protective device.

The rated current of the transformer is calculated as follows:

U_e - is the rated voltage at the LT side

The Breaking capacity of the breaker for protection can be calculated as: and

$$I_b = \frac{I_e}{Z\%} \times 10^{-3} \text{ kA}$$

Where I_b - is the rated breaking capacity,

I_e - the rated current and

Z% - is the percentage impedance of transformer (Specified by the manufacturer)

Selection Table For Transformer Protection

Transformer Rating (KVA)	MCCB Rating in amperes				
	KP 125-F 25kA	KP 250-F 35kA	KP 800-F 50kA	KP 1250-F 50kA	KP 1600-F 50kA
16	25				
25	40				
63	100	100			
100	125	160			
160		250			
200					
250			400		
315					
400			630		
500			800		
630				1000	
750				1200	1200

GENERATOR SET PROTECTION

Loading MCCBs can be used for the effective protection and control of DG sets against overload and short circuits.

The Current rating of MCCBs to be selected is calculated as

$$kVA = \sqrt{3} U_e \times I_e$$

or

$$I_e = \frac{kVA}{\sqrt{3} \times U_e}$$

Where,

kVA = Rating of the DG Set

U_e = Rated voltage

I_e = Rated Current

The MCCB rating selected os greater than or equal to the rated current value.

Selection Table for DG Set Protection

DG Set Rating (kVA)	MCCB Rating (amperes)
16	25
25	40
63	100
100	160
160	250
200	315
250	400
400	500
500	630
630	1000
750	1200

TECHNICAL DATA

MOTOR CONTROL

MCCBS can be used for motor protection. Selection of MCCBs has to be done taking into consideration the starting inrush current, and the system fault levels. Further the selection is also based on type of starting, i.e., Direct on Line or Star-Delta.

Direct on Line Starting

Care is to be taken to avoid nuisance tripping during starting of Squirrel Cage Motors since the inrush current will be in the order of 600 to 800% of the full load current of the motor.

The overload setting is chosen such that it does not trip during starting

Star-Delta Starting

In Star-Delta starting of motors, since there is a reduction in the starting current due to reduced voltage, the MCCBs do not have a problem in the overload setting. But the transient currents can go up to 12 times the rated current during change over from star to delta which will cause the instantaneous magnetic release to trip the breaker. So proper selection of magnetic pickup level is important for prevention of nuisance tripping during change over from Star to Delta.

It is always recommended to select an MCCB in co-ordination with Contactor and Over Load Relay so as to have the best and optimum benefit of all the devices.

Selection Table For Motor Protection

Motor HP	Rating kW	Aprox. Full Load Current (A) at 415V	Direct On Line MCCB Rating/Type			Star/Delta MCCB Rating/Type			
			KP 125-F	KP 250-F	KP 800-F	KP 125-F	KP 250-F	KP 800-F	KP 1600-F
10	7.5	14	25			25			
12.5	9	17	25			25			
15	11	21	25			25			
20	15	28	32			32			
25	19	35	40			40			
30	22	41	50			50			
40	30	52	80			80			
50	37	69	100			100			
60	45	80	125						
75	55	97		100		125	100		
100	75	125		160			160		
125	90	156		250			250		
150	112	190		250			250		
175	130	225			315			315	
200	149	255			315			315	
220	160	275			400			400	
250	186	320			400			500	600
300	224	375			500			500	600
350	261	449			630			630	600
400	298	505			630			630	600

The figures shown are based on following motor starting conditions:

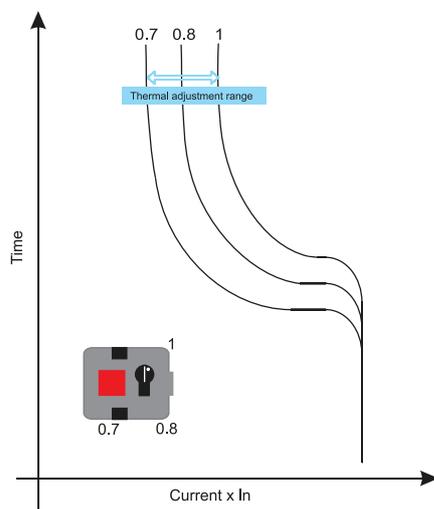
- direct online 7x full load current for 5 seconds.
- Star-Delta 4x full load current for 12 seconds.

TECHNICAL DATA

Thermal Magnetic Characteristics and Adjustments Operation Settings

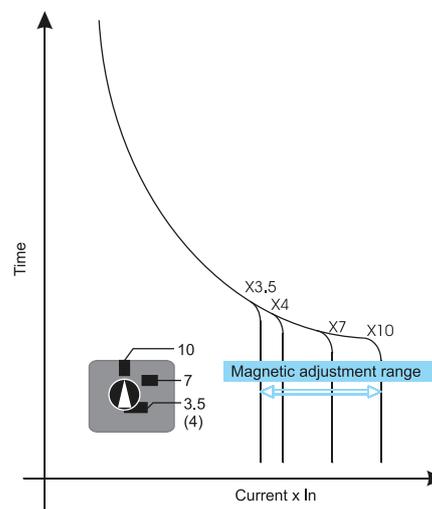
Thermal adjustment

KP MCCBs have a wide thermal adjustment range, one of the largest one on the market. The rated current 'Ir' is continuously adjustable from 70% to 100% of its nominal current 'In'. There are three main points of calibration marked at 70%, 80% and 100%, as shown in the diagram below.



Magnetic Adjustment

Magnetic adjustment is available on MCCB's from KP-250F and above. The magnetic setting 'Im' is continuously adjustable from 350% to 1000% of its rated current 'In'. There are three main points of calibration marked as multiples of In: 3.5 (4 for KP-800F), 7 and 10. These are shown in the diagram below.



Examples

- 1.KP 125-F 125A MCCB set at $I_r=0.8$, the rated current is calculated as $125 \times 0.8=100A$
 - 2.KP 250-F 250A MCCB set at $I_m=7$. The magnetic setting is calculated as $250 \times 7=1750A$
 - 3.KP 800-F 630A MCCB set at $I_r=0.7$ and $I_m=10$
The rated current is calculated as $630 \times 0.7=441A$
The magnetic setting is calculated as $630 \times 10=6300A$
- Note that the magnetic setting is multiple of the nominal current I_n and not the rated current I_r .
All thermal and magnetic trip settings are expressed as AC r.m.s. Values.
All MCCBs are calibrated at $40C^\circ$. For others temperatures see Table for changing of the nominal current depending from the ambient temperature.

TECHNICAL DATA

TYPE CIRCUIT BREAKERS			KP 125-F	KP 250-F	KP 800-F	KP 1250-F	KP 1600-F	
Standard conformity			IEC/EN 60947-2					
No. of poles			3P	3P	3P	3P	3P	
Standard current range/ratings	In	A	16, 80, 100 125, 160	160, 200, 250	300, 400, 500, 630, 800	1000, 1250	1600	
Rated operational voltage	Ue~	V	415	415	415	415	415	
Rated operational voltage	Ue=	V	250	250	250			
Rated insulation voltage	Ui~	V	750	750	750	750	750	
Rated impulse withstand	U _{imp}	kV	8	8	8	8	8	
Category of use			A	A	A	A	A	
Degree of protection: Standard appliance with terminal shields Appliance in enclosure with front plate			IP 30 IP 40			IP 00 IP 40	IP 00 IP 40	
Pollution degree			III					
Ambient temperature			°C			-5 to +60	-5 to +40	-5 to +40
Ultimate breaking capacity I _{cu} *	230/240 V ~	kA	35	65	70	80	80	
	400/415 V ~	kA	25	35	50	50	50	
	440 V ~	kA	20	25	40	35	40	
	480/500 V ~	kA	12	18	35	25	25	
	690 V ~	kA	8	12	25	18	20	
	250 V -	kA	15	22	22	-	-	
Standard breaking capacity I _{cs} (%I _{cu})*			75	100	50	50	50	
Rated closing capacity on short-circuit (415 V~)			52	105	⁷⁴ 105(for 800A)	105	105	
Endurance (o.c. cycle)	mechanical		≥15 000	≥15 000	≥15 000	≥15 000	≥15 000	
	electrical		3 000	3 000	3 000	3 000	3 000	
Type of protection								
Thermal adjustable			(0,8 - 1)In	(0,7 - 1)In	(0,7 - 1)In	(0,4 - 1)In	(0,4 - 1)In	
Magnetic fixed	10xIn for 125 A		10xIn for 250 A(*)	-	-	-	-	
	10xIn for 100 A		10xIn for 200 A(*)	-	-	-	-	
	10xIn for 80 A		10xIn for 160 A(*)	-	-	-	-	
	10xIn for 16 A		-	-	-	-	-	
	-		-	-	-	-	-	
Magnetic adjustable			-	(5 - 10)In(*)	^{(5 - 10)In} (5 - 8)In-for 800A	(2 - 10)In	(2 - 10)In	

* The LINE side is the upper side. LOAD is to be connected on the down side.

(*) On request for KP 250-F magnetic can be fixed or adjustable.

OTHER CHARACTERISTICS

Head devices KP	Max. Width on term. (mm)	Connection cross-sections						
		Connection via terminal (mm ²)				Connection via bars (mm)	Connection via cage terminals (mm ²)	
		copper cable	aluminium cable	Cable shoe	Terminal screw		rigid cable	flexible cable
125-F	14.6	-	-					50
250-F	23.5							120
800-F	52.5	-	-	-		2x(40x5)	-	-
1250-F	45.7	-	-	-		2x(45x8)	-	-
1600-F	46.5	-	-	-		45x20	-	-

TECHNICAL DATA

Table for changing of the nominal current depending from the ambient temperature

Thermal adjustment	Currents in amps in accordance with ambient temperature				
	20 °C	30 °C	40 °C	50 °C	60 °C
In = 16 A	17.1	16.6	16	15.2	14.6
In = 20 A	21.4	20.8	20	19	18.2
In = 25 A	26.7	26	25	23.8	22.8
In = 32 A	34.2	33.3	32	30.4	29.1
In = 40 A	42.8	41.6	40	38	36.4
In = 50 A	53.5	52	50	47.5	45.5
In = 63 A	67.4	65.5	63	59.9	57.3
In = 80 A	85.6	83.2	80	76	72.8
In = 100 A	107	104	100	95	91
In = 125 A	133.8	130	125	118.8	113.8
In = 160 A	171.2	166.4	160	152	145.6
In = 200 A	214	208	200	190	182
In = 200 A	240.8	234	225	213.8	204.8
In = 250 A	267.5	260	250	237.5	227.5
In = 300 A	321	312	300	285	273
In = 400 A	428	416	400	380	364
In = 500 A	535	520	500	475	455
In = 630 A	674.1	655.2	630	598.5	573.3
In = 800 A	856	832	800	760	728

Selectivity table-average values of selectivity limits (A)

MCCB downstream		MCCB upstream																
		KP 125-F						KP 250-F				KP 800-F				KP 1250-F		KP 1600-F
		32A	40A	63A	80A	100A	125A	100A	160A	200A	250A	400A	500A	630A	800A	1000A	1250A	1600A
KP 125-F	25 A	800	800	1000	1000	1200	1200	1000	2500	3000	3500	4000	5000	6300	8000	9200	9200	9200
	32 A		800	1000	1000	1200	1200	1000	2500	3000	3500	4000	5000	6300	8000	9200	9200	9200
	40 A			1000	1000	1200	1200	1000	2500	3000	3500	4000	5000	6300	8000	9200	9200	9200
	63 A					1200	1200		2500	3000	3500	4000	5000	6300	8000	9200	9200	9200
	80 A								2500	3000	3500	4000	5000	6300	8000	9200	9200	9200
	100 A								2500	3000	3500	4000	5000	6300	8000	9200	9200	9200
	125 A								2500	3000	3500	4000	5000	6300	8000	9200	9200	9200
KP 250-F	100 A							1600	2000	2500	4000	5000	6300	8000	9200	9200	9200	
	160 A									2500	4000	5000	6300	8000	9200	9200	9200	
	200 A									2500	4000	5000	6300	8000	9200	9200	9200	
	250 A									2500	4000	5000	6300	8000	9200	9200	9200	
KP 800-F	400 A											5000	6300	8000	9200	9200	9200	
	630 A												6300	8000	9200	9200	9200	
	800 A													8000	9200	9200	9200	
KP 1250-F	1000 A															9200	9200	9200
	1250 A																9200	9200
KP 1600-F	1600 A																	9200

ORDERING INSTRUCTION FOR MOLDED CASE CIRCUIT BREAKERS

Type _____

Rated current _____

No. of poles (3 or 4) _____

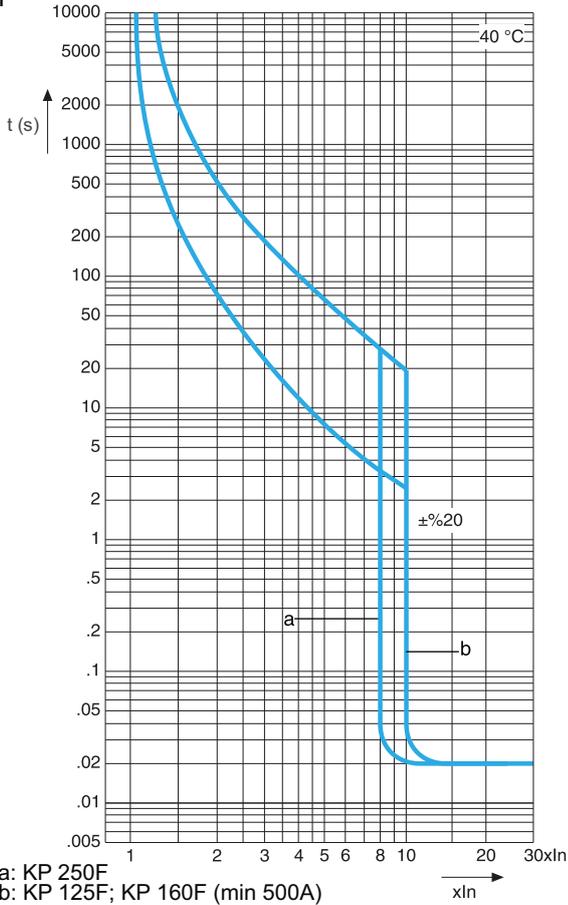
Part No. of additional elements _____

Example: Molded case circuit breaker type KP 125-F for rated current 100A, 3 poles, with shunt trip release

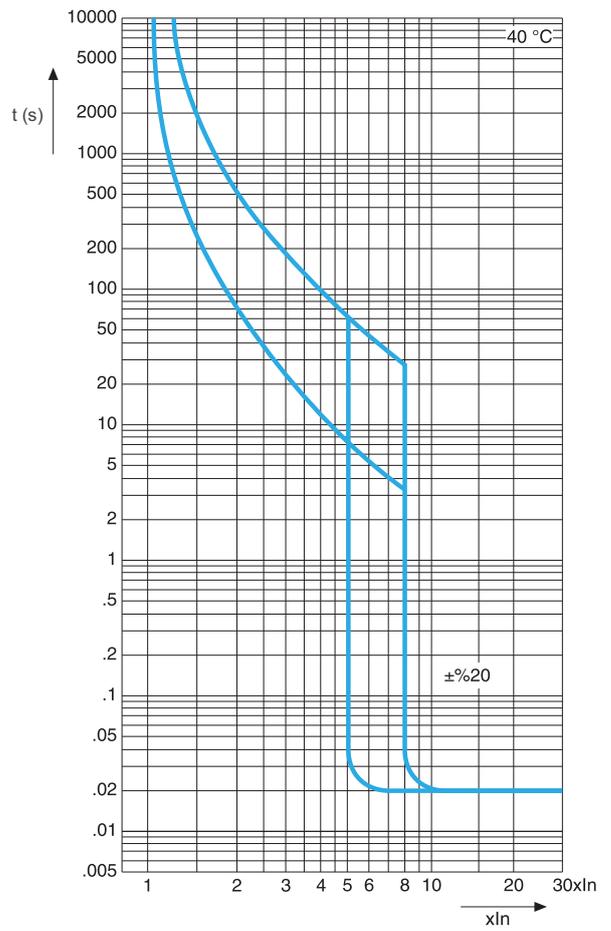
KP 125-F 100A 3P KP DF1

TRIPPING CHARACTERISTICS

KP 125/160F
KP 250F

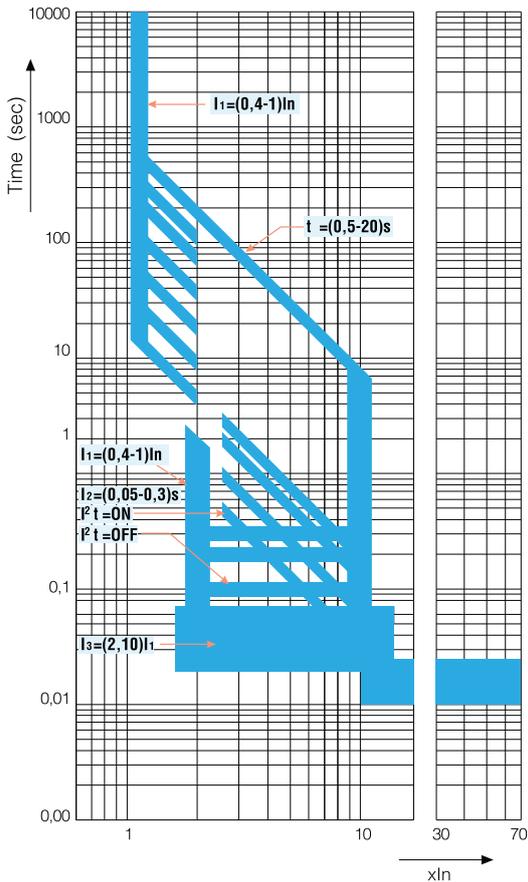


KP 800F

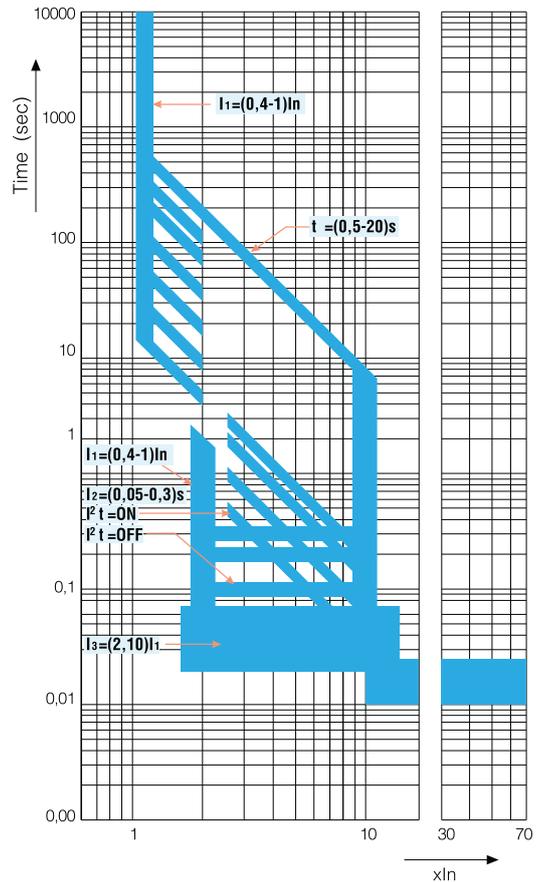


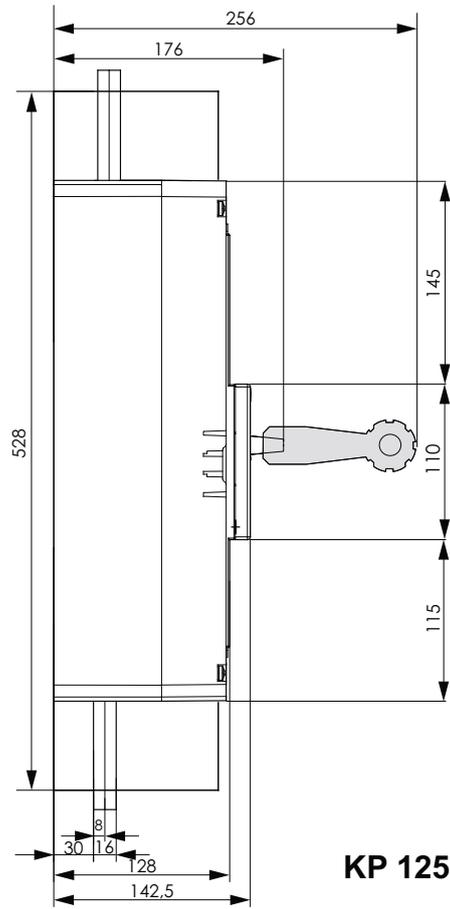
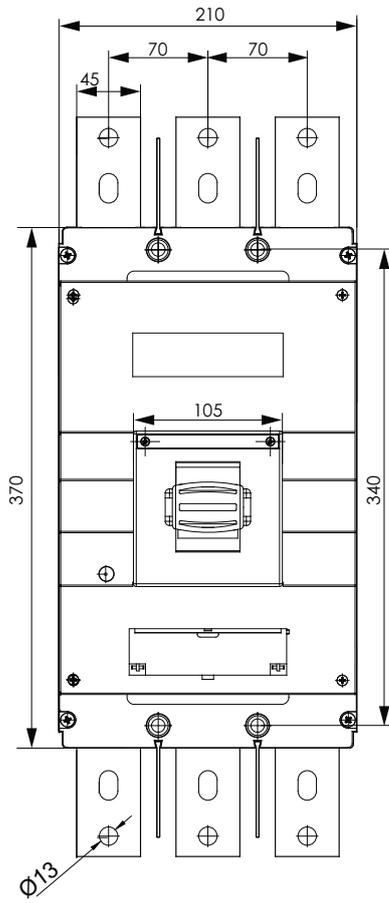
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KP 1250F



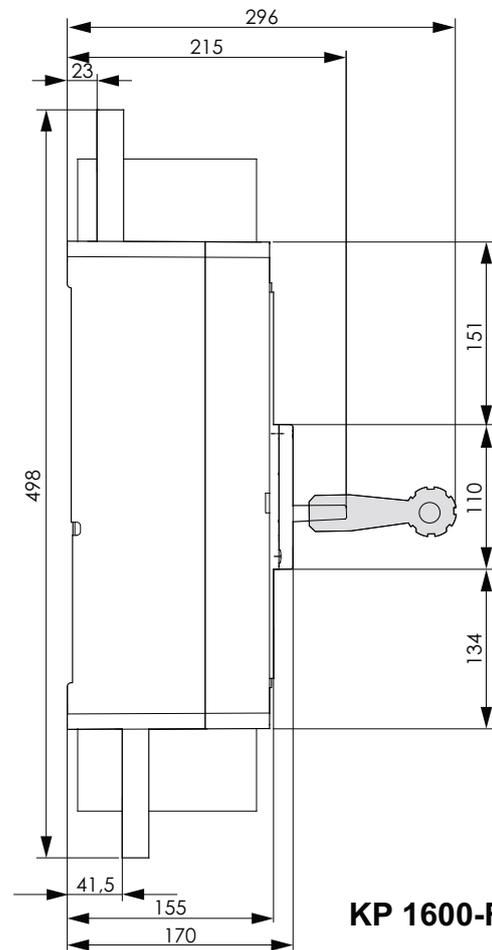
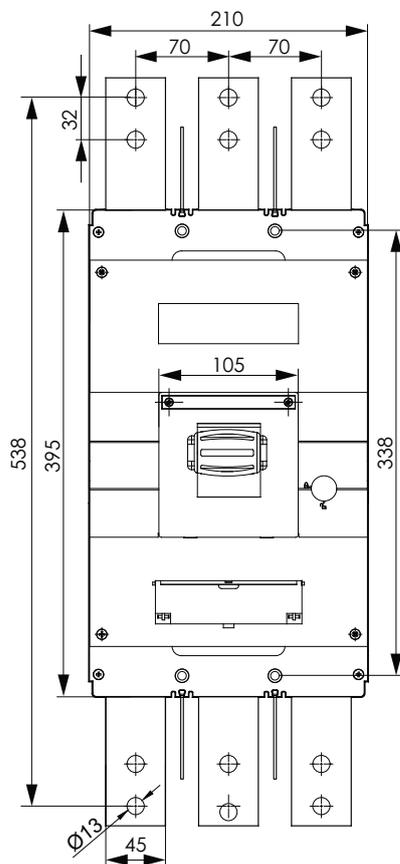
KP 1600F





KP 1250-F

5



KP 1600-F