RADE KONČAR KONTAKTORI I RELEI D.O.O.

Low-Voltage Switchgear



Catalogue

2006

QUALITY SYSTEM

**ISO 9001 “Quality system.
Models for quality assurance in
design / development, production
and distribution of low - voltage
switching devices”.**
The RADE KONCAR - KONTAKTORI I
RELEI D.O.O. Quality Managments
System has been certified by
TÜV CERT- Certification
Body of TÜV Rheinland Euroqua Kft.
The Certificate No. 75 100 40035 issued
until December 2006 confirms that the quality
system is in conformance with
requirements of the standard ISO 9001: 2000
and refers to following product categories:
Contactors, Thermal overload relays,
Rotary cam switches, Pilot devices,
Moulded case circuit breakers,
Rotary switches, Electronic time relays and
Temperature monitor relays, and Staricase
lighting controller .



TÜV CERT

CERTIFICATE

The TÜV CERT Certification Body
of TÜV Rheinland InterCert Kft.
certifies in accordance with TÜV CERT procedures that

“RADE KONCAR - KONTAKTORI I RELEI” D.O.O.
1000 Skopje
Macedonia

has established and applies a quality management system for

design, production and distribution of
low-voltage switchgear and controlgear.

An audit was performed, Report No. 40035
Proof has been furnished that the requirements according to
ISO 9001:2000
are fulfilled. The certificate is valid until 2006-12-04
Certificate Registration No. 75 100 40035
Date of first certification audit: February 1999

TÜV InterCert

APPROVALS/STANDARDS

TÜV CERT EN ISO 9001:2000

Lloyd's Register TA TYPE APPROVED

HRVATSKI REGISTAR BRODOVA C R

NRTL /C

TSE

PCT

ESC

CE

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CATALOGUE 2006

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MINI MOTOR CONTACTORS type CM0, CM1
WITH AC CONTROL CIRCUIT

Features
- In conformity with: 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** 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
6	1.5	**2.2**	3	20	1	0	**CM0 10**	0.17
					0	1	**CM0 01**	
					0	0	**CM0 004** (4 main contacts)	
9	3	**4**	4	20	1	0	**CM1 10**	0.17
					0	1	**CM1 01**	
					0	0	**CM1 004** (4 main contacts)	

Snap-on auxillary contact blocks

Rated operational current at **Ie/AC15/AC14**: **230 V (A)**	400 V (A)	500 V (A)	690 V (A)	Auxiliary contacts NO	NC	Type	Weights 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**	

Number of auxiliary contacts can be extended up to 7 for CM0/CM1 10;01

Snap on surge suppressors	Type	Weights kg
RC elements for control voltage 24 V...60V	**RC0-60**	0.01
for control voltage 72 V...220V	**RC0-220**	

Mechanical interlock

	Type	Weights kg
Set comprising mechanical interlock and contactor jointing parts For use with CP0, CM0 and CM1	**MB1**	0.002

MOTOR CONTACTORS type CNM 9 - CNM 36
WITH AC CONTROL CIRCUIT

Features

- In conformity with: 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
	9	2.2	**4**	5.5	20	1	0	**CNM 9 10**	0.37
						0	1	**CNM 9 01**	
						0	0	**CNM 9 004** (4 main contacts)	
	12	3	**5.5**	7.5	20	1	0	**CNM 12 10**	0.38
						0	1	**CNM 12 01**	
						0	0	**CNM 12 004** (4 main contacts)	
	12	3	**5.5**	7.5	20	1	1	**CNM 12 11**	0.47
						2	2	**CNM 12 22**	
	16	4	**7.5**	11	30	1	1	**CNM 16 11**	0.50
						2	2	**CNM 16 22**	
	22	5.5	**11**	11	30	1	1	**CNM 22 11**	0.51
						2	2	**CNM 22 22**	
	30	7.5	**15**	15	35	1	1	**CNM 30 11**	0.52
						2	2	**CNM 30 22**	
	36	11	**18.5**	26	45	2	2	**CNM 36 22**	0.63
						4	4	**CNM 36 44**	0.73

MOTOR CONTACTORS type CNM 45 - CNM 170
WITH AC CONTROL CIRCUIT

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
	140	45	**75**	100	160	2	2	**CNM 140 22**	5.1
						4	4	**CNM 140 44**	5.6
	170	55	**90**	132	200	2	2	**CNM 170 22**	5.2
						4	4	**CNM 170 44**	5.7

MOTOR CONTACTORS type CNM 200 - CNM 400
WITH AC CONTROL CIRCUIT

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
	200	60	**105**	155	250	2	2	**CNM 200 22**	5.3
						4	4	**CNM 200 44**	5.8
	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

Selection and ordering data

	Motor switching **AC2** and **AC3** duty				Rated operational current **Ie/AC1** at 40°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
	9	2.2	**4**	5.5	20	1 0 0	0 1 0	**CNB 9 10** **CNB 9 01** **CNB 9 004** (4 main contacts)	0.60
	12	3	**5.5**	7.5	20	1 0 0	0 1 0	**CNB 12 10** **CNB 12 01** **CNB 12 004** (4 main contacts)	0.60
	12	3	**5.5**	7.5	20	1 2	1 2	**CNB 12 11** **CNB 12 22**	0.68
	16	4	**7.5**	11	30	1 2	1 2	**CNB 16 11** **CNB 16 22**	0.74
	22	5.5	**11**	11	30	1 2	1 2	**CNB 22 11** **CNB 22 22**	0.80
	30	7.5	**15**	15	35	1 2	1 2	**CNB 30 11** **CNB 30 22**	0.80
	50	15	**25**	35	100	2	2	**CNB 50 22**	3.65

MOTOR CONTACTORS type CNM 36 - CNM 170
WITH DC CONTROL CIRCUIT

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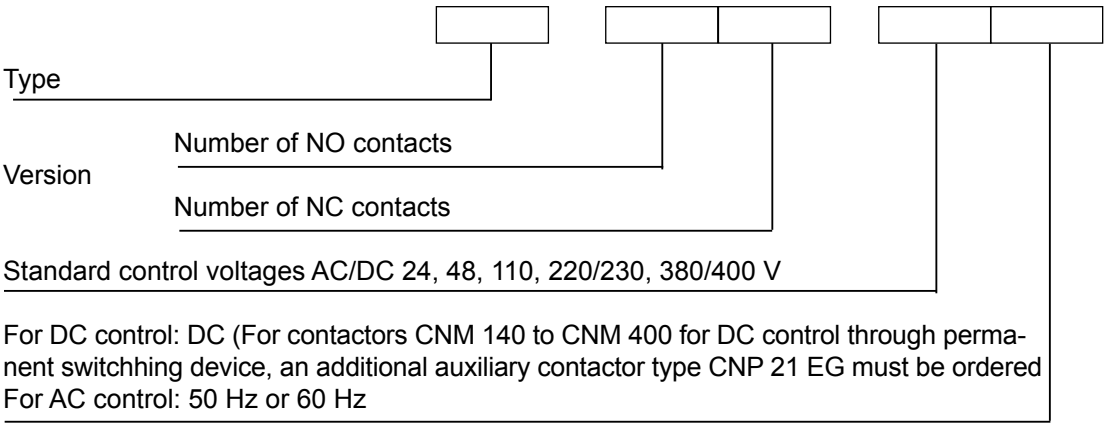
Selection and ordering data

	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
	36	11	**18.5**	26	45	2	1	**CNM 36 21**	0.63
						4	3	**CNM 36 43**	0.73
	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
	140	45	**75**	100	160	2	2	**CNM 140 22**	5.1
						4	4	**CNM 140 44**	5.6
	170	55	**90**	132	200	2	2	**CNM 170 22**	5.2
						4	4	**CNM 170 44**	5.7

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
	200	60	**105**	155	250	2	2	**CNM 200 22**	5.3
						4	4	**CNM 200 44**	5.8
	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

ORDER-CONTACTORS



Example: Motor contactor type CNM 16 with two NO and two NC auxiliary contacts, control voltage 220/230 V, 50 Hz

CNM 16 | **2** | **2** | **220/230 V** | **50 Hz**

1

Selection and ordering data

Auxiliary contact blocks

For contactor	Description	Part. Nº	Weights kg
CNM 36 - CNM 110	Block with auxiliary contacts left, 1NO+1NC	733889S	
	Block with auxiliary contacts right, 1NO+1NC	733890S	
	Additional block with auxiliary contacts left , 1NO+1NC	733891S	0.042
	Additional block with auxiliary contacts right, 1NO+1NC	733892S	
CNM 36 - CNM 110	Block with auxiliary DC contacts right, 1NO+1NC	733888S	
CNM 140 - CNM 400	Block with auxiliary contacts left, 1NO+1NC	155129S	
	Block with auxiliary contacts right, 1NO+1NC	155113S	
	Additional block with auxiliary contacts left, 1NO+1NC	155089S	0.075
	Additional block with auxiliary contacts right, 1NO+1NC	155087S	
Arc chambers			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
Main contact sets			Weights kg
CNM 36	Set of 3 moving contacts and 6 fixed contacts	155967S	0.090
CNM 45		739889S	0.095
CNM 60		739885S	0.100
CNM 75		733227S	0.190
CNM 90		733623S	0.192
CNM 110		733856S	0.195
CNM 140		155093S	0.390
CNM 170		155091S	0.400
CNM 200		155090S	0.410
CNM 250		155603S	0.700
CNM 315		155618S	0.710
CNM 400		155619S	0.720





SPARE PARTS FOR CNM 9 - CNM 400

Selection and ordering data

	AC coils		Control voltage V 50 or 60 Hz	Part N.	Weights kg
	CNM 9 -CNM36	Coil	24 48 110 220/230 380/400	739361S/739608S 739601S/158597S 739363S/158579S 739603S/739607S 739365S/739472S	0.050
	CNM 45 - CNM60	Coil	24 48 110 220 380	739879S/158907S 739882S/158929S 739883S/158906S 739880S/158903S 739884S/158937S	0.150
	CNM 75 - CNM110	Coil	24 48 110 220/230 380/400	158850S/158884S 158852S/158890S 158853S/158876S 158854S/158878S 158855S/158895S	0.230
	CNM 140 - CNM 200	Coil	24 48 110 220/ 230 380/400	155117S/158814S 155119S/158817S 155120S/158838S 155195S/158803S 155122S/158822S	0.380
	CNM 250 - CNM 400	Coil	24 48 110 220/230 380/400	155610S/158955S 155612S/158956S 155613S/158986S 155615S/158951S 155616S/158961S	0.650

ACCESSORIES

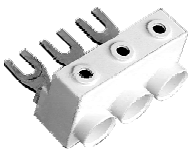
Selection and ordering data

Surge supressors

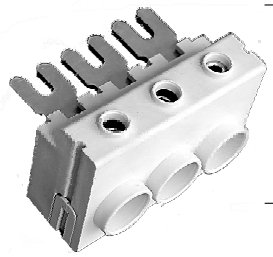


For contactor	Description	Part No.	Weights kg
CN(B, P) 21 CN(B, P) 31 CN(B, M) 9 - 30	RC elements for control voltage 24....60 V for mounting on the coil: A for mounting on the front cover: B for control voltages 110...240 V for mounting on the coil: A for mounting on the front cover: B	 739968 739914 739913 739908	

Additional terminal blocks



For contactor	Description	Part No.	Weights kg
CNM 16 - CNM 36	Set of 2 additional terminal blocks for connecting multy-wired conductor up to 25 mm^2	601478	0.210



CNM 45 - CNM 60	Set of 2 additional terminal blocks for connecting multy-wired conductor up to 35 mm^2	601479	0.070

REVERSING CONTACTORS

Features

- Utilizing contactors with fixed auxiliaries
- Includes power wiring
- Mechanically and electrically interlocked
- DIN rail mounting MBCM0, MBCM1

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Selection and ordering data

AC coil operation

Motor switching							Ie/AC1	Auxiliary contacts	Type	Weights
AC2 / AC3 duty				AC4 duty			at 55 °C	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
6	1.5	**2.2**	3	0.5	**1.1**	1.1	20	0 0	**MBCM0 00**	0.40
								1 0	**MBCM0 10***	0.41
9	3	**4**	4	0.75	**1.5**	1.5	20	0 0	**MBCM1 00**	0.40
								1 0	**MBCM1 10***	0.41
12	3	**5.5**	7.5	1.1	**1.9**	3.3	20	2 1	**MBCNM 12 21**	1.12
16	4	**7.5**	11	2	**3**	6	30	2 1	**MBCNM 16 21**	1.18
22	5.5	**11**	11	2.2	**4**	6.6	30	2 1	**MBCNM 22 21**	1.20
30	7.5	**15**	15	4.3	**7.5**	9.8	35	2 1	**MBCNM 30 21**	1.22
36	11	**18.5**	26	5.2	**9**	11.8	45	2 1	**MBCNM 36 21**	1.96
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













* For Push button control

The main and control circuits are wired according to the circuit diagrams on page 50.

Note: Electrical endurance of contacts in AC4 utilization category is 200 000.

CONTACTORS type TK 25 - TK 250
for SWITCHING RESISTIVE LOADS

Features

- With fixed auxiliary contacts
- Rugged construction
- Other control voltage are available

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
	**25**	9	**16**	2	2	**TK 25 22**	0.43
	**35**	13	**23**	2	2	**TK 35 22**	0.49
	**65**	25	**43**	2	2	**TK 65 22**	0.59
	**85**	32	**56**	2	2	**TK 85 22**	0.70
	**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
	**250**	95	**164**	2	2	**TK 250 22**	5.2

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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
	**350**	133 / **230**	2 2	**TK 350 22**	8.9
	**450**	170 / **295**	2 2	**TK 450 22**	8.9

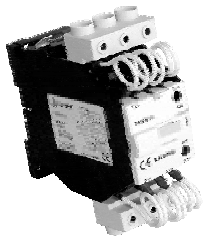
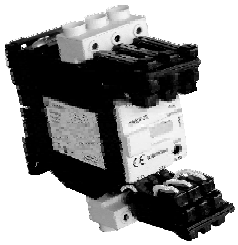
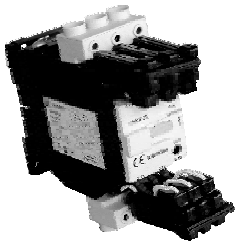
CAPACITOR CONTACTORS type CNKN 12 -CNKN 25

Features

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

Selection and ordering data

AC coil operation

	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		
	6,7	**12**	**18**	1	0	**CNKN 12 10**	0.49
				0	1	**CNKN 12 01**	
	8.5	**15**	**22**	1	0	**CNKN 15 10**	0.67
				0	1	**CNKN 15 01**	
	11	**20**	**28**	1	0	**CNKN 20 10**	0.68
				0	1	**CNKN 20 01**	
	14	**25**	**35**	1	0	**CNKN 25 10**	0.71
				0	1	**CNKN 25 01**	

These CNKN 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.

CAPACITOR CONTACTORS type CNKM 30 -CNKM 60

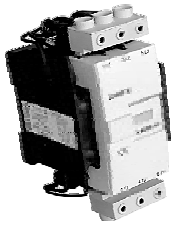
Features

- 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 coil operation

	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
	20	**30**	**44**	0 0	**CNKM 30 00**	0.94
	25	**40**	**58**	0 0 2 2	**CNKM 40 00** **CNKM 40 22**	1.58
	29	**50**	**72**	0 0 2 2	**CNKM 50 00** **CNKM 50 22**	1.6
	34	**60**	**87**	2 2	**CNKM 60 22**	2.4

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.

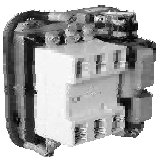
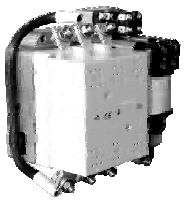
DC CONTACTORS type CNO30 - CNO 250, with AC CONTROL CIRCUIT

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
	50	45	10	16	2	2	**CNO 63 22**	2.76
	80	80	16	28	2	2	**CNO 110 22**	5.7
	170	140	32	56	2	2	**CNO 250 22**	9.7

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

Features

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

1

Selection and ordering data

DC coil operation

	Motor switching **DC3** and **DC5** duty				Auxiliary contacts		Type	Weights
	Rated operational current **Ie** at		Rated outputs of DC motor at					
	220 V A	440 V A	220 V kW	440 V kW	NO	NC		kg
	30	22.5	5	9	2	2	**CNO 30 22**	0.97
	50	45	10	16	2	2	**CNO 63 22**	2.76
	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 1 NO.
For DC control through permanent contact control the number of free auxiliary contacts is minus 1NC.

ORDER-CONTACTORS

Type

Version

Number of NO contacts

Number of NC contacts

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

For AC control: 50 or 60Hz
For DC control: DC, "**UT**" for Push button control or "**UTKN**" for Permanent contact control

Example: Motor contactor type CNO 63 with two NO and two NC auxiliary contacts, control voltage 220V DC, for Permanent contact control "UTKN"

CNO 63	**2 2**	**220V DC**	**UTKN**

Selection and ordering data



PN



PNT/PNRT

Data for AC2 and AC3 utilization categories			Auxiliary contacts	Degree of protection	Type	
Rated operational current **Ie/400V** A	Motor rating 50 Hz				without relay	with relay
	230 V kW	**400 V kW**	NO NC			
CONTACTORS IN ENCLOSURES						
9	2.2	**4**	1 0	IP 65	**PN 9**	**PNR 9**
12	3	**5.5**	2 2	IP 65	**PN 12**	**PNR 12**
16	4	**7.5**	2 2	IP 65	**PN 16**	**PNR 16**
22	5.5	**11**	2 2	IP 65	**PN 22**	**PNR 22**
30	7.5	**15**	2 2	IP 65	**PN 30**	**PNR 30**
DIRECT ON-LINE STARTERS WITH (I-O) PUSH BUTTON						
9	2.2	**4**	- -	IP 54	**PNT 9**	**PNRT 9**
12	3	**5.5**	1 2	IP 54	**PNT 12**	**PNRT 12**
16	4	**7.5**	1 2	IP 54	**PNT 16**	**PNRT 16**
22	5.5	**11**	1 2	IP 54	**PNT 22**	**PNRT 22**
30	7.5	**15**	1 2	IP 54	**PNT 30**	**PNRT 30**
DIRECT ON-LINE STARTERS WITH PERMANENT CONTACTS						
9	2.2	**4**	1 0	IP 54	**PNG 9**	**PNRG 9**
12	3	**5.5**	2 2	IP 54	**PNG 12**	**PNRG 12**
16	4	**7.5**	2 2	IP 54	**PNG 16**	**PNRG 16**
22	5.5	**11**	2 2	IP 54	**PNG 22**	**PNRG 22**
30	7.5	**15**	2 2	IP 54	**PNG 30**	**PNRG 30**
DIRECT ON-LINE STARTERS WITH RESETING BUTTON						
9	2.2	**4**	1 0	IP 54		**PNRD 9**
12	3	**5.5**	2 2	IP 54		**PNRD 12**
16	4	**7.5**	2 2	IP 54		**PNRD 16**
22	5.5	**11**	2 2	IP 54		**PNRD 22**
30	7.5	**15**	2 2	IP 54		**PNRD 30**

Selection and ordering data



PN

Design	Degree of protection	Type
Enclosures without push-button With "I" make and "O" breake push button	IP 65 IP 54	**PN** **PNT**

ORDER:

Type

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

For AC control: 50 Hz or 60 Hz

Seting range for thermal overload relay (Upper value)

Example: Motorstarter type PNT 16 control voltage 220/230 V, 50 Hz

PNT 16 **220/230 V** **50 Hz.**

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

PNRT 16 **220/230 V** **50 Hz** **16A**

AUXILIARY CONTACTORS type CP0
WITH AC CONTROL CIRCUIT

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

Selection and ordering data



Rated operational current Ie for **AC 15/AC 14** utilization category for				Auxiliary contacts		Type	Weights
230 V	400 V	500 V	690 V				
A	A	A	A	NO	NC		kg
6	4	2.5	1.5	4	0	**CP0 40**	0.17
				3	1	**CP0 31**	
				2	2	**CP0 22**	

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**	

Number of auxiliary contacts can be extended up to 10 (2BP1+BP0) for CPO



Snap on surge suppressors	Type	Weights kg
RC elements for control voltage 24 V...60V	**RC0-60**	0.01
for control voltage 72 V...220V	**RC0-220**	

AUXILIARY CONTACTORS type CNP
WITH AC CONTROL CIRCUIT

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

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 V	690 V			
A	A	A	A	NO NC		kg
10	6	4	2	4 0	**CNP 21 40**	
				3 1	**CNP 21 31**	
				2 2	**CNP 21 22**	0.37
				1 3	**CNP 21 13**	
				0 4	**CNP 21 04**	
10	6	4	2	8 0	**CNP 31 80**	
				7 1	**CNP 31 71**	
				6 2	**CNP 31 62**	0.43
				5 3	**CNP 31 53**	
				4 4	**CNP 31 4 4**	





AUXILIARY CONTACTORS WITH FAST-ON TERMINALS

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 this contactors are identical to those of contactors without FAST-ON terminals.	**CNP 21 F**	0.38
	CNP 31 F	0.44
	CNB 21 F	0.61
	CNB 31 F	0.67



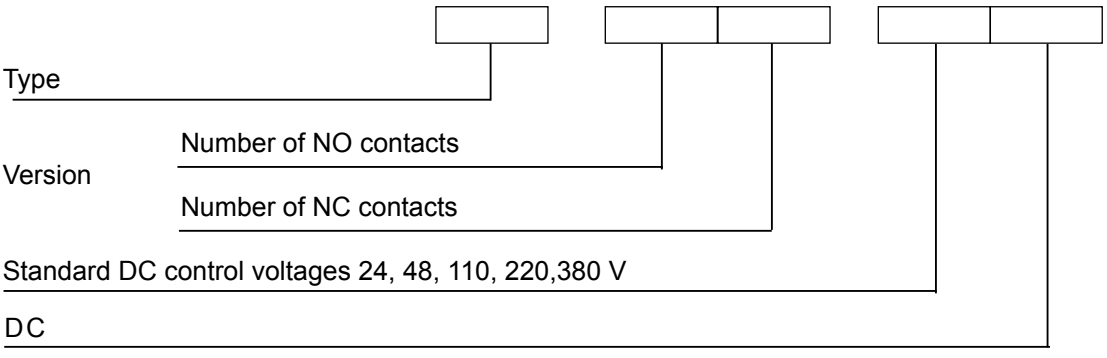
AUXILIARY CONTACTORS type CNB
WITH DC SOLENOID SYSTEM

Features
- In conformity with: IEC 60947-5
- 35 mm DIN rail mounting
- Up to 8 auxiliary contacts
- Utilizies the same coil

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 V	690 V				
A	A	A	A	NO	NC		kg
10	6	4	2	4	0	**CNB 21 40**	
				3	1	**CNB 21 31**	
				2	2	**CNB 21 22**	0.60
				1	3	**CNB 21 13**	
				0	4	**CNB 21 04**	
10	6	4	2	8	0	**CNB 31 80**	
				7	1	**CNB 31 71**	
				6	2	**CNB 31 62**	0.66
				5	3	**CNB 31 53**	
				4	4	**CNB 31 44**	

ORDER FOR CNB CONTACTORS



Example: Auxiliary contactor type CNB 21 with two NO and two NC auxiliary contacts, control voltage 220 V, DC

CNB 21	**2**	**2**	**220 V**	**DC**

Contactors

Application

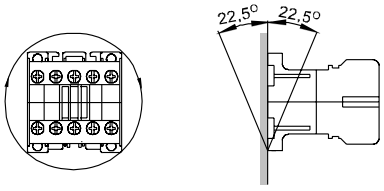
Contactors type CPO, CNP are used for closing and opening operations of the control circuit as well as for the control of small size motors and other a.c. and d.c. loads.
CM, CNM contactors are intended for switching and control of three-phase motors and other a.c. loads such as electric ovens, bulbs, electromagnets, capacitors etc.
Contactors of the type 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

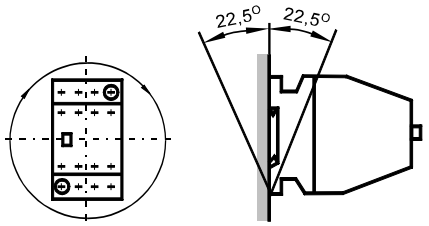
Contactors type CPO, CNP are in conformity with International standard IEC 60947-5-1 and national standards VDE-0660.
Contactors CM, CNM comply with IEC 60947-4-1, TS EN 60947-4-1 and VDE-0660. Designations of contactors, conform to EN 50 005, EN 50 012.

Installation

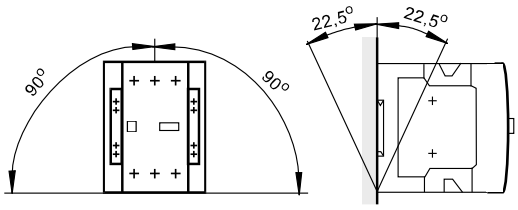
Contactors can be mounted on the baseplate by means of two or four screws. Contactors type CPO, CNP, CNB, CMO, CM1 and CNM 9 to CNM 36 are designed for quick installation on vertical standard support having the width of 35 mm according to DIN EN 50022.
Permissible deviations of mounting surfaces from the vertical base are shown on sketches:



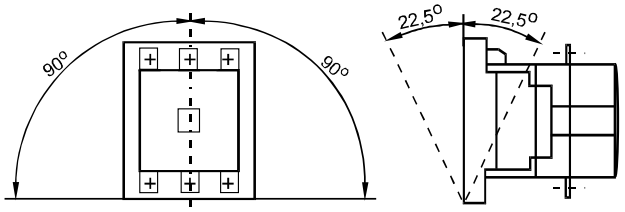
CP0, CM0, CM1



CNP, CNB, CNM 9 --- CNM 30

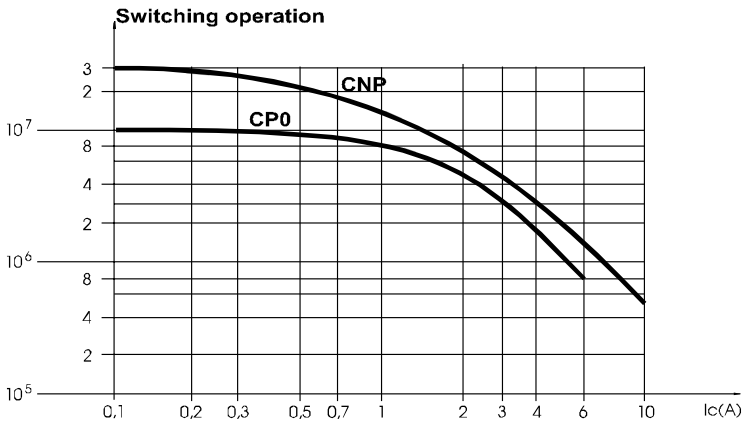


CNM 36 — CNM 60



CNM 75 — CNM 400

Diagram of electrical endurance of CP0 and CNP contactors



Ic — breaking current
Utilization category AC15

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 the rated operational voltage it is assumed that the operating mechanisms are switched randomly, i.e. Not synchronized with the phase angle of the supply system. The rated operational current Ie for the AC4 utilization category (breaking six times the rated operational current) is designed for a contact endurance of approximately 200 000 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= multiplple of Ie) in operating cycles
C - Inchingoperations as a percentage of total swiching operations.

Diagram of electrical endurance of CM, CNM contactors - AC3

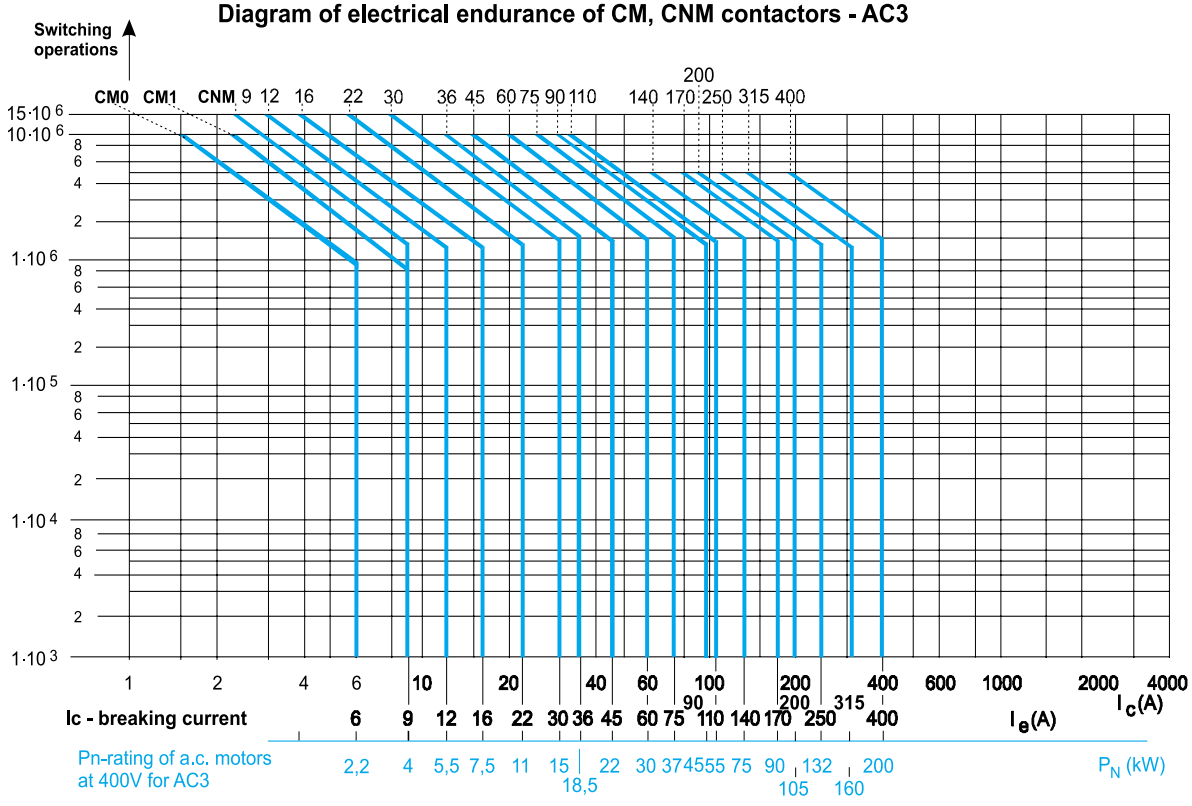
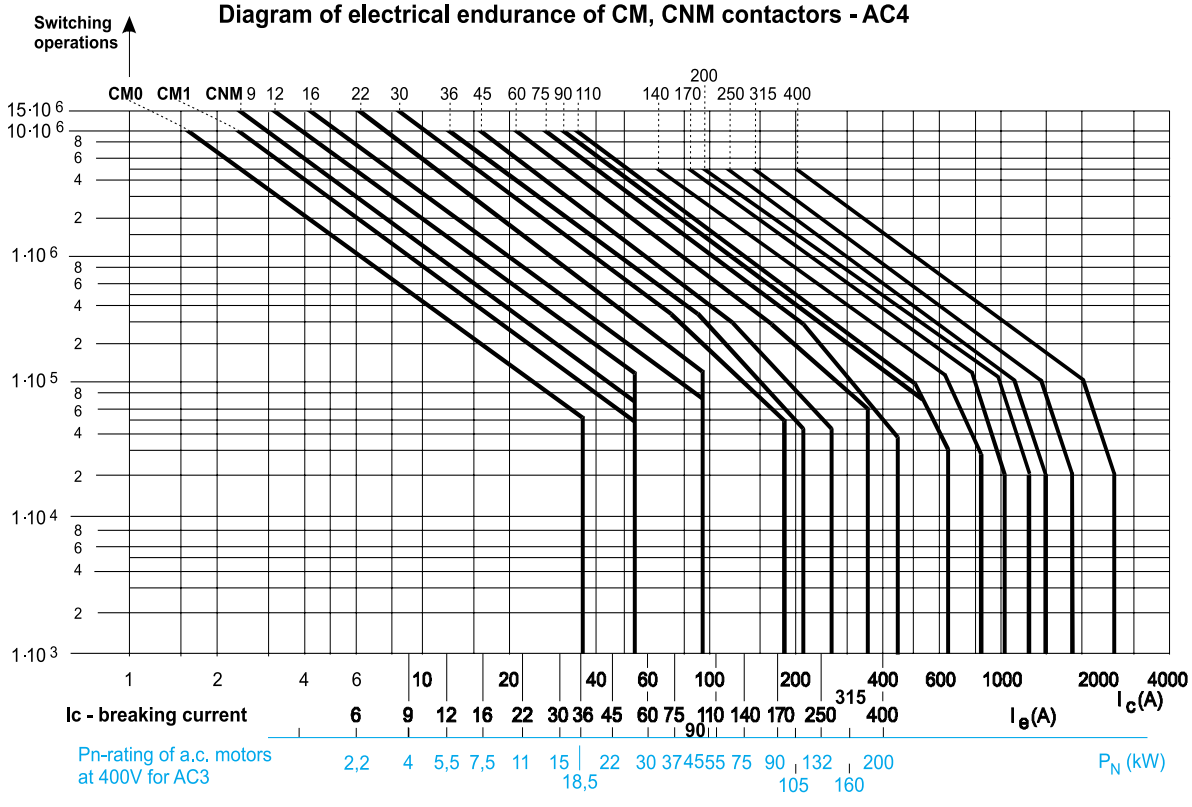


Diagram of electrical endurance of CM, CNM contactors - AC4



Utilization categories for contactors

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

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

1) By plugging is understood stopping or reversing the motor rapidly by reversing motor prmary connectioons while the motor is running.
2) By inching (jogging) is understood energizing a motor once or repeatedly for short periods to obtain small movements of the driven mechanism.
3) Tests to be carred out with an incandescent light load.
4) p.f.=0,45 for Ie ≤100 A ; 0,35 for Ie > 100 A.
5) Capacitive ratings may be derived by capacitor switching tests or assigned on the basis of established practice and experience.

I - making current **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

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 EN 60947-1. Besides the IP symbol, the complete code has two figures followed (optionally) by two additional letters. A short description of the elements used in IP coding is given below.

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

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

Over voltage limiter (surge suppressors)

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

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

The most often used systems for over voltage blockade are:
- R-C elements
- Varistors
- Diodes (with or without resistor in serial)

The advantages and disadvantages when using these elements are following:

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

Disadvantages
- Resonance
- Limited influence on the period of activating contactor
- Contactors with DC magnets without current limiting resistor, difficulties with limiting over voltage due to big powers.

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

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

Diodes Advantages
- Optimal muffling

Disadvantges
- Delay when cutting off
- Only DC circuits

Voltage drop in main circuits and current transformers

Voltage drop in main circuits

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

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

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

Where ΔV = voltage drop in Volts

ΔV_0 = unit voltage drop from table

L = cable length in km

I = current

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

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

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

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

Rated cross-section	**Single wire cable** active resistance r	reactive resistance x	**DC**	AC cosϕ = 0,8 1 fase	3 fases	**Two and three wire cable** active resistance r	reactive resistance x	**DC**	AC cosϕ = 0,8 1 fase	3 fases
[mm²]	[Ω/km]	[Ω/km]	ΔV [V/Akm]	ΔV [V/Akm]	ΔV [V/Akm]	[Ω/km]	[Ω/km]	ΔV [V/Akm]	ΔV [V/Akm]	ΔV [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 influence on the precision of the transmitting ratio as big as the phase angle.

The power of the secondary in the current transformer is made by the 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 idefined by the producer. Here are listed just informative values for some instruments.

Electromagnetic ammetar	1,1 VA	Cos ϕ - meter	0,5 VA	Counter	0,5 VA
Wattmeter - Varmeter	0,5 VA	Ammeter - printer	0,5-1,5-2,5 VA	Wattmeter - printer	0,5 VA

Auxiliary current circuits

Voltage drop in auxiliary current circuit

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

$L = L_0 / P$ where is:
L = Maximal cable length in km
L_0 = Cable coefficient depending on the voltage drop and the cross section
P = Active load power when tripping (for AC=VA cosf)

The maximal length of the cable depends on the allowed voltage drop and it is changing proportionally.
Ex. for 10 % voltage drop the cable length has been doubled.

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

Rated cross-section [mm²]	Coefficient L_0					
	24V [kmW]	48V [kmW]	110V [kmW]	220/230V [kmW]	380/400V [kmW]	500V [kmW]
1,5	1,08	4,32	22,7	90,8	272	471
2,5	1,80	7,20	37,8	151	453	785
4	2,88	11,5	60,5	242	725	1260

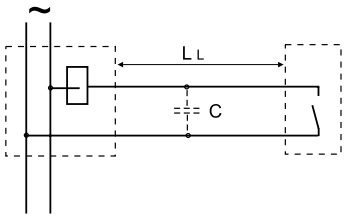
Cable capacity

Cable Capacity

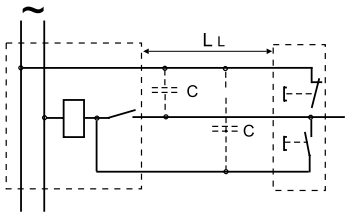
If the length of the cables in the auxiliary current circuits is excessive the voltage drop is not only the one that should be considered but the cable capacity as well. The cable capacity can get such a high value to hold the contactor closed even when the voltage is cut off.

The control circuit configuration is shown below (permanent contact control) in the case of two-wire cable.
This effect is more expressed at small auxiliary relays where is required smaller energy for holding in closed position.
The conductor's critical capacity and appropriate critical length of the conductors for nominal control voltage
(coil voltage) 220 V, 50 Hz, at permissible 10% increasemant of control voltage.

Contractors (Type)	Critical conductor capacity (μF)	Critical conductor length (m)	(m)
		Control with push button	Control with permanent contact switch
CNM 9 - CNM 36 TK 25 - TK 85	0,085	142	285
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 TK 250	0,376	626	1252
CNM 250 - CNM 400 TK 350 - TK 450	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.

MINI MOTOR CONTACTORS type CM0, CM1

Technical data

Contactor type				CM0	CM1
Mechanical endurance	make/break operations		x10^6	10	
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.			0,8	
	closed		VA	4	
	p.f.			0,35	
Coil voltage tolerances				0,8 — 1,1 U_n	
Duration of making and breaking					
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 1	s/h	1200	
		AC2; AC3	s/h	1000	
		AC4	s/h	600	
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			16	
	fuse-links, quick-acting A			20	
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 contactor CM0 and CM1					
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	5	
		110 V	A	1,2	
		220 V	A	0,6	
Load carrying capacity of the main contacts					
rated continuous current I_{th} ; 35°C			A	20	
AC1 utilization category rated current I_e/AC1 ; 55°C			A	20	

TECHNICAL INFORMATION
MOTOR CONTACTORS type CM0 and CM1

1

Technical data

Contactor type				CM0	CM1
AC2 and AC3 utilization categories (slip-ring and cage motors)				See tables for orders page 1/1	
AC4 utilization category					
(electrical endurance of contacts 100.000)					
rated current	I_e/AC4		A	3	4
ratings of squirrel-cage motors at 50 c/s		for 230 V	kW	0.5	0.75
		380 V	kW	1.1	1.5
		500 V	kW	1.1	1.5
		690 V	kW	1.1	1.5
max. permissible rated current I_e/AC4 ;		400 V	A	6	9
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	9	12
		48 V	A	8	10
		75 V	A	4	4
		110 V	A	3	3
through three poles connected in series		for 24 V	A	14	16
		48 V	A	14	16
		75 V	A	8	10
		110 V	A	8	10
		160 V	A	6	8
utilization categories DC2 to DC5					
series and shunt motors (L/R ≤ 15 ms)					
rated operational current I_e. 55°C					
through one pole		for 24 V	A	6	7
		48 V	A	5	6
		75 V	A	2	2
		110 V	A	1	1
through three poles connected in series		for 24 V	A	9	10
		48 V	A	9	10
		75 V	A	5	6
		110 V	A	4	5
		160 V	A	3	4

AUXILIARY CONTACT BLOCKS BP0 and BP1

Technical data

Block type				BP0	BP1
Insulation rating			V	690	
Permissible ambient temperature			°C	- 25 to +55	
Maximum permissible fuse rating	for contactors without relays				
max short circuit current 10 kA					
main circuit	fuse-links, time-lagging		A	16	10
	fuse-links, quick-acting		A	20	16
Loadability of auxiliary contacts of bloks					
rated continuous current I_{th} ; 35°C			A	10	
AC rated operational current I_e/AC15		for 230 V	A	6	
		400 V	A	3	
		690 V	A	1	
rated operational current I_e/DC13		for 24 V	A	4	
		110 V	A	0.7	
		220 V	A	0.3	

TECHNICAL INFORMATION

MOTOR CONTACTORS TYPE CNM and type CNB
TYPE CNM WITH AC COTROL CIRCUIT, type CNB DC SOLENOID SYSTEM

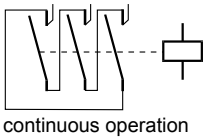
Technical data

Contactor type			CNM 9 CNM 12	CNM 16 CNM 22	CNM 30	CNB 9 CNB 12	CNB 16 CNB 22	CNB 30	CNB 50
Mechanical endurance	make/break operations	x10^6	10			10			
Insulation rating		V	690						
Permissible ambient temperature		°C	- 25 to +55			- 25 to +40			
Consumption of electromagnet in cold state with Un									
AC operated	closing	VA	68	69	69	—	—	—	—
	p.f.		0.8	0.8	0.8	—	—	—	—
	closed	VA	10	10	10	—	—	—	—
	p.f.		0.28	0.28	0.28	—	—	—	—
DC operated	closing	W	—	—	—	10	10	10	25
	closed	W	—	—	—	10	10	10	25
Coil voltage tolerances			0,85 — 1,1 Un						
Duration of making and breaking (values are also valid for voltages of electromagnet from 0,8 to 1,1 Un for each coil in cold and warm state). Total breaking time is addition of opening time and duration of electric arc.									
AC operated	closing time	ms	8-35	10-35	13-57	-	-	-	-
	opening time	ms	4-18	5-20	5-20	-	-	-	-
	duration of electric arc	ms	10	10	10	-	-	-	-
DC operated	closing time	ms	—	—	—	20-170	30-175	30-175	80-200
	opening time	ms	—	—	—	10-25	10-25	10-25	20-45
	duration of electric arc	ms	—	—	—	10	10	10	20-25
Frequency of switching operations without thermal relay									
	utilization category AC1	s/h	1500	1500	1200	1500	1500	1200	1000
	AC2 ; AC3	s/h	1000	750	750	750	750	750	500
	AC4	s/h	250	250	250	250	250	250	250
with thermal relay		s/h	15	15	15	15	15	15	15
Resistivity to shocks	(square shock)	g/ms	10/4.6 and 5/10	10/3 and 5/6,6	5,7/5 and 9/5	10/4,6 and 5/10	10/3 and 5/6,6	5,7/5 and 9/5	
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	16/20	25/32	50	16/20	25/32	50	80
DIN VDE 0660 Part 102	Type of coord. "2" aM	A	10/10	16/16	25	10/10	16/16	25	40
Sizes of connecting conductors for contact without thermal relay main circuit									
	single-wire conductor	mm^2	1-4	2,5-6	2,5-10	1-2,5	2,5-6	2,5-10	6-25
	multi-wire conductor with cable shoe	mm^2	0,75-1,5	1,5-4	2,5-6	0,75-1,5	1,5-4	2,5-6	6-10
auxiliary 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 CNM rated continuous current I_{th} ; 35°C		A	16	16	16	16	16	16	20
AC rated operational current Ie/AC15	for 230 V	A	10	10	10	10	10	10	5
	400 V	A	6	6	6	6	6	6	5
	500 V	A	4	4	4	4	4	4	3.5
	690 V	A	2	2	2	2	2	2	3.5

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNM and type CNB
Type CNM WITH AC CONTROL CIRCUIT, CNB DC SOLENOID SYSTEM

Technical data

Contactor type			CNM 9 CNM 12	CNM 16 CNM 22	CNM 30	CNB 9 CNB 12	CNB 16 CNB 22	CNB 30	CNB 50
Loadability of auxiliary contacts of contactors CNM									
DC									
rated operational current Ie/DC1 ; L/R≤1ms	for 24 V	A	10		10	10		10	10
	110 V	A	2.1		3.2	2.1		3.2	2.5
	220 V	A	0.8		0.9	0.8		0.9	0.8
	440 V	A	0.6		0.3	0.6		0.33	0.3
	600 V	A	0.6		0.22	0.6		0.22	0.3
rated operational current Ie/DC13	for 24 V	A	10		10	10		10	10
	110 V	A	0.9		1.8	0.9		1.8	1.3
	220 V	A	0.45		0.9	0.45		0.9	0.55
	440 V	A	0.25		0.27	0.25		0.27	0.3
	600 V	A	0.2		0.18	0.2		0.18	0.25
Load carrying capacity of the main contacts									
rated continuous current I_{th} ; 35°C		A	25	35	39	22	35	39	100
AC1 utilization category rated current Ie/AC1 ; 55°C		A	20	30	35	20	30	35	
AC2 and AC3 utilization categories (slip-ring and cage motors)			See tables for orders page 1/2 and 1/5						
AC4 utilization category									
(electrical endurance of contacts 200.000)									
rated current	Ie/AC4	A	3.3/4.3	7.7/8.5	15.6	3.3/4.3	7.7/8.5	15.6	
ratings of squirrel-cage motors at 50 c/s	for 230 V	kW	0.75/1.1	2/2.2	4.3	0.75/1.1	2/2.2	4.3	
	400 V	kW	1.4/1.9	3/4	7.5	1.4/1.9	3/4	7.5	
	500 V	kW	1.7/2.5	4/5.2	7.5	1.7/2.5	4/5.2	7.5	
	690 V	kW	2.4/3.3	6/6.6	9.8	2.4/3.3	6/6.6	9.8	
max. permissible rated current	Ie/AC4 ; 400 V	A	9	16	30	9	16	30	
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	2.5	4	10	2.5	4	10	24
	400 V	kvar	4	7.5	16.7	4	7.5	16.7	41
	500 V	kvar	4	7.5	20	4	7.5	20	50
	690 V	kvar	4	7.5	16.7	4	7.5	16.7	
ratings of capacitor banks									
(minimum inductive reactance between two capacitors switched on in parallel amounts to 6µH. 50 c/s)									
	for 230 V	kvar	2.5	4	10	2.5	4	10	
	400 V	kvar	4	7.5	16.7	4	7.5	16.7	
	500 V	kvar	4	7.5	20	4	7.5	20	
	690 V	kvar	4	7.5	16.7	4	7.5	16.7	
Application in stator circuit of motor									
intermittent opertaion. AC2									
stator current[1] at duty factor in intermittent periodic duty[2]									
	20%	A	20	40	60	20	40	60	
	40%	A	20	37	55	20	37	55	
	60%	A	20	33	49	20	33	49	
	80%	A	20	30	45	20	30	45	
Application in rotor circuit of motor									
intermittent opertaion									
rotor current[1] at duty factor in intermittent periodic duty[2]									
	10%	A	31	6	95	31	63	95	
	20%	A	31	63	95	31	63	95	
	40%	A	31	59	87	31	59	87	
	60%	A	31	52	77	31	52	77	
	80%	A	31	47	71	31	47	71	
continuous operation		A	31	47	71	31	47	71	
permissible voltage of motionless rotor									
	starting	V	1320	1320	1320	1320	1320	1320	
	regulation	V	660	660	660	660	660	660	
	countercurrent breaking	V	440	440	440	440	440	440	

[1] Electrical endurance of contacts at these loads, see page 1/22.

[2] Intermittent periodic duty in % = $\frac{\text{on-load period}}{\text{duration of total cycle}}$ x 100. The total cycle duration can amount up to 10 minutes

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNM and type CNB
Type CNM WITH AC CONTROL CIRCUIT, CNB DC SOLENOID SYSTEM

Technical data

Contactor type			CNM 9 CNM 12	CNM 16 CNM 22	CNM 30	CNB 9 CNB 12	CNB 16 CNB 22	CNB 30	CNB 50
Loadability by direct current DC1 utilization category, non-inductive loads L/R ≤ 1 ms									
rated operational current Ie, 55°C through one pole	for 24 V	A	20	30	45	20	30	45	100
	60 V	A	20	20	30	20	20	30	100
	110 V	A	2.1	4.5	6	2.1	4.5	6	10
	220 V	A	0.8	1	1	0.8	1	1	–
	440 V	A	0.6	0.4	0.4	0.6	0.4	0.4	–
	600 V	A	0.6	0.25	0.25	0.6	0.25	0.25	–
through three poles connected in series	for 24 V	A	20	30	45	20	30	45	100
	60 V	A	20	30	45	20	30	45	100
	110 V	A	20	30	45	20	30	45	100
	220 V	A	20	30	45	20	30	45	65
	440 V	A	1.3	2.9	2.9	1.3	2.9	2.9	–
	600 V	A	1	1.4	1.4	1	1.4	1.4	–
utilization categories DC2 to DC5 series and shunt motors (L/R ≤ 15 ms)									
rated operational current Ie, 55°C through one pole	for 24 V	A	1.2	5	5	1.2	5	5	8.5
	60 V	A	0.5	2	2	0.5	2	2	–
	110 V	A	0.15	0.75	0.75	0.15	0.75	0.75	–
	220 V	A	–	0.2	0.2	–	0.2	0.2	–
	440 V	A	–	0.09	0.1	–	0.09	0.1	–
	600 V	A	–	0.06	0.08	–	0.06	0.08	–
through three poles connected in series	for 24 V	A	20	30	45	20	30	45	–
	60 V	A	20	30	45	20	30	45	–
	110 V	A	20	30	45	20	30	45	–
	220 V	A	1.75	3.5	3.5	1.75	3.5	3.5	–
	440 V	A	0.2	0.6	0.6	0.2	0.6	0.6	–
	600 V	A	0.1	0.3	0.35	0.1	0.3	0.35	–

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNM
AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

Technical data

Contactor type			CNM 36	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	10			5		
Insulation rating		V	690	750	1000			
Permissible ambient temperature		°C	- 25 to +55					
Consumption of electromagnet in cold state with U_n								
AC operated	closing	VA	68	206	300	580	1340	1340
	p.f.		0.8	0.6	0.5	0.45	0.46	0.41
	closed	VA	10	26	26	44	84	84
	p.f.		0.28	0.29	0.24	0.24	0.23	0.25
DC operated	closing	W	130	270	690	550	1180	1180
	closed	W	3	3.5	4	5	8	8
Coil voltage tolerances			0,85 – 1,1 U_n					
Duration of making and breaking (values are also valid for voltages of electromagnet from 0,8 to 1,1 U_n for each coil in cold and warm state). Total breaking time is addition of opening time and duration of electric arc.								
AC operated	closing time	ms	13-57	15-40	20-50	20-50	20-50	20-50
	opening time	ms	5-10	5-25	8-30	10-30	10-30	10-30
	duration of electric arc	ms	10	10-15	10-15	10-15	10-15	10-15
DC operated	closing time	ms	10-25	15-40	20-50	20-50	25-80	30-100
	opening time	ms	10-16	100-120	150-190	22-35	15-30	15-30
	duration of electric arc	ms	10	10-15	10-15	10-15	10-15	10-15
Frequency of switching operations without thermal relay								
	utilization category AC1	s/h	1200	1500	1000	1000	1000	1000
	AC2 ; AC3	s/h	700	750	500	500	500	500
	AC4	s/h	200	250	250	250	250	250
with thermal relay		s/h	15	15	15	15	15	15
Resistivity to shocks	(square shock)	g/ms	5,7/5 and 9/5	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	63	80/100	125/160/200	250/315	400	500/ 630
DIN VDE 0660 Part 102	Type of coord. "2" aM	A	32	40/50	63/80/100	125/160	200	400/500
Sizes of connecting conductors for contact without thermal relay main circuit								
	single-wire conductor	mm^2	2,5 -10	6 -16	–	–	–	–
	multi-wire conductor with cable shoe	mm^2	2,5 -10	4-25	–	–	–	–
	stranded with cable lug	mm^2	–	–	6 -35	25 -70	70 -150	2x150
			–	–	25-50	50 -120		
	flat bar	mm	–	–	15x2,5	15x3	25x3	2x25x3
				–	15x3	20x3		
	protective conductor with cable lug	mm^2	–	–	–	25 -70	35 -70	50 -120
auxiliary circuit								
	single-wire conductor	mm^2	1 – 2,5					
	multi-wire conductor with cable shoe	mm^2	0,75 – 1,5					

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNM
AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

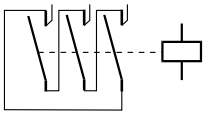
Technical data

Contactor type			CNM 36	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	16
AC								
rated operational current I_e/AC15	for 230 V	A	6	6	6	6	6	6
	400 V	A	4	4	4	4	4	4
	500 V	A	2.5	2.5	2.5	2.5	2.5	2.5
	690 V	A	2.5	2.5	2.5	2.5	2.5	2.5
DC								
rated operational current I_e/DC1 ; L/R≤1ms	for 24 V	A	10	10	10	10	10	10
	110 V	A	3.2	3.2	3.2	8	8	8
	220 V	A	0.9	0.9	0.9	2	2	2
	440 V	A	0.33	0.33	0.33	0.6	0.6	0.6
	600 V	A	0.22	0.22	0.22	0.4	0.4	0.4
rated operational current I_e/DC13								
	for 24 V	A	10	10	10	10	10	10
	110 V	A	1.8	1.8	1.8	2.4	2.4	2.4
	220 V	A	0.9	0.9	0.9	1.1	1.1	1.1
	440 V	A	0.27	0.27	0.27	0.32	0.32	0.32
	600 V	A	0.18	0.18	0.18	0.21	0.2	0.21
Load carrying capacity of the main contacts								
rated continuous current I_{th} ; 35°C		A	55	63/72	100/110/115	160/200/250	350	390/450
AC1 utilization category								
rated current I_e/AC1 ; 55°C		A	45	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 1/2 , 1/3, 1/4, 1/6 and 1/7					
AC4 utilization category (electrical endurance of contacts 200.000)								
rated current	I_e/AC4	A	18.5	24/28	34/38/42	68/72/75	100	125/150
ratings of squirrel-cage motors at 50 c/s for	230 V	kW	5.2	6,9/8,1	7,7/11/12	20/21/23	31	35/ 37,5
	400 V	kW	9	12/14	17/20/22	35/37/40	55	65/69
	500 V	kW	9	15,8/18,4	22/25/27	46/48/50	72	76/85,5
	690 V	kW	11.8	20,8/24,3	28,5/32/36	60/64/69	92	100/106
max. permissible rated current I_e/AC4;	400 V	A	36	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	12	17	24	35/40/58	87	90/115
	400 V	kvar	16.7	30	40	40/60/100	150	150/ 200
	500 V	kvar	25	35	50	50/ 80/130	190	190/265
	690 V	kvar	16.7	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	12	17	24	30/37/40	66	66/85
	400 V	kvar	16.7	30	40	50/50/70	115	115/150
	500 V	kvar	25	35	50	66/65/90	145	145/195
	690 V	kvar	16.7	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	60	103	153	245/308/308	462	462/617
	40%	A	55	98	122	195/245/245	367	367/490
	60%	A	49	87	109	174/218/218	327	327/436
	80%	A	45	80	100	160/200/200	300	300/400

TECHNICAL INFORMATION

MOTOR CONTACTORS type CNM
AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

Technical data

Contactor type			CNM 36	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	95	163	293	395/560/560	759	864/1075
	20%	A	95	163	242	388/487/487	730	730/ 975
	40%	A	87	155	193	308/380/380	580	580/ 775
	60%	A	77	138	173	275/345/345	517	517/689
	80%	A	71	127	158	252/316/316	474	474/632
continuous operation		A	71	127	158	252/316/316	474	474/632
permissible voltage of motionless rotor								
	starting	V	1320	1500	2000	2000	2000	2000
	regulation	V	660	750	1000	1000	1000	1000
	counter current breaking	V	440	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	55	80	90/100/160	160/200/200	300	300/400
	60 V	A	30	30	75/80/80	160/200/200	300	300/330
	110 V	A	6	6	12/12/18	18/18/30	33	33/ 33
	220 V	A	1	1.2	2,5/2,5/3,4	3,4/3,4/3,4	3,8	3,8/ 3,8
	440 V	A	0.4	0.48	0,6/0,6/0.8	0,8/0,8/0,8	0,9	0,9/0,9
	600 V	A	0.25	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	55	80	100	160/200/200	300	400
	60 V	A	55	80	100	160/200/200	300	400
	110 V	A	55	80	100	160/200/200	300	400
	220 V	A	45	80	100	160/200/200	300	400
	440 V	A	2.9	3	6	11,5	11	11
	600 V	A	1.4	1	3,4	4	5,2	5,2
utilization categories DC2 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	5	6/16	16	35	35
	60 V	A	2	2	3/7.5	7.5	11	11
	110 V	A	0.75	0.75	1.25/2.5	2.5	3	3
	220 V	A	0.2	0.2	0.35/0.6	0.6	0.6	0.6
	440 V	A	0.1	0.1	0.15/0.17	0.17	0.18	0.18
	600 V	A	0.08	0.08	0.1/0.12	0.12	0.12	0.12
through three poles connected in series	for 24 V	A	55	80	100	200	300	400
	60 V	A	55	80	100	200	300	400
	110 V	A	55	80	100	200	300	400
	220 V	A	3.5	3.5	4	200	300	400
	440 V	A	0.6	0.6	0.8	1.4	1.4	1.4
	600 V	A	0.35	0.35	0.45	0.75	0.75	0.75

[1] Electrical endurance of contacts at these loads, see page 1/22.

[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 TK for SWITCHING RESISTIVE LOADS

Technical data

Contactor type			TK25	TK35	TK65	TK85	TK115	TK130	TK175	TK250	TK350	TK450
Mechanical endurance	make/break operations	x10^6	10							5		
Insulation rating		V	690									
Permissible ambient temperature		°C	- 25 to +40									
Consumption of electromagnet in cold state with Un												
AC operated	closing	VA	68	68	68	68	206	350	350	580	1340	1340
	p.f.		0.8	0.8	0.8	0.8	0.6	0.5	0.5	0.5	0.4	0.4
	closed	VA	10	10	10	10	26	26	26	44	84	84
	p.f.		0.28	0.28	0.28	0.28	0.29	0.24	0.24	0.24	0.25	0.25
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, 380									
Frequency of switching operations without thermal relay												
utilization category	**AC1**	s/h	**650**	**650**	**650**	**650**	**650**	**650**	**650**	**500**	**500**	**500**
	AC2 / AC3	s/h	750	750	750	750	750	500	500	500	500	500
Maximum permissible fuse ratings for contactors without relays main circuit gL/gG		A	40	63	100	160	200	250	315	400	500	630
Electrical endurance		x10^6	0,5									
Sizes of connecting conductors for contact without thermal relay main circuit												
multi-wire conductor		mm^2	4	6	16	25	35					
multi-wire conductor with cable shoe		mm^2						50	70	120	185	2x150
Terminal screw			M3.5	M4	M6	M6	M6	M8	M8	M10	M10	M10
auxiliary circuit												
single-wire conductor		mm^2	1 - 2,5									
multi-wire conductor with cable shoe		mm^2	0,75 - 1,5									
AC-1 utilization category, switching resistive load												
Rated operational currents Ie at 40°C		**A**	**25**	**35**	**65**	**85**	**115**	**130**	**175**	**250**	**350**	**450**
Ratings of	230 /220 V	kW	9	13	25	32	44	50	67	95	133	170
three-phase loads with	400 /380 V	kW	16	23	43	56	76	85	115	164	230	295
p.f.=1												
AC-2 and AC-3 utilization categories												
Rated operational currents Ie at	**400/380 V**	**A**	**12**	**16**	**30**	**36**	**60**	**90**	**110**	**170**	**250**	**400**
Ratings of motors	230 /220 V	kW	3	4	7.5	11	18.5	26	37	55	75	115
	400 /380 V	kW	5.5	7.5	15	18.5	30	45	55	90	132	200
	500 V	kW	7.5	9	15	22	37	59	75	110	160	255
	690 /660 V	kW	7.5	11	15	36	37	67	90	132	200	355

Control of lighting circuits

General

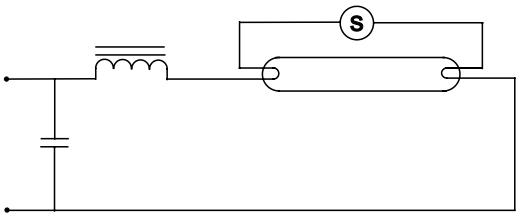
- Contactor choice criteria for control of lighting circuits are as follows:
- Type, power rating and number of lamps
- Conection mode
- Current values on closing and in steady state
- Power factor cosϕ of the lamps
- Presence or not of compensation capacitors

Lighting circuits

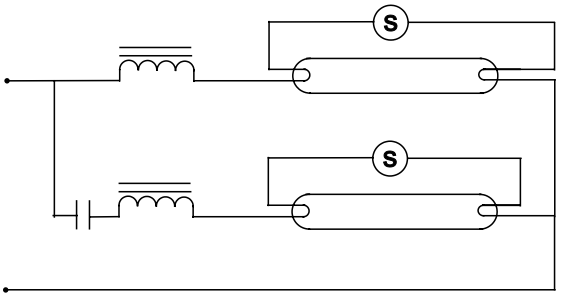
In a given circuit, the number and power rating of lamps are defined and cannot result in overload. Only short-circuit protection has to be provided. GG fuses or modular circuit-breakers will be chosen for this purpose. The lamps have very specific technical data, according to their construction type.

- Incandescent lamps have a very high current on 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 55^0C.

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

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

Table of technical characteristics for lighting switching

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

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

Contactor with AC coil

Type				TK 25	TK 35	TK 65	TK 85	TK 115	TK 130	TK 175
Switching incandescent lamps, per main conducting path at 230/220 V			kW	2,2	4	5,8	7,3	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	-	54	81	121	157	216	243	270
	36	0,43	-	46	69	104	133	186	209	232
	58	0,67	-	29	44	67	85	119	134	149
Fluorescent lamps with parallel compensation										
220-240 V AC	18	0,11	4,5	29	54	78	101	111	160	197
	36	0,21	4,5	29	54	78	101	111	160	197
	58	0,32	7	19	34	50	63	71	103	127
Fluorescent lamps in dual mounting										
220- 240 V AC	2x18	2x0,11	-	180	272	408	470	726	-	-
	2x36	2x0,21	-	94	142	214	266	380	-	-
	2x58	2x0,32	-	62	92	140	166	250	-	-
High pressure sodium vapour lamps without compensation										
220-240 V AC	150	1,8	-	7	8	17	23	26	34	41
	250	3	-	4	5	10	14	16	21	25
	400	4,4	-	3	3	7	9	10	13	17
	600	6,2	-	2	2	5	7	8	10	12
	1000	10,3	-	1	1	3	4	5	5	7
High pressure sodium vapour lamps with compensation										
220-240 V AC	150	1	20	14	15	30	50	58	73	88
	250	1,5	36	9	10	20	33	38	48	59
	400	2,5	48	5	6	12	20	23	29	36
	600	3,3	65	4	5	9	15	17	21	27
	1000	6,2	100	2	2	5	8	9	11	14
High pressure mercury vapour lamps without compensation										
220-240 V AC	80	0,8	-	26	36	75	93	120	150	200
	125	1,2	-	18	27	45	65	83	95	130
	250	2,2	-	10	14	26	35	47	57	71
	400	3,3	-	6	9	17	23	31	38	47
	700	5,5	-	4	5	10	14	19	23	29
	1000	7,5	-	3	4	7	10	14	17	21
	2000	8	-	1	2	4	5	7	9	11
High pressure mercury vapour lamps with compensation										
220-240 V AC	80	0,41	8	35	53	53	112	178	200	238
	125	0,65	10	22	35	35	71	107	154	165
	250	1,3	18	14	24	24	38	59	83	102
	400	2	25	9	15	15	24	38	54	67
	700	3,5	40	6	9	9	16	22	30	38
	1000	5	64	5	6	6	11	15	21	26
	2000	5	37	2	3	3	7	9	13	16

TECHNICAL INFORMATION

CAPACITOR CONTACTORS TYPE
CNKN 12 - CNKN 25, CNKM 30 - CNKM 50

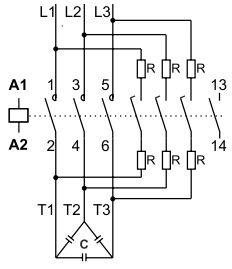
Special contactors for power factor correction capacitors

Main characteristics

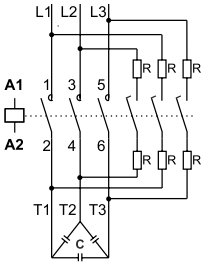
These contactors are equipment with early - make contacts. This special type of contact has the purpose of connecting for a very brief interval, 2-3 ms, during the contactor closing, resistances which limit the connecting current of the capacitors. These resistances are then excluded when the closing operation is complete and the current capacity is conveyed to the main contacts.

Type designation		**CNKN 12 10 CNKN 12 01**	**CNKN 15 10 CNKN 15 01**	**CNKN 20 10 CNKN 20 01**	**CNKN 25 10 CNKN 25 01**	**CNKM 30 00**	**CNKM 40 00 CNKM 40 22**	**CNKM 50 00 CNKM 50 22**	**CNKM 60 22**
Capacitor rating at 230V	kvar	6,7	8,5	11	14	20	25	29	34
400V	**kvar**	**12**	**15**	**20**	**25**	**30**	**40**	**50**	**60**
Rated operational current Ie/AC6b et 400 V	A	**18**	**22**	**28**	**35**	**44**	**58**	**72**	**87**
Insulation rating	V	690					750		1000
Permissible ambient temperature	°C	- 25 to + 55							
Coil voltage tolerances		0,85 - 1,1 Un							
Maximum permissible fuse ratings main circuit gL/gG auxilliary circuit	A A	25 16	35 16	40 16	50 16	63 16	80 16	125 16	160 16
Frequency of switching operations	s/h	240	120	120	120	100	100	100	100
Electrical endurance	x10^6	0,1							
Sizes of connecting conductors main circuit multi-wire conductor multi-wire cond. with cable shoe	mm^2	2,5-4	6-25	6-25	6-25	6-25	16-35	16-35	50/8

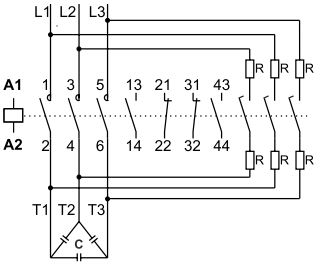
CONNECTION DIAGRAMS AND TERMINAL MARKINGS



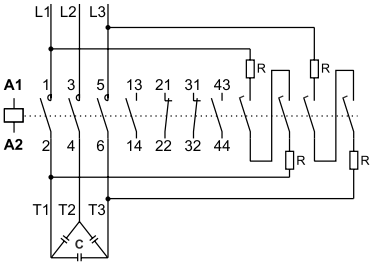
CNKN 12 10, CNKN 15 10
CNKN 20 10, CNKN 25 10



CNKM 30 00, CNKM 40 00
CNKM 50 00



CNKM 40 22, CNKM 50 22



CNKM 60 22

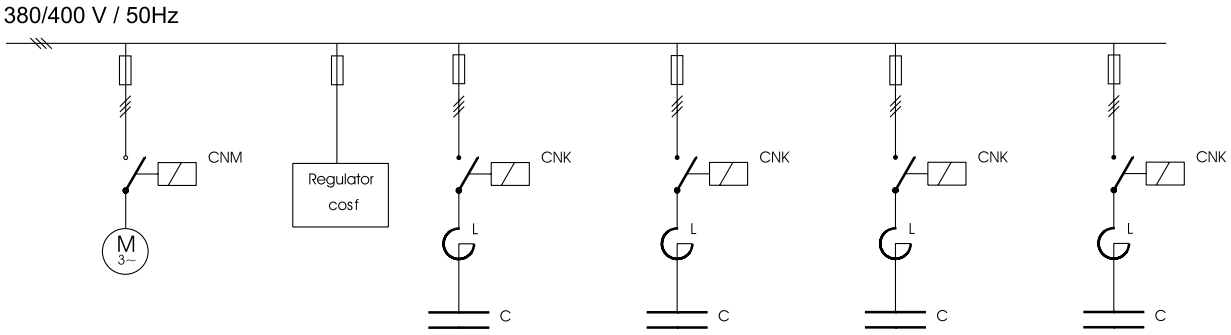
VERY IMPORTANT NOTE:

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.

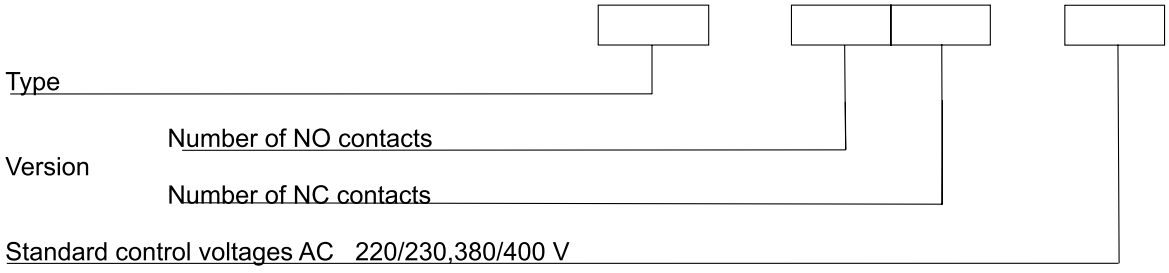
Before switch the contactor in the circuit, capacitor must be discharged (the voltage at the terminals must be < 50 V).

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

CONECTION DIAGRAM FOR GROUP (CENTRAL) COMPENSATION



ORDER FOR CAPACITOR CONTACTORS



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

CNKM 50	2	2	220 V	50 Hz.

TECHNICAL INFORMATION

DC CONTACTORS type CNO

AC CONTROL CIRCUIT or DC CONTROL CIRCUIT

Technical data

Contactor type			CNO 30	CNO 63	CNO 110	CNO 250
Mechanical endurance	make/break operations	x10^6	10			5
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	300	350	1150
	p.f.		0.5	0.6	0.42	0.31
	closed	VA	18	30	50	75
	p.f.		0.33	0.3	0.36	0.4
DC operated	closing	W	130	140	450	450
	closed	W	15	13	25	25
Coil voltage tolerances			0.85 - 1.1 Un			
Auxiliary contacts (making and breaking capacity)						
Rated thermal current Ith		A	20	20	20	20
Rated making capacity		A	50	50	50	50
Alternating current						
	for voltages 24V to 380V	A	5	5	5	5
	for voltages 50V	A	3.5	3.5	3.5	3.5
Rated breaking capacity AC 15						
	for voltages 24V to 380V	A	50	50	50	50
	for voltages 500V	A	35	35	35	35
Direct current						
Rated operational current DC1						
	for voltages 110V-	A	2.5	2.5	2.5	2.5
	220V-	A	0.8	0.8	0.8	0.8
	440V-	A	0.3	0.3	0.3	0.3
Rated operational current DC13						
	for voltages 110V-	A	1.3	1.3	1.3	1.3
	220V-	A	0.55	0.55	0.55	0.55
	440V-	A	0.3	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	63	110	200
DIN VDE 0660 Part 102	Type of coord. "2" aM	A	50	160	160	355
Sizes of connecting conductors for contact without thermal relays						
main circuit						
	single-wired conductor	mm^2	2.5 -10	6 -16	-	-
	multy-wired conductor with cable shoe	mm^2	-	6 - 25	16 - 50	50 - 120
	flat conductor	mm	-	15x2	20x3	25x4
auxiliary circuit						
	single-wired conductor	mm^2	1 - 2.5			
	multy-wired conductor with cable shoe	mm^2	0.75 - 1.5			

TECHNICAL INFORMATION

MINI AUXILIARY CONTACTORS type CP0

Technical data

Contactor type				**CP0**
Mechanical endurance	make/break operations		x10^6	10
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
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	5
		110 V	A	1,2
		220 V	A	0,6

TECHNICAL INFORMATION

AUXILIARY CONTACTORS type CNP and type CNB

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

Technical data

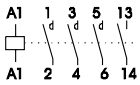
				CNP31 CNP21	CNB31 CNB21
Contactor type					
Mechanical endurance	make/break operations		x10^6	30	10
Insulation rating			V	690	
Permissible ambient temperature			°C	- 25 to +55	- 25 to +40
Consumption of electromagnet in cold state with U_n					
AC operated	closing		VA	68	–
	p.f.			0.8	–
	closed		VA	10	–
	p.f.			0.28	–
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	8 - 35	–
	opening time		ms	4 - 18	–
	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	3000	3000
	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 CNP and CNB					
rated continuous current		I_{th} ; 35°C	A	16	16
AC rated operational current I_e/AC15		for 230 V	A	10	10
		400 V	A	6	6
		500 V	A	4	4
		690 V	A	2	2
DC rated operational current I_e/DC1 ; L/R≤1ms		for 24 V	A	10	(10)[1]
(with series connection of 3 current paths)[1)]		110 V	A	2.1	(10)[1]
		220 V	A	0.8	(10)[1]
		440 V	A	0.6	(1,3)[1]
		600 V	A	0.6	(1)[1]
rated operational current I_e/DC13		for 24 V	A	10	(10)[1]
(with series connection of 3 current paths)[1)]		110 V	A	0.9	(10)[1]
		220 V	A	0.45	(2)[1]
		440 V	A	0.25	(0,9)[1]
		600 V	A	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

1

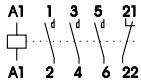
Motor contactors

AC coil operation



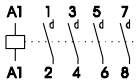
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CM0, CM1, CNM 9, CNM 12



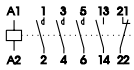
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CM0, CM1, CNM 9, CNM 12



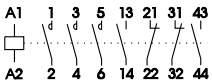
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CM0, CM1, CNM 9, CNM 12



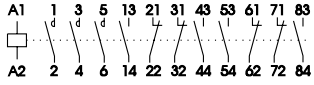
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CNM 12, CNM 16, CNM 22, CNM 30



22

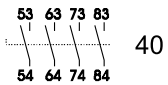
CNM 12, CNM 16, CNM 22, CNM 30,
CNM 36, CNM 45, CNM 60, CNM 75,
CNM 90, CNM 110, CNM 140, CNM 170,
CNM 200, CNM 250, CNM 315, CNM 400



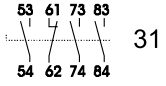
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CNM 200, CNM 250,CNM 315, CNM 400

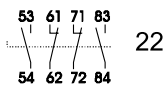
Snap-on auxiliary contakt blocks



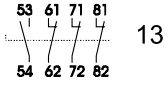
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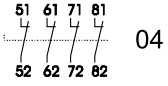
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22

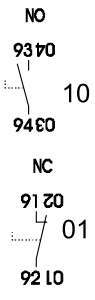


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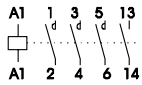
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BP0



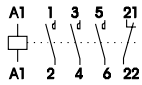
BP1

DC coil operation



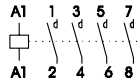
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CNB 9, CNB 12



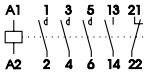
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CNB 9, CNB 12



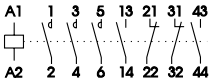
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CNB 9, CNB 12



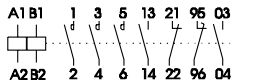
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CNB 12, CNB 16, CNB 22, CNB 30



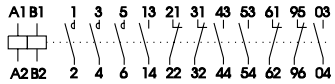
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CNB 12, CNB 16, CNB 22, CNB 30



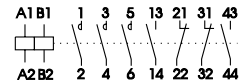
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CNM 36, CNM 45, CNM 60, CNM 75,
CNM 110



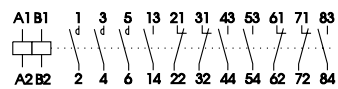
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CNM 45, CNM 60, CNM 75,CNM 110



22

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

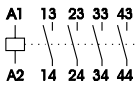


44

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

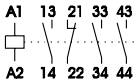
Auxiliary contactors

AC and DC coil operation



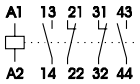
40

CP0, CNP 21, CNB 21



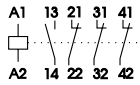
31

CP0, CNP 21, CNB 21



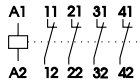
22

CP0, CNP 21, CNB 21



13

CNP 21, CNB 21



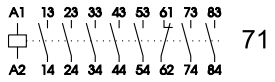
04

CNP 21, CNB 21



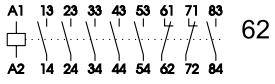
80

CNP 31, CNB 31



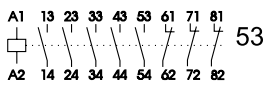
71

CNP 31, CNB 31



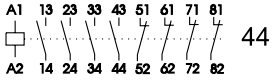
62

CNP 31, CNB 31



53

CNP 31, CNB 31

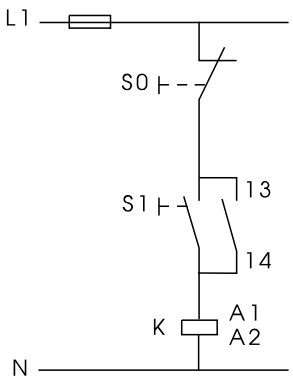


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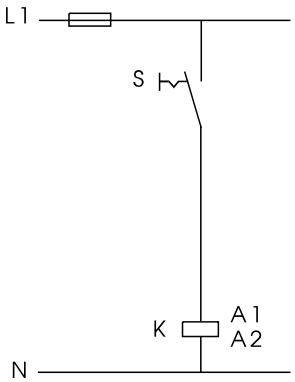
CNP 31, CNB 31

SCHEMATIC DIAGRAMS FOR AC OPERATED CONTACTORS

CPO, CNP 21, CNP 31,CNM 9-CNM 400



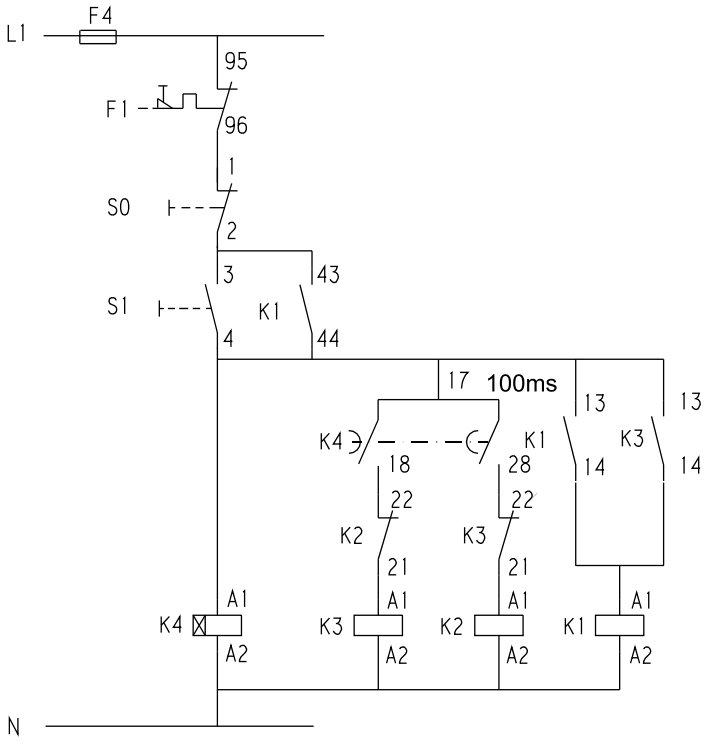
With push button"S0,S1"

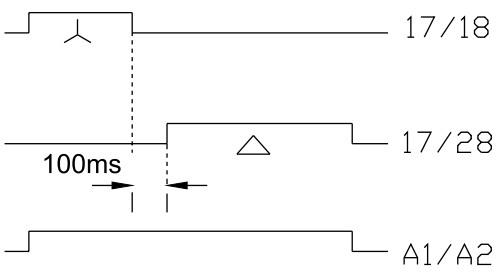


With permanent contact switch "S"

IMPORTANT:

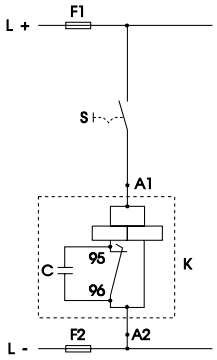
When used in star-delta starters the time between change over conection from star to delta must be bigger than 100ms which is achieved with electronic time relays (e.g. Rade Koncar type EVR 40).



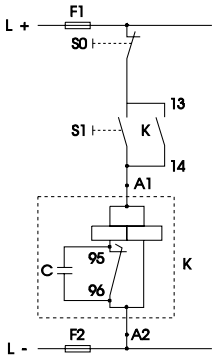


SCHEMATIC DIAGRAMS FOR DC OPERATED CONTACTORS

CNM 36

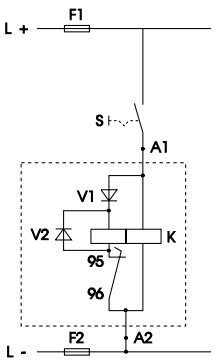


Permanent contact control

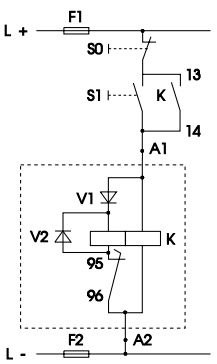


Push button control

CNM 45 - CNM 60

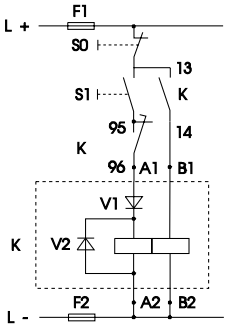


Permanent contact control

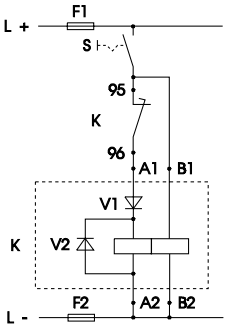


Push button control

CNM75 - CNM 110

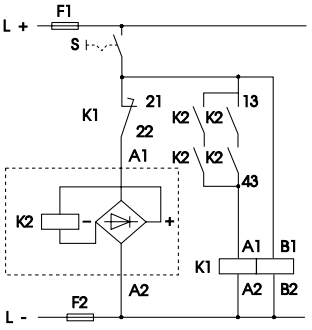


Push button control



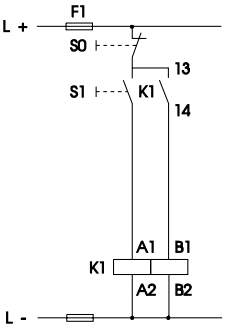
Permanent contact control

CNM 140 - CNM 200
CNM 250 - CNM 400



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

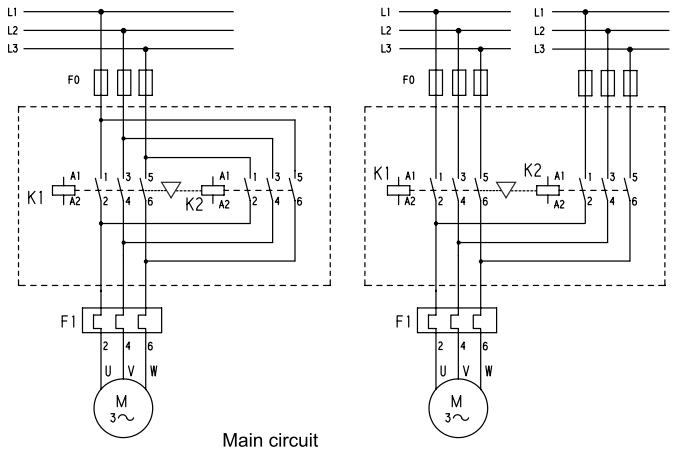
Permanent contact control



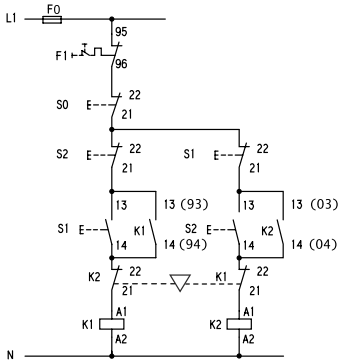
Push button control

SCHEMATIC DIAGRAMS FOR REVERSING CONTACTORS and “AVR”

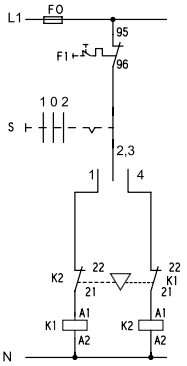
MBCM0; MBCM1; MBCNM 12; MBCNM 16; MBCNM 22; MBCNM 30; MBCNM 36; MBCNM 45; MBCNM 60; MBCNM 75; MBCNM 90; MBCNM 110; MBCNM 140; MBCNM 170; MBCNM 200; MBCNM 250; MBCNM 315; MBCNM 400



Main circuit

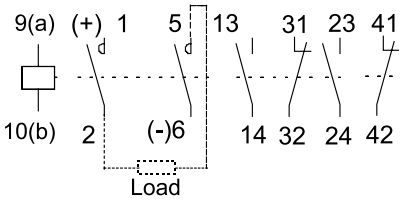


Control circuit - push-button operation

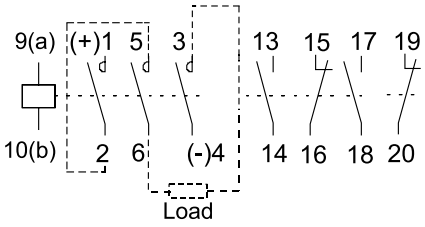


Control circuit - permanent contact operation

Wiring diagrams

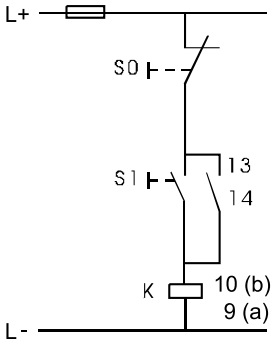


CNO 30

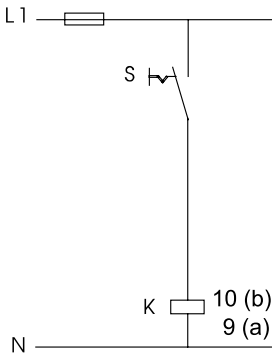


CNO 63, CNO 110, CNO 250

SCHEMATIC DIAGRAMS FOR AC OPERATED CONTACTORS

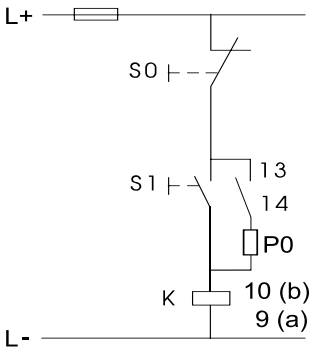


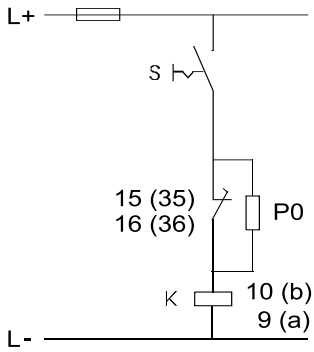
Push button control



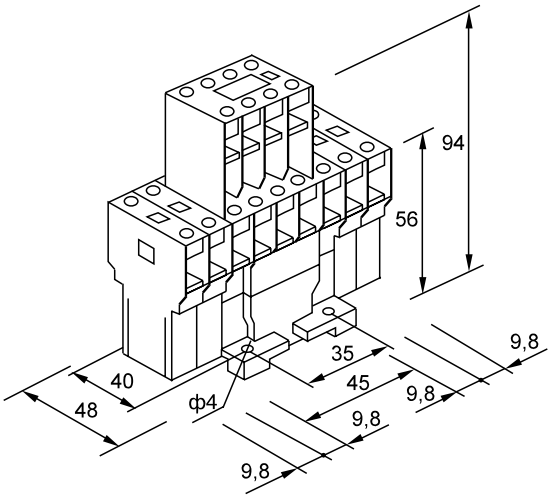
Permanent contact control

SCHEMATIC DIAGRAMS FOR DC OPERATED CONTACTORS

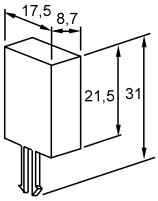




DIMENSION DRAWINGS (mm)

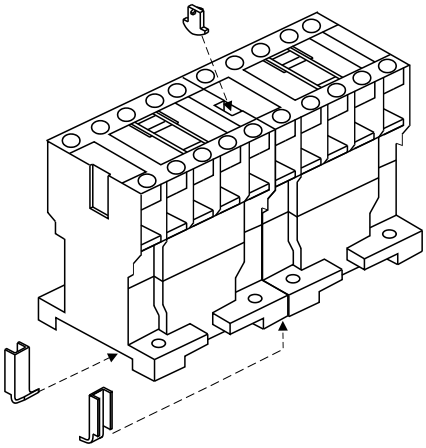


CPO, CMO, CM1

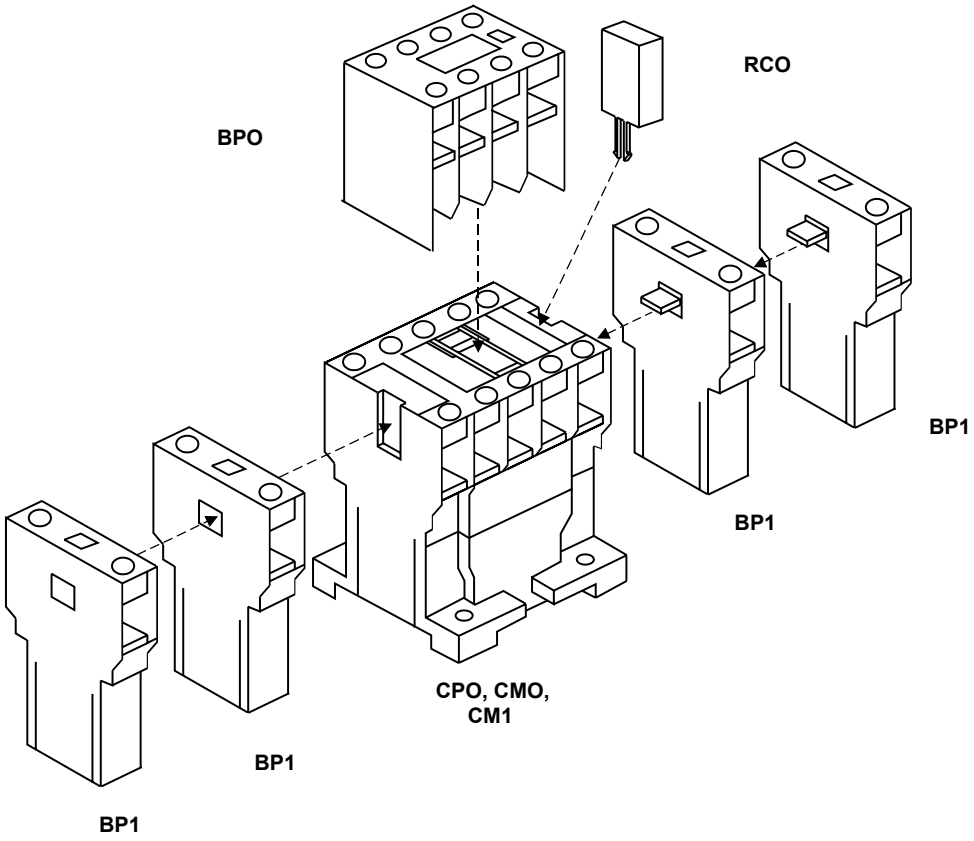


RCO

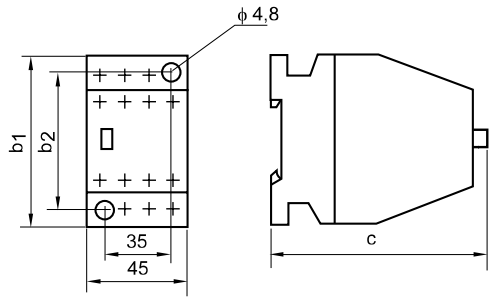
MECHANICAL INTERLOCK



Fixing system for rapid and simple mounting by clamping onto standard rail EN 50022 - 35 mm

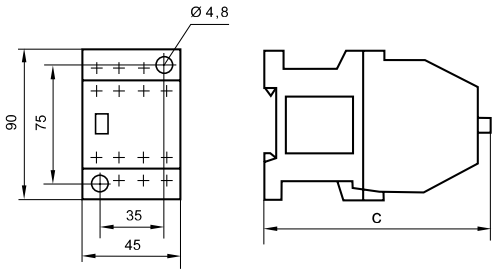


DIMENSION DRAWINGS (mm)



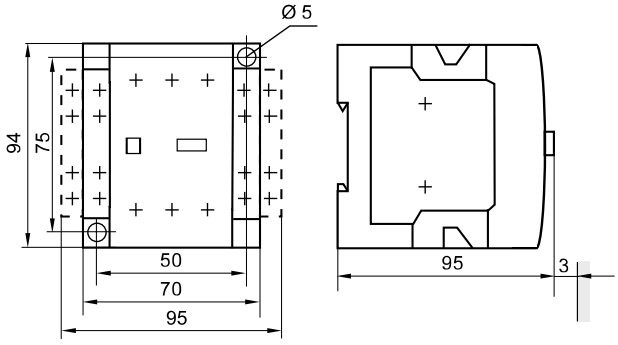
CNM 9, CNM 12, CNM 16, CNM 22, CNM 30, CNP 21, CNP 31

TYPE	CNM 9	CNM 12	CNM 12	CNM 16	CNM 22	CNM 30	CNP 21	CNP 31
b1	75	75	75	90	90	90	75	75
b2	60	60	60	75	75	75	60	60
c	85	85	102	113	113	113	85	102

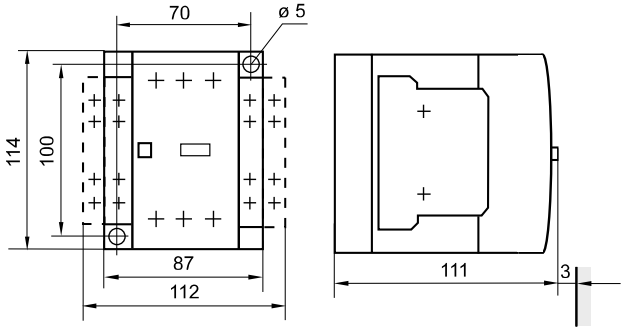


CNB 9, CNB 12, CNB 16, CNB 22, CNB 21, CNB 31, CNB 30

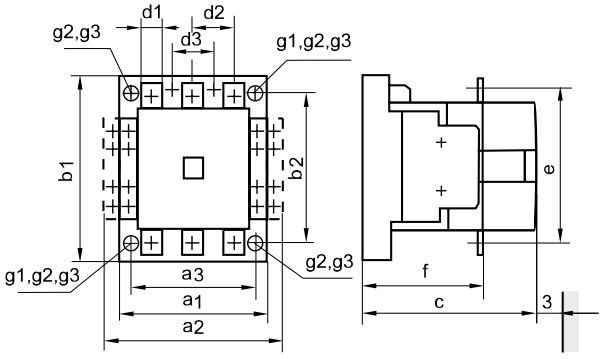
TYPE	CNB 9	CNB 12	CNB 16	CNB 22	CNB 21	CNB 31	CNB 30
c	129	145	155	155	129	145	155



CNM 36

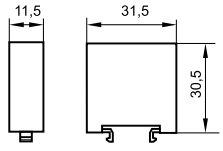


CNM 45, CNM 60

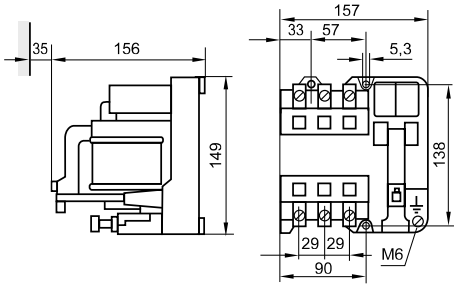


TYPE	a 1	a 2	a 3	b 1	b 2	c	d 1	d 2	d 3	e	f	g 1	g 2	g 3
CNM 75	100	125	80	132	110	142	15	30	24	113	86.5	Ø6		
CNM 90	100	125	80	132	110	142	15	30	24	113	86.5	Ø6		
CNM 110	100	125	80	132	110	142	15	30	24	113	86.5	Ø6		
CNM 140	135	162	110	180	160	189	20	42	24	162	116		Ø7	
CNM 170	135	162	110	180	160	189	20	42	24	162	116		Ø7	
CNM 200	135	162	110	180	160	189	20	42	24	162	116		Ø7	
CNM 250	160	187	130	200	180	226	25	48	24	178	141			Ø10,5
CNM 315	160	187	130	200	180	226	25	48	24	178	141			Ø10,5
CNM 400	160	187	130	200	180	226	25	48	24	178	141			Ø10,5

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

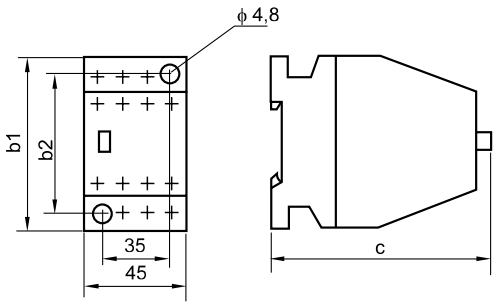


RC 1



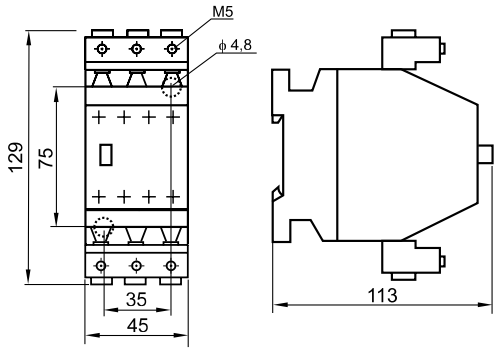
CNB 50

DIMENSION DRAWINGS (mm)

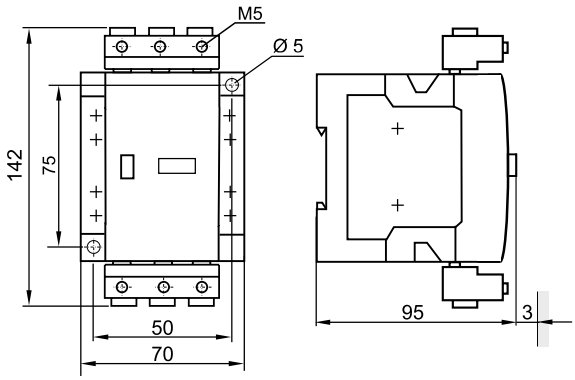


TK 25; TK 35

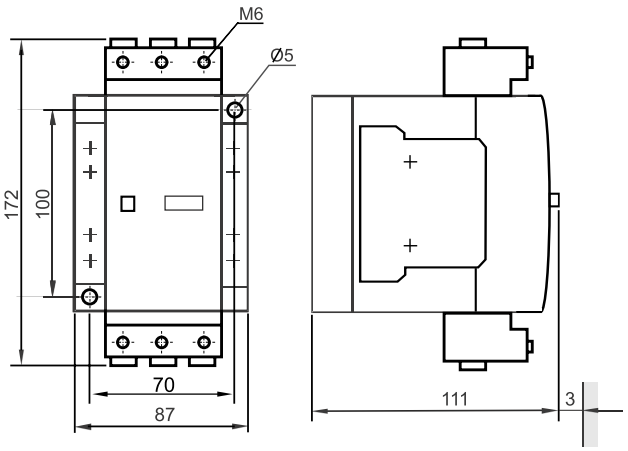
TYPE	b1	b2	c
TK 25	75	60	102
TK 35	90	75	113



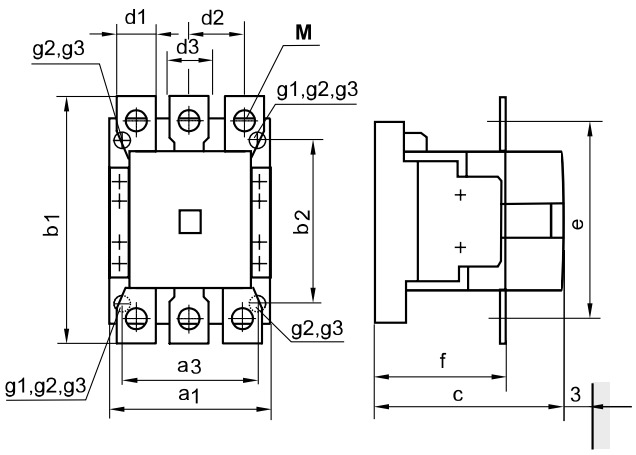
TK 65



TK 85



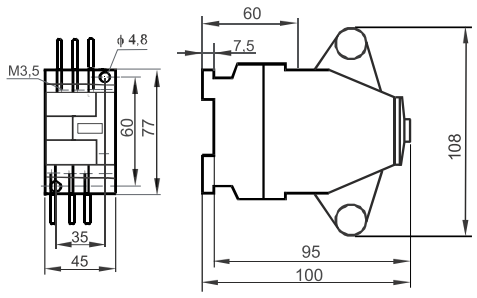
TK 115



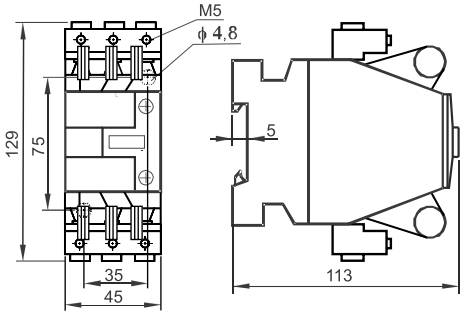
TYPE	a1	a3	b1	b2	c	d1	d2	d3	e	f	g1	g2	g3	M
TK 130	100	80	158	110	142	20	36	24	138	86	Ø6			M8
TK 175	100	80	158	110	142	20	36	24	138	86	Ø6			M8
TK 250	135	110	180	160	189	20	42	24	162	116		Ø7		M10
TK 350	160	130	200	180	226	25	48	24	178	141			Ø10,5	M10
TK 450	160	130	200	180	226	25	48	24	178	141			Ø10,5	M10

TK 130; TK 175; TK 250; TK 350; TK 450

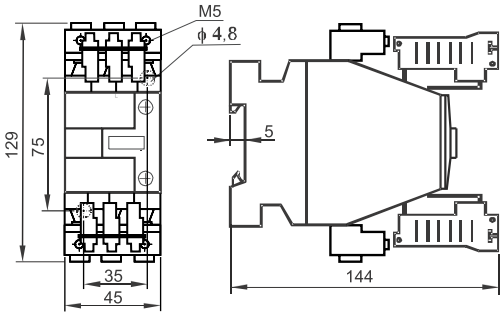
DIMENSION DRAWINGS (mm)



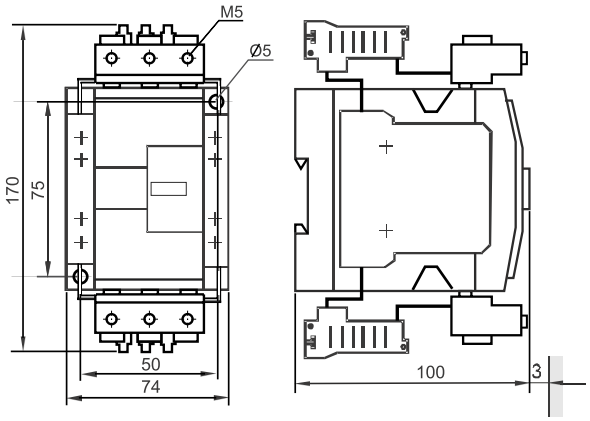
CNKN 12



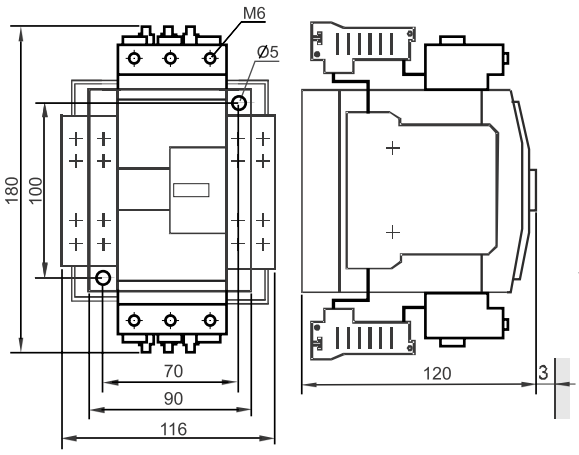
CNKN 15



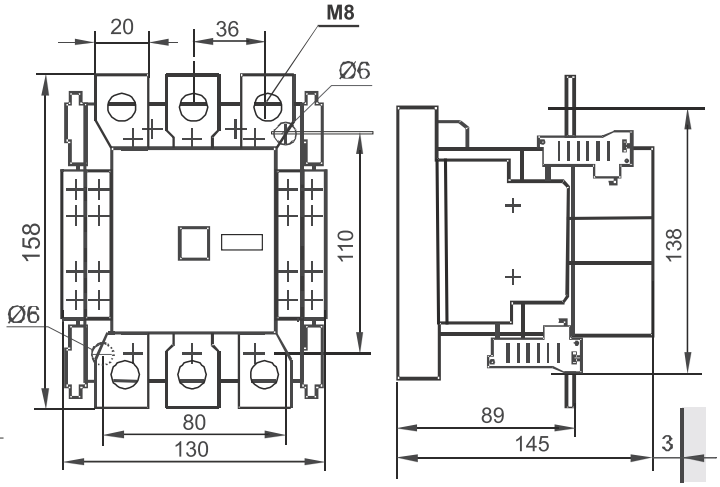
CNKN 20, CNKN 25



CNKM 30

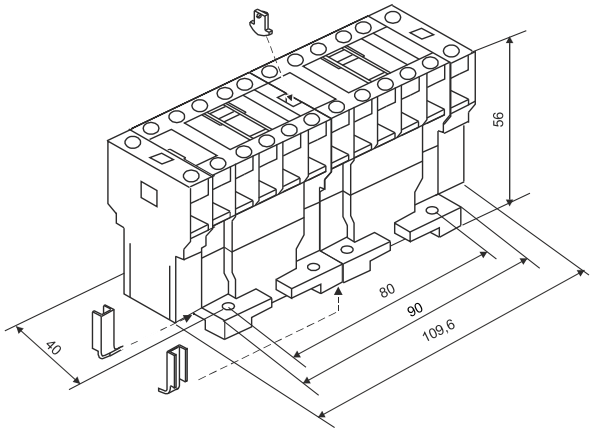


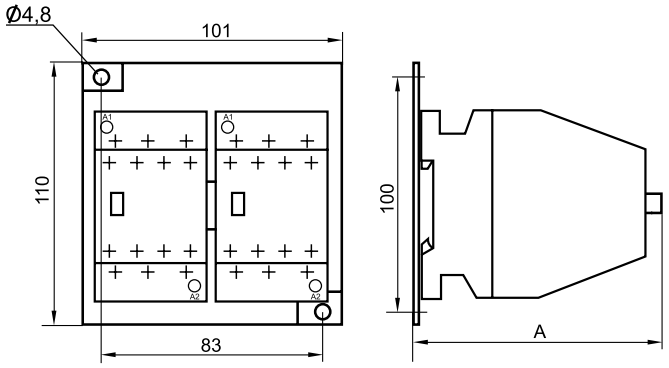
CNKM 40, CNKM 50



CNKM 60

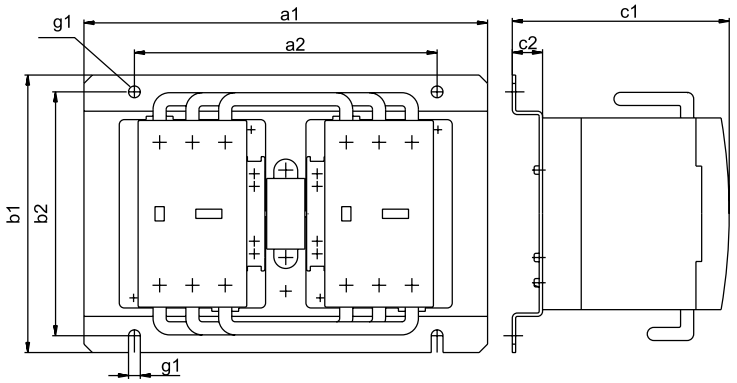
DIMENSION DRAWINGS (mm)



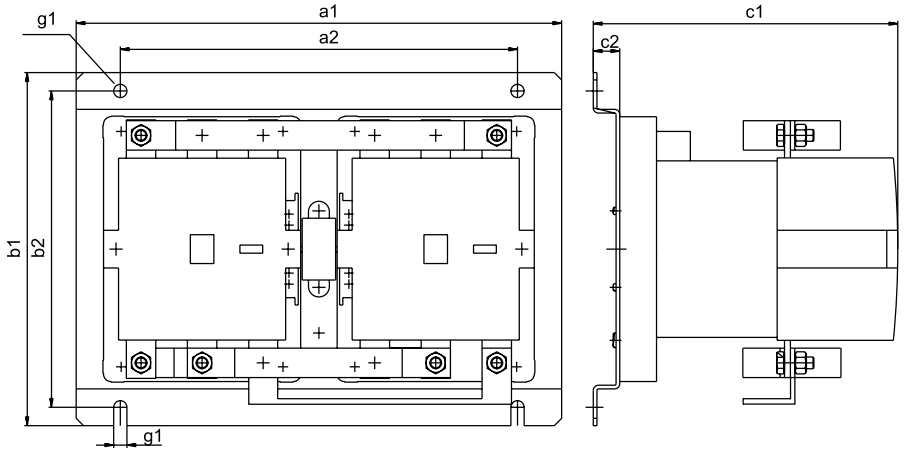


MBCM0, MBCM1

TYPE	MBCNM 12	MBCNM 16	MBCNM 22	MBCNM 30
A	106	117	117	117

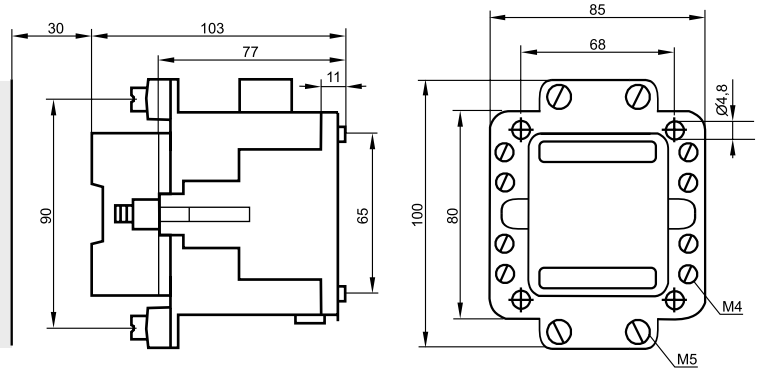


TYPE	a1	a2	b1	b2	c1	c2	g1
MBCNM 36	194	154	132	119	109	14	7
MBCNM 45 - MBCNM 60	240	180	165	145	129	18	7

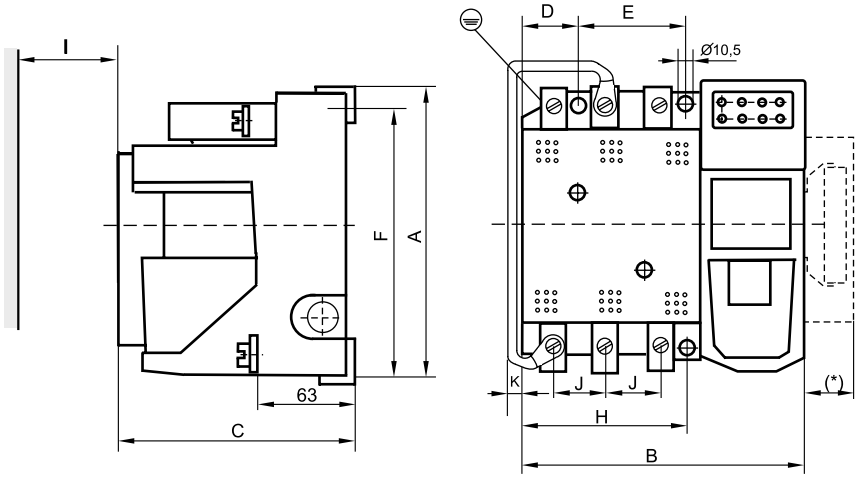


TYPE	a1	a2	b1	b2	c1	c2	g1
MBCNM 75 - MBCNM 110	260	200	175	155	160	18	7
MBCNM 140 - MBCNM 200	330	270	240	215	207	18	9
MBCNM 250 - MBCNM 400	380	310	265	240	247	21	11

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 63	149	157	107	33	57	138	6	90	35	29	20	
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 TRM 2/1

Order-thermal overload relays 2/2

Adaptor for separate installation ASM 22,ASM 75 ..... 2/2

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Contactors with termal overload relays 2/4, 2/5

Dimension drawings 2/6

THERMAL OVERLOAD RELAYS type TRM 12 - TRM 22

Features

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

Selection and ordering data

Thermal overloads





For direct mounting onto contactor	Overload setting range (A)	Type	Weights kg
CNP 21, CNP 31, CNM 9, CNM 12, CNB 9, CNB 12	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 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	**TRM 12**	0.16
CNM 16, CNM 22, CNM 30 CNB 16, CNB 22, CNB 30	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 24 - 30	**TRM 22**	0.16

THERMAL OVERLOAD RELAYS type TRM 75 - TRM 400

Selection and ordering data

Thermal overloads

For direct mounting onto contactor	Overload setting range (A)	Type	Weights kg
CNM 36	16 - 25 20 - 32 25 - 40	**TRM 75 - 36**	0.38
CNM 45 CNM 60	16 - 25 20 - 32 25 - 40 32 - 50 40 - 57 50 - 63	**TRM 75 - 60**	0.38
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**	0.38
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**	2.4





ORDER-THERMAL OVERLOAD RELAYS

Type

Seting range (Upper value)

Example: Thermal overload relay type TRM 22, current range (10 - 16) A

TRM 22	**16 A**

ADAPTOR FOR SEPARATE INSTALLATION ASM 22, ASM 75

For thermal overload relays type	Type	Weights kg
TRM 12 TRM 22	**ASM 22**	0.065
TRM 75	**ASM 75**	0.135





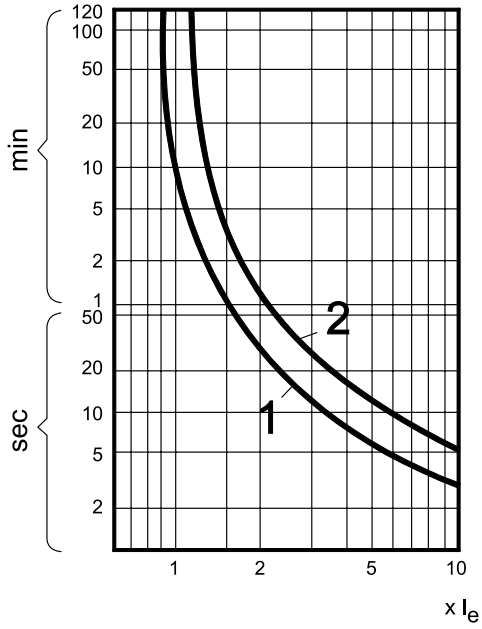
THERMAL OVERLOAD RELAYS TRM

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, TS EN 60947-4-1 and VDE 0660.
They are normally intended for mounting on our contactors see ordering table.
Individual screw mounting of the TRM 12 and TRM 22 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 22.
The relay TRM 400 is intended for individual screw mounting.

Current time curves

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



2

Technical data

Relay type			TRM 12	TRM 22	TRM 75	TRM 400
Insulation rating U_i		V	690	690	1000	690
Permissible ambient temperature		°C	- 25 to +55			
Degree of protection			IP00			
Release time classification			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	8
Main circuit						
rated operational current (AC 50 to 400 Hz or DC)		A	16	30	80	400
conductor cross - section						
solid or stranded		mm^2	2,5 - 6	2,5 - 6	2,5 - 35	120/24
finely stranded with end sleeve		mm^2	1,5 - 4	1,5 - 4	1,5 - 25	
Power input per pole						
max. at setting range min.		W/VA	0,9	0,9	2,6	5
max. at setting range max.		W/VA	2,25	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)			
finely stranded with end sleeve		mm^2	2 x (0,75 - 1,5)			
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			
	500 V	A	1			
rated current	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



CNMR 9, CNMR 12 (10,01)



CNMR 12



CNMR 30



CNMR 36

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	2.2	**4**	1	0	**TRM 12** 0.1 - 0.16		
9	2.2	**4**	0	1	0.16 - 0.25	**CNMR 9 10**	
12	3	**5.5**	1	0	0.25 - 0.4	**CNMR 9 01**	
12	3	**5.5**	0	1	0.4 - 0.63	**CNMR 12 10**	
12	3	**5.5**	1	1	0.63 - 1.0	**CNMR 12 01**	
12	3	**5.5**	2	2	0.8 - 1.25	**CNMR 12 11**	
					1.0 - 1.6	**CNMR 12 22**	
					1.25 - 2		
					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		
16	4	**7.5**	1	1	**TRM 22** 0.1 - 0.16	**CNMR 16 11**	
16	4	**7.5**	2	2	0.16 - 0.25	**CNMR 16 22**	
22	5.5	**11**	1	1	0.25 - 0.4	**CNMR 22 11**	
22	5.5	**11**	2	2	0.4 - 0.63	**CNMR 22 22**	
30	7.5	**15**	1	1	0.63 - 1.0	**CNMR 30 11**	
30	7.5	**15**	2	2	0.8 - 1.25	**CNMR 30 22**	
					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		
					24 - 30		
36	11	**18.5**	2	2	**TRM 75-36** 16 - 25	**CNMR 36 22**	
36	11	**18.5**	4	4	20 - 32	**CNMR 36 44**	
					25 - 40		

CONTACTORS WITH THERMAL OVERLOAD RELAYS

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

Selection and ordering data



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**	**CNMR 45 22**	
45	15	**22**	4	4	16 - 25	**CNMR 45 44**	
60	18.5	**30**	2	2	20 - 32	**CNMR 60 22**	
60	18.5	**30**	4	4	25 - 40	**CNMR 60 44**	
					32 - 50		
					40 - 57		
					50 - 63		
75	22	**37**	2	2	**TRM 75-110**	**CNMR 75 22**	
75	22	**37**	4	4	16 - 25	**CNMR 75 44**	
90	26	**45**	2	2	20 - 32	**CNMR 90 22**	
90	26	**45**	4	4	25 - 40	**CNMR 90 44**	
110	37	**55**	2	2	32 - 50	**CNMR 110 22**	
110	37	**55**	4	4	40 - 57	**CNMR 110 44**	
					50 - 63		
					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

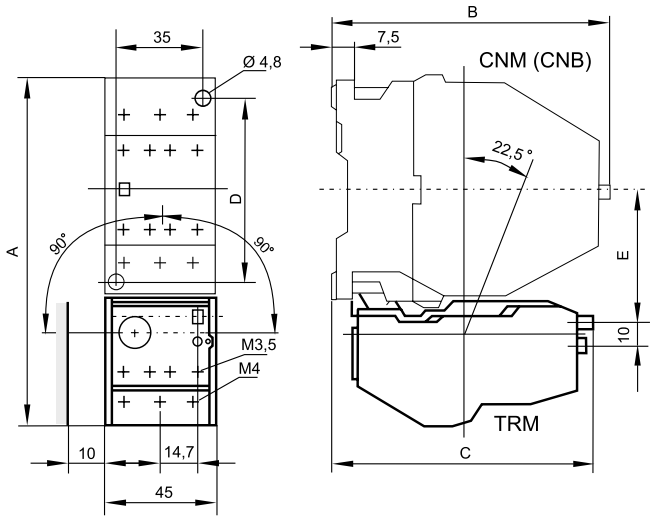
Setting range (Upper value)

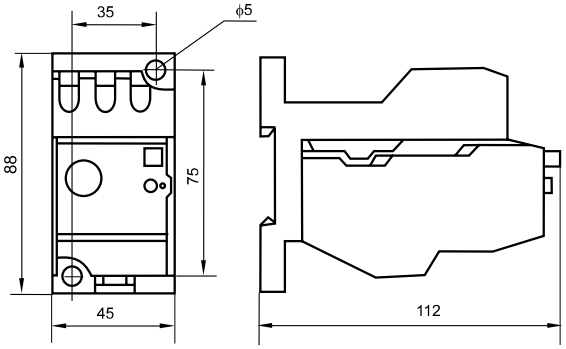
Example: Contactor with thermal relay type CNMR 16 22, control voltage 220/230 V, 50 Hz, thermal overload relay type TRM 22, current range (10-16)A

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

DIMENSION DRAWINGS (dimensions in mm)

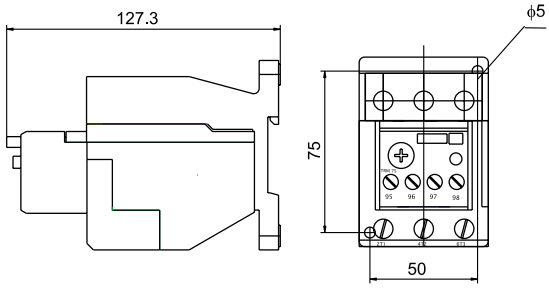
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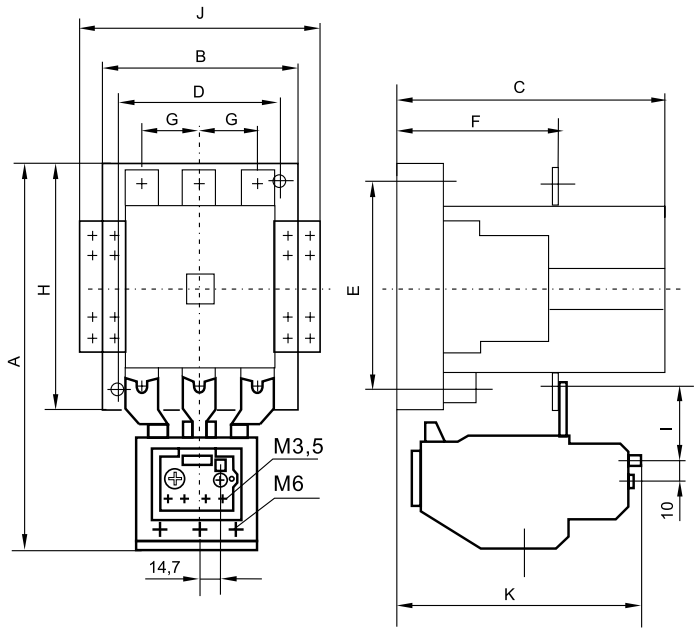




TRM 12/22 + ASM 22

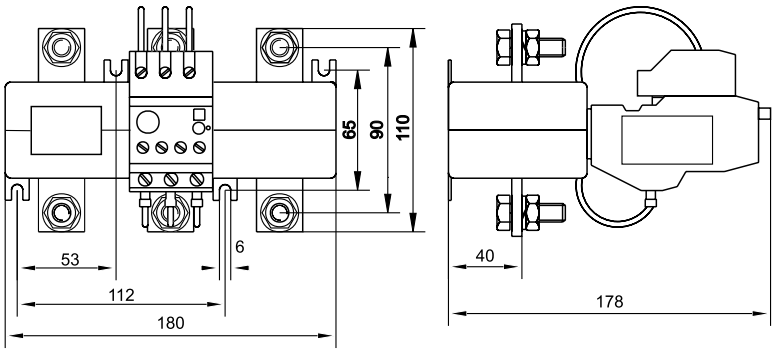
Type	A	B	C	D	E
TRM 12 + CNM 9	126	85	112	60	43
TRM 12 + CNM 12	130	102	103	60	47
TRM 22 + CNM 16, 22, 30	142	113	110	75	51
TRM 12 + CNB 9	141	129	156	60	43
TRM 12 + CNB 12	145	145	146	60	47
TRM 22 + CNB 16, 22, 30	126	157	154	75	51





TRM 75 + ASM 75

Тип	A	B	C	D	E	F	G	H	I	J	K
TRM 75-36 + CNM 36	153	70	95	50	75	68	15,5	94	22	-	115
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



TRM 400

ROTARY CAM SWITCHES

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TYPES



BS 20/G 10



BS 25/G 16



BS 32/G 25



BS 40/G 32



BS 50/G 40



BS 63/G 63



BS 80/G 80



BS 100



BS 200

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

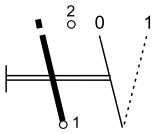
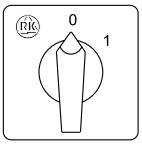
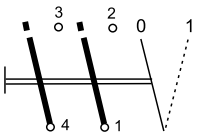
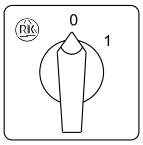
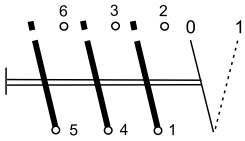
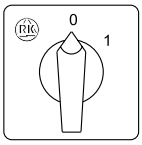
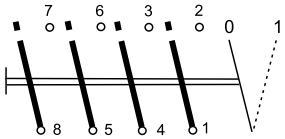
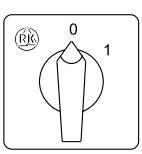
Selection and ordering data









Rated thermal current **Ith** A	DIAGRAM	Escutch. plate	Type	No. of diagram
Switches: 1-pole -1 element				
20			**BS 20/G 10 90 U**	
25			**BS 25/G 16 90 U**	
32			**BS 32/G 25 90 U**	
40			**BS 40/G 32 90 U**	
50			**BS 50/G 40 90 U**	
63			**BS 63/G 63 90 U**	
80			**BS 80/G 80 90 U**	
2 - poles - 1 element				
20			**BS 20/G 10 91 U**	
25			**BS 25/G 16 91 U**	
32			**BS 32/G 25 91 U**	
40			**BS 40/G 32 91 U**	
50			**BS 50/G 40 91 U**	
63			**BS 63/G 63 91 U**	
80			**BS 80/G 80 91 U**	
3 - poles - 2 elements (3 elements for BS 400; 5 elements for BS 630)				
20			**BS 20/G 10 10 U**	
25			**BS 25/G 16 10 U**	
32			**BS 32/G 25 10 U**	
40			**BS 40/G 32 10 U**	
50			**BS 50/G 40 10 U**	
63			**BS 63/G 63 10 U**	
80			**BS 80/G 80 10 U**	
120			**BS 100 10 U**	
200			**BS 200 10 U**	
400			**BS 400 10 U**	
630			**BS 630 10 U**	
4 - poles - 2 elements (4 elements for BS 400; 6 elements for BS 630)				
20			**BS 20/G 10 92 U**	
25			**BS 25/G 16 92 U**	
32			**BS 32/G 25 92 U**	
40			**BS 40/G 32 92 U**	
50			**BS 50/G 40 92 U**	
63			**BS 63/G 63 92 U**	
80			**BS 80/G 80 92 U**	
120			**BS 100 92 U**	
200			**BS 200 92 U**	
400			**BS 400 92 U**	
630			**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

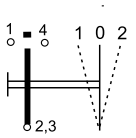
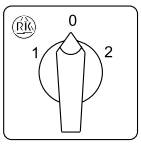
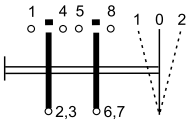
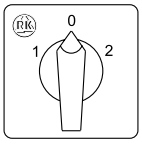
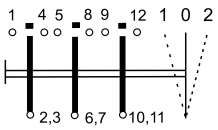
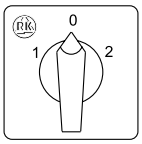
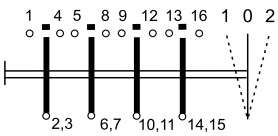
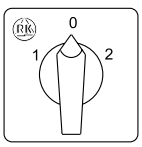
Selection and ordering data









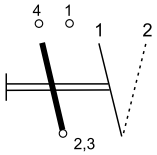
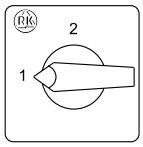
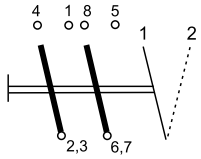
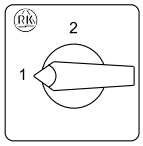
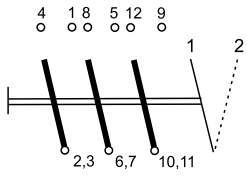
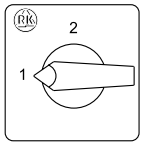
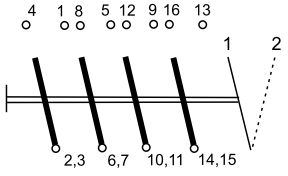
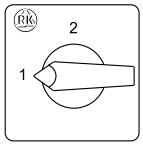
Rated thermal current **Ith** A	DIAGRAM	Escutch. plate	Type	No. of diagram
Changeover switches with zero position 1-pole - 1 element				
20			**BS 20/G 10**	**51 U**
25			**BS 25/G 16**	**51 U**
32			**BS 32/G 25**	**51 U**
40			**BS 40/G 32**	**51 U**
50			**BS 50/G 40**	**51 U**
63			**BS 63/G 63**	**51 U**
80			**BS 80/G 80**	**51 U**
2-poles -2 elements (4 elements for BS 400; 6 elements for BS 630)				
20			**BS 20/G 10**	**52 U**
25			**BS 25/G 16**	**52 U**
32			**BS 32/G 25**	**52 U**
40			**BS 40/G 32**	**52 U**
50			**BS 50/G 40**	**52 U**
63			**BS 63/G 63**	**52 U**
80			**BS 80/G 80**	**52 U**
120			**BS 100**	**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 20/G 10**	**53 U**
25			**BS 25/G 16**	**53 U**
32			**BS 32/G 25**	**53 U**
40			**BS 40/G 32**	**53 U**
50			**BS 50/G 40**	**53 U**
63			**BS 63/G 63**	**53 U**
80			**BS 80/G 80**	**53 U**
120			**BS 100**	**53 U**
200			**BS 200**	**53 U**
400			**BS 400**	**53 U**
630			**BS 630**	**53 U**
4 - poles - 4 elements				
20			**BS 20/G 10**	**75 U**
25			**BS 25/G 16**	**75 U**
32			**BS 32/G 25**	**75 U**
40			**BS 40/G 32**	**75 U**
50			**BS 50/G 40**	**75 U**
63			**BS 63/G 63**	**75 U**
80			**BS 80/G 80**	**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 **25** **32** **40** **50** **63** **80**			**BS 20/G 10 54 U** **BS 25/G 16 54 U** **BS 32/G 25 54 U** **BS 40/G 32 54 U** **BS 50/G 40 54 U** **BS 63/G 63 54 U** **BS 80/G 80 54 U**	
2 - poles - 2 elements				
20 **25** **32** **40** **50** **63** **80**			**BS 20/G 10 55 U** **BS 25/G 16 55 U** **BS 32/G 25 55 U** **BS 40/G 32 55 U** **BS 50/G 40 55 U** **BS 63/G 63 55 U** **BS 80/G 80 55 U**	
3-poles -3 elements				
20 **25** **32** **40** **50** **63** **80**			**BS 20/G 10 56 U** **BS 25/G 16 56 U** **BS 32/G 25 56 U** **BS 40/G 32 56 U** **BS 50/G 40 56 U** **BS 63/G 63 56 U** **BS 80/G 80 56 U**	
4 - poles - 4 elements				
20 **25** **32** **40** **50** **63** **80**			**BS 20/G 10 69 U** **BS 25/G 16 69 U** **BS 32/G 25 69 U** **BS 40/G 32 69 U** **BS 50/G 40 69 U** **BS 63/G 63 69 U** **BS 80/G 80 69 U**	



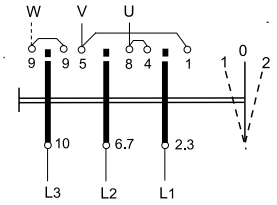
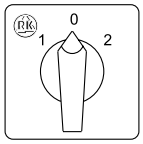
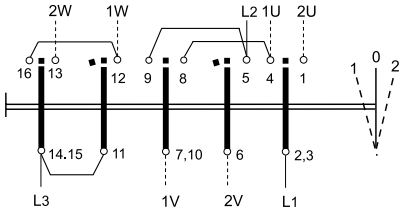
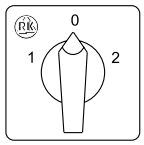
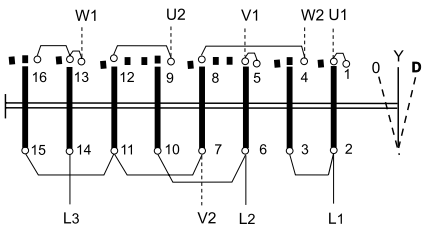
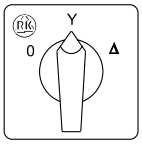
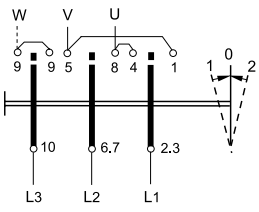
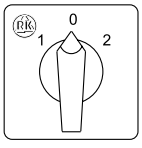






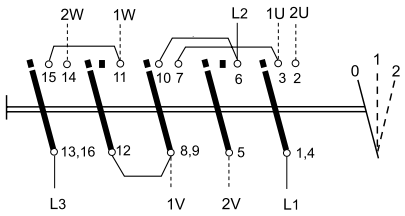
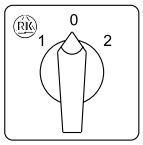
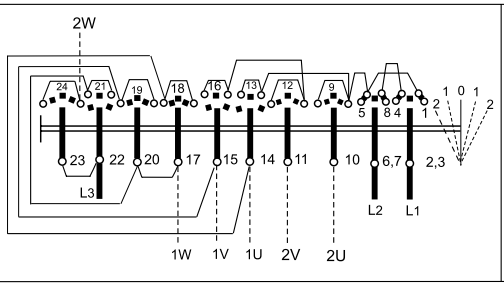
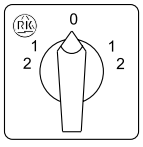
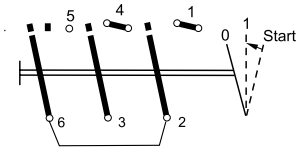
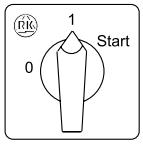
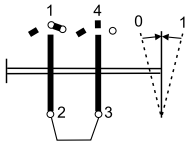
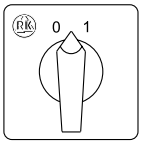
ROTARY CAM SWITCHES TYPE BS

Selection and ordering data

Rated thermal current **Ith** A	DIAGRAM	Escutch plate	Type	No. of diagram
Motor switches				
3 - pole reversing switches - 3 elements				
20 **25** **32** **40** **50** **63** **80** **120** **200**			**BS 20/G 10 11 U** **BS 25/G 16 11 U** **BS 32/G 25 11 U** **BS 40/G 32 11 U** **BS 50/G 40 11 U** **BS 63/G 63 11 U** **BS 80/G 80 11 U** **BS 100 11 U** **BS 200 11 U**	
Motor switch with Dahlander - 4 elements				
20 **25** **32** **40** **50** **63** **80**			**BS 20/G 10 13 U** **BS 25/G 16 13 U** **BS 32/G 25 13 U** **BS 40/G 32 13 U** **BS 50/G 40 13 U** **BS 63/G 63 13 U** **BS 80/G 80 13 U**	
Star-delta switch - 4 elements				
20 **25** **32** **40** **50** **63** **80**			**BS 20/G 10 12 U** **BS 25/G 16 12 U** **BS 32/G 25 12 U** **BS 40/G 32 12 U** **BS 50/G 40 12 U** **BS 63/G 63 12 U** **BS 80/G 80 12 U**	
Motor switches				
3-pole reversing switches, return to "0" -3 elements				
20 **25** **32** **40**			**BS 20/G 10 26 U** **BS 25/G 16 26 U** **BS 32/G 25 26 U** **BS 40/G 32 26 U**	

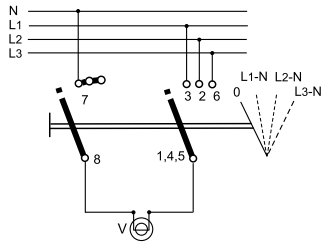
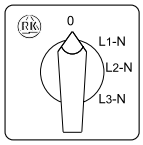
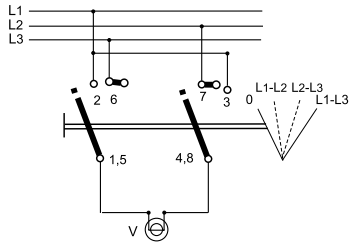
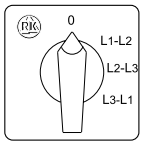
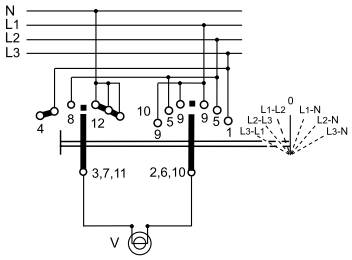
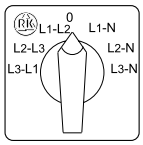
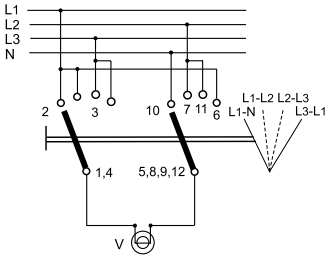
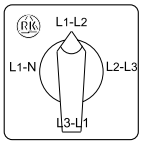
ROTARY CAM SWITCHES TYPE BS

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** **80**			**BS 20/G 10 19 U** **BS 25/G 16 19 U** **BS 32/G 25 19 U** **BS 40/G 32 19 U** **BS 50/G 40 19 U** **BS 63/G 63 19 U** **BS 80/G 80 19 U**	
Motor switch with Dahlander - 6 elements				
				
20 **25** **32** **40**			**BS 20/G 10 20 U** **BS 25/G 16 20 U** **BS 32/G 25 20 U** **BS 40/G 32 20 U**	
Switch for single - phase motors - 2 elements				
				
20 **25** **32** **40** **50** **63** **80**			**BS 20/G 10 15 U** **BS 25/G 16 15 U** **BS 32/G 25 15 U** **BS 40/G 32 15 U** **BS 50/G 40 15 U** **BS 63/G 63 15 U** **BS 80/G 80 15 U**	
Switch to control contactors - 1 element				
				
20 **25** **32** **40**			**BS 20/G 10 207 U** **BS 25/G 16 207 U** **BS 32/G 25 207 U** **BS 40/G 32 207 U**	

ROTARY CAM SWITCHES TYPE BS

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**			**BS 20/G 10 68 U** **BS 25/G 16 68 U** **BS 32/G 25 68 U** **BS 40/G 32 68 U**	
To measure line voltages L1-L2/L2-L3/L3-L1 - 2 elements				
20 **25** **32** **40**			**BS 20/G 10 67 U** **BS 25/G 16 67 U** **BS 32/G 25 67 U** **BS 40/G 32 67 U**	
To measure phase and line voltages - 3 elements				
25 **32** **40**			**BS 25/G 16 66 U** **BS 32/G 25 66 U** **BS 40/G 32 66 U**	
To measure 1phase and 3 line voltages - 3 elements				
20 **25** **32** **40**			**BS 20/G 10 60 U** **BS 25/G 16 60 U** **BS 32/G 25 60 U** **BS 40/G 32 60 U**	



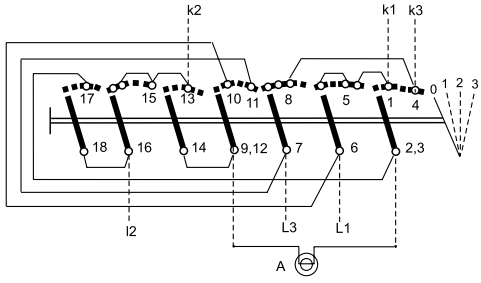
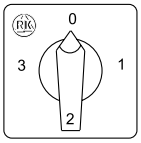
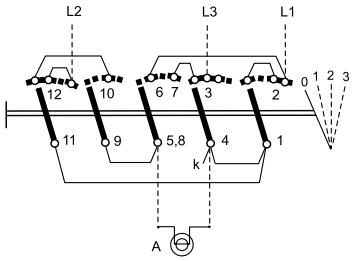
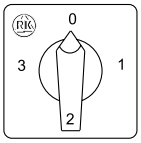






ROTARY CAM SWITCHES TYPE BS

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			**BS 20/G 10 97 U** **BS 25/G 16 97 U** **BS 32/G 25 97 U** **BS 40/G 32 97 U**	
With off position to measure current in 3-phases - 4 elements				
20 25 32 40			**BS 20/G 10 98 U** **BS 25/G 16 98 U** **BS 32/G 25 98 U** **BS 40/G 32 98 U**	





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

- Emergency switch have to make electrical separation between 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.

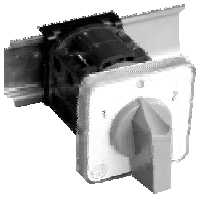


BS 25/G 16 10 LK (Three-pole)
BS 32/G 25 10 LK (Three-pole)
BS 40/G 32 10 LK (Three-pole)
BS 25/G 25 92 LK (Four-pole)
BS 32/G 25 92 LK (Four-pole)
BS 40/G 32 92 LK (Four-pole)



BS 50/G 40 10 LK (Three-pole)
BS 63/G 63 10 LK (Three-pole)
BS 80/G 80 10 LK (Three-pole)
BS 50/G 40 92 LK (Four-pole)
BS 63/G 63 92 LK (Four-pole)
BS 80/G 80 92 LK (Four-pole)

MOUNTING ON THE RAIL



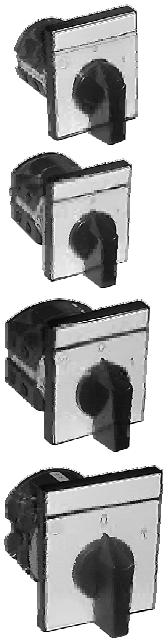
BS 20/G 10 .. L*
BS 25/G 16 .. L*
* Max. up to 4 elements



***"ES"** - General emergency on - off switch
Sizes : BS 20/G 10; .... ; BS 80/G 80
Color for front part: ES - (handle-red and front plate-yellow)

3

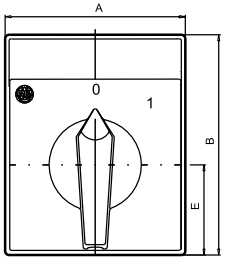
Selection and ordering data

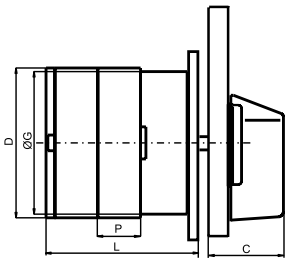


Rated thermal current Ith A	Description	Type
20		BS 20/G 10 .. . N
25		BS 25/G 16 .. . N
32		BS 32/G 25 .. . N
40		BS 40/G 32 .. . N
50		BS 50/G 40 .. . N
63		BS 63/G 63 .. . N
80		BS 80/G 80 .. . N
	No. Of diagram are as the standard version of the model "BS"	
	Front mounting "U", Rear mounting "O"	
	Extended front plate with title Standard colour - Black	

3

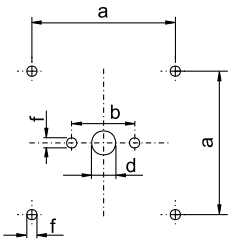
DIMENSIONAL DRAWIINGS (mm)





TYPE	MARKING			
	A	B	E	C
BS 20/G 10 ..N	48	60	24	26
BS 25/G 16 ..N	48	60	24	26
BS 32/G 25 ..N	65	80	32,5	33
BS 40/G 32 ..N	65	80	32,5	33
BS 50/G 40 ..N	90	110	45	41
BS 63/G 63 ..N				
BS 80/G 80 ..N				
BSB 20 ..N	48	60	24	26
BSB 25 ..N				

DRILLING PLATE



TYPE	a	b	d	f
BS 20/G 10 ..N		30	10	4.2
BS 25/G 16 ..N				
BS 32/G 25..N	48		10	4.2
BS 40/G 32 ..N				
BS 50/G 40 ..N	72		14	5.3
BS 63/G 63 ..N				
BS 80/G 80 ..N				
BSB 20 ..N	36		10	4.2
BSB 25 ..N				

NOTES:

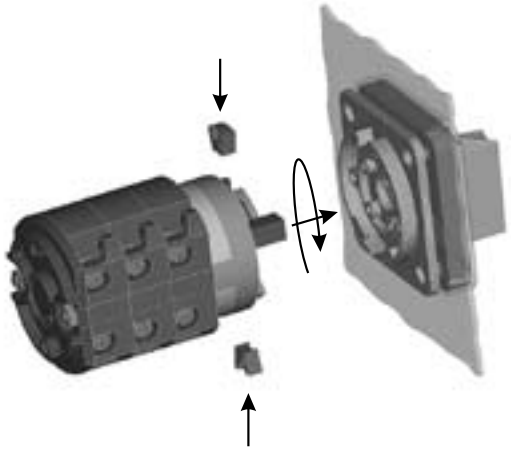
1.Technical date and drilling plan are same as the standard version of the model "BS"

“BAYONET” ROTARY CAM SWITCHES TYPE BSB

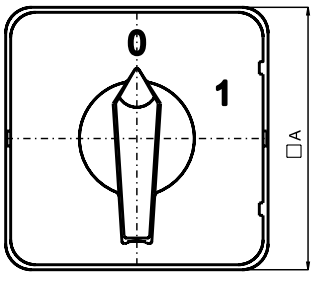
Selection and ordering data

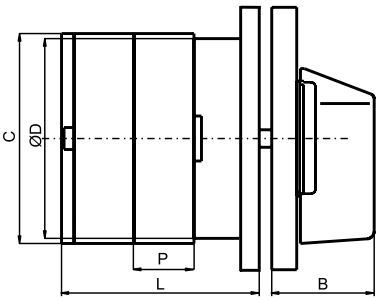


Rated thermal current **Ith** A	Description	Type
20 **25**	No.of diagram are as the standard version of the model “BS” Mounting form - for front “U” Front part: P - (handle and front plate - blue) C - (handle and front plate - black)	**BSB 20** .. . . **BSB 25** .. . .



DIMENSIONAL DRAWINGS (mm)



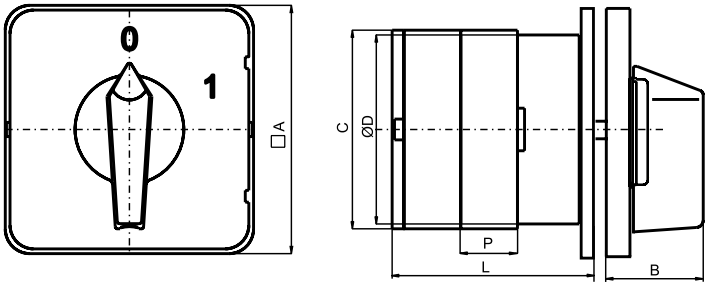


TYPE	MARKING					NUMBER OF ELEMENTS (L/mm)											
	□A	B	C	ØD	P	1	2	3	4	5	6	7	8	9	10	11	12
BSB 20	51,2	27,2	38,6	38,6	12,8	39,5	52,3	65,1	77,9	90,7	103,5	116,3	129,1	141,9	154,7	167,5	180,3
BSB 25	51,2	27,2	45,2	38,6	12,8	39,5	52,3	65,1	77,9	90,7	103,5	116,3	129,1	141,9	154,7	167,5	180,3

NOTES:

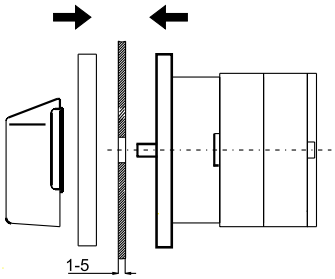
1.Technical date and drilling plan are same as the standard version of the model “BS”
2.The selection of the color for the front parts for “BS” is same as previus case for “BSB”

DIMENSIONAL DRAWINGS (mm)

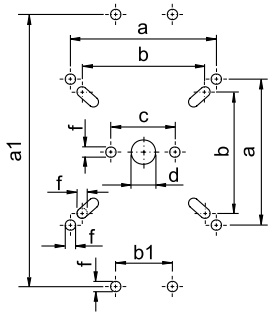


TYPE	MARKING				NUMBER OF ELEMENTS (L/mm)												
	□A	B	C	ØD	P	1	2	3	4	5	6	7	8	9	10	11	12
BS 20/G 10	51,2	27,2	38,6	38,6	12,8	32,5	45,3	58,1	70,9	83,7	96,5	109,3	122,1	134,9	147,7	160,5	173,3
BS 25/G 16	51,2	27,2	45,2	38,6	12,8	32,5	45,3	58,1	70,9	83,7	96,5	109,3	122,1	134,9	147,7	160,5	173,3
BS 32/G 25	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/G 32	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/G 40	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 63/G 63																	
BS 80/G 80																	
BS 100	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"

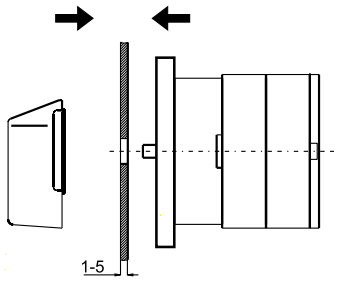


DRILLING PLAN

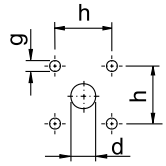


TYPE	a	b	a1	b1	c	d	f
BS 20/G 10					30	10	3.2
BS 25/G 16							
BS 32/G 25	58	48				10	4.2
BS 40/G 32							
BS 50/G 40	85	68-74				14	5.3
BS 63/G 63							
BS 80/G 80							
BS 100			90	30		18	5.3
BS 200							
BS 400							
BS 630							

FRONT MOUNTING "M"

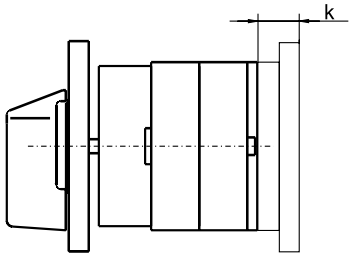


DRILLING PLAN

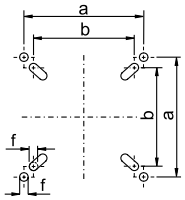


TYPE	h	d	g
BS 20/G 10	13.5	10	3.5
BS 25/G 16			
BS 32/G 25	16.2	10	4
BS 40/G 32			
BS 50/G 40	20	14	4.5
BS 63/G 63			
BS 80/G 80			

REAR MOUNTING "O"

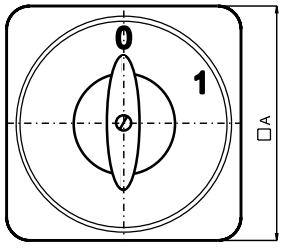


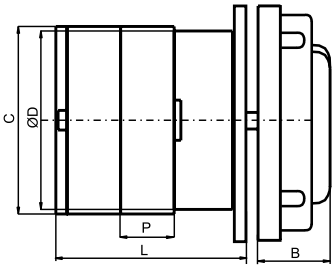
DRILLING PLAN



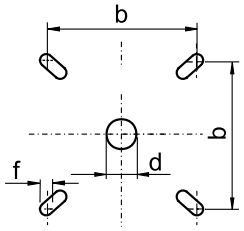
TYPE	a	b	f	k
BS 20/G 10	36	36	4.2	15.5
BS 25/G 16				
BS 32/G 25	58	48	4.5	17
BS 40/G 32				
BS 50/G 40	85	68	5.3	20.5
BS 63/G 63				
BS 80/G 80				

DIMENSIONAL DRAWINGS VERSION “LK” (mm)





DRILLING PLAN



TYPE	□A	C	ØD	P	B	L/2	b	d	f
BS 25/G 16 LK	72	45.2	38.6	12.8	32	49.8	58	10	4.2
BS 32/G 25 LK	72	53	38.6	12.8	32	49.8	58	10	4.2
BS 40/G 32 LK	72	61	56.4	17.5	32	68.1	58	10	4.2
BS 50/G 40 LK									
BS 63/G 63 LK	105	84	80	25	44	92.5	85	14	5.3
BS 80/G 80 LK									

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:

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

EXAMPLE:	BS 25/G 16	10	U	P

Type **BS 25/G 16**, shematic diagram **10,** mounting from front plate **U,** with blue front plate **P**.

BS 40/G 32	10	N	U

Type **BS 40/G 32,** shematic diagram **10, N-** Extended front plate with title, mounting from front plate **U**

BS 63/G 63	10	LK

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

TECHNICAL DATA

SWITCH TYPE			BS 20/G 10	BS 25/G 16	BS 32/G 25	BS 40/G 32	BS 50/G 40	BS 63/G 63	BS 80/G 80
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**	**80**
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	35	40	50	63	80
Rated Short-time Withstand current Icw	1 sek	A	200	400	600	800	1000	1600	1800
	3 sek	A	120	250	400	530	700	800	900
	10 sek	A	70	140	240	290	350	400	450
	30 sek	A	40	90	150	200	250	250	300
	60 sek	A	30	70	120	150	150	160	200
Rated operational current I_e AC1 / AC21		A	20	25	32	40	50	63	75
Rated operational current I_e AC15									
	110V	A	10	20	25	40	50	63	72
	220/230V	A	8	20	25	30	40	50	50
	380/400V	A	6	16	20	25	40	45	45
	660/690V	A		8	8,5	8.5	10	10	10
Motor switch in utilization category	AC3/AC23								
3- Phase	220/230 V	kW	3	5.5	7.5	9	11	12	19
	380/400 V	**kW**	**5**	**7.5**	**11**	**15**	**18.5**	**22**	**32**
	500/690 V	kW		11	15	19	22	28	42
1-phase 2 poles	110V	kW	0.8	1.5	2.5	3	-	-	-
	220/230V	kW	2.2	3	4.8	5.5	-	-	-
	380/400 V	kW	3	5.5	6.5	7.5	-	-	-
Motor switch in utilization category	AC4								
3-phase	220/230V	kW	1.5	2.5	3	5	6	7	9.5
	380/400V	kW	2	4	5.5	8	11	12	16
	500/690V	kW		4	7.5	8	11	12	16
Mechanical endurance switching cycles		10^6	3	3	3	3	2	2	2
Terminal screw			M3.5	M3.5	M4	M5	2xM5	2xM5	2xM5
Cable cross-section	rigid	mm^2	1-2.5	2.5-4	2.5-6	2.5-10	10-16	10-16	10-25
	flexible		0.75-1.5	1.5-4	2.5-6	2.5-6	6-16	6-16	6-16
									2x10

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

TECHNICAL DATA

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

(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



PNBS 20/G 10, 25/G 16



PNGBS 25/G 16, 32/G 25, 40/G 32

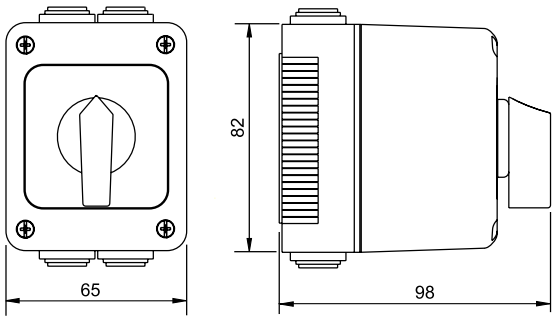


PNGBS 25/G 16..LK, 32/G 25..LK, 40/G 32..LK

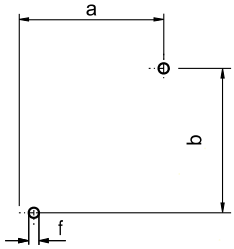
	Degree of protection	Type	
	IP 65	**PNBS 20/G 10**	.. .
		PNBS 25/G 16*	.. .
No. of diagram - (90, 91,10, 92, 51, 52, 53, 54, 55, 56, 11, 26, 15)			
Front parts P - (handle and front plate of rotary cam switches - blue) C - (handle and front plate of rotary cam switches - black)			
	IP 65	**PNGBS 25/G 16**	.. .
		PNGBS 32/G 25	.. .
		PNGBS 40/G 32	.. .
		PNGBS 32/G 25 LK	..
		PNGBS 40/G 32 LK	..
No. of diagram for PNGBS 25/G 16 - (90, 91,10, 92, 51, 52, 53, 54, 55, 56, 11, 26, 15)			
No. of diagram for PNGBS 32/G 25 - (90, 91,10, 92, 51, 52, 53, 54, 55, 56, 11, 26, 15)			
No. of diagram for PNGBS 40/G 32 - (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)			

DIMENSION DRAWINGS (mm)

PNBS 20/G 10, 25/G 16

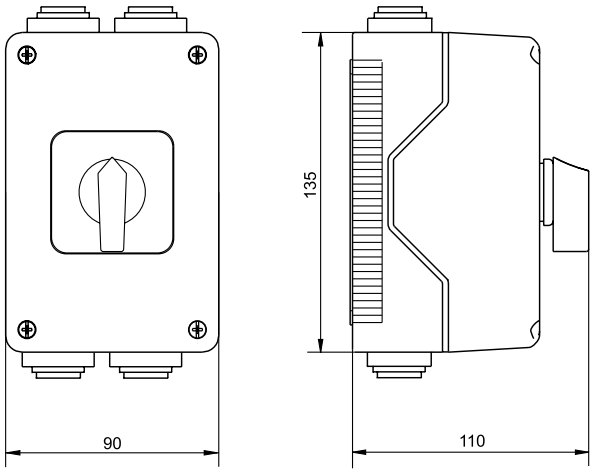


DRILLING PLAN



TYPE	a	b	f
PNBS 20/G 10 PNBS 25/G 16	44	48	4,3
PNGBS 25/G 16 PNGBS 32/G 25 (LK) PNGBS 40/G 32 (LK)	48	100	4,3

PNGBS 25/G 16, 32/G 25 , 40/G 32



NOTES:

Color of enclosures ist grey (RAL 7035)

*** Only with conection cable up to 2.5 mm^2**

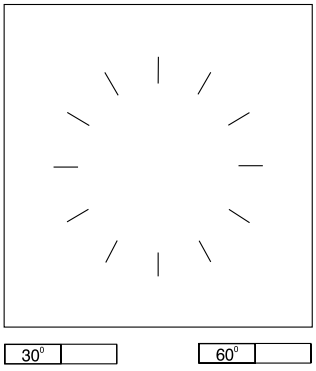
In the same enclosure can be placed 1,2 or 3 elements depends on costumer's needs.

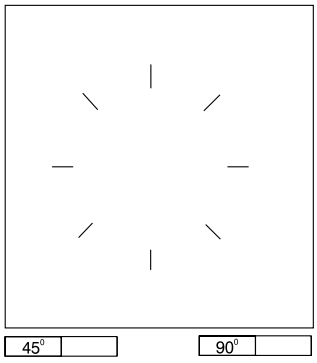
RADE KONČAR
KONTAKTORI I RELEI D.O.O.
MADE IN MACEDONIA

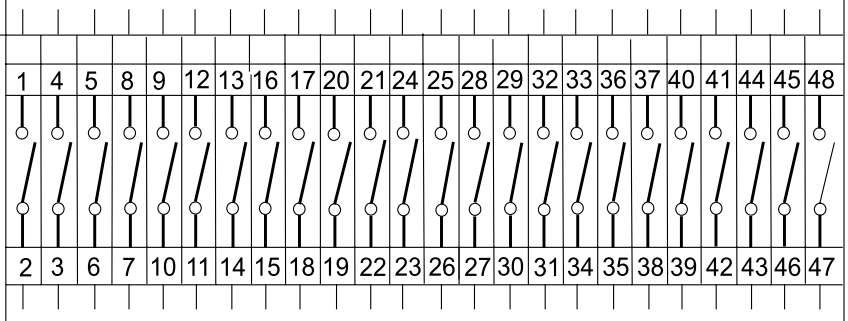
ORDER FORM

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

Connection diagram

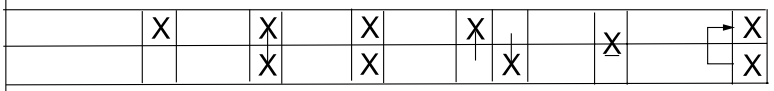






Arrangement of posittion marks on front plate

Note:



Contact clozed	Contact closed no break	Contact closed with break	Contact switching	Through contact	Indeperdent return contact 30° max.

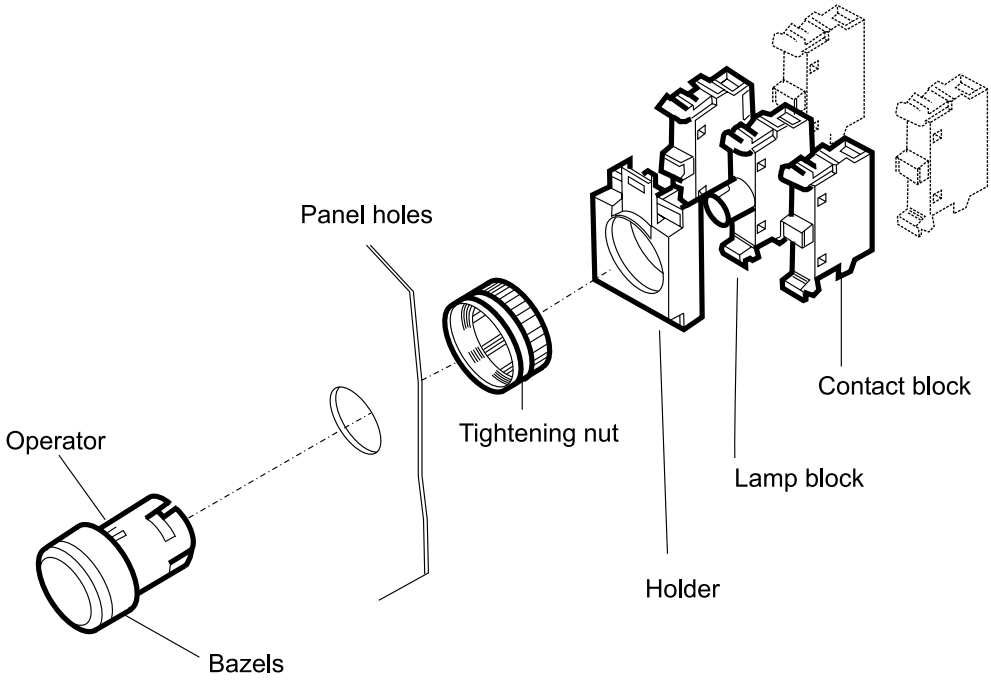
RADE KONČAR
KONTAKTORI I RELEI D.O.O.
MADE IN MACEDONIA

Purchaser _____

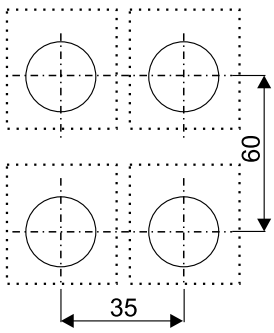
Address _____

Telephone _____ Fax _____ Data _____

Pushbuttons, non-illuminated PB 22-1- 4/1
Pushbuttons, non-illuminated PB 22-2- 4/1
Mushroom Pushbuttons PB 22-4- 4/1
Toggle switches PB 22-6- 4/2
Pushbuttons, illuminated PB 22-8- 4/2
Pilot lights and buzzer PB 22-31 ..... 4/2
Selector switches, non-illuminated PB 22-11- 4/2
Selector switches, non-illuminated PB 22-13- 4/3
Selector switches, non-illuminated PB 22-12- 4/3
Selector switches, non-illuminated PB 22-16- 4/3
Selector switches, illuminated PB 22-25- 4/3
Selector switches, illuminated PB 22-14- 4/3
Selector switches, illuminated PB 22-26 - 4/3
Selector switches, illuminated PB 22-17- 4/3
Selector switches, illuminated PB 22-24- 4/3
Double pushbuttons, illuminated PB 22-42- 4/4
Double pushbuttons, non-illuminated PB 22-41- 4/4
Elements which are delivered separatly 4/4
Technical data 4/5
Dimenzional drawings 4/6
Pushbutton in insulated enclosures type PNPB 4/7



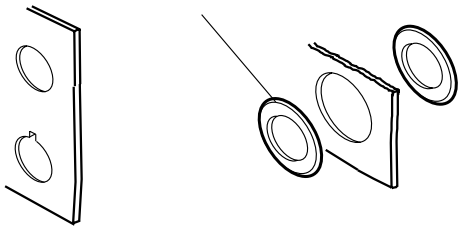
Panel holes



∅ 22.5

∅ 30.5

Hole adapter



PUSHBUTTONS 22 mm DIAMETER

Features

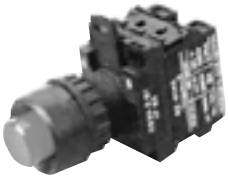
- 22 mm mounting diameter
- Adaptable design with actuators for any control function

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**

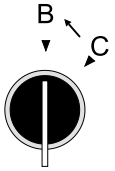
Mushroom pushbuttons — **complete**

	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**

PUSHBUTTON AND INDICATOR LIGHTS 22 mm DIAMETER

Selection and ordering data

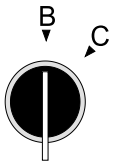
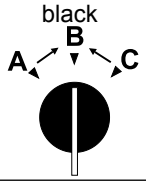
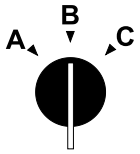
Toggle switches — **complete**

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		**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**
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**

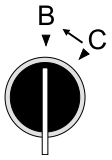
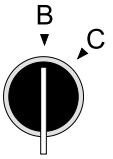
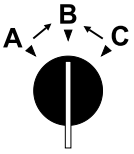
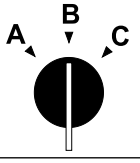
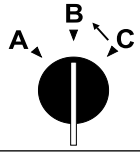
4

Selection and ordering data

Selector switches, non-illuminated

	Design	button color	included blocks	complete 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

	Design	button color	included blocks	complete Part No.
	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**

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



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**

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

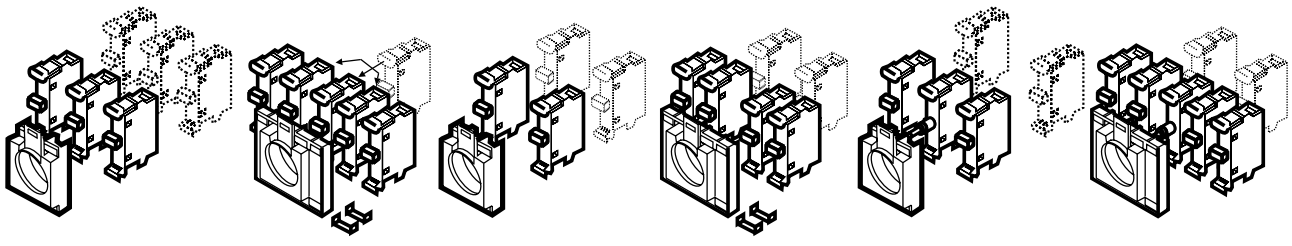
Terminals

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

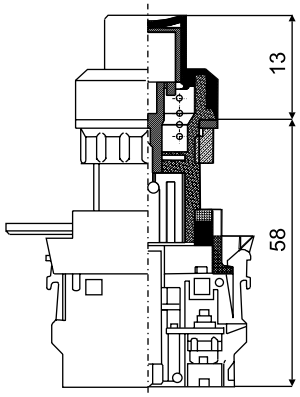
Max. number of contact blocks per button



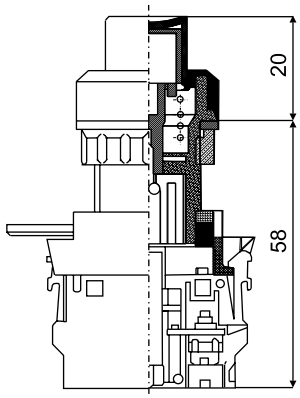
Buttons type PB 22 IEC 60529; IEC 60947-5-1

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

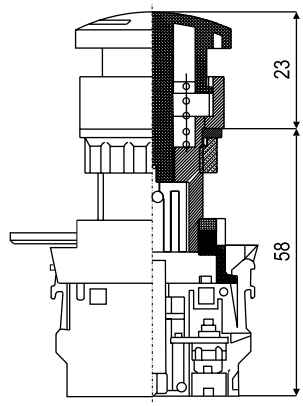
DIMENSIONS DRAWINGS in mm



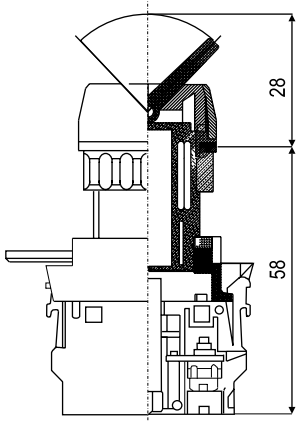
PB 22-1-



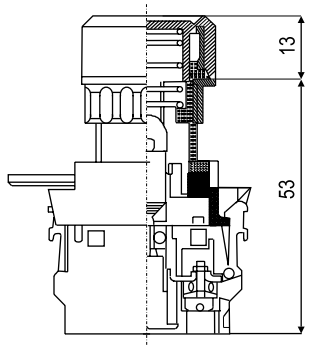
PB 22-2-



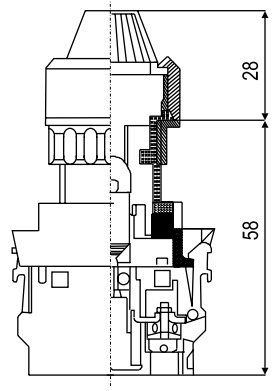
PB 22-4-



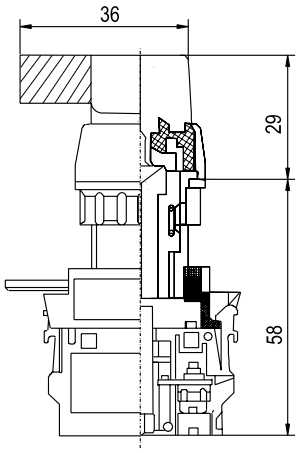
PB 22-6-



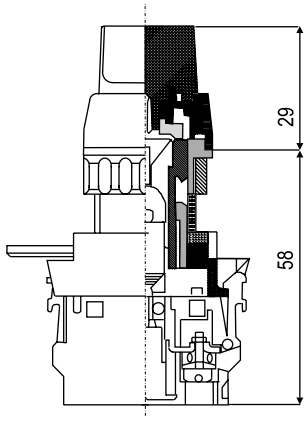
PB 22-8-



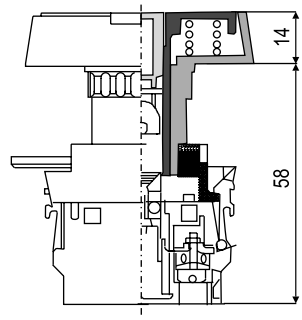
PB 22-31-



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 .. .. .**

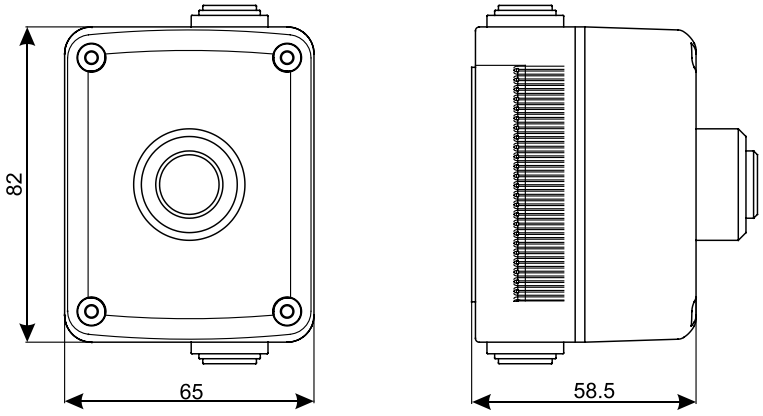
Code: 1, 2, 4, 6, 8, 11, 12, 13, 14, 16, 17, 24, 25, 26, 41, 42

(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

Type KP 125 (25A-125A) 3P 5/1

Type KP 250 (100A-250A) 3P 5/1

Type KP 800 (400A-800A) 3P 5/1

Type KP 1250 (1000-1250) 3P 5/1

Type KP 250 (100A-250A) 4P 5/2

Type KP 800 (400A-800A) 4P 5/2

Type KP 125 (25A-125A) 3P Z 5/3

Type KP 250 (100A-250A) 3P Z 5/3

Electrical Accessories for KP 125 and KP 250 ..... 5/4

Electrical Accessories for KP 800 ..... 5/4

Electrical Accessories for KP 1250 ..... 5/5

Technical data 5/6

Tripping characteristics 5/8

Accessories 5/9

Ordering instruction 5/9

Dimensionns 5/10

Moulded case circuit breakers with contactors 5/11

THREE POLE MOULDED CASE CIRCUIT BREAKERS

Features

- In conformity with: IEC 60947-2
- Wide range from (25 - 1250) 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	16	**KP 125-N 25A 3P**	0.85
40	3	16	**KP 125-N 40A 3P**	
63	3	16	**KP 125-N 63A 3P**	
100	3	16	**KP 125-N 100A 3P**	
125	3	16	**KP 125-N 125A 3P**	



Type KP 250-N (100-250) A

100	3	25	**KP 250-N 100A 3P**	2.9
160	3	25	**KP 250-N 160A 3P**	
250	3	25	**KP 250-N 250A 3P**	

Type KP 250-M (100-250) A

100	3	36	**KP 250-M 100A 3P**	2.9
160	3	36	**KP 250-M 160A 3P**	
250	3	36	**KP 250-M 250A 3P**	



Type KP 800 (400 - 800) A

400	3	50	**KP 800 400A 3P**	9.2
500	3	50	**KP 800 500A 3P**	
630	3	50	**KP 800 630A 3P**	
800	3	50	**KP 800 800A 3P**	



Type KP 1250 (1000 - 1250) A

1000	3	50	**KP 1250 1000A 3P**	17*/19**
1250	3	50	**KP 1250 1250A 3P**	

** Terminals at Front
* Terminals at back / rear

5

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

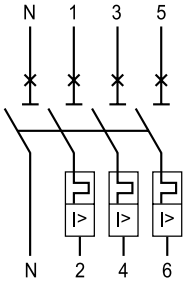


Type KP 250-N (100-250) A

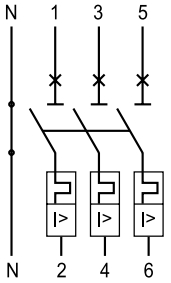
Rated current at 40 °C A	No. of poles	Breaking capacity (Icu) kA at 415V AC	Part No.	Weight Kg
100	4	25	**KP 250-N 100A 4P**	3.7
			KP 250-N 100A 3P+N	
160	4	25	**KP 250-N 160A 4P**	
			KP 250-N 160A 3P+N	
250	4	25	**KP 250-N 250A 4P**	
			KP 250-N 250A 3P+N	
Type KP 250-M (100-250) A				
100	4	36	**KP 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



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

Type KP 125-N (25 -125) A 3P Z



Rated current at 40 °C A	No. of poles	Breaking capacity (Icu) kA at 415 V AC	Part No.	Weight Kg
25	3	16	**KP 125-N 25A 3P Z**	0.85
40	3	16	**KP 125-N 40A 3P Z**	
63	3	16	**KP 125-N 63A 3P Z**	
100	3	16	**KP 125-N 100A 3P Z**	
125	3	16	**KP 125-N 125A 3P Z**	
Type KP 250-N (100-250) A 3P Z				
100	3	25	**KP 250-N 100A 3P Z**	2.9
160	3	25	**KP 250-N 160A 3P Z**	
250	3	25	**KP 250-N 250A 3P Z**	
Type KP 250-M (100-250) A 3P Z				
100	3	36	**KP 250-M 100A 3P Z**	2.9
160	3	36	**KP 250-M 160A 3P Z**	
250	3	36	**KP 250-M 250A 3P Z**	



KP 125 ... 3P Z and KP 250-(N,M) 3P Z 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.



KP 250 - (N,M) With terminal shields

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**

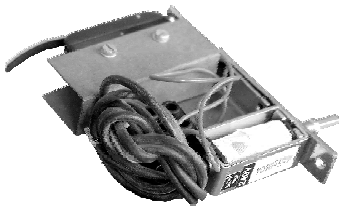
Under voltage release

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

Selection and ordering data



Type KP 1250

Auxiliary switch

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

Shunt trip

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

Under voltage release

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

TECHNICAL DATA

TYPE CIRCUIT BREAKERS			KP 125-N	KP 250-N	KP 250-M	KP 800	KP 1250
Standard conformity			IEC 60947-2				
No. of poles			3P	3P or 4P		3P or 4P	3P
Standard current range/ratings	In	A	25,40,63,100,125	100, 160, 250		400, 500, 630, 800	1000, 1250
Rated operational voltage	Ue~	V	500	690		690	690
Rated operational voltage	Ue=	V	250	250		250	250
Rated insulation voltage	Ui~	V	500	690		690	690
Rated impulse withstand	U_{imp}	kV	6	8		8	8
Category of use			A	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				
Humidity working condition			80% at 30°C			0-90%	
Ambient temperature		°C	-10 to + 70			-5 to + 40	
Ultimate breaking capacity Icu*	230/240 V ~	kA	22	35	60	70	70
	400/415 V ~	kA	**16**	**25**	**36**	**50**	**50**
	440 V ~	kA	10	18	30		
	480/500 V ~	kA	8	15	25	35	35
	690 V ~	kA		8	16	27	27
	250 V -	kA	16	25	36	16	40
Standard breaking capacity Ics (%Icu)*			75	75	75	50	75
Rated closing capacity on short-circuit (400 V~)			32	52.5	75.6	73.5	105
Endurance (o.c. cycle)	mechanical		20 000	20 000		4 000	2500
	electrical		7 000	7 000		1 000	500
Type of protection							
Thermal adjustable			(0,7 - 1)In	(0,7 - 1)In		(0,7 - 1)In	(0,7 - 1)In
Magnetic fixed			10xIn for 125 A	-		-	-
			12xIn for 100 A	-		-	-
			15xIn for 63 A	-		-	-
			20xIn for 40 A	-		-	-
			25xIn for 25 A	-		-	-
Magnetic adjustable			-	(3,5 - 10)In		(4 - 10)In	(4 - 10)In

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

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)	-	-
1250	1000	45	-	-	-	M16	15x45	-	-
	1250	60	-	-	-	M20	15x60	-	-

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**		50 °C		60 °C		70 °C	
		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**	16	24	16	23	16	22
	In = 40 A	32	45	30	43	29	42	**28**	**40**	27	38	26	37	25	36
	In = 63 A	49	70	48	68	46	66	**44**	**63**	42	60	40	58	38	55
	In = 100 A	79	112	76	108	73	104	**70**	**100**	67	96	64	92	61	88
	In = 125 A	98	140	95	135	91	130	**87**	**125**	84	120	80	115	76	110
KP 250	In = 100 A	88	127	82	118	76	109	**70**	**100**	63	91	56	82	52	73
	In = 160 A	143	205	133	190	122	175	**112**	**160**	100	145	90	130	80	115
	In = 250 A	216	310	202	290	189	270	**175**	**250**	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				
KP 1250	In = 1000 A														
	In = 1250 A														

5

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 of the 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

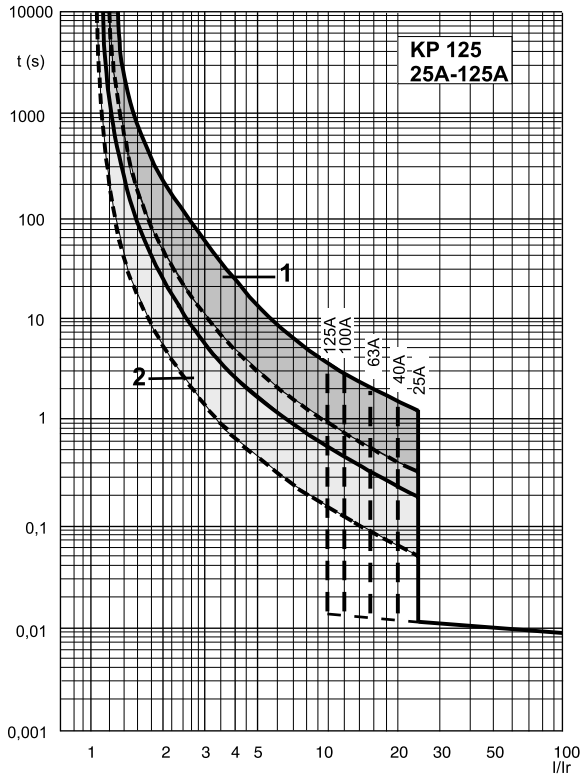
MCCB downstream	gG type				
	250A	400A	500A	630A	800A
KP 125	7 500				
KP 250		8 000			
KP 800			2 500		5 500
KP 1250					

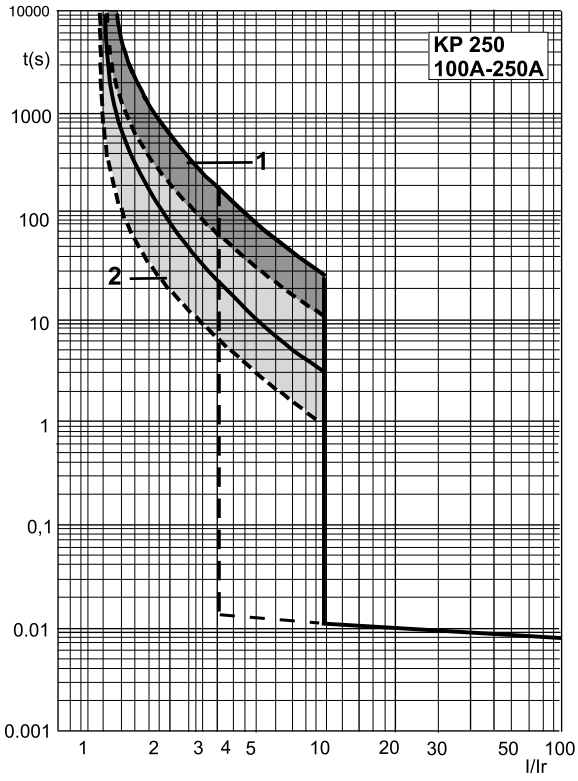
Selectivity table-average values of selectivity limits (A)

MCCB upstream

MCCB downstream		KP 125				KP 250			KP 800			KP 1250	
		40A	63A	100A	125A	100A	160A	250A	400A	630A	800A	1000A	1250A
KP 125	25 A	800	1000	1200	1200	1000	2500	3500	4000	6300	8000	9200	9200
	40 A		1000	1200	1200	1000	2500	3500	4000	6300	8000	9200	9200
	63 A			1200	1200		2500	3500	4000	6300	8000	9200	9200
	100 A						2500	3500	4000	6300	8000	9200	9200
	125 A						2500	3500	4000	6300	8000	9200	9200
KP 250	100 A						1600	2500	4000	6300	8000	9200	9200
	160 A							2500	4000	6300	8000	9200	9200
	250 A							2500	4000	6300	8000	9200	9200
KP 800	400 A									6300	8000	9200	9200
	630 A									6300	8000	9200	9200
	800 A										8000	9200	9200
KP 1250	1000 A											9200	9200
	1250 A											9200	9200

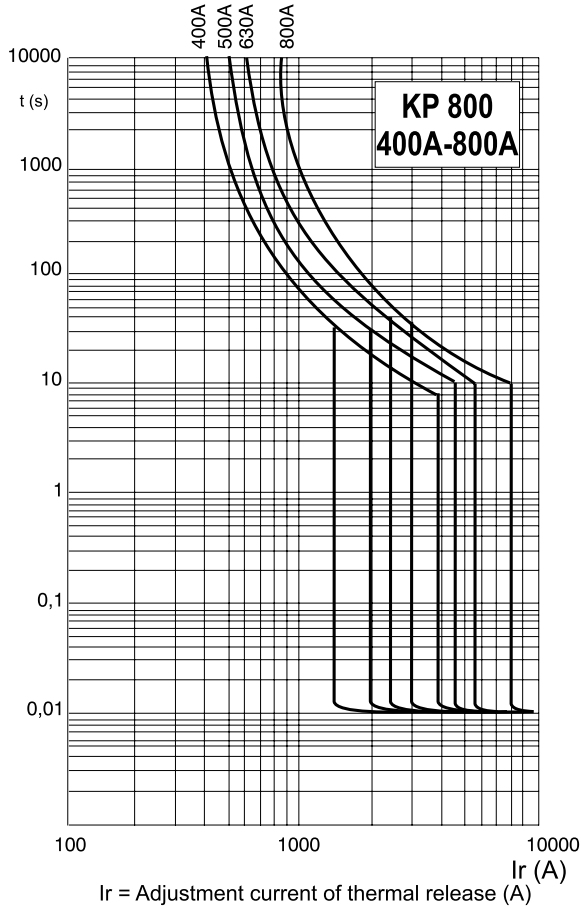
TRIPPING CHARACTERISTICS



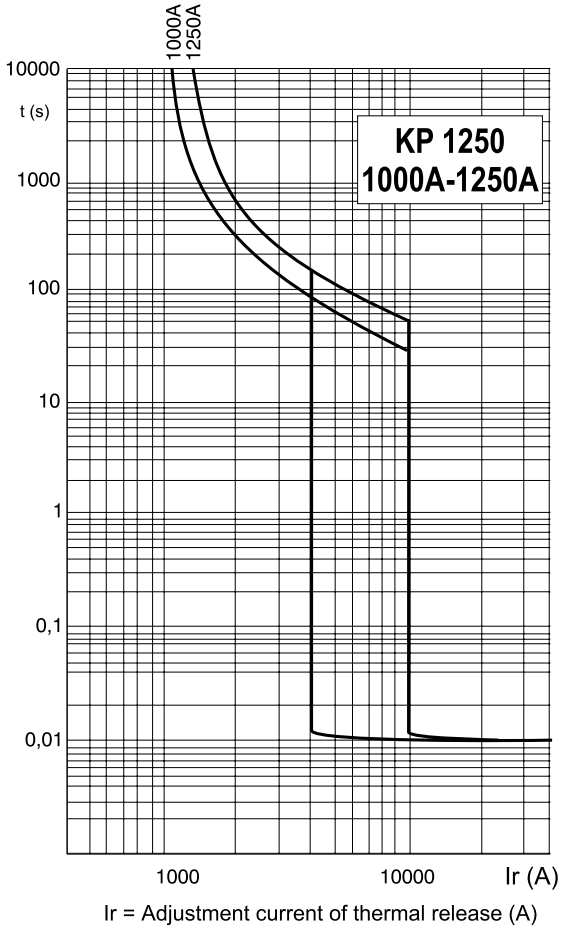


I = Actual current (A)
Ir = Adjustment current of thermal release (A)

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

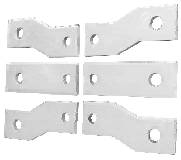


Ir = Adjustment current of thermal release (A)



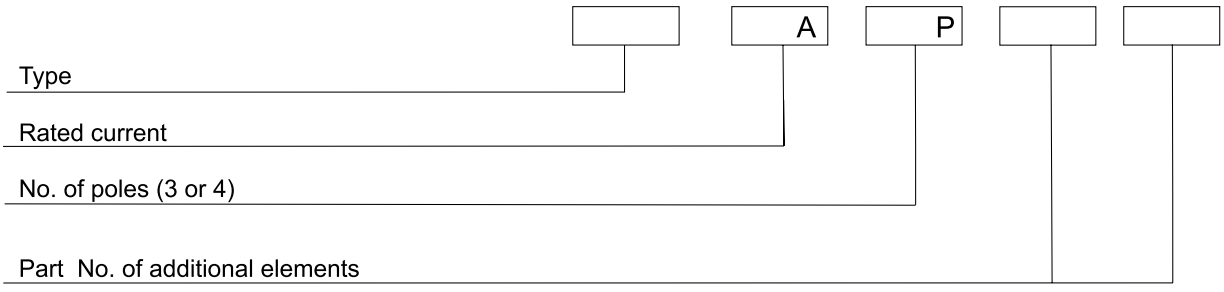
Ir = Adjustment current of thermal release (A)

Accessories

Accessory for mounting on rail 35 mm (DIN 50022)		
Description	**Part N.**	**Weight Kg**
 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 to be connected Set of 6 rear terminals, incoming or outgoing	600834	
Terminal shields		
 Set of 2 terminal shields for KP 125	S40230	
Set of 2 terminal shields for KP 250 Aditional cover for KP 250 should be used only for conection with cage terminals or with cable lugs in combination with short aditional terminals No. S40727.	S40713	

5

ORDERING INSTRUCTION FOR MOULDED CASE CIRCUIT BREAKERS

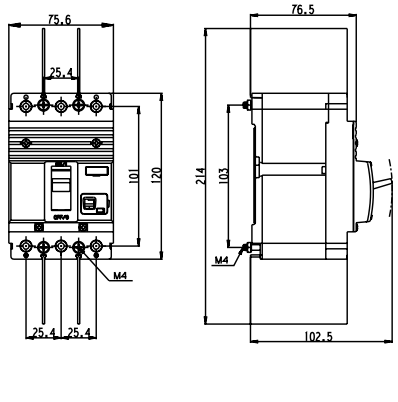


Example: Moulded case circuit breaker type KP 125 16 kA for rated current 100A, 3 poles, with built-in device for remote opening with supply voltage range: 230 V AC

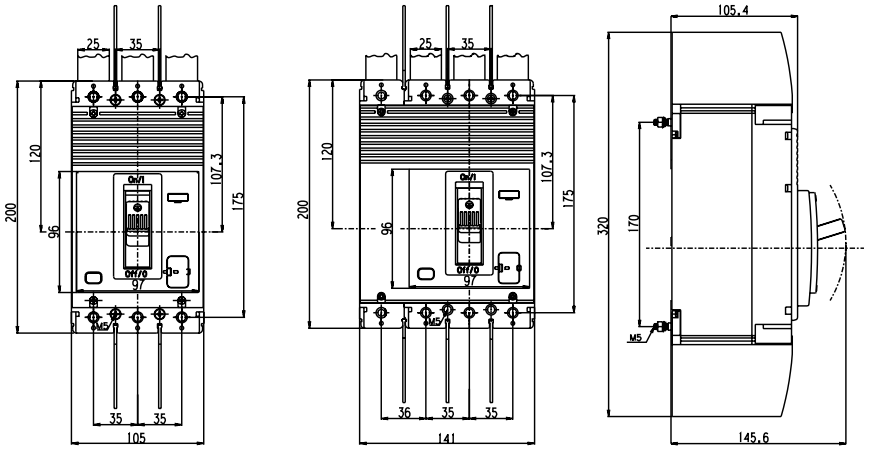
KP 125-N	100A	3P	KP DO 230

DIMENSION DRAWINGS (mm)

Type KP 125



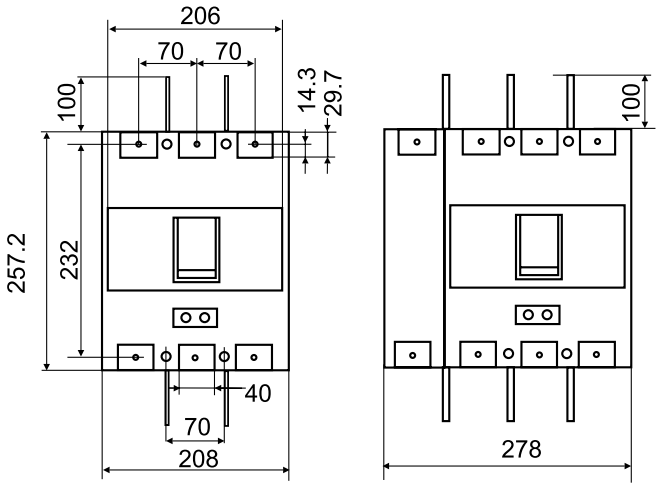
Type KP 250



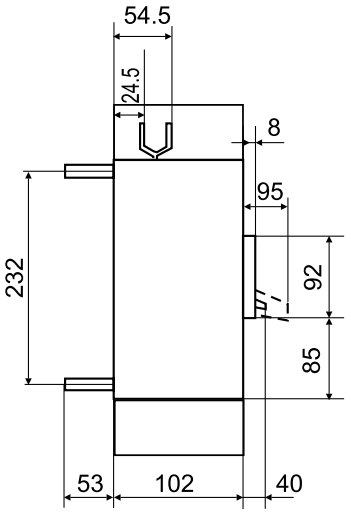
3P 4P

5

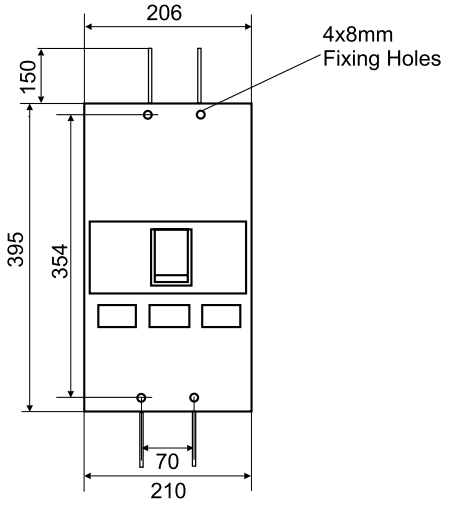
Type KP 800

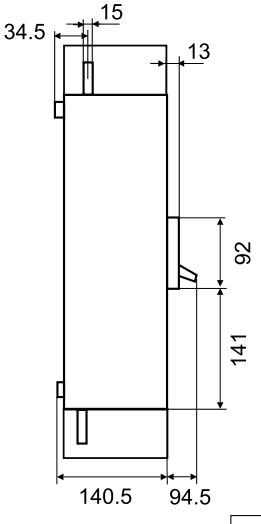


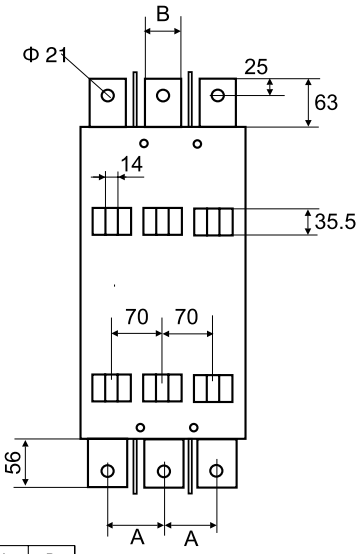
3P 4P



Type KP 1250







	A	B
1000A	70	45
1250A	82	60

MOULDED CASE CIRCUIT BREAKERS WITH CONTACTORS

In conformity with: IEC 60947-2, IEC 60947-4









Motor ratings (kW) / Ultimate breaking capacity (kA) AC3 230V kW / kA	400V kW / kA	690V kW / kA	Type	Auxiliary contacts	Dimensions (axbxc) mm
Size KP 125-N (40 A), 415 V-16 kA + CNM 36 22					
11 / 22	**18.5 / 16**	22 / -	**KP CNM 36 22**	**2 2**	116x262x109
Size KP 125-N (63 A), 415 V-16 kA + CNM 60 22					
18.5 / 22	**30 / 16**	37 / -	**KP CNM 60 22**	**2 2**	127x276x125
Size KP 250-N (100 A), 415 V-25 kA + CNM 110 22					
37 / 35	**55 / 25**	65 / 8	**KP CNM 100 22**	**2 2**	153x367x156
Size KP 250-N (160 A), 415 V-25 kA + CNM 170 22					
55 / 35	**90 / 25**	110 / 8	**KP CNM 160 22**	**2 2**	185x415x220

Electronic time relays type EVR,
Staircase lighting controller type ESA 11 and
Thermistor protection type ETZM 6/1, 6/2, 6/3 and 6/4

ELECTRONIC TIME RELAYS TYPE EVR

Application, standards and installation

Electronic time relays EVR are used for operations in the field of automation and industrial plants, energetics, traffic etc. They could be used in installations with hard working conditions such as ships, cranes, heavy industry and similar since they are resistant to vibrations and high temperatures. The outlet relay with contacts of AgCdO provides stable control of almoust all devices used in operating technics.
Electronic time relays are designed for fast and easy installation on standard rail support TH 35 - 7,5 according to DIN EN 50022 or installation with screws on standard plate according to DIN 46121. When they are used in rooms with increased humidity and dust, relays should be installed in closed cases.
Wiring of the relays is by flexible cores with cable shoe or with full cores made of copper, cross section from 1 to 2,5 mm².

STAIRCASE LIGHTING CONTROLLER TYPE ESA 11

APPLICATION

The staircase lighting controller ESA11 is intended for time delayed switching of light.

CONSTRUCTION

The staircase lighting controller ESA11 is assembled in an insulated housing made of polycarbonat with a compact width of 22,5mm which gives full protection to the personnel against touching of live parts according to VDE 01106T.100. The time is adjustable from 0,6 to 6 minutes with the help of a potentiometer mounted on the front of the relay.

A continous ON position of the light is reached by inserting a short circuiting conductor between the terminsls B1-B2. The integrated circuits inside the ESA11 are in C-MOS technology and all the components are carefully selected to provide high performances and rellability. the supply voltage is 220VAC. Other supply voltages will be offered on special demand.

INSTALLATION

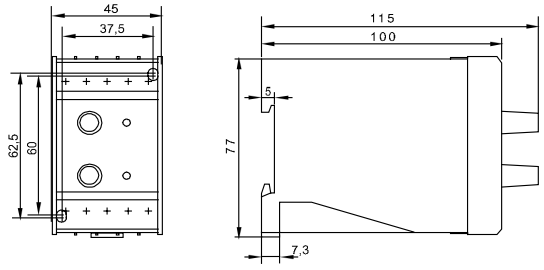
The staircase lighting controller ESA11 is intended for fast and easy installation on standard rail support TH35-7,5 according to DIN EN50022 or installation with screws 2xM4 on standard plate, according to DIN 46121. When they are used in rooms with increased humidity and dust the relays should be installed in closed cases. Wiring of the relays is by flexible cores with cable shoe or with full cores made of copper, cross section from 1 to 2,5mm².

TEMPERATURE MONITOR RELAYS TYPE ETZM

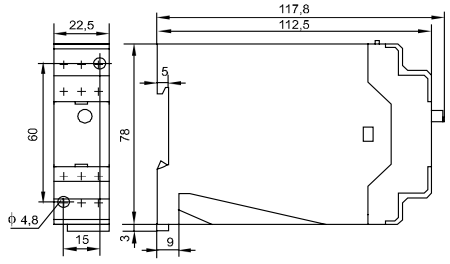
Application, standards and installation

Relays ETZM in combination with thermistor probes (PTC) are devices for complete temperature protection of motors and other machines.
Thermistor motor protection consist of thermistor probes embeded in stator winding, with special characteristics of varying the electric resistance of temperature.
Relay ETZM is supervozir of the electrical resistance of the thermistor probes. Output relay switches off, after the resistance of the thermistor circuit, assumed certain value. Relays ETZM can not be adjusted, therefore the output function is determined entirely by the reference temperature of the thermistors.
Temperature "NIT" is chosen according to temperature class insulation of the motor.
Relays ETZM are predicted for fast and simple installation with connectible cables (cross-section 1 to 2,5 mm²). They should be installed in dry and clean rooms. For use in areas with increased wetness, the relays should be built in enclosed boards.

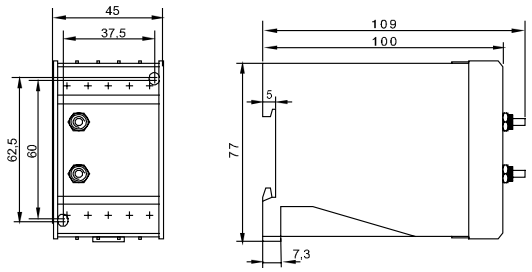
DIMENSIONS (mm)



EVR

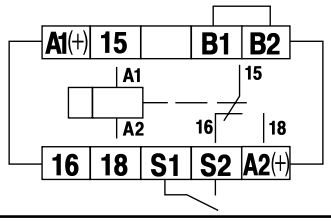
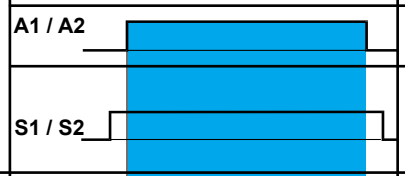
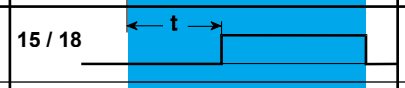
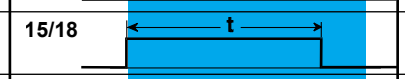
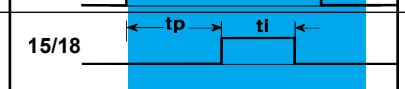
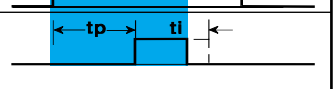
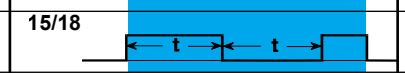
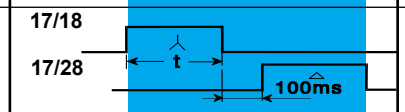
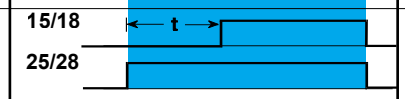
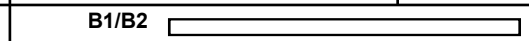
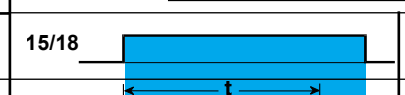
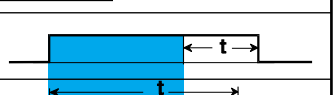
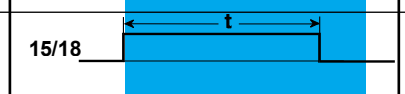
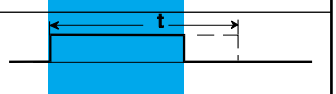
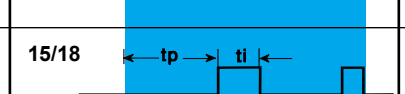
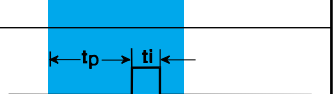
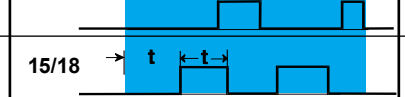
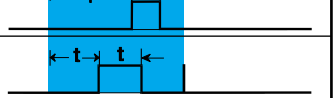
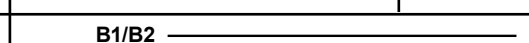
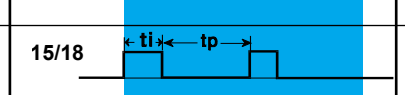
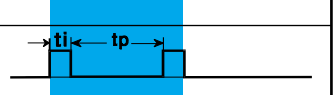
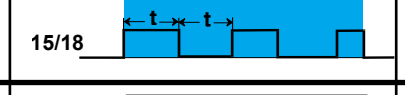
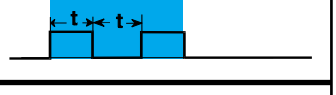
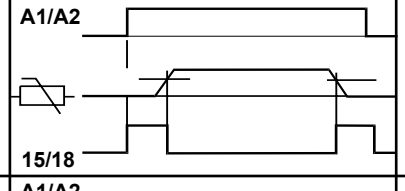
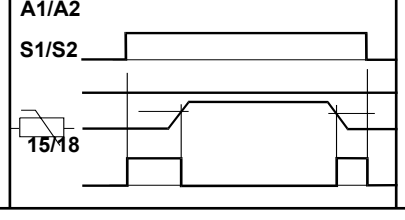
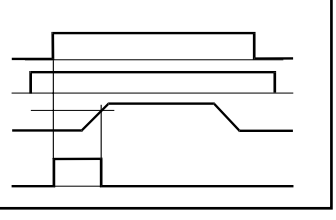


ESA 11



ETZM

ELECTRONIC TIME RELAYS AND THERMISTOR PROTECTION

Number of function	Time function - EVR, EVRK, EVRU	Timing chart: Start: with supply voltage	Timing chart: with external switch S1 - S2
			
11 1PS[4]	Delay on operate		
12	Delay on operate on de-energisation		
21 2PS[4]	Pulse on energisation		
32	Two stage program, one cycle		
50	Flasher relay		
40	Star delta relay		
41	Delay on operate +Instaneous contact		
	With short circuit connection B1 - B2		
22	Delay on release		
23	Pulse on energisation		
33	Two stage program relay		
51	One stage program relay		
	Without short circuit connection B1 - B2		
22	Delay on release		
23	Pulse on energisation (instant. contact)		
33	Two stage program relay		
51	One stage program relay		
	ETZM - A Relay for thermistor protection of motors with automatic reseting		
	ETZM - R Relay for thermistor protection of motors with manual reseting		

[4]1PS; 2PS with remote potentiometer control

ELECTRONIC TIME RELAYS, STAIRCASE LIGHTING CONTROLLER AND THERMISTOR PROTECTION

In conformity: IEC 255-2				
Type designation	**EVR**	**ESA 11**	**EVRU**	**ETZM**
Functions	11,1PS,12,21,2PS,22 23,32,33,40,41,50,51	11	11, 21, 22, 50	ETZM A ETZM R
Control voltage (V)	24 - 500	220	24 - 500	24 - 500
Rated insulation voltage (V)	250	250	250	250
Power consumption (VA)	3	5	4	3
Dielectric strentgh (V)	2000	2000	2000	2000
Setting time	0,06-0,6s 6-60s 0,6-6s 0,6-6min 2-20s 6-60min		0,06 -160s 0,15 min - 6h	
Permited ambient temperature (^{0}C)	-20 ... +55	-20 ... +55	-20 ... +55	-20 ... +55
Repetition error	<0,3% ± 2ms	<1%	<0,3% ± 2ms	
Timing error within ±10% Un	<1%	<1%	<1%	
Setting error (%)	<10	<10	<10	
Weight (kg)	0,30	0,20	0,35	0,25
CONTACTS DATA Max. thermal current I_{th}(cosϕ=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-		8 A 3 A 0.3 A 380 V~/250 V-	
Tripping thermistor resistance (Ω)				3000 ± 500
Reset thermistor resistance (KΩ)				1,5 - 2,3
Standard voltages (V)	380, 220, 110, 24, 50 Hz; 24V DC	220 V, 50 Hz	380, 220, 110, 24, 50 Hz; 24V DC	220,50 Hz

* EVR 40 (Star delta relay) is activated by connecting the operating voltage on terminal conections A1/A2, and the contact 17/18 for motor connection i star is immediately switched on. After set time t contact 17/18 switches off, and after cca 100 ms the contact 17/28 switches on for connecting the motor in delta which stays switched on until the terminal connections A1/A2 are with operating voltage.

ORDERING INSTRUCTIONS FOR ELECTRONIC TIME RELAYS

Type designation

Number of function

Setting time (upper value)

Control voltage and frequency

Example: EVR | 32 | 6 min | 220V, 50Hz

ORDERING INSTRUCTION FOR THERMISTOR PROTECTION

Type designation

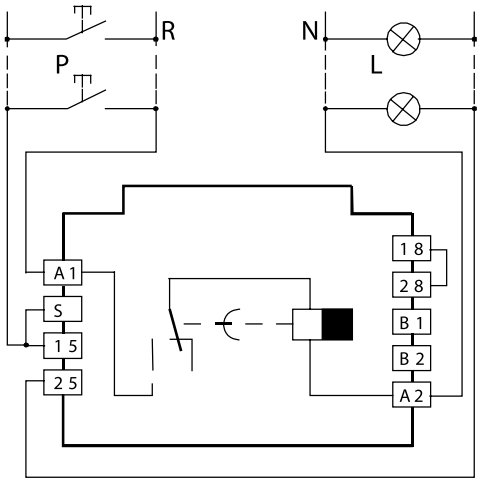
Control voltage and frequency

Example: ETZM-A | 220V, 50Hz

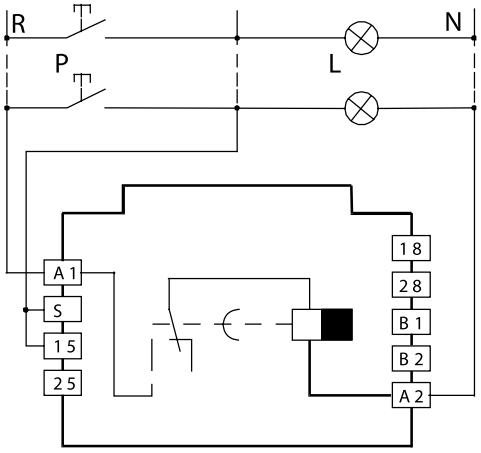
Wiring diagrams

EXTERNAL CONNECTIONS

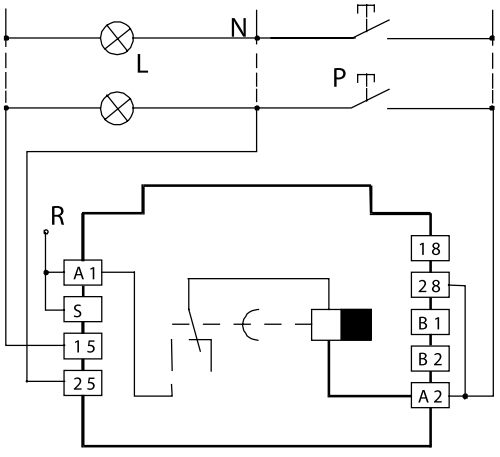
CONNECTION WITH 4 WIRES



CONNECTION WITH 3 WIRES

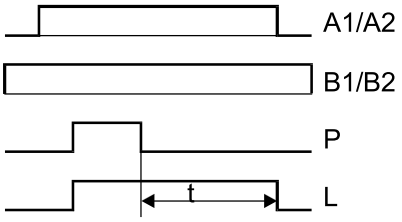


CONNECTION WITH 3 WIRES

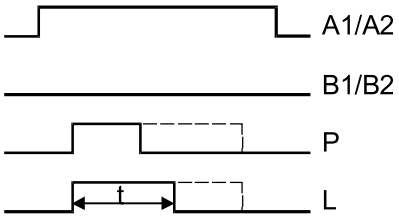


TIMING CHARTS

WITH SHORTCIRCUITER B1-B2



WITHOUT SHORTCIRCUITER B1-B2



R.. phase
N.. neutral
P.. momentary switch
L.. light

Type , circuit diagram and description 7/1, 7/2

Technical data..... 7/3

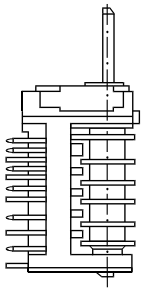
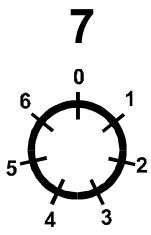
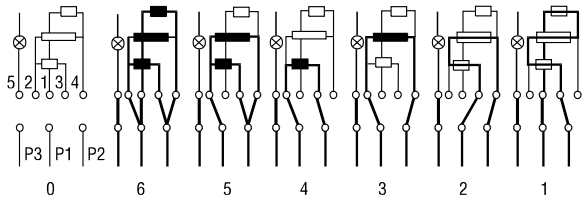
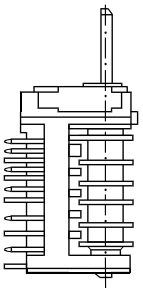
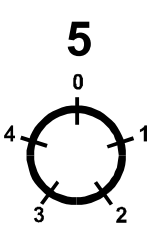
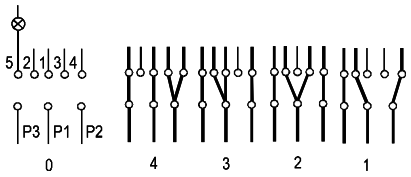
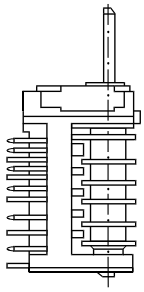
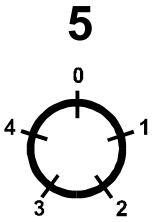
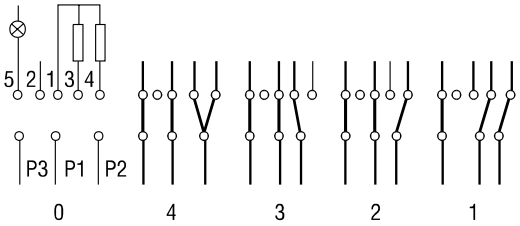
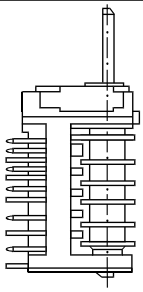
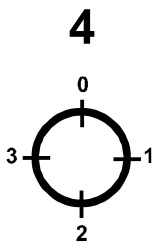
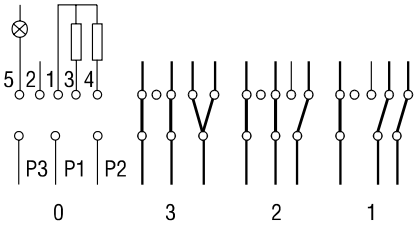
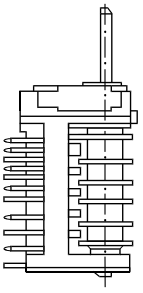
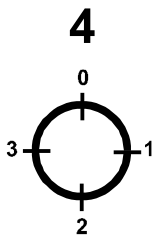
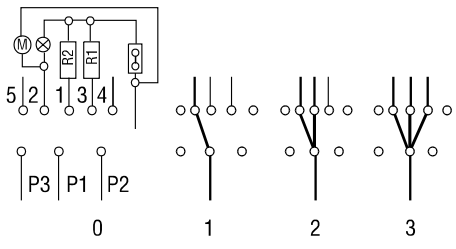
Dimensional drawings 7/4

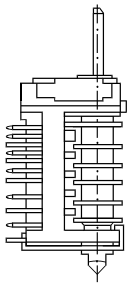
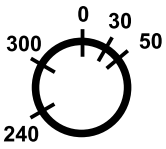
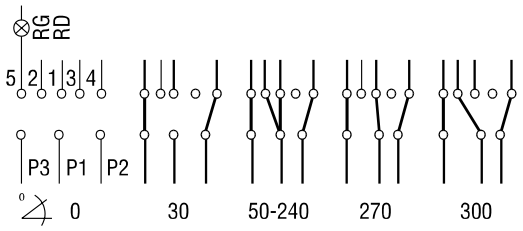
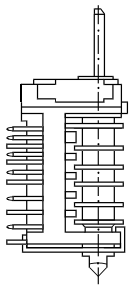
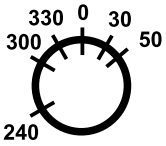
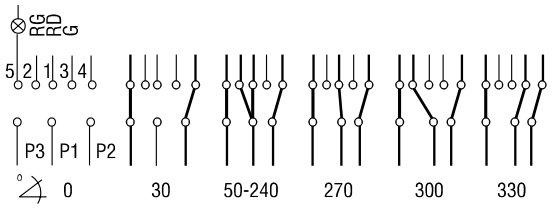
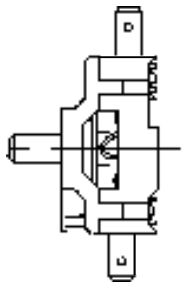
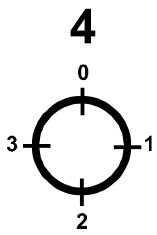
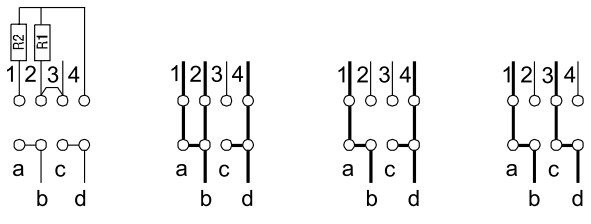
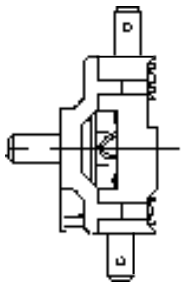
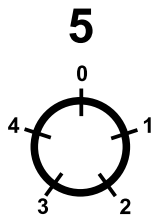
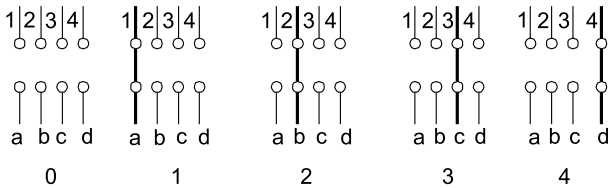
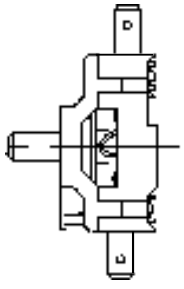
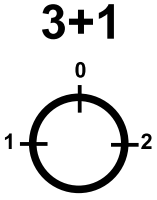
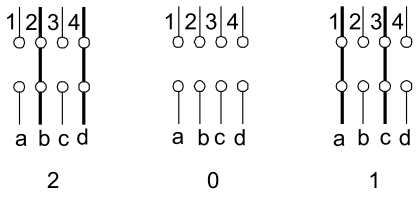
Type VS



Type VA



TYPE	NUMBER OF POSITIONS	CIRCUIT DIAGRAM	DESCRIPTION
 **VS 7231** **VS 7171**		 direction of rotating: right DIAGRAM 1	rotary switch with 7 positions with contact for signalisation
 **VS 5237**		 direction of rotating: right DIAGRAM 7	rotary switch with 5 positions with contact for signalisation
 **VS 5233** **VS 5173**		 direction of rotating: right DIAGRAM 3	rotary switch with 5 positions with contact for signalisation
 **VS 4232**		 direction of rotating: right DIAGRAM 2	rotary switch with 4 positions with contact for signalisation
 **VS 4176**		 direction of rotating: right DIAGRAM 6	rotary switch with 4 positions

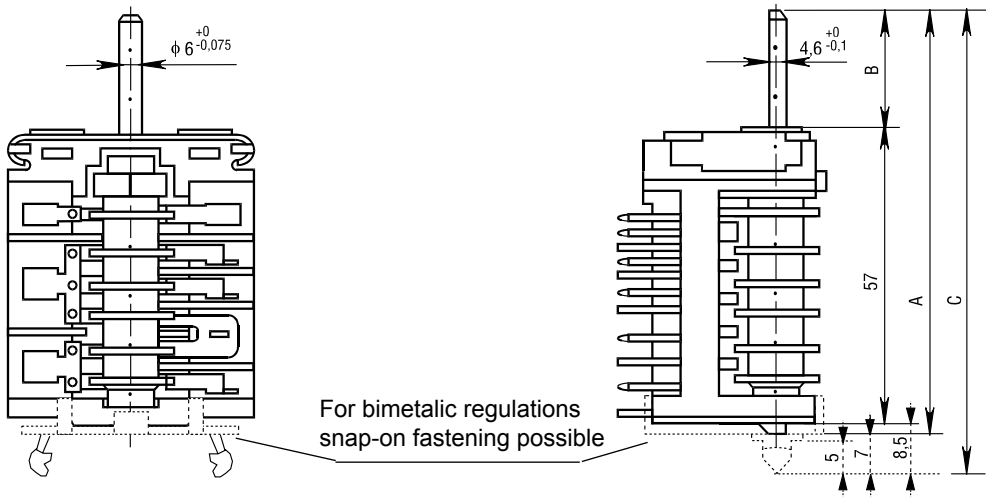
TYPE	NUMBER OF POSITIONS	CIRCUIT DIAGRAM	DESCRIPTION
 **VS R234** **VS R184**		 direction of rotating: right DIAGRAM 4	rotary switch for oven without grill, with adapter for termostat
 **VS R235** **VS R185**		 direction of rotating: right DIAGRAM 5	rotary switch for oven with grill, with adapter for termostat
 **VA 4111**		 direction of rotating: right DIAGRAM 1	axial rotary switch with 4 positions
 **VA 5242**		 direction of rotating: right DIAGRAM 2	axial rotary switch with 5 positions
 **VA 4243**		 direction of rotating: left direction of rotating: right DIAGRAM 3	axial rotary switch with 3+1 positions

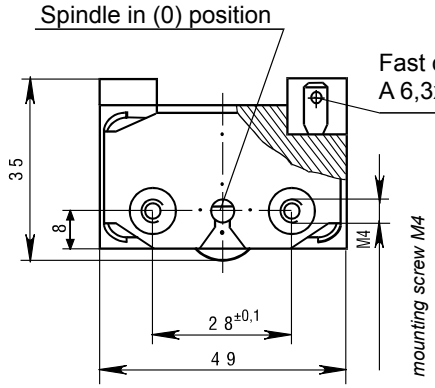
TECHNICAL DATA		
TYPE	ROTARY SWITCHES VS	AXIAL ROTARY SWITCHES VA
Standards and specifications:	IEC 61058-1, VDE 0630	IEC 61058-1, VDE 0630
Material (base and cam):	high quality duroplastic	high quality thermoplastic
Contact springs material:	CuSn 6	Cu Zn
Contacts: switching capacity for ohmic loads	 16A 250V~ ; 10A 400V~	 16A 250V~ ; 8A 400V~
electrical endurance	50 E3	
contact gap	≥ 3mm	≥ 3mm
contact material	AgNi	AgNi
Permited ambient temperature:	+150°C (T 150)	+125°C (T 125)
Terminals: Fixing:	6,3 x 0,8mm (DIN 46 244) fast on terminals. internal connection between several terminals are posible 2 x M4 holes at 28 mm centres	
Application:	Recomended as selector switch for domestic appliances, especially suitable for cookers (hotplates and ovens)	

Note: Rotary switches with other circuit diagrams and lenghts of spindles on special demand.

DIMENSIONS (mm)

VS

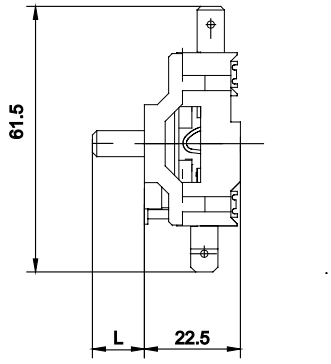


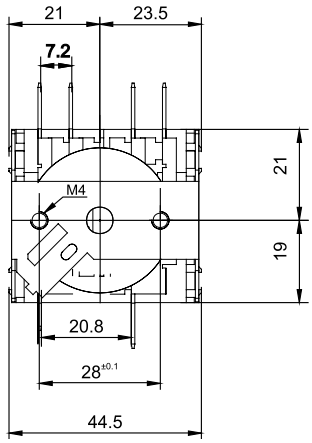


TYPE	A(mm)	B(mm)
VS 4232,VS 5233,VS 7231	81,5	23 ±0,5
VS 4176,VS 5173,VS 7171	75,5	17 ±0,5

TYPE	B(mm)	C(mm)
VS R234, VS R235	23 ±0,5	88,5
VS R184, VS R185	18 ±0,5	83,5

VA





TYPE	L(mm)
VA 4 111	11
VA 5 242, VA 4 243	24

ORDERING DATA

Type	Number of positions or sign "R" for rotary switch for oven	Dimension (B)	Circuit diagram
V S			
V A			

Example: VS 7 23 1 rotary switch with 7 positions, B = 23mm, circuit diagram number 1.

Example: VA 4 11 1 axial rotary switch with 4 positions, L= 11mm, circuit diagram number 1.

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