RADE KONČAR
KONTAKTORI I RELEI D.O.O.

Low-Voltage Switchgear

General catalogue 2015

QUALITY SYSTEM

ISO 9001 "Quality system. Models for quality assurance in design / development, production and distribution of low - voltage switching devices".

The **RADE KONČAR - KONTAKTORI I RELEI D.O.O.** Quality Managments System has been certified by TÜV CERT- Certification Body of TÜV Rheinland Euroqua Kft.The Certificate No. 01 100 1334405 issued until January 2016 confirms that the quality system is in conformance with requirements of the standard ISO 9001: 2008 and refers to following product categories: Contactors, Thermal overload relays, Rotary cam switches, Pilot devices, Moulded case circuit breakers, and Electronic time relays.

RADE KONČAR - KONTAKTORI I RELEI D.O.O is delicately balancing between maintaining profitability and reducing environmental impact of its business. With commitment of its entire organization has achieved both objectives and has been certified by TÜV Rheinland Bulgaria according ISO 14001 : 2004 with certificate No. TRBA 110 0032.

GREEN ORIENTED COMPANY

APPROVALS/ STANDARDS

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CATALOGUE 2015

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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
- 4 kW rating 400 V AC3
- Snap-on auxiliaries

Selection and ordering data

Motor switching **AC2** and **AC3** duty				Rated operational current **Ie/AC1** at 55 °C 400 V A	Auxiliary contacts		Type	Weights
Rated operational current **Ie** at 400 V A	Max. Ratings of three-phase motor at 50 Hz and 230 V kW	**400 V kW**	690 V kW		NO	NC		kg
9	3	**4**	4	20	0	0	**CM1 00**	0.175
					1	0	**CM1 10**	
					0	1	**CM1 01**	
					0	0	**CM1 004** (4 main contacts)	

* Number of auxiliary contacts can be extended up to 5 for CM1 10;01

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

Motor switching **AC2** and **AC3** duty				Rated operational current **Ie/AC1** at 55 °C 400 V A	Auxiliary contacts		Type	Weights
Rated operational current **Ie** at 400 V A	Max. Ratings of three-phase motor at 50 Hz and 230 V kW	**400 V kW**	690 V kW		NO	NC		kg
9	3.2	**4.5**	5.5	25	1	0	**CNN 9 10**	0.26
					0	1	**CNN 9 01**	
					0	0	**CNN 9 004*** (4 main contacts)	
12	3.5	**5.7**	7.5	25	1	0	**CNN 12 10**	0.26
					0	1	**CNN 12 01**	
					0	0	**CNN 12 004*** (4 main contacts)	

* See page 1/60 and page 1/17 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 **Ie/AC1** at 55 °C 400 V A	Auxiliary contacts		Type	Weights
	Rated operational current **Ie** at 400 V A	Max. Ratings of three-phase motor at 50 Hz and 230 V kW	**400 V kW**	690 V kW		NO	NC		kg
	18	4	**7.5**	10	30	1 0	0 1	**CNN 18 10** **CNN 18 01**	0.265
	25	5.5	**11**	15	40	0	0	**CNN 25**	0.28
	30	7.5	**15**	15	40	0	0	**CNN 30**	0.285
	32	7.5	**15**	18.5	50	0	0	**CNN 32***	0.395
	38	11	**18.5**	22	50	0	0	**CNN 40***	0.40

* For connecting multy-wired conductor up to 16 mm^2 must be ordered additional terminal blocks with Part No. 601478 (see 1/28).

** Number of auxiliary contacts can be extended up to 5 for CNN 9 10;01; CNN 12 10;01; CNN 18 10;01 and 4 for CNN 25; CNN 32; CNN 40 (see 1/26).

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

	Motor switching **AC2** and **AC3** duty				Rated operational current **Ie/AC1** at 45 °C 400 V A	Auxiliary contacts		Type	Weights
	Rated operational current **Ie** at 400 V A	Max. Ratings of three-phase motor at 50 Hz and 230 V kW	**400 V kW**	690 V kW		NO	NC		kg
	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
	25	5.5	**11**	11	40	0	0	**CNNB 25**	0.64
	30	7.5	**15**	15	40	0	0	**CNNB 30**	0.65

[1] 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 and CNNB 30

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

* Tehnical information for Contactor CNM 110ST are same as CNM 110.
ST - Main conductors with box terminal max. 1x50mm^2 or 2x35mm^2

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

	Motor switching **AC2** and **AC3** duty				Rated operational current **Ie/AC1** at 55°C 400 V A	Auxiliary contacts		Type	Weights
	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		NO	NC		kg
	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	**105**	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 **Ie** at 400 V A	Max. Ratings of three-phase motor at 50 Hz 230 V kW	 **400 V** **kW**	 690 V kW	Rated operational current **Ie/AC1** at 55°C 400 V A	Auxiliary contacts NO	 NC	Type	Weights kg
	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

	Motor switching **AC2** and **AC3** duty: 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	Rated operational current **Ie/AC1** at 55°C 400 V A	Auxiliary contacts NO	NC	Type	Weights kg
	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
	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 multy-wired conductor up to 16 mm^2 must be ordered additional terminal blocks with Part No. 601478 (see 1/28).

** Number of auxiliary contacts can be extended up to 5 for CNN 9 10;01; CNN 12 10;01; CNN 18 10;01 and 4 for CNN 25; CNN 32; CNN 40 (see 1/26).

*** On left side with BP3 01 DC for CNN 9 - 18, 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

	Motor switching **AC2** and **AC3** duty				Rated operational current **Ie/AC1** at 55°C 400 V A	Auxiliary contacts		Type	Weights
	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		NO	NC		kg
	80	22	**37**	55	95	1	0	**CNN 80 10**	2.27
	90	26	**45**	67	105	1	0	**CNN 90 10**	2.28
	110	37	**55**	90	115	2 4	1 3	**CNM 110 21** **CNM 110 43**	2.29 2.39
	110	37	**55**	90	115	2 4	1 3	**CNM 110ST 21*** **CNM 110ST 43***	2.28 2.38

* Tehnical information for Contactor CNM 110ST are same as CNM 110.
ST - Main conductors with box terminal max. 1x50mm^2 or 2x35mm^2

** On left side with BP5 11 DC for CNN 80 - 90.

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

	Motor switching **AC2** and **AC3** duty 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	Rated operational current **Ie/AC1** at 55°C 400 V A	Auxiliary contacts NO	NC	Type	Weights kg
	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	**105**	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

1

Selection and ordering data

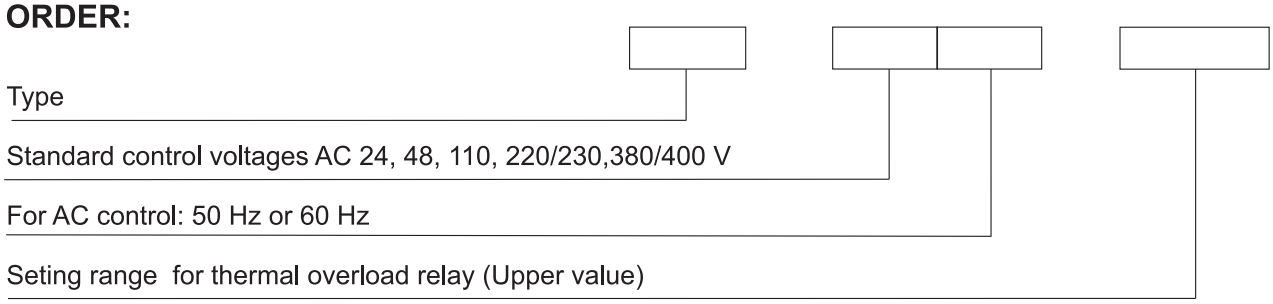
Data for **AC2** and **AC3** utilization categories			Auxiliary contacts			Type		Weights kg
Rated operational current **Ie/400V** A	Motor rating at 50 Hz for V 230 V kW	**400V kW**	NO	NC	Degree of protection	without relay	with relay	
CONTACTORS IN ENCLOSURES								
9	3.2	**4.5**	1	0	IP 65	**PNN 9**	**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	**PNNG 9**	**PNNRG 9**	0.720/0.870
12	3.5	**5.7**	1	0	IP 54	**PNNG 12**	**PNNRG 12**	0.720/0.870
18	4	**7.5**	1	0	IP 54	**PNNG 18**	**PNNRG 18**	0.725/0.875
25	5.5	**11**	0	0	IP 54	**PNNG 25**	**PNNRG 25**	0.735/0.890
30	6.5	**15**	0	0	IP 54	**PNNG 30**	**PNNRG 30**	0.745/0.895
32	7.5	**15**	0	0	IP 54	**PNNG 32**	**PNNRG 32**	0.855/1.005
38	11	**18.5**	0	0	IP 54	**PNNG 40**	**PNNRG 40**	0.860/1.010

ENCLOSURES - type PNN , PNNT and PNNG
from insulation material

Selection and ordering data

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

ORDER:



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 PNNRG 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**

STAR - DELTA STARTERS - TYPE SDS

1

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. he 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 date for Star - Delta starters

Star-Delta starter type SDS	In at 400 V	Max. motor output at 50 Hz and			
		220 V	400 V	500 V	690 V
	A	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	EVRK	TM	Range A	Ir A
SDS 7,5	**7,5**	CNN 9	CNN 9	CNN 9	EVRK 40	TM 40	6,3-10	9
SDS 11	**11**	CNN 12	CNN 12	CNN 9	EVRK 40	TM 40	10-16	12,7
SDS 15	**15**	CNN 18	CNN 18	CNN 12	EVRK 40	TM 40	12,5-20	16,8
SDS 18,5	**18,5**	CNN 25	CNN 25	CNN 12	EVRK 40	TM 40	16-25	20,3
SDS 22	**22**	CNN 25	CNN 25	CNN 18	EVRK 40	TM 40	16-25	23,7
SDS 25	**25**	CNN 32	CNN 32	CNN 18	EVRK 40	TM 40	22-30	29
SDS 30	**30**	CNN 40	CNN 40	CNN 25	EVRK 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**

Table 1 - Technical date 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	
PNSDS 25	50	15	**25**	25	18,5	
PNSDS 30	55	18,5	**30**	30	25	
PNSDS 37	72	22	**37**	37	37	400x500x207
PNSDS 45	85	26	**45**	45	45	
PNSDS 55	105	37	**55**	55	55	

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

Type of starter	Pn kW	K1	K2	K3	EVRK	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 18	EVRK 40	TM 40	16-25	20,3	
PNSDS 22	**22**	CNN 25	CNN 25	CNN 25	EVRK 40	TM 40	16-25	23,7	
PNSDS 25	**25**	CNN 32	CNN 32	CNN 25	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

Selection and ordering data

	Motor switching							Ie/AC1	Auxiliary	Type	Weights
	AC2 / AC3 duty				AC4 duty			at 55 °C	contacts		
	Max.Ratings of three-phase motor at 50 Hz								per contactor		
	Ie at 400 V A	230 V kW	400 V kW	690 V kW	230 V kW	400 V kW	690 V kW	400 V A	NO NC		kg
	9	3	**4**	4	0.75	**1.5**	1.5	20	0 0	**MBCM1 00**	0.40
									1 0	**MBCM1 10***	0.41
	9	3.2	**4.5**	5.5	0.75	**1.9**	1.9	25	0 0	**MBCNN 9 00**	0.54
									1 1	**MBCNN 9 11***	0.58
	12	3.5	**5.7**	7.5	1.1	**2.2**	2.2	25	0 0	**MBCNN 12 00**	0.54
									1 1	**MBCNN 12 11***	0.58
	18	4	**7.5**	10	1.5	**3**	3	30	0 0	**MBCNN 18 00**	0.56
									1 1	**MBCNN 18 11***	0.6
	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	**MBCNNB 9 00**	1.26
									1 1	**MBCNNB 9 11***	1.30
	12	3.5	**5.7**	7.5	1.1	**2.2**	2.2	25	0 0	**MBCNNB 12 00**	1.26
									1 1	**MBCNNB 12 11***	1.30
	18	4	**7.5**	10	1.5	**3**	3	30	0 0	**MBCNNB 18 00**	1.27
									1 1	**MBCNNB 18 11***	1.31
	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 62.

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

Motor switching							Ie/AC1	Auxiliary		Type	Weights
AC2 / AC3 duty				AC4 duty			at 55 °C	contacts per contactor			
Max.Ratings of three-phase motor at 50 Hz											
Ie at 400 V A	230 V kW	400 V kW	690 V kW	230 V kW	400 V kW	690 V kW	400 V A	NO	NC		kg
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
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 62.
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

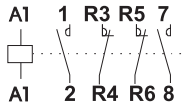
	Rating **AC1** utilization category Switching resistive load at 55°C			Auxiliary contacts		Type	Weights
	Operational current **Ie/AC1** **A**	Ratings of three-phase loads at 230 V kW	**400 V kW**	NO	NC		kg
	**65**	25	**43**	0	0	**TKN 65 00**	0.45
	**115**	44	**76**	0	0	**TKN 115 00**	0.90
	**130**	50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

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

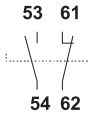
I_e (I_{th})	AC 1 ($\Theta \leq 55°C$)		A	25	25
$I_{e\,max}$	AC 3 ($U_e \leq 690V$)		A	**9**	**12**
Rated operational voltage Ue			V	690	690
Rated insulation voltage Ui			V	690	690
Sizes of Connecting conductors Main contacts		rigid	mm^2	1,5 - 4	1,5 - 4
		flexible	mm^2	1,5 - 2.5	1,5 - 2.5
Squirred-cage induction motors Single phase	AC 3 1 ~ 50 Hz	**230 V**	**kW**	**1,1**	**1,5**
		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	62 / 7
Weights			kg	0,25	0,260
Dimensions a x b x c Boring plan a1; b1; ϕ1				45x72,2x71 60,65/35, 4,5	45x72,2x71 60,65/35, 4,5

Wiring diagrams

CNN 9 0022, CNN 12 0022

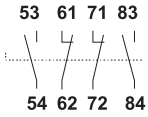


BP2



11

BP4



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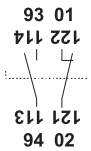
BP3

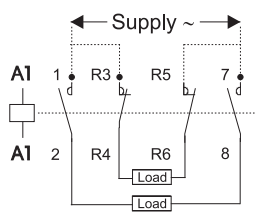


11

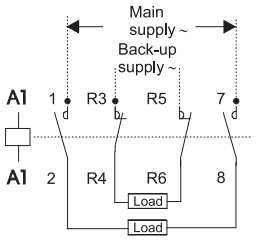
Remark for (CNN 9 0022...CNN 12 0022) 4-pole contactors fitted with 2NO + 2NC main poles
These contactors are suitable for controling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates 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 7.5

Features

- In conformity with: IEC 60947-1, IEC 60947-4
- Switching of 3 phase capacitors
- Ambient temperature of 55 ^{0}C
- Available in other AC voltages on request

1

Selection and ordering data

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

*) With BP3 11.

Note:
Maximum permissible peak current I ≤ 100 times the nominal rms current of the switched capacitor

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 ^{0}C
- Available in other AC voltages on request

Selection and ordering data

	AC-6b utilization category For switching three-phase capacitors			Auxiliary contacts		Type	Weights
	Capacitor rating at operating voltage 50 Hz		Ie (A)				kg
	230 V kVAr	400/440V kVAr	400 V/50 Hz	NO	NC		
	5	**10**	**14**	2 1 0	0 1 2	**CNNK 10 20** **CNNK 10 11** **CNNK 10 02**	0.320
	6,7	**12.5**	**18**	2 1 0	0 1 2	**CNNK 12 20** **CNNK 12 11** **CNNK 12 02**	0.320
	8.5	**15**	**22**	2 1 0	0 1 2	**CNNK 15 20** **CNNK 15 11** **CNNK 15 02**	0.325
	11	**20**	**29**	1 0	0 1	**CNNK 20 10** **CNNK 20 01**	0.340
	14	**25**	**36**	1 1 0	0 0 1	**CNNK 25E 10*** **CNNK 25 10** **CNNK 25 01**	0.465 0.525
	20	**30**	**44**	1 0	0 1	**CNNK 30 10** **CNNK 30 01**	0.530

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

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 75

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

1

Selection and ordering data

	AC-6b utilization category For switching three-phase capacitors Capacitor rating at operating voltage 50 Hz 230 V kVAr	400/440V kVAr	Ie (A) 400 V/50 Hz	Auxiliary contacts	Type	Weights kg
	25	**40**	**58**	1 0 0 1	**CNNK 40 10** **CNNK 40 01**	0.943
	29	**50**	**72**	1 0 0 1	**CNNK 50 10** **CNNK 50 01**	0.945
	32	**60**	**87**	1 0 0 1	**CNNK 60 10** **CNNK 60 01**	0.968
	34	**60**	**87**	2 2	**CNKM 60 22**	2.4
	38	**75**	**108**	2 2	**CNKM 75 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.

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

Selection and ordering data

AC coil operation

	Motor switching **DC3** and **DC5** duty				Auxiliary contacts		Type	Weights
	Rated operational current **Ie** at		Rated outputs of DC motor at					
	220 V A	440 V A	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				Auxiliary contacts		Type	Weights
	Rated operational current **Ie** at		Rated outputs of DC motor at					
	220 V A	440 V A	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

(*)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

Number of NO contacts

Number of NC contacts

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 spase is at premium
- Snap-on auxiliaries

Selection and ordering data

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

* Number of auxiliary contacts can be extended up to 10 (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 **Ie** for **AC 15/AC 14** utilization category for				Auxiliary contacts		**Type**	Weights
230 V	400 V	500	690 V				
A	A	A	A	NO	NC		kg
6	4	4	1,5	4	0	**CNNP 40**	
				3	1	**CNNP 31**	
				2	2	**CNNP 22**	0.23
				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
WITH AC CONTROL CIRCUIT

1

Selection and ordering data

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

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

Features

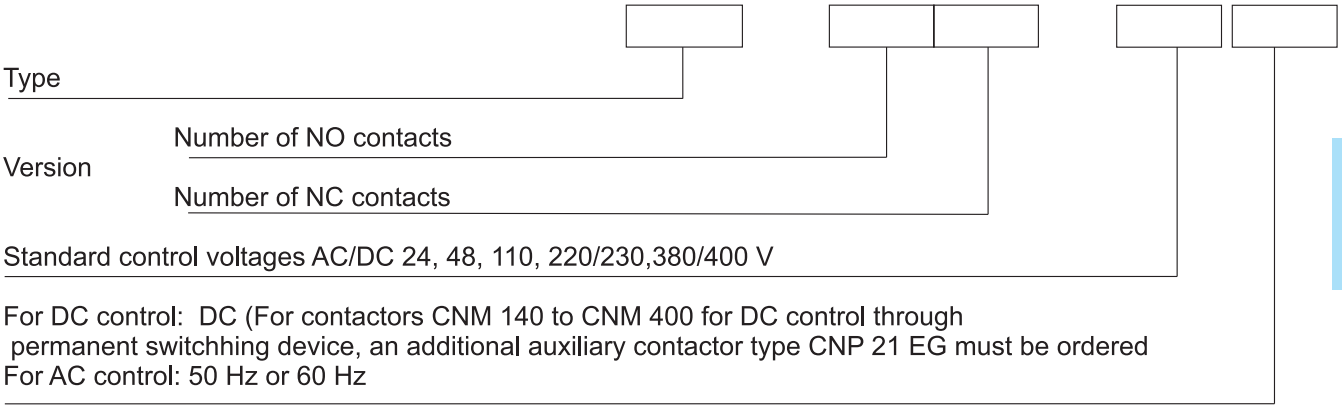
- In conformity with: IEC 60947-1, IEC 60947-5
- 35 mm DIN rail mounting
- Up to 8 auxiliary contacts
- Utilizes the same coils

Selection and ordering data

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



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

Snap-on auxiliary contact blocks

Rated operational current at **Ie/AC15/AC14** 230 V	400 V	500 V	690 V	Auxiliary contacts NO	Auxiliary contacts NC	Type	Weights kg
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 **Ie/AC15/AC14** 230 V	400 V	500 V	690 V	Auxiliary contacts NO	Auxiliary contacts NC	Type	Weights kg
A	A	A	A				
6	3	1.8	1	1	1	**BP2 11** **BP2N 11***	0.03
				2	2	**BP4 22** **BP4N 22***	0.04
				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 and CNN 90
BP2 11; BP4N 22 for CNN 9 to CNN 60, 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, CNN 25 and CNN 32/40	**Type**	Weights kg
	MB2	0.017

ACCESSORIES for CONTACTORS type CNN

Selection and ordering data

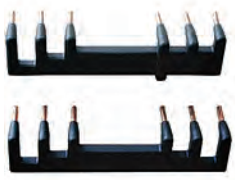
Type	Width
RKUMP 45 Adapter plate for Power switch 1 DIN-rail movable	45 mm
RKUMP 45A Adapter plate for Power switch 2 DIN-rail movable	45mm
RKUMP 90 Adapter plate for Reversing-Starter-Combination 2x Power switches,1 DIN-rail movable	90 mm
RKUMP 90E Adapter for Star-Delta Wiring 3x Power switches,1 DIN-rail movable	90 mm

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

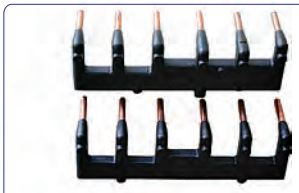
RKWK WIRING SISTEM

RKWK 1.1

Type	Description
RKWK 1.1	For reversing switch, suitable for contactor: 4 kW (for mini CM1) (max. current 16 A) 5 terminal in line, (3 main terminals, 1 auxliary terminal, 1 coil terminal)
RKWK 5.1	For reversing switch, suitable for contactors: 4,5 - 7,5 kW (for CNN 9 - CNN 18) (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)

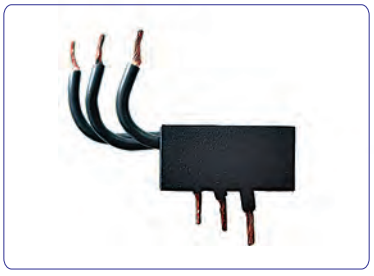


RKWK 5.1



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

Selection and ordering data

1

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.

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 supressors

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 for mounting on the front cover: B for control voltages 110...240 V for mounting on the coil: A for mounting on the front cover: B	 **739968** **739914** **739913** **739908**	 0.014 0.019 0.015 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 **RKTD56CA** **RKTD160CA** **RKTD250CA** **RKTD440CA**	0.005

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** **604128**	0.135 0.150

SPARE PARTS for CONTACTORS and CONTACTOR RELAYES

SPARE COILS for CONTACTOR type CM1 and CONTACTOR RELAYES type CP0

Selection and ordering data

AC coils for		Control voltage V	Rated frequency	Part N. 50 Hz	Part N. 60 Hz	Weights kg
CM1 CP0	Coil	24 48 110 220/230 380/400		**S32617S** **S32619S** **S32620S** **504124S** **S32806S**	**503645S** **503644S** **503643S** **S32807S** **S32808S**	0.042

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SPARE COILS for CONTACTORS type CNN

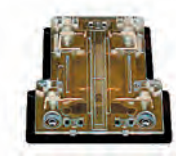
Selection and ordering data

AC coils for		Control voltage V	Rated frequency	Part N. 50 Hz	Part N. 60 Hz	Weights kg
CNN 9 -CNN 25,CNNP	Coil	24 48 110 220/230 380/400		**603028** **603030** **603032** **605227** **605231**	**603029** **603031** **603033** **605229** **605232**	0.050
CNN 32 - CNN 40	Coil	24 48 110 220/230 380/400		**603042** **603044** **603046** **605228** **605233**	**603043** **603045** **603047** **605230** **605234**	0.08
CNN 50 - CNN 70; TKN 115	Coil	24 48 110 220/230 380/400		**604795** **604796** **604797** **604762** **604798**	**604802** **604801** **604800** **604803** **604799**	0.130
CNN 80 - CNN 90;	Coil	24 48 110 220/230 380/400		**605564** **605565** **605534** **605532** **605533**	**605566** **605567** **605568** **605569** **605571**	0.140

SPARE PARTS for CONTACTORS CNN 50 - CNN 90; CNM110 - CNM 400

Selection and ordering data

Auxiliary contact blocks



For contactor	Description	Part N.	Weights kg
CNN 50 - CNN 90	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**	
CNM 140 - CNM 400	Block with auxiliary contacts left, 1NO+1NC	**155129S**	0.075
	Block with auxiliary contacts right, 1NO+1NC	**155113S**	
	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

For contactor	Description	Part N.	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 N.	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 N.	Weights kg
CNM110 TK 130 - TK 175	Coil	24 48 110 220/230 380/400	50 / 60	**158850S/158884S** **158852S/158890S** **158853S/158876S** **158854S/158878S** **158855S/158895S**	0.230
CNM 140 - CNM 200	Coil	24 48 110 220/230 380/400	50 / 60	**155117S/158814S** **155119S/158817S** **155120S/158838S** **155195S/158803S** **155122S/158822S**	0.380
CNM 250 - CNM 400	Coil	24 48 110 220/230 380/400	50 / 60	**155610S/158955S** **155612S/158956S** **155613S/158986S** **155615S/158951S** **155616S/158961S**	0.650

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 intended for switching and control of three-phase motors and other a.c. loads such as electric ovens, bulbs, electromagnets, capacitors etc.
Contactors of the 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.

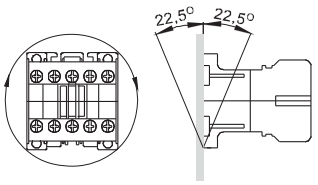
These noisless contactors are particulary suitable for use with passenger lifts.
Closing and opening operations are affected by an electromagnet thus the contactors are primarily suitable for remote control and automatic operation.
Contactors should be installed in dry and clean areas.

Standards

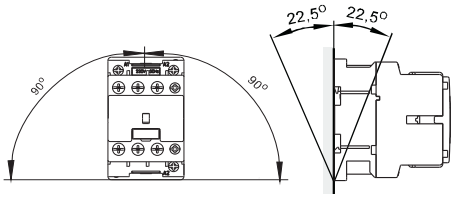
Contactors type CPO, CNNP are in conformity with International standard IEC 60947-5-1, EN 60947-5-1 and national standards VDE-0660.
Contactors CM, CNN and CNM comply with IEC 60947-4-1, EN 60947-4-1 and VDE-0660.
Designations of contactors, conform to EN 50 005, EN 50 012.
.

Installation

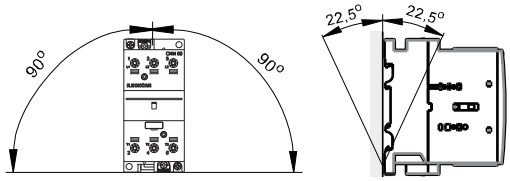
Contactors can be mounted on the baseplate by means of two or four screws. Contactors type CPO, CNNP, CNNB, CNB, CM1 and CNN 9 - 90 are designed for quick installation on vertical standard support having the width of 35 mm and CNN 50 - 90 also the width of 70 mm according to DIN EN 50022.
Permissible deviations of mounting surfaces from the vertical base are shown on sketches:



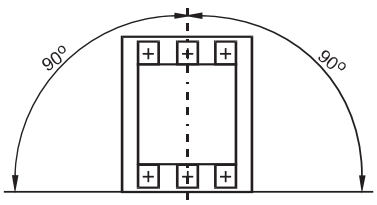
CP0, CM1

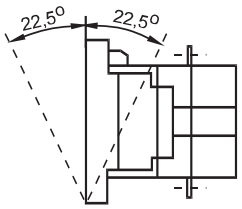


CNN 9 - CNN 40 , CNNP and CNNB 9 - CNNB 30

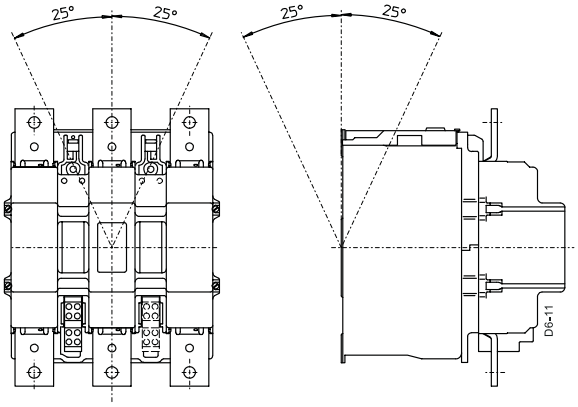


CNN 50 - CNN 90





CNM 110 - CNM 400



CNM 450 - CNM1000

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 synchronizad with the phase angle of the supply system.
The rated operational current Ie 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 Ie/AC4 ca 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 (Ic=Ie) in operating cycles
B - Contact endurance for inching (Ic= multiple of Ie) in operating cycles
C - Inchingoperations as a percentage of total swiching operations

Diagram of electrical endurance of CM, CNN contactors - AC3

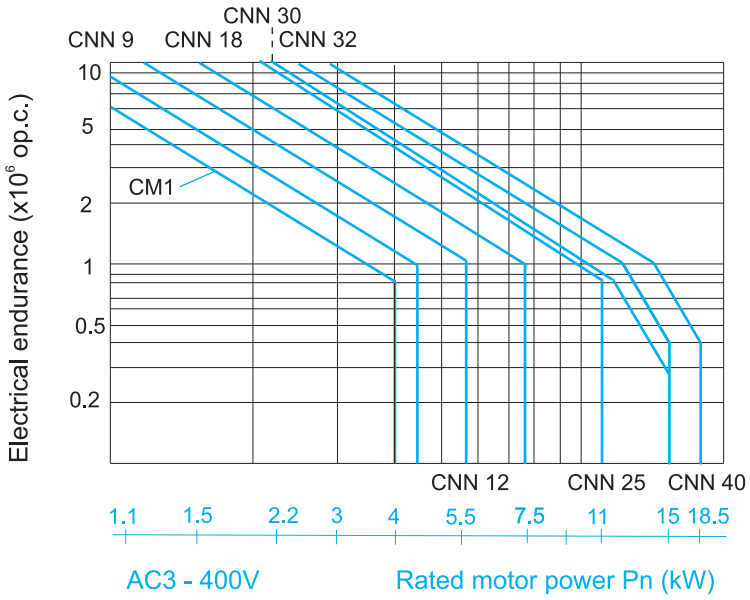


Diagram of electrical endurance of CM, CNN contactors - AC4

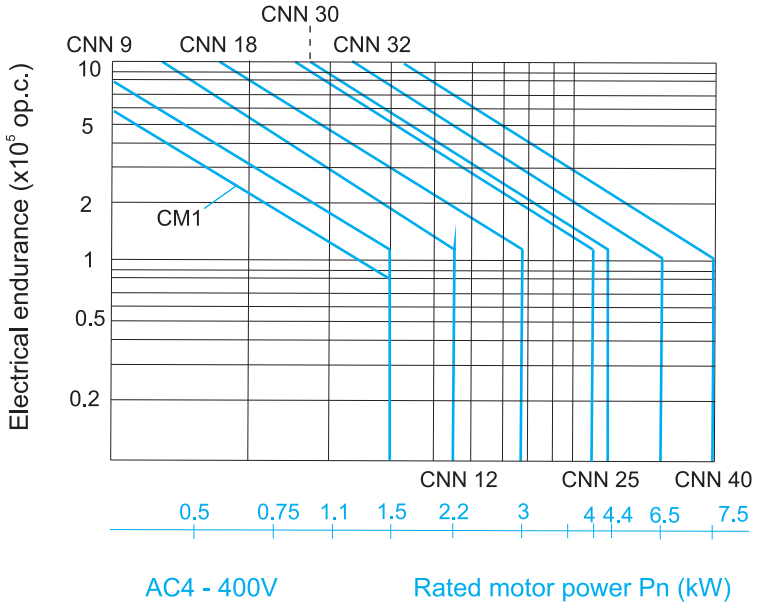


Diagram of electrical endurance of CP0 and CNNP contactor relayes

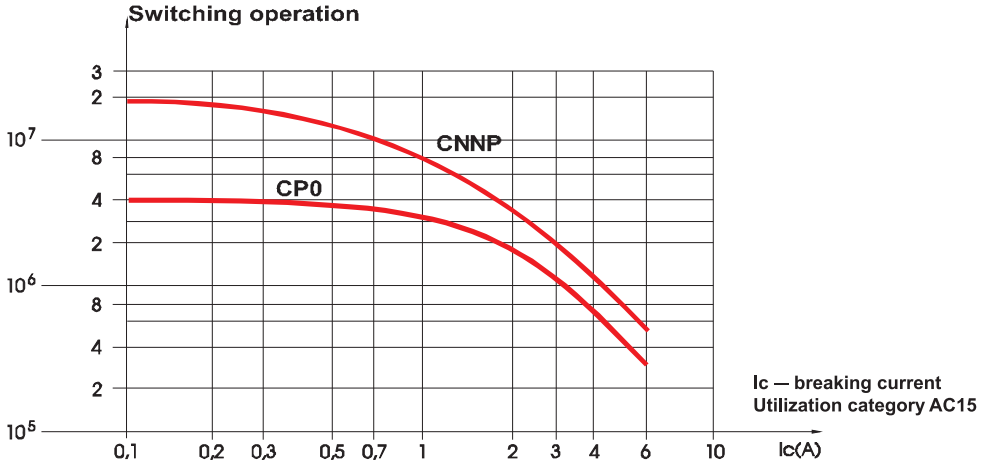


Diagram of electrical endurance of CNN and CNM contactors - AC3

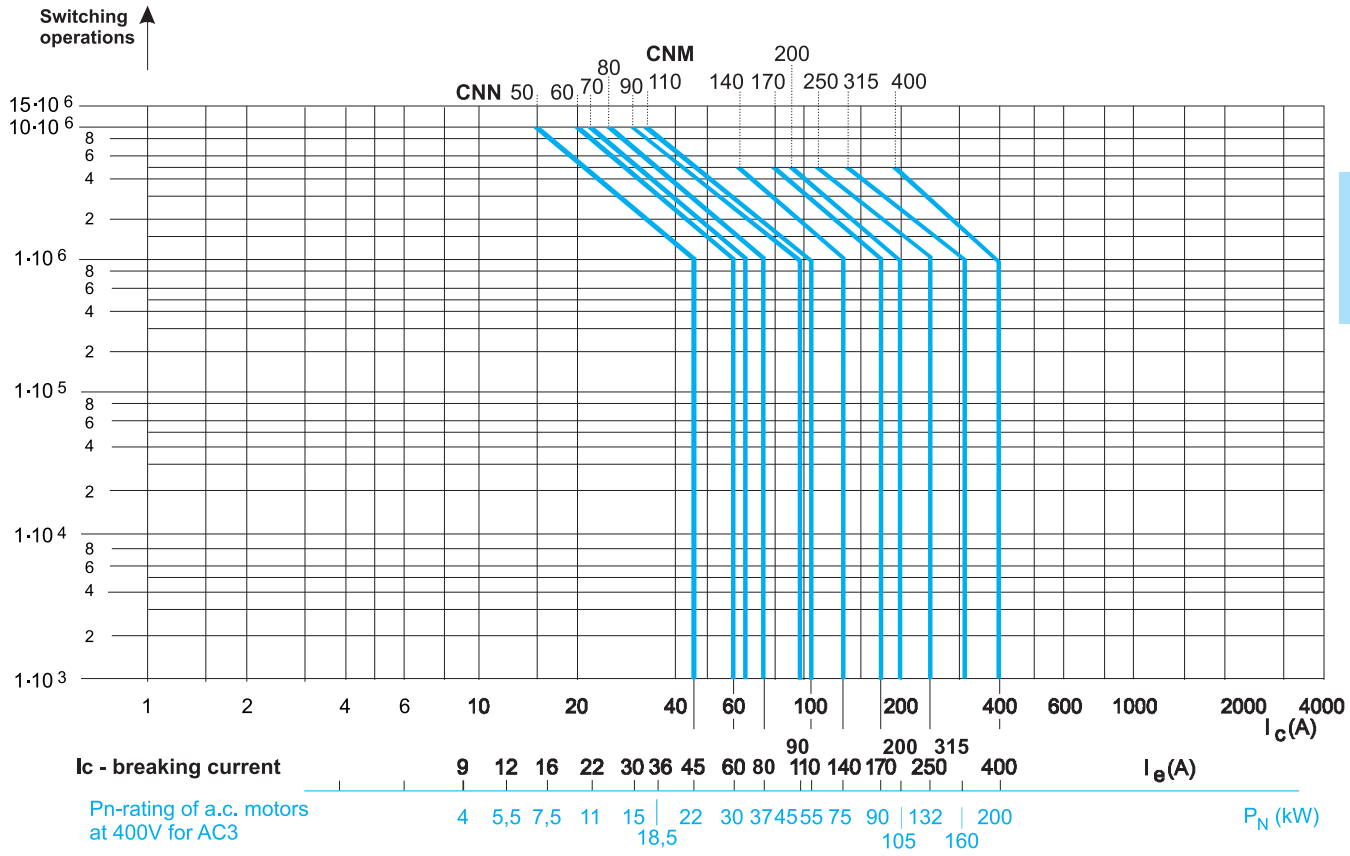
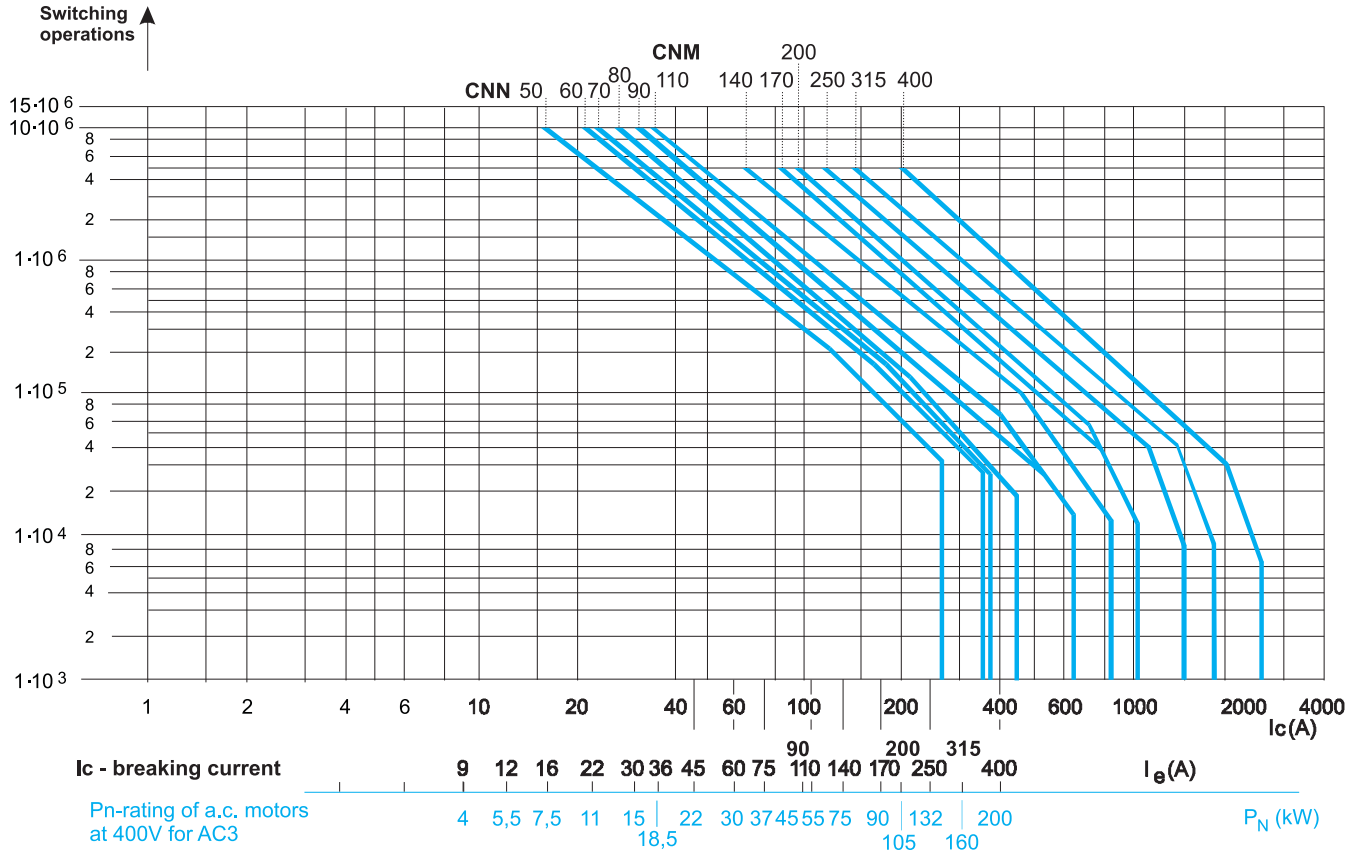


Diagram of electrical endurance of CNN and CNM contactors - AC4



Utilization categories for contactors

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

		ELECTRICAL DURABILITY						MAKE AND BREAK CONDITIONS					
Category	Typical applications	MAKE			BREAK			MAKE			BREAK		
		Current **I/Ie**	Voltage **U/Ue**	p.f.	Current **Ic/Ie**	Voltage **Ur/Ue**	p.f.	Current **I/Ie**	Voltage **U/Ue**	p.f.	Current **Ic/Ie**	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: Ie(A)≤17 Starting, switching off 17<Ie≤100 motors during running. Ie > 100	6 6 6	1 1 1	0,65 0,35 0,35	1 1 1	0,17 0,17 0,17	0,65 0,35 0,35	10 10 10	1,05 1,05 1,05	0,45 0,45 0,35	8 8 8	1,05 1,05 1,05	0,45 0,45 0,35
AC-4	Squirrel-cage motors: Ie(A)<17 Starting, plugging[1], 17<Ie<100 inching[2]. Ie > 100	6 6 6	1 1 1	0,65 0,35 0,35	6 6 6	1 1 1	0,65 0,35 0,35	12 12 12	1,05 1,05 1,05	0,45 0,45 0,35	10 10 10	1,05 1,05 1,05	0,45 0,45 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.							[5]					
AC-7a	Slightly induktive 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 reseting of overload releases.							6	1 ,05	[4]	6	1,05	[4]
AC-8b	Hermetic refrigerant compressor motor control with automatic reseting 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/Ie	U/Ue	L/R ms	I/Ie	U/Ue	L/R ms	I/Ie	U/Ue	L/R ms	I/Ie	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	1 0	1,1	15	10	1,1	15

1) By plugging is understood stopping or reversing the motor rapidly by reversing motor prmary connectioons 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 carred out with an incandescent light load.
4) p.f.=0,45 for **Ie** ≤100 A ; 0,35 for **Ie** > 100 A.
5) Capacitive ratings may be derived by capacitor switching tests or assigned on the basis of established practice and experience.

I - making current
U - voltage before breaking
Ie - rated operational current
Ue rated operational voltage
Ic - breaking current
Ur - recovery voltage
P = Ue x Ie (W)

Degrees of Protection of enclosed equipment

In an installation, the degree of protection recuired for electrical equipment depends on the environmental characteristics. The degree of protection, ensured by the enclosure of equipment or by the cubicle containing the equipment is exspressed 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 persons
Codes		**IP**	
First figure		**Against ingress of foreign bodies**	**Against access to hazardous parts with**
	0	No protection	Non-protected
	1	Diameter ≥ 50 mm	Back of hand
	2	Diameter ≥ 12,5 mm	Finger
	3	Diameter ≥ 2,5 mm	Tool
	4	Diameter ≥ 1 mm	Wire
	5	Limited protection against dust	Wire
	6	Total protection against dust	Wire
Second figure		**Against entrance of water having a harmful effect**	
	0	No protection	
	1	Vertical dripping	
	2	Dripping up to 15^0 from the vertical	
	3	Rain at a vertical angle of $\leq 60^0$	
	4	Splashing from all directions	
	5	Hosing jets from all directions	
	6	Strong hosing jets from all directions	
	7	Temporary immersion	
	8	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.)		**Specific additional information**	
	H	High voltage apparatus	
	M	Moving parts which are moving during water test	
	S	Moving parts which are stationary during water test	
	W	Specifed atmospheric conditions	

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

Over voltage limiter (surge suppressors)

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 sistems. In practice this overvoltages may disconnect the coil of the contactor. Cutting off the coil (wounding) 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 infuence on the period of activating contactor
- Contactors with DC magnet swith out current limiting resistor, diffculties with limiting overvoltage due to big powers.

Varistors Advantages

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

Disadvantges

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

Diodes Advantages (see page 1/28)

- Optimalmuffing

Disadvantges

- Delay when cutting off
- Only DC circuits

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 insuffcient voltage can disable running up of 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 it should be used the following formulas :

Single phase $\Delta V = 2\ I*L\ (\cos f + X_l \sin f)$

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

Rated cross-section	**Single wire cable** active resistance r	reactive resistance x	**DC** ΔV	**AC** cosf = 0,8 1 fase ΔV	3 fases ΔV	**Two and three wire cable** active resistance r	reactive resistance x	**DC** ΔV	**AC** cosf = 0,8 1 fase ΔV	3 fases ΔV
[mm²]	[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	0.975	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 infuence 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 impendence 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 1 mm²	1,5 mm²	2,5 mm²	4,5 mm²	6 mm²	10 mm²	16 mm²
A	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 idefned by the producer.Here are listed just informative values for some instruments.

Electromagnetic ammetar	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

Auxiliary current circuits

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 cosf)

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 has been 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]	Coeffcient 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

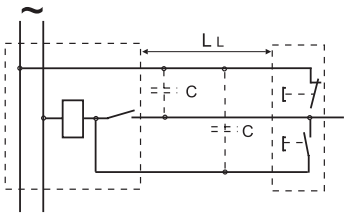
Cable capacity

Cable Capacity

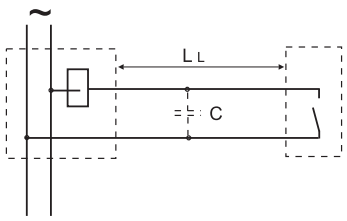
If the length of the cables in the auxiliary current circuits is excessive the voltage drop is not only the one that should be considered but the cable capacity as well. The cable capacity can get such a high value to hold the contactor closed even when the voltage is cut off.

The control circuit confguration 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% increasemant of control voltage.

Contractors (Type)	Critical conductor capacity (μF)	Critical conductor length (m)	(m)
		Control with push button	Control with permanent
CNN 50 - CNN 60 TKN 115	0,137	228	455
CNN 80 - CNN 90, 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

Squirred-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	CNN 9	CNN 12	CNN 18	CNN 25	CNN 30	CNN 32	CNN 40
Mechanical endurance	make/break operations	x10⁶	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
	p.f.		0.35	0.3	0.3	0.3	0.3	0.3	0.3	0.3
DC operated	closing	W	-	123	123	123	123	125	125	125
	closed	W	-	2.8	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	1000
	AC2 ; AC3	s/h	1000	750	750	750	750	750	750	750
	AC4	s/h	250	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	Type of coord. "1" gL/gG	A	20	25	25	40	50	50	63	63
DIN VDE 0660 Part 102	Type of coord. "2"	A	16	20	20	25	35	35	40	40
Sizes of connecting conductors for contact without thermal relay										
main circuit	single-wire conductor	mm²	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	mm²	0,75-1,5	1,5-6	1,5-6	1,5-6	2,5-10	2,5-10	2,5-16	2,5-16
	Screw		M3.5	M4	M4	M4	M4	M4	M4	M4
	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	1.6	1.6
auxiliary circuit	single-wire conductor	mm²	1 - 2,5							
	multi-wire conductor with cable shoe	mm²	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	-	-	-	-
AC rated operational current Ie/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 Ie/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 AC1 utilization category		A	20	25	25	30	40	40	50	50
rated operational current Ie/AC1; 55°C		A	20	25	25	30	40	40	50	50

TECHNICAL INFORMATION

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

Technical data

Contactor type			CM1	CNN 9	CNN 12	CNN 18	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	Ie/AC4	A	4	4.5	5	6.7	8.5	9	13.5	15.8
ratings of squirrel-cage motors at 50 Hz	for 230 V	kW	0.75	0.75	1.1	1.5	2.2	2.5	4	5.5
	400 V	kW	1.5	1.9	2.2	3	4	4.4	6.5	7.5
	500 V	kW	1.5	1.9	2.2	3	4	4.4	6.5	7.5
	690 V	kW	1.5	1.5	2.2	3	4	4.4	6.5	7.5
max. permissible rated current	Ie/AC4 ; 400 V	A	9	9	12	18	25	30	32	38
Loadability by direct current DC1 utilization category, non-inductive loads L/R≤1 ms										
rated operational current Ie, 55°C	for 24 V	A	12	20	20	20	35	35	45	50
through one pole	48 V	A	10	20	20	20	20	20	20	23
	110 V	A	1.5	2.1	2.1	2.1	4.5	4.5	4.5	4.5
	220 V	A	0.6	0.8	0.8	0.8	1	1	1	1
	440 V	A	0.42	0.6	0.6	0.6	0.6	0.6	0.4	0.4
	600 V	A	0.42	0.6	0.6	0.6	0.6	0.6	0.25	0.25
through three poles connected in series	for 24 V	A	16	20	20	20	35	35	45	50
	48 V	A	16	20	20	20	35	35	45	45
	110 V	A	10	20	20	20	35	35	45	45
	220 V	A	15	20	20	20	35	35	45	45
	440 V	A	0.9	1.3	1.3	1.3	2.9	2.9	2.9	2.9
utilization categories DC3 to DC5 series and shunt motors (L/R≤15 ms)	600 V	A	0.7	1	1	1	1.4	1.4	1.4	1.4
rated operational current Ie, 55°C	for 24 V	A	7	20	20	20	20	20	35	35
through one pole	60 V	A	4	5	5	5	5	5	6	6
	110 V	A	1	1.5	1.5	1.5	2.5	2.5	2.5	2.5
	220 V	A	-	0.75	0.75	0.75	1	1	1	1
	440 V	A	-	-	-	0.09	0.09	0.09	0.1	0.1
	600 V	A	-	-	-	0.06	0.06	0.06	0.06	0.06
through three poles connected in series	for 24 V	A	10	20	20	20	35	35	50	50
	60 V	A	10	20	20	20	35	35	50	50
	110 V	A	5	20	20	20	35	35	50	50
	220 V	A	1.2	1.5	6	6	10	10	25	25
	440 V	A	0.14	0.2	0.2	0.2	0.6	0.6	0.6	0.6
	600 V	A	0.14	0.2	0.2	0.2	0.3	0.3	0.35	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 Ith ; 35°C		A	10				
AC rated operational current Ie/AC15	for 24V	A	6				
	230V	A	6				
	400V	A	4				
	690V	A	1				
rated operational current Ie/DC13	for 24V	A	4				
	110V	A	0.6				
	230V	A	0.2				
	400V	A	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 25	CNNB 30
Mechanical endurance	make/break operations	x10⁶	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
	sealed	W	6.5	6.5	6.5	6.5	6.5
Coil voltage tolerances	operating		0,85 to 1,1 Un				
	drop out		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
	opening time	ms	6 -14	6 -14	6 -14	6 -14	6 -14
Frequency of switching operations without thermal relay							
utilization category	AC1	s/h	1000	1000	1000	1000	1000
	AC2 ; AC3	s/h	750	750	750	750	750
	AC4	s/h	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	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	50	50
DIN VDE 0660 Part 102	Type of coord. "2"	A	20	20	25	35	35
Sizes of connecting conductors for contact without thermal relay							
main circuit	single-wire conductor	mm²	1,5-6	1,5-6	1,5-6	2,5-10	2,5-10
	multi-wire conductor with cable shoe	mm²	1,5-6	1,5-6	1,5-6	2,5-10	2,5-10
	Screw		M4	M4	M4	M4	M4
	Screw head		PZ2	PZ2	PZ2	PZ2	PZ2
	Tightening torque	Nm	1.2	1.2	1.2	1.4	1.4
auxiliary circuit	single-wire conductor	mm²	1 - 2,5				
	multi-wire conductor with cable shoe	mm²	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	-	-
AC rated operational current Ie/AC15	for 24 V	A	6	6	6	-	-
	230 V	A	6	6	6	-	-
	400 V	A	4	4	4	-	-
	500 V	A	2	2	2	-	-
	690 V	A	1	1	1	-	-
rated operational current Ie/DC13	for 24 V	A	4	4	4	-	-
	110 V	A	0.6	0.6	0.6	-	-
	230 V	A	0.3	0.3	0.3	-	-
Load carrying capacity of the main contacts							
rated continuous current I_{th} ; 55°C		A	25	25	30	40	40
AC1 utilization category							
rated operational current Ie/AC1; 55°C		A	25	25	30	40	40

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNNB WITH DC CONTROL CIRCUIT

Technical data

Contactor type			CNNB 9	CNNB 12	CNNB 18	CNNB 25	CNNB 30
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)	Ie/AC4	A	4.5	5	6.7	8.5	9
rated current	for 230 V	kW	0.75	1.1	1.5	2.2	2.5
ratings of squirrel-cage motors at 50 c/s	400 V	kW	1.5	2.2	3	4	4.4
	500 V	kW	1.5	2.2	3	4	4.4
	690 V	kW	1.5	2.2	3	4	4.4
max. permissible rated current	Ie/AC4 ; 400 V	A	9	12	18	25	30
Loadability by direct current							
DC1 utilization category, non-inductive loads L/R≤1 ms							
rated operational current Ie, 55°C	for 24 V	A	20	20	20	35	35
through one pole	48 V	A	20	20	20	20	20
	110 V	A	2.1	2.1	2.1	4.5	4.5
	220 V		0.8	0.8	0.8	1	1
	440 V		0.4	0.4	0.4	0.6	0.6
	600 V		0.25	0.25	0.25	0.6	0.6
through three poles connected in series	for 24 V	A	20	20	20	35	35
	48 V	A	20	20	20	35	35
	110 V	A	20	20	20	35	35
	220 V	A	20	20	20	35	35
	440 V	A	1.3	1.3	1.3	2.9	2.9
utilization categories DC3 to DC5	600 V	A	1	1	1	1.4	1.4
series and shunt motors (L/R≤15 ms)							
rated operational current Ie, 55°C	for 24 V	A	20	20	20	20	20
through one pole	60 V	A	5	5	5	5	5
	110 V	A	1.5	1.5	1.5	2.5	2.5
	220 V	A	0.75	0.75	0.75	1	1
	440 V	A	-	-	-	0.09	0.1
	600 V	A	-	-	-	0.06	0.08
through three poles connected in series	for 24 V	A	20	20	20	35	35
	60 V	A	20	20	20	35	35
	110 V	A	20	20	20	35	35
	220 V	A	1.75	6	6	10	10
	440 V	A	0.2	0.2	0.2	0.6	0.6
	600 V	A	0.2	0.2	0.2	0.3	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 Ith ; 35°C	A	10		
AC rated operational current Ie/AC15 for 24V	A	6		
230V	A	6		
400V	A	4		
690V	A	1		
rated operational current Ie/DC13 for 24V	A	4		
110V	A	0.6		
230V	A	0.2		
400V	A	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

Technical data

Contactor type			CNN 50 CNN 60 CNN 70	CNN 80 CNN 90	CNM 110	CNM 140 CNM 170 CNM 200	CNM 250	CNM 315 CNM 400
Mechanical endurance	make/break operations	x10⁶	5			3		
Insulation rating		V	1000					
Permissible ambient temperature		°C	- 25 to +55					
Consumption of electromagnet in cold state with Un								
AC operated	closing	VA	155	204	300	580	1340	1340
	p.f.		0.6	0.54	0.5	0.45	0.46	0.41
	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 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.								
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
	duration of electric arc	ms	10-15	10-15	10-15	10-15	10-15	10-15
DC operated	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
with thermal relay		s/h	15	15	15	15	15	15
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,	Type of coord. "1" gL/gG	A	80/100/125	125/160	200	250/315/355	400	500/ 630
DIN VDE 0660 Part 102	Type of coord. "2"	A	40/50/63	63/80	10	125/160/200	250	315/500
Sizes of connecting conductors for contact without thermal relay								
main circuit	Rigid: solid	mm²	1 x 6 - 50					
	stranded	mm²	2 x 6 - 25	25-70	–	–	–	–
	multi-wire conductor with cable shoe	mm²	1 x 6 - 35	–	–	–	–	–
	stranded with cable lug	mm²	2 x 6 - 16	25-50	6-35	25 -70	70 -150	2x150
			–	–	25-50	50 -120		
	flatbar	mm	–	–	15x2,5	15x3	25x3	2x25x3
			–	–	15x3	20x3		
	protective conductor with cable lug	mm²	–	–	–	25 -70	35 -70	50 -120
	Screw		M6	M8	M6	M8	M10	M10
	Screw head		PZ2	⬡				
	Tightening torque	Nm	3-4	4-4,5	2,5	3,5	4	4
auxiliary circuit	single-wire conductor	mm²	1 — 2,5					
	multi-wire conductor with cable shoe	mm²	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

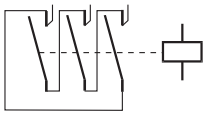
Technical data

Contactor type			CNN 50 CNN 60 CNN 70	CNN 80 CNN 90	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≤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	115	160/200/250	350	390/400
AC1 utilization category								
rated current I_e/AC1 ; 55°C		A	85/85/90	95/105	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	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	for 230 V	kvar	-	-	24	35/40/58	87	90/115
	400 V	kvar	-	-	40	40/60/100	150	150/ 200
	500 V	kvar	-	-	50	50/ 80/130	190	190/265
	690 V	kvar	-	-	40	40/60/100	150	150/200
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	66/85
	400 V	kvar	-	-	40	50/50/70	115	115/150
	500 V	kvar	-	-	50	66/65/90	145	145/195
	690 V	kvar	-	-	40	50/70/70	115	115/150
Application in stator circuit of motor								
intermittent opertaion, AC2								
stator current [1] at duty factor in intermittent periodic duty [2]								
	20%	A	103	135	153	245/308/308	462	462/617
	40%	A	98	110	122	195/245/245	367	367/490
	60%	A	87	100	109	174/218/218	327	327/436
	80%	A	80	90	100	160/200/200	300	300/400

TECHNICAL INFORMATION

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

Technical data

Contactor type			CNN 50 CNN 60 CNN 70	CNN 80 CNN 90	CNM 110	CNM 140 CNM 170 CNM 200	CNM 250	CNM 315 CNM 400
Application in rotor circuit of motor								
intermittent opertaion								
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 % = $\frac{\text{on-load period}}{\text{duration of total cycle}}$ x 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

1

Permissible ambient temperature: -25 to +55 °C

Contactor 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		Ui (V)	1000				690
Thermal current		Ith (A)	700	800	1000	1100	1200
Rated operational current Ie AC1 Ue = 690V t.amb. = 40°C		(A)	700	800	1000	1100	1200
Ie AC3 Ue = 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
Cooling time (without current)	30 s	(A)	2300	3000	3700	4500	5500
	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 (Ue = 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)	10 x Ie in AC3				
	690V	(A)	4500	5500	7000	8600	10000
	max. values 1000V	(A)	2000	2500	-	-	-
Breaking capacity	coordination to EN 60947- 4-1		8 x Ie 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 connectiong conductors	Cables	mm^2	2 x (40x5)	2 x (50x5)	2 x (60x5)	2 x (60x6)	
	Bars	mm					
Tightening torque		(Nm)	35	50	60	75	60
Weignt (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 Uc				
	a.c drop-out	(V)	0,2 ... 0,75 Uc				
	d.c drop-out	(V)	0,1 ... 0,6 Uc				
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

Technical data

Contactor type			TKN 65	TKN 115	TK 130	TK 175
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 torqu		Nm	2	3 - 4	3.5	3.5
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 Ie at 40 °C		**A**	**65**	**115**	**130**	**175**
Ratings of	230 /220 V	kW	25	44	50	67
three-phase loads with p.f.=1	400 /380 V	kW	43	76	85	115
AC-2 and AC-3 utilization categories						
Rated operational currents Ie at	**400/380 V**	**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

Control of lighting circuits

General

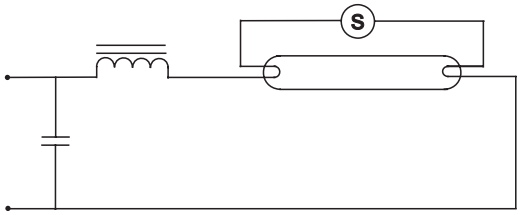
- Contactor choice criteria for control of lighting circuits are as follows:
- Type, power rating and number of lamps
- Conection mode
- Current values on closing and in steady state
- Power factor cosf of the lamps
- Presence or not of compensation capacitors

Lighting circuits

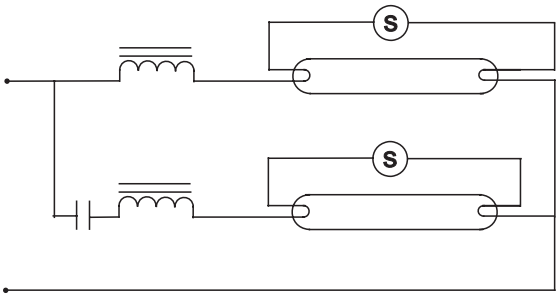
In a given circuit,the number and power rating of lamps are defned and cannot result in overload.Only short-circuit protection has to be provided. GG fuses or modular circuit-breakers will be chosen for this purpose.The lamps have very specifc technical data,according to their construction type.

- Incandescent lamps have a very high current on clossing: more than 15 times normal current. They do not introduce a large phase displacement beween current and voltage.
- Fluorescent tubes are equipped with a ballast whose purpose is two-fold: conttrbute to ignition and limit curreent 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 compennsation 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^{0}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.

Table of technical characteristics for lighting switching

Type of lamps	compensation	Start curret x In[1]	cos φ	Starting time s	Important for choosing contactor type
Light gas lamp connection	without	1	0,5	-	Rated continuous current Ith[2] (A)
	with	20	0,9	-	Start current Ie
Lamps with mercury vapour - High pressure lamps	without	1,6	0,4-0,6	< 5	Rated continuous current Ith[2] (A)
	with	2	0,95	< 5	Start current Ie (A)
DUO-wiring (most frequent applied wiring)		1	1	-	Rated continuous current Ith[2] (A)
Serial wiring (Tandem connection)	without	1	0,5		Rated continuous current Ith[2] (A)
	with	20	0,9		Start current Ie (A)
Lighting gas lamps without starter	without	1	0,5	-	Rated continuous current Ith[2] (A)
Halogen - metal vapour lamps	without	1	0,4-0,6	-	Rated continuous current Ith[2] (A)
	with	1	0,4-0,6	-	Rated continuous current Ith[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 Ith[2] (A)
	with	20	0,95	5...12	
(Low pressure vapour lamps)	without	1	0,3	5...12	70% Rated Continuous current Ith[2] (A)
	with	20	0,95	5...12	
High pressure sodium vapour lamps	without	1,6	0,4-0,6	5...8	70% Rated continuour current Ith[2] (A)
	with	20	0,95	5..8	70% Rated continuous current Ith (A) and Start current Ie (A)

[1] In = Rated lamp current
[2] Ith = Rated continuous contactor current

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 AC	18	0,37	-	121	216	243	270
	36	0,43	-	104	186	209	232
	58	0,67	-	67	119	134	149
Fluorescent lamps with parallel compensation							
220-240 V AC	18	0,11	4,5	78	111	160	197
	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 AC	2x18	2x0,11	-	408	726	-	-
	2x36	2x0,21	-	214	380	-	-
	2x58	2x0,32	-	140	250	-	-
High pressure sodium vapour lamps without compensation							
220-240 V AC	150	1,8	-	17	26	34	41
	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 AC	150	1	20	30	58	73	88
	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 AC	80	0,8	-	75	120	150	200
	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 AC	80	0,41	8	53	178	200	238
	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 7,5

In confomity 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 ≤ 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**
Capacitor rating at operating 230V kVAr voltage **400-440V kVAr** 50/60Hz 500-550V kVAr 660-690V kVAr	 1,4 **2,5** 3 3,7	 2.8 **5** 5,5 7,5	 4 **7,5** 9 11
Rated operational current **Ie**/AC-6b et **400 V** **A**	**3,6**	**7,2**	**11**
Insulation rating Ui V	690		
Permissible ambient temperature ^{0}C	- 25 to + 55		
Rated impuls wihtstand voltage Uimp kV	8		
Consumption of electromagnet in cold state with Un AC operated closing VA p.f. closed VA p.f.	 62 0,75 7 0,3		
Coil voltage tolerances	0,85 - 1,1 Un		
Degree of protection	IP 20		
Maximum permissible fuse ratings main circuit gL/gG A auxilliary circuit A	 20 16	 25 20	 40 25
Frequency of switching operations s/h	240		
Electrical endurance min.	150.000	120.000	100.000
Sizes of connecting conductors - main circuit multi-wire conductor mm^2 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
Terminal screw	M4	M4	M4
Screw head	PZ2	PZ2	PZ2
Tightening torque Nm	1,2	1,2	1,4
- auxiliary circuit multi-wire conductor mm^2 multi-wire conductor with cable shoe mm^2 Terminal screw	1-2,5 0,75-1,5 M3,5		
Screw head	PZ2		
Tightening torque Nm	0,8		
Loadability of auxiliary contacts rated continuous current I_{th}; 35^{0}C A AC rated operational current Ie/AC15 for 230V A 400V A 500V A 690V A	 10 6 4 2 1		

TECHNICAL INFORMATION

CAPACITOR CONTACTORS type CNNK 10 - CNNK 30

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

Special contactors for power factor correction

1

Main characteristics

These contactors are equipment 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, resistances which limit the connecting current of the capacitors. These resistances are then excluded when the closing operation is complete and the current capacity is conveyed to the main contacts.

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 at operating voltage 50/60Hz	230V kVAr	5	6.7	8.5	11	14	14	20
	400-440V kVAr	**10**	**12.5**	**15**	**20**	**25**	**25**	**30**
	500-550V kVAr	12.5	15	18	24	30	30	35
	660-690V kVAr	15	18	22	30	35	35	40
Rated operational current **Ie**/AC-6b et **400 V**	**A**	**14**	**18**	**22**	**29**	**36**	**36**	**44**
Insulation rating Ui	V	690						
Permissible ambient temperature	°C	- 25 to + 55						
Rated impuls wihtstand voltage Uimp	kV	8						
Consumption of electromagnet in cold state with Un AC operated								
closing	VA	62				65		
p.f.		0,75				0,75		
closed	VA	7				8		
p.f.		0,3				0,3		
Coil voltage tolerances		0,85 - 1,1 Un						
Degree of protection		IP 20						
Maximum permissible fuse ratings								
main circuit gL/gG	A	25	35	50	50	63	63	80
auxilliary 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	
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	A	10						
AC rated operational current Ie/AC15								
for 230V	A	6						
400V	A	4						
500V	A	2						
690V	A	1						

TECHNICAL INFORMATION

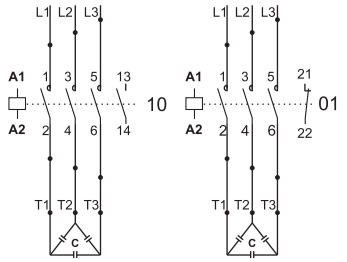
CAPACITOR CONTACTORS type
CNNK 40 - CNKM 75
In confomity with: IEC 60947-1, IEC 60947-4

Special contactors for power factor correction

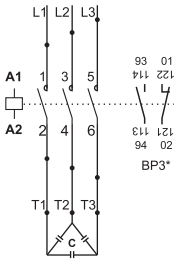
Type designation	CNNK 40 10 CNNK 40 01	CNNK 50 10 CNNK 50 01	CNNK 60 10 CNNK 60 01	CNKM 60 22	CNKM 75 22
Capacitor rating at operating 230V kVAr voltage **400-440V kVAr** 50/60Hz 500-550V kVAr 660-690V kVAr	 25 **40** 50 58	 29 **50** 60 70	 32 **60** 70 80	 34 **60** 75 92	 38 **75** 88 100
Rated operational current **Ie**/AC-6b et **400 V** **A**	**58**	**72**	**87**	**87**	**108**
Insulation rating Ui V	1000				
Permissible ambient temperature °C	- 25 to + 55				
Rated impuls wihtstand voltage Uimp kV	8				
Consumption of electromagnet in cold state with Un AC operated closing VA p.f. closed VA p.f.	 155 0,6 12 0,29			 310 0,5 26 0,24	
Coil voltage tolerances	0,85 - 1,1 Un				
Degree of protection	IP 20			IP 00 or IP 20	
Maximum permissible fuse ratings main circuit gL/gG A auxilliary circuit A	 100 16	 125 16	 160 16	 160 16	 160 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 multi-wire conductor with cable shoe mm^2	 16-35	 16-35	 16-50	 2x35 or 1x50 (for ST*) 35-50 (with IP 20) 50 50-70 (without IP 20)	
Terminal screw	M6			M6 (with IP 20) M8 (without IP 20)	
Screw head	PZ2				
Tightening torque Nm	3 - 4			3.5	
- auxiliary circuit multi-wire conductor mm^2 multi-wire conductor with cable shoe mm^2 Terminal screw Screw head Tightening torque Nm	 1-2,5 0,75-1,5 M3,5 PZ2 0,8				
Loadability of auxiliary contacts rated continuous current I_{th}; 35°C A AC rated operational current I_e/AC15 I_{th}; for 230V A 400V A 500V A 690V A	 16 10 6 4 2				

ST - Main conductors with box terminal max. 1x50mm^2 or 2x35mm^2

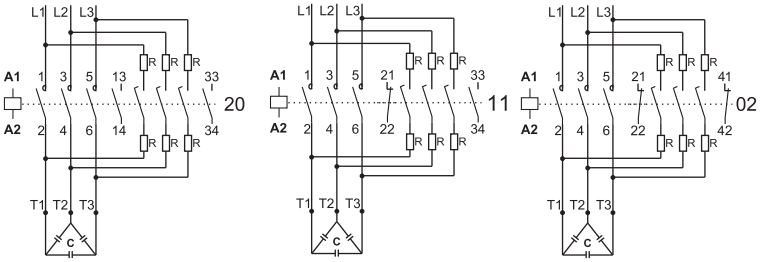
CONNECTION DIAGRAMS AND TERMINAL MARKINGS FOR SINGLE COMPENSATION



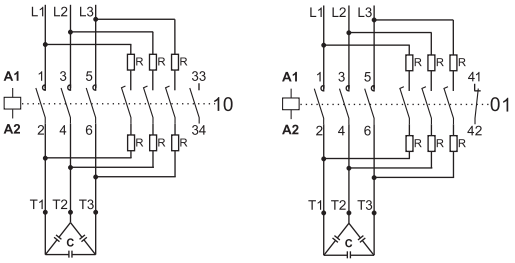
CNNK 2.5, CNNK 5



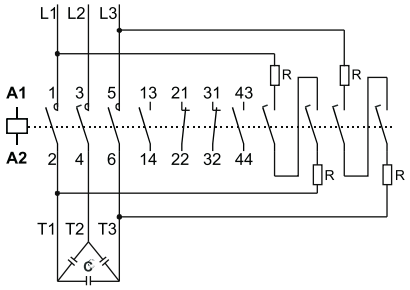
CNNK 7,5 00
CNNK 7,5 11*



CNNK 10, CNNK 12, CNNK 15



CNNK 20, CNNK 25, CNNK 25E,
CNNK 30, CNNK 40, CNNK 50 , CNNK 60



CNKM 60 22; CNKM 75 22

VERY IMPORTANT NOTES:

For single compensattion 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's 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.

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

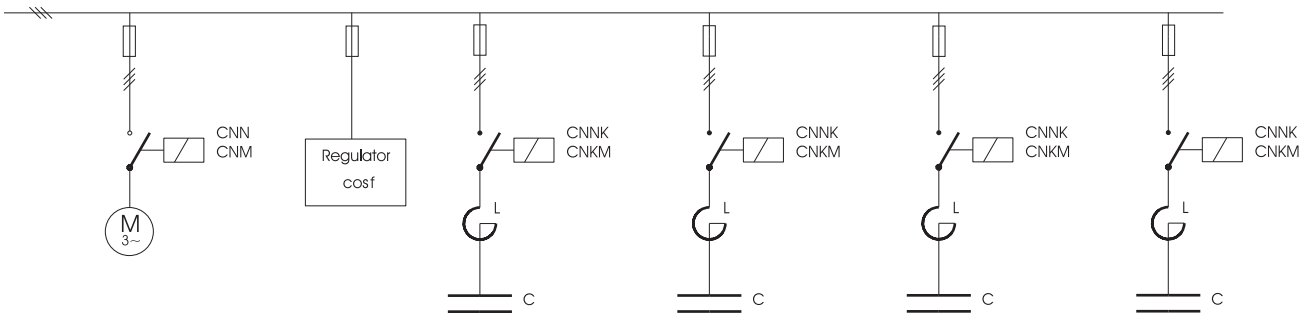
At group and central compensation, when reactors are not in use, one step higher rating of the contactor is recommendable.

Before switch the contactor in the circuit, capacitor must be discharged (the voltage at the terminals must be < 50 V).

During exploitation, current value must not exceed the declared values.

CONECTION 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		^{0}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
	closed	VA	18	50	75
	p.f.		0.33	0.36	0.4
DC operated	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 Ith		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	200
DIN VDE 0660 Part 102	Type of coord. "2" aM	A	50	160	355
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 1/21 and 1/22

TECHNICAL INFORMATION

MINI CONTACTOR RELAY type CP0

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 - 1,1Un
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	for contactors without relays			
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			A	16
AC rated operational current I_e/AC15	for	230 V	A	6
		400 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 CNNNB

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

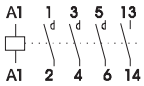
Technical data

				CNNP	CNNPB
Contactor type					
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	–
	closed		VA	7	–
	p.f.			0.3	–
DC operated	closing		W	128	6.5
	closed		W	2.8	6.5
Coil voltage tolerances				0,8 - 1,1Un	
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	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			A	16	16
	fuse-links, quick-acting		A	20	20
	high-rupturing capacity fuses		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
DC rated operational current I_e/DC1 ; L/R≤1ms		for 24 V	A	6 (6)[1]	6 (6)[1]
(with series connection of 3 current paths)[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		for 24 V	A	4 (6)[1]	4 (6)[1]
(with series connection of 3 current paths)[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**	

Wiring diagrams

Motor contactors

AC coil operation



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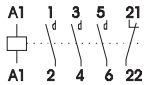
CM1, CNN 9,
CNN 12, CNN 18



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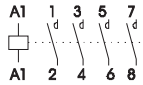
CM1, CNN 9,
CNN 12, CNN 18



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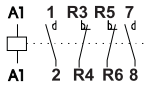
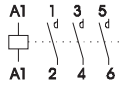
CM1,CNN 9, CNN 12



0022

CNN 9 0022, CNN 12 0022



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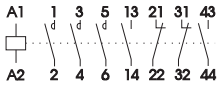
CM1, CNN 25, CNN 30, CNN 32,
CNN 40,CNN 50, CNN 60,
CNN 70, CNN 80, CNN 90



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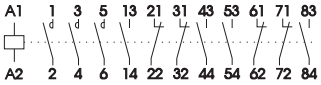
CNM 110, CNM 140, CNM 170, CNM 200,
CNM 250, CNM 315, CNM 400



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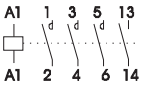
CNM 110, CNM 140,
CNM 170, CNM 200,
CNM 250,CNM 315, CNM 400

DC coil operation



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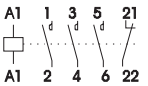
CNNB 9, CNNB 12,
CNNB 18



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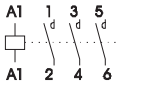
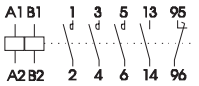
CNNB 9, CNNB 12,
CNNB 18



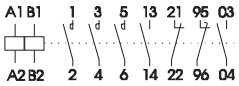
00

CNNB 25, CNNB 30



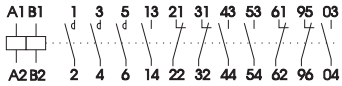
10

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



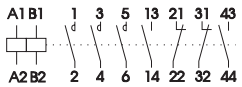
21

CNM 110



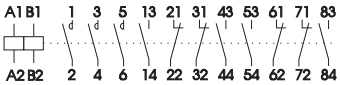
43

CNM 110



22

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

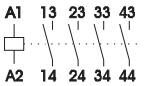


44

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

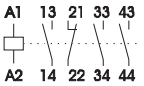
Contactors relays

AC and DC coil operation



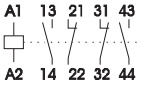
40

CP0, CNNP , CNNPB



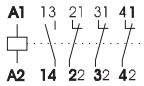
31

CP0, CNNP , CNNPB



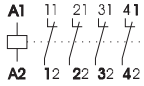
22

CP0, CNNP , CNNPB



13

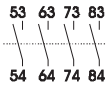
CNNP , CNNPB



04

CNNP , CNNPB

Snap-on auxiliary contakt blocks



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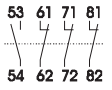

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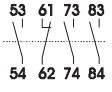
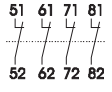
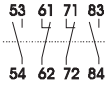


31



04

BP0



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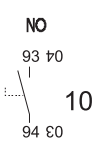
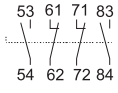


BP1

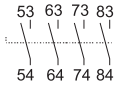
11

BP2; BP2N



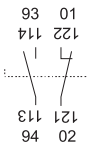
22

BP4; BP4N



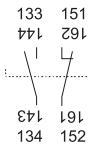
40

BP4



11

BP3

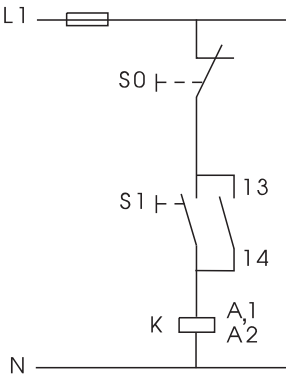


11

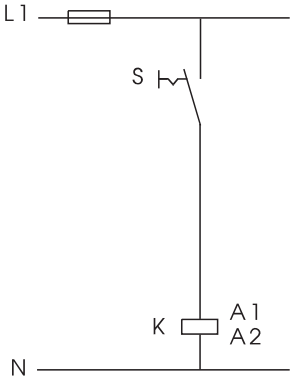
BP5

SCHEMATIC DIAGRAMS FOR AC OPERATED CONTACTORS

CPO, CNNP, CM1, CNN 9 - CNN 90, CNM 110 - CNM 400



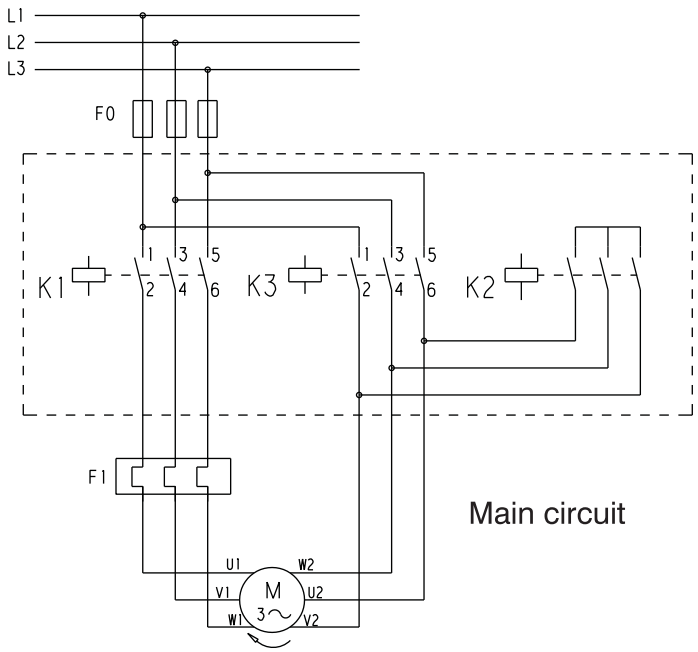
With push button "S0, S1"



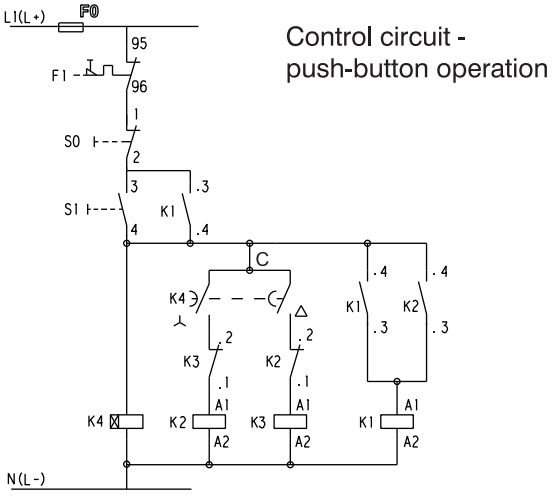
With permanent contact switch "S"

IMPORTANT:

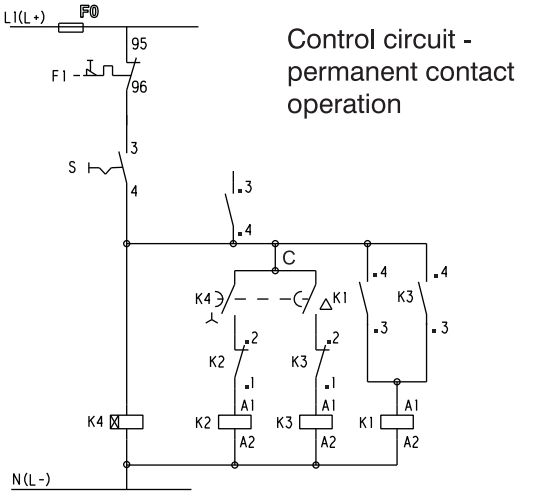
When used in **star-delta starters** the time between change over connection from star to delta must be bigger than 100ms which is achieved with electronic time relays (e.g. **Rade Koncar type EVRK 40**, see page 6/5).



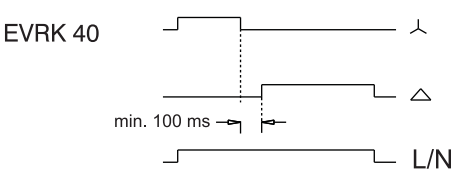
Main circuit



Control circuit - push-button operation

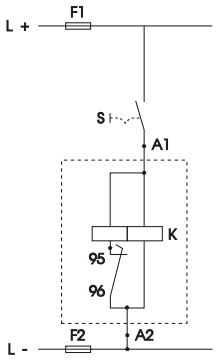


Control circuit - permanent contact operation

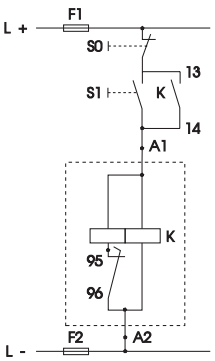


SCHEMATIC DIAGRAMS FOR DC OPERATED CONTACTORS

CNN 9 - CNN 40

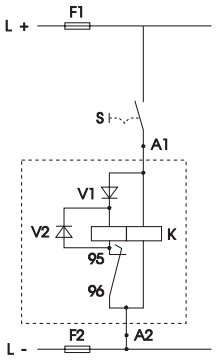


Permanent contact control

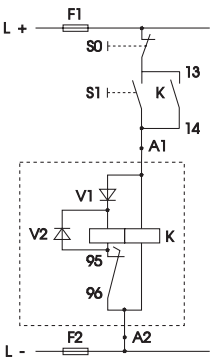


Push button control

CNN 50 - CNN 90

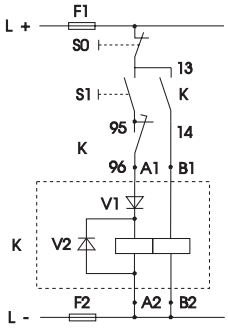


Permanent contact control

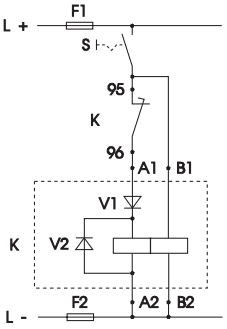


Push button control

CNM 110

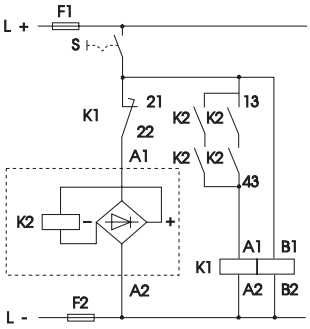


Push button control



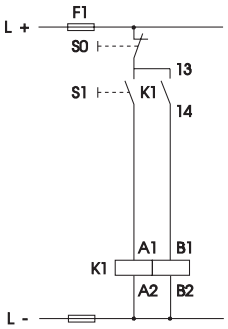
Permanent contact control

CNM 140 - CNM 200
CNM 250 - CNM 400



K1 = CNM 140, CNM 400
K2 = CNP 21 40 EG

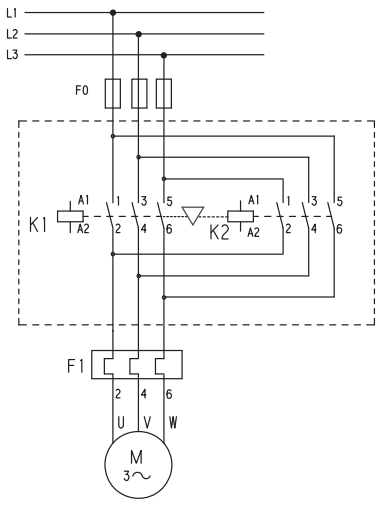
Permanent contact control



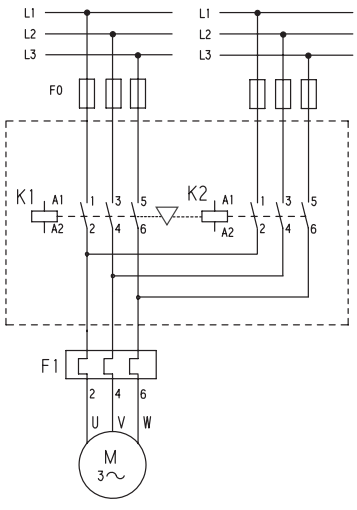
Push button control

SCHEMATIC DIAGRAMS FOR REVERSING CONTACTORS and “AVR”

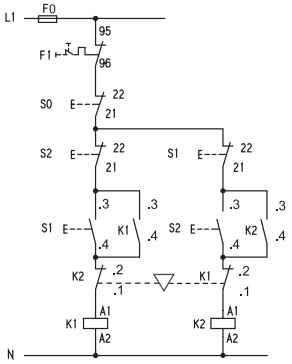
MBCM1, MBCNN 9 - MBCNN 90, MBCNM 110 -MBCNM 400



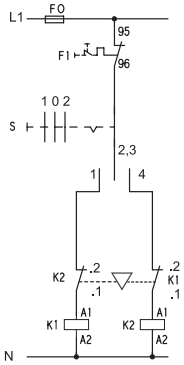
Main circuit



AVR

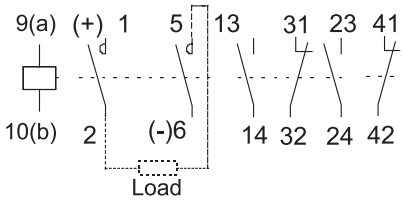


Control circuit - push-button operation

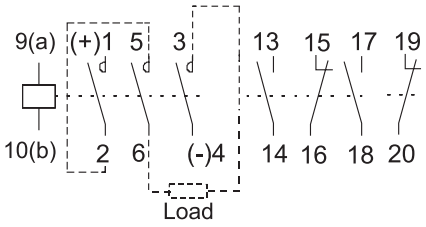


Control circuit - permanent contact operation

Wiring diagrams

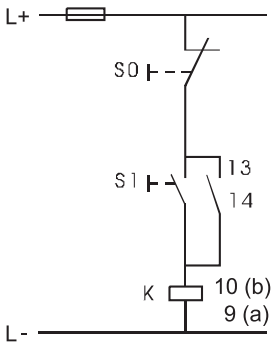


CNO 30

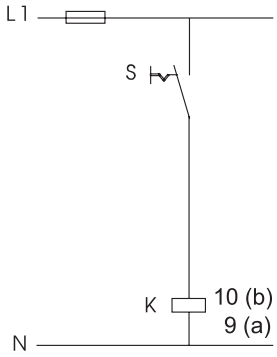


CNO 110, CNO 250

SCHEMATIC DIAGRAMS FOR AC OPERATED CONTACTORS

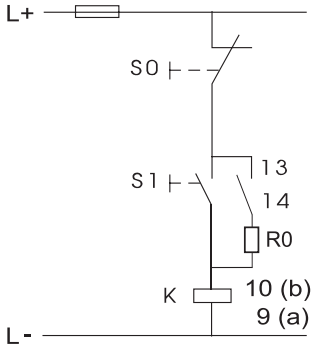


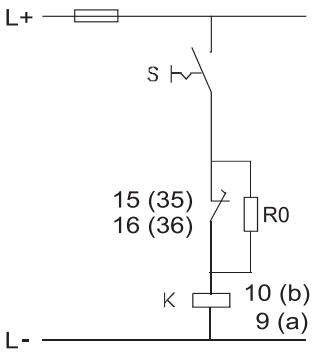
Push button control



Permanent contact control

SCHEMATIC DIAGRAMS FOR DC OPERATED CONTACTORS

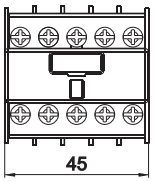




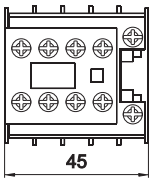
DIMENSION DRAWINGS (dimensions in mm)

1

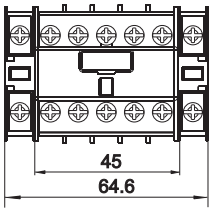
CP0,
CM1

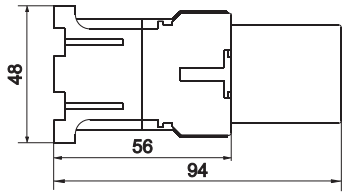


CP0 + BP0,
CM1 + BP0



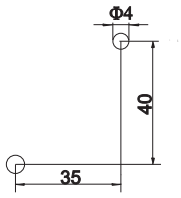
CP0 + 2xBP1,
CM1 + 2xBP1



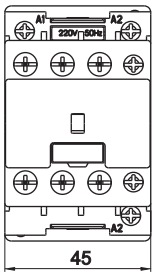


Driling plan (mm)

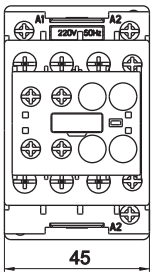
CP0; CM1



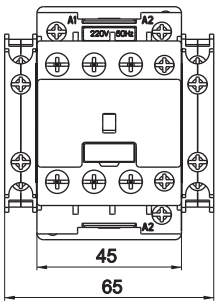
CNN 9; CNN 12;
CNN 18; CNNB 9;
CNNB 12; CNNB 18

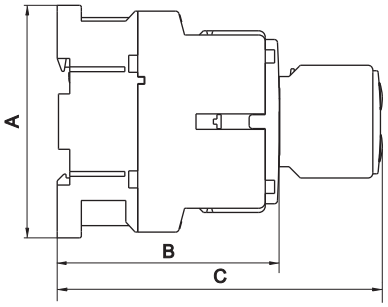


CNN 9 (CNNB 9) + BP2 (BP4)
CNN 12 (CNNB 12) + BP2 (BP4)
CNN 18 (CNNB 18) + BP2 (BP4)

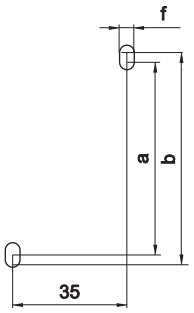


CNN 9 (CNNB 9) + 2xBP3
CNN 12 (CNNB 12) + 2xBP3
CNN 18 (CNNB 18) + 2xBP3





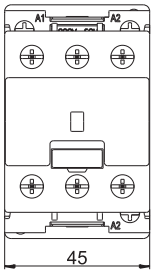
CNN 9; CNN 12; CNN 18;
CNNB 9; CNNB 12; CNNB 18



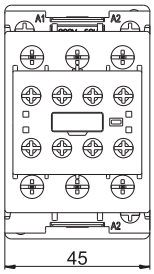
TYPE	CNN 9 - CNN 18	CNNB 9 - CNNB 18
A	72.2	74.2
B	71	114.5
C	101	146.8

TYPE	CNN 9 - CNN 18	CNNB 9 - CNNB 18
a	60	50
b	65	60
f	4.5	4.6

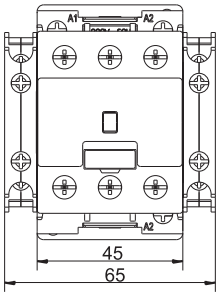
CNN 25; CNN 30,
CNNB 25; CNNB 30

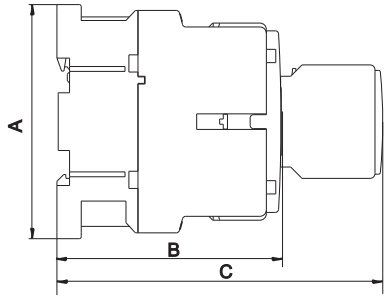


CNN 25 (CNNB 25) + BP2 (BP4)
CNN 30 (CNNB 30) + BP2 (BP4)

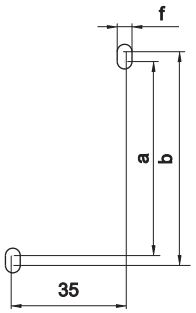


CNN 25 (CNNB 25) + 2xBP3
CNN 30 (CNNB 30) + 2xBP3





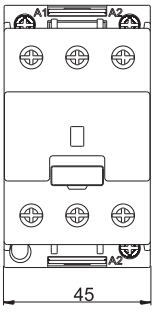
CNN 25; CNN 30;
CNNB 25; CNNB 30



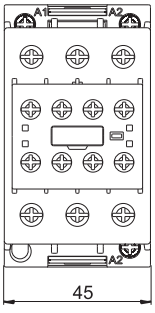
TYPE	CNN 25; CNN 30	CNNB 25; CNNB 30
A	72.2	74.2
B	71	114.5
C	100.5	146.1

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

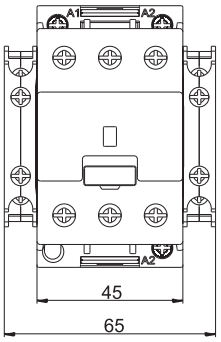
CNN 32;
CNN 40

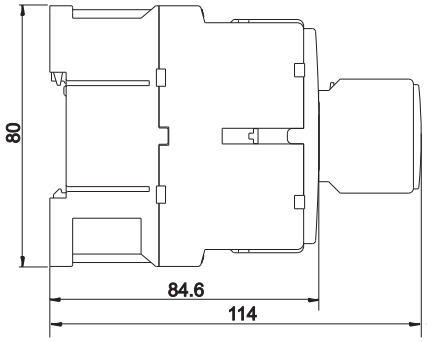


CNN 32 + BP2 (BP4);
CNN 40 + BP2 (BP4)

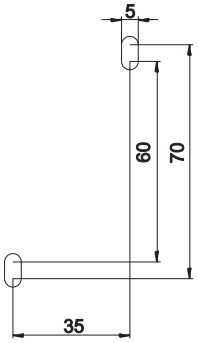


CNN 32 + 2xBP3;
CNN 40 + 2xBP3



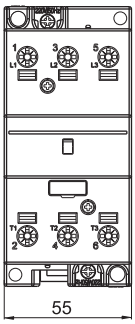


CNN 32; CNN 40

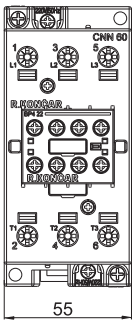


DIMENSION DRAWINGS (mm)

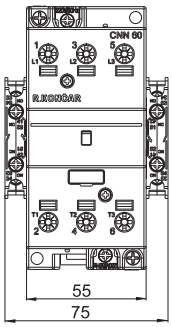
CNN 50; CNN 60;
CNN 70

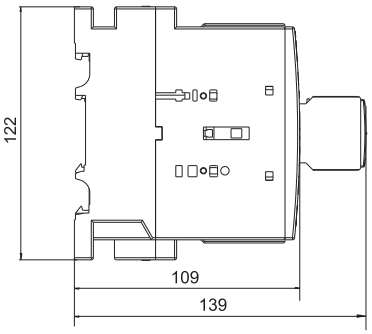


CNN 50 + BP2(BP4);
CNN 60 + BP2(BP4)
CNN 70 + BP2(BP4)

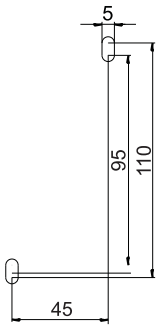


CNN 50 + 2BP3;
CNN 60 + 2BP3
CNN 70 + 2BP3

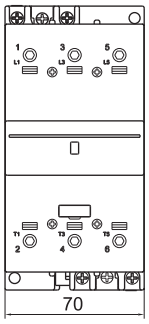




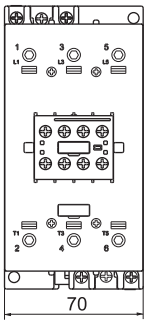
Driling plan (mm)



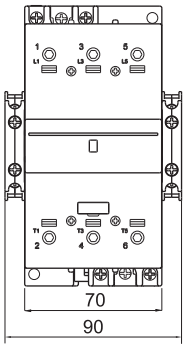
CNN 80; CNN 90

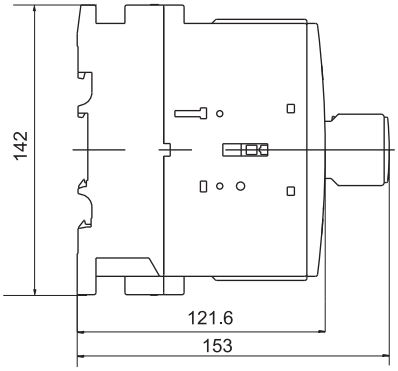


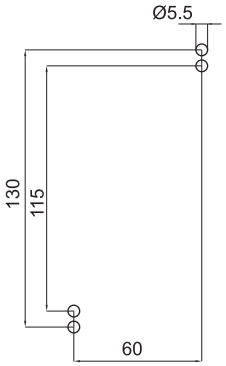
CNN 80 + BP2N(BP4N);
CNN 90 + BP2N(BP4N)



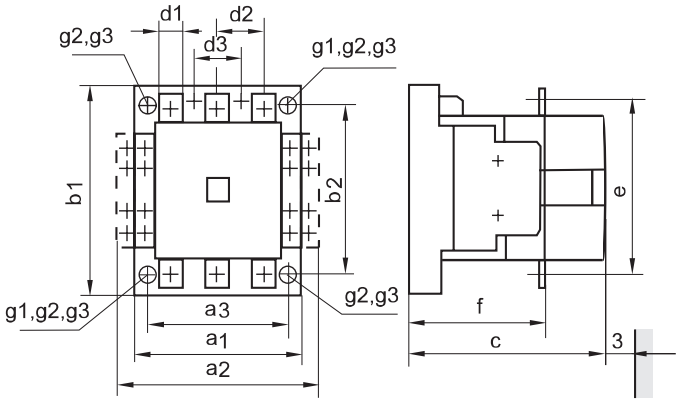
CNN 80 + 2BP3;
CNN 90 + 2BP3



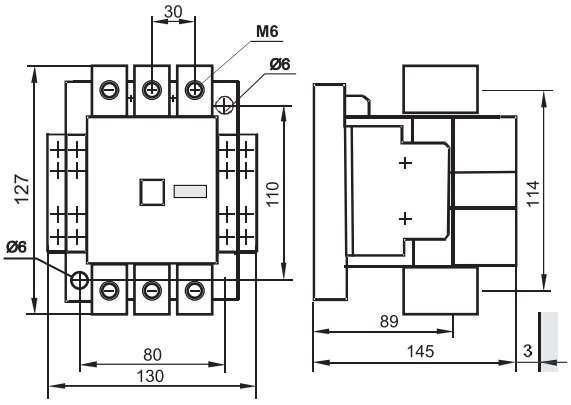




CNM 110, CNM 140, CNM 170, CNM 250, CNM 400

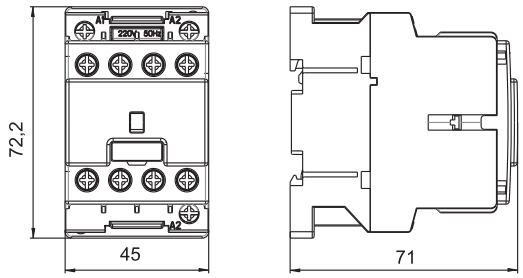


CNM 110ST

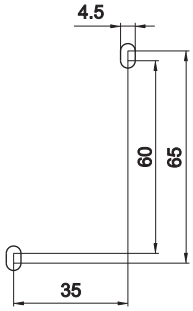


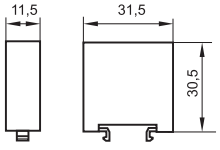
TYPE	a 1	a 2	a 3	b 1	b 2	c	d 1	d 2	d 3	e	f	g 1	g 2	g 3
CNM 110	100	125	80	132	110	142	15	30	44	113	86.5	Ø6		
CNM 140	135	162	110	180	160	189	20	42	44	162	116		Ø7	
CNM 170	135	162	110	180	160	189	20	42	44	162	116		Ø7	
CNM 200	135	162	110	180	160	189	20	42	44	162	116		Ø7	
CNM 250	160	187	130	200	180	226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



Driling plan (mm)

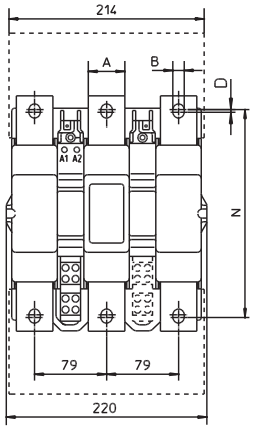


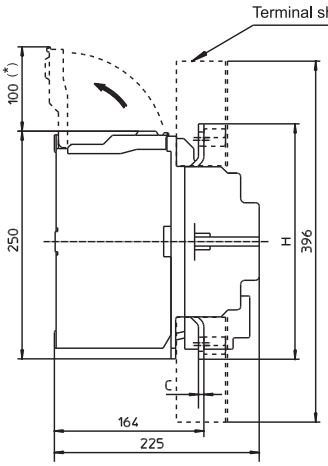


RC 1

Driling plan (mm)

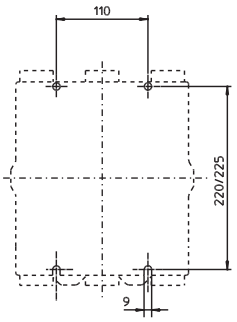
CNM 450; CNM 550;



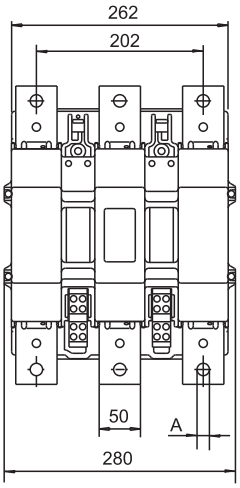


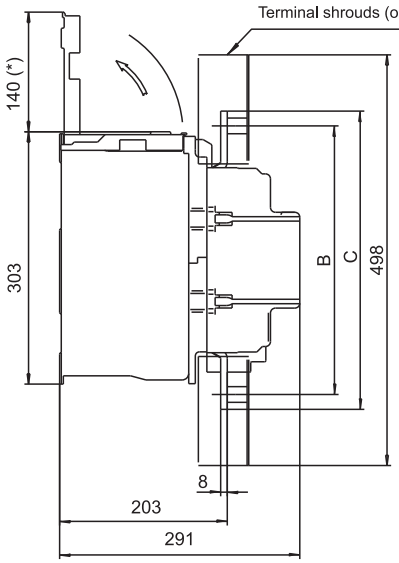
	A	B	C	D	N	H
CNM 450	40	10,5	4	4	208	235
CNM 550	40	12,5	6	3	228	258

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



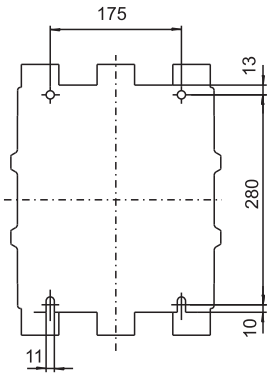
CNM 700; CNM 860



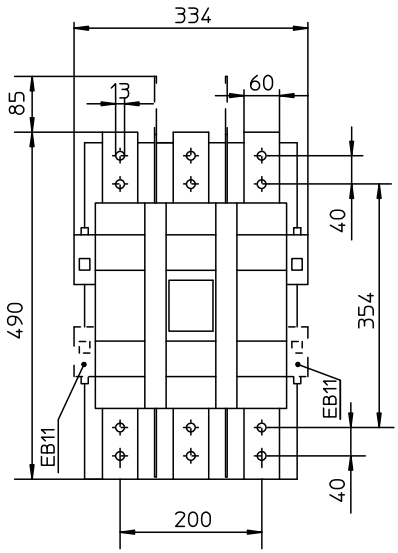


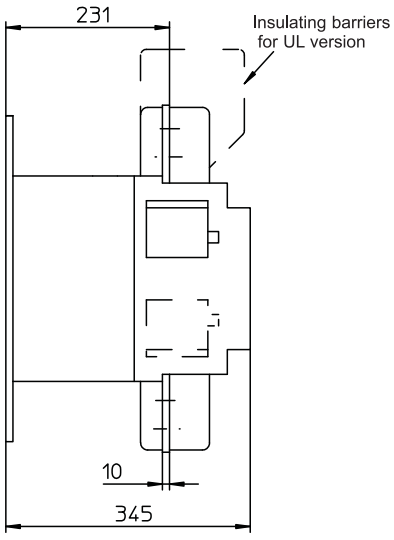
	A	B	C
CNM 700	13	277	307
CNM 860	15	325	361

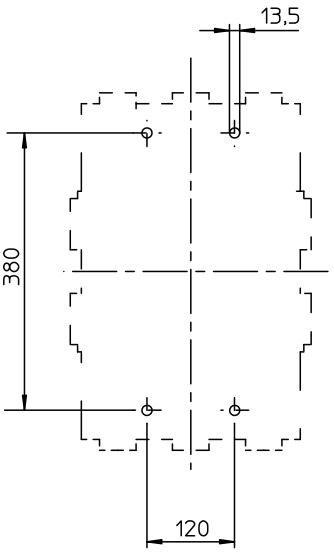
(*) Necessary distance to remove coil and/or feeder group.



CNM 1000

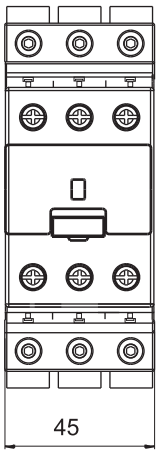


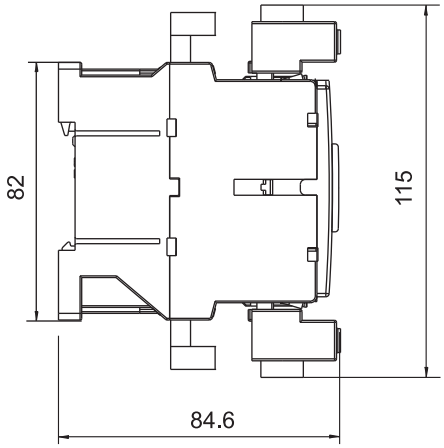




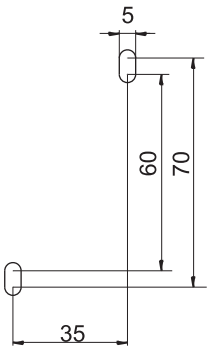
DIMENSION DRAWINGS (mm)

TKN 65

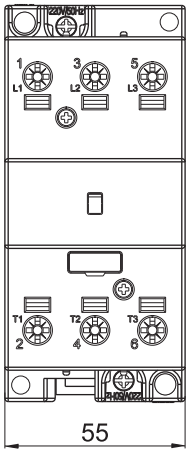


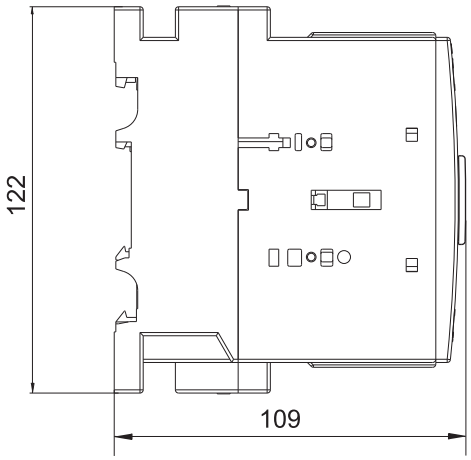


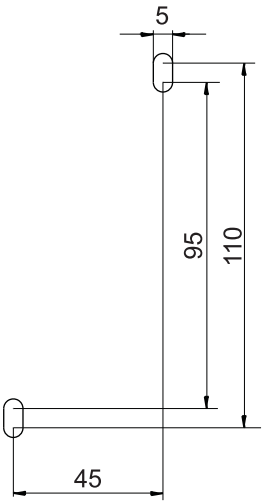
Driling plan (mm)



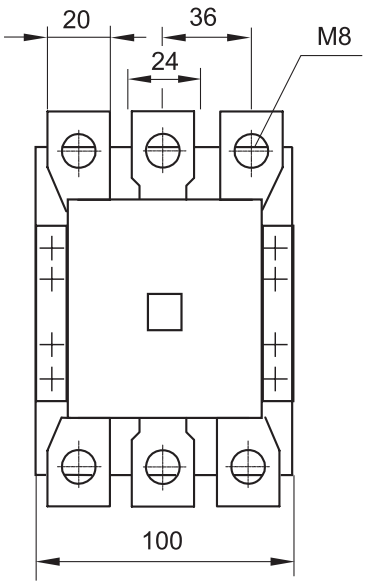
TKN 115

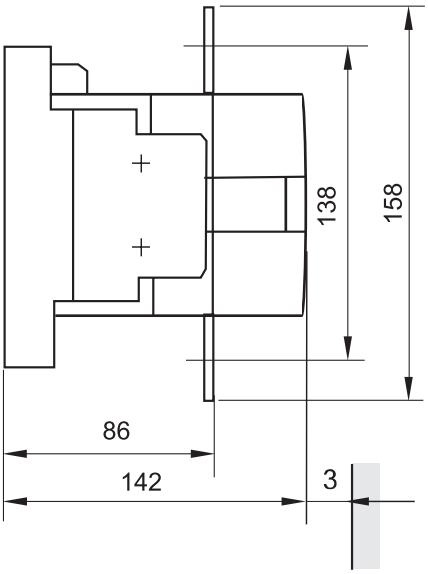


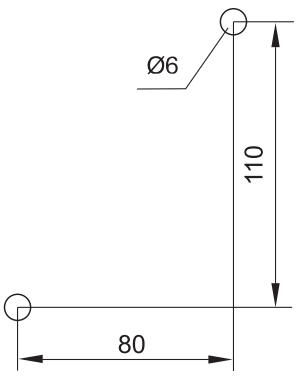




TK 130, TK 175

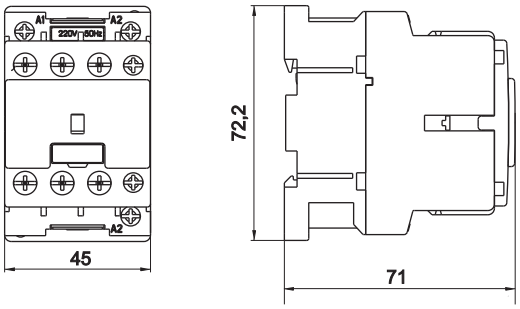




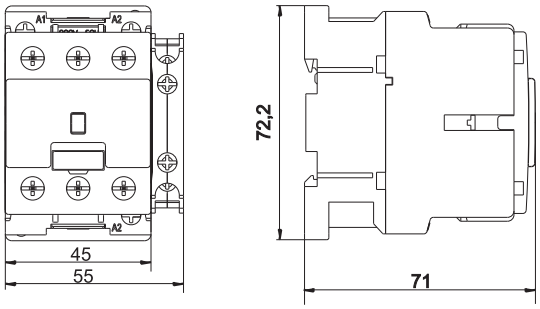


DIMENSION DRAWINGS (mm)

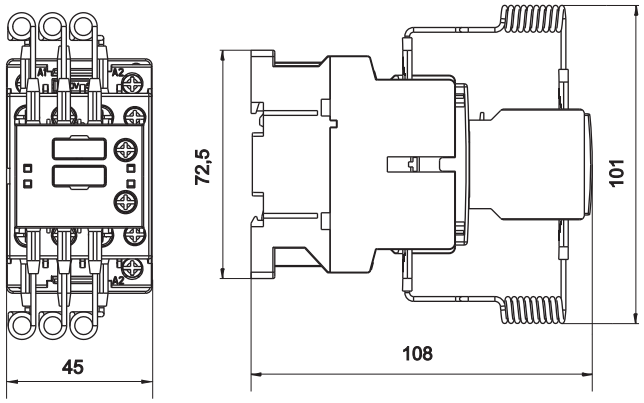
CNNK 2,5; CNNK 5



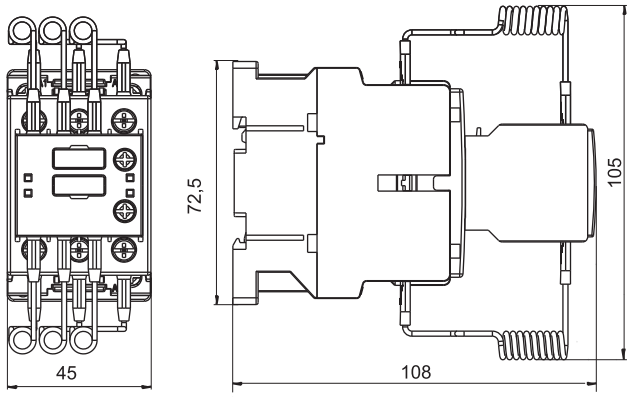
CNNK 7,5



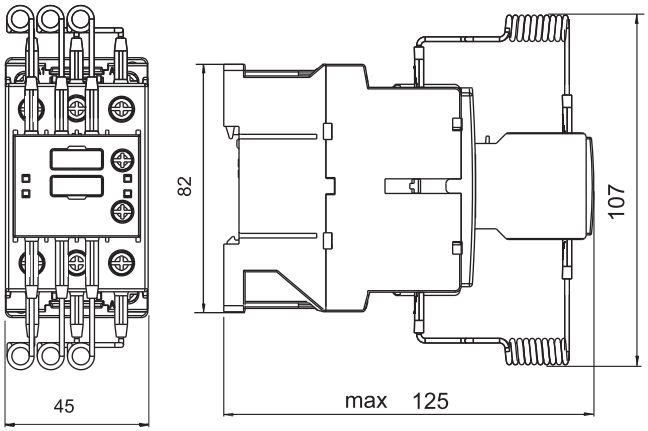
CNNK 10; CNNK 12; CNNK 15



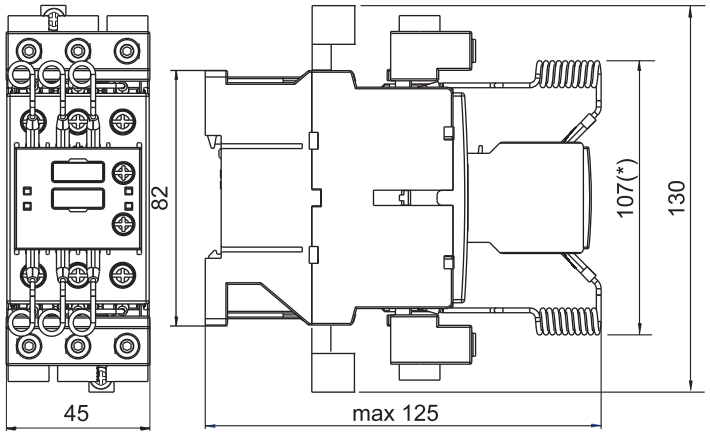
CNNK 20



CNNK 25E

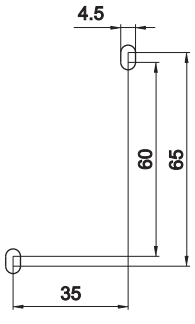


CNNK 25; CNNK 30

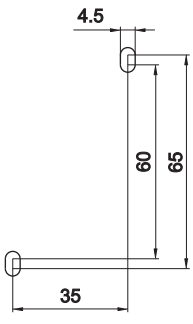


Driling plan (mm)

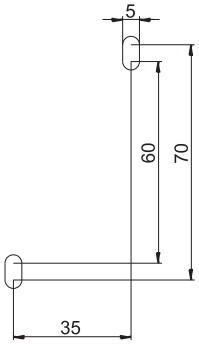
CNNK 2,5; CNNK 5
CNNK 7,5



CNNK 10; CNNK 12;
CNNK 15; CNNK 20



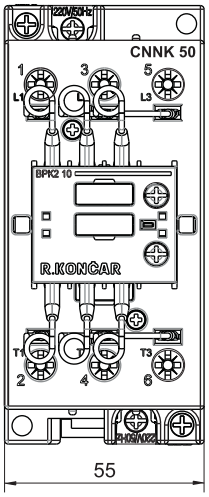
CNNK 25E; CNNK 25,
CNNK 30

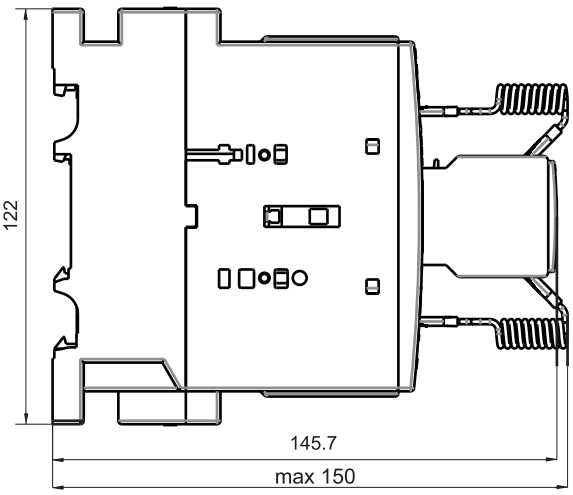


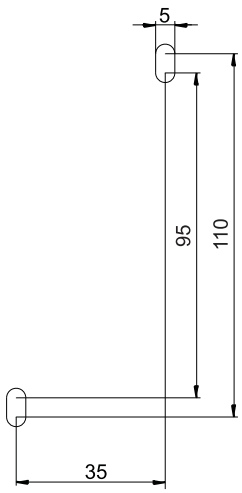
DIMENSION DRAWINGS (mm)

Driling plan (mm)

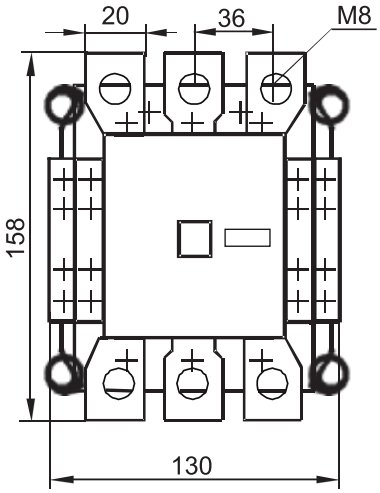
CNNK 40, CNNK 50, CNNK 60

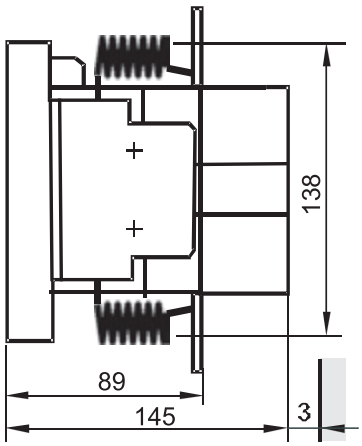




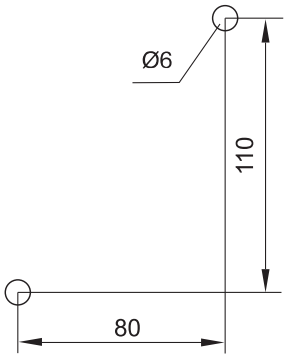


CNKM 60 and CNKM 75 without IP 20

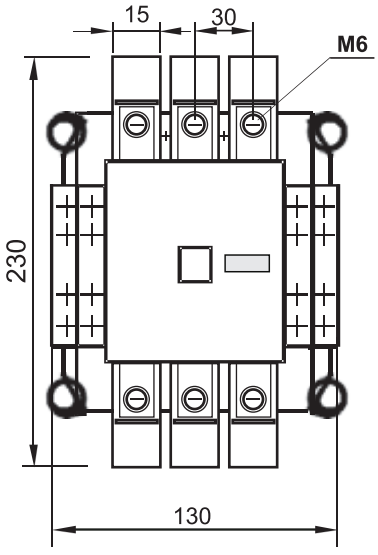


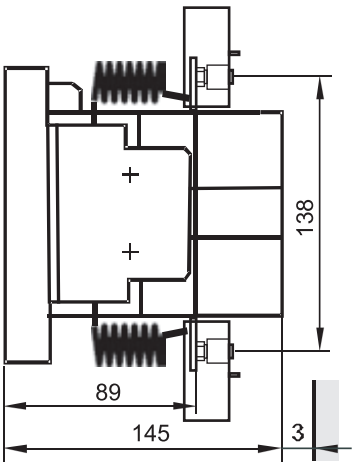


CNKM 60 and CNKM 75

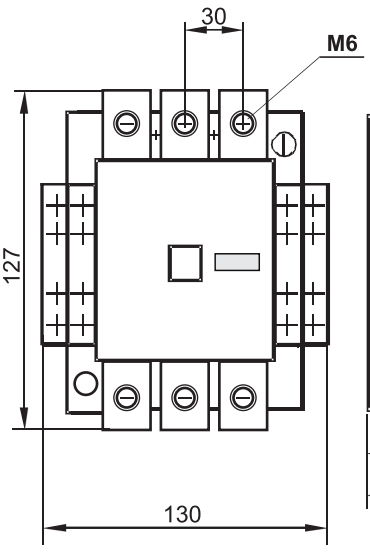


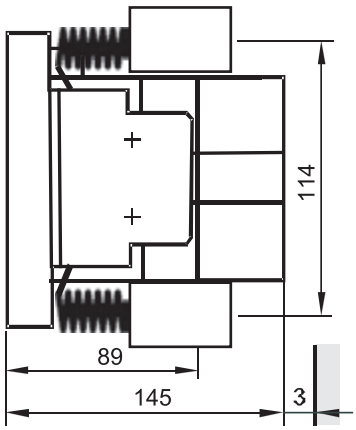
CNKM 60 and CNKM 75 with IP 20





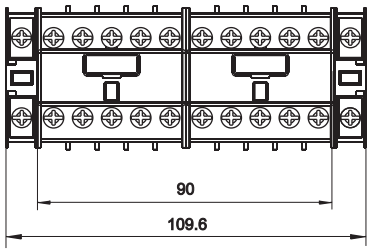
CNKM 60ST and CNKM 75ST

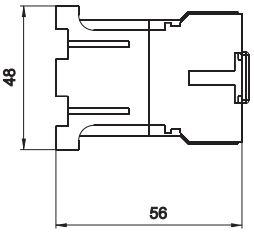




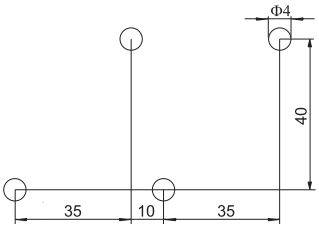
DIMENSION DRAWINGS (mm)

MBCM1 00; MBCM1 11

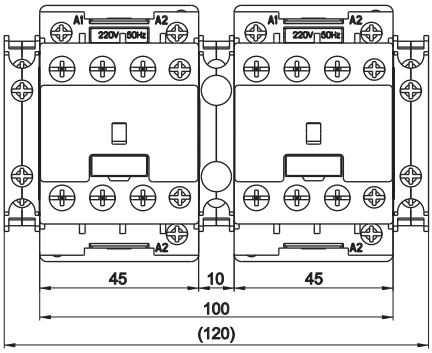


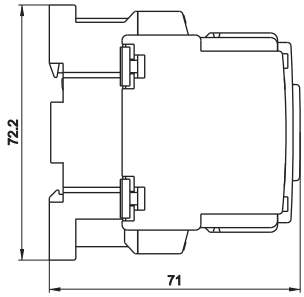


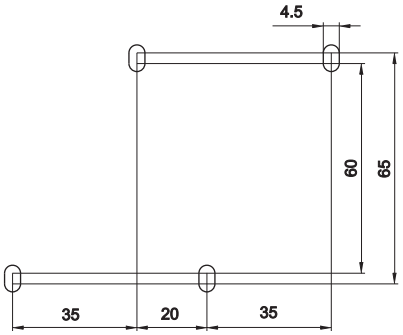
Driling plan (mm)



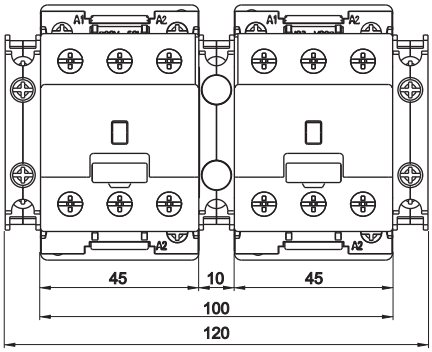
MBCNN 9 00 (11); MBCNN 12 00 (11); MBCNN 18 00 (11)

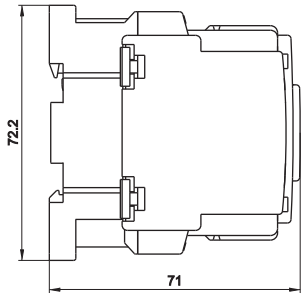


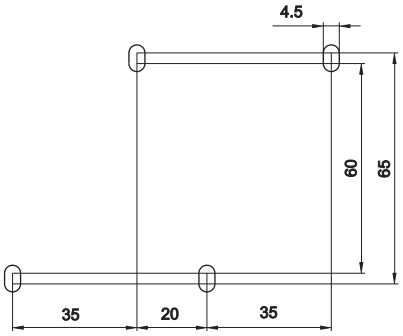




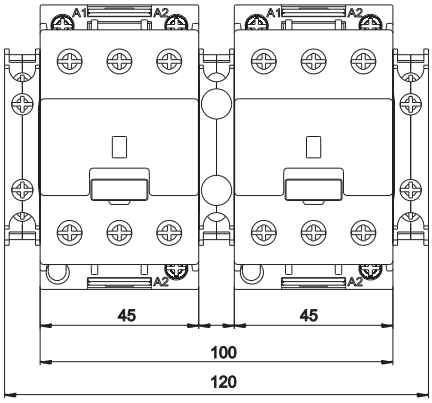
MBCNN 25 10; MBCNN 30 10

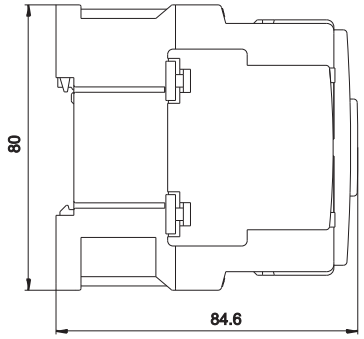


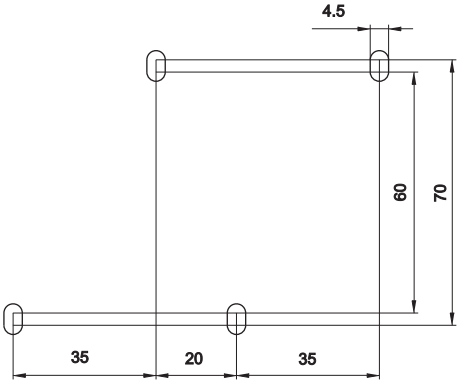




MBCNN 32 10 ; MBCNN 40 10

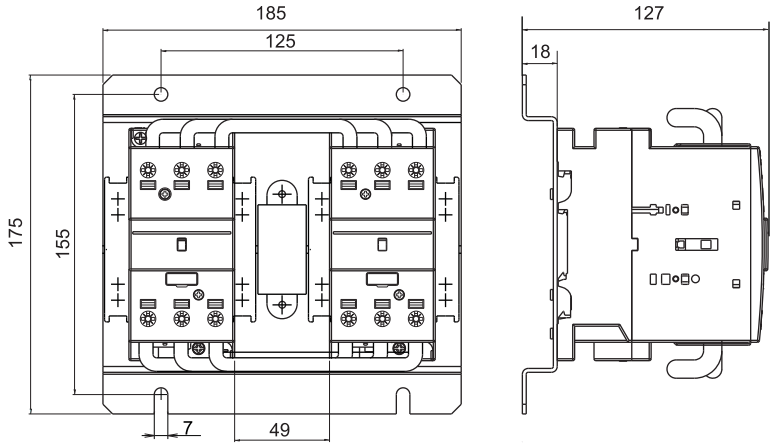




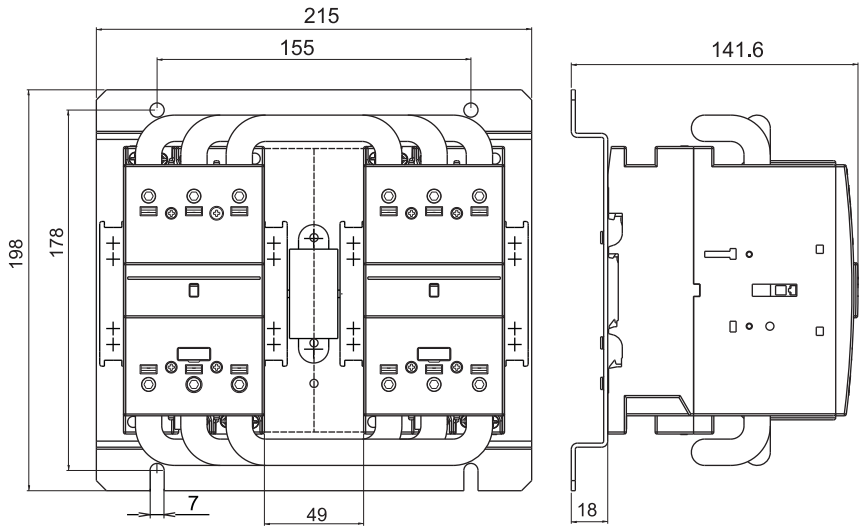


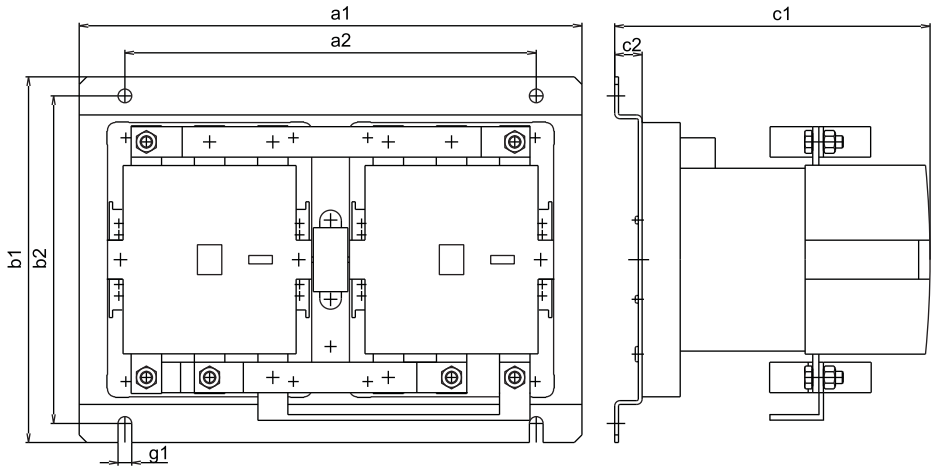
DIMENSION DRAWINGS (mm)

MBCNN 50 - MBCNN 70



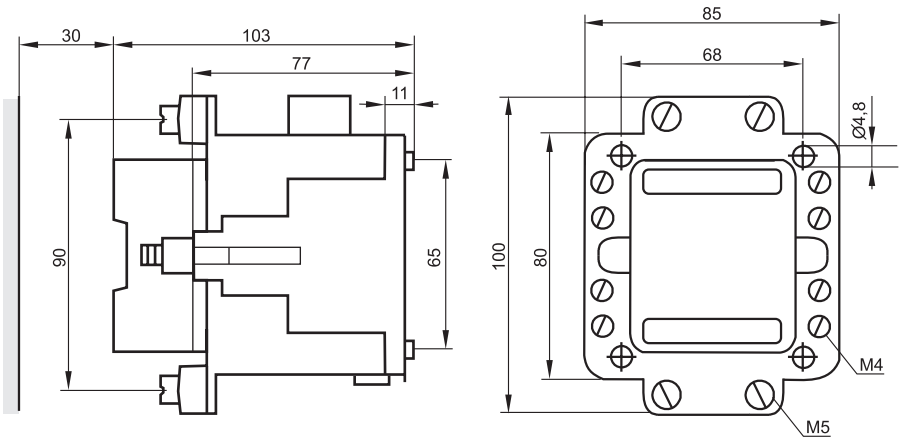
MBCNN 80 - MBCNN 90



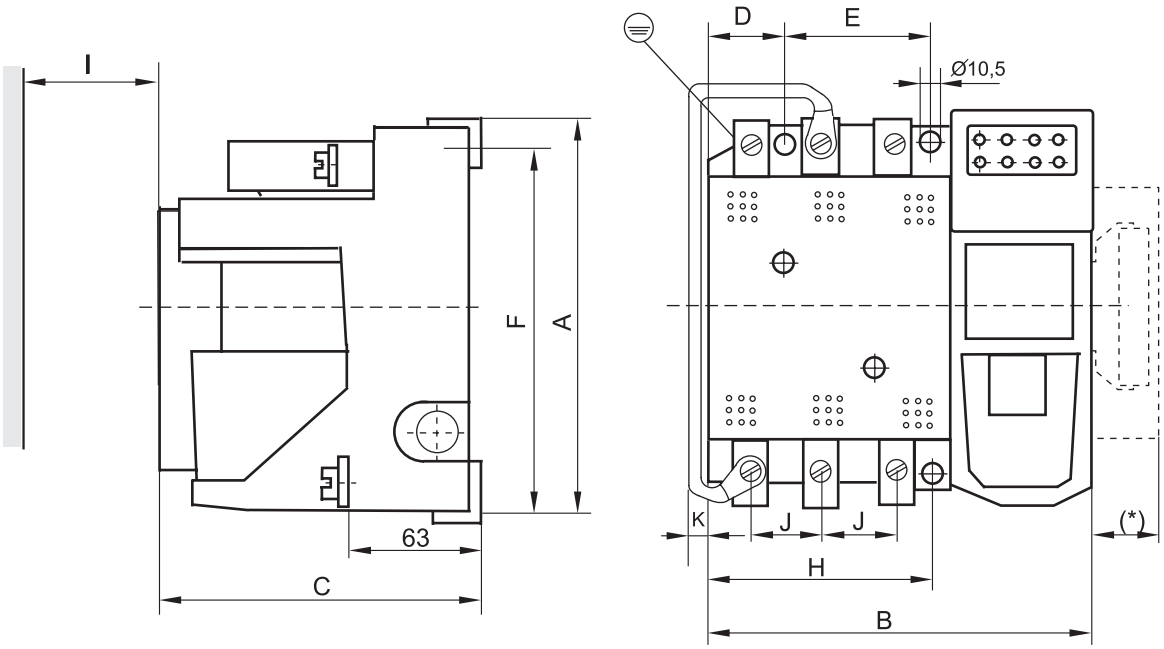


TYPE	a1	a2	b1	b2	c1	c2	g1
MBCNM 110	260	200	175	155	163	18	7
MBCNM 140 - MBCNM 200	330	270	240	215	210	18	9
MBCNM 250 - MBCNM 400	380	310	265	240	250	21	11

DIMENSION DRAWINGS (mm)



CNO 30



Contactor	A	B	C	D	E	F	G	H	I	J	K	(*) - Only for DC controlled cotactors 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	

Security Hologram Labels for original

RADE KONČAR KONTAKTORI I RELEI D.O.O.

products

From 1.06.2009 every products that has been produced in our company is market with tamper-eviden Security Hologram Label that provides authentication and protection against counterfeiting.

Only original products from
RADE KONČAR
have this
SECURITY HOLOGRAM LABELS

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