Industrial Products

CATALOGUE 2012

CONTACTORS

TECHNICAL INFORMATION

TECHNICAL DATA

1

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**	0.17
					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**	0.25
					0	1	**CNN 9 01**	
12	3.5	**5.7**	7.5	27	1	0	**CNN 12 10**	0.255
					0	1	**CNN 12 01**	

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	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	operational current **Ie/AC1** at 55 °C 400 V A	NO	NC		kg
	18	4	**7.5**	10	30	1 0	0 1	**CNN 18 10** **CNN 18 01**	0.26
	25	5.5	**11**	15	40	0	0	**CNN 25**	0.275
	32	7.5	**15**	18.5	50	0	0	**CNN 32**	0.355
	38	11	**18.5**	22	50	0	0	**CNN 40***	0.36

* For connecting multy-wired conductor up to 16 mm^2 must be ordered additional terminal blocks with Part No. 601478 (see 1/23).

** 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 1/21).

MOTOR CONTACTORS type CNNB 9-25
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 55 °C	Auxiliary contacts		Type	Weights
	Rated operational current **Ie** at 400 V	Max. Ratings of three-phase motor at 50 Hz and							
	A	230 V kW	**400 V kW**	690 V kW	400 V A	NO	NC		kg
	9	2.2	**4**	5.5	25	1 0	0 1	**CNNB 9 10** **CNNB 9 01**	0.54
	12	3.5	**5.7**	7.5	25	1 0	0 1	**CNNB 12 10** **CNNB 12 01**	0.54
	18	4	**7.5**	10	30	1 0	0 1	**CNNB 18 10** **CNNB 18 01**	0.55
	25	5.5	**11**	11	40	0	0	**CNNB 25**	0.60

[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;

MOTOR CONTACTORS type CNM 45 - CNM 170
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

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
	45	15	**22**	37	60	2	2	**CNM 45 22**	1.26
						4	4	**CNM 45 44**	1.36
	60	18.5	**30**	37	70	2	2	**CNM 60 22**	1.3
						4	4	**CNM 60 44**	1.4
	75	22	**37**	55	100	2	2	**CNM 75 22**	2.27
						4	4	**CNM 75 44**	2.37
	90	26	**45**	67	110	2	2	**CNM 90 22**	2.28
						4	4	**CNM 90 44**	2.38
	110	37	**55**	90	115	2	2	**CNM 110 22**	2.29
						4	4	**CNM 110 44**	2.39
	75	22	**37**	55	100	2	2	**CNM 75ST* 22**	2.27
						4	4	**CNM 75ST* 44**	2.37
	90	26	**45**	67	110	2	2	**CNM 90ST* 22**	2.28
						4	4	**CNM 90ST* 44**	2.38

* Tehnical information for Contactors CNM 75ST, CNM 90ST, CNM 110ST are same as CNM 75, CNM 90 and CNM 110. ST - Main conductors with box terminal max. 1x50mm^2 or 2x35mm^2

MOTOR CONTACTORS type CNM 200 - 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
	110	37	**55**	90	115	2	2	**CNM 110ST* 22**	2.29
						4	4	**CNM 110ST* 44**	2.39
	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	450	2	2	**CNM 400 22**	8.5
						4	4	**CNM 400 44**	8.9

MOTOR CONTACTORS type CNM 45 - CNM 170
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

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
	45	15	**22**	37	60	2	1	**CNM 45 21**	1.3
						4	3	**CNM 45 43**	1.4
	60	18.5	**30**	37	70	2	1	**CNM 60 21**	1.3
						4	3	**CNM 60 43**	1.4
	75	22	**37**	55	100	2	2	**CNM 75 22**	2.27
						4	4	**CNM 75 44**	2.37
	90	26	**45**	67	110	2	2	**CNM 90 22**	2.28
						4	4	**CNM 90 44**	2.38
	110	37	**55**	90	115	2	2	**CNM 110 22**	2.29
						4	4	**CNM 110 44**	2.39
	75	22	**37**	55	100	2	2	**CNM 75ST* 22**	2.27
						4	4	**CNM 75ST* 44**	2.37
	90	26	**45**	67	110	2	2	**CNM 90ST* 22**	2.28
						4	4	**CNM 90ST* 44**	2.38

* Tehnical information for Contactors CNM 75ST, CNM 90ST, CNM 110ST are same as CNM 75, CNM 90 and CNM 110. ST - Main conductors with box terminal max. 1x50mm^2 or 2x35mm^2

MOTOR CONTACTORS type CNM 200 - 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/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
	110	37	**55**	90	115	2	2	**CNM 110ST* 22**	2.29
						4	4	**CNM 110ST* 44**	2.39
	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	450	2	2	**CNM 400 22**	8.5
						4	4	**CNM 400 44**	8.9

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

1

Selection and ordering data

Data for **AC2** and **AC3** utilization categories			Auxiliary contacts			Type		Weights kg
Rated operational current **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**	0.634/0.784
12	3.5	**5.7**	1	0	IP 65	**PNN 12**	**PNNR 12**	0.637/0.787
18	4	**7.5**	1	0	IP 65	**PNN 18**	**PNNR 18**	0.642/0.792
25	5.5	**11**	0	0	IP 65	**PNN 25**	**PNNR 25**	0.705/0.855
32	7.5	**15**	0	0	IP 65	**PNN 32**	**PNNR 32**	0.822/0.972
38	11	**18.5**	0	0	IP 65	**PNN 40**	**PNNR 40**	0.824/0.974
DIRECT - ON LINE STARTERS WITH (I - O) PUSH - BUTTON								
								
9	3.2	**4.5**	-	-	IP 54	**PNNT 9**	**PNNRT 9**	0.672/0.822
12	3.5	**5.7**	-	-	IP 54	**PNNT 12**	**PNNRT 12**	0.674/0.824
18	4	**7.5**	-	-	IP 54	**PNNT 18**	**PNNRT 18**	0.677/0.827
25	5.5	**11**	1	2	IP 54	**PNNT 25**	**PNNRT 25**	0.740/0.890
32	7.5	**15**	1	2	IP 54	**PNNT 32**	**PNNRT 32**	0.859/1.009
38	11	**18.5**	1	2	IP 54	**PNNT 40**	**PNNRT 40**	0.861/1.011
DIRECT - ON LINE STARTERS WITH PERMANENT CONTACTS								
								
9	3.2	**4.5**	1	0	IP 54	**PNNG 9**	**PNNRG 9**	0.633/0.783
12	3.5	**5.7**	1	0	IP 54	**PNNG 12**	**PNNRG 12**	0.635/0.785
18	4	**7.5**	1	0	IP 54	**PNNG 18**	**PNNRG 18**	0.637/0.787
25	5.5	**11**	0	0	IP 54	**PNNG 25**	**PNNRG 25**	0.652/0.802
32	7.5	**15**	0	0	IP 54	**PNNG 32**	**PNNRG 32**	0.760/0.910
38	11	**18.5**	0	0	IP 54	**PNNG 40**	**PNNRG 40**	0.763/0.913

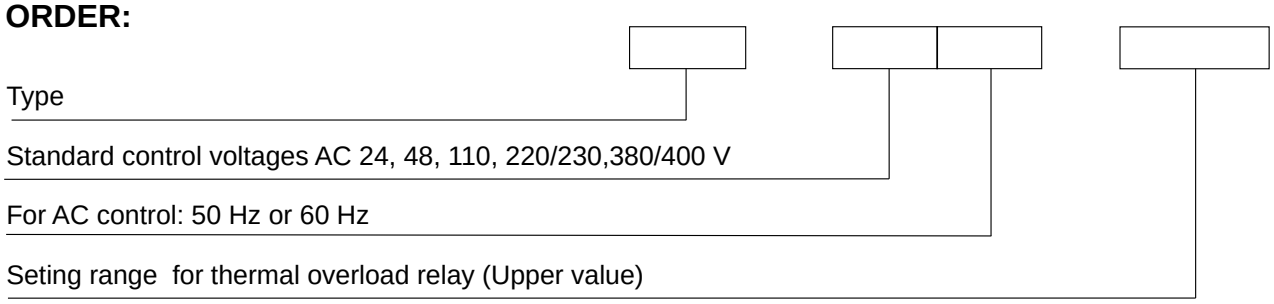
ENCLOSURES - type PNN and PNNT
from insulation material

Selection and ordering data

1

	Desing	Degree of protection	Type	Weights kg
 PNN	Enclosures without push-buttons	IP 65	**PNN**	0.315
 PNNT	Enclosures with push-buttons With "I" make and "O" breake push button	IP 54	**PNNT**	0.500

ORDER:



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

PNNT 18	**220 V**	**50 Hz.**

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

PNNRT 18	**220**	**50 Hz**	**16A**

REVERSING CONTACTOR ASSEMBLIES
type MBCM1 and MBCNN 9 - MBCNN 40 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 - MBCNN 40

1

Selection and ordering data

	Motor switching										
	AC2 / AC3 duty				**AC4 duty**			**Ie/AC1** at 55 °C	Auxiliary contacts per contactor	Type	Weights
	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
	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	**1.5**	1.5	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
	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

* For Push button control

The main and control circuits are wired according to the circuit diagrams on page 58.

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

REVERSING CONTACTOR ASSEMBLIES
type MBCNM 45 - MBCNM 400 for switching motors

Features

- Utilizing contactors with fixed auxiliaries
- 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
45	15	**22**	37	6.9	**12**	20.8	60	2	1	**MBCNM 45 21**	4
60	18.5	**30**	37	8.1	**14**	24.3	70	2	1	**MBCNM 60 21**	4
75	22	**37**	37	9	**17**	28.5	100	2	1	**MBCNM 75 21**	5.74
90	26	**45**	67	12	**22**	36	110	2	1	**MBCNM 90 21**	5.76
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	450	2	1	**MBCNM 400 21**	23.4

The main and control circuits are wired according to the circuit diagrams on page 58.
Note: Electrical endurance of contacts in AC4 utilization category is 120 000.

CONTACTORS type TKN 65; TK 115 - 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**	0.45
	**115**	44	**76**	2	2	**TK 115 22**	1.5
	**130**	50	**85**	2	2	**TK 130 22**	2.42
	**175**	67	**115**	2	2	**TK 175 22**	2.42

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

Selection and ordering data

1

	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 V kVAr**	400 V/50 Hz	NO	NC		
	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

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

1

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 V kVAr**	400 V/50 Hz	NO	NC		
	5	**10**	**14**	2 1	0 1	**CNNK 10 20** **CNKN 10 11**	0.314
	6,7	**12.5**	**18**	2 1	0 1	**CNNK 12 20** **CNKN 12 11**	0.316
	8.5	**15**	**22**	2 1	0 1	**CNNK 15 20** **CNNK 15 11**	0.318
	11	**20**	**29**	1	0	**CNNK 20 10**	0.333
	14	**25**	**36**	1	0	**CNNK 25E* 10** **CNNK 25 10**	0.404
	20	**30**	**44**	1	0	**CNNK 30 10**	0.404

* Without terminal blocks (see page 1/47 and 1/61)

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 CNKM 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

Selection and ordering data

	AC-6b utilization category For switching three-phase capacitors Capacitor rating at operating voltage 50 Hz		**Ie (A)**	Auxiliary contacts		Type	Weights
	230 V kVAr	**400 V kVAr**	400 V/50 Hz				kg
	25	**40**	**58**	0 2	0 2	**CNKM 40 00** **CNKM 40 22**	1.51 1.60
	29	**50**	**72**	0 2	0 2	**CNKM 50 00** **CNKM 50 22**	1.53 1.62
	32	**60**	**87**	0 2	0 2	**CNKM 60E 00** **CNKM 60E 22**	1.7 1.78
	34	**60**	**87**	2	2	**CNKM 60 22**	2.4
	38	**75**	**108**	2	2	**CNKM 75 22**	2.45

These 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

1

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

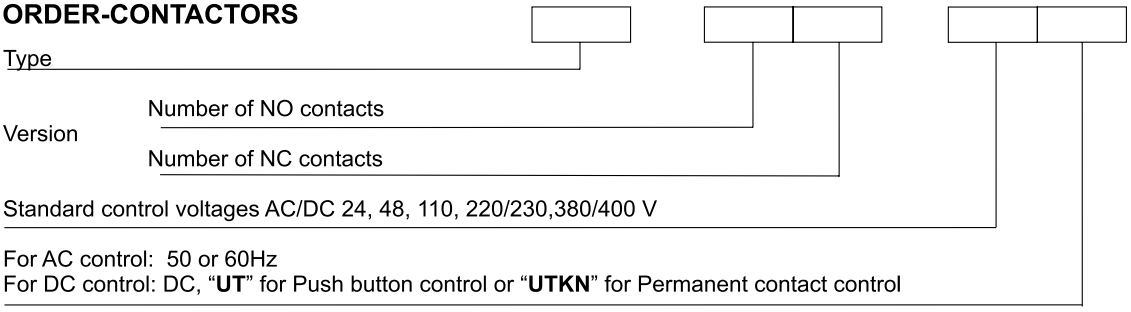
Selection and ordering data

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



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

1

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**	0.17
				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

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 CNB for auxiliary circuit switching
with DC SOLENOID SYSTEM

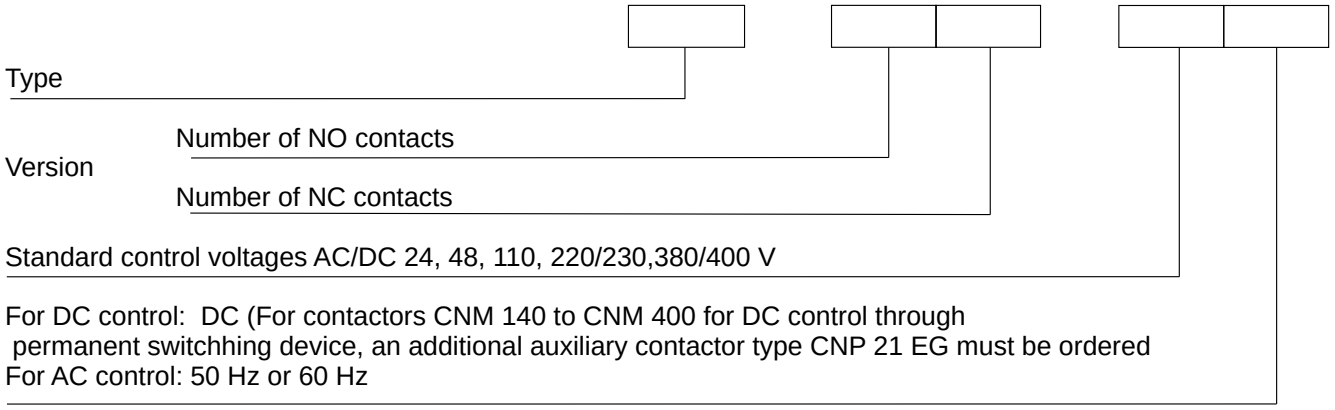
Features

- 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
10	6	4	2	4	0	**CNB 21 40**	0.60
				3	1	**CNB 21 31**	
				2	2	**CNB 21 22**	
				1	3	**CNB 21 13**	
				0	4	**CNB 21 04**	
10	6	4	2	8	0	**CNB 31 80**	0.66
				7	1	**CNB 31 71**	
				6	2	**CNB 31 62**	
				5	3	**CNB 31 53**	
				4	4	**CNB 31 44**	

ORDER-CONTACTORS



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

CNN 18	**1**	**0**	**220 V**	**50 Hz.**

Example: Motor contactor type CNM 45 with two NO and two NC auxiliary contacts, control voltage 220 V, 50 Hz

CNM 45	**2**	**2**	**220 V**	**50 Hz.**

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

CNNP	**2**	**2**	**220 V**	**50 Hz**

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

CNB 21	**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**				Auxiliary contacts		Type	Weights
230 V	400 V	500 V	690 V				
A	A	A	A	NO	NC		kg
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**				Auxiliary contacts		Type	Weights
230 V	400 V	500 V	690 V				
A	A	A	A	NO	NC		kg
6	3	1.8	1	1	1	**BP2 11**	0.03
				2	2	**BP4 22**	0.04
6	3	1.8	1	1	1	**BP3 11**	0.02

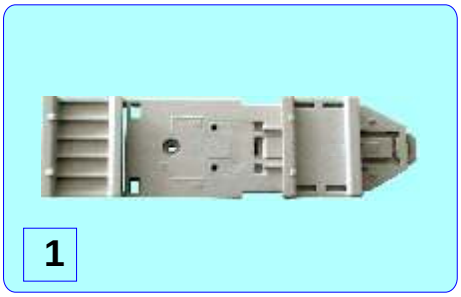
Mechanical interlock

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

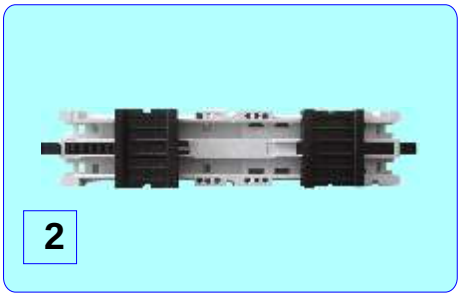
ACCESSORIES for CONTACTORS type CNN

Selection and ordering data

1



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

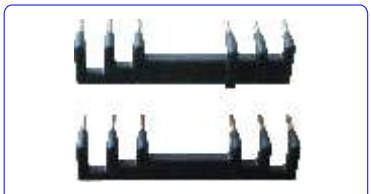
3 For reversing starter up to 38 A

4 For star-delta starter up to 38 A

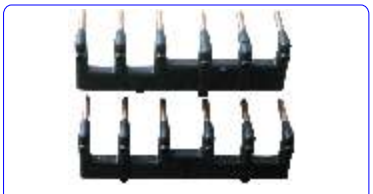
RKWK WIRING SISTEM

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)

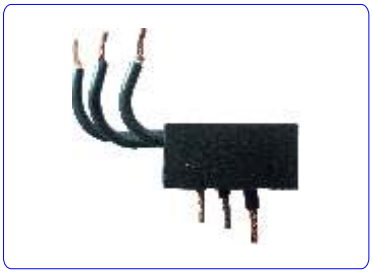


RKWK 5.1



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

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
CNN P CNB 21, 31 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

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 45 - CNM 60	Set of 2 additional terminal blocks for connecting bare cables 35 mm^2	**601479**	0.210
CNM 75 - 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

1

Selection and ordering data

AC coils for		Control voltage V	Rated frequency Hz	Part N.	Weights kg
CM1 CP0	Coil	24 48 110 220 230 380 400	50 / 60	**S32617S / 503645S** **S32619S / 503644S** **S32620S / 503643S** **S32621S / 501729S** **501432S / 503642S** **S32622S / 503641S** **503639S / 503640S**	0.042

SPARE COILS for CONTACTORS type CNN

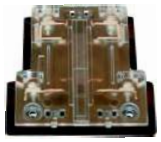
Selection and ordering data

AC coils for		Control voltage V	Rated frequency Hz	Part N.	Weights kg
CNN 9 -CNN 25,CNNP	Coil	24 48 110 220 230 380 400	50 / 60	**603028 / 603029** **603030 / 603031** **603032 / 603033** **603034 / 603035** **603036 / 603037** **603038 / 603039** **603040 / 603041**	0.050
CNN 32 - CNN 40	Coil	24 48 110 220 230 380 400	50 / 60	**603042 / 603043** **603044 / 603045** **603046 / 603047** **603048 / 603049** **603050 / 603051** **603052 / 603053** **603054 / 603055**	0.150

SPARE PARTS for CONTACTORS CNM 45 - CNM 400

Selection and ordering data

Auxiliary contact blocks



For contactor	Description	Part N.	Weights kg
CNM 45 - CNM 110	Block with auxiliary contacts left, 1NO+1NC	**733889S**	0.042
	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 45 - 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**	

For contactor	Description	Part N.	Weights kg
CNM 75	**Arc chamber**	**733845S**	0.48
CNM 90		**733846S**	0.48
CNM 110		**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 MAIN CONTACTS for CONTACTORS CNM 45 - 400

Selection and ordering data

Main contact set

For contactor	Description		Weights kg
CNM 45	Set of: - 3 moving contacts and - 6 fixed contacts	**739889S**	0.095
CNM 60		**739885S**	0.1
CNM 75		**733227S**	0.190
CNM 90		**733623S**	0.192
CNM 110		**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

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SPARE COILS for CONTACTORS CNM 45 - 400 and TK115 - TK 175

Selection and ordering data

	AC coils for		**Control voltage V**	**Rated frequency Hz**	**Part N.**	Weights kg
	CNM 45 - CNM60 TK 115	Coil	24 48 110 220 380	50 / 60	**739879S/158907S** **739882S/158929S** **739883S/158906S** **739880S/158903S** **739884S/158937S**	0.150
	CNM 75 - 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, CNB 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.

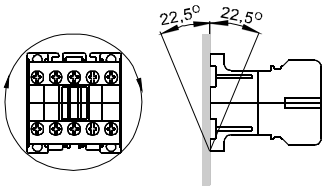
These noisless contactors are particulary suitable for use with passenger lifts.
Closing and opening operations are affected by an electromagnet thus the contactors are primarily suitable for remote control and automatic operation.
Contactors should be installed in dry and clean areas.

Standards

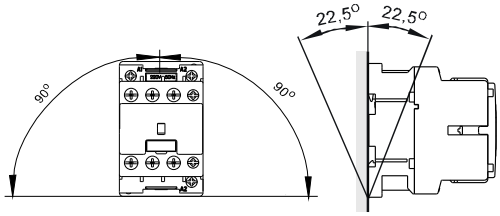
Contactors type CPO, CNNP are in conformity with International standard IEC 60947-5-1, EN 60947-5-1 and national standards VDE-0660.
Contactors CM, CNN and CNM comply with IEC 60947-4-1, EN 60947-4-1 and VDE-0660.
Designations of contactors, conform to EN 50 005, EN 50 012.
.

Installation

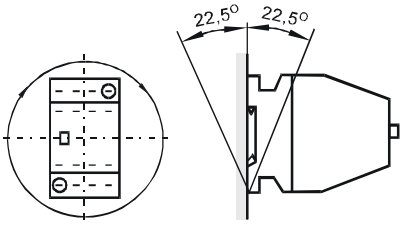
Contactors can be mounted on the baseplate by means of two or four screws. Contactors type CPO, CNNP, CNNB, CNB, CM1 and CNN are designed for quick installation on vertical standard support having the width of 35 mm according to DIN EN 50022.
Permissible deviations of mounting surfaces from the vertical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



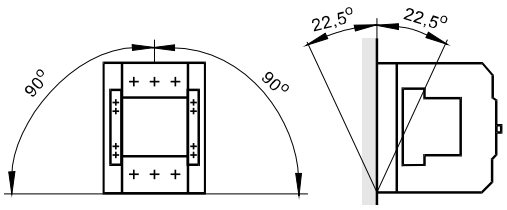
CP0, CM1



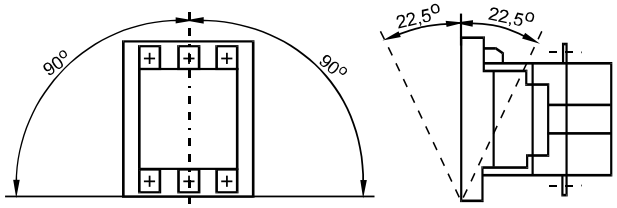
CNN 9 - CNN 40 , CNNP and CNNB 9 - CNNB 25



CNB



CNM 45 - CNM 60



CNM 75 - CNM 400

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

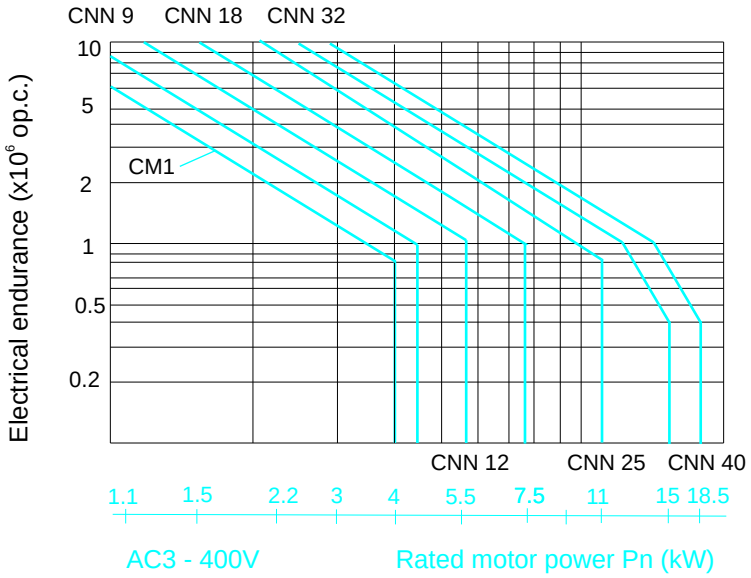


Diagram of electrical endurance of CM, CNN contactors - AC4

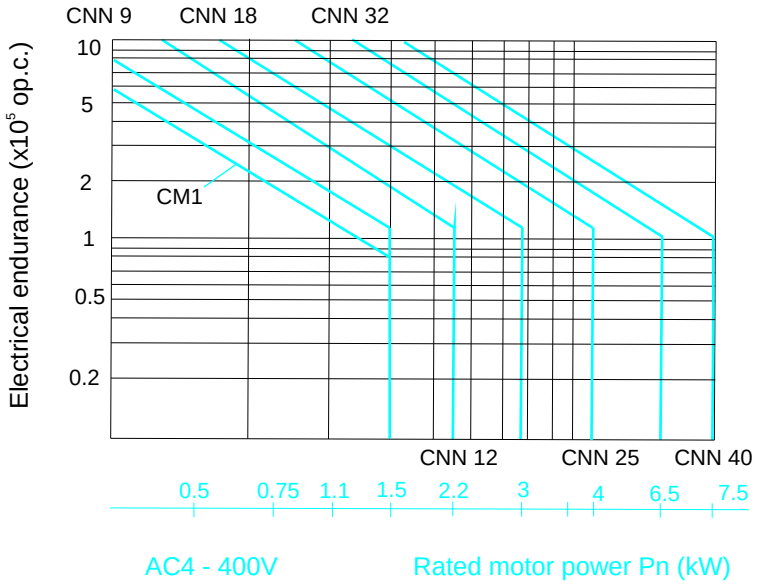


Diagram of electrical endurance of CP0 and CNNP contactor relayes

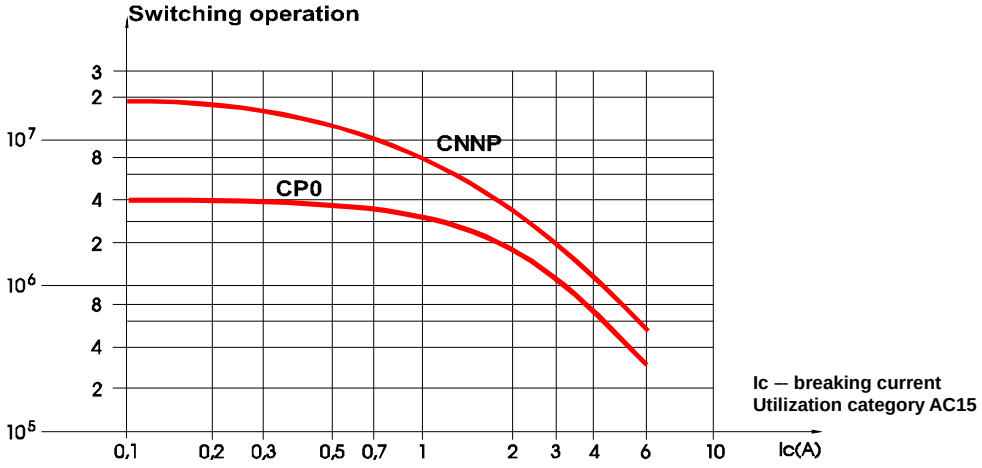


Diagram of electrical endurance of CNM contactors - AC3

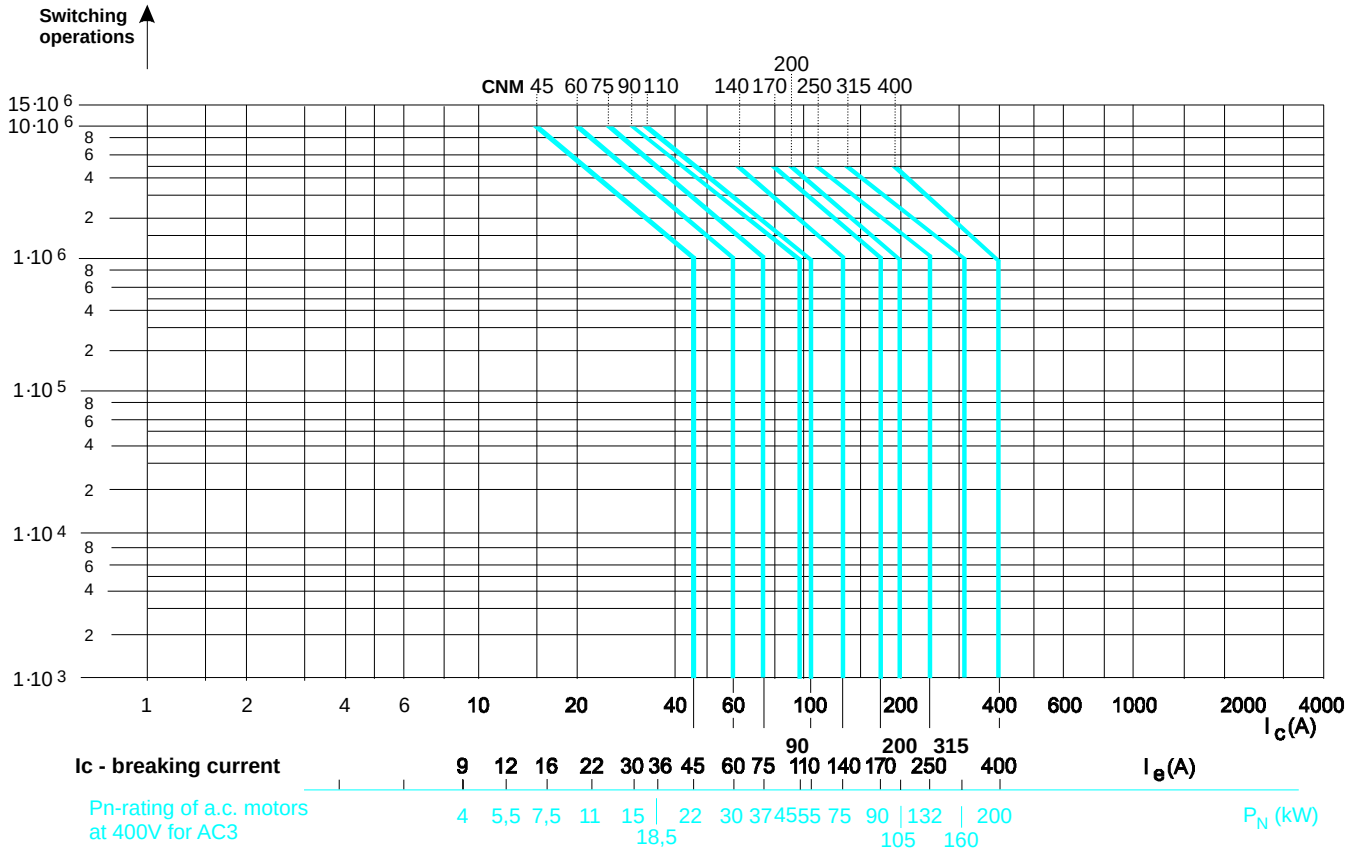
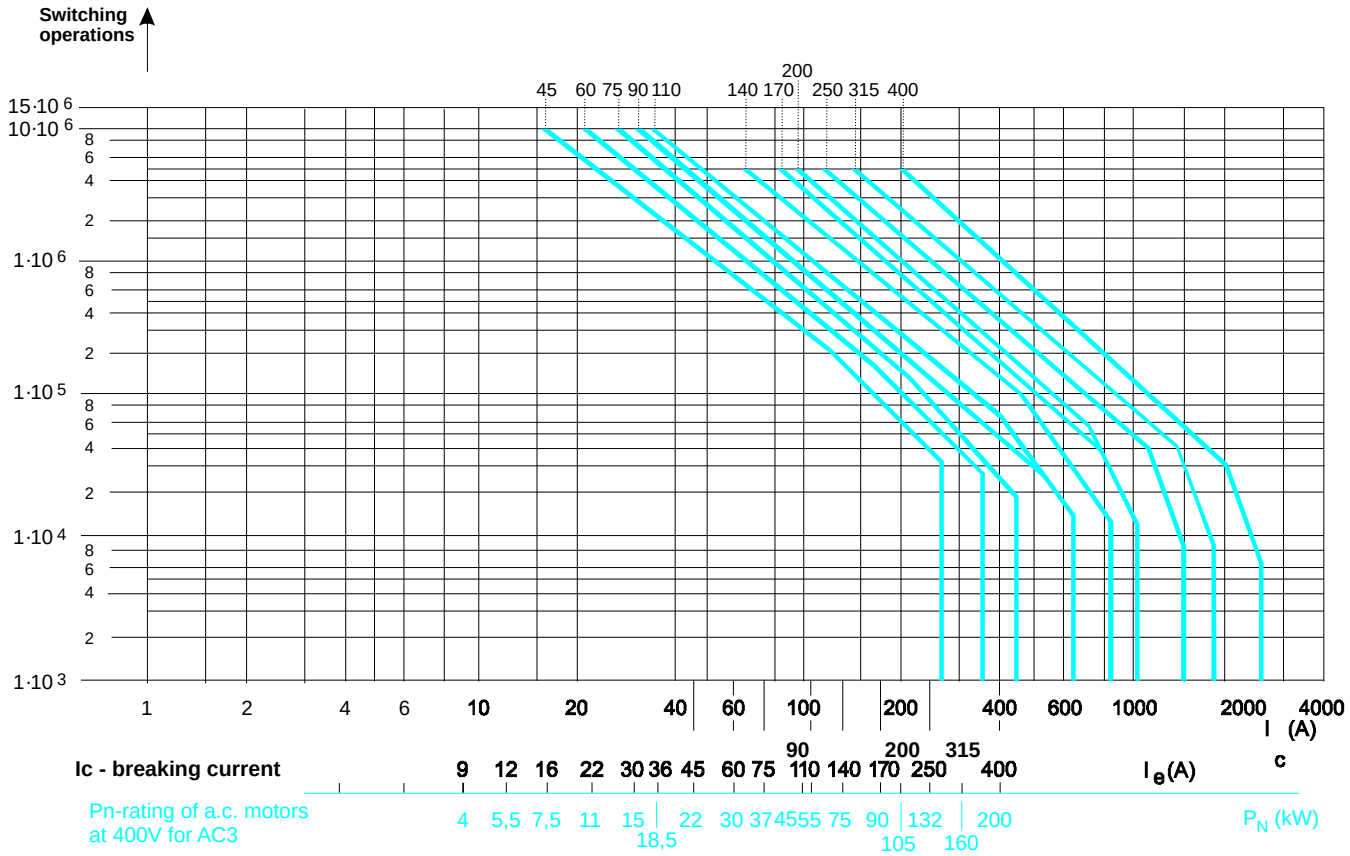


Diagram of electrical endurance of CNM contactors - AC4



Utilization categories for contactors

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

		ELECTRICAL DURABILITY						MAKE AND BREAK CONDITIONS					
		MAKE			BREAK			MAKE			BREAK		
Category	Typical applications	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 **Ie** - rated operational current **Ic** - breaking current P = Ue x Ie (W)
U - voltage before breaking **Ue** rated operational voltage **Ur** - recovery voltage

Degrees of Protection of enclosed equipment

1

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 ≤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 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 and length of 100 mm	Tool
First figure 2 or 3	**d**	Wire with 1 mm 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 equip-ment 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
- Limitedinfuenceontheperiodofactivatingcontactor
- 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

- Optimalmuffing

Disadvantges

- Delay when cutting off
- Only DC circuits

Voltage drop in main circuits and current transformers

Voltage drop in main circuits

1

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:

$?V = ? V_0 * L * I$

Where ?V = voltage drop in Volts
$?V_0$ = unit voltage drop from table
L = cable length in km
I = current

Thisformulaisvalidforcalculatingthevoltagedropformotors,wheninsuffcient voltagecandisable - 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 $?V = 2\ I*L\ (\cos f + X_l \sin f)$
Three phase $?V = \sqrt{3}\ I*L\ (\cos f + X_l \sin f)$

Rated cross-section	Single wire cable					Two and three wire cable				
	active resistance	reactive resistance	DC	AC cosf = 0,8		active resistance	reactive resistance	DC	AC cosf = 0,8	
				1 fase	3 fases				1 fase	3 fases
	r	x	?V	?V	?V	r	x	?V	?V	?V
[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=Cablecoeffcientdependingonthevoltagedropandthecrosssection
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 proportion ally.
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

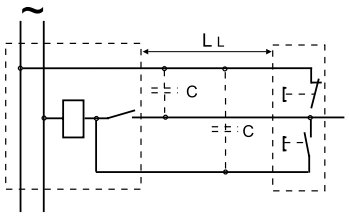
1

Cable Capacity

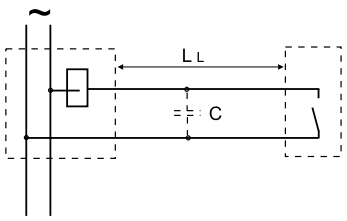
If the length of the cables in the auxiliary current circuits is excessive the voltage drop is not only the one that should be considered but the cable capacity as well. The cable capacity can get such a high value to hold the contactor closed even when the voltage is cut off.

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
CNM 45 - CNM 60 TK 115	0,137	228	455
CNM 75 - CNM 110 TK 130 - TK 175	0,222	370	740
CNM 140 - CNM 170	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

1

Technical data

Contactor type			CM1	CNN 9	CNN 12	CNN 18	CNN 25	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	65	65
	p.f.		0.8	0.75	0.75	0.75	0.75	0.75	0.75
	closed	VA	4	7	7	7	7	8	8
	p.f.		0.35	0.3	0.3	0.3	0.3	0.3	0.3
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
	opening time	ms	9 -18	4 - 19	4 - 19	4 - 19	4 - 19	4 - 19	4 - 19
	duration of electric arc	ms	10	10	10	10	10	10	10
Frequency of switching operations without thermal relay									
	utilization category AC1	s/h	1200	1000	1000	1000	1000	1200	1200
	AC2 ; AC3	s/h	1000	750	750	750	750	750	750
	AC4	s/h	250	250	250	250	250	250	250
with thermal relay		s/h		15	15	15	15	15	15
Resistivity to shocks	(square shock)	g/ms	7/5 and 4.2/10	7/5 and 4.2/10	7/5 and 4.2/10	7/5 and 4.2/10	8.2/5 and 4.9/10	8.2/5 and 4.9/10	8.2/5 and 4.9/10
Short-circuit protection of contactors without overload relays									
Main circuit With fuse links									
-acc. to IEC 60947-4-1	Type of coord. "1" gL/gG	A	20	25	25	40	50	63	63
DIN VDE 0660 Part 102	Type of coord. "2"	A	16	20	20	25	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
	multi-wire conductor with cable shoe	mm²	0,75-1,5	1,5-6	1,5-6	1,5-6	2,5-10	2,5-16	2,5-16
	Screw		M3.5	M4	M4	M4	M4	M4	M4
	Screw head		PZ2	PZ2	PZ2	PZ2	PZ2	PZ2	PZ2
	Tightening torque	Nm	1.2	1.2	1.2	1.2	1.4	1.6	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		A	20	25	25	30	40	50	50
AC1 utilization category rated operational current Ie/AC1; 55°C		A	20	25	25	30	40	50	50

TECHNICAL INFORMATION

MOTOR CONTACTORS type CM1 and type CNN WITH AC CONTROL CIRCUIT

Technical data

Contactor type			CM1	CNN 9	CNN 12	CNN 18	CNN 25	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	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	4	5.5
	400 V	kW	1.5	1.5	2.2	3	4	6.5	7.5
	500 V	kW	1.5	1.5	2.2	3	4	6.5	7.5
	690 V	kW	1.5	1.5	2.2	3	4	6.5	7.5
max. permissible rated current	Ie/AC4 ; 400 V	A	9	9	12	18	25	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	35	35	45	50
through one pole	48 V	A	10	20	20	20	20	20	23
	110 V	A	1.5	2.1	2.1	4.5	4.5	4.5	4.5
	220 V	A	0.6	0.8	0.8	1	1	1	1
	440 V	A	0.42	0.6	0.6	0.4	0.4	0.4	0.4
	600 V	A	0.42	0.6	0.6	0.25	0.25	0.25	0.25
through three poles connected in series	for 24 V	A	16	20	20	35	35	45	50
	48 V	A	16	20	20	35	35	45	45
	110 V	A	10	20	20	35	35	45	45
	220 V	A	15	20	20	35	35	45	45
	440 V	A	0.9	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	1.4	1.4	1.4	1.4
rated operational current Ie, 55°C	for 24 V	A	7	20	20	20	20	35	35
through one pole	60 V	A	4	5	5	5	5	6	6
	110 V	A	1	1.5	1.5	1.5	2.5	2.5	2.5
	220 V	A	-	0.75	0.75	0.75	1	1	1
	440 V	A	-	-	-	0.09	0.09	0.1	0.1
	600 V	A	-	-	-	0.06	0.06	0.06	0.06
through three poles connected in series	for 24 V	A	10	20	20	35	35	50	50
	60 V	A	10	20	20	35	35	50	50
	110 V	A	5	20	20	35	35	50	50
	220 V	A	1.2	1.75	6	10	10	25	25
	440 V	A	0.14	0.2	0.2	0.6	0.6	0.6	0.6
	600 V	A	0.14	0.2	0.2	0.6	0.6	0.35	0.35

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

Technical data

Block type			BP0	BP1	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		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 CNNB
WITH DC CONTROL CIRCUIT

1

Technical data

Contactor type			CNNB 9	CNNB 12	CNNB 18	CNNB 25
Mechanical endurance	make/break operations	x10^6	5			
Insulation rating		V	690			
Permissible ambient temperature		°C	- 25 to +55			
Consumption of electromagnet in cold state with Un						
DC operated	inrush	W	6.5	6.5	6.5	6.5
	sealed	W	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
	opening time	ms	6 -14	6 -14	6 -14	6 -14
Frequency of switching operations without thermal relay						
	utilization category AC1	s/h	1000	1000	1000	1000
	AC2 ; AC3	s/h	750	750	750	750
	AC4	s/h	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
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
DIN VDE 0660 Part 102	Type of coord. "2"	A	20	20	25	35
Sizes of connecting conductors for contact without thermal relay						
main circuit	single-wire conductor	mm^2	1,5-6	1,5-6	1,5-6	2,5-10
	multi-wire conductor with cable shoe	mm^2	1,5-6	1,5-6	1,5-6	2,5-10
	Screw		M4	M4	M4	M4
	Screw head		PZ2	PZ2	PZ2	PZ2
	Tightening torque	Nm	1.2	1.2	1.2	1.4
auxiliary circuit	single-wire conductor	mm^2	1 - 2,5			
	multi-wire conductor with cable shoe	mm^2	0,75 - 1,5			
	Screw		M3.5			
	Screw head		PZ2			
	Tightening torque	Nm	0.8			
Loadability of auxiliary contacts of contactors CNNB						
rated continuous current I_{th} ; 35°C		A	10	10	10	-
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 AC1 utilization category		A	25	25	30	40
rated operational current Ie/AC1; 55°C		A	25	25	30	40

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNNB WITH DC CONTROL CIRCUIT

Technical data

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

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 CNM
AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

1

Technical data

Contactor type			CNM 45 CNM 60	CNM 75 CNM 90 CNM 110	CNM 140 CNM 170 CNM 200	CNM 250	CNM 315 CNM 400
Mechanical endurance make/break operations		$x10^6$	5		3		
Insulation rating	V		750	1000			
Permissible ambient temperature		°C	- 25 to +55				
Consumption of electromagnet in cold state with U_n							
AC operated	closing	VA	206	300	580	1340	1340
	p.f.		0.6	0.5	0.45	0.46	0.41
	closed	VA	26	26	44	84	84
	p.f.		0.29	0.24	0.24	0.23	0.25
DC operated	closing	W	270	690	550	1180	1180
	closed	W	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 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	15-40	20-50	20-50	20-50	20-50
	opening time	ms	5-25	8-30	10-30	10-30	10-30
	duration of electric arc	ms	10-15	10-15	10-15	10-15	10-15
DC operated	closing time	ms	15-40	20-50	20-50	25-80	30-100
	opening time	ms	100-120	150-190	22-35	15-30	15-30
	duration of electric arc	ms	10-15	10-15	10-15	10-15	10-15
Frequency of switching operations without thermal relay							
	utilization category AC1	s/h	1500	1000	1000	1000	1000
	AC2 ; AC3	s/h	750	500	500	500	500
	AC4	s/h	250	250	250	250	250
with thermal relay		s/h	15	15	15	15	15
Resistivity to shocks	(square shock)	g/ms	9,2/5 and 5,4/10	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	125/160/200	250/315/355	400	500/ 630
DIN VDE 0660 Part 102	Type of coord. "2"	A	40/50	63/80/100	125/160/200	250	315/500
Sizes of connecting conductors for contact without thermal relay							
main circuit	single-wire conductor	mm^2	6 -16	–	–	–	–
	multi-wire conductor with cable shoe	mm^2	4-25	–	–	–	–
	stranded with cable lug	mm^2	–	6-35	25 -70	70 -150	2x150
			–	25-50	50 -120		
	fatbar	mm	–	15x2,5	15x3	25x3	2x25x3
			–	15x3	20x3		
	protective conductor with cable lug	mm^2	–	–	25 -70	35 -70	50 -120
	Screw		M5	M6	M8	M10	M10
	Screw head		PZ2				
	Tightening torque	Nm	2	2,5	3,5	4	4
auxiliary circuit	single-wire conductor	mm^2	1 – 2,5				
	multi-wire conductor with cable shoe	mm^2	0,75 – 1,5				
	Screw		M3,5				
	Screw head		PZ2				
	Tightening torque	Nm	0,8				

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNM
AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

Technical data

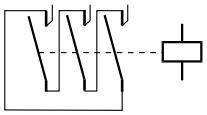
Contactor type			CNM 45 CNM 60	CNM 75 CNM 90 CNM 110	CNM 140 CNM 170 CNM 200	CNM 250	CNM 315 CNM 400
Loadability of auxiliary contacts of contactors CNM							
rated continuous current I_{th} ; 35°C		A	16	16	16	16	16
AC							
rated operational current I_e/AC15	for 230 V	A	6	6	6	6	6
	400 V	A	4	4	4	4	4
	500 V	A	2.5	2.5	2.5	2.5	2.5
	690 V	A	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
	110 V	A	3.2	3.2	8	8	8
	220 V	A	0.9	0.9	2	2	2
	440 V	A	0.33	0.33	0.6	0.6	0.6
	600 V	A	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
	110 V	A	1.8	1.8	2.4	2.4	2.4
	220 V	A	0.9	0.9	1.1	1.1	1.1
	440 V	A	0.27	0.27	0.32	0.32	0.32
	600 V	A	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	63/72	100/110/115	160/200/250	350	390/450
AC1 utilization category							
rated current I_e/AC1 ; 55°C		A	60/70	100/110/115	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	34/38/42	68/72/75	100	125/150
ratings of squirrel-cage motors at 50 c/s for	230 V	kW	6,9/8,1	7,7/11/12	20/21/23	31	35/ 37,5
	400 V	kW	12/14	17/20/22	35/37/40	55	65/69
	500 V	kW	15,8/18,4	22/25/27	46/48/50	72	76/85,5
	690 V	kW	20,8/24,3	28,5/32/36	60/64/69	92	100/106
max. permissible rated current I_e/AC4;	400 V	A	45/60	75/90/110	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	17	24	35/40/58	87	90/115
	400 V	kvar	30	40	40/60/100	150	150/ 200
	500 V	kvar	35	50	50/ 80/130	190	190/265
	690 V	kvar	30	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	17	24	30/37/40	66	66/85
	400 V	kvar	30	40	50/50/70	115	115/150
	500 V	kvar	35	50	66/65/90	145	145/195
	690 V	kvar	30	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	153	245/308/308	462	462/617
	40%	A	98	122	195/245/245	367	367/490
	60%	A	87	109	174/218/218	327	327/436
	80%	A	80	100	160/200/200	300	300/400

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNM
AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

1

Technical data

Contactor type			CNM 45 CNM 60	CNM 75 CNM 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	293	395/560/560	759	864/1075
	20%	A	163	242	388/487/487	730	730/ 975
	40%	A	155	193	308/380/380	580	580/ 775
	60%	A	138	173	275/345/345	517	517/689
	80%	A	127	158	252/316/316	474	474/632
continuous operation		A	127	158	252/316/316	474	474/632
permissible voltage of motionless rotor							
	starting	V	1500	2000	2000	2000	2000
	regulation	V	750	1000	1000	1000	1000
	counter current breaking	V	660	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	90/100/160	160/200/200	300	300/400
	60 V	A	30	75/80/80	160/200/200	300	300/330
	110 V	A	6	12/12/18	18/18/30	33	33/ 33
	220 V	A	1.2	2,5/2,5/3,4	3,4/3,4/3,4	3,8	3,8/ 3,8
	440 V	A	0.48	0,6/0,6/0.8	0,8/0,8/0,8	0,9	0,9/0,9
	600 V	A	0.35	0,48/0,5/0,5	0,5/0,5/0,5	0,6	0,6/ 0,6
through three poles connected in series	for 24 V	A	70	100	160/200/200	300	400
	60 V	A	70	100	160/200/200	300	400
	110 V	A	70	100	160/200/200	300	400
	220 V	A	70	100	160/200/200	300	400
	440 V	A	3	6	11,5	11	11
	600 V	A	1	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	100	200	300	400
	60 V	A	70	100	200	300	400
	110 V	A	70	100	200	300	400
	220 V	A	3.5	4	200	300	400
	440 V	A	0.6	0.8	1.4	1.4	1.4
	600 V	A	0.35	0.45	0.75	0.75	0.75

[1] Electrical endurance of contacts at these loads, see page 1/29.

[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

CONTACTORS TYPE TKN and TK for SWITCHING RESISTIVE LOADS

Technical data

Contactor type			**TKN 65**	**TK 115**	**TK 130**	**TK 175**
Mechanical endurance make/break operations		x10⁶	5			
Insulation rating			690			
Permissible ambient temperature		°C	- 25 to +40			
Consumption of electromagnet in cold state with Un						
AC operated	closing	VA	62	206	350	350
	p.f.		0.75	0.6	0.5	0.5
	closed	VA	7	26	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 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		x10⁶	0,5			
Sizes of connecting conductors for contact without thermal relay						
main circuit						
	multi-wire conductor	mm²	6-16	16-35		
	multi-wire conductor with cable shoe	mm²			50	70
Terminal screw			M5	M8	M8	M8
Screw head			Hexagon socket			
Tightening torqu		Nm	2	4	3.5	3.5
auxiliary circuit						
	single-wire conductor	mm²	1 - 2,5			
	multi-wire conductor with cable shoe	mm²	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	400 /380 V	kW	43	76	85	115
p.f.=1						
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

1

General

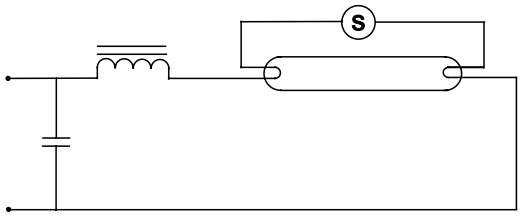
- Contactor choice criteria for control of lighting circuits are as follows:
- Type, power rating and number of lamps
- Conection mode
- Current values on closing and in steady state
- Power factor cosf of the lamps
- Presence or not of compensation capacitors

Lighting circuits

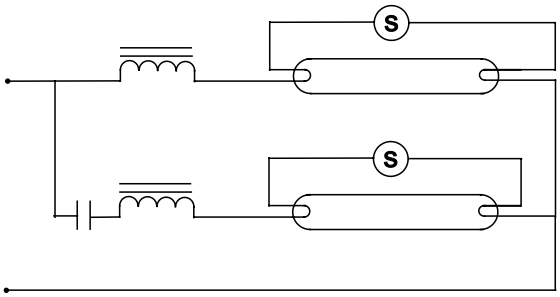
In a given circuit,the number and power rating of lamps are defned and cannot result in overload.Only short-circuit protection has to be provided. GG fuses or modular circuit-breakers will be chosen for this purpose.The lamps have very specifc technical data,according to their construction type.

- 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 ?	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

1

Contactor with AC coil

Type				TKN 65	TK 115	TK 130	TK 175
Switching incandescent lamps, per main conducting path at 230/220 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.	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 Screw head Tightening torque Nm	M4 PZ2 1,2	M4 PZ2 1,2	M4 PZ2 1,4	
- 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^{0}C A AC rated operational current I_e/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 12 20 CNNK 12 11**	**CNNK 15 20 CNNK 15 11**	**CNNK 20 10**	**CNNK 25E 10**	**CNNK 25 10**	**CNNK 30 10**
Capacitor rating at operating 230V kVAr	5	6.7	8.5	11	14	14	20
voltage **400-440V kVAr**	**10**	**12.5**	**15**	**20**	**25**	**25**	**30**
50/60Hz 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 ^{0}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 I_{th}; 35^{0}C A	10						
AC rated operational current I_e/AC15							
for 230V A	6						
400V A	4						
500V A	2						
690V A	1						

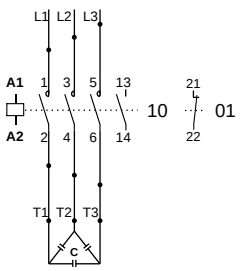
TECHNICAL INFORMATION

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

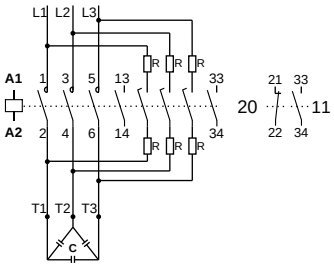
Special contactors for power factor correction

Type designation	CNKM 40 00 CNNK 40 22	CNKM 50 00 CNKM 50 22	CNKM 60E 00 CNKM 60E 22	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	750			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.	 215 0,6 26 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		85.000	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	 35-50 (with IP 20) 50 50-70 (without IP 20)	
Terminal screw	M8			M6 (with IP 20) M8 (without IP 20)	
Screw head	Hexagon socket				
Tightening torque Nm	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 for 230V A 400V A 500V A 690V A	 16 10 6 4 2				

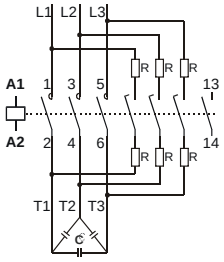
1



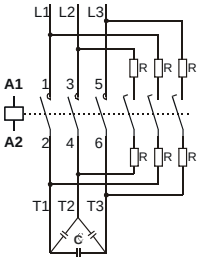
CNNK 2,5; CNNK 5
CNNK 7,5



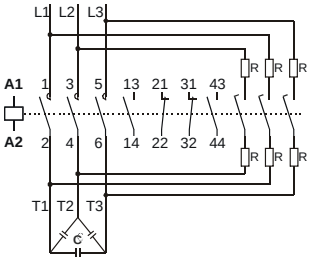
CNNK 10; CNNK 12
CNNK 15



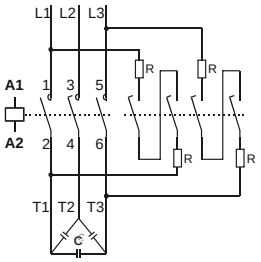
CNNK 20 10; CNNK 25E 10
CNNK 25 10, CNNK 30 10



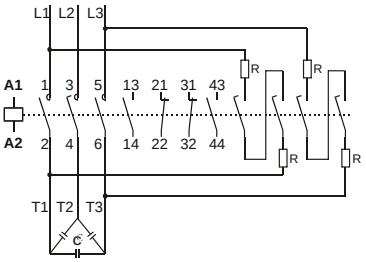
CNKM 40 00
CNKM 50 00



CNKM 40 22
CNKM 50 22



CNKM 60E 00



CNKM 60E 22, CNKM 60 22
CNKM 75 22

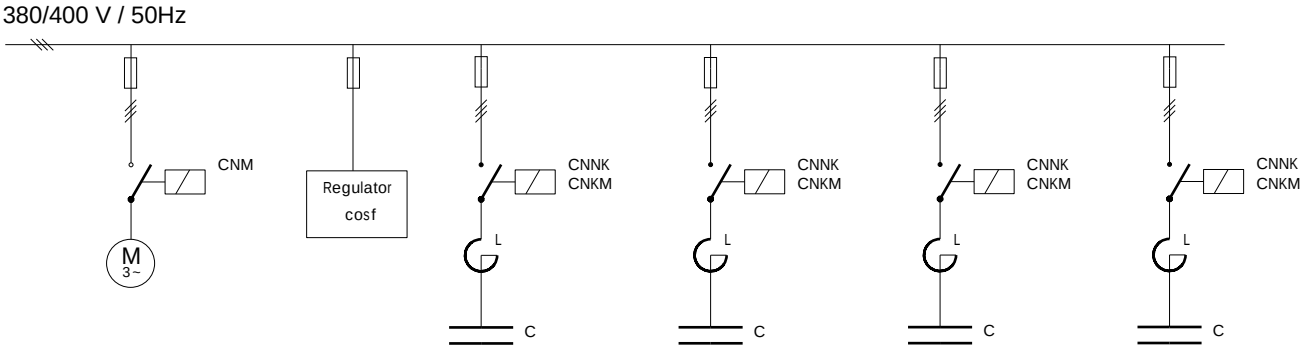
VERY IMPORTANT NOTE:

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



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 1/18 and 1/19

TECHNICAL INFORMATION

MINI CONTACTOR RELAY type CP0

1

Technical data

Contactor type				**CP0**
Mechanical endurance	make/break operations		x10^6	5
Insulation rating			V	690
Permissible ambient temperature			°C	- 25 to +55
Consumption of electromagnet in cold state with U_n				
AC operated	closing		VA	26
	p.f.			0,9
	closed		VA	4
	p.f.			0,34
Coil voltage tolerances				0,8 –1,1 U_n
duration of making and breaking				
(values are also valid for voltages of electromagnet from 0,8 to 1,1 U_n for each coil in cold and warm state). Total breaking time is addition of opening time and duration of electric arc.				
AC operated	closing time		ms	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 CNB

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

Technical data

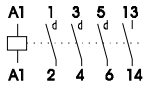
Contactor type				CNNP	CNB 31 CNB 21
Mechanical endurance	make/break operations		x10^6	10	5
Insulation rating			V	690	
Permissible ambient temperature			°C	- 25 to +55	- 25 to +40
Consumption of electromagnet in cold state with U_n					
AC operated	closing		VA	62	–
	p.f.			0.75	–
	closed		VA	7	–
	p.f.			0.3	–
DC operated	closing		W	–	10
	closed		W	–	10
Coil voltage tolerances				0,8 –1,1 U_n	
	duration of making and breaking				
AC operated	closing time		ms	12 - 22	–
	opening time		ms	4 - 19	–
	duration of electric arc		ms	10	–
DC operated	closing time		ms	–	20 - 170
	opening time		ms	–	10 - 25
	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 CNB					
rated continuous current		I_{th} ; 35°C	A	16	16
AC rated operational current I_e/AC15		for 230 V	A	6	10
		400 V	A	4	6
		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]	10 (10)[1]
(with series connection of 3 current paths)[1)]		110 V	A	2 (6)[1]	2.1 (10)[1]
		220 V	A	0.6 (6)[1]	0.8 (10)[1]
		440 V	A	0.3 (1,2)[1]	0.6 (1,3)[1]
		600 V	A	0.15 (0,8)[1]	0.6 (1)[1]
rated operational current I_e/DC13		for 24 V	A	4 (6)[1]	10 (10)[1]
(with series connection of 3 current paths)[1)]		110 V	A	0.9 (3)[1]	0.9 (10)[1]
		220 V	A	0.2 (1,2)[1]	0.45 (2)[1]
		440 V	A	0.14 (0,5)[1]	0.25 (0,9)[1]
		600 V	A	0.15 (0,26)[1]	0.2 (0,8)[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

Auxiliary contactors

1

AC coil operation



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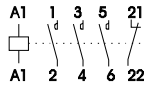
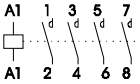
CM1, CNN 9,
CNN 12, CNN 18



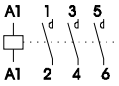
01

CM1, CNN 9,
CNN 12, CNN 18



004

CM1



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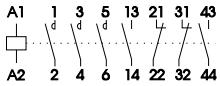
CNN 25, CNN 32, CNN 40, TKN 65



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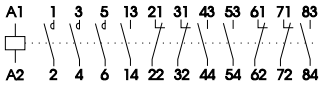
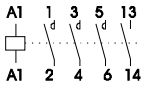
CNM 45, CNM 60, CNM 75,
CNM 90, CNM 110, CNM 140, CNM 170,
CNM 200, CNM 250, CNM 315, CNM 400



44

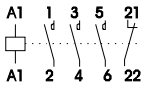
CNM 45, CNM 60, CNM 75,
CNM 90, CNM 110, CNM 140, CNM 170,
CNM 200, CNM 250,CNM 315, CNM 400

DC coil operation



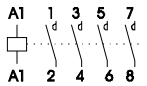
10

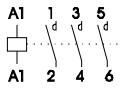
CNNB 9, CNNB 12,
CNNB 18



01

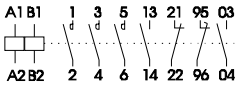
CNNB 9, CNNB 12,
CNNB 18





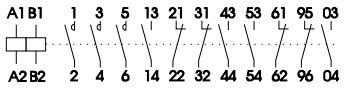
00

CNNB 25



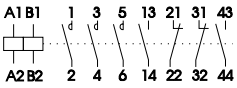
22

CNM 45, CNM 60, CNM 75,
CNM 110



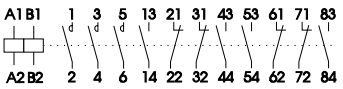
44

CNM 45, CNM 60, CNM 75,CNM 110



22

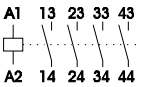
CNM 140, CNM 170, CNM 200,
CNM 250,CNM 315, CNM 400



44

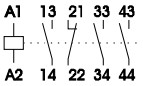
CNM 140, CNM 170, CNM 200,
CNM 250,CNM 315, CNM 400

AC and DC coil operation



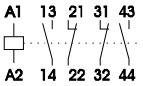
40

CP0, CNNP , CNB 21



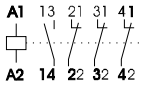
31

CP0, CNNP , CNB 21



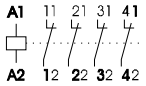
22

CP0, CNNP , CNB 21



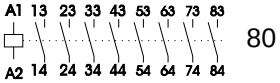
13

CNNP , CNB 21



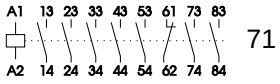
04

CNNP , CNB 21



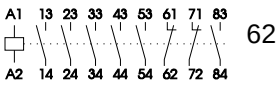
80

CNP 31, CNB 31



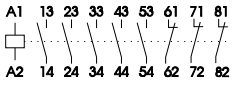
71

CNP 31, CNB 31



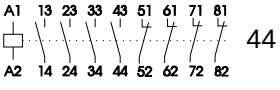
62

CNP 31, CNB 31



53

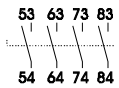
CNP 31, CNB 31



44

CNP 31, CNB 31

Snap-on auxiliary contakt blocks



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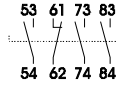

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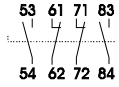

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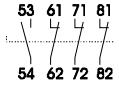

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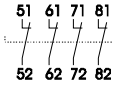
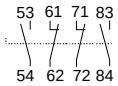


04

BP0

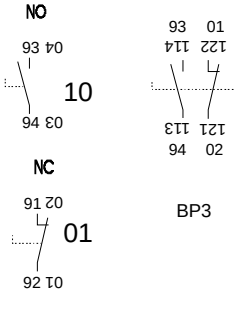
11

BP2



22

BP4

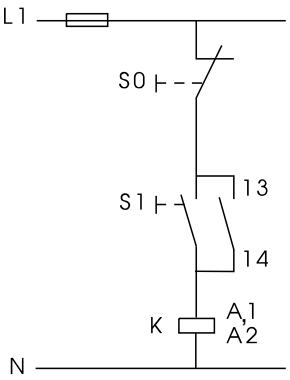


BP1

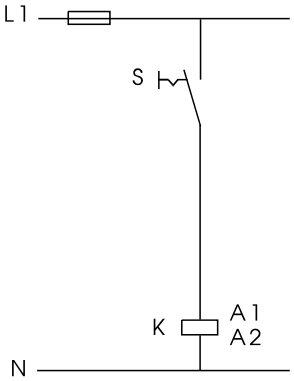
BP3

SCHEMATIC DIAGRAMS FOR AC OPERATED CONTACTORS

CPO, CNNP,CNP 31,CM1, CNN 9 - CNN 40, CNM 45-CNM 400



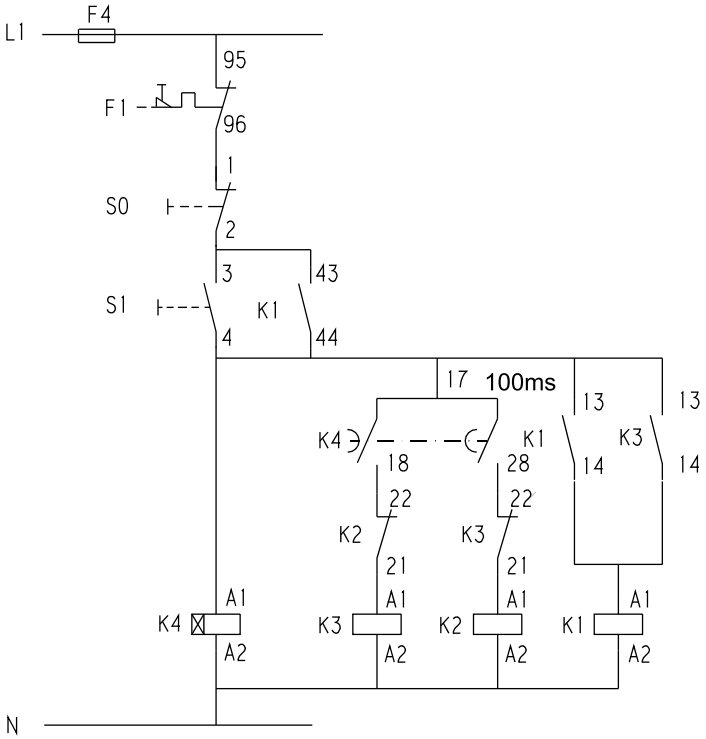
With push button"S0 S1"

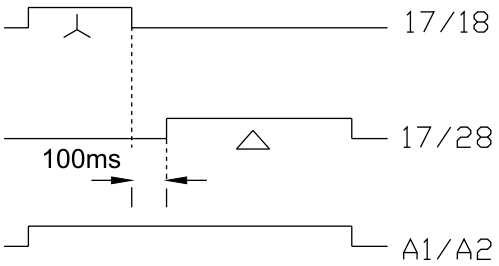


With permanent contact switch "S"

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 EVR 40**).



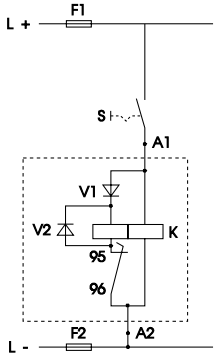


In conformity: IEC 255-2

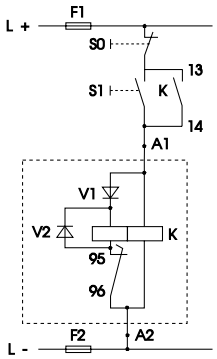
	EVR
Functions	40
Control voltage (V)	24 - 500
Rated insulation voltage (V)	250
Power consumption (VA)	3
Dielectric strentgh (V)	2000
Setting time	0,06-0,6s 6-60s 0,6-6s 0,6-6min 2-20s 6-60min
Permited ambient temperature (^{0}C)	-20 ... +55
Repetition error	<0,3% ± 2ms
Timing error within ±10% Un	<1%
Setting error (%)	<10
Weight (kg)	0,30
CONTACTS DATA Max. thermal current I_{th} (cosf=1) Max. current I_e for AC15/220V Max. current I_e for DC13/220V Max. operating voltage	 8 A 3 A 0.3 A 380 V~/250 V-
Standard voltages (V)	380, 220, 110, 24, 50 Hz; 24V DC

SCHEMATIC DIAGRAMS FOR DC OPERATED CONTACTORS

CNM 45 - CNM 60

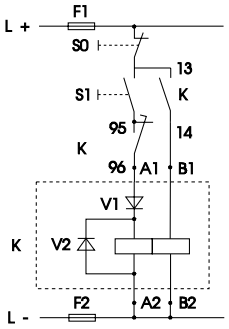


Permanent contact control

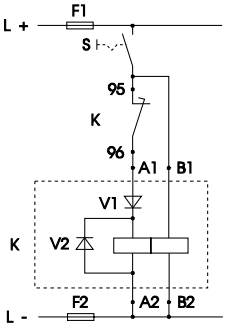


Push button control

CNM75 - CNM 110

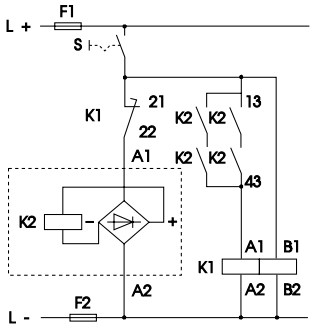


Push button control



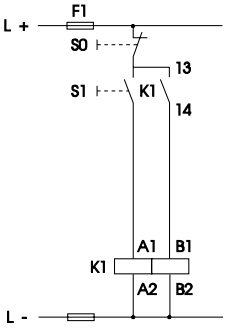
Permanent contact control

CNM 140 - CNM 200
CNM 250 - CNM 400



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

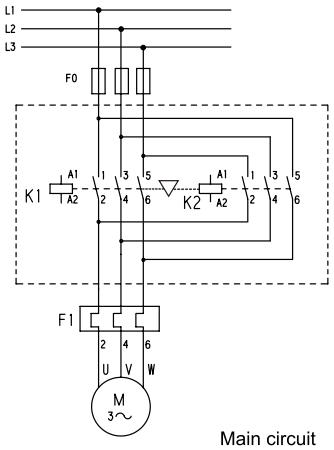
Permanent contact control



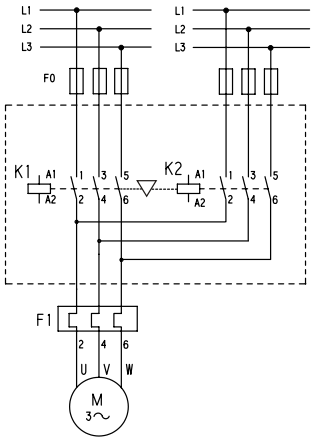
Push button control

SCHEMATIC DIAGRAMS FOR REVERSING CONTACTORS and “AVR”

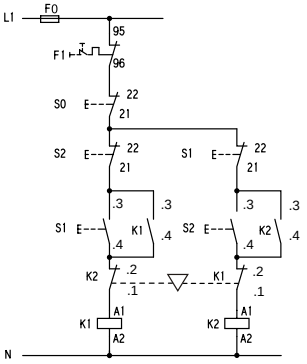
MBCM1, MBCNN 9 - MBCNN 40, MBCNM 12 -MBCNM 400



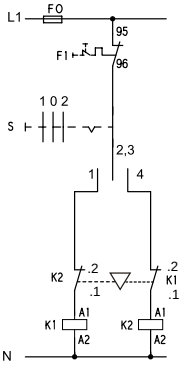
Main circuit



AVR

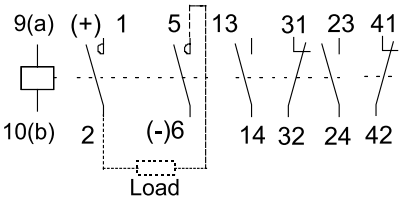


Control circuit - push-button operation

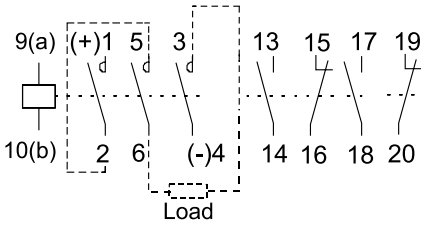


Control circuit - permanent contact operation

Wiring diagrams

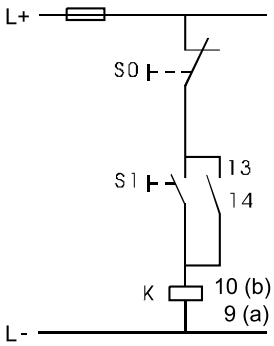


CNO 30

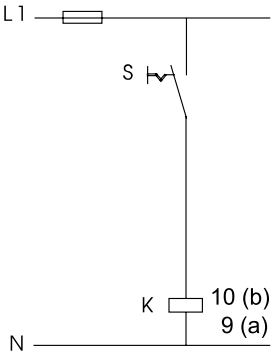


CNO 110, CNO 250

SCHEMATIC DIAGRAMS FOR AC OPERATED CONTACTORS

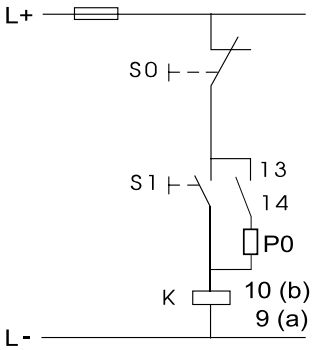


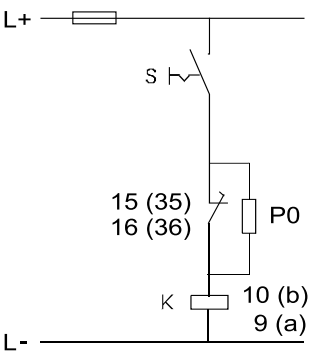
Push button control



Permanent contact control

SCHEMATIC DIAGRAMS FOR DC OPERATED CONTACTORS

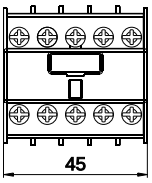




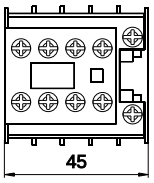
DIMENSION DRAWINGS (dimensions in mm)

1

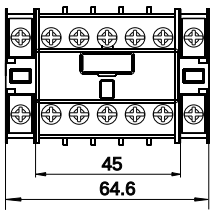
CP0,
CM1

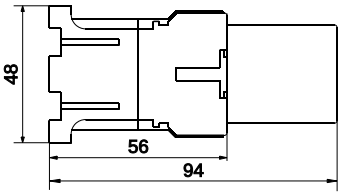


CP0 + BP0,
CM1 + BP0



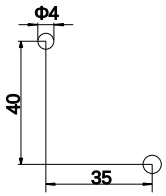
CP0 + 2xBP1,
CM1 + 2xBP1



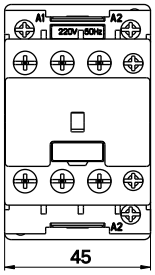


Driling plan (mm)

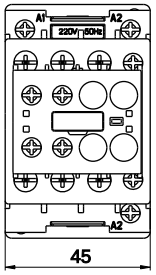
CP0; CM1



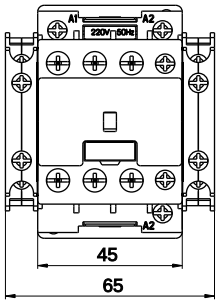
CNN 9; CNN 12;
CNN 18; CNNB 9;
CNNB 12; CNNB 18

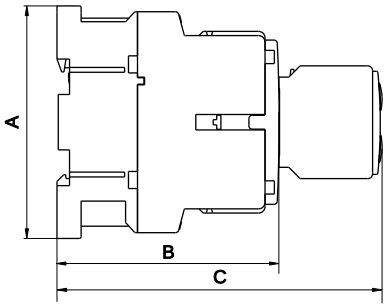


CNN 9 (CNNB 9) + BP2 (BP4)
CNN 12 (CNNB 12) + BP2 (BP4)
CNN 18 (CNNB 18) + BP2 (BP4)

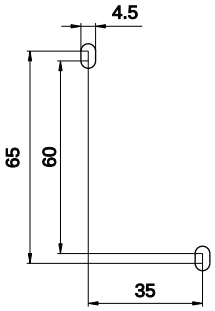


CNN 9 (CNNB 9) + 2xBP3
CNN 12 (CNNB 12) + 2xBP3
CNN 18 (CNNB 18) + 2xBP3





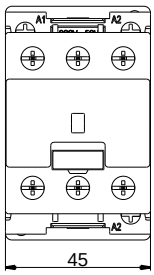
CNN 9; CNN 12; CNN 18;
CNNB 9; CNNB 12; CNNB 18



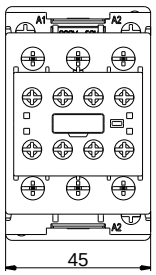
TYPE	CNN 9 - CNN 18	CNNB 9 - CNNB 18
A	72.2	74.2
B	71	114.5
C	101	146.8

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

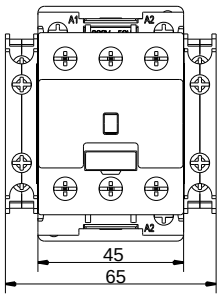
CNN 25; CNNB 25

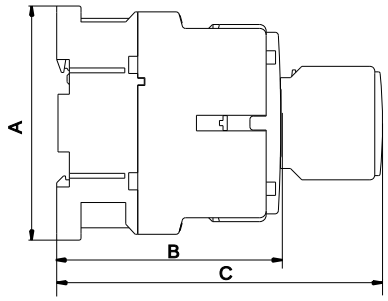


CNN 25 (CNNB 25) + BP2 (BP4)

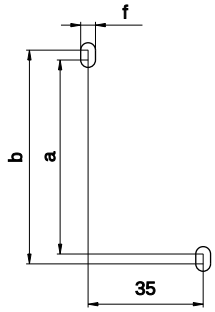


CNN 25 (CNNB 25) + 2xBP3





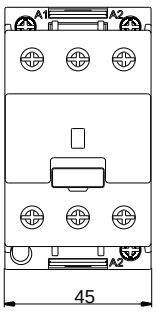
CNN 25; CNNB 25



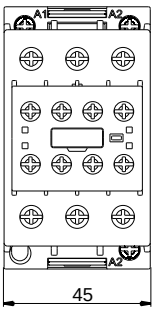
TYPE	CNN 25	CNNB 25
A	72.2	74.2
B	71	114.5
C	100.5	146.1

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

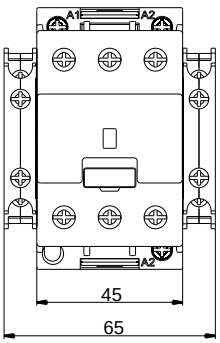
CNN 32;
CNN 40

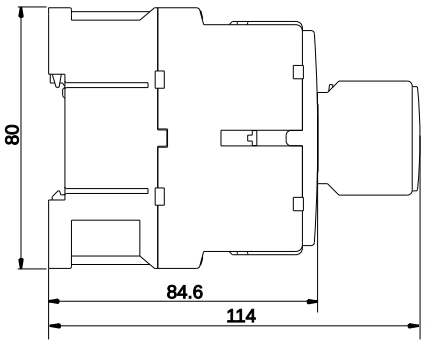


CNN 32 + BP2 (BP4);
CNN 40 + BP2 (BP4)

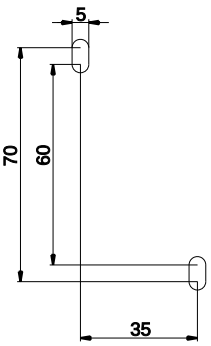


CNN 32 + 2xBP3;
CNN 40 + 2xBP3



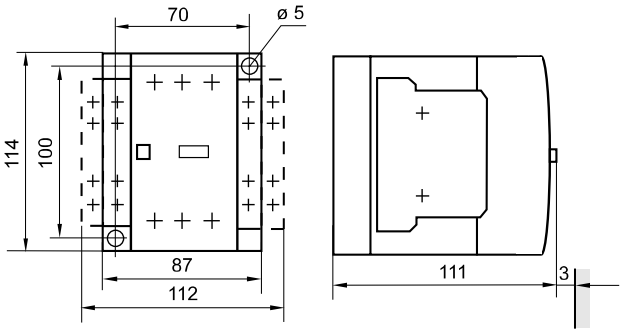


CNN 32; CNN 40

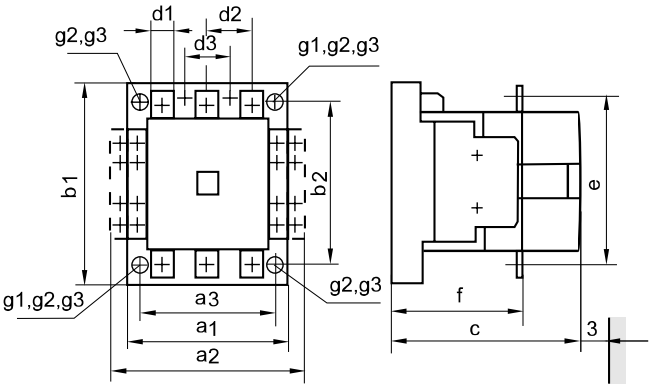


DIMENSION DRAWINGS (mm)

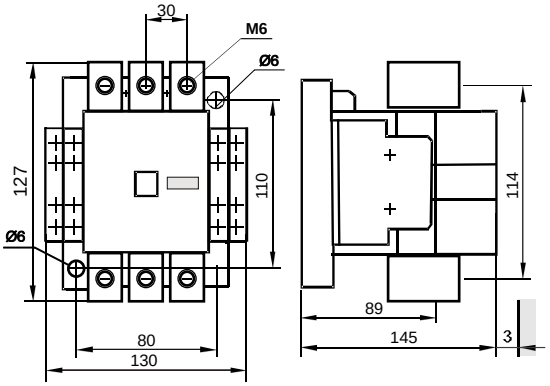
CNM 45, CNM 60



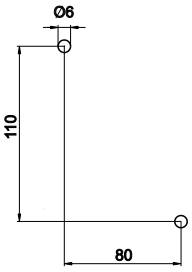
CNM 75, CNM 90, CNM 110, CNM 140, CNM 170, CNM 250, CNM 400

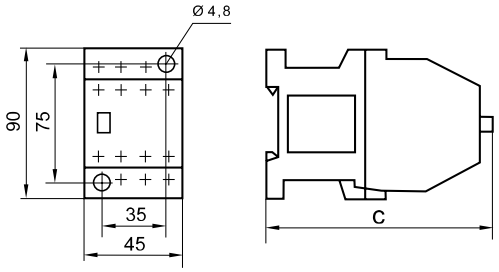


CNM 75ST , CNM 90ST and CNM 110ST



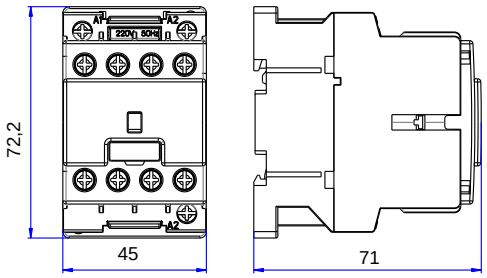
TYPE	a 1	a 2	a 3	b 1	b 2	c	d 1	d 2	d 3	e	f	g 1	g 2	g 3
CNM 75	100	125	80	132	110	142	15	30	44	113	86.5	Ø6		
CNM 90	100	125	80	132	110	142	15	30	44	113	86.5	Ø6		
CNM 110	100	125	80	132	110	142	15	30	44	113	86.5	Ø6		
CNM 140	135	162	110	180	160	189	20	42	44	162	116		Ø7	
CNM 170	135	162	110	180	160	189	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



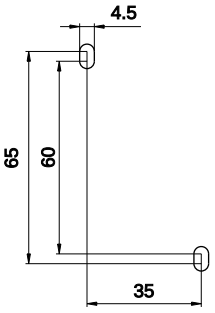


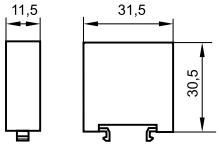
CNB 21, CNB 31

TYPE	CNB 21	CNB 31
C	129	145



CNNP

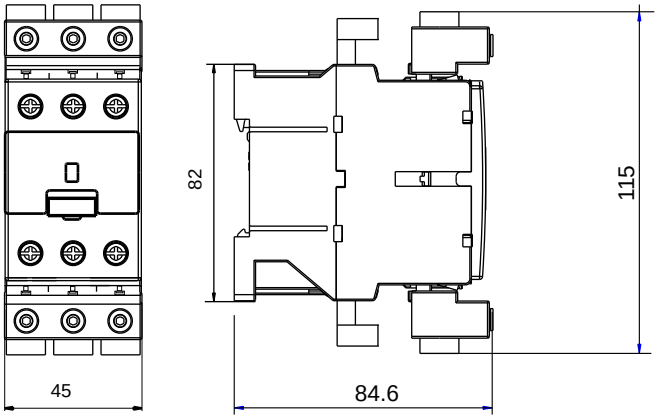




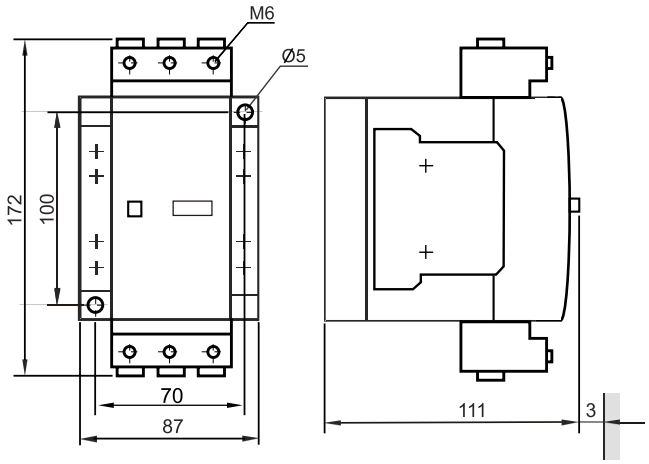
RC 1

DIMENSION DRAWINGS (mm)

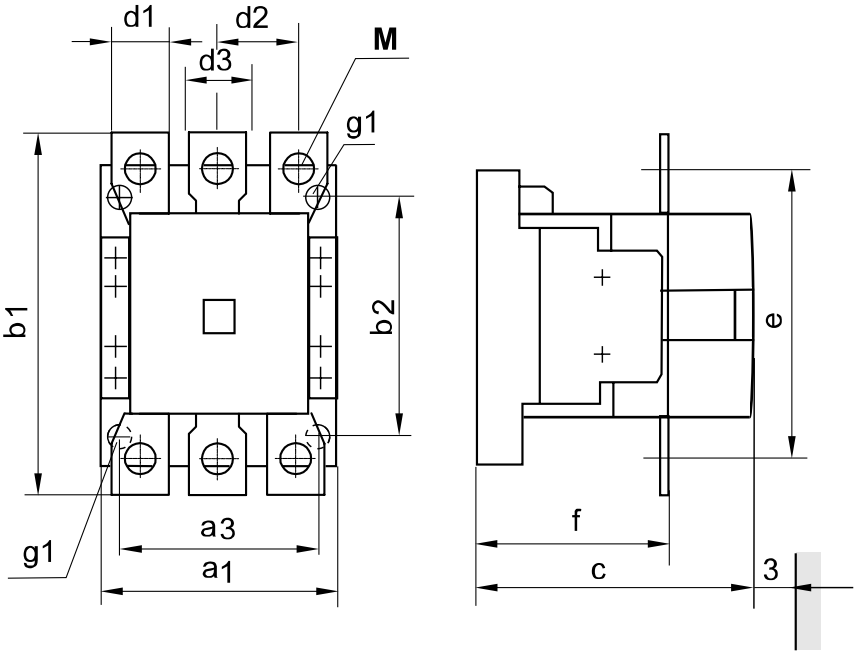
1



TKN 65



TK 115

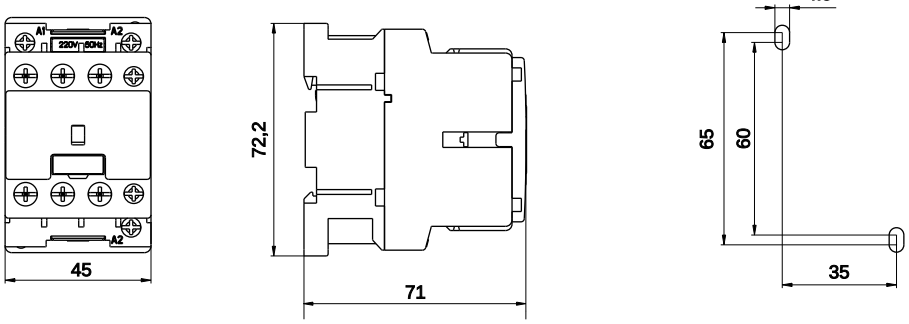


TK 130; TK 175

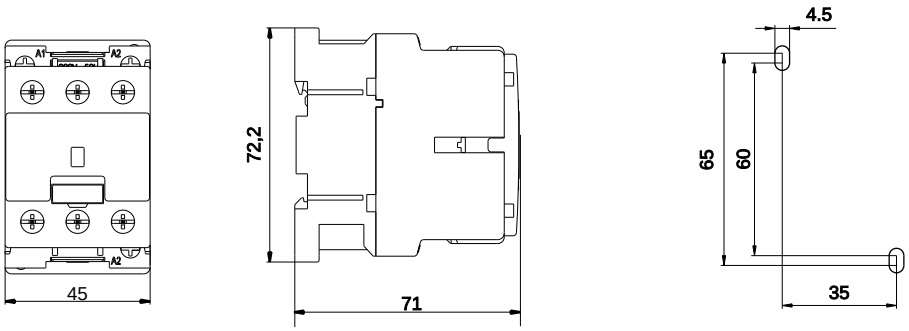
TYPE	a1	a3	b1	b2	c	d1	d2	d3	e	f	g1	M
TK 130	100	80	158	110	142	20	36	24	138	86	Ø6	M8
TK 175	100	80	158	110	142	20	36	24	138	86	Ø6	M8

DIMENSION DRAWINGS (mm)

CNNK 2,5; CNNK 5

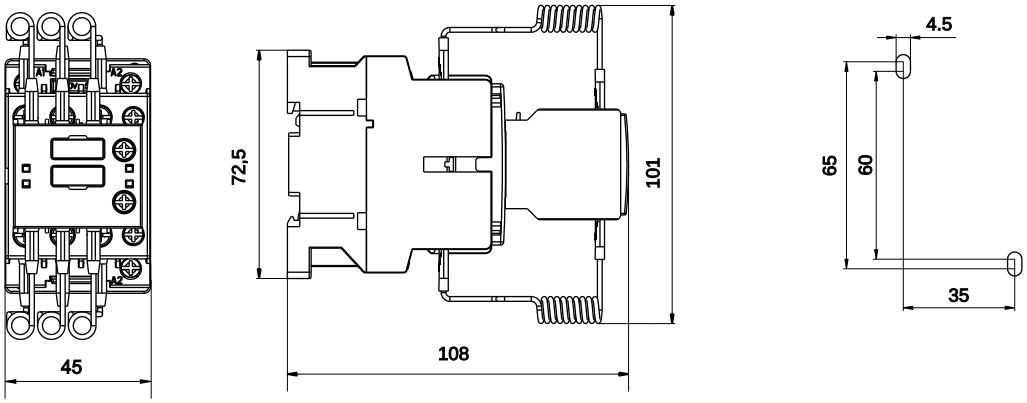


CNNK 7,5

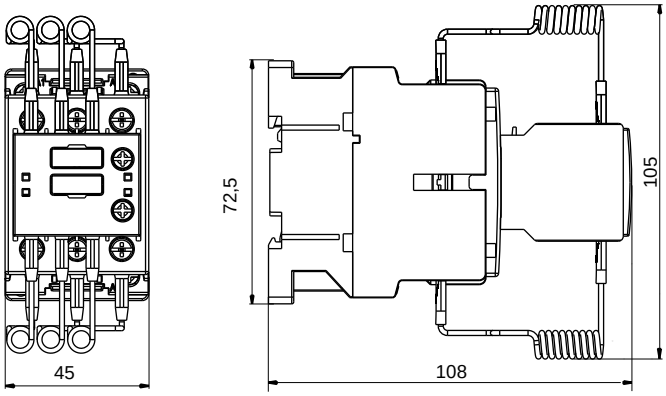


CNNK 10; CNNK 12; CNNK 15

CNNK 10; CNNK 12;
CNNK 15; CNNK 20

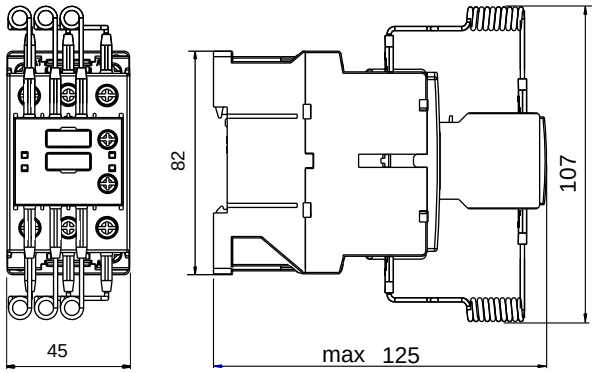


CNNK 20

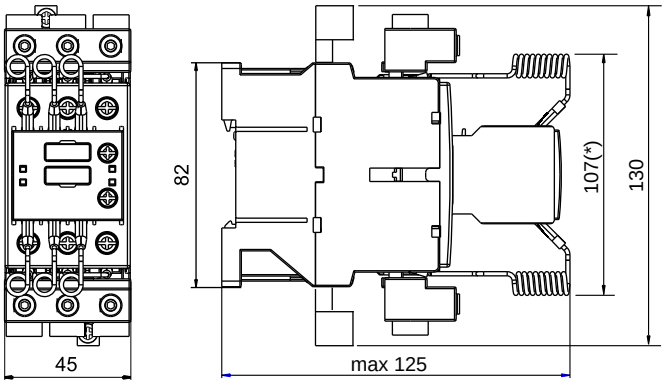


DIMENSION DRAWINGS (mm)

CNNK 25E

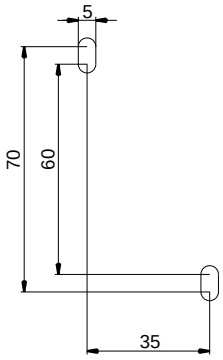


CNNK 25; CNNK 30

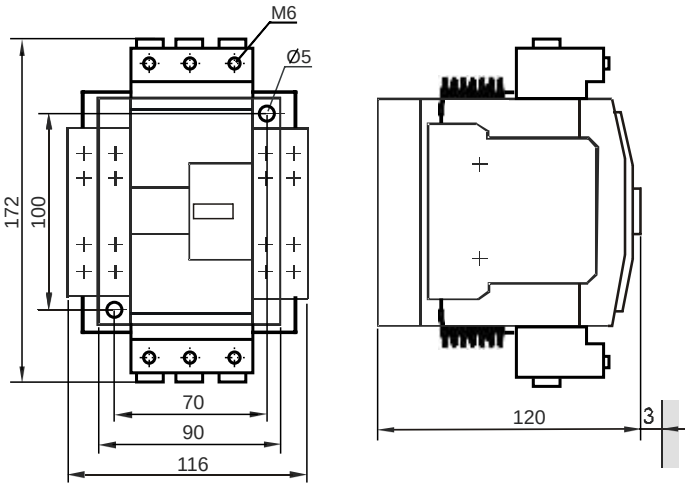


Driling plan (mm)

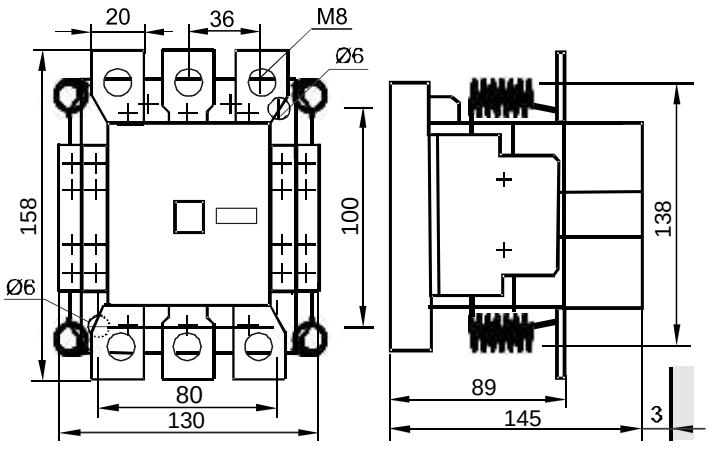
CNNK 25E; CNNK 25, CNNK 30



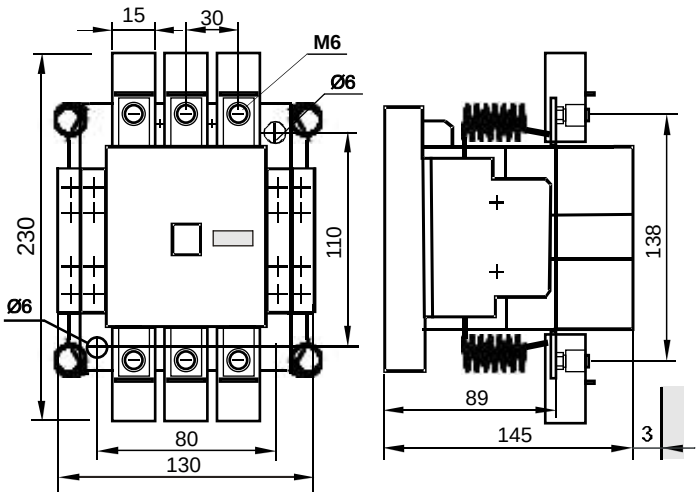
CNKM 40, CNKM 50; CNKM 60E



CNKM 60 and CNKM 75 without IP 20



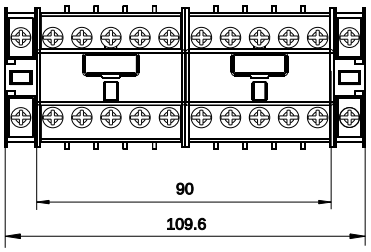
CNKM 60 and CNKM 75 with IP 20

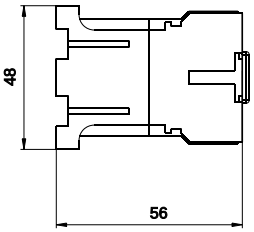


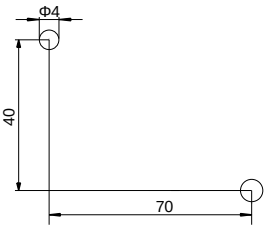
DIMENSION DRAWINGS (mm)

Driling plan (mm)

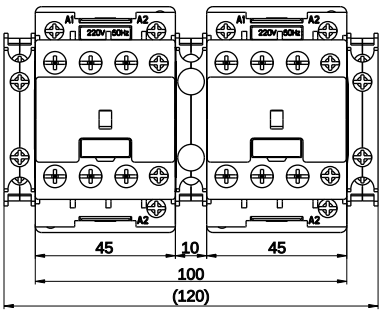
MBCM1 00; MBCM1 11

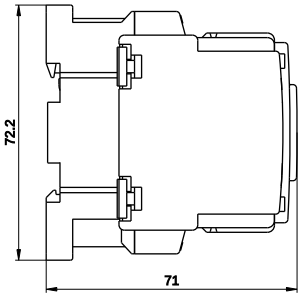


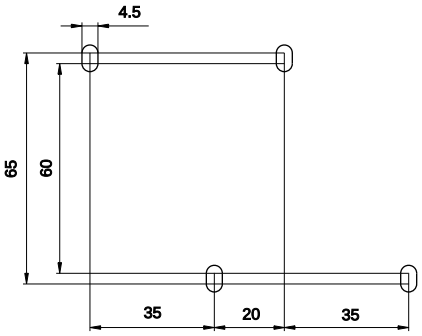


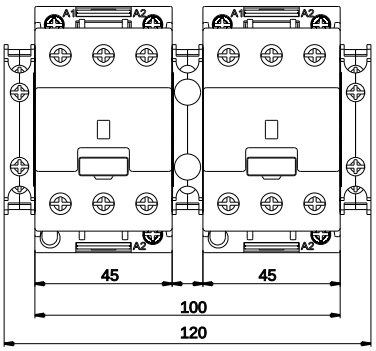


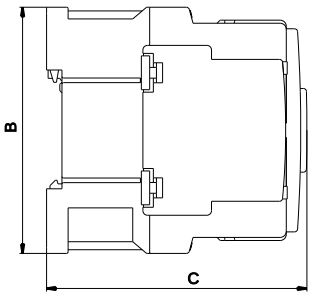
MBCNN 9 00 (11); MBCNN 12 00 (11); MBCNN 18 00 (11)

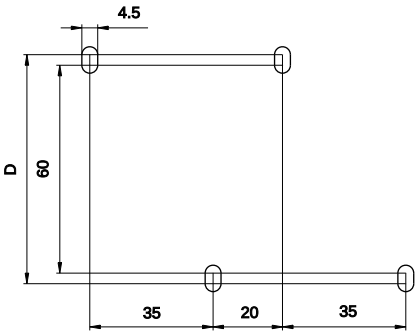










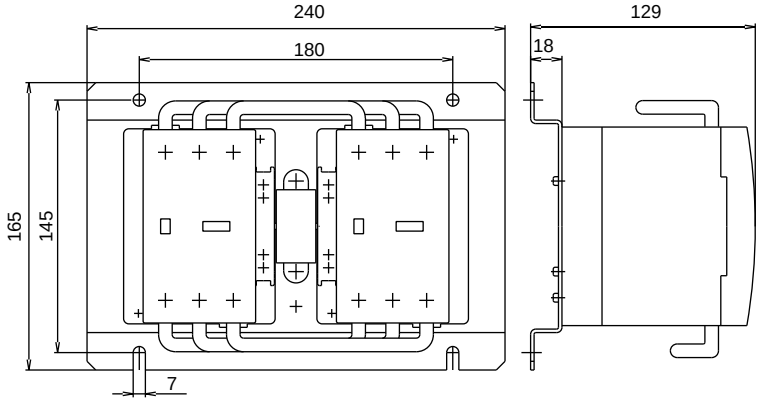


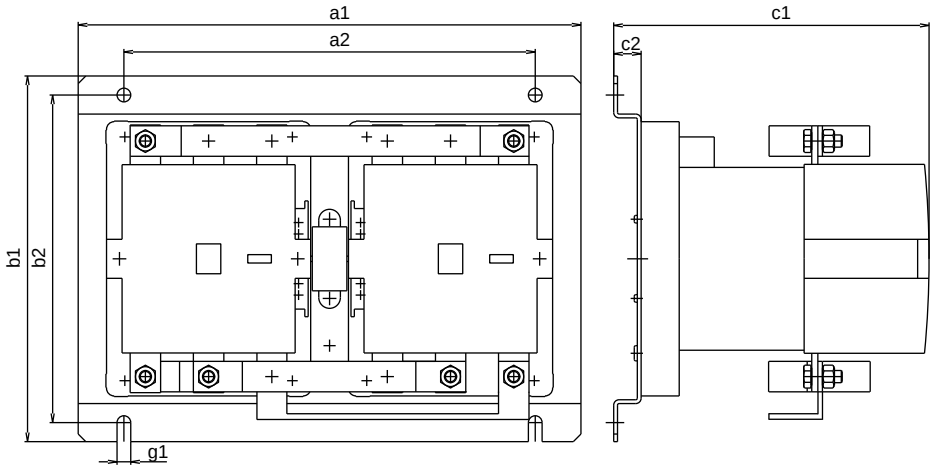
TYPE	B	C	D
MBCNN 25 10	72.2	71	65
MBCNN 30 10; MBCNN 40 10	80	84.6	70

DIMENSION DRAWINGS (mm)

1

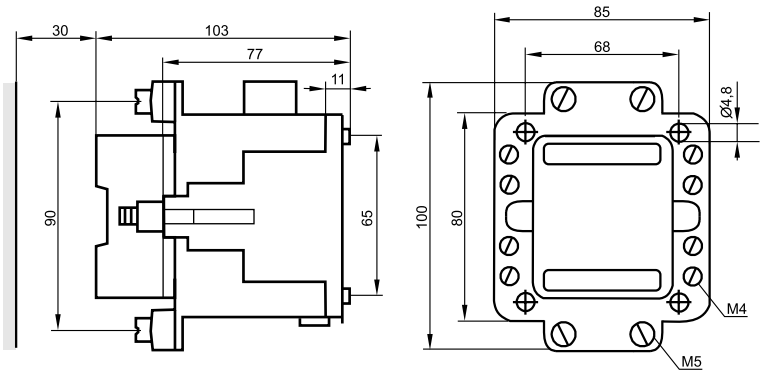
MBCNM 45 - MBCNM 60



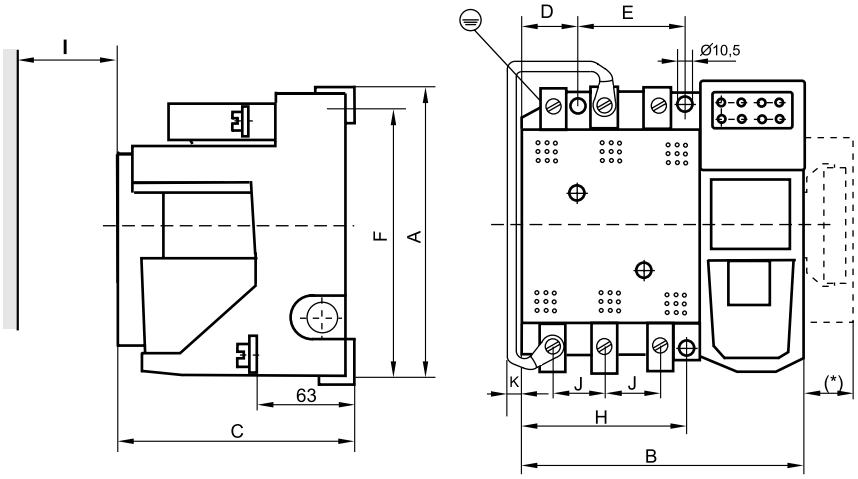


TYPE	a1	a2	b1	b2	c1	c2	g1
MBCNM 75 - MBCNM 110	260	200	175	155	160	18	7
MBCNM 140 - MBCNM 200	330	270	240	215	207	18	9
MBCNM 250 - MBCNM 400	380	310	265	240	247	21	11

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	

THERMAL OVERLOAD RELAYS

THERMAL OVERLOAD RELAYS TYPE TM 40

Features

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

Selection and ordering data

2

Thermal overloads

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

THERMAL OVERLOAD RELAYS type TRM 75 - TRM 400

Selection and ordering data

2

Thermal overloads

	For direct mounting onto contactor	Overload setting range (A)	Type	Weights kg
	CNM 45 CNM 60	16 - 25 20 - 32 25 - 40 32 - 50 40 - 57 50 - 63	**TRM 75 - 60**	0.39
	CNM 75 CNM 90 CNM 110	16 - 25 20 - 32 25 - 40 32 - 50 40 - 57 50 - 63 57 - 70 63 - 80	**TRM 75 - 110**	0.40
	For individual mounting CNM 110 CNM 140 CNM 170 CNM 200 CNM 250 CNM 315 CNM 400	70 - 100 80 - 125 100 - 160 125 - 200 160 - 250 200 - 320 250 - 400	**TRM 400**	2.2
	For individual mounting CNM 110 CNM 140 CNM 170 CNM 200 CNM 250 CNM 315 CNM 400	70 - 100 80 - 125 100 - 160 125 - 200 160 - 250	***TRM 400D**	1.58

***TRM 400D with straight-trough transformer.**

ADAPTOR FOR SEPARATE INSTALLATION ASM 40, ASM 75

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

2

ORDER-THERMAL OVERLOAD RELAYS

Type

Seting range (Upper value)

Example: Thermal overload relay type TRM 75 - 60, current range (40 - 57) A

TRM 75 - 60 **57 A**

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

TRM 400 **160 A**

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

TRM 400D **160 A**

THERMAL OVERLOAD RELAYS TM and TRM

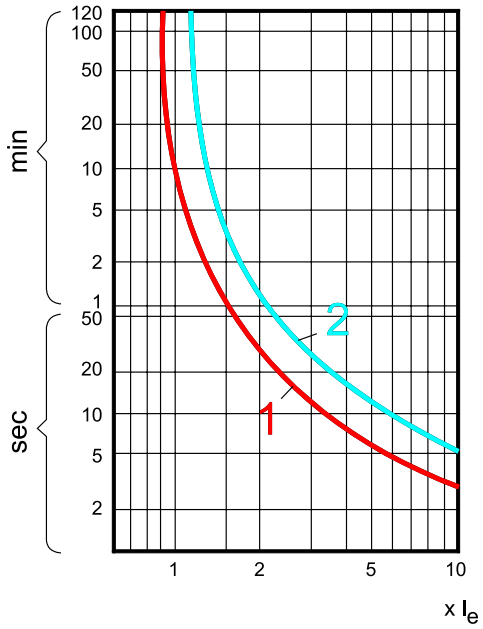
Application, standards and installation

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

2

Current time curves

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



Technical data

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

CONTACTORS WITH THERMAL OVERLOAD RELAYS

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

Selection and ordering data

CNNR 9

CNNR 12

CNNR 25

CNNR 40

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

CONTACTORS WITH THERMAL OVERLOAD RELAYS

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

Selection and ordering data

2

CNMR 60

CNMR 110

Data for **AC2** and **AC3** utilization categories			Auxiliary contacts		Type of relay	**Type**	**Weights**
Rated operational current **Ie/400V** A	Motor rating at 50Hz				Overload seting range		
	230 V kW	**400V kW**	NO	NC	A		
CONTACTORS WITH THERMAL RELAY							
45	15	**22**	2	2	**TRM 75-60** 16 - 25	**CNMR 45 22**	
45	15	**22**	4	4	20 - 32	**CNMR 45 44**	
60	18.5	**30**	2	2	25 - 40	**CNMR 60 22**	
60	18.5	**30**	4	4	32 - 50	**CNMR 60 44**	
					40 - 57		
					50 - 63		
75	22	**37**	2	2	**TRM 75-110** 16 - 25	**CNMR 75 22**	
75	22	**37**	4	4	20 - 32	**CNMR 75 44**	
90	26	**45**	2	2	25 - 40	**CNMR 90 22**	
90	26	**45**	4	4	32 - 50	**CNMR 90 44**	
110	37	**55**	2	2	40 - 57	**CNMR 110 22**	
110	37	**55**	4	4	50 - 63	**CNMR 110 44**	
					57 - 70		
					63 - 80		

ORDER FOR CNMR:

Type

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

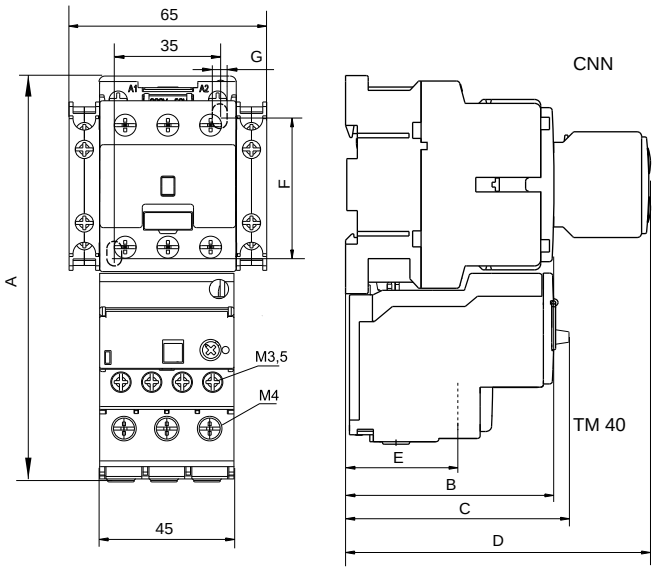
For AC control: 50 Hz or 60 Hz

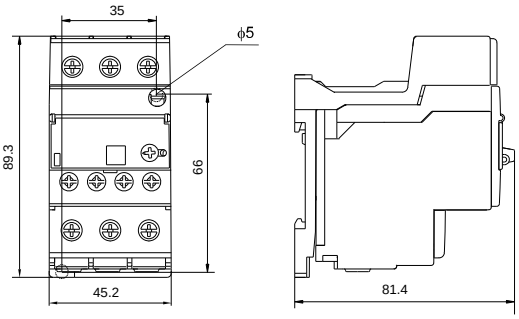
Setting range (Upper value)

Example: Contactor with thermal relay type CNMR 16 22, control voltage 220/230 V, 50 Hz, thermal overload relay type TRM 22, current range (10-16)A

CNMR 16 22	**220/230 V**	**50 Hz**	**16A**

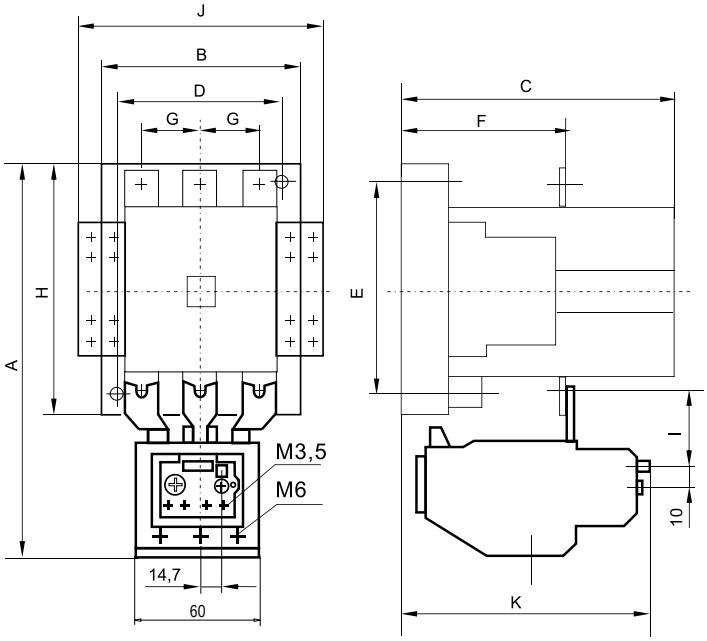
DIMENSION DRAWINGS (dimensions in mm)

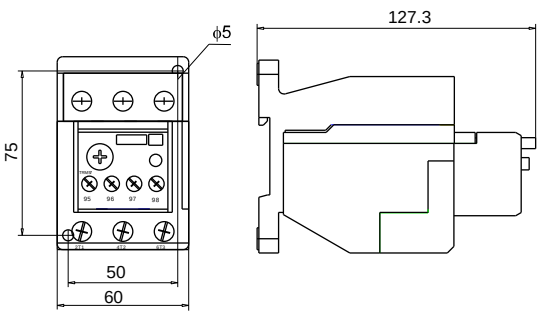




TM 40 + ASM 40

Type	A	B	C	D	E	F	G
TM 40 + CNN 9; 12; 18	132.2	71	74	101	31	60-65	4.5
TM 40 + CNN 25	134	71	75,5	101	32.8	60-65	4.5
TM 40 + CNN 32, 40	143.5	84.5	86	114	43.5	60-70	5



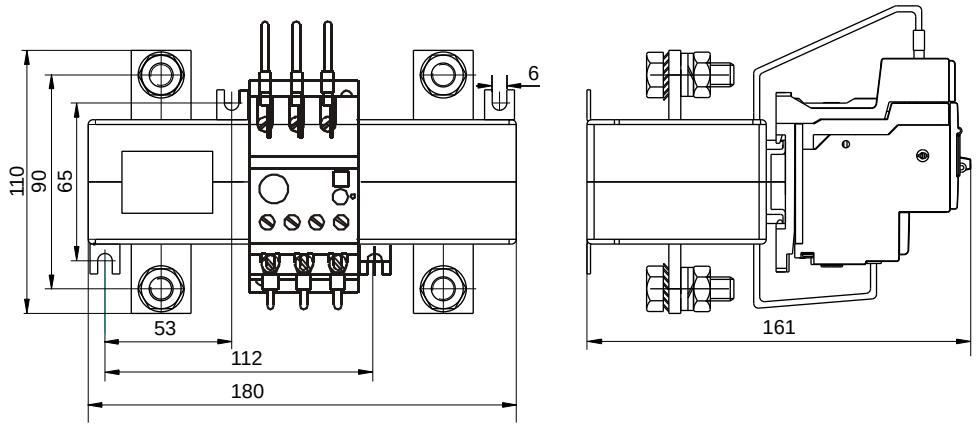


TRM 75 + ASM 75

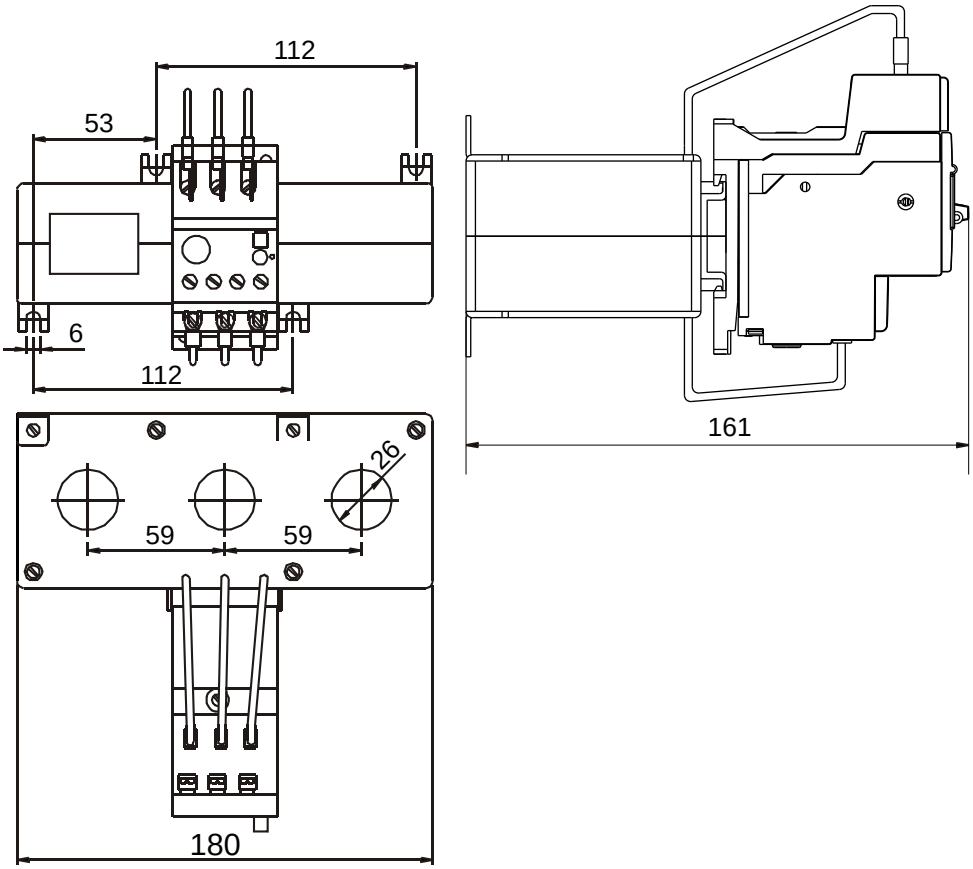
Type	A	B	C	D	E	F	G	H	I	J	K
TRM 75-60 +CNM 45, 60	180	87	111	60	100	81	19,5	114	24	112	121
TRM 75-110 + CNM 75, 110	199	100	142	80	110	86.5	30	132	24	125	126

DIMENSION DRAWINGS (dimensions in mm)

2



TRM 400



TRM 400D

ROTARY CAM SWITCHES

TYPES

BS 10, BS 20

BS 25

BS 32

BS 40

BS 50, BS 63

BS 80, BS 100K

BS 125

BS 200

BS 400

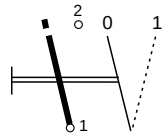
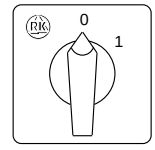
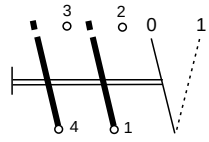
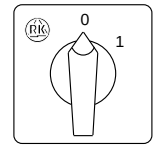
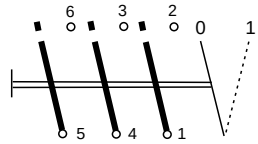
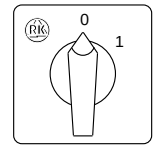
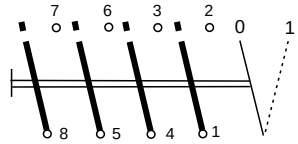
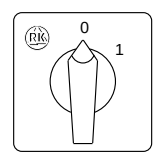
BS 630

ROTARY CAM SWITCHES type BS

Features

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

Selection and ordering data

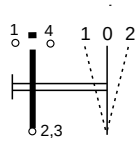
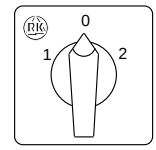
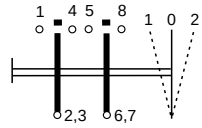
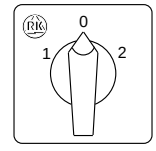
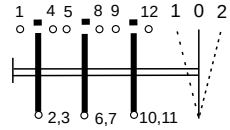
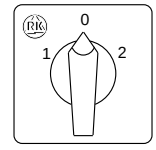
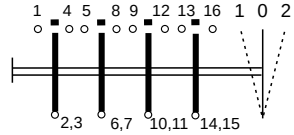
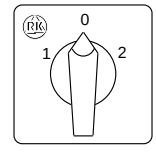
Rated thermal current **Ith** A	DIAGRAM	Escutch. plate	Type	No. of diagram
Switches: 1-pole -1 element				
20 **25** **32** **40** **50** **63** **70** **80** **100**			**BS 10 90 U** **BS 20 90 U** **BS 25 90 U** **BS 32 90 U** **BS 40 90 U** **BS 50 90 U** **BS 63 90 U** **BS 80 90 U** **BS 100K 90 U**	
2 - poles - 1 element				
20 **25** **32** **40** **50** **63** **70** **80** **100**			**BS 10 91 U** **BS 20 91 U** **BS 25 91 U** **BS 32 91 U** **BS 40 91 U** **BS 50 91 U** **BS 63 91 U** **BS 80 91 U** **BS 100K 91 U**	
3 - poles - 2 elements (3 elements for BS 400; 5 elements for BS 630)				
20 **25** **32** **40** **50** **63** **70** **80** **100** **125** **200** **400** **630**			**BS 10 10 U** **BS 20 10 U** **BS 25 10 U** **BS 32 10 U** **BS 40 10 U** **BS 50 10 U** **BS 63 10 U** **BS 80 10 U** **BS 100K 10 U** **BS 125 10 U** **BS 200 10 U** **BS 400 10 U** **BS 630 10 U**	
4 - poles - 2 elements (4 elements for BS 400; 6 elements for BS 630)				
20 **25** **32** **40** **50** **63** **70** **80** **100** **125** **200** **400** **630**			**BS 10 92 U** **BS 20 92 U** **BS 25 92 U** **BS 32 92 U** **BS 40 92 U** **BS 50 92 U** **BS 63 92 U** **BS 80 92 U** **BS 100K 92 U** **BS 125 92 U** **BS 200 92 U** **BS 400 92 U** **BS 630 92 U**	

ROTARY CAM SWITCHES type BS

Features

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

Selection and ordering data

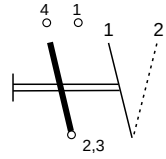
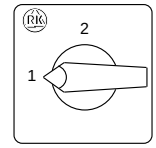
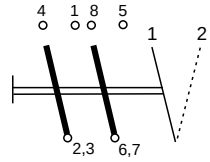
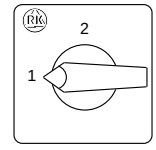
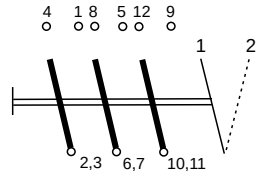
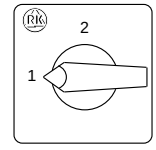
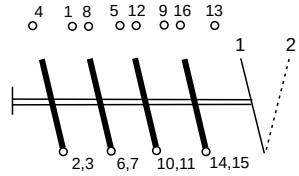
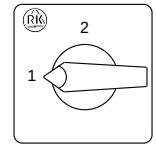
Rated thermal current **Ith** A	DIAGRAM	Escutch. plate	Type	No. of diagram
Changeover switches with zero position				
1-pole - 1 element				
20			**BS 10**	**51 U**
25			**BS 20**	**51 U**
32			**BS 25**	**51 U**
40			**BS 32**	**51 U**
50			**BS 40**	**51 U**
63			**BS 50**	**51 U**
70			**BS 63**	**51 U**
80			**BS 80**	**51 U**
100			**BS 100K**	**51 U**
2-poles -2 elements (4 elements for BS 400; 6 elements for BS 630)				
20			**BS 10**	**52 U**
25			**BS 20**	**52 U**
32			**BS 25**	**52 U**
40			**BS 32**	**52 U**
50			**BS 40**	**52 U**
63			**BS 50**	**52 U**
70			**BS 63**	**52 U**
80			**BS 80**	**52 U**
100			**BS 100K**	**52 U**
125			**BS 125**	**52 U**
200			**BS 200**	**52 U**
400			**BS 400**	**52 U**
630			**BS 630**	**52 U**
3 - poles - 3 elements (6 elements for BS 400; 9 elements for BS 630)				
20			**BS 10**	**53 U**
25			**BS 20**	**53 U**
32			**BS 25**	**53 U**
40			**BS 32**	**53 U**
50			**BS 40**	**53 U**
63			**BS 50**	**53 U**
70			**BS 63**	**53 U**
80			**BS 80**	**53 U**
100			**BS 100K**	**53 U**
125			**BS 125**	**53 U**
200			**BS 200**	**53 U**
400			**BS 400**	**53 U**
630			**BS 630**	**53 U**
4 - poles - 4 elements				
20			**BS 10**	**75 U**
25			**BS 20**	**75 U**
32			**BS 25**	**75 U**
40			**BS 32**	**75 U**
50			**BS 40**	**75 U**
63			**BS 50**	**75 U**
70			**BS 63**	**75 U**
80			**BS 80**	**75 U**
100			**BS 100K**	**75 U**

ROTARY CAM SWITCHES type BS

Features

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

Selection and ordering data

	Rated thermal current **Ith** A	DIAGRAM	Escutch. plate	Type	No. of diagram
	Shangeover switches without zero position				
	1 - pole - 1 element				
	**20**			**BS 10**	**54 U**
	25			**BS 20**	**54 U**
	32			**BS 25**	**54 U**
	40			**BS 32**	**54 U**
	50			**BS 40**	**54 U**
	63			**BS 50**	**54 U**
	70			**BS 63**	**54 U**
	80			**BS 80**	**54 U**
	100			**BS 100K**	**54 U**
	2 - poles - 2 elements				
	**20**			**BS 10**	**55 U**
	25			**BS 20**	**55 U**
	32			**BS 25**	**55 U**
	40			**BS 32**	**55 U**
	50			**BS 40**	**55 U**
	63			**BS 50**	**55 U**
	70			**BS 63**	**55 U**
	80			**BS 80**	**55 U**
	100			**BS 100K**	**55 U**
	3-poles -3 elements				
	**20**			**BS 10**	**56 U**
	25			**BS 20**	**56 U**
	32			**BS 25**	**56 U**
	40			**BS 32**	**56 U**
	50			**BS 40**	**56 U**
	63			**BS 50**	**56 U**
	70			**BS 63**	**56 U**
	80			**BS 80**	**56 U**
	100			**BS 100K**	**56 U**
	4 - poles - 4 elements				
	**20**			**BS 10**	**69 U**
	25			**BS 20**	**69 U**
	32			**BS 25**	**69 U**
	40			**BS 32**	**69 U**
	50			**BS 40**	**69 U**
	63			**BS 50**	**69 U**
	70			**BS 63**	**69 U**
	80			**BS 80**	**69 U**
	100			**BS 100K**	**69 U**

3

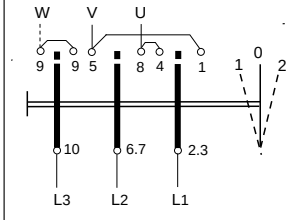
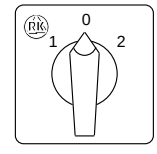
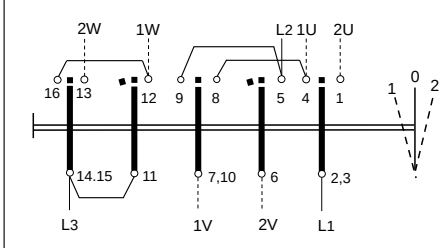
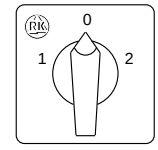
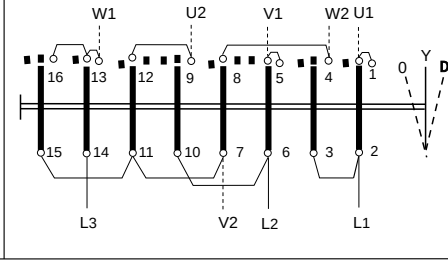
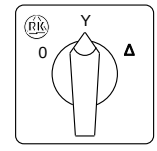
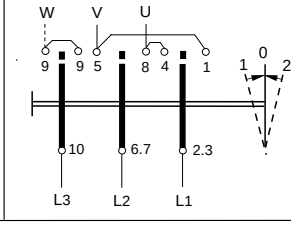
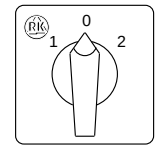
ROTARY CAM SWITCHES type BS

Features

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

Selection and ordering data

3

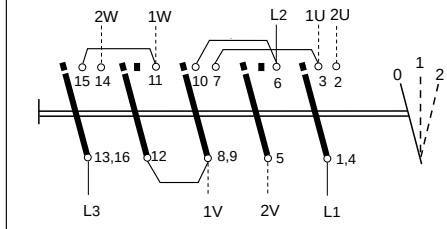
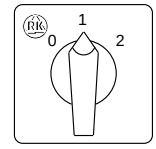
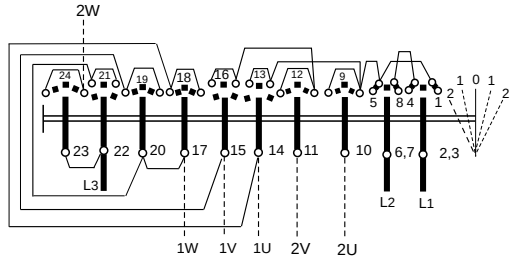
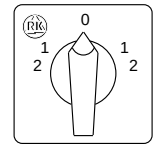
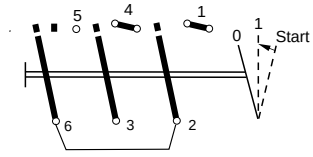
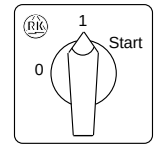
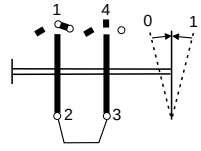
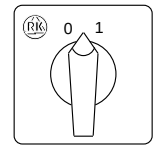
Rated thermal current **Ith** A	DIAGRAM	Escutch plate	Type	No. of diagram
Motor switches				
3 - pole reversing switches - 3 elements				
20				**BS 10 11 U**
25				**BS 20 11 U**
32				**BS 25 11 U**
40				**BS 32 11 U**
50				**BS 40 11 U**
63				**BS 50 11 U**
70				**BS 63 11 U**
80				**BS 80 11 U**
100				**BS 100K 11 U**
125				**BS 125 11 U**
200				**BS 200 11 U**
Motor switch with Dahlander - 4 elements				
20				**BS 10 13 U**
25				**BS 20 13 U**
32				**BS 25 13 U**
40				**BS 32 13 U**
50				**BS 40 13 U**
63				**BS 50 13 U**
70				**BS 63 13 U**
80				**BS 80 13 U**
100				**BS 100K 13 U**
Star-delta switch - 4 elements				
20				**BS 10 12 U**
25				**BS 20 12 U**
32				**BS 25 12 U**
40				**BS 32 12 U**
50				**BS 40 12 U**
63				**BS 50 12 U**
70				**BS 63 12 U**
80				**BS 80 12 U**
100				**BS 100K 12 U**
Motor switches				
3-pole reversing switches, return to "0" -3 elements				
20				**BS 10 26 U**
25				**BS 20 26 U**
32				**BS 25 26 U**
40				**BS 32 26 U**
50				**BS 40 26 U**

ROTARY CAM SWITCHES type BS

Features

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

Selection and ordering data

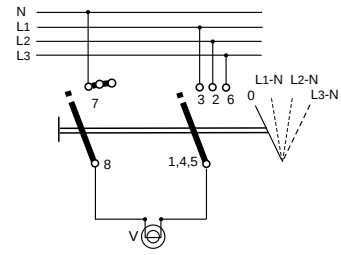
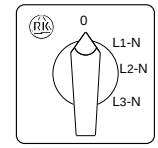
Rated thermal current **Ith** A	DIAGRAM	Escutch. plate	Type	No. of diagram
Motor switch with Dahlander - 4 elements				
20 **25** **32** **40** **50** **63** **70** **80** **100**			**BS 10 19 U** **BS 20 19 U** **BS 25 19 U** **BS 32 19 U** **BS 40 19 U** **BS 50 19 U** **BS 63 19 U** **BS 80 19 U** **BS 100K 19 U**	
Motor switch with Dahlander - 6 elements				
20 **25** **32** **40** **50**			**BS 10 20 U** **BS 20 20 U** **BS 25 20 U** **BS 32 20 U** **BS 40 20 U**	
Switch for single - phase motors - 2 elements				
25 **32** **40** **50** **70** **80** **100**			**BS 10 15 U** **BS 20 15 U** **BS 25 15 U** **BS 32 15 U** **BS 40 15 U** **BS 50 15 U** **BS 63 15 U** **BS 80 15 U** **BS 100K 15 U**	
Switch to control contactors - 1 element				
20 **25** **32** **40** **50**			**BS 10 207 U** **BS 20 207 U** **BS 25 207 U** **BS 32 207 U** **BS 40 207 U**	

Selection and ordering data

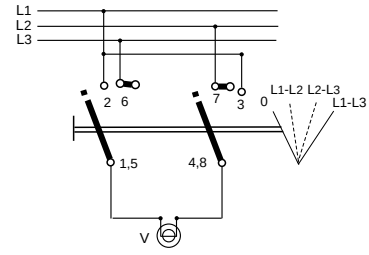
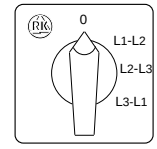
Rated thermal current **Ith** A	DIAGRAM	Escutch. plate	Type	No. of diagram

Voltmeter change over switches

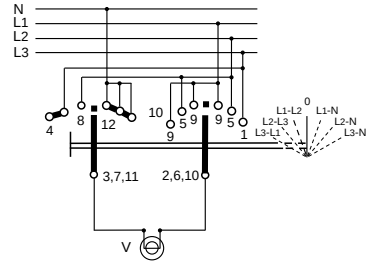
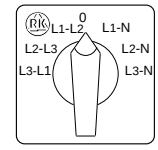
To measure phase voltages L1-N, L2-N, L3-N -2 elements

20 25 32 40 50			**BS 10 68 U** **BS 20 68 U** **BS 25 68 U** **BS 32 68 U** **BS 40 68 U**	

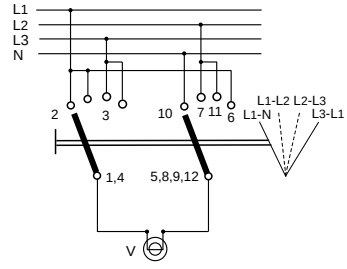
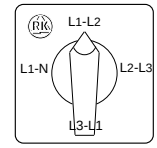
To measure line voltages L1-L2/L2-L3/L3-L1 - 2 elements

20 25 32 40 50			**BS 10 67 U** **BS 20 67 U** **BS 25 67 U** **BS 32 67 U** **BS 40 67 U**	

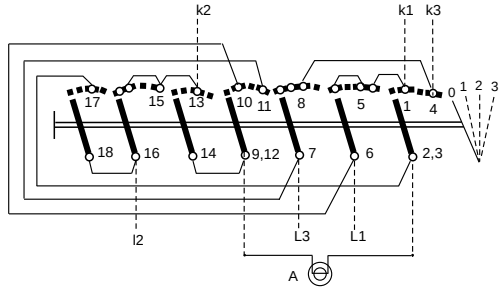
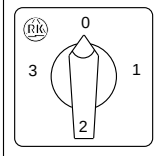
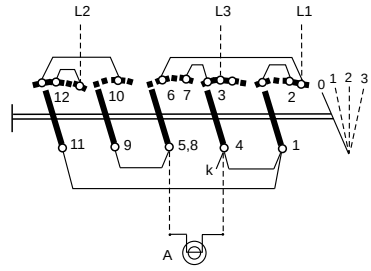
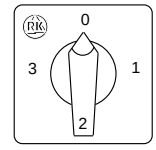
To measure phase and line voltages - 3 elements

20 25 32 40 50			**BS 10 66 U** **BS 20 66 U** **BS 25 66 U** **BS 32 66 U** **BS 40 66 U**	

To measure 1phase and 3 line voltages - 3 elements

20 25 32 40 50			**BS 10 60 U** **BS 20 60 U** **BS 25 60 U** **BS 32 60 U** **BS 40 60 U**	

Selection and ordering data

Rated thermal current **Ith** A	DIAGRAM	Escutch. Plate	Type	No.of Diagram
Ammeter change over switches **With off position to measure current in 3-phasees - 5 element**				
20 **25** **32** **40** **50**			**BS 10 97 U** **BS 20 97 U** **BS 25 97 U** **BS 32 97 U** **BS 40 97 U**	
With off position to measure current in 3-phases - 4 elements				
20 **25** **32** **40** **50**			**BS 10 98 U** **BS 20 98 U** **BS 25 98 U** **BS 32 98 U** **BS 40 98 U**	

3

GENERAL EMERGENCY ON - OFF SWITCH VERSION “LK” WITH PADLOCKING ONLY IN "0"

- Emergency switch have to make electrical separation beetwen el. supply and electrical equipment.
- Control handle according the Standards is Red, and the plate behind the handle yellow .
- Emergency switch is able to lock in the open position "0" up to three padlocks.

BS 25 10 LK (Three-pole)
BS 32 10 LK (Three-pole)
BS 40 10 LK (Three-pole)
BS 50 10 LK (Three-pole)
BS 63 10 LK (Three-pole)

BS 25 92 LK (Four-pole)
BS 32 92 LK (Four-pole)
BS 40 92 LK (Four-pole)
BS 50 92 LK (Four-pole)
BS 63 92 LK (Four-pole)

BS 80 10 LK (Three-pole)
BS 100K 10 LK (Three-pole)
BS 80 92 LK (Four-pole)
BS 100K 92 LK (Four-pole)

MOUNTING ON THE RAIL

BS 10 .. L*, BS 20 .. L*, BS 25 .. L*, BS 32L*

* Max. up to 4 elements

*"**ES**" - General emergency on - off switch
Sizes : BS 10; .... ; BS 100**K**

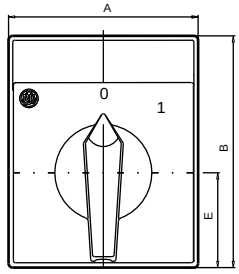
Color for front part: ES - (handle-red and front plate-yellow)

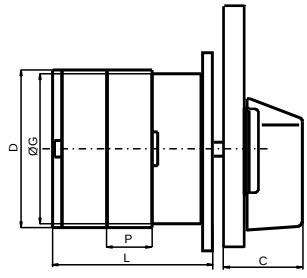
Selection and ordering data



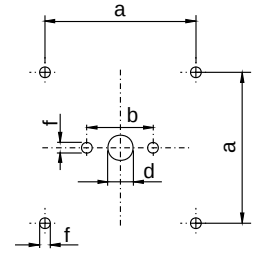

Rated thermal current Ith A	Description	Type
20		BS 10 .. . N
25		BS 20 .. . N
32		BS 25 .. . N
40		BS 32 .. . N
50		BS 40 .. . N
63		BS 50 .. . N
70		BS 63 .. . N
80		BS 80 .. . N
100		BS 100K .. . N
	No. Of diagram are as the standard version of the model “BS”	
	Front mounting “U”, Rear mounting “O”	
	Extended front plate with title Standard colour - Black	

DIMENSIONAL DRAWIINGS (mm)





DRILLING PLATE



TYPE	MARKING					
	A	B	E	C	D	ØG
BS 10 .. N	48	60	24	26	38.6	38.6
BS 20 .. N						
BS 25 .. N	48	60	24	26	45.2	38.6
BS 32 .. N	65	80	32,5	33	53	38.6
BS 40 .. N	65	80	32,5	33	61	56.4
BS 50 .. N	65	80	32,5	33	68.6	56.4
BS 63 .. N						
BS 80 .. N	90	110	45	41	84	80
BS 100K .. N	90	110	45	41	84	80
BSB 20 ..N	48	60	24	26	38.6	38.6
BSB 25 ..N	48	60	24	26	45.2	38.6

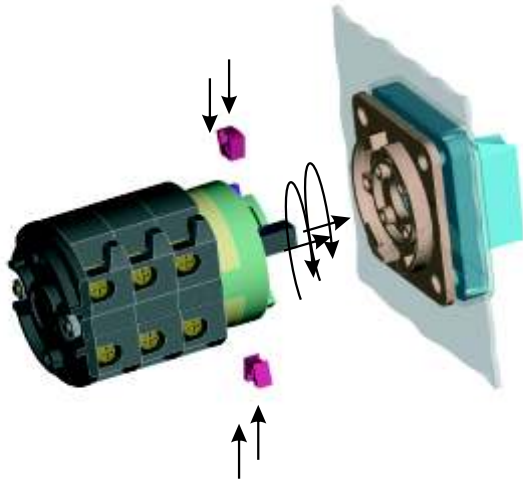
TYPE	a	b	d	f
BS 10 .. N	36	30	10	4.2
BS 20 .. N				
BS 25 .. N				
BS 32 .. N	48		10	4.2
BS 40 .. N				
BS 50 .. N	72		14	5.3
BS 63 .. N				
BS 80 .. N				
BS 100K .. N				
BSB 20 .. N	36		10	4.2
BSB 25 .. N				

NOTES:

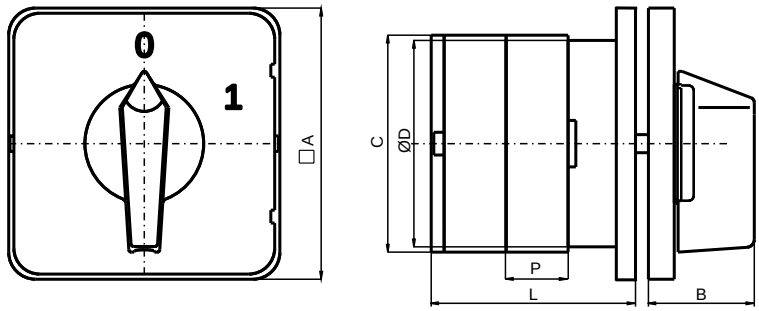
- 1.Technical date and drilling plan are same as the standard version of the model “BS”

Selection and ordering data

Rated thermal current **Ith** A	Description	Type
20 **25** **32** **40**	No.of diagram are as the standard version of the model “BS” Mounting form - for front “U” Front part: P - (handle and front plate - blue) C - (handle and front plate - black)	**BSB 10** .. . . **BSB 20** .. . . **BSB 25** .. . . **BSB 32** .. . .



DIMENSIONAL DRAWINGS (mm)



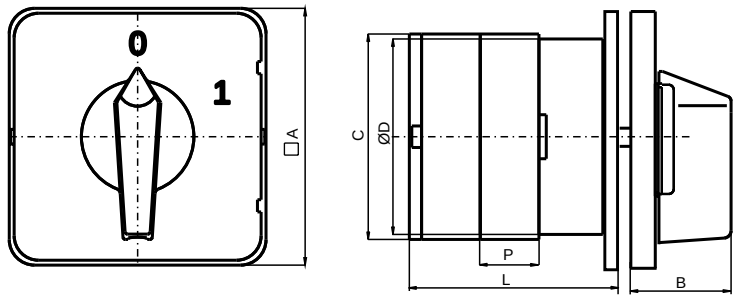
TYPE	MARKING					NUMBER OF ELEMENTS (L/mm)											
	□A	B	C	ØD	P	1	2	3	4	5	6	7	8	9	10	11	12
BSB 10	51,2	27,2	38,6	38,6	12,8	39,5	52,3	65,1	77,9	90,7	103,5	116,3	129,1	141,9	154,7	167,5	180,3
BSB 20																	
BSB 25	51,2	27,2	45,2	38,6	12,8	39,5	52,3	65,1	77,9	90,7	103,5	116,3	129,1	141,9	154,7	167,5	180,3
BSB 32	51,2	27,2	53	38,6	12,8	44	56,8	69,6	82,4	95,2	108	120,8	133,6	146,4	159,2	172	184,8

NOTES:

1.Technical date and drilling plan are same as the standard version of the model “BS”

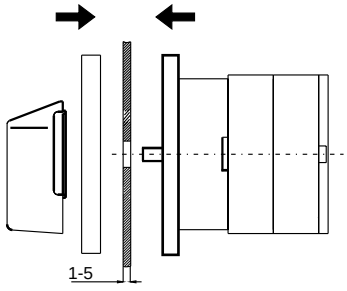
2.The selection of the color for the front parts for “BS” is same as previus case for “BSB”

DIMENSIONAL DRAWINGS (mm)

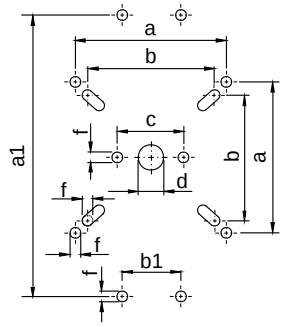


TYPE		MARKING			NUMBER OF ELEMENTS (L/mm)												
	□A	B	C	ØD	P	1	2	3	4	5	6	7	8	9	10	11	12
BS 10 BS 20	51,2	27,2	38,6	38,6	12,8	32,5	45,3	58,1	70,9	83,7	96,5	109,3	122,1	134,9	147,7	160,5	173,3
BS 25	51,2	27,2	45,2	38,6	12,8	32,5	45,3	58,1	70,9	83,7	96,5	109,3	122,1	134,9	147,7	160,5	173,3
BS 32	72	33	53	38,6	12,8	37	49.8	62.6	75,4	88,2	101	113,8	126,6	139,4	152,2	165	177,8
BS 40	72	33	61	56,4	17,5	50,6	68,1	85,6	103,1	120,6	138,1	155,6	173,1	190,6	208,1	225,6	243,1
BS 50 BS 63	72	33	68,6	56,4	20,5	42,5	63	83,5	104	124,5	145	165,5	186	206,5	227	247,5	268
BS 80	105	41	84	80	25	67,5	92,5	117,5	142,5	167,5	192,5	217,5	242,5	267,5	292,5	317,5	342,5
BS 100K	105	41	84	80	25	67,5	92,5	117,5	142,5	167,5	192,5	217,5	242,5	267,5	292,5	317,5	342,5
BS 125	130	62	110	110	30	91	121	151	181								
BS 200					39	100	139	178	217								
BS 400					39	100	139	178	217	-	295						
BS 630					39	-	139	178	–	256	295	-	-	412			

FRONT MOUNTING "U"

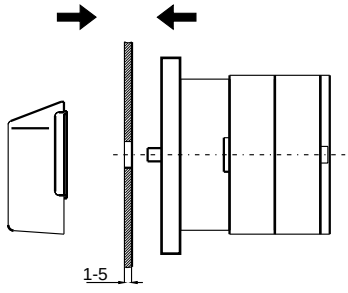


DRILLING PLAN

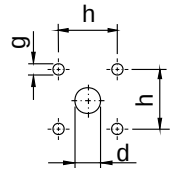


TYPE	a	b	a1	b1	c	d	f
BS 10 BS 20 BS 25	58	32-39	90	30	30	8 10	3.2
BS 32 BS 40 BS 50 BS 63		48				10	4.2
BS 80 BS 100K	85	68-74				14	5.3
BS 125 BS 200 BS 400 BS 630						18	5.3

FRONT MOUNTING "M"

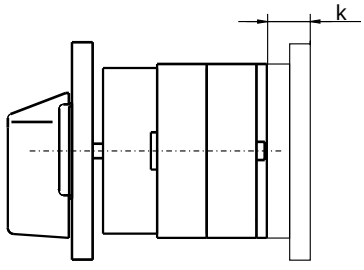


DRILLING PLAN

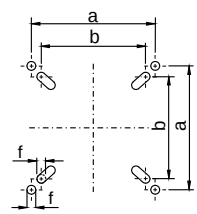


TYPE	h	d	g
BS 10 BS 20 BS 25	13.5	8 10	3.5
BS 32 BS 40 BS 50 BS 63	16.2	10	4
BS 80 BS 100K	20	14	4.5

REAR MOUNTING "O"

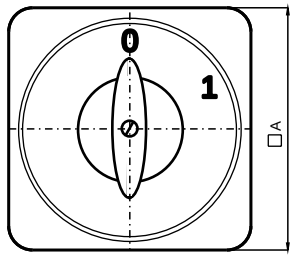


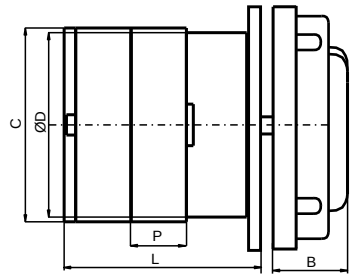
DRILLING PLAN



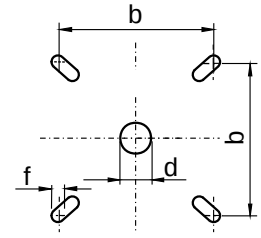
TYPE	a	b	f	k
BS 10 BS 20 BS 25	36	36	4.2	15.5
BS 32 BS 40	58	48	4.5	17
BS 50 BS 63	58	48	4.5	
BS 80 BS 100K	85	68	5.3	20.5

DIMENSIONAL DRAWINGS VERSION “LK” (mm)





DRILLING PLAN



TYPE	□A	C	ØD	P	B	L/2	b	d	f
BS 25 LK	72	45.2	38.6	12.8	32	49.8	58	10	4.2
BS 32 LK	72	53	38.6	12.8	32	49.8	58	10	4.2
BS 40 LK	72	61	56.4	17.5	32	68.1	58	10	4.2
BS 50 LK	72	68.6	56.4	20.5	32	63	58	10	4.2
BS 63 LK									
BS 80 LK	105	84	80	25	44	92.5	85	14	5.3
BS 100K LK	105	84	80	25	44	92.5	85	14	5.3

3

ORDER- ROTARY CAM SWITCHES

When ordering please define:

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

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

EXAMPLE:	BS 25	10	U	C

Type **BS 25**, shematic diagram **10,** mounting from front plate **U,** with **black** front plate **C**.

BS 40	10	N	U

Type **BS 40,** shematic diagram **10, N-** Extended front plate with title, mounting from front plate **U**

BS 63	10	LK

Type **BS 63,** shematic diagram **10, LK** Version Main emergency on-off switch with 3 padloc facility in “0” position

TECHNICAL DATA

SWITCH TYPE		BS 10	BS 20	BS 25	BS 32	BS 40	BS 50	BS 63
Rated insulation voltage U_i	V	400		690				
Rated impulse withstand voltage U_{imp}	kV	4		6				
Rated thermal current Ith	**A**	**20**	**25**	**32**	**40**	**50**	**63**	**70**
Main switch (1) Max.value of rated operational voltage	V	480						
Rated impulse wiythstand voltage	kV	4						
Max. fuse size for short circuit protection gL 10 kA	A	20	25	32	40	50	63	70
Rated Short-time Withstand current Icw 1 sek	A	200	250	400	600	800	800	800
3 sek	A	120	150	250	400	530	640	700
10 sek	A	70	80	140	240	290	320	350
30 sek	A	40	50	90	150	200	230	250
60 sek	A	30	40	70	120	150	150	150
Rated operational current I_e AC1 / AC21	A	10	20	25	32	40	50	63
Rated operational current I_e AC15								
110 V	A	8	10	20	25	40	45	50
220/230 V	A	6	8	20	25	30	35	40
380/400 V	A	4	6	16	20	25	32	40
660/690 V	A			8	8,5	8.5	9	10
Motor switch in utilization category								
AC3 220/230 V	kW	2.5	3	5.5	7.5	9	10	11
3-phase **380/400 V**	**kW**	**4**	**5**	**7.5**	**11**	**15**	**16**	**18.5**
500/690 V	kW			11	15	19	20	22
1-phase 110V	kW	0.8	0.8	1.5	2.5	2.5	3	3
2-poles 220/230 V	kW	1.5	2.2	3	4.8	5.5	5.5	6
380/400 V	kW	2.2	3	5.5	6.5	7.5	9	11
AC23 220/230 V	kW	3	5	6.5	8	9	10	15
3-phase **380/400 V**	**kW**	**6**	**7.5**	**11**	**15**	**18.5**	**20**	**22**
500/690 V	kW	-	-	11	18.5	22	25	30
1-phase 110 V	kW	0.8	0.8	1.5	2.5	3	3	3.5
2-poles 220/230 V	kW	1.7	2.5	3.7	5	6	7	9
380/400 V	kW	3	3.7	5.5	7.5	9	11	15
AC4 220/230 V	kW	1.5	1.5	2.5	3	5	5.5	6
3-phase 380/400 V	kW	2	3	4	5.5	8	9	11
500/690 V	kW			4	7.5	8	9	11
Mechanical endurance swit. cycles	10^6	3	3	3	3	3	3	2
Terminal screw		M3.5	M3.5	M3.5	M4	M5	M5	M5
Screw head		PZ2	PZ2	PZ2	PZ2	PZ2	PZ2	PZ2
Tightening torque		0.8	0.8	0.8	1.2	1.8	2	2
Cable cross-section rigid	mm^2	2x(1-2.5) 2-4*	2x(1-2.5) 2-4*	2x(1-4) 1-6*	2x(2,5-6) 1-10*	2x(2.5-10)	2x(4-16)	2x(4-16)
flexible		2x(1-2.5) 2-4*	2x(1-2.5) 2-4*	2x(1-4)	2x(2,5-6) 1-10*	2x(2.5-10)	2x(4-16)	2x(4-16)

(1) Valid for neutral earthed systems, overvoltage category III, polution degree 3.
(*) Only for diagrams without inside links.

TECHNICAL DATA

SWITCH TYPE			BS 80	BS 100K	BS 125	BS 200	BS 400	BS 630
Rated insulation voltage	U_i	V	690		690			
Rated impulse withstand voltage	U_{imp}	kV	6		8			
Rated thermal current Ith		**A**	**80**	**100**	**125**	**200**	**400**	**630**
Main switch (1) Max.value of rated operational voltage		V	480		690			
Rated impulse wiythstand voltage		kV	4		6			
Max. fuse size for short circuit protection gL 10 kA		A	80	100	125	200	400	630
Rated Short-time Withstand current Icw	1 sek	A	1000	1800	2100	3000		
	3 sek	A	800	900	1300	1700		
	10 sek	A	400	450	700	850		
	30 sek	A	250	300	400	500		
	60 sek	A	160	200	300	400		
Rated operational current I_e AC1 / AC21		A	70	75	120	200	400	630
Motor switch in utilization category	AC3/AC23							
3- Phase	220/230 V	kW	12/18.5	19/22	26	37	37	37
	380/400 V	**kW**	**22/32**	**32/37**	**41**	**60**	**60**	**60**
	500/690 V	kW	28/45	42/55	55	75	75	75
1-phase 2 poles	110V	kW	-	-	-	-	-	-
	220/230 V	kW	-	-	-	-	-	-
	380/400 V	kW	-	-	-	-	-	-
Motor switch in utilization category	AC4							
3-phase	220/230 V	kW	7	9.5	17	17		
	380/400 V	kW	12	16	30	30		
	500/690 V	kW	12	16	32	32		
Mechanical endurance switching cycles			$2x10^6$	$2x10^6$	$3x10^5$	$1x10^5$	$5x10^4$	$5x10^4$
Terminal screw			2xM5	2xM5	M8	M10		
Cable cross-section flexible		mm^2	6-16	6-16	16-35	70-95[2]		
Flat connection		mm	2x(6-16)	2x(6-16)			△	△

(1) Valid for neutral earthed systems, overvoltage category III, polution degree 3.
[2] Connections valid for lugs with cables having a section; min. 70 mm^2, max. 95 mm^2.
△ Connection valid to connect copper bars.

Selection and ordering data

	Degree of protection	Type	
 PNBS 20, PNBS 25	IP 65	**PNBS 10** .. . **PNBS 20** .. . **PNBS 25*** .. .	
No. of diagram - (90, 91,10, 92, 51, 52, 53, 54, 55, 56, 11, 26, 15) Front parts P - (handle and front plate of rotary cam switches - blue) C - (handle and front plate of rotary cam switches - black)			
 PNGBS 25, PNGBS 32, PNGBS 40	IP 65	**PNGBS 25** .. . **PNGBS 32** .. . **PNGBS 40** .. .	
 PNGBS 25..LK, PNGBS 32..LK, PNGBS 40..LK		**PNGBS 32 LK** .. **PNGBS 40 LK** ..	
No. of diagram for PNGBS 25 - (90, 91,10, 92, 51, 52, 53, 54, 55, 56, 11, 26, 15) No. of diagram for PNGBS 32 - (90, 91,10, 92, 51, 52, 53, 54, 55, 56, 11, 26, 15) No. of diagram for PNGBS 40 - (90, 91,10, 92, 51, 52, 54, 55) Front parts P - (handle and front plate of rotary cam switches - blue) C - (handle and front plate of rotary cam switches - black)			
 PN1BS 10, PN1BS 20 PN1BS 25	Number of elements 4-5	**PN1BS 10** .. . **PN1BS 20** .. . **PN1BS 25** .. .	
No. of diagram - (12, 13, 75, 69, 19, 97, 98) Front parts P - (handle and front plate of rotary cam switches - blue) C - (handle and front plate of rotary cam switches - black)			

NOTES:
Color of enclosures ist grey (RAL 7035)
* Only with conection cable up to 2.5 mm^2

Selection and ordering data

PN2BS 32, PN2BS 40, PN2BS 50, PN2BS 63

	Degree of protection	Type	
Number of elements 4-5 for BS 32 Number of elements 3-5 for BS 40 Number of elements 1-4 for BS 50, BS 63	IP 65	**PN2BS 32** **PN2BS 40** **PN2BS 50** **PN2BS 63**	**.. .** **.. .** **.. .** **.. .**

No. of diagram for PN2BS 32 - (75, 69, 13, 12, 19, 97, 98)
No. of diagram for PN2BS 40 - (53,75, 56, 69, 11,13, 12, 26,19, 97, 98)
No. of diagram for PN2BS 50 and PN2BS 63 - (90, 91, 10, 92, 51, 52, 53, 75, 54, 55, 56, 69, 11, 13, 12, 26,19, 15, 207, 98)

Front parts
P - (handle and front plate of rotary cam switches - blue)
C - (handle and front plate of rotary cam switches - black)

PN3BS 80, PN3BS 100K

	Degree of protection	Type	
Number of elements 1-3	IP 65	**PN3BS 80** **PN3BS 100K**	**.. .** **.. .**

No. of diagram - (90, 91, 10, 92, 51, 52, 53, 54, 55, 56, 11, 26, 15,)

Front parts
P - (handle and front plate of rotary cam switches - blue)
C - (handle and front plate of rotary cam switches - black)

PN4BS 80, PN4BS 100K PN4BS 125, PN4BS 200

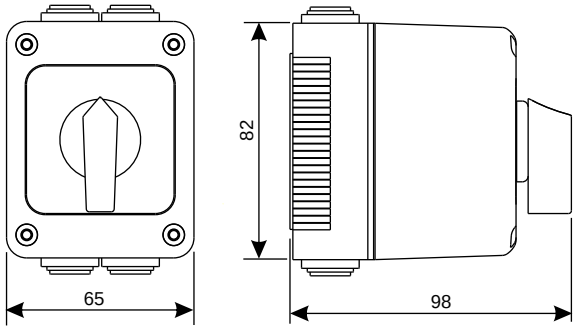
	Type	
Number of elements 4 for BS 80 and BS 100K Number of elements 1-3 for BS 125 Number of elements 1-2 for BS 200	**PN4BS 80** **PN4BS 100K** **PN4BS 125** **PN4BS 200**	**.. .** **.. .** **.. .** **.. .**

No. of diagram for PN4 BS 80, 100K - (12, 13, 19, 75, 98)
No. of diagram for PN4 BS 125 - (10, 11, 51, 52, 53, 54, 55, 56, 92)
No. of diagram for PN4 BS 200 - (10, 51, 52, 54, 55, 92)

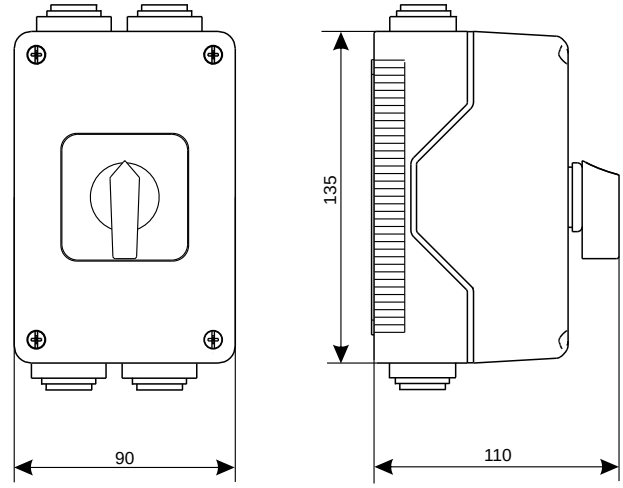
Front parts
P - (handle and front plate of rotary cam switches - blue)
C - (handle and front plate of rotary cam switches - black)

DIMENSION DRAWINGS (mm)

PNBS 20, PNBS 25

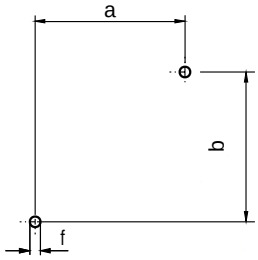


PNGBS 25, PNGBS 32 , PNGBS 40



3

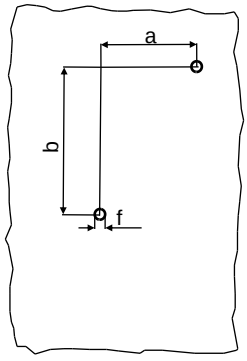
DRILLING PLAN

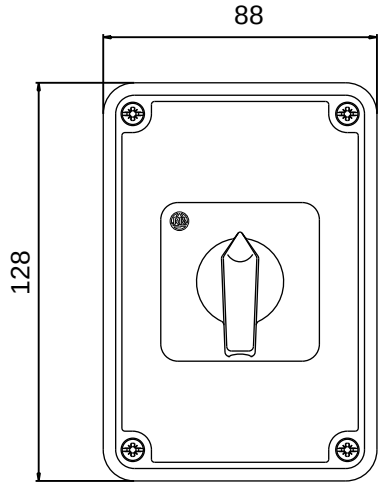


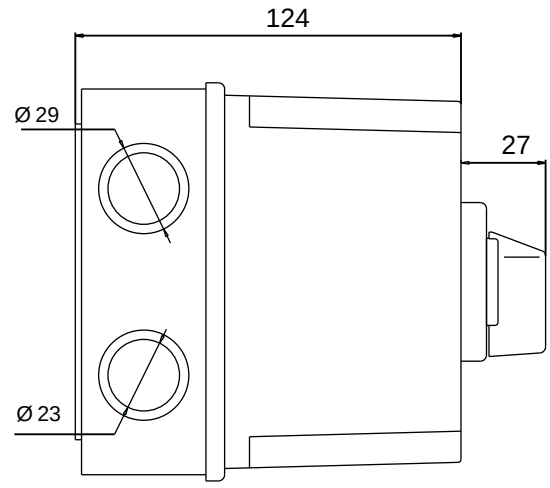
TYPE	a	b	f
PNBS 20 PNBS 25	44	48	4,3
PNGBS 25 PNGBS 32 (LK) PNGBS 40 (LK)	48	100	4,3

PN1BS 10 , PN1BS 20 , PN1BS 25

DRILLING PLAN



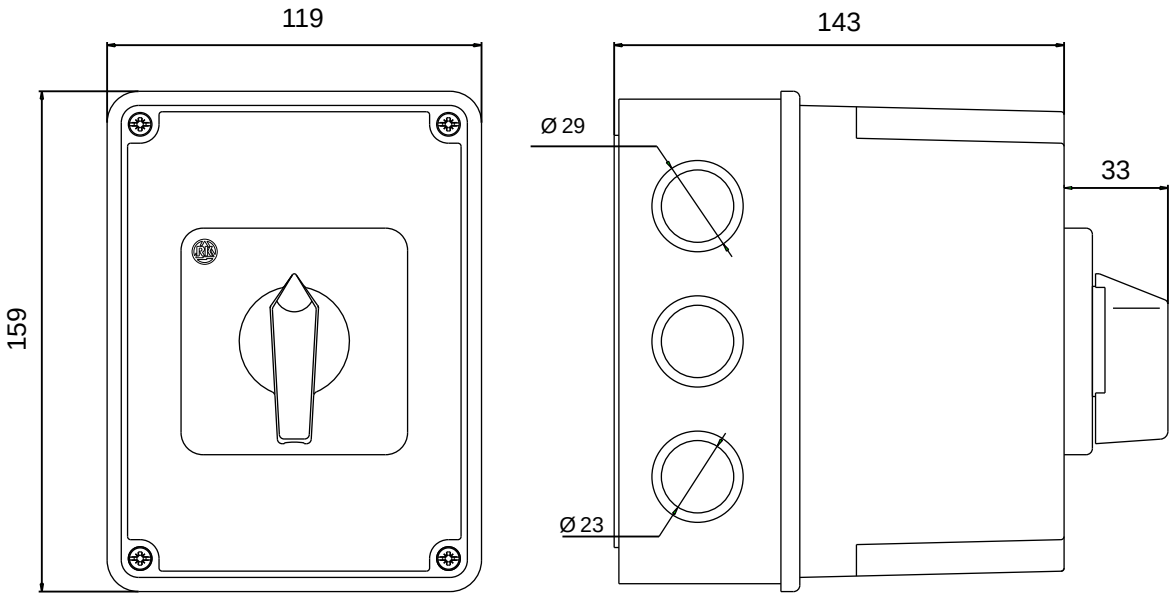




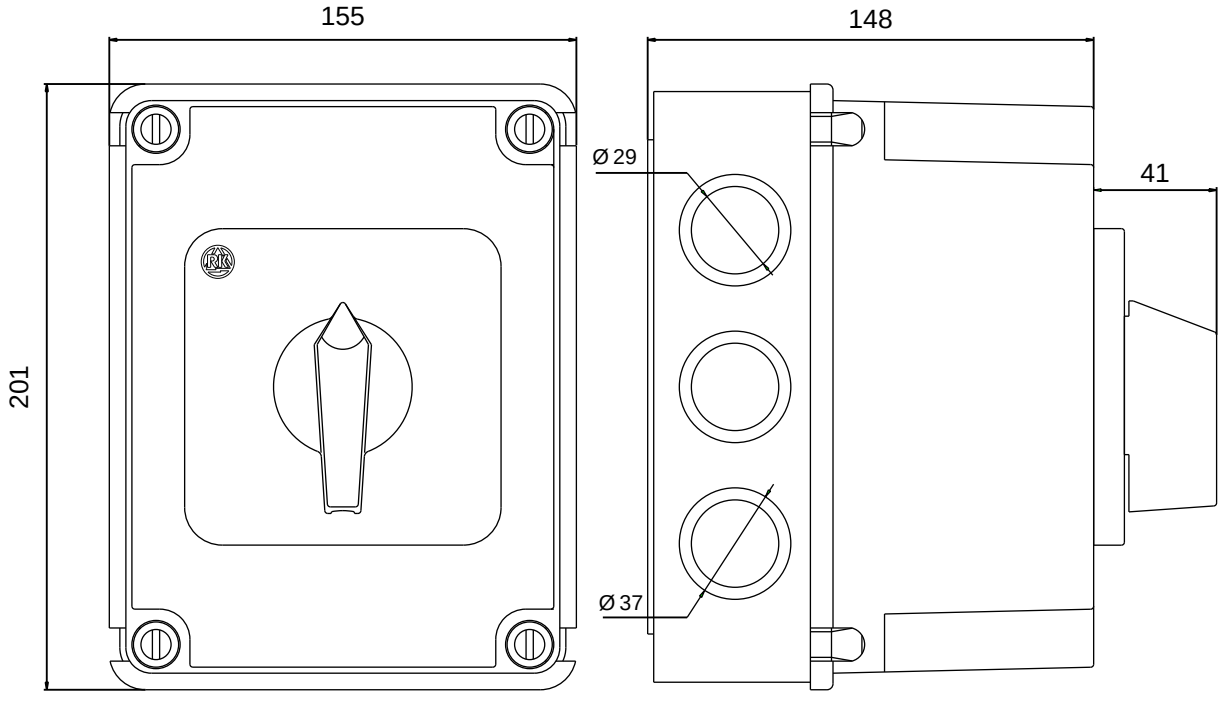
TYPE	a	b	f
PN1BS 10 PN1BS 20 PN1BS 25	42	82	4,3

DIMENSION DRAWINGS (mm)

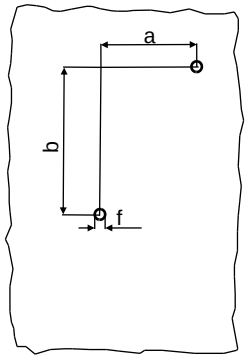
PN2BS 32 , PN2BS 40 , PN2BS 50 , PN2BS 63



PN3BS 80 , PN3BS 100K ,



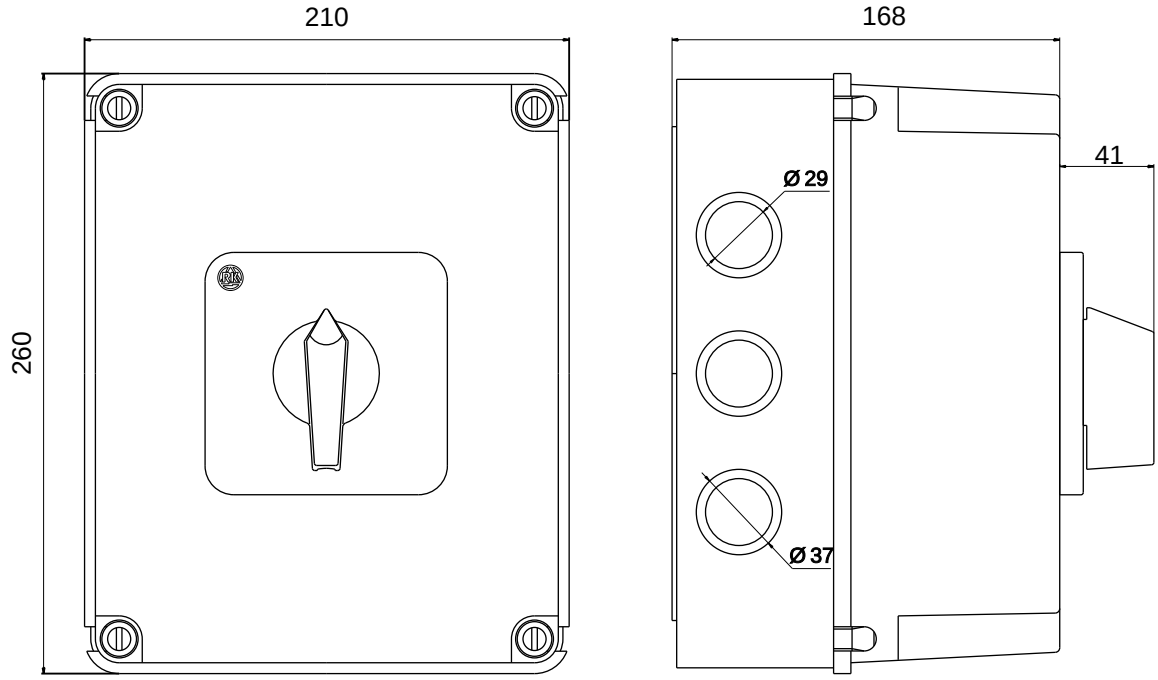
DRILLING PLAN



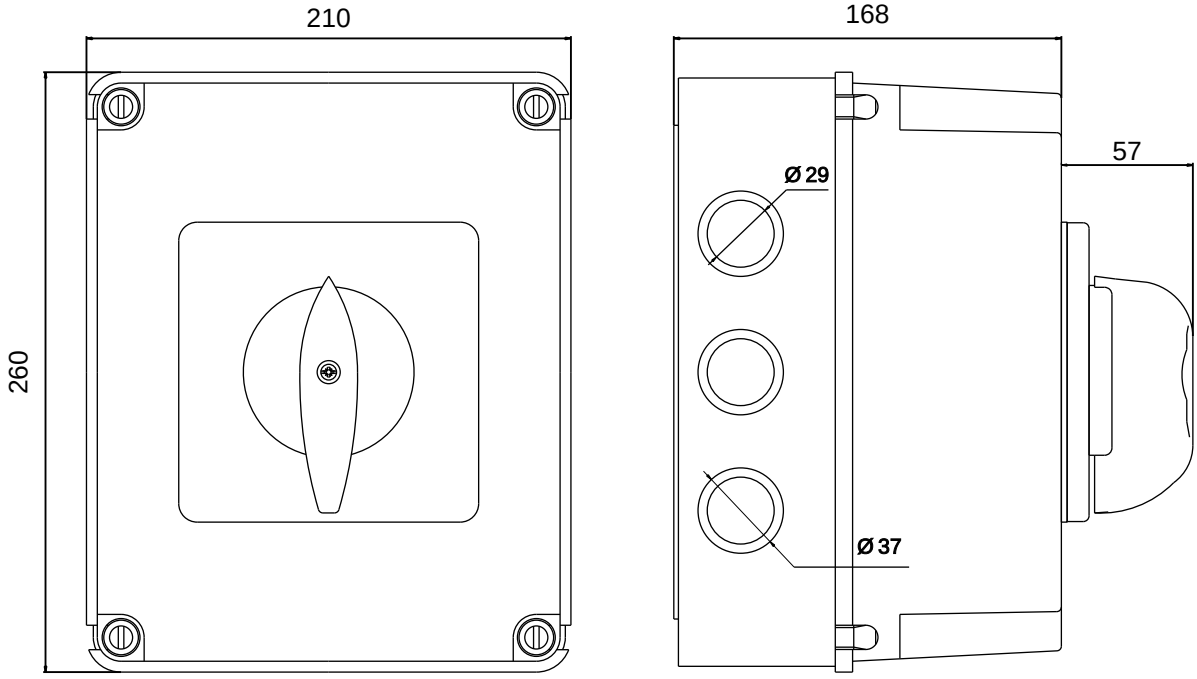
TYPE	a	b	f
PN2BS 32 PN2BS 40 PN2BS 50 PN2BS 63	72	112	4,5
PN3BS 80 PN3BS 100K	98	144	4,5

DIMENSION DRAWINGS (mm)

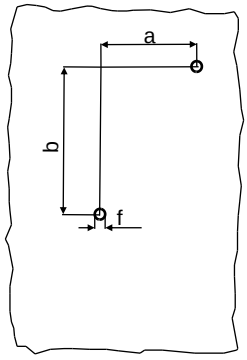
PN4BS 80 , PN4BS 100K ,



PN4BS 125 , PN4BS 200



DRILLING PLAN



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

When ordering cam switches whose switching program is not inluded in the catalogue, the purtchaser is required to submit a developed diagram for switching of contacts. For this purpose is used the attached order form, wich besides the diagram, it is to be filled in with date for rated current, rated voltage , utilization category, mounting form, type of handle, special version
and on marks front plate.
Example of filled in order form.

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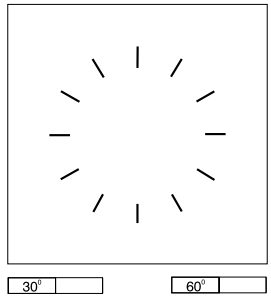
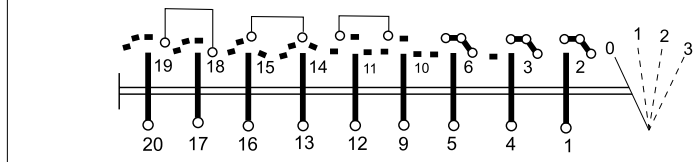
KONTAKTORI I RELEI D.O.O.

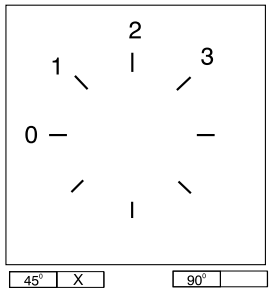
ORDER FORM

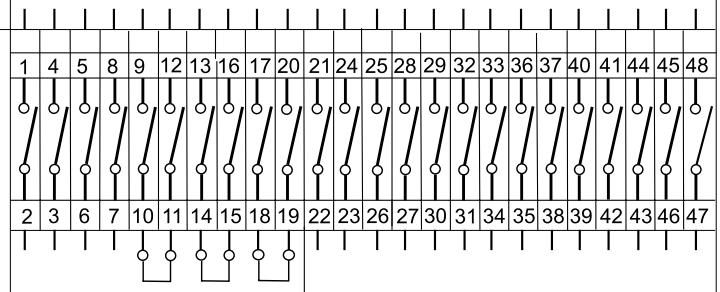
Rated voltage	220 V	Type of switch	BS 40	Mounting form	U	Diagram No.	A001
Rated current	40 A	Utilization category	AC 21			Special version	S

Connection diagram







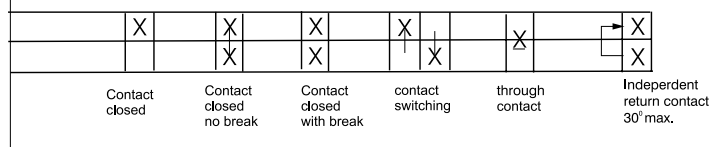


Arrangement of position marks on front plate

0	
1	X X X X X
2	X X
3	X X X X X

Note :

$\measuredangle 45^0$



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KONTAKTORI I RELEI D.O.O.

Puchaser _____

Address _____

Telephone _____ Fax _____ Data _____

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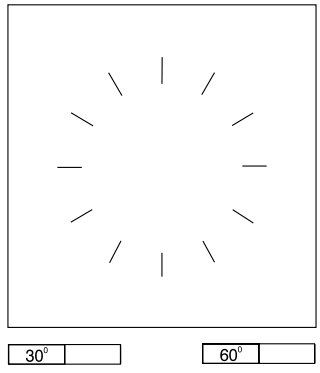
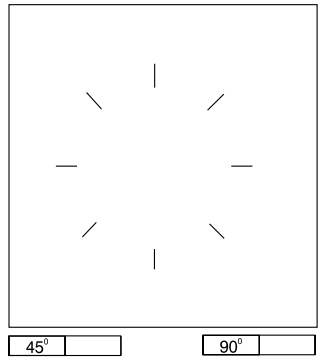
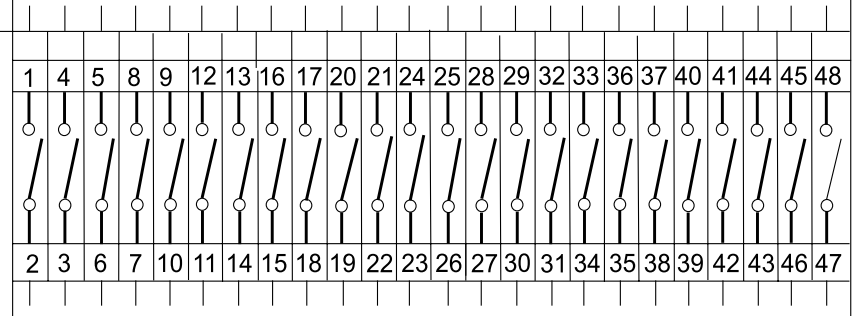
ORDER FORM

Rated voltage	V ~ V =	Type of switch	**BS**	Mounting form		Diagram No.	
Rated current	A	Utilization category				Special version	S

Connection diagram

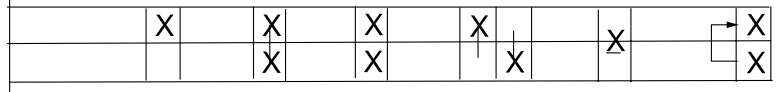






Arrangement of posittion marks on front plate

Note:



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KONTAKTORI I RELEI D.O.O.

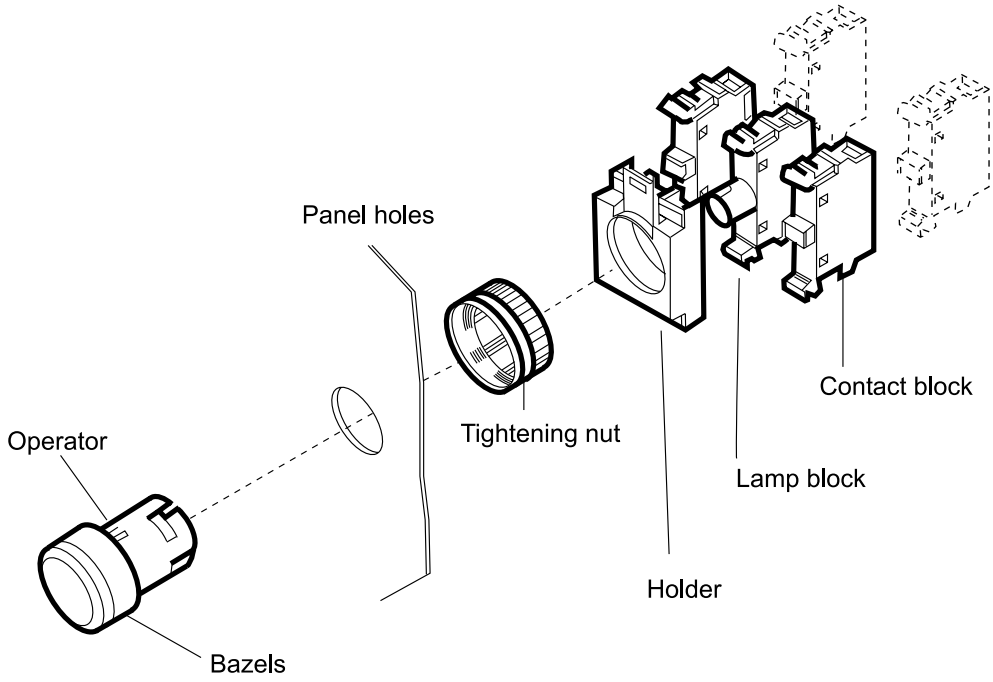
Puchaser _____

Address _____

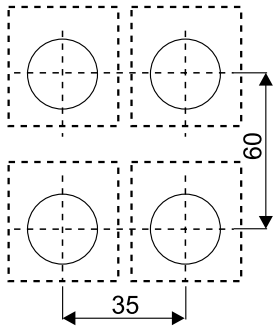
Telephone _____ Fax _____ Data _____

MOUNTING INSTRUCTION

4

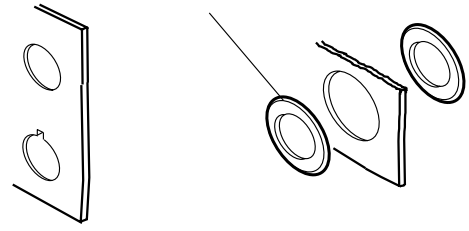


Panel holes



∅ 22.5 **∅ 30.5**

Hole adapter



PUSHBUTTONS 22 mm DIAMETER

Features

- 22 mm mounting diameter
- Adaptable design with actuators for any control function

Selection and ordering data

Pushbuttons, non-illuminated — **complete**

Design	button color	included blocks	Part No.
Flat pushbuttons 	red	1NC	**PB 22-1-01R**
	green	1NO	**PB 22-1-10G**
	yellow	1NO	**PB 22-1-10Y**
	blue	1NO	**PB 22-1-10BL**
	black	1NO	**PB 22-1-10B**
	white	1NO	**PB 22-1-10W**
	red	1NO+1NC	**PB 22-1-11R**
	green	1NO+1NC	**PB 22-1-11G**
	yellow	1NO+1NC	**PB 22-1-11Y**
	blue	1NO+1NC	**PB 22-1-11BL**
	black	1NO+1NC	**PB 22-1-11B**
	white	1NO+1NC	**PB 22-1-11W**

Pushbuttons, non-illuminated — **complete**

Design	button color	included blocks	Part No.
Flat pushbuttons 	red	1NC	**PB 22-2-01R**
	green	1NO	**PB 22-2-10G**
	yellow	1NO	**PB 22-2-10Y**
	blue	1NO	**PB 22-2-10BL**
	black	1NO	**PB 22-2-10B**
	white	1NO	**PB 22-2-10W**
	red	1NO+1NC	**PB 22-2-11R**
	green	1NO+1NC	**PB 22-2-11G**
	yellow	1NO+1NC	**PB 22-2-11Y**
	blue	1NO+1NC	**PB 22-2-11BL**
	black	1NO+1NC	**PB 22-2-11B**
	white	1NO+1NC	**PB 22-2-11W**

Mushroom pushbuttons — **complete**

	red	1NO	**PB 22-4-10**
		2NO	**PB 22-4-20**
		1NC	**PB 22-4-01**
		1NO+1NC	**PB 22-4-11**
		3NO	**PB 22-4-30**
		1NO+2NC	**PB 22-4-12**
		3NC	**PB 22-4-03**
		2NO+1NC	**PB 22-4-21**
		2NC	**PB 22-4-02**

Selection and ordering data

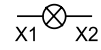
Toggle switches — complete

Design	button color	included blocks	Part No.
Maintained 	red	1NO	**PB 22-6-10R**
	green	1NO	**PB 22-6-10G**
	red	1NC	**PB 22-6-01R**
	green	1NC	**PB 22-6-01G**
	red	1NO+1NC	**PB 22-6-11R**
	green	1NO+1NC	**PB 22-6-11G**
	red	1NO+2NC	**PB 22-6-12R**
	green	1NO+2NC	**PB 22-6-12G**
	red	2NO+1NC	**PB 22-6-21R**
	green	2NO+1NC	**PB 22-6-21G**
	red	3NO	**PB 22-6-30R**
	green	3NO	**PB 22-6-30G**

Pushbuttons-illuminated — complete

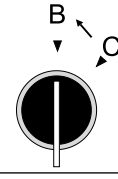
Flat pushbuttons 	red	1NO	**PB 22-8-10R**
	green	1NO	**PB 22-8-10G**
	yellow	1NO	**PB 22-8-10Y**
	blue	1NO	**PB 22-8-10BL**
	black	1NO	**PB 22-8-10B**
	white	1N	**PB 22-8-10W**
	red	1NO+1NC	**PB 22-8-11R**
	green	1NO+1NC	**PB 22-8-11G**
	yellow	1NO+1NC	**PB 22-8-11Y**
	blue	1NO+1NC	**PB 22-8-11BL**
	black	1NO+1NC	**PB 22-8-11B**
	white	1NO+1NC	**PB 22-8-11W**

Pilot lights and buzzer — complete

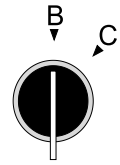
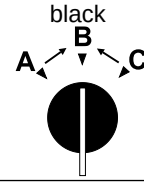
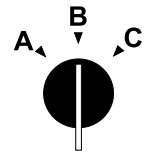
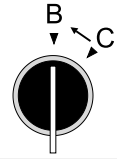
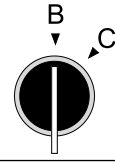
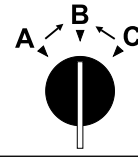
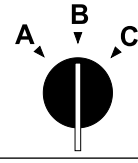
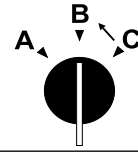
	red	24V 2W 	**PB 22-31-00R**
	green		**PB 22-31-00G**
	yellow		**PB 22-31-00Y**
	blue		**PB 22-31-00B**
	white		**PB 22-31-00W**
	clear		**PB 22-31-00C**

Can be produced with lampes BA 9s-24V - 2W

Selector switches, non-illumineted — complete

	Two position momentary, spring return from C to B	black 	1NO	**PB 22-11-10**
			2NO	**PB 22-11-20**
			1NC	**PB 22-11-01**
			1NO+1NC	**PB 22-11-11**
			3NO	**PB 22-11-30**

Selection and ordering data

Selector switches, non-illuminated			complete
Design	button color	included blocks	Part No.
 Two position maintained	black 	1NO 2NO 1NC 1NO+1NC 3NO	**PB 22-13-10** **PB 22-13-20** **PB 22-13-01** **PB 22-13-11** **PB 22-13-30**
Three position momentary, spring return from A to B and C to B	black 	2NO 1NO+1NC 2NC	**PB 22-12-20** **PB 22-12-11** **PB 22-12-02**
Three position maintained	black 	2NO 1NO+1NC 2NC 2NO+1NC 1NO+2NC	**PB 22-16-20** **PB 22-16-11** **PB 22-16-02** **PB 22-16-21** **PB 22-16-12**
Selector switches, illuminated			**complete**
 Two position momentary, spring return from C to B	red 	1NO+1LB 2NO+1LB 1NC+1LB 1NO+1NC+1LB	**PB 22-25-10** **PB 22-25-20** **PB 22-25-01** **PB 22-25-11**
Two position maintained	red 	1NO+1LB 2NO+1LB 1NC+1LB 1NO+1NC+1LB	**PB 22-14-10** **PB 22-14-20** **PB 22-14-01** **PB 22-14-11**
Three position momentary, spring return from A to B and C to B	red 	2NO+1LB 1NO+1NC+1LB 2NC+1LB	**PB 22-26-20** **PB 22-26-11** **PB 22-26-02**
Three position maintained	red 	2NO+1LB 1NO+1NC+1LB 2NC+1LB	**PB 22-17-20** **PB 22-17-11** **PB 22-17-02**
Three position momentary, spring return from C to B and maintained A	red 	2NO+1LB 1NO+1NC+1LB 2NC+1LB	**PB 22-24-20** **PB 22-24-11** **PB 22-24-02**

4

PILOT DEVICES 22 mm DIAMETER

Selection and ordering data

Double pushbuttons, illuminated — complete

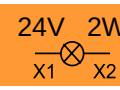
Design	button color	included blocks	Part No.
MainLower button	red/green	1NO+1NC+1LB	**PB 22-42-11R**
inscription 0/1	red/green	1NO+1NC+1LB	**PB 22-42-11R-T**

Double pushbuttons, non-illuminated — complete

Design	button color	included blocks	Part No.
Lower button	red/green	1NO+1NC	**PB 22-41-11GR**
inscription 0/1	red/green	1NO+1NC	**PB 22-41-11GR-Tx**

Elements which are delivered separately

4

			Part No.
	**Holder**	**C E- 3**	**S57057**
	**Holder**	**CE - 5**	**S57145**
	**Contact block**	**KE 10 NO** 	**S57061**
	**Contact block**	**KE 01 NC** 	**S57060**
	**Lamp block***	**PF-VA 9S** 	**S57078**

*Can be produced with lampes BA 9s-24V - 2W

TECHNICAL DATA

Mechanical life

pushbuttons	1 million operations
selector switches	0.5 million operations
toggle switches	0.3 million operations
mushroom pushbuttons	0.5 million operations
double pushbuttons	1 million operations

Lamp block

rated installation voltage	230V
base	BA9s
max.permissible power	2W

Temperature

ambient temperature during operation	-25^0 to $+40^0$C

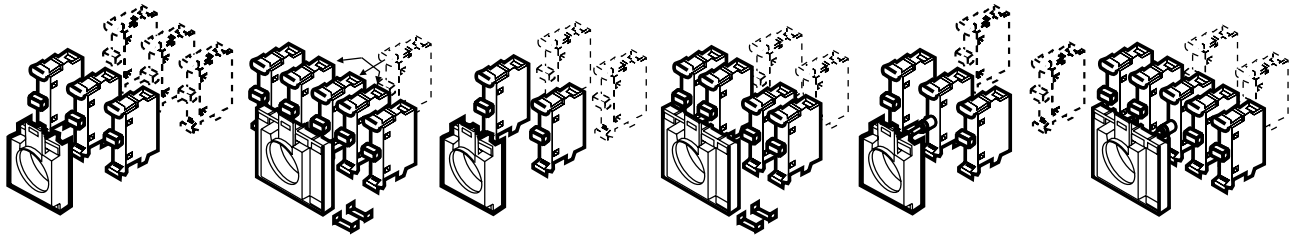
Terminals

connectable area	min.1 x 0.5mm^2
max	2 x 2.5mm^2
recommended torque	0.9Nm

Contact blocks

mechanical endurance	0.5 million operation
rated insulation voltage	690V
rated thermal current	10A
rated operational current,Ie	AC15 400V Ie = 6A
utilization category	DC13 220V Ie=0.25A

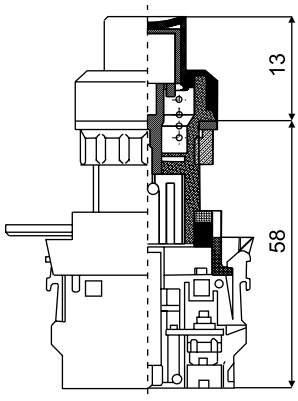
Max. number of contact blocks per button



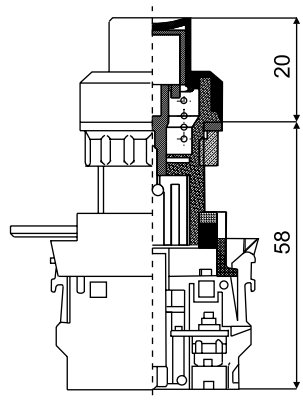
Buttons type PB 22 IEC 60529; IEC 60947-5-1

- Non- standard schemes can be produced on request of the clients.

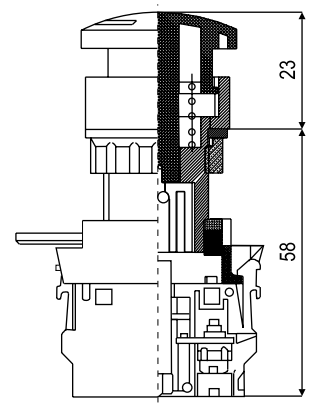
DIMENSIONS DRAWINGS in mm



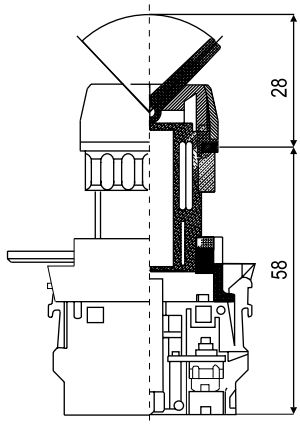
PB 22-1-



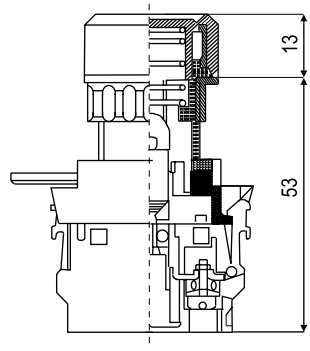
PB 22-2-



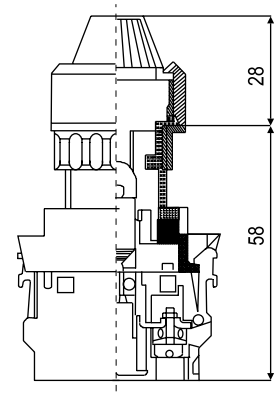
PB 22-4-



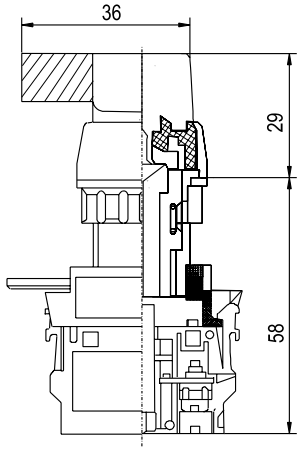
PB 22-6-



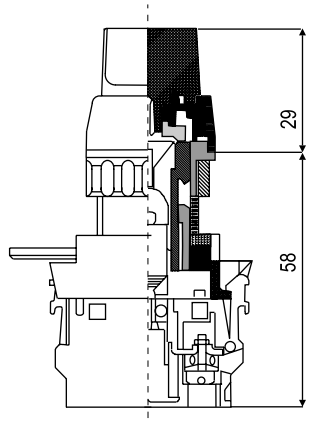
PB 22-8-



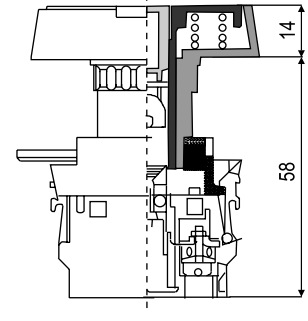
PB 22-31-



PB 22-11-
PB 22-13-
PB 22-12-
PB 22-16-



PB 22-25-
PB 22-14-
PB 22-26-
PB 22-17-
PB 22-24-



PB 22-42-
PB 22-41-

PUSHBUTTON IN INSULATED ENCLOSURES TYPE PNPB

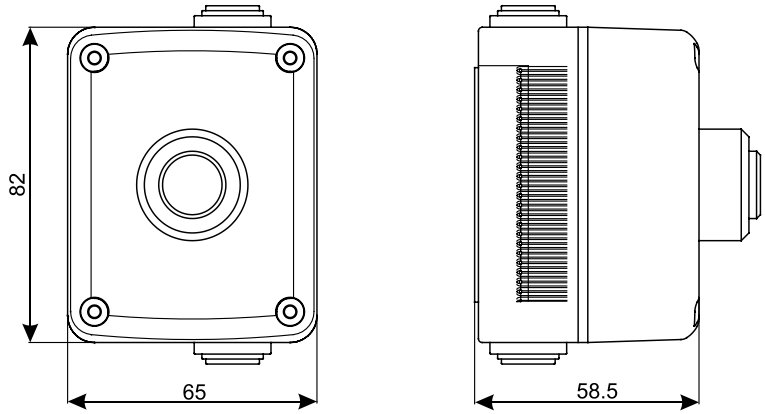
Selection and ordering data

PNPB 22..

	IP 65	**PNPB 22 .. .. .**
Code: 1, 2, 4, 6, 8, 11, 12, 13, 14, 16, 17, 24, 25, 26, 41, 42		
(NO) (NC)		
Red - R, Green-G, Yellow-Y, Blue-Bl, White-W, Black-B, Clear-C		

4

DIMENSION DRAWINGS (mm)



PNPB 22..

NOTES:
Color of enclosures is grey (RAL 7035)

MOULDED CASE CIRCUIT BREAKERS

THREE POLE MOULDED CASE CIRCUIT BREAKERS

Features

- In conformity with: IEC 60947-2
- Wide range from (25 - 800) A
- Compact dimensions, thus consumes less panel space

Selection and ordering data

Type KP 125-N (25 -125) A

Rated current at 40 °C A	No. of poles	Breaking capacity (Icu) kA at 415 V AC	Part No.	Weight Kg
25	3	18	**KP 125-N 25A 3P**	0.80
40	3	18	**KP 125-N 40A 3P**	
63	3	18	**KP 125-N 63A 3P**	
100	3	18	**KP 125-N 100A 3P**	
125	3	18	**KP 125-N 125A 3P**	
Type KP 125-M (25 -125) A				
25	3	25	**KP 125-M 25A 3P**	0.85
40	3	25	**KP 125-M 40A 3P**	
63	3	25	**KP 125-M 63A 3P**	
100	3	25	**KP 125-M 100A 3P**	
125	3	25	**KP 125-M 125A 3P**	
Type KP 250-N (63-250) A				
63	3	25	**KP 250-N 63A 3P**	2.90
100	3	25	**KP 250-N 100A 3P**	
160	3	25	**KP 250-N 160A 3P**	
200	3	25	**KP 250-N 200A 3P**	
250	3	25	**KP 250-N 250A 3P**	
Type KP 250-M (63-250) A				
63	3	36	**KP 250-M 63A 3P**	2.85
100	3	36	**KP 250-M 100A 3P**	
160	3	36	**KP 250-M 160A 3P**	
200	3	36	**KP 250-M 200A 3P**	
250	3	36	**KP 250-M 250A 3P**	
Type KP 800 (400 - 800) A				
400	3	50	**KP 800 400A 3P**	2.90
500	3	50	**KP 800 500A 3P**	
630	3	50	**KP 800 630A 3P**	
800	3	50	**KP 800 800A 3P**	

THREE POLE MOULDED CASE CIRCUIT BREAKERS WITH THERMAL AND MAGNETIC PROTECTION FIXED

Selection and ordering data

Type KP 125-FN (25 -100) A

Rated current at 40 °C A	No. of poles	Breaking capacity (Icu) kA at 415 V AC	Part No.	Weight Kg
25	3	18	**KP 125-FN 25A 3P**	0.80
32	3	18	**KP 125-FN 32A 3P**	
40	3	18	**KP 125-FN 40A 3P**	
50	3	18	**KP 125-FN 50A 3P**	
63	3	18	**KP 125-FN 63A 3P**	
80	3	18	**KP 125-FN 80A 3P**	
100	3	18	**KP 125-FN 100A 3P**	

Type KP 125-FM (25-100) A

25	3	25	**KP 125-FM 25A 3P**	0.85
32	3	25	**KP 125-FM 32A 3P**	
40	3	25	**KP 125-FM 40A 3P**	
50	3	25	**KP 125-FM 50A 3P**	
63	3	25	**KP 125-FM 63A 3P**	
80	3	25	**KP 125-FM 80A 3P**	
100	3	25	**KP 125-FM 100A 3P**	

Type KP 250-FN (100-250) A

100	3	25	**KP 250-FN 100A 3P**	2.80
160	3	25	**KP 250-FN 160A 3P**	
200	3	25	**KP 250-FN 200A 3P**	
250	3	25	**KP 250-FN 250A 3P**	

Type KP 250-FM (100-250) A

100	3	36	**KP 250-FM 100A 3P**	2.90
160	3	36	**KP 250-FM 160A 3P**	
200	3	36	**KP 250-FM 200A 3P**	
250	3	36	**KP 250-FM 250A 3P**	

FOUR POLE MOULDED CASE CIRCUIT BREAKERS

Features

- In conformity with: IEC 60947-2
- Wide range from (100 - 800) A
- Compact dimensions, thus consumes less panel space

Selection and ordering data

Type KP 250-N (100-250) A

Rated current at 40 °C A	No. of poles	Breaking capacity (Icu) kA at 415V AC	Part No.	Weight Kg
100	4	25	**KP 250-N 100A 4P**	3.6
			KP 250-N 100A 3P+N	
160	4	25	**KP 250-N 160A 4P**	
			KP 250-N 160A 3P+N	
250	4	25	**KP 250-N 250A 4P**	
			KP 250-N 250A 3P+N	

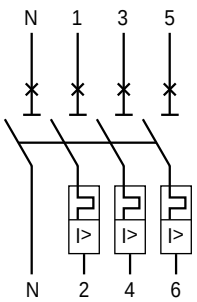
Type KP 250-M (100-250) A

100	4	36	**KP 250-M 100A 4P**	3.7
			KP 250-M 100A 3P+N	
160	4	36	**KP 250-M 160A 4P**	
			KP 250-M 160A 3P+N	
250	4	36	**KP 250-M 250A 4P**	
			KP 250-M 250A 3P+N	

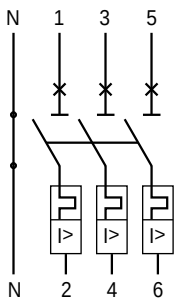
Type KP 800 (400 - 800) A

400	4	50	**KP 800 400A 4P**	11,6
630	4	50	**KP 800 630A 4P**	
800	4	50	**KP 800 800A 4P**	

KP 250-(N,M) (100-250A) 4P
KP 800 (400-630A) 4P



KP 250-(N,M) (100-250A) 3P+N



5

THREE POLE MOULDED CASE CIRCUIT BREAKERS
VERSION WITH BUILT- IN LOCKING MECHANISM

Features

- In conformity with: IEC 60947-2
- Wide range from (25 - 250) A
- Compact dimensions, thus consumes less panel space
- Uniform front escutcheon plate

Selection and ordering data

5

Type KP 125-ZN (25 -125) A 3P

Rated current at 40 °C A	No. of poles	Breaking capacity (Icu) kA at 415 V AC	Part No.	Weight Kg
25	3	18	**KP 125-ZN 25A 3P**	0.85
40	3	18	**KP 125-ZN 40A 3P**	
63	3	18	**KP 125-ZN 63A 3P**	
100	3	18	**KP 125-ZN 100A 3P**	
125	3	18	**KP 125-ZN 125A 3P**	
Type KP 125-ZM (25 -125) A 3P				
25	3	25	**KP 125-ZM 25A 3P**	0.85
40	3	25	**KP 125-ZM 40A 3P**	
63	3	25	**KP 125-ZM 63A 3P**	
100	3	25	**KP 125-ZM 100A 3P**	
125	3	25	**KP 125-ZM 125A 3P**	

Type KP 250-ZN (100-250) A 3P

100	3	25	**KP 250-ZN 100A 3P**	2.9
160	3	25	**KP 250-ZN 160A 3P**	
250	3	25	**KP 250-ZN 250A 3P**	
Type KP 250-ZM (100-250) A 3P				
100	3	36	**KP 250-ZM 100A 3P**	2.9
160	3	36	**KP 250-ZM 160A 3P**	
250	3	36	**KP 250-ZM 250A 3P**	

KP 125-Z(N,M) 3P and KP 250-Z(N,M) 3P ist version with built - in locking mechanism.
This version have possibility of locking in open position.
Technical date and dimension drawings are same as the basic model.

ELECTRICAL ACCESSORIES

Selection and ordering data

Type KP 125, KP 250 (Accessories are three pole execution only)

Auxiliary switch

Voltage	Current Rating (AC 15)	Config.	Part No.
240V AC	3 A	Changeover switch	**KP BPK***

Shunt trip

Voltage	Part No.
24 V AC/DC	**KP DO 24**
230 V AC/DC	**KP DO 230**

Type KP 800

Auxiliary switch

Voltage	Current Rating (AC 15)	Config.	Part No.
250V AC/250V DC	4A	2(1NO+1NC)	**BC 250**
450V AC/250V DC	4A	2(1NO+1NC)	**BC 450**

Shunt trip

Voltage	Part No.
18-30V AC/12-36V DC	**DC 24**
110-110V AC	**DC 110**
220-240V AC	**DC 220**
380-415V AC	**DC 380**

Under voltage release

Coil Voltage	Part No.
110-120V AC	**UC 110**
220-240V AC	**UC 220**
380-440V AC	**UC 380**

NOTE:
* Number of auxiliary switch can be up to 2 (1 for signaling+1 as auxiliary contacts) for KP 125 and up to 3 (1 for signaling+2 as auxiliary contacts) for KP 250

5

TECHNICAL DATA

CAPACITOR CONTROL

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

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

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

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

$$I_r > 1.5 \times I_c$$

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

Where:
I_r = Rated current of MCCBs
I_c = Rated current of capacitor
I_{inst} = Short circuit pick - up settings of the MCCB
I_p = Maximum capacitor inrush current

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

DC CONTROL

MCCBs though not separately designed for DC applications are suitably modified to be able to operate on DC Systems also up to 500V DC/250V DC. This is achieved by modifying for:
i) Current carrying capacity
ii) Over current and short circuit protection
iii) Short circuit breaking capacity (with L/R time constant limitations)

Current Carrying Capacity

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

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

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

Overload Release & Overload Protection

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

Short Circuit Release & Short Circuit Protection

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

Short Circuit Breaking Capacity

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

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

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

TECHNICAL DATA

SELECTION & APPLICATION
TRANSFORMER PROTECTION

Primary side

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

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

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

Secondary side

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

The rated current of the transformer is calculated as follows:

U_e - is the rated voltage at the LT side

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

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

Where I_b - is the rated breaking capacity,
I_e - the rated current and
Z% - is the percentage impedance of transformer (Specified by the manufacturer)

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Selection Table For Transformer Protection

Transformer Rating (KVA)	MCCB Rating in amperes				
	KP 125-N 16kA	KP 125-M 25kA	KP 250-N 25kA	KP 250-M 36kA	KP 800 50kA
16 25	25 40	25 40			
63 100	100 125	100 125	100 160	100 160	
160 200			250	250	
250 315					400
400 500					630 800
630 750					

GENERATOR SET PROTECTION

Loading MCCBs can be used for the effective protection and control of DG sets against overload and short circuits.
The Current rating of MCCBs to be selected is calculated as

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

or

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

Where,
kVA = Rating of the DG Set
U = Rated voltage
I = Rated Current
The MCCB rating selected os greater than or equal to the rated current value.

Selection Table for DG Set Protection

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

MOTOR CONTROL

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

Direct on Line Starting

Care is to be taken to avoid nuisance tripping during starting of Squirrel Cage Motors since the inrush current will be in the order of 600 to 800% of the full load current of the motor.
The overload setting is chosen such that it does not trip during starting.

Star-Delta Starting

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

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

Selection Table For Motor Protection

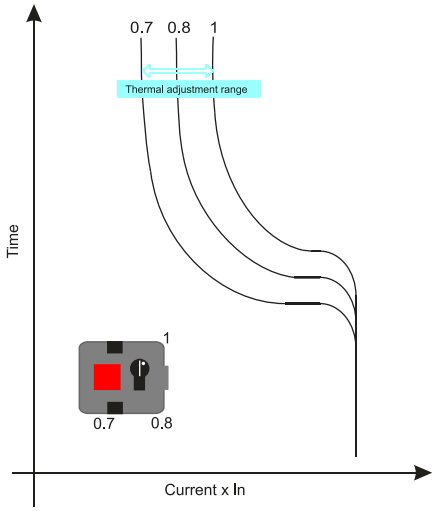
Motor HP	Rating kW	Aprox. Full Load Current (A) at 415V	Direct On Line MCCB Rating/Type			Star/Delta MCCB Rating/Type		
			KP 125	KP 250	KP 800	KP 125	KP 250	KP 800
10	7.5	14	25			25		
12.5	9	17	25			25		
15	11	21	25			25		
20	15	28	32			32		
25	19	35	40			40		
30	22	41	50			50		
40	30	52	80			80		
50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

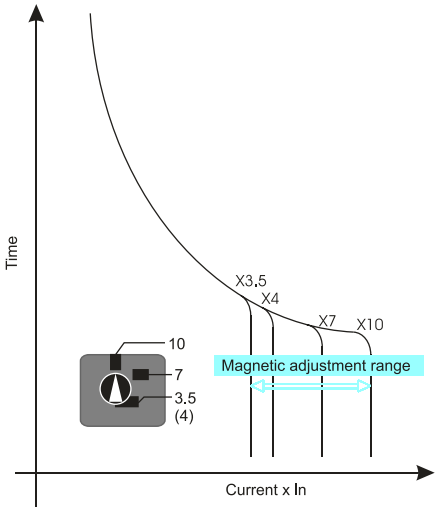
The figures shown are based on following motor starting conditions:
- direct online 7xfull load current for 5 seconds.
- Star-Delta 4xfull load current for 12 seconds.

Thermal Magnetic Characteristics and Adjustments
Operation Settings

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

Magnetic Adjustment
Magnetic adjustment is available on MCCB's from KP 250 and above. The magnetic setting 'Im' is continuously adjustable from 350% to 1000% of its rated current 'In'. There are tree main points of calibration marked as multiples of In: 3.5 (4 for KP 800, KP 1250), 7 and 10. These are shown in the diagram below.





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Examples

1. KP 125 125A MCCB set at Ir=0.8, the rated current is calculated as 125 x 0.8=100A

2. KP 250 250A MCCB set at Im=7. The magnetic setting is calculated as 250 x 7=1750A

3. KP 800 630A MCCB set at Ir=0.7 and Im=10
   The rated current is calculated as 630 x 0.7=441A
   The magnetic setting is calculated as 630 x10=6300A

Note that the magnetic setting is multiple of the nominal current In and not the rated current Ir.
All thermal and magnetic trip settings are expressed as AC r.m.s. Values.
All MCCBs are calibrated at 40C^0. For others temperatures see Table for changing of the nominal current depending from the ambient temperature.

TECHNICAL DATA

TYPE CIRCUIT BREAKERS			KP 125-N KP 125-FN	KP 125-M KP 125-FM	KP 250-N KP 250-FN	KP 250-M KP 250-FM	KP 800
Standard conformity			IEC 60947-2				
No. of poles			3P		3P or 4P		3P or 4P
Standard current range/ratings	In	A	25,40,63,100,125 (25,32,40,50,63,80,100)**		100, 160, 200, 250		400, 630, 800
Rated operational voltage	Ue~	V	690		690		690
Rated operational voltage	Ue=	V	250		250		250
Rated insulation voltage	Ui~	V	690		690		690
Rated impulse withstand	U_{imp}	kV	6		8		8
Category of use			A		A		A
Degree of protection: Standard appliance with terminal shields Appliaance in enclosure with front plate			Direct control IP 30 Direct control IP 40				IP 00 IP 40
Polution degree			III				III
Humidity working condition			80% at 30^0C				0-90%
Ambient temperature		^{0}C	-10 to + 70				-5 to + 40
Ultimate breaking capacity Icu*	230/240 V ~	kA	22	35	35	60	70
	400/415 V ~	**kA**	**18**	**25**	**25**	**36**	**50**
	440 V ~	kA	10	18	18	30	
	480/500 V ~	kA	8	12	15	25	35
	690 V ~	kA	3	4	8	16	27
	250 V -	kA	18	25	25	36	16
Standard breaking capacity Ics (%Icu)*			75	50	75	75	50
Rated closing capacity on short-circuit (400 V~)			36	52.5	52.5	75.6	105
Endurance (o.c. cycle)	mechanical		≥10 000		≥10 000		4 000
	electrical		≥4 000		≥4 000		1000
Type of protection							
Thermal adjustable			(0,7 - 1)In fixed In for FN and FM		(0,7 - 1)In fixed In for FN and FM		(0,7 - 1)In
Magnetic fixed			10xIn for 125 A		-		-
			10xIn for 100 A		-		-
			15xIn for 63 A		-		-
			17xIn for 50 A		-		-
			20xIn for 40 A		-		-
			25xIn for 25 A		-		-
Magnetic adjustable			-		(3,5 - 10)In		(4 - 10)In

*The LINE side is the upper side. LOAD is to be connected on the down side.
**Valid only for fixed protection
FN, FM - Thermal and Magnetic protection fixed

OTHER CARACTERISTICS

Connection cross-sections

Head devices KP	Max. Width on term. (mm)	Connection via teriminal (mm^2)				Connection via bars (mm)	Connection via cage terminals (mm^2)	
		copper cable	aluminium cable	Cable shoe	Terminal screw		rigid cable	flexible cable
125	12	-	-			5x12	70	50
250	25	95-120	95-120	A 8 - 120	M8	4x25	185	150
800	40	-	-	-	M12	2x(5x40)	-	-

TECHNICAL DATA

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

Type	Thermal adjustment	Currents in amps in accordance with ambient temperature															
		10 °C		20 °C		30 °C		**40 °C**		45 °C		50 °C		60 °C		70 °C	
		min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
KP 125	In = 25 A	20	28	19	27	18	26	**17**	**25**	17	25	16	24	16	23	16	22
	In = 32 A	25	36	24	34	23	33	**22**	**32**	22	32	21	30	20	29	20	28
	In = 40 A	32	45	30	43	29	42	**28**	**40**	28	40	27	38	26	37	25	36
	In = 50 A	39	55	38	54	36	52	**35**	**50**	34	48	33	47	32	46	30	48
	In = 63 A	49	70	48	68	46	66	**44**	**63**	43	61	42	60	40	58	38	55
	In = 80 A	63	89	60	86	58	83	**56**	**80**	54	78	53	76	51	73	48	70
	In = 100 A	79	112	76	108	73	104	**70**	**100**	68	98	67	96	64	92	61	88
	In = 125 A	98	140	95	135	91	130	**87**	**125**	85	123	84	120	80	115	76	110
KP 250	In = 63 A	74	93	64	83	54	73	**44**	**63**	40	58	31	53	22	43	17	33
	In = 100 A	88	127	82	118	76	109	**70**	**100**	68	96	63	91	56	82	52	73
	In = 160 A	143	205	133	190	122	175	**112**	**160**	106	153	100	145	90	130	80	115
	In = 200 A	200	260	180	240	160	220	**140**	**200**	130	190	120	180	100	160	100	140
	In = 250 A	216	310	202	290	189	270	**175**	**250**	168	240	160	230	142	210	125	190
KP 800	In = 400 A	336	480	316	452	300	428	**280**	**400**	-	-	260	372				
	In = 630 A	529	756	498	712	472	674	**440**	**630**	-	-	410	586				
	In = 800 A	672	960	633	904	599	856	**560**	**800**	-	-	520	744				

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Discrimination between diferent sizes MCCB

In an installation where combinations of protective devices arise, it is important to ensure correct co-ordination between the different characteristics of the devices.

Satisfactory discrimination of protective devices prevents the unnecessary interruption of a perfectly healthy supply when an overload or fault is detected on a subsidiary supply.

The tables on this page summarise the discrimination data for circuits including MCCB Fuses. This is the value ofthe current below which, in the presence of two over current protective devices in series, the minor device completes its breaking operation in time to prevent the major device from starting its operation.

Upstream fuse

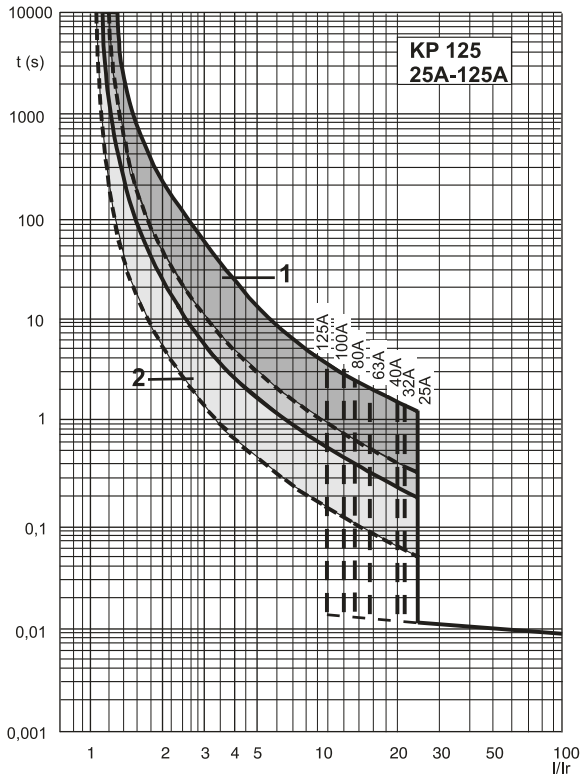
MCCB downstream	gG type				
	250A	400A	500A	630A	800A
KP 125	7 500				
KP 250		8 000			
KP 800			2 500		5 500

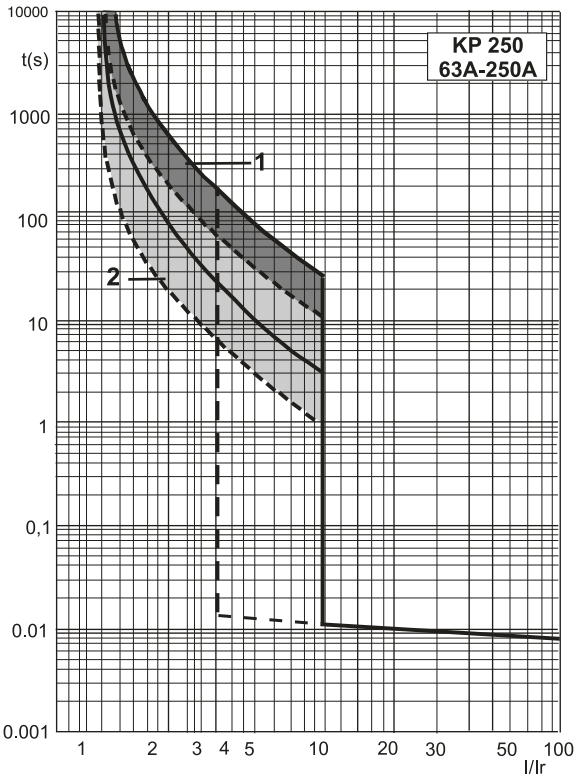
Selectivity table-average values of selectivity limits (A)

MCCB upstream

MCCB downstream		KP 125						KP 250				KP 800		
		32A	40A	63A	80A	100A	125A	100A	160A	200A	250A	400A	630A	800A
	25 A	800	800	1000	1000	1200	1200	1000	2500	3000	3500	4000	6300	8000
	32 A		800	1000	1000	1200	1200	1000	2500	3000	3500	4000	6300	8000
	40 A			1000	1000	1200	1200	1000	2500	3000	3500	4000	6300	8000
KP 125	63 A					1200	1200		2500	3000	3500	4000	6300	8000
	80 A								2500	3000	3500	4000	6300	8000
	100 A								2500	3000	3500	4000	6300	8000
	125 A								2500	3000	3500	4000	6300	8000
	100 A								1600	2000	2500	4000	6300	8000
KP 250	160 A										2500	4000	6300	8000
	200 A										2500	4000	6300	8000
	250 A										2500	4000	6300	8000
	400 A												6300	8000
KP 800	630 A												6300	8000
	800 A													8000

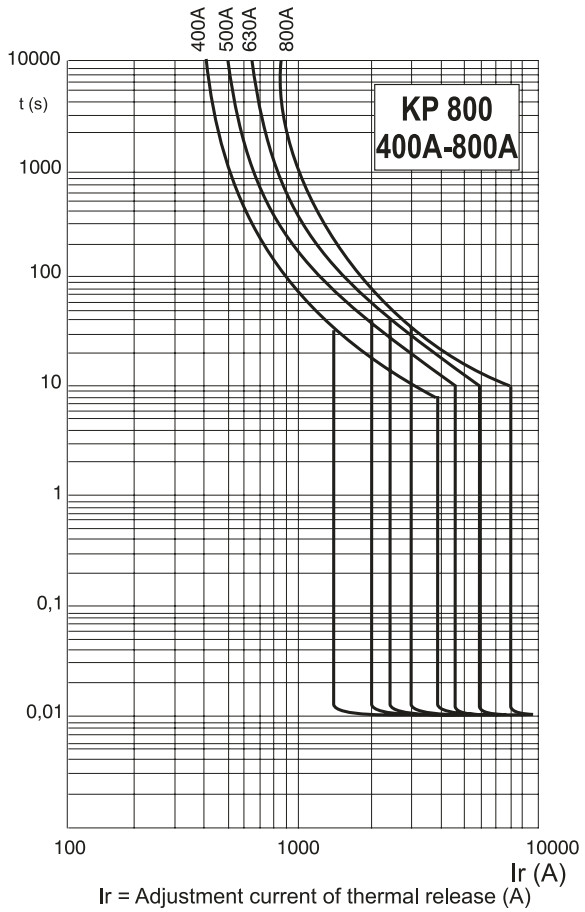
TRIPPING CHARACTERISTICS





I = Actual current (A)
Ir = Adjustment current of thermal release (A)

1 - Thermal release zone when cold
2 - *Thermal release zone when hot (in steady state)*



Ir = Adjustment current of thermal release (A)

Accessories

	Description	Part N.	
	Accessory for mounting on rail 35 mm (DIN 50022)		
	Equipment mounting plate for KP 125	600836	
	Cage terminals		
	For connecting bare cables without lugs for KP 250 Set of 6 terminals for cables: - rigid up to 185 mm^2 - flexible up to 150 mm^2	600835	
	Spreaders		
	For increasing the distance between each pole for KP 250 Set of 6 rear terminals, incoming or outgoing. Terminal screw: M10 Cable shoe: A10 - 120	600834	
	Terminal shields for IP 40		
	Set of 2 terminal shields for KP 125 Set of 2 terminal shields for KP 250 When cage terminals or A8-120 cable lugs are used. Note: Short additional terminals must be ordered for cable lugs A10-120 with M10 terminal screw, if terminal shields are used.	S40230 S40713 S40727	
	Rear terminal		
	Used to convert the fixed version a KP 250 with front terminals to the fixed version a KP 250 with rear terminals. Set of 6 rear terminals ,incoming or outgoing for: - KP 250 63-160A 3P - KP 250 200-250A 3P For KP 250 4P: set of 8 rear terminals - on request.	 602456 602289	

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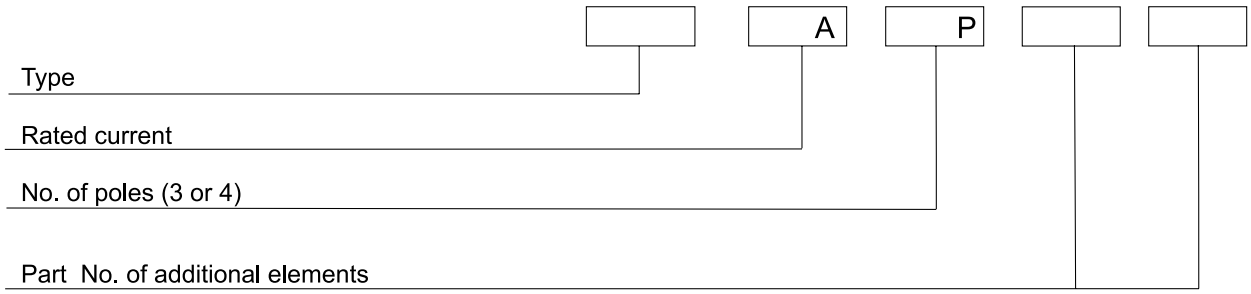
ORDERING INSTRUCTION FOR MOULDED CASE CIRCUIT BREAKERS

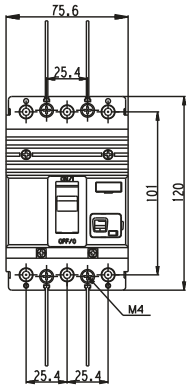


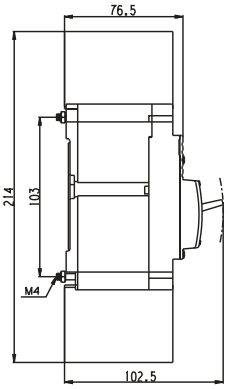
Example: Moulded case circuit breaker type KP 125 18 kA for rated current 100A, 3 poles, with for remote opening with supply voltage range: 230 V AC

KP 125-N	100A	3P	KP DO 230

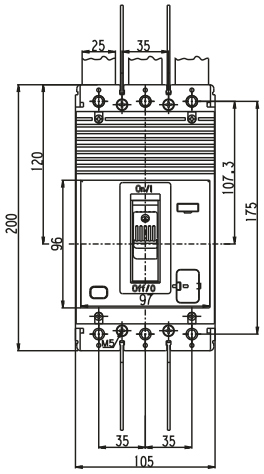
DIMENSION DRAWINGS (mm)

Type KP 125

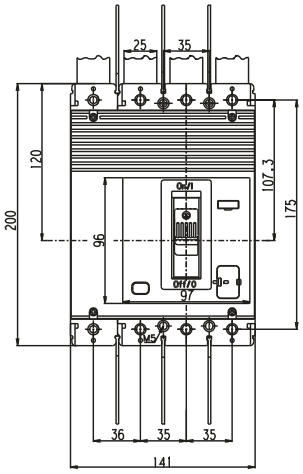




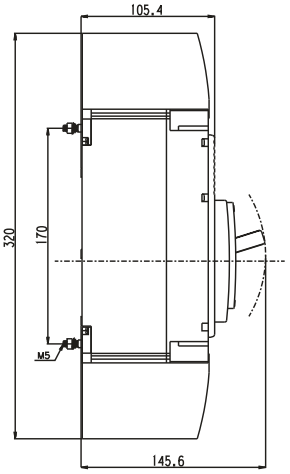
Type KP 250



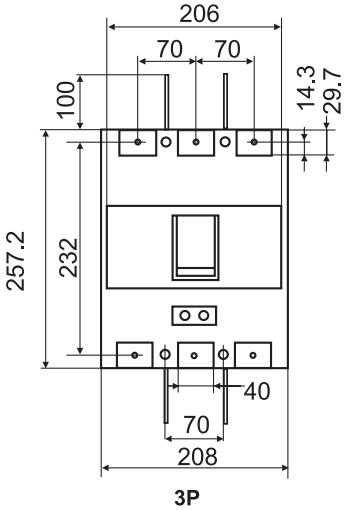
3P



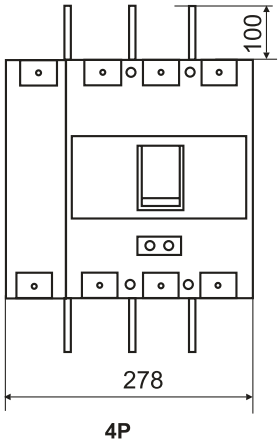
4P



Type KP 800



3P



4P