



Contactors

Contactors

Our product lines include all kinds of contactors from 2.2 kW up to 335 kW. They can be controlled by different control voltages from 12 V up to 500 V. The accessories include many different kinds of auxiliary contacts, mechanical interlocks, RC suppressors, thermal overload relays and equipment for assembling. Special contactors are used for switching capacitor banks from 12.5 kvar up to 60 kvar.

Mini contactors are used for switching electric motors and other resistive, inductive and capacitive loads.



For universal switching:

- All kind of motors
- Building automation systems
- Applications include use in machines

Advanced operation:

- Control combinations

Other benefits:

- A wide variety of snap-on auxiliary switch blocks and accessories
- AC or real DC drive with low consumption
- High contact reliability at low voltage
- Two contactor widths: 35 and 45 mm
- Degree of protection IP 20
- K07F version for fast-on connection or K07X contactors with soldering pins
- Possibility of direct connection of the BR 6 bimetal relay for protection against overload and in case of phase failure
- Version with all four main contacts (Sp4)
- Wide range of control voltages is available

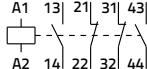
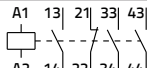
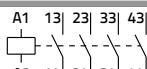


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Contactors relays

AC-15 acc. to IEC/EN 60947-5-1 (4-pole, 35 mm widths)

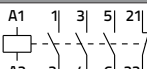
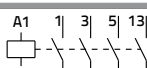
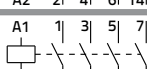
Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
K03C-22	4 A	380/415 V		30.041.215	160	10
K03C-22	4 A	220/240 V		30.041.156	160	10
K03C-22	4 A	24 V		30.040.307	160	10
K03C-31	4 A	380/415 V		30.041.216	160	10
K03C-31	4 A	220/240 V		30.041.155	160	10
K03C-31	4 A	24 V		30.040.306	160	10
K03C-40	4 A	380/415 V		30.041.217	160	10
K03C-40	4 A	220/240 V		30.041.154	160	10
K03C-40	4 A	24 V		30.040.310	160	10

AC



Motor contactors

AC-3 acc. to IEC/EN 60947-4-1 (4-pole, 35 mm widths)

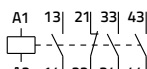
Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
K03M-01	8.5 A	380/415 V		30.041.218	160	10
K03M-01	8.5 A	220/240 V		30.041.157	160	10
K03M-01	8.5 A	24 V		30.040.277	160	10
K03M-10	8.5 A	380/415 V		30.041.220	160	10
K03M-10	8.5 A	220/240 V		30.041.153	160	10
K03M-10	8.5 A	24 V		30.040.279	160	10
K03M-10/Sp4	8.5 A	380/415 V		30.041.290	160	10
K03M-10/Sp4	8.5 A	220/240 V		30.041.144	160	10
K03M-10/Sp4	8.5 A	24 V		30.041.023	160	10

AC



Contactors relays

AC-15 acc. to IEC/EN 60947-5-1 (4-pole, 45 mm widths)

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
K07C-22	4 A	380/415 V		30.041.291	180	10
K07C-22	4 A	220/240 V		30.041.124	180	10
K07C-22	4 A	24 V		30.040.701	180	10
K07CF-22	4 A	380/415 V		30.041.292	180	10
K07CF-22	4 A	220/240 V		30.041.189	180	10
K07CF-22	4 A	24 V		30.041.293	180	10
K07CX-22	4 A	380/415 V		30.041.298	180	10
K07CX-22	4 A	220/240 V		30.041.299	180	10
K07CX-22	4 A	24 V		30.041.300	180	10
K07C-31	4 A	380/415 V			30.041.221	180
K07C-31	4 A	220/240 V	30.041.170		180	10
K07C-31	4 A	24 V	30.040.339		180	10
K07CF-31	4 A	380/415 V	30.041.294		180	10
K07CF-31	4 A	220/240 V	30.041.190		180	10
K07CF-31	4 A	24 V	30.041.295		180	10
K07CX-31	4 A	380/415 V	30.041.301		180	10
K07CX-31	4 A	220/240 V	30.041.302		180	10
K07CX-31	4 A	24 V	30.041.303		180	10
K07C-40	4 A	380/415 V			30.041.222	180
K07C-40	4 A	220/240 V		30.041.125	180	10
K07C-40	4 A	24 V		30.040.340	180	10
K07CF-40	4 A	380/415 V		30.041.296	180	10
K07CF-40	4 A	220/240 V		30.041.136	180	10
K07CF-40	4 A	24 V		30.041.297	180	10
K07CX-40	4 A	380/415 V		30.041.304	180	10
K07CX-40	4 A	220/240 V		30.041.305	180	10
K07CX-40	4 A	24 V		30.041.306	180	10

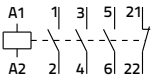
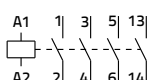
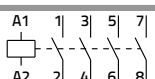
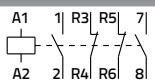
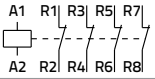
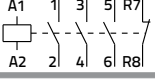
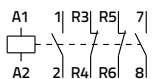
AC



Motor contactors

AC-3 acc. to IEC/EN 60947-4-1 (4-pole, 45 mm widths)

AC

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)	
K07M-01	11.3 A	380/415 V		30.041.274	180	10	
K07M-01	11.3 A	220/240 V		30.041.172	180	10	
K07M-01	11.3 A	24 V		30.040.743	180	10	
K07MF-01	11.3 A	380/415 V		30.041.312	180	10	
K07MF-01	11.3 A	220/240 V		30.041.192	180	10	
K07MF-01	11.3 A	24 V		30.040.196	180	10	
K07MX-01	11.3 A	380/415 V		30.041.318	180	10	
K07MX-01	11.3 A	220/240 V		30.041.319	180	10	
K07MX-01	11.3 A	24 V		30.041.320	180	10	
K08M-01	15.5 A	380/415 V		30.041.323	180	10	
K08M-01	15.5 A	220/240 V		30.041.324	180	10	
K08M-01	15.5 A	24 V		30.041.325	180	10	
K07M-10	11.3 A	380/415 V			30.041.231	180	10
K07M-10	11.3 A	220/240 V			30.041.173	180	10
K07M-10	11.3 A	24 V			30.040.700	180	10
K07MF-10	11.3 A	380/415 V			30.041.313	180	10
K07MF-10	11.3 A	220/240 V	30.041.193		180	10	
K07MF-10	11.3 A	24 V	30.041.314		180	10	
K07MX-10	11.3 A	380/415 V	30.041.321		180	10	
K07MX-10	11.3 A	220/240 V	30.041.322		180	10	
K07MX-10	11.3 A	24 V	30.041.148		180	10	
K08M-10	15.5 A	380/415 V	30.041.326		180	10	
K08M-10	15.5 A	220/240 V	30.041.327		180	10	
K08M-10	15.5 A	24 V	30.041.328		180	10	
K07M-10/Sp4	11.3 A	380/415 V			30.041.273	180	10
K07M-10/Sp4	11.3 A	220/240 V			30.041.146	180	10
K07M-10/Sp4	11.3 A	24 V			30.041.045	180	10
K07M-22/Sp4	10 A	380/415 V			30.041.307	180	10
K07M-22/Sp4	10 A	220/240 V		30.041.176	180	10	
K07M-22/Sp4	10 A	24 V		30.041.076	180	10	
K07M-04/Sp4	11.3 A	380/415 V		30.041.241	180	10	
K07M-04/Sp4	11.3 A	220/240 V		30.041.177	180	10	
K07M-04/Sp4	11.3 A	24 V		30.041.060	180	10	
K07M-01/Sp4	11.3 A	380/415 V		30.041.223	180	10	
K07M-01/Sp4	11.3 A	220/240 V		30.041.175	180	10	
K07M-01/Sp4	11.3 A	24 V		30.041.308	180	10	
K07MF-22	10 A	380/415 V		30.041.309	180	10	
K07MF-22	10 A	220/240 V		30.041.310	180	10	
K07MF-22	10 A	24 V		30.041.311	180	10	
K07MX-22	10 A	380/415 V		30.041.315	180	10	
K07MX-22	10 A	220/240 V		30.041.316	180	10	
K07MX-22	10 A	24 V		30.041.317	180	10	



Tags in title:

- M** - motor contactor
- C** - contactor relay
- Sp4** - version with all four main contacts
- F** - contactor for fast-on connection
- X** - contactor with soldering pins

Miniature Contactors

Contactors relays

AC-15 acc. to IEC/EN 60947-5-1 (4-pole, 45 mm widths)

DC

Type	Rated current I _e	Control voltage	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
K07CG-22	4 A	220 V		30.040.110	220	10
K07CG-22	4 A	48 V		30.040.109	220	10
K07CG-22	4 A	24 V		30.040.107	220	10
K07CGX-22	4 A	220 V		30.041.329	220	10
K07CGX-22	4 A	48 V		30.041.330	220	10
K07CGX-22	4 A	24 V		30.041.331	220	10
K07CG-31	4 A	220 V		30.040.106	220	10
K07CG-31	4 A	48 V		30.040.105	220	10
K07CG-31	4 A	24 V		30.040.103	220	10
K07CGX-31	4 A	220 V		30.041.332	220	10
K07CGX-31	4 A	48 V		30.041.333	220	10
K07CGX-31	4 A	24 V		30.041.334	220	10
K07CG-40	4 A	220 V		30.040.102	220	10
K07CG-40	4 A	48 V		30.040.101	220	10
K07CG-40	4 A	24 V		30.040.099	220	10
K07CGX-40	4 A	220 V		30.041.335	220	10
K07CGX-40	4 A	48 V		30.041.336	220	10
K07CGX-40	4 A	24 V		30.041.337	220	10



Motor contactors

AC-3 acc. to IEC/EN 60947-4-1 (4-pole, 45 mm widths)

DC

Type	Rated current I _e	Control voltage	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
K07MG-01	11.3 A	220 V		30.040.098	220	10
K07MG-01	11.3 A	48 V		30.040.097	220	10
K07MG-01	11.3 A	24 V		30.040.095	220	10
K07MGX-01	11.3 A	220 V		30.041.344	220	10
K07MGX-01	11.3 A	48 V		30.041.345	220	10
K07MGX-01	11.3 A	24 V		30.041.069	220	10
K08MG-01	15.5 A	220 V		30.041.347	220	10
K08MG-01	15.5 A	48 V		30.041.348	220	10
K08MG-01	15.5 A	24 V		30.041.349	220	10
K07MG-10	11.3 A	220 V		30.040.094	220	10
K07MG-10	11.3 A	48 V		30.040.093	220	10
K07MG-10	11.3 A	24 V		30.040.091	220	10
K07MGX-10	11.3 A	220 V		30.040.092	220	10
K07MGX-10	11.3 A	48 V		30.041.346	220	10
K07MGX-10	11.3 A	24 V		30.041.090	220	10
K08MG-10	15.5 A	220 V		30.041.350	220	10
K08MG-10	15.5 A	48 V		30.041.351	220	10
K08MG-10	15.5 A	24 V		30.041.352	220	10
K07MG-10/Sp4	11.3 A	220 V		30.041.068	220	10
K07MG-10/Sp4	11.3 A	48 V		30.041.287	220	10
K07MG-10/Sp4	11.3 A	24 V		30.040.703	220	10
K07MG-22/Sp4	10 A	220 V		30.041.243	220	10
K07MG-22/Sp4	10 A	48 V		30.041.339	220	10
K07MG-22/Sp4	10 A	24 V		30.041.105	220	10
K07MG-04/Sp4	11.3 A	220 V		30.041.340	220	10
K07MG-04/Sp4	11.3 A	48 V		30.041.341	220	10
K07MG-04/Sp4	11.3 A	24 V		30.041.140	220	10
K07MG-01/Sp4	11.3 A	220 V		30.041.070	220	10
K07MG-01/Sp4	11.3 A	48 V		30.041.342	220	10
K07MG-01/Sp4	11.3 A	24 V		30.041.343	220	10









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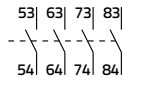
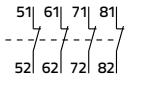
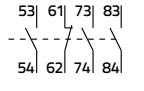
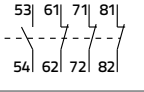
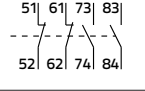
Snap-on auxiliary switch blocks

AC-15 acc. to IEC/EN 60947-5-1 (2-pole)

Type	Rated current I _n	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
ND2C-20	6 A		38.421.982	20	60
ND2C-02	6 A		38.421.984	20	60
ND2C-11	6 A		38.421.983	20	60
ND2M-20	6 A		38.423.465	20	60
ND2M-02	6 A		38.421.981	20	60
ND2M-11	6 A		38.421.980	20	60



AC-15 acc. to IEC/EN 60947-5-1 (4-pole)

Type	Rated current I _n	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
ND4C-40	6 A		38.421.975	36	40
ND4C-04	6 A		38.421.979	36	40
ND4C-31	6 A		38.421.976	36	40
ND4C-13	6 A		38.421.978	36	40
ND4C-22	6 A		38.421.977	36	40



Miniature contactors - Accessories

Snap-on auxiliary switch blocks

AC-15 acc. to IEC/EN 60947-5-1 (4-pole)

Type	Rated current I_n	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
ND4M-40	6 A		38.423.466	36	40
ND4M-04	6 A		38.423.467	36	40
ND4M-31	6 A		38.421.972	36	40
ND4M-13	6 A		38.421.974	36	40
ND4M-22	6 A		38.421.973	36	40



Mechanical interlock

Type	Ordering No.	Weight (g)	Packaging (pcs)
MB7	38.422.210	12	10



Adapter for pin connection

Type	Ordering No.	Weight (g)	Packaging (pcs)
LB7	38.552.323	16	10



RC suppressor

Type	Control voltage U_c	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
RC1-K0X	12 - 48 V		30.017.070	16	10
RC2-K0X	48 - 250 V		30.017.071	16	10
RC3-K0X	250 - 380 V		30.017.072	16	10
RC4-K0X	380 - 600 V		30.017.073	16	10



DI suppressor (for DC contactors)

Type	Control voltage U_c	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
DI-K0X	6 - 250 V		30.017.080	16	10



Rigid connecting kits

Type	Description	Ordering No.	Weight (g)	Packaging (pcs)
WK 1.1	For reversing switch, suitable for contactors: 2.2-5.5 kW (for miniature contactors K03, K07) (max. current 16 A)	655200013000	26	1
WK 1.2	For star-delta starters, suitable for contactors: 2.2-5.5 kW (for miniature contactors K03, K07) (max. current 16 A), 5 terminals in line (3 main terminals, 1 auxiliary terminal, 1 coil terminal)	655200017000	18	1



BR6 thermal overload relay

up to 14 A for K07 contactors

Type	Setting range (A)	Max. backup fuse for Coordination 1 (A)	Max. backup fuse for Coordination 2 (A)	Ordering No.	Weight (g)	Packaging (pcs)
BR6-0.16	0.11 ... 0.16	20	0.5	30.115.002	80	1
BR6-0.25	0.16 ... 0.25	20	1	30.115.003	80	1
BR6-0.4	0.25 ... 0.4	20	2	30.115.004	80	1
BR6-0.6	0.4 ... 0.6	20	2	30.115.005	80	1
BR6-0.9	0.6 ... 0.9	20	4	30.115.006	80	1
BR6-1.3	0.9 ... 1.3	20	4	30.115.007	80	1
BR6-1.9	1.3 ... 1.9	20	6	30.115.008	80	1
BR6-2.8	1.9 ... 2.8	20	6	30.115.013	80	1
BR6-4	2.8 ... 4	20	10	30.115.009	80	1
BR6-6	4 ... 6	20	10	30.115.010	80	1
BR6-9	6 ... 9	20	16	30.115.011	80	1
BR6-11	8 ... 11	25	20	30.115.014	80	1
BR6-14	11 ... 14	35	25	30.115.012	80	1
BR6-15.5	13 ... 15.5	35	25	30.115.019	80	1



Description of the operating means:

- **OFF:** NC contact 95-96 is opened while the pushbutton is pressed and held.
- **RESET:** both contacts (NO and NC) return to the normal position (contact 95-96 closes and 97-98 opens). Automatic (A) or manual (H) operation.
- **TEST:** both contacts (NO and NC) change state from the normal state (contact 95-96 opens, contact 97-98 closes) until RESET push-button is pressed (manual mode) or the TEST lever is held (automatic mode).

Ordering data

Standard control voltages and designations (AC)

V	24	42	48	110/125	220/240	380/415	440	500
50/60 Hz	B7	D7	E7	F7	M7	Q7	R7	S7

Standard control voltages and designations (DC)

V	12	24	48	60	72	110	125	220
	JD	BD	ED	ND	SD	FD	GD	MD

K07M - 01 - M7



Note:

The type designation and control voltage are stated when ordering the contactors. When ordering snap-on auxiliary switch blocks, only the type is stated.

Example: ND4M-22



Technical characteristics

Dimensions



TECHNICAL DATA

Type	Symbol	Unit	K03M	K07M K07MF K07MX	K07MG K07MGF K07MGX	K08MG	K08M
Standards			IEC/EN 60947-5-1, IEC 60947-4-1, UL 508				
Approvals			CE, UL, CSA, EAC			CE, EAC	
Module width		mm	35	45			
Number of poles			4				
Degree of protection			IP20				
Pollution degree			3				
Climatic conditions			95 % relative humidity				
Ambient temperature:							
open		°C	-20 ... +60				
closed		°C	-20 ... +45				
Storage temperature		°C	-30 ... +80				
Maximum altitude		m	2000				
U _i and U _e is reduced for 1.2 % and I _e for 0.4 % for every additional 100 m							
Number of contactors or switches side-by-side:							
<40 °C			no limitation				
(40 ... 55) °C							
Noise level (operation)		dB	30	30	20	20	30
Maximum operating frequency with no load		op. c./h	3.000				
Mechanical endurance		op. c.	10.000.000				
Weight		g	160	170	215	215	170
Contact reliability			≥17 V; ≥50 mA				
Power dissipation per pole		W	1.2				
Overload current withstand capability - 10 s			68	90.4	90.4	124	124
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	25				
Rated insulation voltage	U _i	V	690				
Rated impulse withstand voltage	U _{imp}	kV	6				
Rated operational voltage	U _e	V	690				
Rated frequency	f	Hz	50/60				
Thermal current	I _{th}	A	20				
Rated operational current for AC-1, AC-7a and AC-21	I _e	A	20				
Operational power for AC-1, AC-7a and AC-21:							
single-phase 230 V	P _e	kW	4.4				
three-phase 230 V			7.5				
three-phase 400 V			13				
three-phase 500 V			17.5				
three-phase 690 V			22				
Maximum operating frequency for AC-1, AC-7a and AC-21		op. c./h	600				
Electrical endurance for AC-1, AC-7a and AC-21		op. c.	200.000				
Rated operational current for AC-3, AC-3e, AC-7b and AC-23 (at 400 V)	I _e	A	8.5	11.3	11.3	15.5 (11.3*)	15.5 (11.3*)
Operational power for AC-3, AC-3e, AC-7b and AC-23:							
single-phase 230 V	P _e	kW	0.75	1.1	1.1	1.1	1.1
three-phase 230 V			2	3	3	3.7 (3*)	3.7 (3*)
three-phase 400 V			4	5.5	5.5	7.5 (5.5*)	7.5 (5.5*)
three-phase 500 V			4	5.5	5.5	5.5	5.5
three-phase 690 V			4	5.5	5.5	5.5	5.5
Maximum operating frequency for AC-3, AC-3e, AC-7b and AC-23		op. c./h	600				
Electrical endurance for AC-3, AC-3e, AC-7b and AC-23		op. c.	1.000.000				
Rated operational current for AC-4 (at 400 V)	I _e	A	/	5	5	5	5
Operational power for AC-4:							
three-phase 230 V	P _e	kW	/	0.75	0.75	0.75	0.75
three-phase 400 V			/	2.2	2.2	2.2	2.2
three-phase 500 V			/	1.5	1.5	1.5	1.5
three-phase 690 V			/	1.5	1.5	1.5	1.5
Maximum operating frequency for AC-4		op. c./h	300				
Electrical endurance for AC-4		op. c.	100.000				
Rated motor power according to standards UL and CSA:							
single-phase 115 V	P _e	HP	1/3	1/2	1/2	1/2	1/2
single-phase 230 V			3/4	1.5	1.5	1.5	1.5
three-phase 230 V			2	3	3	3	3
three-phase 460 V			3	5	5	5	5
three-phase 575 V			5	7.5	7.5	7.5	7.5

* It applies for AC-3e

Miniature contactors -

K03M, K07M, K07MF, K07MX, K07MG, K07MGF, K07MGX, K08M, K08MG



TECHNICAL DATA									
	Type	Symbol	Unit	K03M	K07M K07MF K07MX	K07MG K07MGF K07MGX	K08MG	K08M	
MAIN CIRCUIT	Switching of capacitors AC-6b and AC-7c (at 230 V)	C	µF				30		
	Maximum operating frequency for AC-6b and AC-7c		op. c./h				600		
	Electrical endurance for AC-6b and AC7c		op. c.				100.000		
	Terminal capacity: rigid (solid and stranded)	S	mm ²				0.75 ... 2.5		
	flexible						0.5 ... 2.5		
	Length of removed wire insulation		mm				10		
	Screw						M3.5		
	Screw head						PZ2		
Tightening torque		Nm				1.2			
AUXILIARY CIRCUIT	Power dissipation per pole		W				1.2		
	Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2						20		
	Rated insulation voltage	U _i	V				690		
	Rated operational current for AC-15: single-phase 230 V	I _e	A				6		
	single-phase 400 V						4		
	single-phase 500 V						2		
	single-phase 690 V						1		
	Maximum operating frequency for AC-15		op. c./h				1.200		
	Electrical endurance for AC-15		op. c.				1.000.000		
	Rated operational current for DC-13: 1 pole ... 24 V DC/110 V DC		A				4 / 0.25		
	Maximum operating frequency for DC-13		op. c./h				1.200		
	Terminal capacity: rigid (solid and stranded)	S	mm ²				0.75 ... 2.5		
	flexible						0.5 ... 2.5		
	Length of removed wire insulation		mm				10		
	Screw						M3.5		
Screw head						PZ2			
Tightening torque		Nm				1.2			
COIL	Range of control voltage for switch-on	U _c	%				85 ... 110		
	Range of control voltage for drop out	U _c	%	20 ... 75			10 ... 75	10 ... 75	20 ... 75
	Kind of voltage			AC			DC	DC	AC
	Standard control voltages	U _c	V	1)	2)	3)	3)	3)	2)
	Frequency of AC control voltage	f	Hz	50/60			/	/	50/60
	Control mode			remote control with U _c					
	Coil consumption: switch-on		VA/W	39/34			/	/	39/34
	operation			8.1/4			3	3	8.1/4
	Delays: make		ms	10 ... 15	10 ... 15	25 ... 30	25 ... 30	10 ... 15	
	brake			6 ... 15	5 ... 10	10 ... 25	10 ... 25	5 ... 10	
	Terminal capacity: rigid (solid and stranded)		mm ²				0.75 ... 2.5		
	flexible						0.5 ... 2.5		
	Length of removed wire insulation		mm				10		
	Screw						M3.5		
	Screw head						PZ2		
Tightening torque		Nm				1.2			
SAFETY	MTTF - Mean time to failure MTTF = 1/λ = B10/(0.1 n _{op})	AC-1 AC-3	h				5.000 25.000		
	MTTF _d - Mean time to failure dangerous MTTF _d = 1/λ _d = B10 _d /(0.1 n _{op})	AC-1 AC-3	h				6.666 33.333		
	B10 - Number of operating cycles until 10 % of devices fail	AC-1 AC-3	op. c.				150.000 750.000		
	B10 _d - Number of operating cycles until 10 % of device dangerous B10 _d = B10/ratio of dangerous failures	AC-1 AC-3	op. c.				200.000 1.000.000		
	λ - Failure rate λ = (0.1 n _{op})/B10	AC-1 AC-3	1/h				0.0002 0.00004		
	λ _d - Failure rate dangerous λ _d = (0.1 n _{op})/B10 _d	AC-1 AC-3	1/h				0.00015 0.00003		
	Ratio of dangerous failures		%				75		
	n _{op} - Operating cycles (operating cycles/h)		op. c./h				300		

1) 6,12,24,42,48,110/125,220/240,380/415,440/460,550 V

2) 6,12,24,42,48,110/125,220/240,380/415,440/460,500,690 V

3) 6,12,24,48,60,72,110,125,220,250 V

TECHNICAL DATA

Type	Symbol	Unit	K03C	K07C K07CF K07CX	K07CG K07CGF K07CGX
Standards			IEC/EN 60947-5-1, UL 508		
Approvals			CE, UL, CSA, EAC		
Module width		mm	35	45	
Number of poles			4		
Degree of protection			IP20		
Pollution degree			3		
Climatic conditions			95 % relative humidity		
Ambient temperature:					
open		°C	-20 ... +60		
closed		°C	-20 ... +45		
Storage temperature		°C	-30 ... +80		
Maximum altitude		m	2000		
U _i and U _e is reduced for 1.2 % and I _e for 0.4 % for every additional 100 m					
Number of contactors or switches side-by-side:					
<40 °C			no limitation		
(40 ... 55) °C					
Noise level (operation)		dB	30	30	20
Maximum operating frequency with no load		op. c./h	3.000		
Mechanical endurance		op. c.	10.000.000		
Weight		g	160	170	215
Contact reliability			≥17 V; ≥50 mA		
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	25		
Rated insulation voltage	U _i	V	690		
Rated impulse withstand voltage	U _{imp}	kV	6		
Rated operational voltage	U _e	V	690		
Rated frequency	f	Hz	50/60		
Thermal current	I _{th}	A	20		
Rated operational current for AC-1, AC-7a and AC-21	I _e	A	20		
Rated operational current for AC-15:					
single-phase 230 V	I _e	A	6		
single-phase 400 V			4		
single-phase 500 V			2		
single-phase 690 V			1		
Maximum operating frequency for AC-15		op. c./h	1.200		
Electrical endurance for AC-15		op. c.	1.000.000		
Rated operational current for DC-13:					
1 pole ... 24 V DC/110 V DC		A	4 / 0.25		
Maximum operating frequency for DC-13		op. c./h	1.200		
Terminal capacity:					
rigid (solid and stranded)	S	mm ²	0.75 ... 2.5		
flexible			0.5 ... 2.5		
Length of removed wire insulation		mm	10		
Screw			M3.5		
Screw head			PZ2		
Tightening torque		Nm	1.2		
Range of control voltage for switch-on	U _c	%	85 ... 110		
Range of control voltage for drop out	U _c	%	20 ... 75		10 ... 75
Kind of voltage			AC		DC
Standard control voltages	U _c	V	1)	2)	3)
Frequency of AC control voltage	f	Hz	50/60		/
Control mode			remote control with U _c		
Coil consumption:					
switch-on		VA/W	39/34		- / 3
operation		VA/W	8.1/4		- / 3
Delays:					
make		ms	10 ... 15	10 ... 15	25 ... 30
brake		ms	6 ... 15	5 ... 10	10 ... 25
Terminal capacity:					
rigid (solid and stranded)		mm ²	0.75 ... 2.5		
flexible			0.5 ... 2.5		
Length of removed wire insulation		mm	10		
Screw			M3.5		
Screw head			PZ2		
Tightening torque		Nm	1.2		

1) 6,12,24,42,48,110/125,220/240,380/415,440/460,550 V

2) 6,12,24,42,48,110/125,220/240,380/415,440/460,500,690 V

3) 6,12,24,48,60,72,110,125,220,250 V

Miniature contactors -

K03M, K07M, K07MF, K07MX, K07MG, K07MGF, K07MGX, K08M, K08MG



TECHNICAL DATA

Type	Symbol	Unit	K03C	K07C K07CF K07CX	K07CG K07CGF K07CGX
MTTF - Mean time to failure $MTTF = 1/\lambda = B10/(0.1 n_{op})$	AC-15 DC-13	h		12.500 10.000	
MTTF _d - Mean time to failure dangerous $MTTF_d = 1/\lambda_d = B10_d/(0.1 n_{op})$	AC-15 DC-13	h		16.666 13.333	
B10 - Number of operating cycles until 10 % of devices fail	AC-15 DC-13	op. c.		750.000 600.000	
B10 _d - Number of operating cycles until 10 % of device dangerous $B10_d = B10/\text{ratio of dangerous failures}$	AC-15 DC-13	op. c.		1.000.000 800.000	
λ - Failure rate $\lambda = (0.1 n_{op})/B10$	AC-15 DC-13	1/h		0.00008 0.0001	
λ_d - Failure rate dangerous $\lambda_d = (0.1 n_{op})/B10_d$	AC-15 DC-13	1/h		0.00006 0.000075	
Ratio of dangerous failures		%		75	
n_{op} - Operating cycles (operating cycles/h)		op. c./h		600	

Electrical endurance

Diagram 1

Electrical endurance of contactor relays and auxiliary contacts of motor contactors

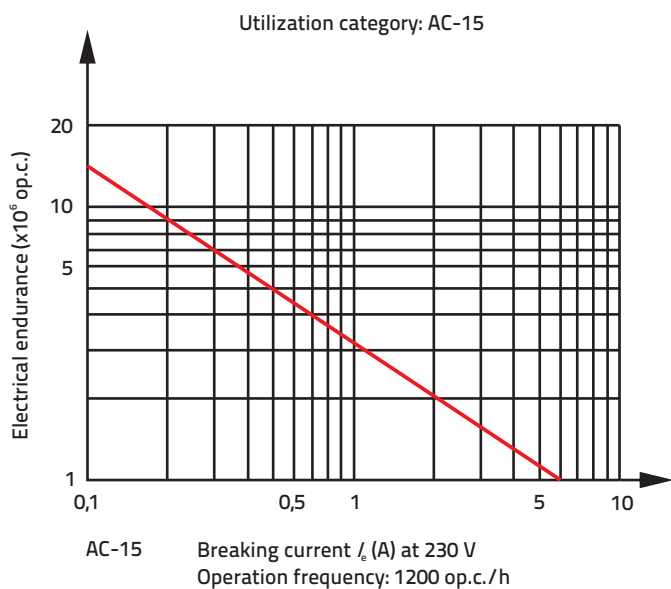
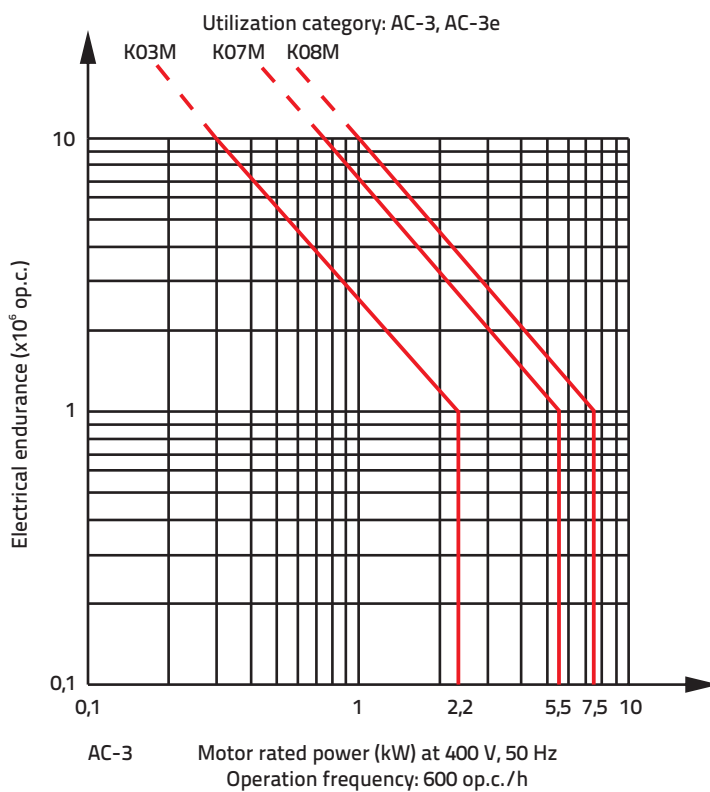
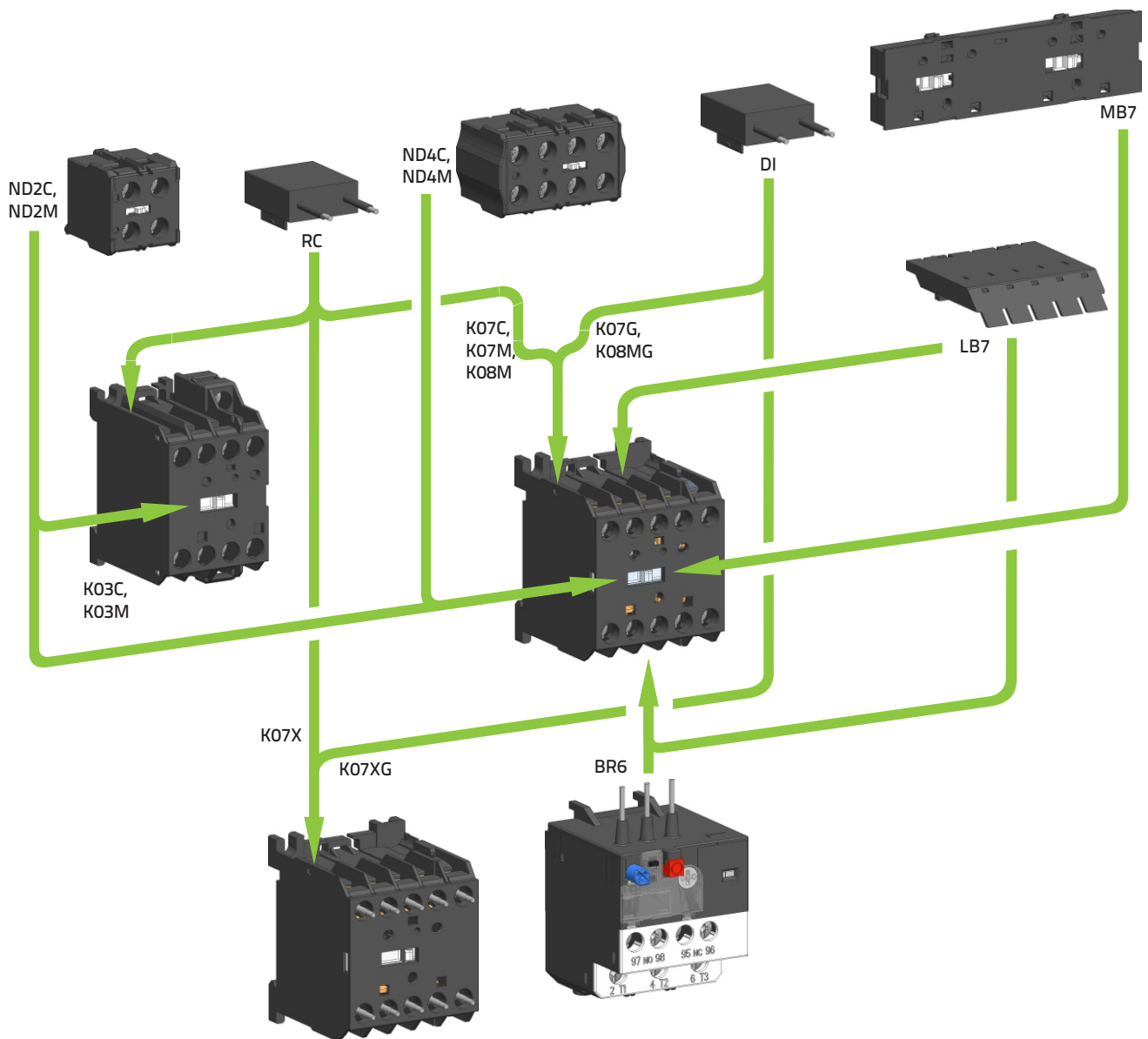


Diagram 2

Electrical endurance of main contacts of motor contactors



Mounting positions of accessories



Miniature contactors - Accessories



Snap-on auxiliary switch blocks

TECHNICAL DATA

		Symbol	Unit	ND2C ND2M	ND4C ND4M	
GENERAL	Type					
	Standards			IEC/EN 60947-5-1, VDE 0660, UL 508		
	Approvals			CE, UL, CSA		
	Module width			1	2	
	Number of poles			2	4	
	Degree of protection			IP20		
	Pollution degree			3		
	Maximum altitude <i>U_i</i> and <i>U_e</i> is reduced for 1.2 % and <i>I_e</i> for 0.4 % for every additional 100 m		m	2000		
	Maximum operating frequency with no load		op. c./h	3000		
	Mechanical endurance		op. c.	10.000.000		
Weight		g	20	40		
AUXILIARY CIRCUIT	Contact reliability			≥17 V; ≥50 mA		
	Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	20		
	Rated insulation voltage	<i>U_i</i>	V	690		
	Rated impulse withstand voltage	<i>U_{imp}</i>	kV	6		
	Rated operational voltage	<i>U_e</i>	V	690		
	Rated frequency	<i>f</i>	Hz	50 /60		
	Thermal current	<i>I_{th}</i>	A	20		
	Rated operational current for AC-15: single-phase 230 V single-phase 400 V single-phase 500 V single-phase 690 V			A	6	
					4	
					2	
					1	
	Maximum operating frequency for AC-15		op. c./h	1.200		
	Electrical endurance for AC-15		op. c.	500.000		
	Switching of auxiliary loads acc. to standard UL and CSA			A600, R300		
	Rated operational current for DC-13: 1 pole ... 24 V DC / 110 V DC		A	3 / 0.15		
	Maximum operating frequency for DC-13		op. c./h	1.200		
	Electrical endurance for DC-13		op. c.	500.000		
	Terminal capacity: rigid (solid and stranded) flexible	S	mm ²	0.75 ... 2.5		
				0.5 ... 2.5		
	Length of removed wire insulation		mm	10		
Screw			M3.5			
Screw head			PZ2			
Tightening torque		Nm	1.2			

Thermal overload relay BR6

TECHNICAL DATA

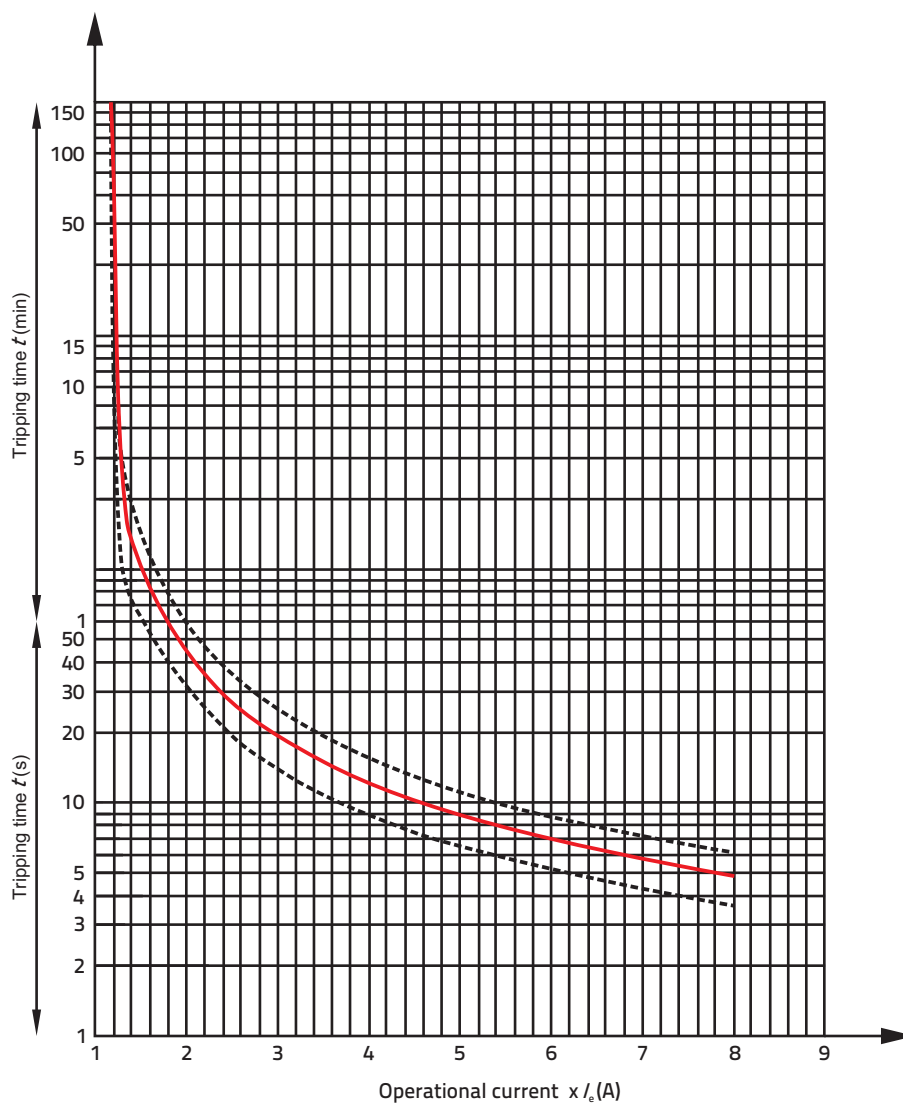
Type		Symbol	Unit	BR6	
GENERAL	Standards			IEC 60947-4-1, IEC 60947-5-1, UL508	
	Approvals			CE	
	For use with			K07	
	Degree of protection			IP20	
	Ambient temperature operating		°C	-25 ... +50	
	storage			-25 ... +70	
	Dimensions (WxHxD)		mm	44.8 x 70.6 x 50.6	
	Operating position			vertical	
	Reset type			auto, manual	
	Maximum altitude above sea level		m	2000	
Weight		g	80		
MAIN CIRCUIT	Rated insulation voltage	U_i	V	690	
	Rated impulse withstand voltage	U_{imp}	kV	6	
	Rated operational voltage	U_e	V	690	
	Adjustable current	I_r	A	0.1 ... 14	
	Rated frequency	f	Hz	0 ... 400	
	Overvoltage category / pollution degree acc. to IEC/EN 60947-1			III / 3	
	Trip class acc. to IEC/EN 60947-4-1			10	
	Temperature compensation range		°C	-5 ... +40	
	Sensitivity to phase failure			yes	
	Power loss at I_n	P	W	6	
	Terminal capacity		mm ²	0.75 ... 2.5	
	Conductor insulation stripping length		mm	9	
	Screw			M3.5	
Screw head			PZ2		
Tightening torque		Nm	1.2		
AUXILIARY CIRCUITS	Rated insulation voltage	U_i	V	690	
	Rated impulse withstand voltage	U_{imp}	kV	6	
	Rated operational voltage	U_e	V	AC: 500 ; DC: 230	
	Overvoltage category / pollution degree acc. to IEC/EN 60947-1			III / 3	
	Thermal current (both contacts)	I_{th}	A	6	
	Contact electrical rating			C600 / P600	
	Rated operational current AC-15				
	220/240 V	NO	I_e	A	0.5
	380/415 V				0.5
	500 V				0.3
	220/240 V	NC	I_e	A	1.5
	380/415 V				0.7
	500 V				0.5
Rated operational current DC-13					
220/240 V	both contacts	I_e	A	1.5	
380/415 V				0.7	
500 V				0.5	
Terminal capacity		mm ²		0.75 ... 2.5	
Conductor insulation stripping length		mm		9	
Screw				M3.5	
Screw head				PZ2	
Tightening torque		Nm		1	

Miniature contactors - Accessories

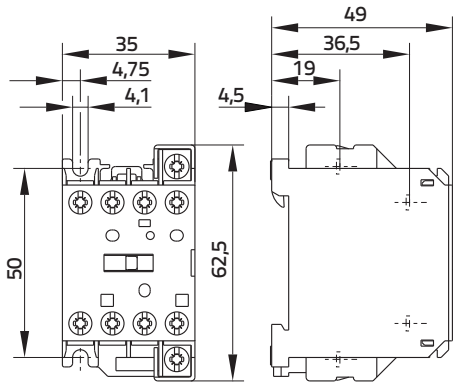
Setting ranges and maximum permitted back-up fuses

Setting range (A)	Max. back-up fuse gL/gG – for coordination 1 (A)	Max. back-up fuse gL/gG – for coordination 2 (A)
0.11 - 0.16	20	0.5
0.16 - 0.25	20	1
0.25 - 0.4	20	2
0.4 - 0.6	20	2
0.6 - 0.9	20	4
0.9 - 1.3	20	4
1.3 - 1.9	20	6
1.9 - 2.8	20	6
2.8 - 4	20	10
4 - 6	20	10
6 - 9	20	16
8 - 11	25	20
11 - 14	35	25
13 - 15.5	35	25

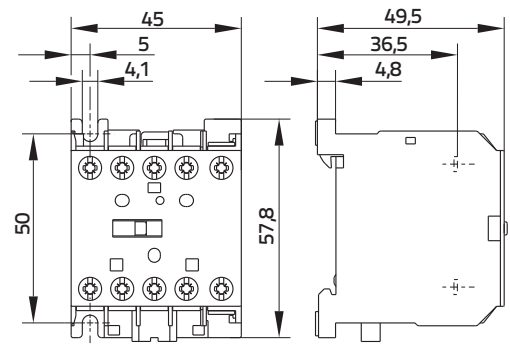
Tripping curve BR6



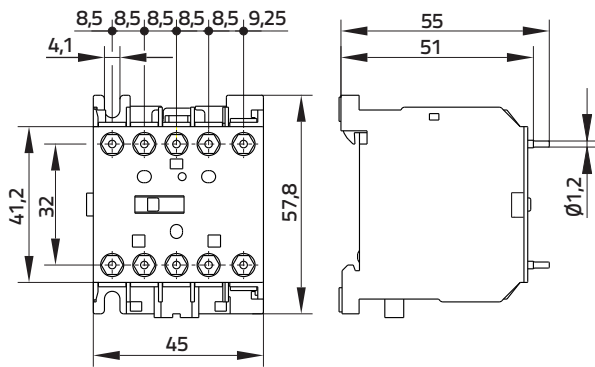
K03C, K03M, K03MX



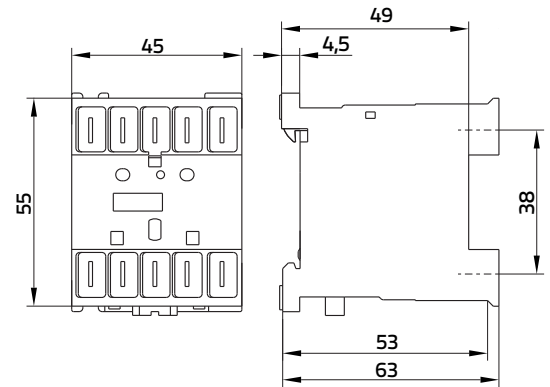
K07C, K07M, K08M, K07CG, K07MG, K08MG



K07CX, K07CGX, K07MX, K07MGX

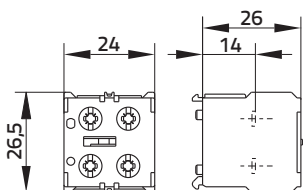


K07CF, K07MF, K07MGF, K07CGF



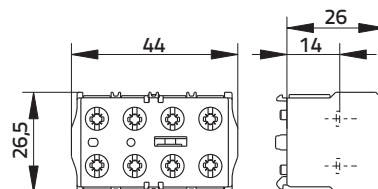
ND2

Two pole snap-on auxiliary switch blocks

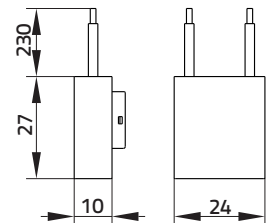


ND4

Four pole snap-on auxiliary switch blocks

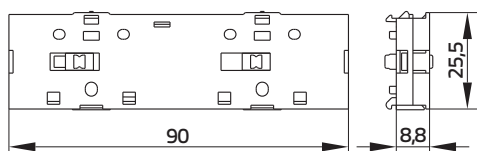


RC, DI suppressor



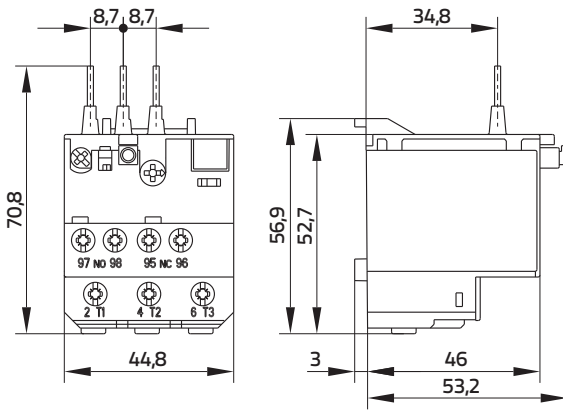
MB7

Mechanical interlock

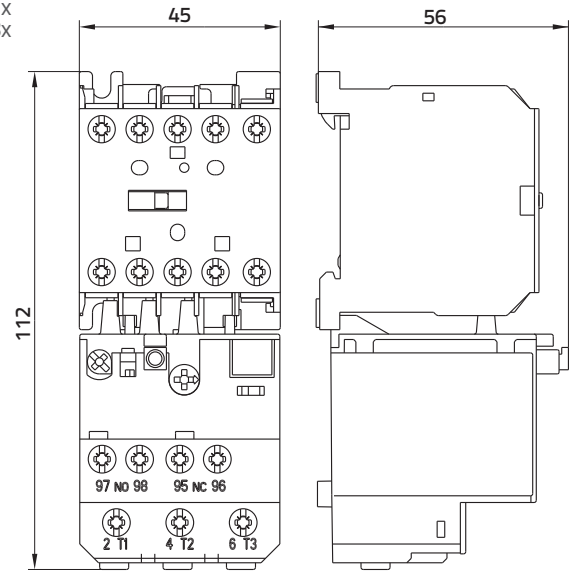


Miniature contactors - Dimensions

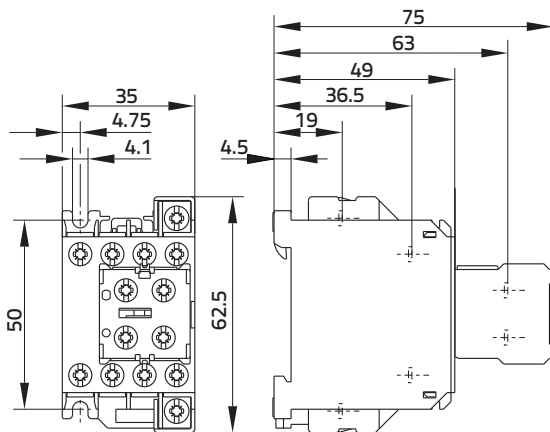
BR6
Thermal overload relay



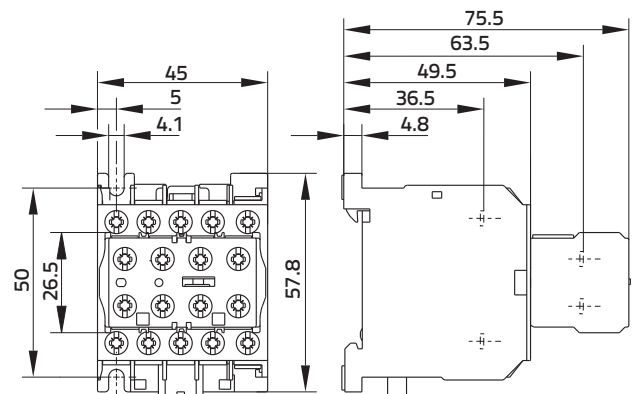
BR6 + K07x
BR6 + K08x



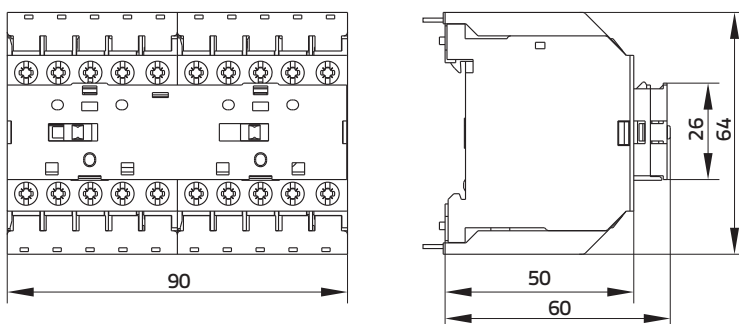
K03x + ND2



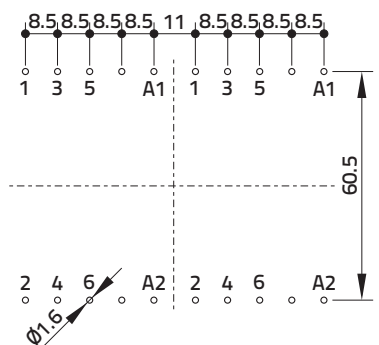
K07x + ND4
K08x + ND4



K07x + MB7 + LB7
K08x + MB7 + LB7



LB7 - raster





Contactors are an electrically controlled switch used for switching a power circuit.

For universal switching:

- All kind of motors
- Electric heating
- Lights and lightning
- Capacitor
- Other electrical loads

Advanced operation:

- Contactor combinations

Other benefits:

- High contact reliability at low voltages
- High electrical and mechanical endurance and high switching capacity
- Wide range of control voltages is available



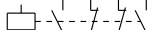
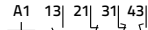
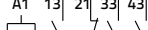
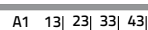
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Contactors relays

AC-15 acc. to IEC/EN 60947-5-1 (4-pole, 45 mm widths)

AC

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL6-22	4 A	380/415 V	A1 13 21 31 43	30.050.631	300	10
KNL6-22	4 A	220/240 V		30.050.486	300	10
KNL6-22	4 A	24 V	A2 14 22 32 44	30.050.619	300	10
KNL6-22ü	4 A	380/415 V	A1 13 21 31 43	30.051.046	300	10
KNL6-22ü	4 A	220/240 V		30.051.037	300	10
KNL6-22ü	4 A	24 V	A2 14 22 32 44	30.051.047	300	10
KNL6-31	4 A	380/415 V	A1 13 21 33 43	30.050.632	300	10
KNL6-31	4 A	220/240 V		30.050.469	300	10
KNL6-31	4 A	24 V	A2 14 22 34 44	30.050.620	300	10
KNL6-40	4 A	380/415 V	A1 13 23 33 43	30.050.700	300	10
KNL6-40	4 A	220/240 V		30.050.468	300	10
KNL6-40	4 A	24 V	A2 14 24 34 44	30.050.621	300	10



Motor contactors

AC-3 acc. to IEC/EN 60947-4-1 (4-pole, 45 mm widths)

AC

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL9-01	9 A	380/415 V	A1 1 3 5 21	30.050.639	300	10
KNL9-01	9 A	220/240 V		30.050.475	300	10
KNL9-01	9 A	24 V	A2 2 4 6 22	30.050.615	300	10
KNL9-10	9 A	380/415 V	A1 1 3 5 13	30.050.640	300	10
KNL9-10	9 A	220/240 V		30.050.474	300	10
KNL9-10	9 A	24 V	A2 2 4 6 14	30.050.616	300	10
KNL9-10/Sp4	9 A	380/415 V	A1 1 3 5 7	30.051.048	300	10
KNL9-10/Sp4	9 A	220/240 V		30.050.736	300	10
KNL9-10/Sp4	9 A	24 V	A2 2 4 6 8	30.051.049	300	10
KNL9-01/Sp4	9 A	380/415 V	A1 1 3 5 R7	30.051.050	300	10
KNL9-01/Sp4	9 A	220/240 V		30.051.051	300	10
KNL9-01/Sp4	9 A	24 V	A2 2 4 6 R8	30.051.052	300	10
KNL9-22/Sp4	10 A	380/415 V	A1 1 R3 R5 7	30.051.053	300	10
KNL9-22/Sp4	10 A	220/240 V		30.050.864	300	10
KNL9-22/Sp4	10 A	24 V	A2 2 R4 R6 8	30.051.054	300	10
KNL9-13/Sp4	9 A	380/415 V	A1 R1 R3 R5 7	30.051.055	300	10
KNL9-13/Sp4	9 A	220/240 V		30.051.056	300	10
KNL9-13/Sp4	9 A	24 V	A2 R2 R4 R6 8	30.051.057	300	10
KNL9-04/Sp4	9 A	380/415 V	A1 R1 R3 R5 R7	30.051.058	300	10
KNL9-04/Sp4	9 A	220/240 V		30.051.041	300	10
KNL9-04/Sp4	9 A	24 V	A2 R2 R4 R6 R8	30.051.059	300	10



Tags in title:

- ü - version with early and late contacts
- Sp4 - version with all four main contacts

Motor contactors

AC-3 acc. to IEC/EN 60947-4-1 (4-pole, 45 mm widths)

AC

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL12-01	12 A	380/415 V	A1 1 3 5 21	30.050.657	300	10
KNL12-01	12 A	220/240 V		30.050.656	300	10
KNL12-01	12 A	24 V	A2 2 4 6 22	30.050.648	300	10
KNL12-10	12 A	380/415 V	A1 1 3 5 13	30.050.658	300	10
KNL12-10	12 A	220/240 V		30.050.488	300	10
KNL12-10	12 A	24 V	A2 2 4 6 14	30.050.649	300	10
KNL12-10/Sp4	12 A	380/415 V	A1 1 3 5 7	30.051.060	300	10
KNL12-10/Sp4	12 A	220/240 V		30.050.735	300	10
KNL12-10/Sp4	12 A	24 V	A2 2 4 6 8	30.051.061	300	10
KNL12-01/Sp4	12 A	380/415 V	A1 1 3 5 R7	30.051.062	300	10
KNL12-01/Sp4	12 A	220/240 V		30.051.063	300	10
KNL12-01/Sp4	12 A	24 V	A2 2 4 6 R8	30.051.064	300	10
KNL12-22/Sp4	12 A	380/415 V	A1 1 R3 R5 7	30.051.065	300	10
KNL12-22/Sp4	12 A	220/240 V		30.050.039	300	10
KNL12-22/Sp4	12 A	24 V	A2 2 R4 R6 8	30.051.066	300	10
KNL12-13/Sp4	12 A	380/415 V	A1 R1 R3 R5 7	30.051.067	300	10
KNL12-13/Sp4	12 A	220/240 V		30.051.068	300	10
KNL12-13/Sp4	12 A	24 V	A2 R2 R4 R6 8	30.051.069	300	10
KNL12-04/Sp4	12 A	380/415 V	A1 R1 R3 R5 R7	30.051.070	300	10
KNL12-04/Sp4	12 A	220/240 V		30.051.071	300	10
KNL12-04/Sp4	12 A	24 V	A2 R2 R4 R6 R8	30.051.072	300	10



AC-3 acc. to IEC/EN 60947-4-1 (4-pole, 45 mm widths)

AC

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL16-01	16 A	380/415 V	A1 1 3 5 21	30.050.674	300	10
KNL16-01	16 A	220/240 V		30.050.673	300	10
KNL16-01	16 A	24 V	A2 2 4 6 22	30.050.665	300	10
KNL16-10	16 A	380/415 V	A1 1 3 5 13	30.050.675	300	10
KNL16-10	16 A	220/240 V		30.050.489	300	10
KNL16-10	16 A	24 V	A2 2 4 6 14	30.050.666	300	10
KNL16-10/Sp4	16 A	380/415 V	A1 1 3 5 7	30.050.999	300	10
KNL16-10/Sp4	16 A	220/240 V		30.050.807	300	10
KNL16-10/Sp4	16 A	24 V	A2 2 4 6 8	30.051.073	300	10
KNL16-01/Sp4	16 A	380/415 V	A1 1 3 5 R7	30.051.074	300	10
KNL16-01/Sp4	16 A	220/240 V		30.050.930	300	10
KNL16-01/Sp4	16 A	24 V	A2 2 4 6 R8	30.051.075	300	10
KNL16-22/Sp4	17 A	380/415 V	A1 1 R3 R5 7	30.051.076	300	10
KNL16-22/Sp4	17 A	220/240 V		30.050.860	300	10
KNL16-22/Sp4	17 A	24 V	A2 2 R4 R6 8	30.051.077	300	10
KNL16-13/Sp4	16 A	380/415 V	A1 R1 R3 R5 7	30.051.078	300	10
KNL16-13/Sp4	16 A	220/240 V		30.050.975	300	10
KNL16-13/Sp4	16 A	24 V	A2 R2 R4 R6 8	30.051.079	300	10
KNL16-04/Sp4	16 A	380/415 V	A1 R1 R3 R5 R7	30.051.080	300	10
KNL16-04/Sp4	16 A	220/240 V		30.050.834	300	10
KNL16-04/Sp4	16 A	24 V	A2 R2 R4 R6 R8	30.051.081	300	10
KNL16-10/St4	16 A	380/415 V	A1 1 3 5 7	30.051.082	300	10
KNL16-10/St4	16 A	220/240 V		30.050.984	300	10
KNL16-10/St4	16 A	24 V	A2 2 4 6 8	30.051.083	300	10
KNL16-01/St4	16 A	380/415 V	A1 1 3 5 R7	30.051.084	300	10
KNL16-01/St4	16 A	220/240 V		30.050.985	300	10
KNL16-01/St4	16 A	24 V	A2 2 4 6 R8	30.051.085	300	10



Tags in title:

- Sp4 - version with all four main contacts
- St4 - contactor for switching of capacitor banks

Motor contactors

AC-3 acc. to IEC/EN 60947-4-1 (4-pole, 45 mm widths)

AC

Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL18-01	18 A	380/415 V		30.050.838	300	10
KNL18-01	18 A	220/240 V		30.050.836	300	10
KNL18-01	18 A	24 V		30.050.925	300	10
KNL18-10	18 A	380/415 V		30.050.837	300	10
KNL18-10	18 A	220/240 V		30.050.835	300	10
KNL18-10	18 A	24 V		30.050.924	300	10
KNL18-10/Sp4	18 A	380/415 V		30.050.910	300	10
KNL18-10/Sp4	18 A	220/240 V		30.050.908	300	10
KNL18-10/Sp4	18 A	24 V		30.051.086	300	10
KNL18-01/Sp4	18 A	380/415 V		30.051.087	300	10
KNL18-01/Sp4	18 A	220/240 V		30.051.088	300	10
KNL18-01/Sp4	18 A	24 V		30.051.089	300	10
KNL18-22/Sp4	17 A	380/415 V		30.051.090	300	10
KNL18-22/Sp4	17 A	220/240 V		30.051.091	300	10
KNL18-22/Sp4	17 A	24 V		30.051.092	300	10
KNL18-13/Sp4	18 A	380/415 V		30.051.093	300	10
KNL18-13/Sp4	18 A	220/240 V		30.051.094	300	10
KNL18-13/Sp4	18 A	24 V		30.051.095	300	10
KNL18-04/Sp4	18 A	380/415 V		30.051.096	300	10
KNL18-04/Sp4	18 A	220/240 V		30.051.097	300	10
KNL18-04/Sp4	18 A	24 V		30.051.098	300	10

Tags in title: Sp4 - version with all four main contacts



AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 45 mm widths)

AC

Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL22-00	22 A	380/415 V		30.050.686	320	10
KNL22-00	22 A	220/240 V		30.050.470	320	10
KNL22-00	22 A	24 V		30.050.609	320	10



AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 45 mm widths)

AC

Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL30-00	30 A	380/415 V		30.050.694	320	10
KNL30-00	30 A	220/240 V		30.050.471	320	10
KNL30-00	30 A	24 V		30.050.690	320	10



AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 45 mm widths)

AC

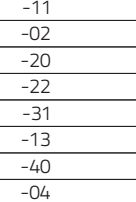
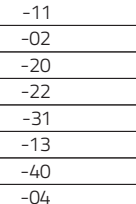
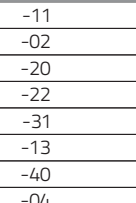
Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL38-00	38 A	380/415 V		30.051.099	320	10
KNL38-00	38 A	220/240 V		30.051.100	320	10
KNL38-00	38 A	24 V		30.051.101	320	10



Note: All versions KNL6(G)-KNL38(G) can be cabled with one (F1) or two (F2) pol faston interface. The limit when we use faston connection to the main circuit $I_{thmax} = 25$ A and $I_{enax} = 25$ A.

Snap-on auxiliary switch blocks

AC-15 acc. to IEC/EN 60947-5-1 (4-pole)

Type	Rated current I_e	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)	
NDL1 (for KNL6)	6 A		-11	38.422.827	66	10
			-02	38.422.828		
			-20	38.422.826		
			-22	38.422.850		
			-31	38.422.940		
			-13	38.422.939		
			-40	38.422.864		
-04	38.422.976					
NDL2 (for KNL9, KNL12, KNL16, KNL18)	6 A		-11	38.423.834	66	10
			-02	38.423.835		
			-20	38.423.457		
			-22	38.422.779		
			-31	38.422.754		
			-13	38.422.941		
			-40	38.422.780		
-04	38.422.781					
NDL3 (for KNL22, KNL30, KNL38)	6 A		-11	38.422.836	66	10
			-02	38.423.014		
			-20	38.423.470		
			-22	38.422.943		
			-31	38.422.851		
			-13	38.422.942		
			-40	38.423.390		
-04	38.423.374					



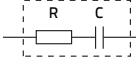
Auxiliary switch blocks

AC-15 acc. to IEC/EN 60947-5-1 (single pole for side mounting)

Type	Rated current I_e	Version	Ordering No.	Weight (g)	Packaging (pcs)
NPL1 (for KNL9-KNL18)	6 A	-10	38.422.751	18	1
NPL1 (for KNL9-KNL18)		-01	38.422.752		
NPL2 (for KNL22-KNL38)		-10	38.422.852		
NPL2 (for KNL22-KNL38)		-01	38.422.945		



RC suppressor (for KNL6 - KNL38)

Type	Control voltage U_c	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
RC1-KNL	12 - 48 V		30.017.074	16	10
RC2-KNL	48 - 250 V		30.017.075	16	10
RC3-KNL	250 - 380 V		30.017.076	16	10
RC4-KNL	380 - 600 V		30.017.077	16	10



Mechanical interlock

for KNL6 - KNL38

Type	Ordering No.	Weight (g)	Packaging (pcs)
MBL	38.422.853	14	10



Distance spacer

Type	Ordering No.	Weight (g)	Packaging (pcs)
DZ	37.421.996	2	10



Identification plate

Type	Ordering No.	Weight (g)	Packaging (pcs)
NT	37.425.330	1	10



Spare parts: AC coils (50/60 Hz) for KNL6 - KNL38

Type	Ordering No.	Weight (g)	Packaging (pcs)
24	38.502.343	60	1
42	38.502.346	60	1
48	38.502.347	60	1
110/125	38.502.348	60	1
220/240	38.502.272	60	1
380/415	38.502.349	60	1
440/460	38.502.585	60	1
480/520	38.502.470	60	1

Contactors KNL6-KNL38

Accessories



Rigid connecting kits

Type	Description	Ordering No.	Weight (g)	Packaging (pcs)
WK 2.1	For reversing switch, suitable for contactors: 4-9 kW (for contactors KNL9-KNL18) (max. current 32 A), 4 terminals in line (3 main terminals, 1 auxiliary terminal)	655200014000	40	1
WK 2.2	For star-delta starters, suitable for contactors: 4-9 kW (for contactors KNL9-KNL18) (max. current 32 A), 4 terminals in line (3 main terminals, 1 auxiliary terminal)	655200018000	50	
WK 4.1	For reversing switch, suitable for contactors: 11 and 18.5 kW (for contactors KNL22-KNL38) (max. current 40 A), 3 terminals in line (3 main terminals)	655200015000	50	
WK 4.2	For star-delta starters, suitable for contactors: 11 and 18.5 kW (for contactors KNL22, KNL38) (max. current 40 A), 3 terminals in line (3 main terminals)	655200019000	60	
WK 5.1	For reversing switch with mechanical interlock, suitable for contactors: 4-9 kW (for contactors KNL9-KNL18) (max. current 32 A), 4 terminals in line (3 main terminals, 1 auxiliary terminal)	655200016000	30	



WK 2.1

BR16 thermal overload relay

up to 20 A for KNL9-KNL18 contactors

Type	Setting range (A)	Max. backup fuse for Coordination 1 (A)	Ordering No.	Weight (g)	Packaging (pcs)
BR16-0.16	0.1 ... 0.16	1	786.050.481	115	1
BR16-0.25	0.16 ... 0.25	1	786.050.482		
BR16-0.4	0.25 ... 0.4	1	786.050.483		
BR16-0.5	0.35 ... 0.5	1	786.050.484		
BR16-0.63	0.45 ... 0.63	1	786.050.485		
BR16-0.8	0.55 ... 0.8	3	786.050.486		
BR16-1	0.75 ... 1	3	786.050.487		
BR16-1.3	0.9 ... 1.3	3	786.050.488		
BR16-1.6	1.1 ... 1.6	3	786.050.489		
BR16-2	1.4 ... 2	6	786.050.490		
BR16-2.5	1.8 ... 2.5	6	786.050.491		
BR16-3.2	2.3 ... 3.2	6	786.050.492		
BR16-4	2.9 ... 4	10	786.050.493		
BR16-4.8	3.5 ... 4.8	10	786.050.494		
BR16-6.3	4.5 ... 6.3	15	786.050.495		
BR16-7.5	5.5 ... 7.5	15	786.050.496		
BR16-10	7.2 ... 10	25	786.050.497		
BR16-12.5	9 ... 12.5	30	786.050.498		
BR16-16	11.3 ... 16	40	786.050.499		
BR16-20	15 ... 20	50	786.050.500		



BR30 thermal overload relay

up to 38 A for KNL22-KNL38 contactors

Type	Setting range (A)	Max. backup fuse for Coordination 1 (A)	Ordering No.	Weight (g)	Packaging (pcs)
BR30-21.5	17.5 ... 21.5	50	786.050.501	115	1
BR30-25	21 ... 25	60	786.050.502		
BR30-30	24.5 ... 30	70	786.050.503		
BR30-36	29 ... 36	60	786.050.532		
BR30-38	33 ... 38	70	786.050.533		



Connection module

for BR16 and BR30 thermal overload relays

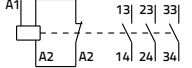
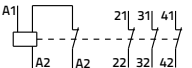
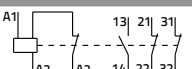
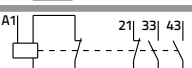
Type	Thermal current (A)	Ordering No.	Weight (g)	Packaging (pcs)
RP16	40	38.422.749	50	1



Contactor relays

AC-15 acc. to IEC/EN 60947-5-1 (3-pole, 45 mm widths)

DC

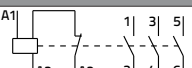
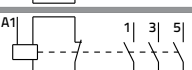
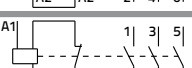
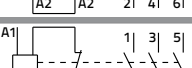
Type	Rated current I_n	Control voltage	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL6G-30	4 A	220 V		30.052.520	300	10
KNL6G-30	4 A	110 V		30.052.521	300	10
KNL6G-30	4 A	24 V		30.052.522	300	10
KNL6G-03	4 A	220 V		30.052.523	300	10
KNL6G-03	4 A	110 V		30.052.524	300	10
KNL6G-03	4 A	24 V		30.052.525	300	10
KNL6G-21	4 A	220 V		30.052.526	300	10
KNL6G-21	4 A	110 V		30.052.527	300	10
KNL6G-21	4 A	24 V		30.052.528	300	10
KNL6G-12	4 A	220 V		30.052.529	300	10
KNL6G-12	4 A	110 V		30.052.530	300	10
KNL6G-12	4 A	24 V		30.052.531	300	10



Motor contactors

AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 45 mm widths)

DC

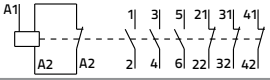
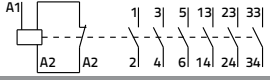
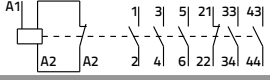
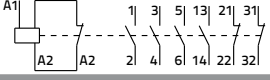
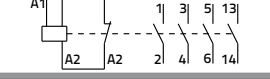
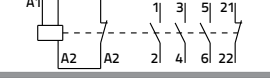
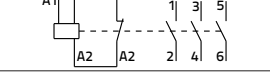
Type	Rated current I_n	Control voltage	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL9G-00	9 A	220 V		30.052.532	300	10
KNL9G-00	9 A	110 V		30.052.533	300	10
KNL9G-00	9 A	24 V		30.052.534	300	10
KNL12G-00	12 A	220 V		30.052.535	300	10
KNL12G-00	12 A	110 V		30.052.536	300	10
KNL12G-00	12 A	24 V		30.052.537	300	10
KNL16G-00	16 A	220 V		30.052.538	300	10
KNL16G-00	16 A	110 V		30.052.539	300	10
KNL16G-00	16 A	24 V		30.052.540	300	10
KNL18G-00	18 A	220 V		30.052.541	300	10
KNL18G-00	18 A	110 V		30.052.542	300	10
KNL18G-00	18 A	24 V		30.052.543	300	10



Motor contactors

AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 45 mm widths)

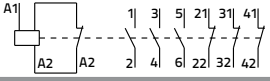
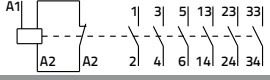
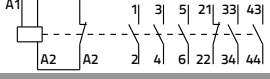
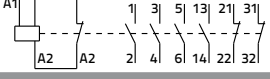
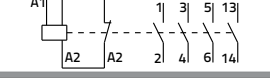
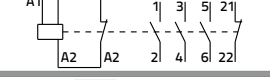
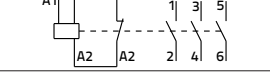
DC

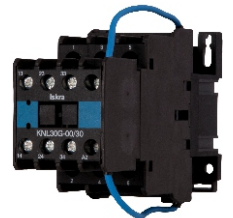
Type	Rated current I_n	Control voltage	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL22G-00 + NDLG-03	22 A	220 V		30.052.230	340	10
KNL22G-00 + NDLG-03	22 A	48 V		30.052.465	340	10
KNL22G-00 + NDLG-03	22 A	24 V		30.052.228	340	10
KNL22G-00 + NDLG-30	22 A	220 V		30.052.222	340	10
KNL22G-00 + NDLG-30	22 A	48 V		30.052.468	340	10
KNL22G-00 + NDLG-30	22 A	24 V		30.052.220	340	10
KNL22G-00 + NDLG-21	22 A	220 V		30.052.257	340	10
KNL22G-00 + NDLG-21	22 A	48 V		30.052.470	340	10
KNL22G-00 + NDLG-21	22 A	24 V		30.052.106	340	10
KNL22G-00 + NDLG-12	22 A	220 V		30.052.227	340	10
KNL22G-00 + NDLG-12	22 A	48 V		30.052.472	340	10
KNL22G-00 + NDLG-12	22 A	24 V		30.052.225	340	10
KNL22G-00 + NDLG-10	22 A	220 V		30.052.474	340	10
KNL22G-00 + NDLG-10	22 A	48 V		30.052.475	340	10
KNL22G-00 + NDLG-10	22 A	24 V		30.052.476	340	10
KNL22G-00 + NDLG-01	22 A	220 V		30.052.477	340	10
KNL22G-00 + NDLG-01	22 A	48 V		30.052.478	340	10
KNL22G-00 + NDLG-01	22 A	24 V		30.052.479	340	10
KNL22G-00 + NPLG ¹⁾	22 A	220 V		30.052.073	310	10
KNL22G-00 + NPLG ¹⁾	22 A	48 V		30.052.480	310	10
KNL22G-00 + NPLG ¹⁾	22 A	24 V		30.052.143	310	10



AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 45 mm widths)

DC

Type	Rated current I_n	Control voltage	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL30G-00 + NDLG-03	30 A	220 V		30.052.097	340	10
KNL30G-00 + NDLG-03	30 A	48 V		30.052.481	340	10
KNL30G-00 + NDLG-03	30 A	24 V		30.052.236	340	10
KNL30G-00 + NDLG-30	30 A	220 V		30.052.033	340	10
KNL30G-00 + NDLG-30	30 A	48 V		30.052.483	340	10
KNL30G-00 + NDLG-30	30 A	24 V		30.052.231	340	10
KNL30G-00 + NDLG-21	30 A	220 V		30.052.095	340	10
KNL30G-00 + NDLG-21	30 A	48 V		30.052.484	340	10
KNL30G-00 + NDLG-21	30 A	24 V		30.052.119	340	10
KNL30G-00 + NDLG-12	30 A	220 V		30.052.096	340	10
KNL30G-00 + NDLG-12	30 A	48 V		30.052.485	340	10
KNL30G-00 + NDLG-12	30 A	24 V		30.052.258	340	10
KNL30G-00 + NDLG-10	30 A	220 V		30.052.486	340	10
KNL30G-00 + NDLG-10	30 A	48 V		30.052.487	340	10
KNL30G-00 + NDLG-10	30 A	24 V		30.052.488	340	10
KNL30G-00 + NDLG-01	30 A	220 V		30.052.489	340	10
KNL30G-00 + NDLG-01	30 A	48 V		30.052.490	340	10
KNL30G-00 + NDLG-01	30 A	24 V		30.052.491	340	10
KNL30G-00 + NPLG ¹⁾	30 A	220 V		30.052.028	310	10
KNL30G-00 + NPLG ¹⁾	30 A	48 V		30.052.492	310	10
KNL30G-00 + NPLG ¹⁾	30 A	24 V		30.052.169	310	10



¹⁾ 57 mm widths

Motor contactors

AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 45 mm widths)

DC

Type	Rated current I _e	Control voltage	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL38G-00 + NDGL-03	38 A	220 V		30.052.493	340	10
KNL38G-00 + NDGL-03	38 A	48 V		30.052.494	340	10
KNL38G-00 + NDGL-03	38 A	24 V		30.052.495	340	10
KNL38G-00 + NDGL-30	38 A	220 V		30.052.496	340	10
KNL38G-00 + NDGL-30	38 A	48 V		30.052.497	340	10
KNL38G-00 + NDGL-30	38 A	24 V		30.052.498	340	10
KNL38G-00 + NDGL-21	38 A	220 V		30.052.499	340	10
KNL38G-00 + NDGL-21	38 A	48 V		30.052.500	340	10
KNL38G-00 + NDGL-21	38 A	24 V		30.052.501	340	10
KNL38G-00 + NDGL-12	38 A	220 V		30.052.502	340	10
KNL38G-00 + NDGL-12	38 A	48 V		30.052.503	340	10
KNL38G-00 + NDGL-12	38 A	24 V		30.052.504	340	10
KNL38G-00 + NDGL-10	38 A	220 V		30.052.505	340	10
KNL38G-00 + NDGL-10	38 A	48 V		30.052.506	340	10
KNL38G-00 + NDGL-10	38 A	24 V		30.052.507	340	10
KNL38G-00 + NDGL-01	38 A	220 V		30.052.508	340	10
KNL38G-00 + NDGL-01	38 A	48 V		30.052.509	340	10
KNL38G-00 + NDGL-01	38 A	24 V		30.052.510	340	10
KNL38G-00 + NPLG ¹⁾	38 A	220 V		30.052.511	310	10
KNL38G-00 + NPLG ¹⁾	38 A	48 V		30.052.512	310	10
KNL38G-00 + NPLG ¹⁾	38 A	24 V		30.052.513	310	10

Simultaneous application of NDGL+NPL and NDG+NPLG snap-on auxiliary switch blocks is available.

¹⁾ 57 mm widths



Ordering data

For contactors KNL6 - KNL38

Standard control voltages and designations (AC)

V	24	42	48	110/125	220/240	380/415	440	480/520
50/60 Hz	B7	D7	E7	F7	M7	Q7	R7	S7

For contactors KNL6G - KNL38G

Standard control voltages and designations (DC)

V	12	24	48	60	72	110	125	220	240
	JD	BD	ED	ND	SD	FD	GD	MD	MUD

KNL16 - 10 - M7

Control voltage
Version of contacts
Type

KNLG + NDL

KNL22G-00 - 22 - BD

Control voltage
NDL snap-on auxiliary switch block
Type

Spare parts: DC coils for KNL6G - KNL38G

Type	Ordering No.	Weight (g)	Packaging (pcs)
12	38.502.516	78	1
24	38.502.397	78	1
48	38.502.399	78	1
60	38.502.400	78	1
72	38.502.464	78	1
110	38.502.401	78	1
125	38.502.528	78	1
220	38.502.386	78	1
220	38.502.386	78	1
240	38.502.402	78	1

Note:

The type designation and control voltage are stated when ordering the contactors.



Technical characteristics

Dimensions



Contactors KNL6(G)

Contactors relays



TECHNICAL DATA

	Type	Symbol	Unit	KNL6	KNL6G
GENERAL	Standards			IEC/EN 60947-5-1, IEC 60947-4-1, UL 508	
	Approvals			CE, UL, CSA, EAC	CE, EAC
	Module width		mm	45	45
	Number of poles			4	
	Degree of protection			IP20	
	Pollution degree			3	
	Climatic conditions			95 % relative humidity	
	Ambient temperature:				
	open		°C	-20 ... +55	
	closed		°C	-20 ... +45	
	Storage temperature		°C	-30 ... +80	
	Maximum altitude		m	2000	
	U _i and U _e is reduced for 1.2 % and I _e for 0.4 % for every additional 100 m				
	Number of contactors or switches side-by-side:				
	<40 °C			no limitation	
	(40 ... 55) °C				
Noise level (operation)		dB	30	20	
Maximum operating frequency with no load		op. c./h	3.000		
Mechanical endurance		op. c.	10.000.000		
Weight		g	300	300	
Contact reliability			≥17 V; ≥50 mA		
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	20		
Rated insulation voltage	U _i	V	690		
Rated impulse withstand voltage	U _{imp}	kV	6		
Rated operational voltage	U _e	V	690		
Rated frequency	f	Hz	50/60		
Thermal current	I _{th}	A	20		
Rated operational current for AC-1, AC-7a and AC-21	I _e	A	20		
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	20		
Rated operational current for AC-15:					
single-phase 230 V	I _c	A	6		
single-phase 400 V			4		
single-phase 500 V			2		
single-phase 690 V			1		
Maximum operating frequency for AC-15		op. c./h	1.200		
Electrical endurance for AC-15		op. c.	1.000.000		
Rated operational current for DC-13:					
1 pole ... 24 V DC/48 V DC/60 V DC/110 V DC/220 V DC		A	10 / 6 / 4 / 0.9 / 0.4		
Maximum operating frequency for DC-13		op. c./h	1.200		
Terminal capacity:					
rigid (solid and stranded)	S	mm ²	0.75 ... 6		
flexible			0.5 ... 6		
Length of removed wire insulation		mm	10		
Screw			M3.5		
Screw head			PZ2		
Tightening torque		Nm	1.4		
Range of control voltage for switch-on	U _c	%	85 ... 110		
Range of control voltage for drop out	U _c	%	20 ... 75	10 ... 75	
Kind of voltage			AC	DC	
Standard control voltages	U _c	V	1)	2)	
Frequency of AC control voltage	f	Hz	50/60	/	
Control mode			remote control with U _c		
Coil consumption:					
switch-on		VA/W	66/48		
operation			8/2.5		
Delays:					
make	ms		10 ... 25		
brake			10 ... 15		
Terminal capacity:					
rigid (solid and stranded)	mm ²		0.75 ... 4		
flexible			0.75 ... 4		
Length of removed wire insulation		mm	10		
Screw			M3.5		
Screw head			PZ2		
Tightening torque		Nm	1.4		

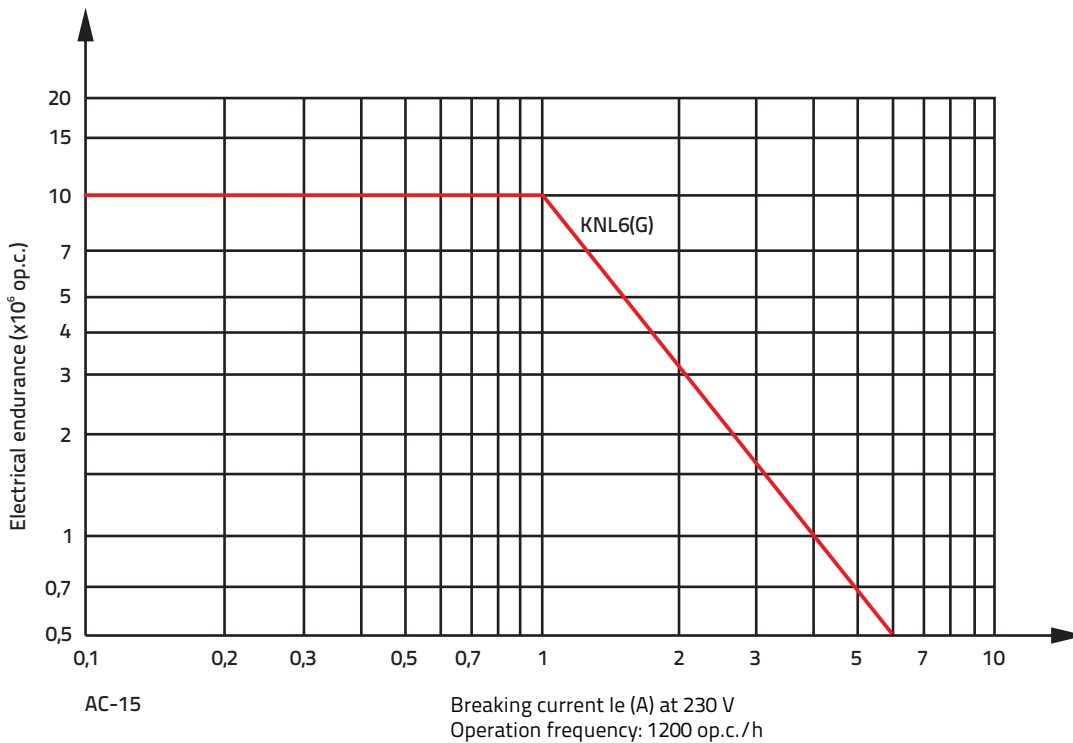
TECHNICAL DATA

Type	Symbol	Unit	KNL6	KNL6G	
SAFETY	MTTF - Mean time to failure $MTTF = 1/\lambda = B10/(0.1 n_{op})$	AC-15 DC-13	h	12.500 10.000	
	MTTF _d - Mean time to failure dangerous $MTTF_d = 1/\lambda_d = B10_d/(0.1 n_{op})$	AC-15 DC-13	h	16.666 13.333	
	B10 - Number of operating cycles until 10 % of devices fail	AC-15 DC-13	op. c.	750.000 600.000	
	B10 _d - Number of operating cycles until 10 % of device dangerous $B10_d = B10/\text{ratio of dangerous failures}$	AC-15 DC-13	op. c.	1.000.000 800.000	
	λ - Failure rate $\lambda = (0.1 n_{op})/B10$	AC-15 DC-13	1/h	0.00008 0.0001	
	λ_d - Failure rate dangerous $\lambda_d = (0.1 n_{op})/B10_d$	AC-15 DC-13	1/h	0.00006 0.000075	
	Ratio of dangerous failures		%	75	
	n_{op} - Operating cycles (operating cycles/h)		op. c./h	600	

Electrical endurance

Diagram 1

Electrical endurance of contactor relays



Contactors KNL9(G)-KNL12(G)

Motor contactors



TECHNICAL DATA

Type	Symbol	Unit	KNL9	KNL9G	KNL12	KNL12G
Standards			IEC/EN 60947-5-1, IEC 60947-4-1, UL 508			
Approvals			CE, UL, CSA, EAC	CE, EAC	CE, UL, CSA, EAC	CE, EAC
Module width		mm	45	45	45	45
Number of poles			4			
Degree of protection			IP20			
Pollution degree			3			
Climatic conditions			95 % relative humidity			
Ambient temperature:						
open		°C	-25 ... +55			
closed		°C	-25 ... +45			
Storage temperature		°C	-30 ... +80			
Maximum altitude		m	2000			
U _i and U _e is reduced for 1.2 % and I _e for 0.4 % for every additional 100 m						
Number of contactors or switches side-by-side:						
<40 °C			no limitation			
(40 ... 55) °C			no limitation			
Noise level (operation)		dB	30	20	30	20
Maximum operating frequency with no load		op. c./h	3.000			
Mechanical endurance		op. c.	10.000.000			
Weight		g	300	300	300	300
Contact reliability			≥17 V; ≥50 mA			
Power dissipation per pole		W	1.3			
Overload current withstand capability						
10 s		A	72	72	96	96
5 s		A	90	90	120	120
1 s		A	110	110	140	140
0.001 s		A	220	220	330	330
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	25			
Rated insulation voltage	U _i	V	690			
Rated impulse withstand voltage	U _{imp}	kV	6			
Rated operational voltage	U _e	V	690			
Rated frequency	f	Hz	50/60			
Thermal current	I _{th}	A	25			
Rated operational current for AC-1, AC-7a and AC-21	I _e	A	25			
Operational power for AC-1, AC-7a and AC-21:						
single-phase 230 V			5.5			
three-phase 230 V			9			
three-phase 400 V			16			
three-phase 500 V			20			
three-phase 690 V			28			
Maximum operating frequency for AC-1, AC-7a and AC-21		op. c./h	600			
Electrical endurance for AC-1, AC-7a and AC-21		op. c.	200.000			
Rated operational current for AC-3, AC-3e, AC-7b and AC-23 (at 400 V)	I _e	A	9	9	12	12
Operational power for AC-3, AC-3e, AC-7b and AC-23:						
single-phase 230 V			1.1	1.1	1.5	1.5
three-phase 230 V			2.2	2.2	3	3
three-phase 400 V			4	4	5.5	5.5
three-phase 500 V			5.5	5.5	5.5	5.5
three-phase 690 V			5.5	5.5	7.5	7.5
Maximum operating frequency for AC-3, AC-3e, AC-7b and AC-23		op. c./h	600			
Electrical endurance for AC-3, AC-3e, AC-7b and AC-23		op. c.	1.000.000			
Rated operational current for AC-4 (at 400 V)	I _e	A	3.6	3.6	4.9	4.9
Operational power for AC-4:						
three-phase 230 V			0.75	0.75	1.1	1.1
three-phase 400 V			1.5	1.5	2.2	2.2
three-phase 500 V			1.5	1.5	2.2	2.2
three-phase 690 V			1.5	1.5	2.2	2.2
Maximum operating frequency for AC-4		op. c./h	300			
Electrical endurance for AC-4		op. c.	300.000			
Rated motor power according to standards UL and CSA:						
single-phase 115 V			3/4	3/4 ¹⁾	1	1 ¹⁾
single-phase 230 V			1.5	1.5 ¹⁾	2	2 ¹⁾
three-phase 230 V			3	3 ¹⁾	3	3 ¹⁾
three-phase 460 V			5	5 ¹⁾	5	5 ¹⁾
three-phase 575 V			7.5	7.5 ¹⁾	7.5	7.5 ¹⁾
Electrical endurance for motors acc. to UL and CSA		op. c.	1.000.000			

¹⁾ No UL/CSA ratings; data only for indication and reference purposes only

TECHNICAL DATA

Type	Symbol	Unit	KNL9	KNL9G	KNL12	KNL12G
Switching of capacitors AC-6b and AC-7c (at 230 V)	C	μF	50	50	66	66
Maximum operating frequency for AC-6b and AC-7c		op. c./h	600			
Switching of capacitors AC-6b and AC-7c (at 230 V)		op. c.	100.000			
Rated operational current for DC-1 (L/R ≤ 1 ms):	I _e	A	15 / 6 / 4 18 / 12 / 8 20 / 15 / 10			
1 pole ... 24 V DC/ 110 V DC/ 220 V DC						
2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC						
3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC			20 / 15 / 10			
Maximum operating frequency for DC-1		op. c./h	300			
Rated operational current for DC-3 (L/R ≤ 2 ms):	I _e	A	12 / 2 / 0.75 15 / 8 / 1.5 18 / 12 / 6			
1 pole ... 24 V DC/ 110 V DC/ 220 V DC						
2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC						
3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC			18 / 12 / 6			
Maximum operating frequency for DC-3		op. c./h	300			
Rated operational current for DC-5 (L/R ≤ 7.5 ms):	I _e	A	12 / 2 / 0.75 15 / 8 / 1.5 18 / 12 / 6			
1 pole ... 24 V DC/ 110 V DC/ 220 V DC						
2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC						
3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC			18 / 12 / 6			
Maximum operating frequency for DC-5		op. c./h	300			
Terminal capacity:	S	mm ²	0.75 ... 6 0.5 ... 6			
rigid (solid and stranded)						
flexible			0.5 ... 6			
Length of removed wire insulation		mm	10			
Screw			M3.5			
Screw head			PZ2			
Tightening torque		Nm	1.4			
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	20			
Rated insulation voltage	U _i	V	690			
Rated operational current for AC-15:	I _e	A	6 4 2 1			
single-phase 230 V						
single-phase 400 V						
single-phase 500 V						
single-phase 690 V			1			
Maximum operating frequency for AC-15		op. c./h	1.200			
Electrical endurance for AC-15		op. c.	1.000.000			
Rated operational current for DC-13:	I _e	A	10 / 6 / 4 / 0.9 / 0.4			
1 pole ... 24 V DC/48 V DC/60 V DC/110 V DC/ 220 V DC						
Maximum operating frequency for DC-13						
Terminal capacity:	S	mm ²	0.75 ... 6 0.5 ... 6			
rigid (solid and stranded)						
flexible			0.5 ... 6			
Length of removed wire insulation		mm	10			
Screw			M3.5			
Screw head			PZ2			
Tightening torque		Nm	1.4			
Range of control voltage for switch-on	U _c	%	85 ... 110			
Range of control voltage for drop out	U _c	%	20 ... 75	10 ... 75	20 ... 75	10 ... 75
Kind of voltage			AC	DC	AC	DC
Standard control voltages	U _c	V	1)	2)	1)	2)
Frequency of AC control voltage	f	Hz	50/60	/	50/60	/
Control mode			remote control with U _c			
Coil consumption:		VA/W	66/48 -/110 66/48 -/110 8/2.5 -/3 8/2.5 -/3			
switch-on						
operation						
Delays:		ms	10 ... 25 10 ... 20 10 ... 25 10 ... 20 10 ... 15 5 ... 15 10 ... 15 5 ... 15			
make						
brake						
Terminal capacity:		mm ²	0.75 ... 4 0.5 ... 2.5			
rigid (solid and stranded)						
flexible			0.5 ... 2.5			
Length of removed wire insulation		mm	10			
Screw			M3.5			
Screw head			PZ2			
Tightening torque		Nm	1.4			

1) 12,24,48,110/125,220/240,380/415,440/460,480/520,550/600 V

2) 12,24,48,60,72,110,125,220,240 V

Contactors KNL9(G)-KNL12(G)

Motor contactors



TECHNICAL DATA

Type	Symbol	Unit	KNL9	KNL9G	KNL12	KNL12G	
SAFETY	MTTF - Mean time to failure $MTTF = 1/\lambda = B10/(0.1 n_{op})$	AC-1 AC-3	h	5.000			25.000
	MTTF _d - Mean time to failure dangerous $MTTF_d = 1/\lambda_d = B10_d/(0.1 n_{op})$	AC-1 AC-3	h	6.666			33.333
	B10 - Number of operating cycles until 10 % of devices fail	AC-1 AC-3	op. c.	150.000			750.000
	B10 _d - Number of operating cycles until 10 % of device dangerous $B10_d = B10/\text{ratio of dangerous failures}$	AC-1 AC-3	op. c.	200.000			1.000.000
	λ - Failure rate $\lambda = (0.1 n_{op})/B10$	AC-1 AC-3	1/h	0.0002			0.00004
	λ_d - Failure rate dangerous $\lambda_d = (0.1 n_{op})/B10_d$	AC-1 AC-3	1/h	0.00015			0.00003
	Ratio of dangerous failures		%	75			
	n_{op} - Operating cycles (operating cycles/h)		op. c./h	300			

TECHNICAL DATA

Type	Symbol	Unit	KNL16	KNL16G	KNL18	KNL18G
Standards			IEC/EN 60947-5-1, IEC 60947-4-1, UL 508			
Approvals			CE, UL, CSA, EAC	CE, EAC	CE, EAC	CE, EAC
Module width		mm	45	45	45	45
Number of poles			4			
Degree of protection			IP20			
Pollution degree			3			
Climatic conditions			95 % relative humidity			
Ambient temperature:						
open		°C	-25 ... +55			
closed		°C	-25 ... +45			
Storage temperature		°C	-30 ... +80			
Maximum altitude		m	2000			
U _i and U _e is reduced for 1.2 % and I _e for 0.4 % for every additional 100 m						
Number of contactors or switches side-by-side:						
<40 °C			no limitation			
(40 ... 55) °C						
Noise level (operation)		dB	30	20	30	20
Maximum operating frequency with no load		op. c./h	3.000			
Mechanical endurance		op. c.	10.000.000			
Weight		g	300	300	300	300
Contact reliability			≥17 V; ≥50 mA			
Power dissipation per pole			1.3	1.3	1.9	1.9
Overload current withstand capability						
10 s		A	128	128	144	144
5 s		A	150	150	170	170
1 s		A	180	180	200	200
0.001 s		A	450	450	500	500
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	35			
Rated insulation voltage	U _i	V	690			
Rated impulse withstand voltage	U _{imp}	kV	6			
Rated operational voltage	U _e	V	690			
Rated frequency	f	Hz	50/60			
Thermal current	I _{th}	A	25	25	32	32
Rated operational current for AC-1, AC-7a and AC-21	I _e	A	25	25	32	32
Operational power for AC-1, AC-7a and AC-21:						
single-phase 230 V			5.5		7	
three-phase 230 V			9		12	
three-phase 400 V			16		21	
three-phase 500 V			20		26	
three-phase 690 V			28		36	
Maximum operating frequency for AC-1, AC-7a and AC-21		op. c./h	600			
Electrical endurance for AC-1, AC-7a and AC-21		op. c.	200.000			
Rated operational current for AC-3, AC-3e, AC-7b and AC-23	I _e	A	16	16	18	18
Operational power for AC-3, AC-3e, AC-7b and AC-23:						
single-phase 230 V			2.2		2.2	
three-phase 230 V			4		4	
three-phase 400 V			7.5		9	
three-phase 500 V			7.5		9	
three-phase 690 V			7.5		9	
Maximum operating frequency for AC-3, AC-3e, AC-7b and AC-23		op. c./h	600			
Electrical endurance for AC-3, AC-3e, AC-7b and AC-23		op. c.	900.000		800.000	
Rated operational current for AC-4	I _e	A	6.5	6.5	6.5	6.5
Operational power for AC-4:						
three-phase 230 V			1.5		1.5	
three-phase 400 V			3		3	
three-phase 500 V			3		3	
three-phase 690 V			3		3	
Maximum operating frequency for AC-4		op. c./h	300			
Electrical endurance for AC-4		op. c.	300.000			
Rated motor power according to standards UL and CSA:						
single-phase 115 V			1.5 ¹⁾		1.5 ¹⁾	
single-phase 230 V			3 ¹⁾		3 ¹⁾	
three-phase 230 V			5 ¹⁾		5 ¹⁾	
three-phase 460 V			7.5 ¹⁾		7.5 ¹⁾	
three-phase 575 V			10 ¹⁾		10 ¹⁾	
Electrical endurance for motors acc. to UL and CSA		op. c.	900.000		800.000	

¹⁾ No UL/CSA ratings; data only for indication and reference purposes only

Contactors KNL16(G)-KNL18(G)

Motor contactors



TECHNICAL DATA

Type	Symbol	Unit	KNL16	KNL16G	KNL18	KNL18G
Switching of capacitors AC-6b and AC-7c (at 230 V)	C	μF	88 (300 for KNL16St4)	88	100	100
Maximum operating frequency for AC-6b and AC-7c		op. c./h	600			
Switching of capacitors AC-6b and AC-7c (at 230 V)		op. c.	100.000			
Rated operational current for DC-1 (L/R ≤ 1 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I _e	A	15 / 6 / 4 18 / 12 / 8 20 / 15 / 10			
Maximum operating frequency for DC-1		op. c./h	300			
Rated operational current for DC-3 (L/R ≤ 2 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I _e	A	12 / 2 / 0.75 15 / 8 / 1.5 18 / 12 / 6			
Maximum operating frequency for DC-3		op. c./h	300			
Rated operational current for DC-5 (L/R ≤ 7.5 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I _e	A	12 / 2 / 0.75 15 / 8 / 1.5 18 / 12 / 6			
Maximum operating frequency for DC-5		op. c./h	300			
Terminal capacity: rigid (solid and stranded) flexible	S	mm ²	0.75 ... 6 0.5 ... 6			
Length of removed wire insulation		mm	10			
Screw			M3.5			
Screw head			PZ2			
Tightening torque		Nm	1.4			
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	20			
Rated insulation voltage	U _i	V	690			
Rated operational current for AC-15: single-phase 230 V single-phase 400 V single-phase 500 V single-phase 690 V	I _e	A	6 4 2 1			
Maximum operating frequency for AC-15		op. c./h	1.200			
Electrical endurance for AC-15		op. c.	1.000.000			
Rated operational current for DC-13: 1 pole ... 24 V DC/48 V DC/60 V DC/110 V DC/ 220 V DC		A	10 / 6 / 4 / 0.9 / 0.4			
Maximum operating frequency for DC-13		op. c./h	1.200			
Terminal capacity: rigid (solid and stranded) flexible	S	mm ²	0.75 ... 6 0.5 ... 6			
Length of removed wire insulation		mm	10			
Screw			M3.5			
Screw head			PZ2			
Tightening torque		Nm	1.4			
Range of control voltage for switch-on	U _c	%	85 ... 110			
Range of control voltage for drop out	U _c	%	20 ... 75	10 ... 75	20 ... 75	10 ... 75
Kind of voltage			AC	DC	AC	DC
Standard control voltages	U _c	V	1)	2)	1)	2)
Frequency of AC control voltage	f	Hz	50/60	/	50/60	/
Control mode			remote control with U _c			
Coil consumption: switch-on operation		VA/W	66/48 8/2.5	-/110 -/3	66/48 8/2.5	-/110 -/3
Delays: make brake		ms	10 ... 25 10 ... 15	10 ... 20 5 ... 15	10 ... 25 10 ... 15	10 ... 20 5 ... 15
Terminal capacity: rigid (solid and stranded) flexible		mm ²	0.75 ... 4 0.75 ... 4			
Length of removed wire insulation		mm	10			
Screw			M3.5			
Screw head			PZ2			
Tightening torque		Nm	1.4			

1) 12,24,48,110/125,220/240,380/415,440/460,480/520,550/600 V

2) 12,24,48,60,72,110,125,220,240 V

TECHNICAL DATA

Type	Symbol	Unit	KNL16	KNL16G	KNL18	KNL18G	
SAFETY	MTTF - Mean time to failure $MTTF = 1/\lambda = B10/(0.1 n_{op})$	AC-1 AC-3	h	5.000			
	MTTF _d - Mean time to failure dangerous $MTTF_d = 1/\lambda_d = B10_d/(0.1 n_{op})$	AC-1 AC-3	h	22.500		20.000	
	B10 - Number of operating cycles until 10 % of devices fail	AC-1 AC-3	op. c.	150.000			
	B10 _d - Number of operating cycles until 10 % of device dangerous $B10_d = B10/\text{ratio of dangerous failures}$	AC-1 AC-3	op. c.	675.000		600.000	
	λ - Failure rate $\lambda = (0.1 n_{op})/B10$	AC-1 AC-3	1/h	0.0002			
	λ_d - Failure rate dangerous $\lambda_d = (0.1 n_{op})/B10_d$	AC-1 AC-3	1/h	0.000044		0.00005	
	Ratio of dangerous failures		%	75			
	n_{op} - Operating cycles (operating cycles/h)		op. c./h	300			
				0.00003			0.00015
				0.00003			0.00004

Contactors KNL22(G)-KNL38(G)

Motor contactors



TECHNICAL DATA

	Type	Symbol	Unit	KNL22	KNL22G	KNL30	KNL30G	KNL38	KNL38G	
					NPLG/NDLG		NPLG/NDLG		NPLG/NDLG	
Standards				IEC/EN 60947-5-1, IEC 60947-4-1, UL 508						
Approvals				CE, UL, CSA, EAC	CE, EAC	CE, UL, CSA, EAC	CE, EAC	CE, EAC	CE, EAC	
Module width		mm		45	56/45	45	56/45	45	56/45	
Number of poles				3						
Degree of protection				IP20						
Pollution degree				3						
Climatic conditions				95 % relative humidity						
Ambient temperature:										
open		°C		-25 ... +55						
closed		°C		-25 ... +45						
Storage temperature		°C		-30 ... +80						
Maximum altitude		m		2000						
U _i and U _e is reduced for 1.2 % and I _e for 0.4 % for every additional 100 m										
Number of contactors or switches side-by-side:										
<40 °C				no limitation						
(40 ... 55) °C				no limitation						
Noise level (operation)		dB		30	20	30	20	30	20	
Maximum operating frequency with no load		op. c./h		3.000						
Mechanical endurance		op. c.		10.000.000						
Weight		g		320	360/410	320	360/410	320	360/410	
Contact reliability				≥17 V; ≥50 mA						
Power dissipation per pole		W		2.3	2.3	2.3	2.3	2.3	2.3	
Overload current withstand capability										
10 s		A		176	176	240	240	304	304	
5 s		A		220	220	280	280	320	320	
1 s		A		250	250	330	330	350	350	
0.001 s		A		600	600	900	900	900	900	
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A		50						
Rated insulation voltage	U _i	V		1000						
Rated impulse withstand voltage	U _{imp}	kV		6						
Rated operational voltage	U _e	V		1000						
Rated frequency	f	Hz		50/60						
Thermal current	I _{th}	A		35	35	35	35	45	45	
Rated operational current for AC-1, AC-7a and AC-21	I _e	A		35	35	35	35	45	45	
Operational power for AC-1, AC-7a and AC-21:										
single-phase 230 V	P _e	kW		8				10		
three-phase 230 V			13				17			
three-phase 400 V			23				29			
three-phase 500 V			28				37			
three-phase 690 V			40				50			
Maximum operating frequency for AC-1, AC-7a and AC-21		op. c./h		600						
Electrical endurance for AC-1, AC-7a and AC-21		op. c.		200.000						
Rated operational current for AC-3, AC-3e, AC-7b and AC-23 (at 400 V)	I _e	A		22	22	30	30	38	38	
Operational power for AC-3, AC-3e, AC-7b and AC-23:										
single-phase 230 V	P _e	kW		2.2	2.2	3.7	3.7	4	4	
three-phase 230 V			5.5	5.5	7.5	7.5	8	8		
three-phase 400 V			11	11	15	15	18.5	18.5		
three-phase 500 V			11	11	15	15	15	15		
three-phase 690 V			11	11	15	15	15	15		
three-phase 1000 V			11	11	15	15	15	15		
Maximum operating frequency for AC-3, AC-3e, AC-7b and AC-23		op. c./h		600						
Electrical endurance for AC-3, AC-3e, AC-7b and AC-23		op. c.		800.000			400.000			
Rated operational current for AC-4 (at 400 V)	I _e	A		7.7	7.7	12.5	12.5	14	14	
Operational power for AC-4:										
three-phase 230 V	P _e	kW		2.2	2.2	4	4	4.5	4.5	
three-phase 400 V			4	4	6.5	6.5	7.5	7.5		
three-phase 500 V			4	4	6.5	6.5	6.5	6.5		
three-phase 690 V			4	4	6.5	6.5	6.5	6.5		
Maximum operating frequency for AC-4		op. c./h		300						
Electrical endurance for AC-4		op. c.		300.000			250.000		200.000	
Rated motor power according to standards UL and CSA:										
single-phase 115 V	P _e	HP		2	2 ¹⁾	2	2 ¹⁾	2	2 ¹⁾	
single-phase 230 V			3	3 ¹⁾	5	5 ¹⁾	5	5 ¹⁾		
three-phase 230 V			7.5	7.5 ¹⁾	10	10 ¹⁾	10	10 ¹⁾		
three-phase 460 V			15	15 ¹⁾	20	20 ¹⁾	20	20 ¹⁾		
three-phase 575 V			15	15 ¹⁾	20	20 ¹⁾	20	20 ¹⁾		
Electrical endurance for motors acc. to UL and CSA		op. c.		800.000			400.000			

TECHNICAL DATA

Type	Symbol	Unit	KNL22	KNL22G NPLG/NDLG	KNL30	KNL30G NPLG/NDLG	KNL38	KNL38G NPLG/NDLG
Switching of capacitors AC-6b and AC-7c (at 230 V)	C	μF	220	220	330	330	350	350
Maximum operating frequency for AC-6b and AC-7c		op. c./h	600					
Switching of capacitors AC-6b and AC-7c (at 230 V)		op. c.	100.000					
Rated operational current for DC-1 (L/R ≤ 1 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I _e	A	28 / 7 / 4 30 / 23 / 13 32 / 25 / 20					
Maximum operating frequency for DC-1		op. c./h	300					
Rated operational current for DC-3 (L/R ≤ 2 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I _e	A	18 / 2 / 1 23 / 13 / 2 28 / 18 / 9					
Maximum operating frequency for DC-3		op. c./h	300					
Rated operational current for DC-5 (L/R ≤ 7.5 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I _e	A	18 / 2 / 1 23 / 13 / 2 28 / 18 / 9					
Maximum operating frequency for DC-5		op. c./h	300					
Terminal capacity: rigid (solid and stranded) flexible	S	mm ²	2.5 ... 10 1.5 ... 10					
Length of removed wire insulation		mm	10					
Screw			M4					
Screw head			PZ2					
Tightening torque		Nm	1.8					
Range of control voltage for switch-on	U _c	%	85 ... 110					
Range of control voltage for drop out	U _c	%	20 ... 75	10 ... 75	20 ... 75	10 ... 75	20 ... 75	10 ... 75
Kind of voltage			AC	DC	AC	DC	AC	DC
Standard control voltages	U _c	V	1)	2)	1)	2)	1)	2)
Frequency of AC control voltage	f	Hz	50/60	/	50/60	/	50/60	/
Control mode			remote control with U _c					
Coil consumption: switch-on operation		VA/W	66/48 8/2.5	-/110 -/3	66/48 8/2.5	-/110 -/3	66/48 8/2.5	-/110 -/3
Delays: make brake		ms	10 ... 20 5 ... 15	15 ... 20 5 ... 10	10 ... 20 5 ... 15	15 ... 20 5 ... 10	10 ... 20 5 ... 15	15 ... 20 5 ... 10
Terminal capacity: rigid (solid and stranded) flexible		mm ²	0.75 ... 4 0.5 ... 2.5					
Length of removed wire insulation		mm	10					
Screw			M3.5					
Screw head			PZ2					
Tightening torque		Nm	1.4					
MTTF - Mean time to failure MTTF = 1/λ = B10/(0.1 n _{op})	AC-1 AC-3	h	20.000		5.000 10.000			
MTTF _d - Mean time to failure dangerous MTTF _d = 1/λ _d = B10 _d /(0.1 n _{op})	AC-1 AC-3	h	26.666		6.666 13.333			
B10 - Number of operating cycles until 10 % of devices fail	AC-1 AC-3	op. c.	600.000		150.000 300.000			
B10 _d - Number of operating cycles until 10 % of device dangerous B10 _d = B10/ratio of dangerous failures	AC-1 AC-3	op. c.	800.000		200.000 400.000			
λ - Failure rate λ = (0.1 n _{op})/B10	AC-1 AC-3	1/h	0.00005		0.0002 0.0001			
λ _d - Failure rate dangerous λ _d = (0.1 n _{op})/B10 _d	AC-1 AC-3	1/h	0.00004		0.00015 0.000075			
Ratio of dangerous failures		%	75					
n _{op} - Operating cycles (operating cycles/h)		op. c./h	300					

1) 12,24,48,110/125,220/240,380/415,440/460,480/520,550/600 V

2) 12,24,48,60,72,110,125,220,240 V

Electrical endurance

Diagram 2

Electrical endurance of motor contactors KNL9(G) - KNL38(G) – AC-3, AC-3e

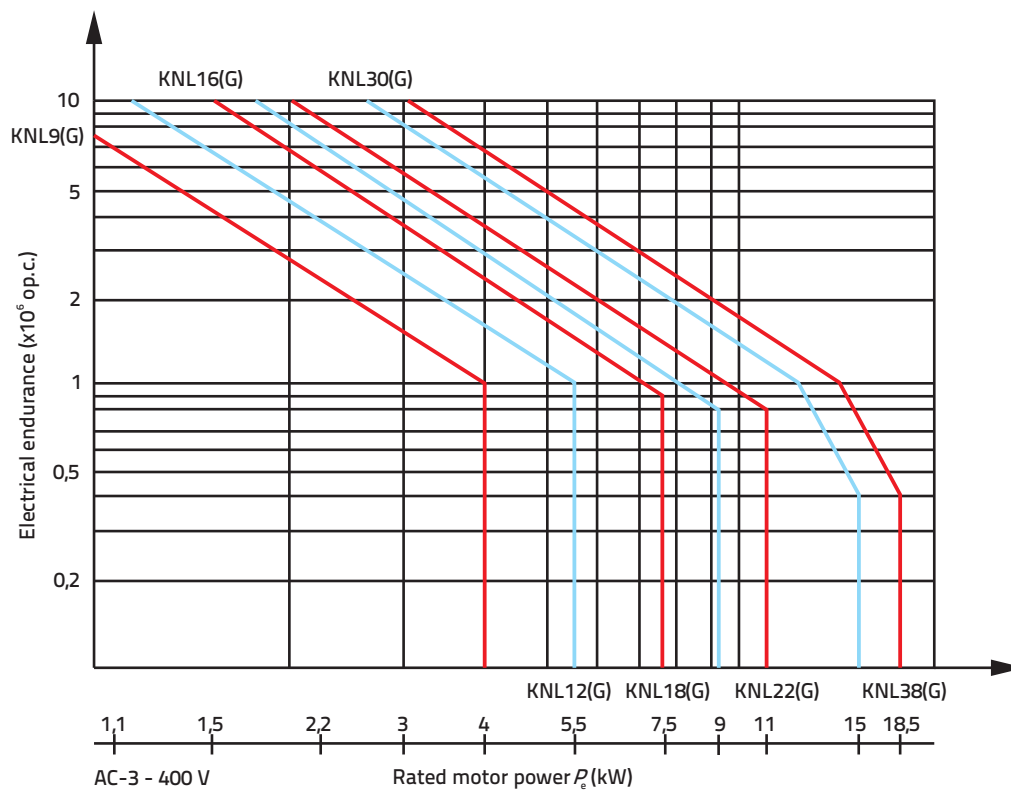
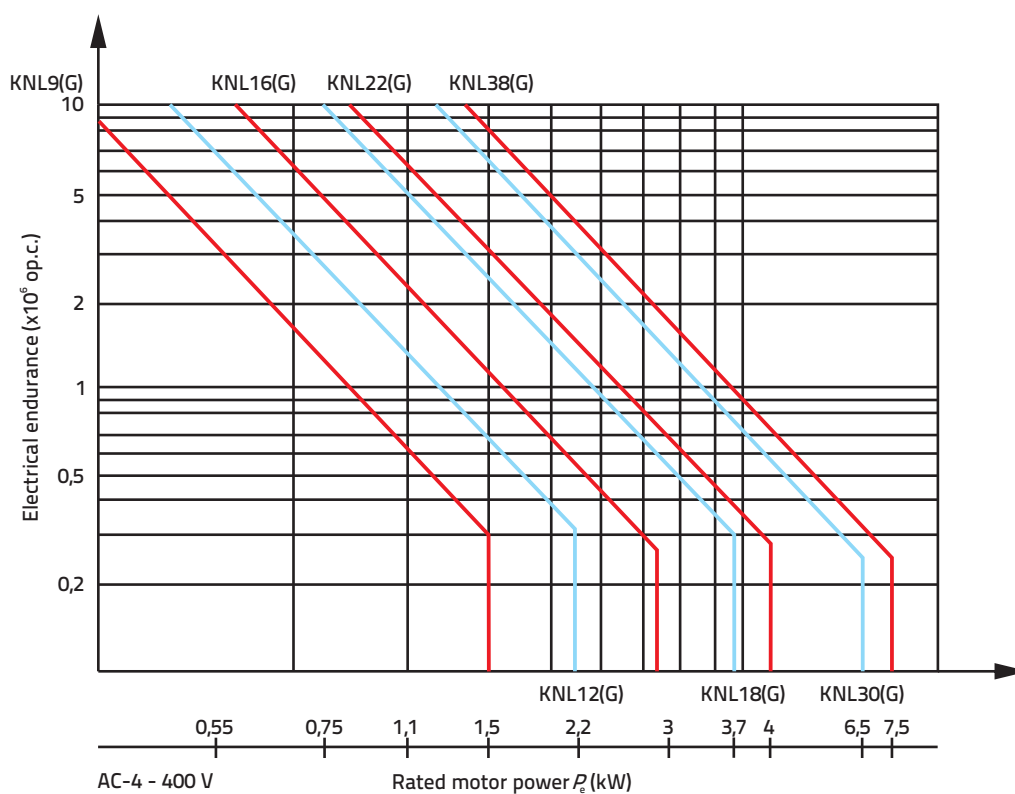
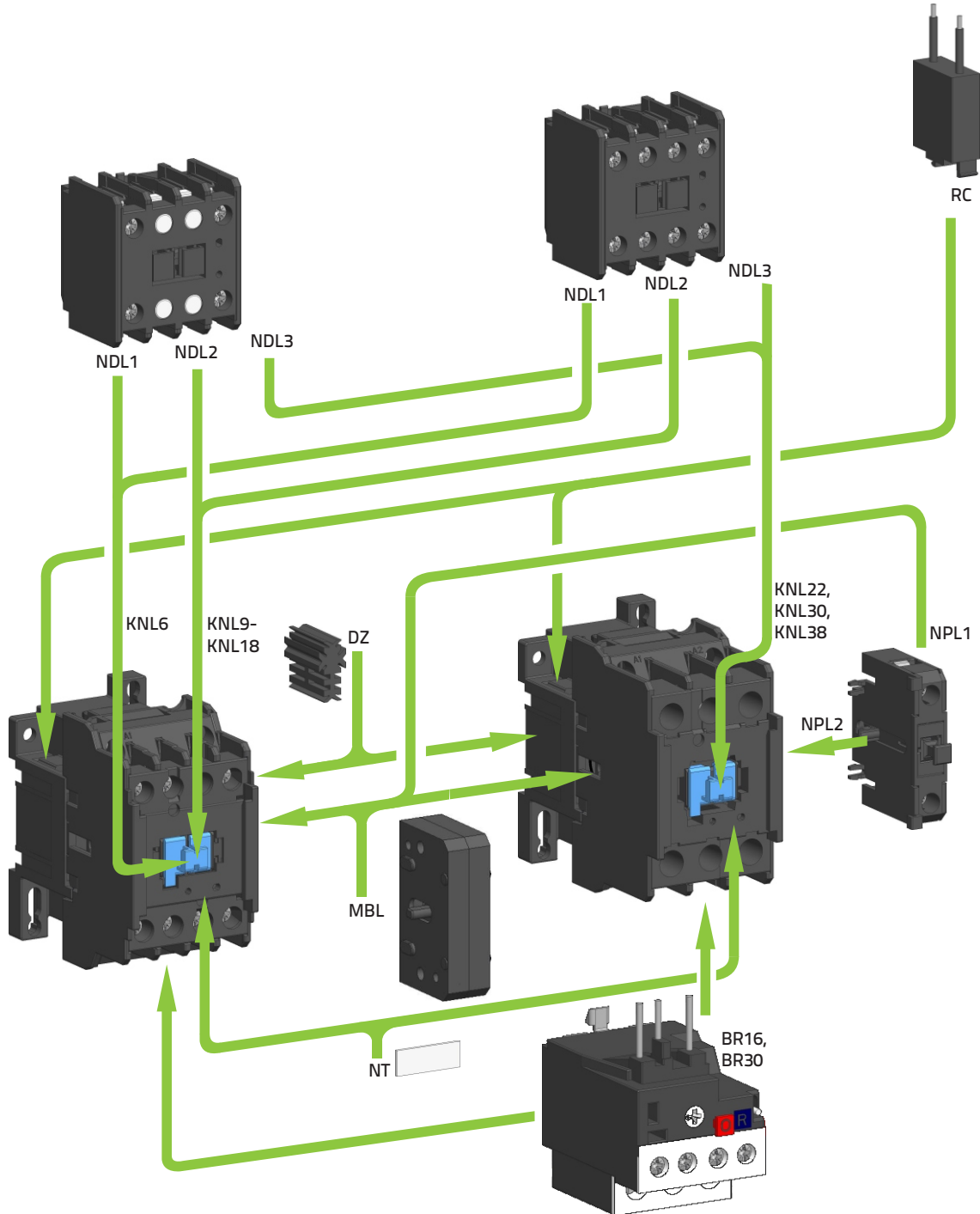


Diagram 3

Electrical endurance of motor contactors KNL9(G) - KNL38(G) – AC-4



Mounting positions of accessories



Contactors KNL6(G)-KNL38(G)

Accessories



Snap-on auxiliary switch blocks

TECHNICAL DATA

		Symbol	Unit	NDL1, NDL2 NDL3, NDLG	NPL1 NPL2	
GENERAL	Type					
	Standards			IEC/EN 60947-5-1, VDE 0660, UL 508		
	Approvals			CE, UL, CSA ¹⁾		
	For use with			NDL1 (KNL6), NDL2 (KNL9-KNL18), NDL3 (KNL22-KNL38), NDLG (KNL6G-KNL38G)	NPL1 (KNL9 - KNL18), NPL2 (KNL22-KNL38)	
	Module width			2	0.5	
	Number of poles			2 or 4	1	
	Degree of protection			IP20		
	Pollution degree			3		
	Ambient temperature open		°C	-25 ... +55		
	closed			-25 ... +45		
	Storage temperature		°C	-30 ... +80		
	Maximum altitude U _i and U _e is reduced for 1.2 % and I _e for 0.4 % for every additional 100 m		m	2000		
	Maximum operating frequency with no load		op. c./h	3000		
	Mechanical endurance		op. c.	10.000.000		
	AUXILIARY CIRCUIT	Weight		g	70	20
		Contact reliability			≥ 17 V; ≥ 50 mA	
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2			A	16	10	
Rated insulation voltage		U _i	V	690		
Rated impulse withstand voltage		U _{imp}	kV	6		
Rated operational voltage		U _e	V	690		
Rated frequency		f	Hz	50 / 60		
Thermal current		I _{th}	A	16	10	
Rated operational current for AC-15: single-phase 230 V		I _e	A	6		
single-phase 400 V				4		
single-phase 500 V				2		
single-phase 690 V				1		
Maximum operating frequency for AC-15			op. c./h	1.200		
Electrical endurance for AC-15			op. c.	500.000		
Switching of auxiliary loads acc. to standard UL and CSA				A600, N600		
Rated operational current for DC-13: 1 pole ... 24 V DC / 60 V DC / 110 V DC / 220 V DC			A	10 / 4 / 0.9 / 0.4	6 / 2.5 / 0.5 / 0.2	
Maximum operating frequency for DC-13		op. c./h	1.200			
Electrical endurance for DC-13		op. c.	500.000			
Terminal capacity: rigid (solid and stranded)	S	mm ²	0.75 ... 4			
flexible			0.5 ... 2.5			
Length of removed wire insulation		mm	10			
Screw			M3.5			
Screw head			PZ2			
Tightening torque		Nm	1.4	1		

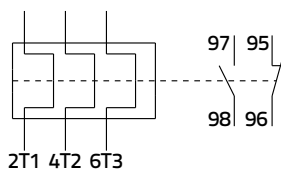
¹⁾ No UL and CSA for NDLG

Thermal overload relay BR16 and BR30

TECHNICAL DATA

Type	Symbol	Unit	BR16	BR30
Standards			IEC 60947-4-1, IEC 60947-5-1, UL508	
Approvals			CE, UL	
For use with			KNL9(G) ... KNL18(G)	KNL22(G) ... KNL38(G)
Degree of protection			IP20	
Ambient temperature operating		°C	-5 ... +55	
storage			-25 ... +70	
Dimensions (WxHxD)		mm	45 x 70.5 x 60	45 x 69 x 60
Operating position			vertical	
Reset type			auto, manual	
Maximum altitude above sea level		m	2000	
Weight		g	115	
Rated insulation voltage	U_i	V	690	
Rated impulse withstand voltage	U_{imp}	kV	6	
Rated operational voltage	U_e	V	690	
Adjustable current	I_r	A	0.1 ... 20	17.5 ... 30
Rated frequency	f	Hz	50/60	
Overvoltage category / pollution degree acc. to IEC/EN 60947-1			III / 3	
Trip class acc. to IEC/EN 60947-4-1			10	
Temperature compensation range		°C	-5 ... +40	
Sensitivity to phase failure			yes	
Power loss at I_n	P	W	5 ... 6.5	
Terminal capacity		mm ²	1 ... 10	
Conductor insulation stripping length		mm	10	
Screw			M4	
Screw head			PZ2	
Tightening torque		Nm	1.2	
Rated insulation voltage	U_i	V	690	
Rated impulse withstand voltage	U_{imp}	kV	6	
Rated operational voltage	U_e	V	AC: 500 ; DC: 230	
Overvoltage category / pollution degree acc. to IEC/EN 60947-1			III / 3	
Thermal current (both contacts)	I_{th}	A	6	
Contact electrical rating			A600 / Q300	
Rated operational current AC-15				
230 V	NO	I_e	A	3
400 V				2
500 V				1
230 V	NC			3
400 V				2
500 V				1
Rated operational current DC-13				
60 V	both contacts	I_e	A	0.45
110 V				0.25
230 V				0.1
Terminal capacity		mm ²	0.75 ... 2.5	
Conductor insulation stripping length		mm	9	
Screw			M3.5	
Screw head			PZ2	
Tightening torque		Nm	0.8	

Connection diagram BR16 and BR30



Contactors KNL6(G)-KNL38(G)

Accessories

Thermal overload relay BR16

Setting ranges and maximum permitted back-up fuses

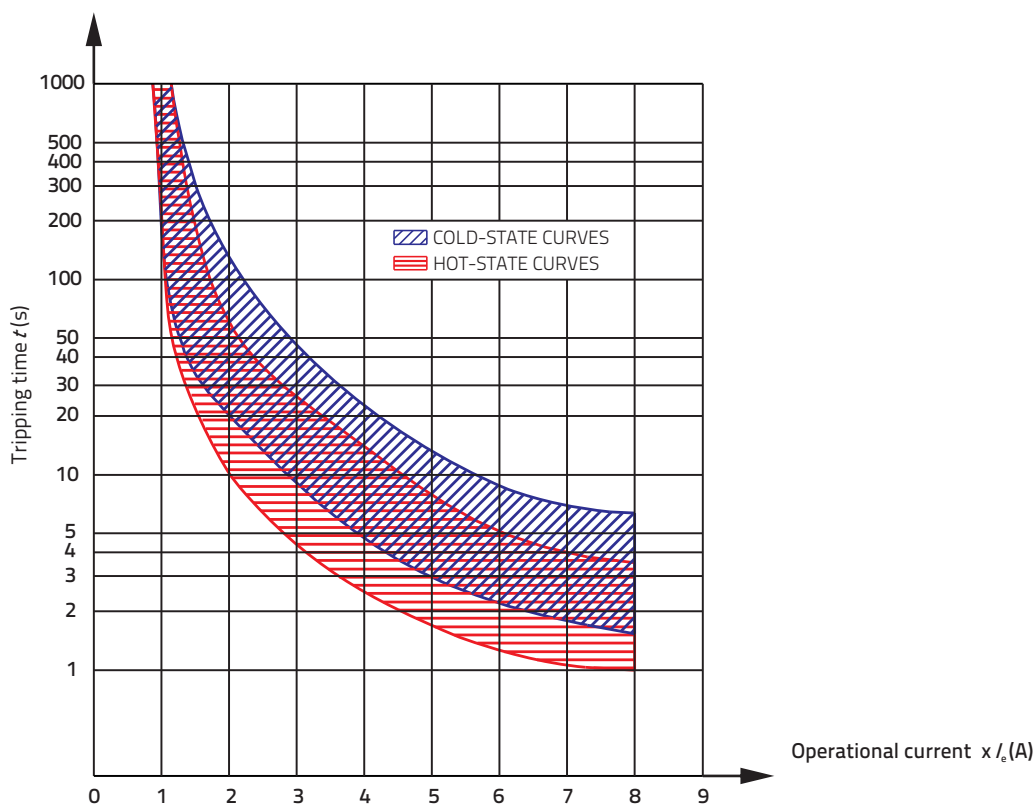
Setting range (A)	Max. back-up fuse gL/gG – UL 508 (A)	Max. back-up fuse gL/gG (A)
0.1 - 0.16	1	1
0.16 - 0.25	1	1
0.25 - 0.4	1	1
0.35 - 0.5	1	1
0.45 - 0.63	1	1
0.55 - 0.8	3	2
0.75 - 1	3	2
0.9 - 1.3	3	2
1.1 - 1.6	3	2
1.4 - 2	6	4
1.8 - 2.5	6	4
2.3 - 3.2	6	4
2.9 - 4	10	8
3.5 - 4.8	10	8
4.5 - 6.3	15	10
5.5 - 7.5	15	10
7.2 - 10	25	16
9 - 12.5	30	20
11.3 - 16	40	25
15 - 20	50	35

Thermal overload relay BR30

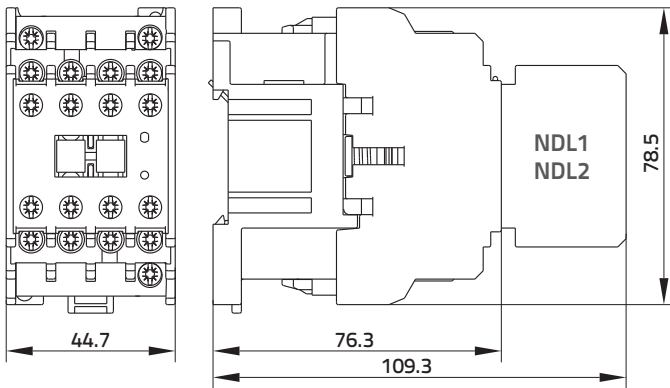
Setting ranges and maximum permitted back-up fuses

Setting range (A)	Max. back-up fuse gL/gG – UL 508 (A)	Max. back-up fuse gL/gG (A)
17.5 - 21.5	50	35
21 - 25	60	40
24.5 - 30	70	50
29 - 36	70	50
33 - 38	70	50

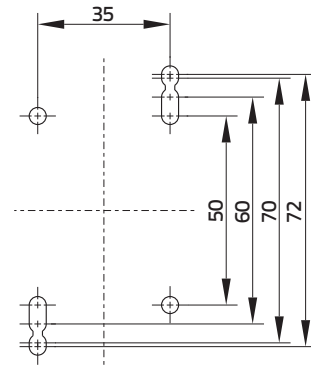
Tripping curve BR16 and BR30



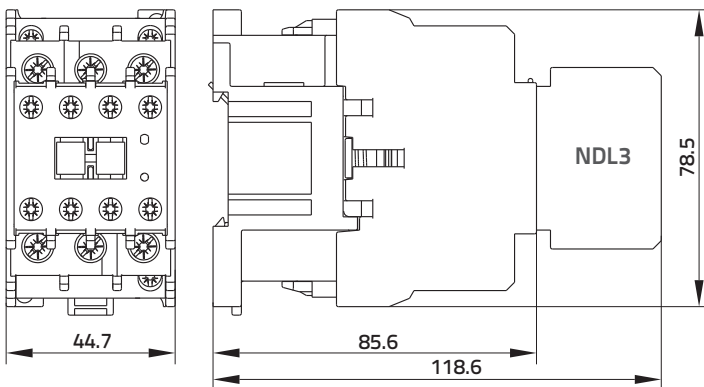
KNL6 ... KNL18



KNL6 ... KNL38 - drilling plan



KNL22 ... KNL38



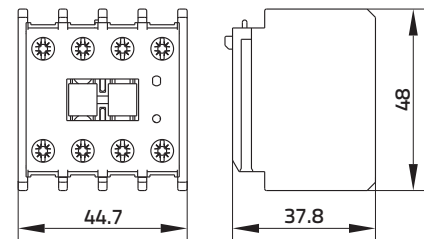
NDL1, NDL2, NDL3

Two and four-pole snap-on auxiliary switch blocks (mounting on a basic contactor)

NDL1 - for KNL6(G)

NDL2 - for KNL9(G) - KNL18(G)

NDL3 - for KNL22(G) - KNL38(G)

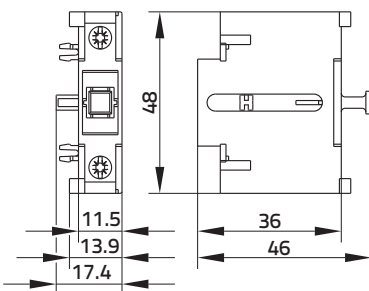


NPL1, NPL2

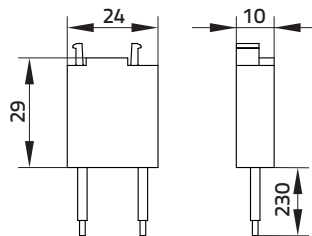
Single pole snap-on auxiliary switch block (for side mounting + push button)

NPL1 - for KNL9(G) - KNL18(G)

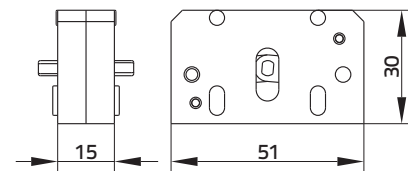
NPL2 - for KNL22(G) - KNL38(G)



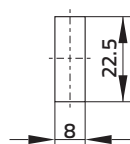
RC suppressor



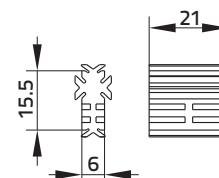
MBL mechanical interlock



NT identification plate



DZ distance spacer

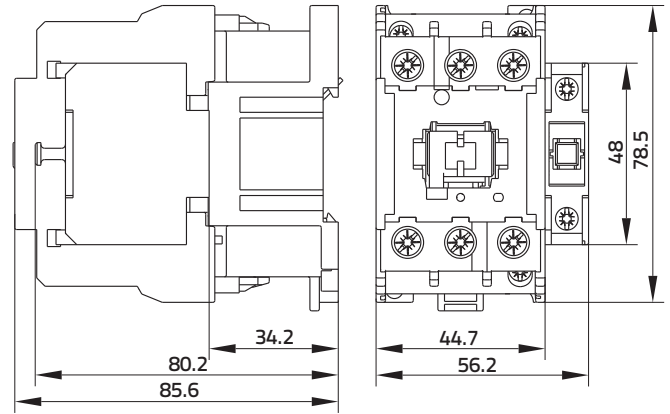
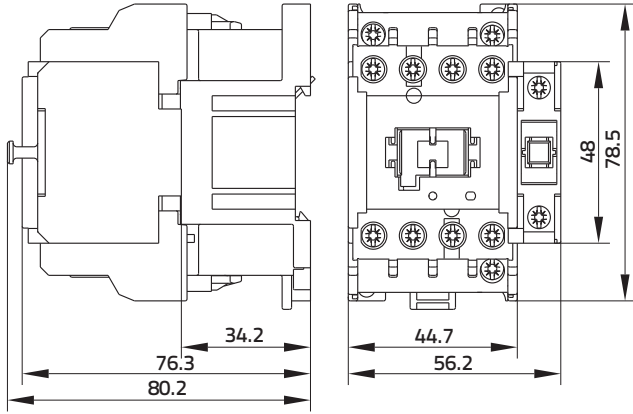


Contactors KN6(G)-KNL38(G)

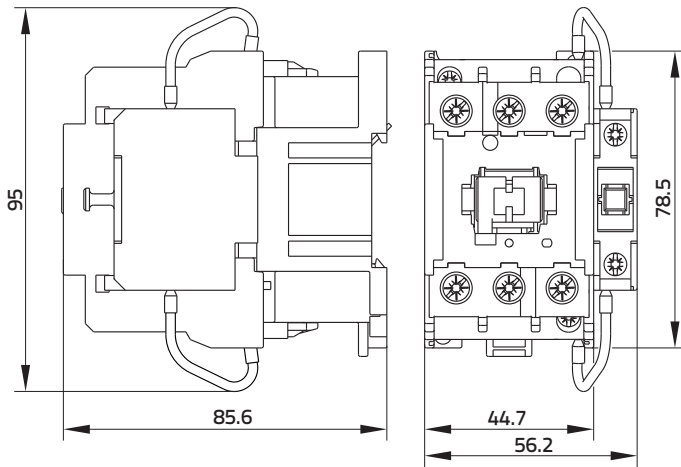
Dimensions

KNL9-KNL18 + NPL1

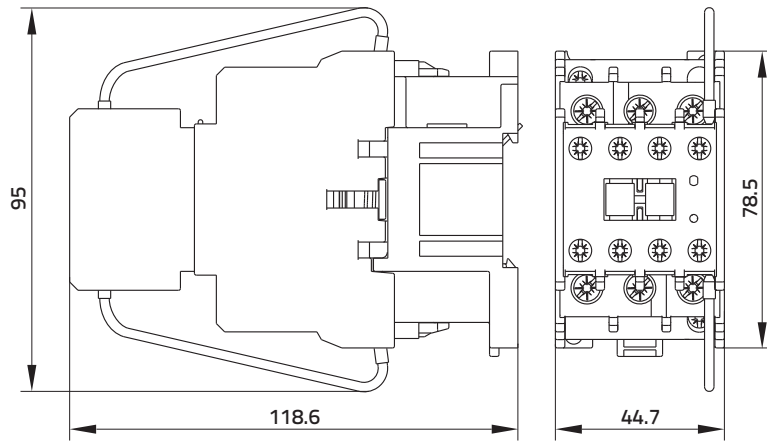
KNL22-KNL38 + NPL2



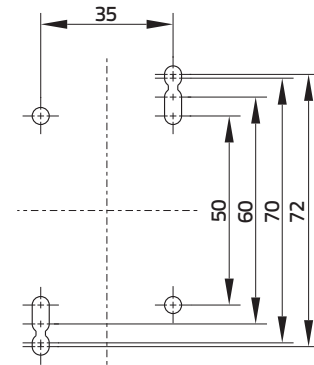
KNL22G-KNL38G + NPLG



KNL22G-KNL38G + NDLG

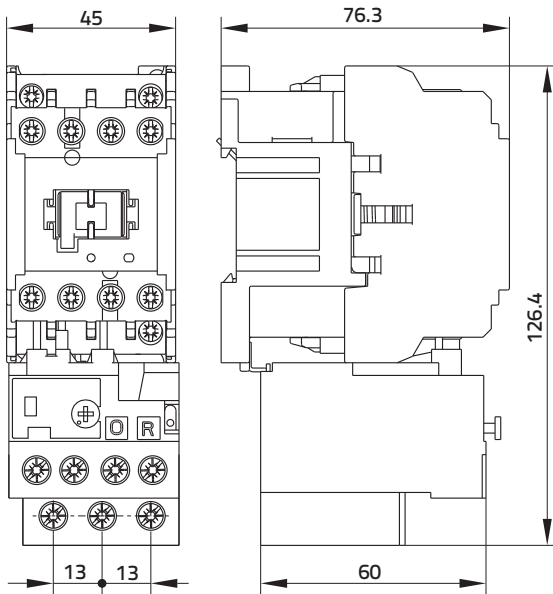


KNL6 ... KNL38 - drilling plan



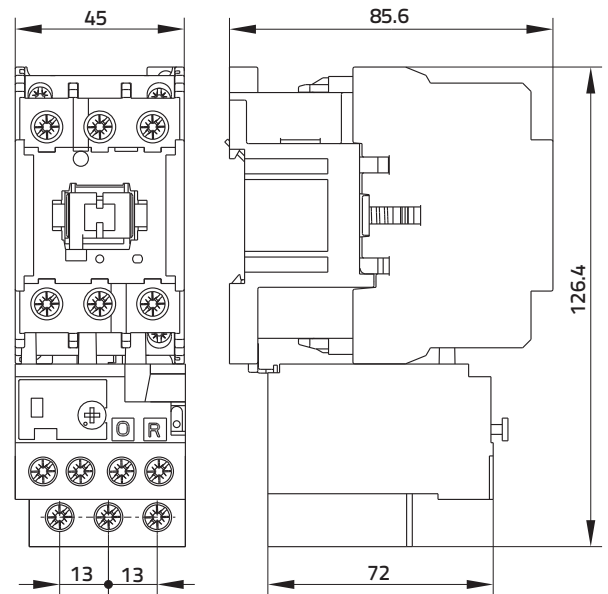
KNL6 ... KNL18 + BR16

Contactor + thermal overload relay

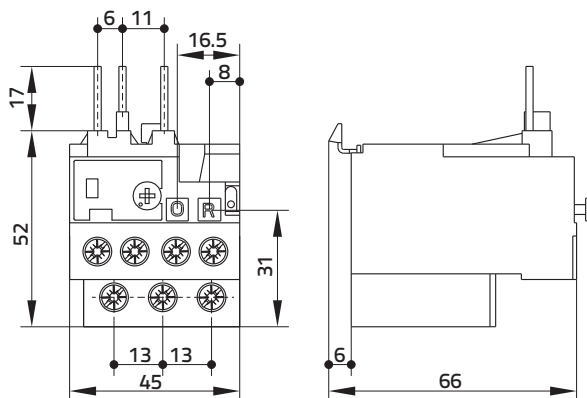


KNL22 ... KNL38 + BR30

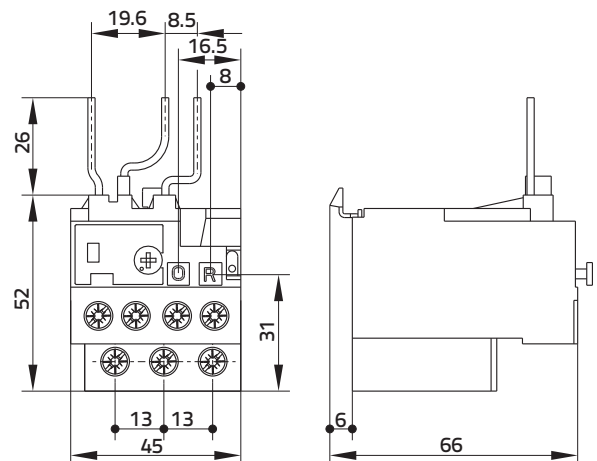
Contactor + thermal overload relay



BR16 thermal overload relay

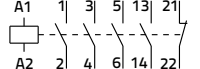


BR30 thermal overload relay



Motor contactors

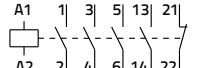
AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 65 mm widths)

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL43-11	43 A	380/415 V		30.050.946	930	1
KNL43-11	43 A	220/240 V		30.050.498	930	1
KNL43-11	43 A	24 V		30.050.482	930	1

AC

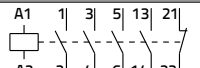


AC-3 acc. to UL 508 (3-pole, 65 mm widths)

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL43-11UL	43 A	380/415 V		30.051.014	930	1
KNL43-11-UL	43 A	220/240 V		30.051.012	930	1
KNL43-11-UL	43 A	24 V		30.051.004	930	1

AC

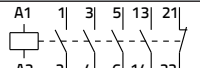
AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 65 mm widths)

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL63-11	63 A	380/415 V		30.050.951	930	1
KNL63-11	63 A	220/240 V		30.050.499	930	1
KNL63-11	63 A	24 V		30.050.490	930	1

AC

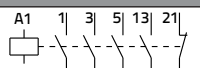


AC-3 acc. to UL 508 (3-pole, 65 mm widths)

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL63-11-UL	63 A	380/415 V		30.051.030	930	1
KNL63-11-UL	63 A	220/240 V		30.051.028	930	1
KNL63-11-UL	63 A	24 V		30.051.020	930	1

AC

AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 65 mm widths)

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL75-11	70 A	380/415 V		30.051.102	930	1
KNL75-11	70 A	220/240 V		30.051.103	930	1
KNL75-11	70 A	24 V		30.051.104	930	1

AC



Ordering data

For contactors **KNL43, KNL43UL, KNL63, KNL63UL, KNL75**

Standard control voltages and designations (AC)

V	24	42	48	220/240	380/415
50/60 Hz	B7	D7	E7	M7	Q7

KNL63 - 11 - M7 - 50/60



Note:

The type designation and control voltage are stated when ordering the contactors.

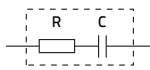
Snap-on auxiliary switch blocks

AC-15 acc. to IEC/EN 60947-5-1 (2- and 4-pole)

Type	Rated current I _e	Rated voltage U _e	Version	Ordering No.	Weight (g)	Packaging (pcs)
NDL4 (for KNL43, KNL43UL, KNL63, KNL63UL, KNL75)	6 A	230 V	-11	38.423.011	66	10
			-02	38.423.012		
			-20	38.423.473		
			-22	38.422.910		
			-31	38.422.911		
			-13	38.423.013		
			-40	38.423.474		
			-04	38.423.475		



RC suppressor (for KNL43-KNL75, KNL43UL, KNL63UL)

Type	Control voltage U _c	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
RC1-KNL	12 - 48 V		30.017.074	16	10
RC2-KNL	48 - 250 V		30.017.075	16	10
RC3-KNL	250 - 380 V		30.017.076	16	10
RC4-KNL	380 - 600 V		30.017.077	16	10



Mechanical interlock

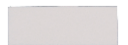
for KNL43 - KNL75, KNL43UL, KNL63UL)

Type	Ordering No.	Weight (g)	Packaging (pcs)
MBL43	38.422.197	16	10



Identification plate

Type	Ordering No.	Weight (g)	Packaging (pcs)
NT	37.425.330	1	10



Spare parts: AC coils (50/60 Hz) for KNL43(UL) - KNL75(UL)

Type	Ordering No. (KNL43 - KNL75)	Ordering No. (KNL43UL - KNL75UL)	Weight (g)	Packaging (pcs)
24	38.501.841	38.502.846	140	1
42	38.502.602	38.502.850	140	1
48	38.501.987	38.502.851	140	1
220/240	38.502.286	38.502.847	140	1
380/415	38.502.610	38.502.848	140	1

BR63 thermal overload relay

up to 97 A for KNL43-KNL75, KNL43UL, KNL63UL contactors

Type	Setting range (A)	Max. backup fuse gL/gG Coordination 1 (A)	Ordering No.	Weight (g)	Packaging (pcs)
BR63-25	17 ... 25	100	786.050.504	350	1
BR63-36	24,5 ... 36	100	786.050.505		
BR63-47	35 ... 47	125	786.050.506		
BR63-60	45 ... 60	150	786.050.507		
BR63-75	58 ... 75	200	786.050.508		
BR63-90	72 ... 90	250	786.050.509		
BR63-97	77 ... 97	250	786.050.510		





Technical characteristics

Dimensions



TECHNICAL DATA

Type	Symbol	Unit	KNL43 KNL43UL	KNL63 KNL63UL	KNL75
Standards			IEC/EN 60947-5-1, IEC 60947-4-1, IEC/EN 60947-1, UL 508		
Approvals			CE, EAC (UL & CSA only for KNL43UL and KNL63UL)		CE, EAC
Module width		mm	65		
Number of poles			3		
Degree of protection			IP20		
Pollution degree			3		
Climatic conditions			95 % relative humidity		
Ambient temperature: open		°C	-20 ... +60		
closed		°C	-20 ... +45		
Storage temperature		°C	-30 ... +80		
Maximum altitude <i>U_i</i> and <i>U_e</i> is reduced for 1.2 % and <i>I_e</i> for 0.4 % for every additional 100 m		m	2000		
Number of contactors or switches side-by-side: ≤40 °C (40 ... 55) °C			no limitation		
Noise level (operation)		dB	30		
Maximum operating frequency with no load		op. c./h	3.000		
Mechanical endurance		op. c.	3.000.000		
Weight		g	930		
Contact reliability			≥17 V; ≥50 mA		
Power dissipation per pole		W	5	6	6
Overload current withstand capability 10 s		A	344	504	528
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	80 (125 ¹⁾)	125	125
Rated insulation voltage	<i>U_i</i>	V	1000		
Rated impulse withstand voltage	<i>U_{imp}</i>	kV	6		
Rated operational voltage	<i>U_e</i>	V	1000		
Rated frequency	<i>f</i>	Hz	50/60		
Thermal current	<i>I_{th}</i>	A	75 (85 ¹⁾)	85 (100 ²⁾)	100
Rated operational current for AC-1, AC-7a and AC-21	<i>I_e</i>	A	75 (85 ¹⁾)	85 (100 ²⁾)	100
Operational power for AC-1, AC-7a and AC-21: single-phase 230 V three-phase 230 V three-phase 400 V	<i>P_e</i>	kW	16 (19 ¹⁾) 28 (32 ¹⁾) 50 (56 ¹⁾)	19 (22 ²⁾) 32 (38 ²⁾) 56 (66 ²⁾)	22 38 66
Maximum operating frequency for AC-1, AC-7a and AC-21		op. c./h	600		
Electrical endurance for AC-1, AC-7a and AC-21		op. c.	200.000		
Rated operational current for AC-3, AC-3e, AC-7b and AC-23 (at 400 V)	<i>I_e</i>	A	43	63	70
Operational power for AC-3, AC-3e, AC-7b and AC-23: single-phase 230 V three-phase 230 V three-phase 400 V three-phase 500 V three-phase 690 V three-phase 1000 V	<i>P_e</i>	kW	5.5 12.5 22 30 30 22	7.5 15 30 40 40 30	9 18.5 37 45 45 30
Maximum operating frequency for AC-3, AC-3e, AC-7b and AC-23		op. c./h	600		
Electrical endurance for AC-3, AC-3e, AC-7b and AC-23		op. c.	800.000	400.000	400.000
Rated operational current for AC-4 (at 400 V)	<i>I_e</i>	A	29	41	41
Operational power for AC-4: three-phase 400 V three-phase 500 V	<i>P_e</i>	kW	15 18.5	22 25	22 25
Maximum operating frequency for AC-4		op. c./h	300		
Electrical endurance for AC-4		op. c.	40.000	20.000	20.000
Rated motor power according to standards UL and CSA: single-phase 120 V single-phase 240 V three-phase 240 V three-phase 480 V three-phase 600 V	<i>P_e</i>	HP	3 7.5 15 25 30	5 10 20 30 40	5 10 25 40 50
Maximum operating frequency for motors acc. to UL and CSA		op. c./h	600		
Electrical endurance for motors acc. to UL and CSA		op. c.	800.000	400.000	400.000

¹⁾ Ratings for KNL43/63UL version

TECHNICAL DATA

	Type	Symbol	Unit	KNL43 KNL43UL	KNL63 KNL63UL	KNL75	
MAIN CIRCUIT	Switching of capacitors AC-6b and AC-7c (at 230 V)	C	μF	440	660	770	
	Maximum operating frequency for AC-6b and AC-7c		op. c./h		600		
	Electrical endurance for AC-6b and AC-7c		op. c.		100.000		
	Rated operational current for DC-1 (L/R ≤ 1 ms): 1 pole ... 24 V DC/ 48 V DC/ 60 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 48 V DC/ 60 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 48 V DC/ 60 V DC/ 110 V DC/ 220 V DC	I _e	A		50 / 50 / 50 / 8 / 6 70 / 70 / 70 / 60 / 36 70 / 70 / 70 / 60 / 50		
	Maximum operating frequency for DC-1		op. c./h		300		
	Terminal capacity: rigid (solid and stranded) flexible	S	mm ²		35 25		
	Length of removed wire insulation		mm		16		
	Screw				M6		
	Screw head				PZ2		
	Tightening torque		Nm		4		
AUXILIARY CIRCUIT	Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2	I _v	A		10		
	Rated operational current for AC-15: single-phase 230 V single-phase 400 V single-phase 500 V single-phase 690 V	I _e	A		6 4 2 1		
	Maximum operating frequency for AC-15		op. c./h		1.200		
	Electrical endurance for AC-15		op. c.		1.000.000		
	Terminal capacity: rigid (solid and stranded) flexible		mm ²		1 ... 2.5 1 ... 2.5		
	Length of removed wire insulation		mm		10		
	Screw				M3.5		
	Screw head				PZ2		
	Tightening torque		Nm		0.8		
	COIL	Range of control voltage for switch-on	U _c	%		85 ... 110	
Range of control voltage for drop out		U _c	%		20 ... 75		
Kind of voltage					AC		
Standard control voltages		U _c	V		12 ... 500		
Frequency of AC control voltage		f	Hz		50/60		
Control mode					remote control with U _c		
Coil consumption: switch-on operation			VA/W		130/80 10/3		
Delays: make brake			ms		10 ... 20 8 ... 15		
Terminal capacity: rigid (solid and stranded) flexible			mm ²		1 ... 2.5 1 ... 2.5		
Length of removed wire insulation			mm		11		
SAFETY	Screw				M3.5		
	Screw head				PZ2		
	Tightening torque		Nm		0.8		
	MTTF - Mean time to failure MTTF = 1/λ = B10/(0.1 n _{op})	AC-1 AC-3	h	20.000	5.000	10.000	
	MTTF _d - Mean time to failure dangerous MTTF _d = 1/λ _d = B10 _d /(0.1 n _{op})	AC-1 AC-3	h	26.666	6.666	13.333	
	B10 - Number of operating cycles until 10 % of devices fail	AC-1 AC-3	op. c.	600.000	150.000	300.000	
	B10 _d - Number of operating cycles until 10 % of device dangerous B10 _d = B10/ratio of dangerous failures	AC-1 AC-3	op. c.	800.000	200.000	400.000	
	λ - Failure rate λ = (0.1 n _{op})/B10	AC-1 AC-3	1/h	0.00005	0.0002	0.0001	
	λ _d - Failure rate dangerous λ _d = (0.1 n _{op})/B10 _d	AC-1 AC-3	1/h	0.00004	0.00015	0.000075	
	Ratio of dangerous failures		%		75		
n _{op} - Operating cycles (operating cycles/h)		op. c./h		300			

1) 12,24,48,110/125,220/240,380/415,440/460,480/520,550/600 V

Electrical endurance

Diagram 1

Electrical endurance of motor contactors KNL43 - KNL75, KNL43UL, KNL63UL - AC-3, AC-3e

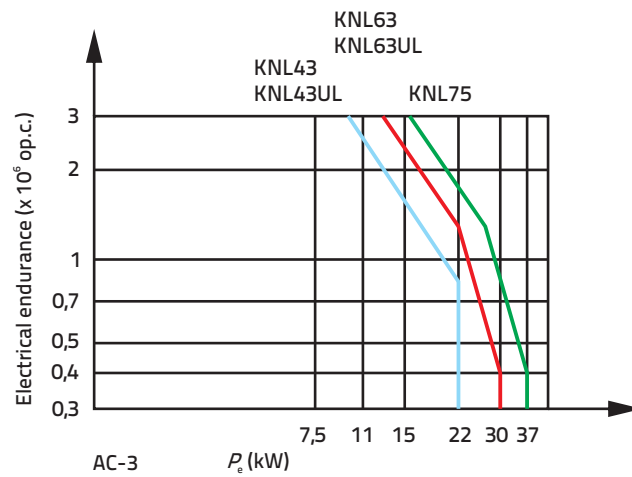
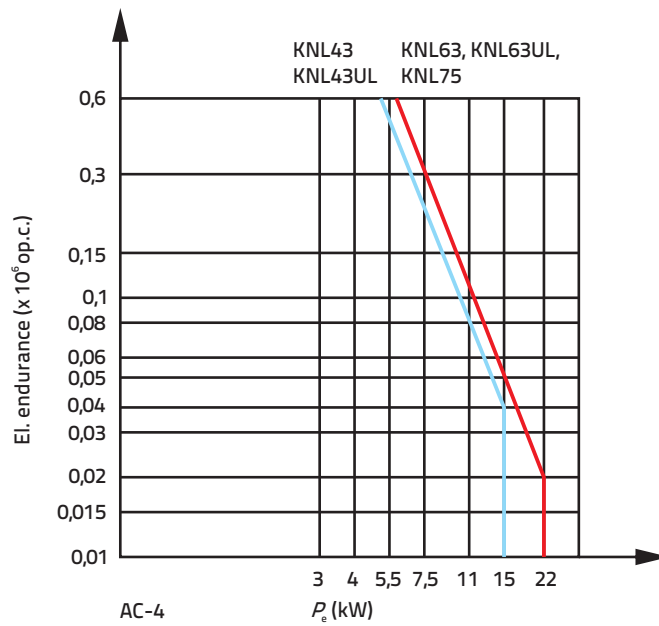
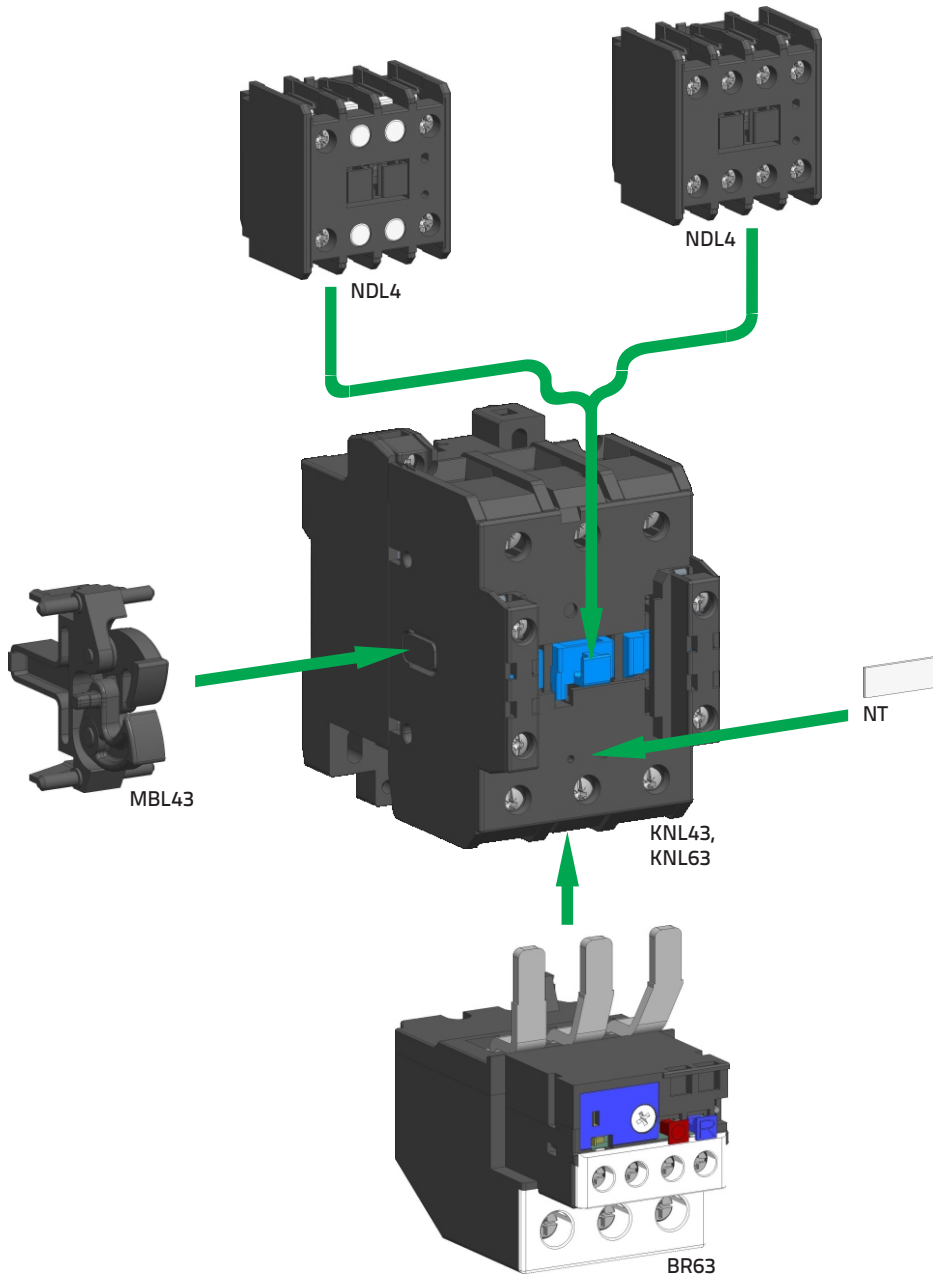


Diagram 2

Electrical endurance of motor contactors KNL43 - KNL75, KNL43UL, KNL63UL - AC-4



Mounting positions of accessories



Contactors KNL43-KNL75

Accessories



Snap-on auxiliary switch blocks

TECHNICAL DATA

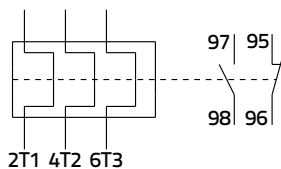
		Symbol	Unit	NDL4
GENERAL	Type			
	Standards			IEC/EN 60947-5-1, VDE 0660, UL 508
	Approvals			CE, UL, CSA
	For use with			KNL43, KNL43UL, KNL63, KNL63UL, KNL75
	Module width			2
	Number of poles			2 or 4
	Degree of protection			IP20
	Pollution degree			3
	Ambient temperature			
	open		°C	-25 ... +55
	closed			-25 ... +45
	Storage temperature		°C	-30 ... +80
	Maximum altitude		m	2000
	U _i and U _e is reduced for 1.2 % and I _e for 0.4 % for every additional 100 m			
Maximum operating frequency with no load		op. c./h	3000	
Mechanical endurance		op. c.	10.000.000	
Weight		g	70	
AUXILIARY CIRCUIT	Contact reliability			≥ 17 V; ≥ 50 mA
	Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2			16
	Rated insulation voltage	U _i	V	690
	Rated impulse withstand voltage	U _{imp}	kV	6
	Rated operational voltage	U _e	V	690
	Rated frequency	f	Hz	50 / 60
	Thermal current	I _{th}	A	16
	Rated operational current for AC-15:			
	single-phase 230 V	I _e	A	6
	single-phase 400 V			4
	single-phase 500 V			2
	single-phase 690 V			1
	Maximum operating frequency for AC-15		op. c./h	1.200
	Electrical endurance for AC-15		op. c.	500.000
	Switching of auxiliary loads acc. to standard UL and CSA			A600, N600
	Rated operational current for DC-13:			
	1 pole ... 24 V DC / 60 V DC / 110 V DC / 220 V DC		A	10 / 4 / 0.9 / 0.4
	Maximum operating frequency for DC-13		op. c./h	1.200
	Electrical endurance for DC-13		op. c.	500.000
	Terminal capacity:			
rigid (solid and stranded)	S	mm ²	0.75 ... 4	
flexible			0.5 ... 2.5	
Length of removed wire insulation		mm	10	
Screw			M3.5	
Screw head			PZ2	
Tightening torque		Nm	1.4	

Thermal overload relay BR63

TECHNICAL DATA

		Symbol	Unit	BR63	
GENERAL	Type			BR63	
	Standards			IEC 60947-4-1, IEC 60947-5-1, UL508	
	Approvals			CE, UL	
	For use with			KNL43, KNL43UL, KNL63, KNL63UL, KNL75	
	Degree of protection			IP20	
	Ambient temperature operating		°C	-5 ... +55	
	storage			-25 ... +70	
	Dimensions (WxHxD)		mm	65 x 85.5 x 97.5	
	Operating position			vertical	
	Reset type			auto, manual	
MAIN CIRCUIT	Weight		g	350	
	Rated insulation voltage	U_i	V	690	
	Rated impulse withstand voltage	U_{imp}	kV	6	
	Rated operational voltage	U_e	V	690	
	Adjustable current	I_r	A	17 ... 97	
	Rated frequency	f	Hz	50/60	
	Overvoltage category / pollution degree acc. to IEC/EN 60947-1			III / 3	
	Trip class acc. to IEC/EN 60947-4-1			10	
	Sensitivity to phase failure			yes	
	Power loss at I_n	P	W	11 ... 15.5	
	Terminal capacity		mm ²	6 ... 35	
	Conductor insulation stripping length		mm	12	
	Screw			M5	
	Screw head			PZ2	
	AUXILIARY CIRCUITS	Tightening torque		Nm	2.5
Rated insulation voltage		U_i	V	690	
Rated impulse withstand voltage		U_{imp}	kV	6	
Rated operational voltage		U_e	V	AC: 600 ; DC: 250	
Overvoltage category / pollution degree acc. to IEC/EN 60947-1				III / 3	
Thermal current (both contacts)		I_{th}	A	10	
Contact electrical rating				A600 / Q300	
Rated operational current AC-15					
120 V		both contacts	I_e	A	6
240 V					3
380 V					1.9
480 V					1.5
500 V					1.4
600 V		1.2			
Rated operational current DC-13					
125 V		both contacts	I_e	A	0.55
250 V					0.27
Terminal capacity			mm ²		0.75 ... 2.5
Conductor insulation stripping length		mm		8	
Screw				M3.5	
Screw head				PZ2	
Tightening torque		Nm		0.8	

Connection diagram BR63



Contactors KNL43-KNL75

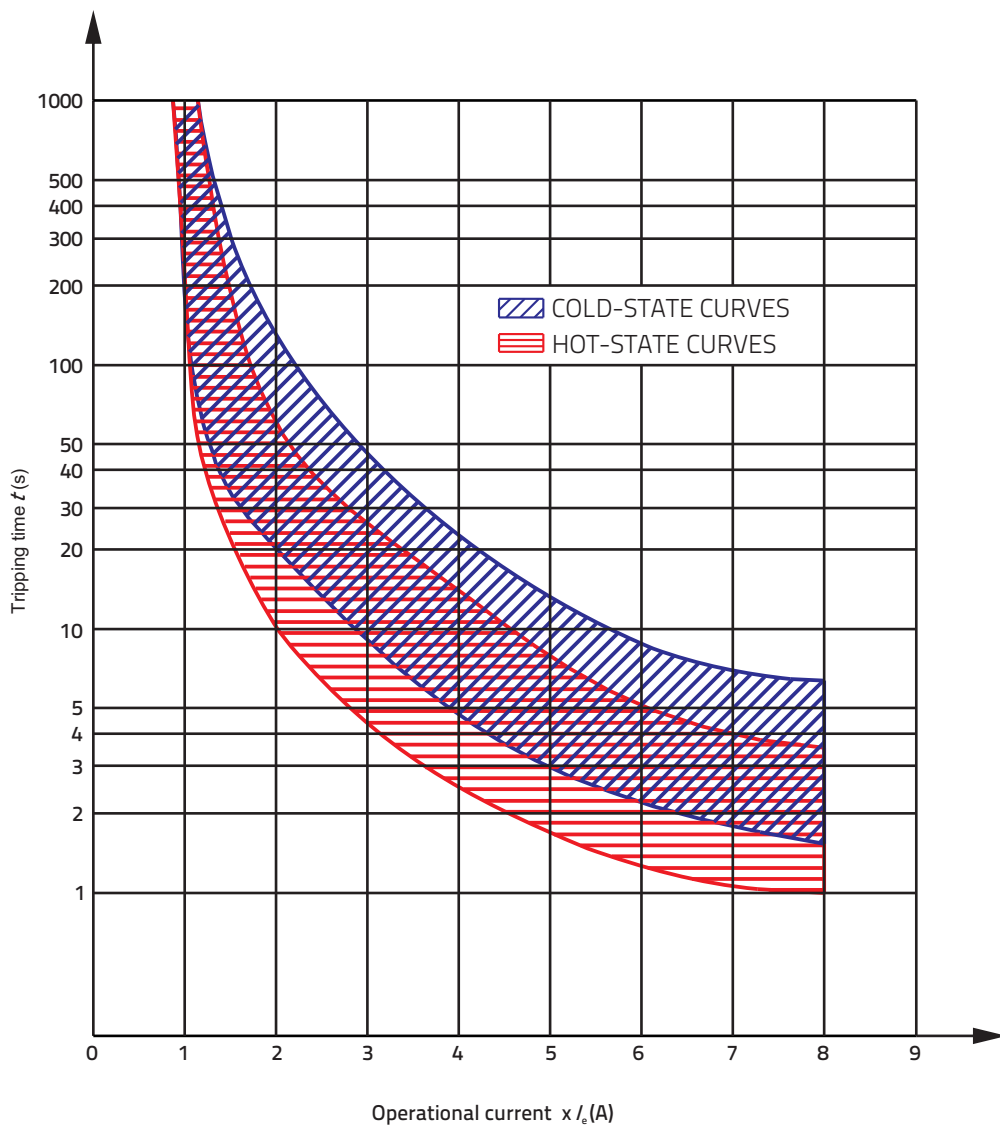
Accessories

Thermal overload relay BR63

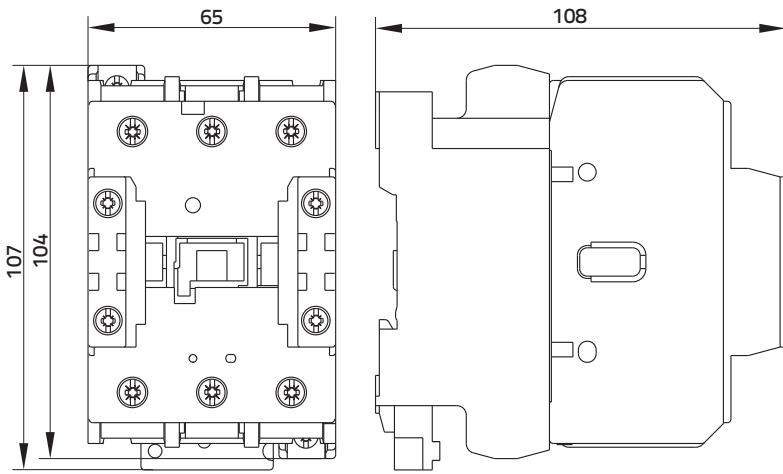
Setting ranges and maximum permitted back-up fuses

Setting range (A)	Max. back-up fuse gL/gG (A)
17 - 25	100
24.5 - 36	100
35 - 47	125
45 - 60	150
58 - 75	200
72 - 90	250
77 - 97	250

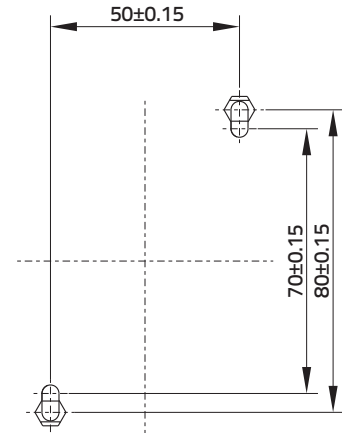
Tripping curve BR63



KNL43 ... KNL75
KNL43UL, KNL63UL

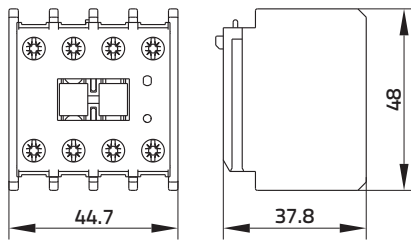


KNL43 ... KNL75 - drilling plan
KNL43UL, KNL63UL

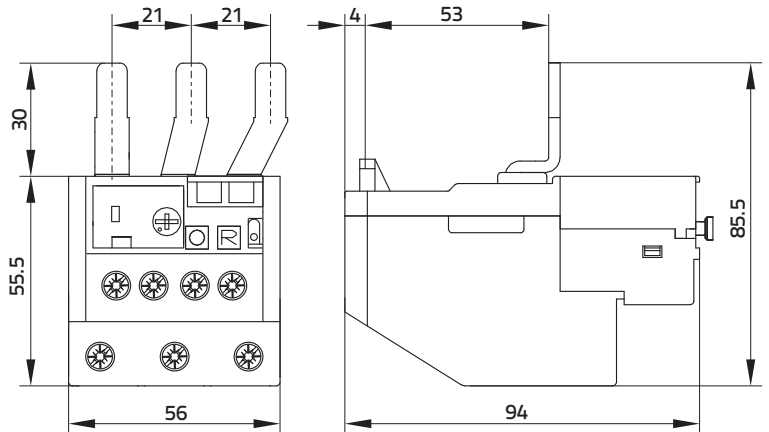


NDL4

Two and four-pole snap-on auxiliary switch blocks
(mounting on a basic contactor)

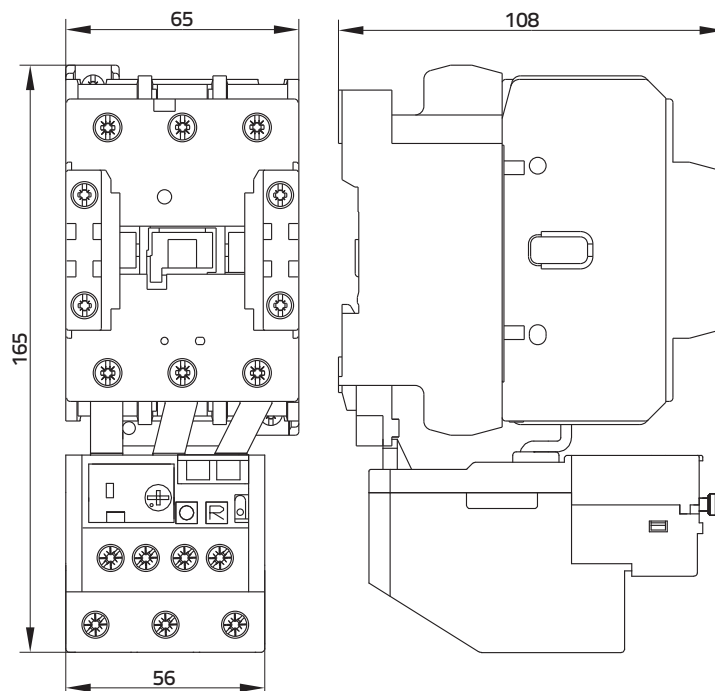


BR63 thermal overload relay



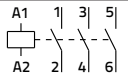
KNL43 ... KNL75 + BR63
KNL43UL + BR63, KNL63UL + BR63

Contactor + thermal overload relay



Motor contactors

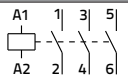
AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 75 mm widths)

Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL80-00	80 A	380/400 V		786020036000	1.28	1
KNL80-00	80 A	220/230 V		786020034000	1.28	1
KNL80-00	80 A	24 V		786020030000	1.28	1

AC



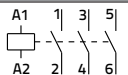
AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 75 mm widths)

Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL90-00	90 A	380/400 V		786020044000	1.28	1
KNL90-00	90 A	220/230 V		786020042000	1.28	1
KNL90-00	90 A	24 V		786020038000	1.28	1

AC



AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 75 mm widths)

Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL110-00	110 A	380/400 V		786020052000	1.28	1
KNL110-00	110 A	220/230 V		786020050000	1.28	1
KNL110-00	110 A	24 V		786020046000	1.28	1

AC



Auxiliary switch blocks

AC-15 acc. to IEC/EN 60947-5-1

Type	Rated current I _e	Rated voltage U _e	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
G484	10 A	690 V	-12	786.025.012	39	1
	10 A	690 V	-21	786.025.013		
BFX10	10 A	690 V	-40	786.015.010	48	1
	10 A	690 V	-13	786.015.011		
	10 A	690 V	-22	786.015.003		
	10 A	690 V	-31	786.015.012		
	10 A	690 V	-04	786.015.013		



BR90 thermal overload relay

up to 110 A for KNL80-KNL110 contactors

Type	Setting range (A)	Max. backup fuse (A)		Ordering No.	Weight (g)	Packaging (pcs)
		aM	gL/gG			
BR90-82	60 ... 82	100	200	786.050.104	365	1
BR90-95	70 ... 95	100	200	786.050.105		
BR90-110	90 ... 110	125	200	786.050.106		



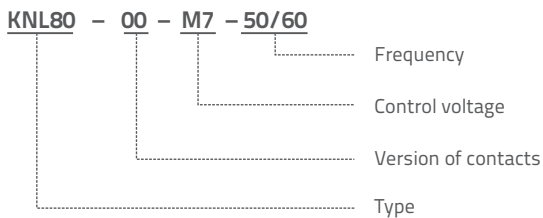
Ordering data

For contactors KNL80 - KNL110

Standard control voltages and designations (AC)

V	24	48	110	220/230	240	380/400
50/60 Hz	B7	E7	F7	M7	U7	Q7

Ordering data



Note:

The type designation and control voltage are stated when ordering the contactors.



Technical characteristics

Dimensions



TECHNICAL DATA

Type	Symbol	Unit	KNL80	KNL90	KNL110
Standards			IEC 60947-4-1, IEC/EN 60947-1, UL 508		
Approvals			CE, UL, EAC		
Module width		mm	75		
Number of poles			3		
Degree of protection			IP20		
Pollution degree			3		
Climatic conditions			95 % relative humidity		
Ambient temperature:					
open		°C	-50 ... +70		
closed		°C	-50 ... +70		
Storage temperature		°C	-60...+80		
Maximum altitude		m	2000		
U _i and U _e is reduced for 1.2 % and I _e for 0.4 % for every additional 100 m					
Number of contactors or switches side-by-side:					
<40 °C			no limitation		
(40 ... 55) °C					
Noise level (operation)		dB	35		
Maximum operating frequency with no load		op. c./h	3.600		
Mechanical endurance		op. c.	15.000.000		
Weight		kg	1.28		
Power dissipation per pole		W	9.4		
Overload current withstand capability					
10 s		A	480	760	880
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	160		
Rated insulation voltage	U _i	V	1000		
Rated impulse withstand voltage	U _{imp}	kV	8		
Rated operational voltage	U _e	V	690		
Rated frequency	f	Hz	50/60		
Thermal current	I _{th}	A	125		
Rated operational current for AC-1, AC-7a and AC-21	I _e	A	125		
Operational power for AC-1, AC-7a and AC-21:					
single-phase 230 V	P _e	kW	27		
three-phase 230 V			47		
three-phase 400 V			82		
three-phase 500 V			108		
three-phase 690 V			128		
Maximum operating frequency for AC-1, AC-7a and AC-21		op. c./h	600		
Rated operational current for AC-3, AC-7b and AC-23 (at 400 V)	I _e	A	80	90	110
Operational power for AC-3, AC-7b and AC-23:					
three-phase 230 V	P _e	kW	23	27.6	33
three-phase 400 V			41	50	61
three-phase 500 V			56	56	59
three-phase 690 V			74	74	80
Maximum operating frequency for AC-3, AC-7b and AC-23		op. c./h	600		
Electrical endurance for AC-3, AC-7b and AC-23		op. c.	1.300.000	1.200.000	800.000
Rated operational current for AC-4 (at 400 V)	I _e	A	38	43	43
Operational power for AC-4:					
three-phase 400 V	P _e	kW	20	23	23
three-phase 500 V			18.5	25	25
Maximum operating frequency for AC-4		op. c./h	300		
Electrical endurance for AC-4		op. c.	200.000		
Rated motor power according to standards UL and CSA:					
three-phase 230 V	P _e	HP	30	30	40
three-phase 460 V			60	60	75
three-phase 575 V			75	75	100
Maximum operating frequency for motors acc. to UL and CSA		op. c./h	600		
Electrical endurance for motors acc. to UL and CSA		op. c.	1.300.000	1.200.000	800.000

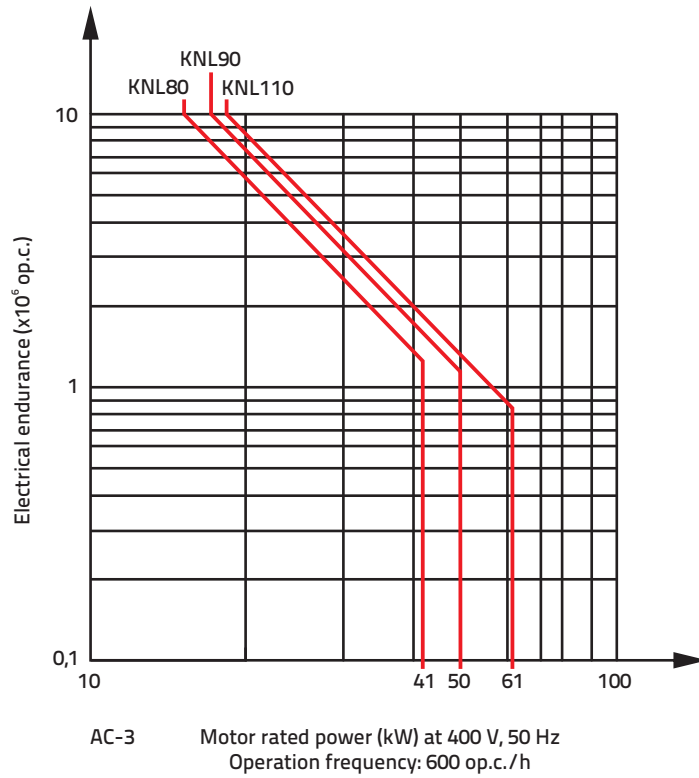
TECHNICAL DATA

Type	Symbol	Unit	KNL80	KNL90	KNL110
Switching of capacitors AC-6b and AC-7c (at 230 V)	C	μF	850		
Maximum operating frequency for AC-6b and AC-7c		op. c./h	600		
Electrical endurance for AC-6b and AC-7c		op. c.	100.000		
Rated operational current for DC-1 (L/R ≤ 1 ms): 1 pole ... 24 V DC/ 48 V DC/ 60 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 48 V DC/ 60 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 48 V DC/ 60 V DC/ 110 V DC/ 220 V DC	I _e	A	60 / 60 / 60 / 8 / 6 100 / 100 / 100 / 80 / 40 100 / 100 / 100 / 85 / 55		
Maximum operating frequency for DC-1		op. c./h	300		
Rated operational current for DC-3 (L/R ≤ 2 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I _e	A	40 / 3 / 1 60 / 40 / 7 80 / 60 / 35		
Maximum operating frequency for DC-1		op. c./h	300		
Rated operational current for DC-5 (L/R ≤ 7.5 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I _e	A	40 / 3 / 1 60 / 40 / 7 80 / 60 / 35		
Maximum operating frequency for DC-1		op. c./h	300		
Terminal capacity: rigid (solid and stranded) flexible	S	mm ²	6 ... 50 6 ... 50		
Screw			M6		
Screw head			hexogen socket oval head		
Tightening torque		Nm	4 - 5		
Range of control voltage for switch-on	U _c	%	85 ... 110		
Range of control voltage for drop out	U _c	%	20 ... 75		
Kind of voltage			AC		
Standard control voltages	U _c	V	12, 24, 48, 110, 220/230, 240, 380/400, 600		
Frequency of AC control voltage	f	Hz	50/60		
Control mode			remote control with U _c		
Coil consumption: switch-on operation		VA	210 18		
Delays: make brake		ms	13-25 8-12		
Terminal capacity: rigid (solid and stranded) flexible		mm ²	2.5 2.5		
Screw			M3.5		
Screw head			Phillips1		
Tightening torque		Nm	0.8 - 1		
MTTF - Mean time to failure MTTF = 1/λ = B10/(0.1 n _{op})	AC-1 AC-3	h	32.500	30.000	20.000
MTTF _d - Mean time to failure dangerous MTTF _d = 1/λ _d = B10 _d /(0.1 n _{op})	AC-1 AC-3	h	43.333	33.333	26.666
B10 - Number of operating cycles until 10 % of devices fail	AC-1 AC-3	op. c.	975.000	750.000	600.000
B10 _d - Number of operating cycles until 10 % of device dangerous	AC-1 AC-3	op. c.	1.300.000	1.000.000	800.000
B10 _d = B10/ratio of dangerous failures	AC-1 AC-3	op. c.	1.300.000	1.200.000	800.000
λ - Failure rate λ = (0.1 n _{op})/B10	AC-1 AC-3	1/h	0.00003	0.00004	0.00005
λ _d - Failure rate dangerous λ _d = (0.1 n _{op})/B10 _d	AC-1 AC-3	1/h	0.00002	0.00003	0.00004
Ratio of dangerous failures		%	75		
n _{op} - Operating cycles (operating cycles/h)		op. c./h	300		

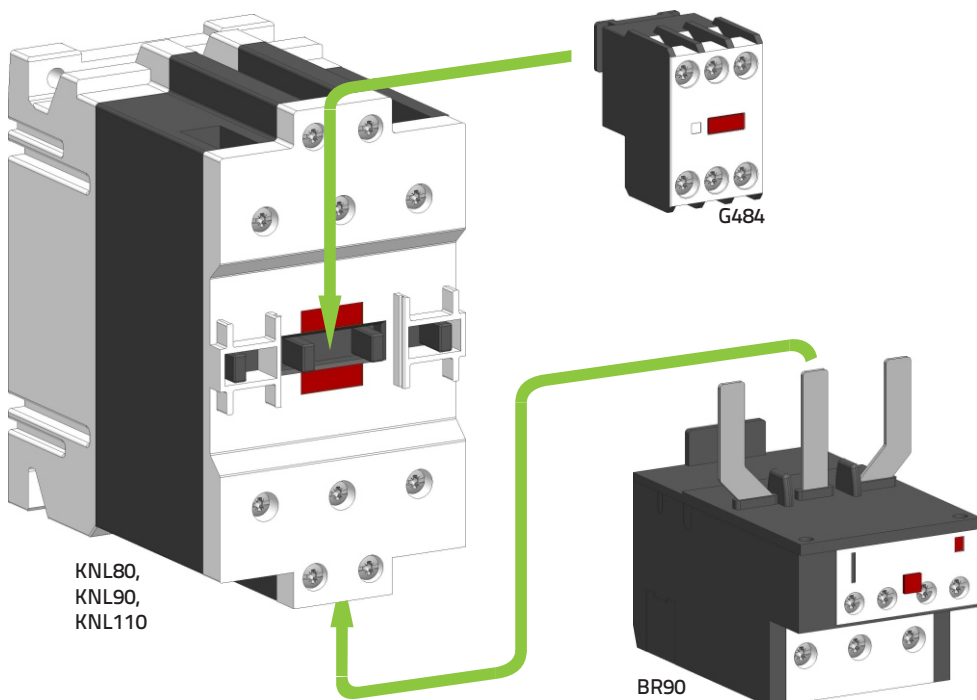
Electrical endurance

Diagram 1

Electrical endurance of motor contactors KNL80 - KNL110 – AC-3



Mounting positions of accessories



Contactors KNL80-KNL110

Accessories



Snap-on auxiliary switch blocks

TECHNICAL DATA

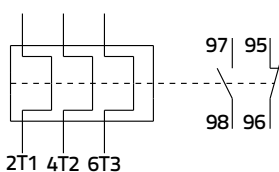
		Symbol	Unit	G484	BFX10
GENERAL	Type				
	Standards			IEC/EN 60947-5-1, UL 508	
	Approvals			CE, UL, CSA, GOST, CCC	
	For use with			KNL80 ... KNL110	
	Module width			1.5	2
	Number of poles			3	4
	Degree of protection			IP20	
	Pollution degree			3	
	Ambient temperature open		°C	-50 ... +70	
	closed				
	Storage temperature		°C	-60 ... +80	
	Mechanical endurance		op. c.	10.000.000	
Weight		g	39	48	
AUXILIARY CIRCUIT	Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	10	
	Rated insulation voltage	U_i	V	690	
	Thermal current	I_{th}	A	10	
	Switching of auxiliary loads acc. to standard UL and CSA			A600, Q600	
	Terminal capacity: rigid (solid and stranded)	S	mm ²	2.5	
	flexible			2.5	
	Screw			M3	
Tightening torque		Nm	1		

Thermal overload relay BR90

TECHNICAL DATA

Type		Symbol	Unit	BR90
GENERAL	Standards			IEC 60947-1, IEC 60947-4-1, UL508
	Approvals			CE, UL, CSA, GOST, CCC
	For use with			KNL80 ... KNL110
	Degree of protection			IP20
	Ambient temperature operating		°C	-20 ... +55
	storage			-55 ... +70
	Dimensions (WxHxD)		mm	55 x 88 x 94.5
	Operating position			vertical
	Reset type			auto, manual
	Maximum altitude above sea level		m	3000
Weight		g	365	
MAIN CIRCUIT	Rated insulation voltage	U_i	V	690
	Rated impulse withstand voltage	U_{imp}	kV	6
	Rated operational voltage	U_e	V	690
	Adjustable current	I_r	A	60 ... 110
	Rated frequency	f	Hz	0 ... 400
	Overvoltage category / pollution degree acc. to IEC/EN 60947-1			III / 3
	Trip class acc. to IEC/EN 60947-4-1			10
	Sensitivity to phase failure			yes
	Temperature compensation range		°C	-15 ... +55
	Power loss at I_n	P	W	6 ... 12.6
	Terminal capacity		mm ²	35
	Conductor insulation stripping length		mm	14
	Screw			M5
Screw head			PH2	
Tightening torque		Nm	3.9	
AUXILIARY CIRCUITS	Rated insulation voltage	U_i	V	690
	Rated impulse withstand voltage	U_{imp}	kV	6
	Rated operational voltage	U_e	V	690
	Overvoltage category / pollution degree acc. to IEC/EN 60947-1			III / 3
	Thermal current (both contacts)	I_{th}	A	10
	Contact electrical rating			B600 / P600
	Rated operational current AC-15 220/230 V	both contacts I_e	A	2.5
	Rated operational current DC-13 110 V	both contacts I_e	A	1.1
	Terminal capacity		mm ²	max. 2.5
	Conductor insulation stripping length		mm	9
	Screw			M3.5
Screw head			PH1	
Tightening torque		Nm	1	

Connection diagram BR90



Contactors KNL80-KNL110

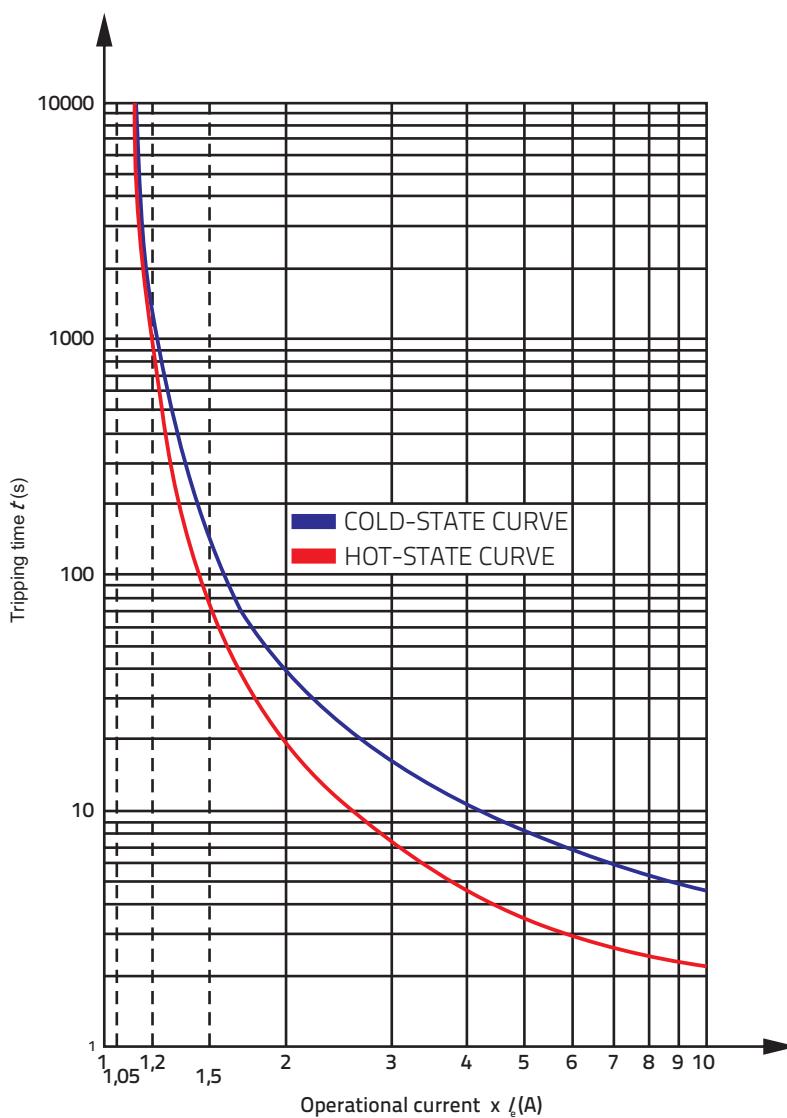
Accessories

Thermal overload relay BR90

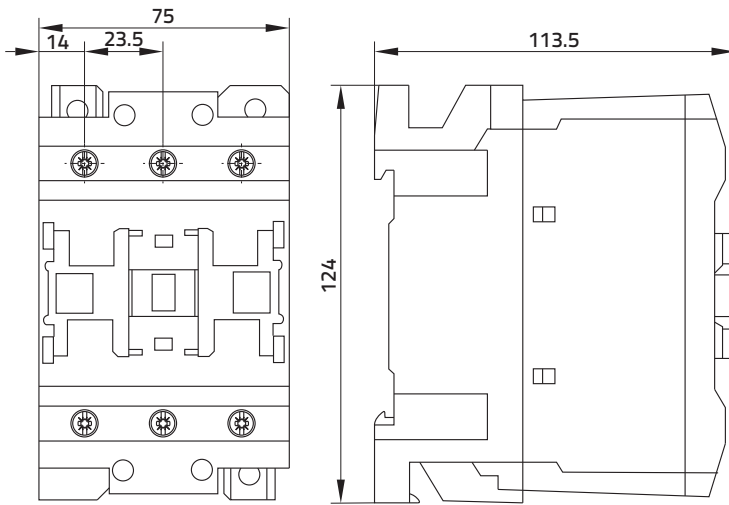
Setting ranges and maximum permitted back-up fuses

Setting range (A)	aM	Max. back-up fuse gL/gG (A)	
17 - 25	100	200	
24.5 - 36	100	200	
35 - 47	125	200	

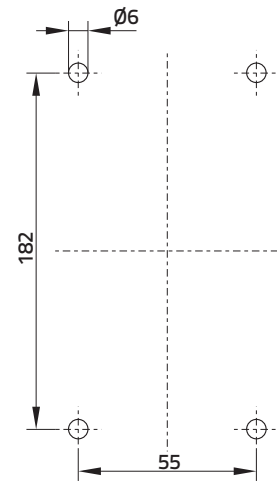
Tripping curve BR90



KNL80 ... KNL110

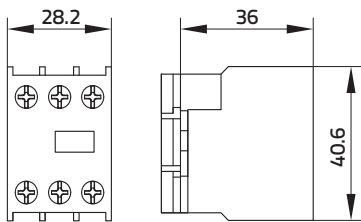


KNL80 ... KNL110 - drilling plan

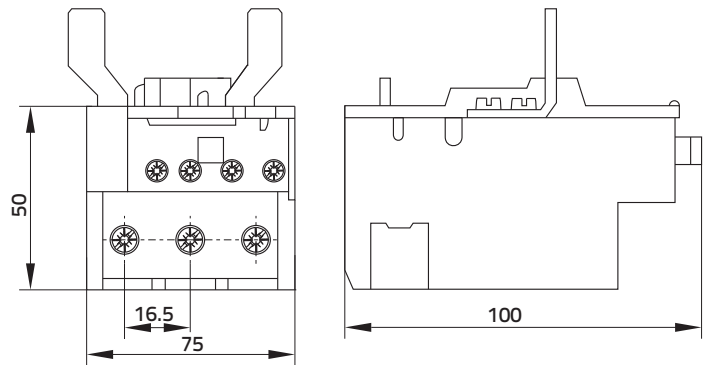


G484

Snap-on auxiliary switch blocks
(mounting on a basic contactor)

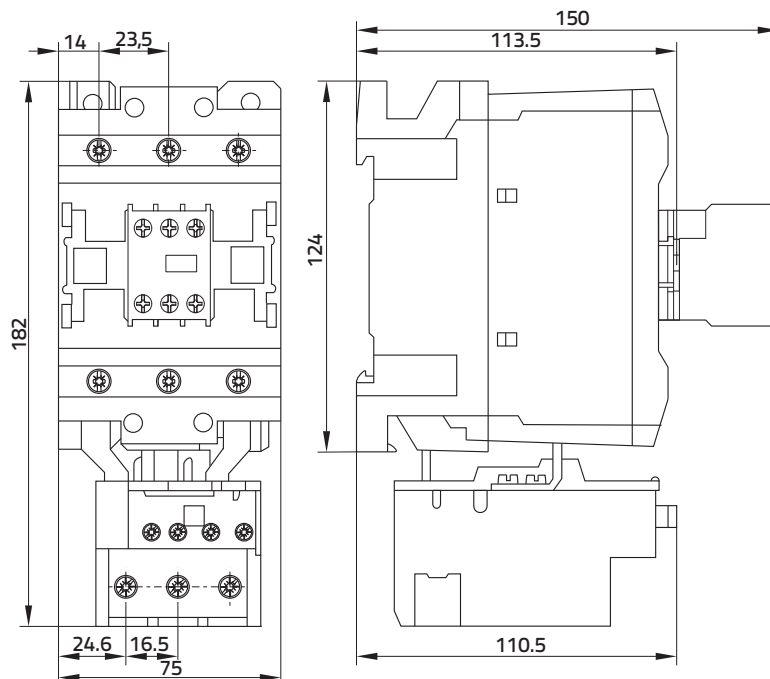


BR90 thermal overload relay



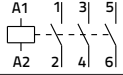
KNL80 ... KNL110 + G484 + BR90

Contactor + snap-on auxiliary switch block +
thermal overload relay



Motor contactors

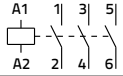
AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 120 mm widths)

Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL95-00	95 A	380 V		30.050.055	5.1	1
KNL95-00	95 A	220 V		30.050.054	5.1	1
KNL95-00	95 A	24 V		30.050.050	5.1	1

AC/DC



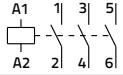
AC 3 acc. to IEC/EN 60947-4-1 (3-pole, 120 mm widths)

Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL115-00	110 A	380 V		30.050.069	5.1	1
KNL115-00	110 A	220 V		30.050.068	5.1	1
KNL115-00	110 A	24 V		30.050.064	5.1	1

AC/DC



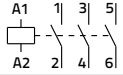
AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 120 mm widths)

Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL145-00	150 A	380 V		30.050.083	5.22	1
KNL145-00	150 A	220 V		30.050.082	5.22	1
KNL145-00	150 A	24 V		30.050.078	5.22	1

AC/DC



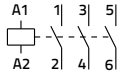
AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 120 mm widths)

Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL180-00	185 A	380 V		30.050.097	5.22	1
KNL180-00	185 A	220 V		30.050.096	5.22	1
KNL180-00	185 A	24 V		30.050.092	5.22	1

AC/DC



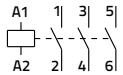
AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 145 mm widths)

Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL250-00	265 A	380 V		30.050.111	9.1	1
KNL250-00	265 A	220 V		30.050.110	9.1	1
KNL250-00	265 A	24 V		30.050.106	9.1	1

AC/DC



AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 145 mm widths)

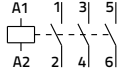
Type	Rated current I_e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL400-00	420 A	380 V		30.050.125	9.25	1
KNL400-00	420 A	220 V		30.050.124	9.25	1
KNL400-00	420 A	24 V		30.050.120	9.25	1

AC/DC



Motor contactors

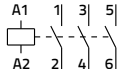
AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 195 mm widths)

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL500-00	520 A	380 V		30.050.138	17.6	1
KNL500-00	520 A	220 V		30.050.137	17.6	1
KNL500-00	520 A	24 V		30.051.116	17.6	1

AC/DC



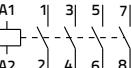
AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 195 mm widths)

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL630-00	630 A	380 V		30.050.150	17.9	1
KNL630-00	630 A	220 V		30.050.149	17.9	1
KNL630-00	630 A	24 V		30.051.120	17.9	1

AC/DC



AC-1 acc. to IEC/EN 60947-4-1 (4-pole, 260 mm widths)

Type	Rated current I _e	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL1000.4-00	1000 A	380 V		30.050.162	21.5	1
KNL1000.4-00	1000 A	220 V		30.050.161	21.5	1
KNL1000.4-00	1000 A	24 V		30.051.123	21.5	1

AC/DC

Contactors KNL95-KNL1000

Accessories



Snap-on auxiliary switch blocks

AC 15 acc. to IEC/EN 60947-5-1

Type	Rated current I _e	Rated voltage U _e	Version	Ordering No.	Weight (g)	Packaging (pcs)
G350 ¹⁾	16 A	690 V	-12 or -21 reversible	38.422.650	67	1

¹⁾ The add-on auxiliary contact block G350 can be applied to contactor KNL95-KNL1000 only up to a maximum of four pieces for each contactor, for a total of 12 contacts. The contact block G350 provides a 2NO+1NC or 1NO+2NC combination depending on its mounting position.



Mechanical interlock

Type	Characteristic	Ordering No.	Weight (g)	Packaging (pcs)
G355	Side-by-side contactors	38.902.072	25	1
G356/1	One on top of other contactors L(mm)	225 - 365	104	1
G356/2		265 - 305	110	1
G356/3		305 - 345	116	1
G356/4		345 - 385	122	1
G356/5		390 - 425	124	1
G356/6		470 - 500	134	1



G355

Main terminal covers

Type	For contactors	Ordering No.	Weight (g)	Packaging (pcs)
G360	KNL95, KNL115	38.422.669	26	1
G361	KNL145, KNL180	38.422.677	26	1
G363	KNL250, KNL400	38.422.679	47	1
G527	KNL500	38.422.680	238	1
G528	KNL500.4	38.422.681	265	1
G529	KNL630	38.422.682	250	1
G530	KNL630.4	38.422.683	290	1



G363

Bars for 3 poles star connection

Type	For contactors	Ordering No.	Weight (g)	Packaging (pcs)
BA1595	KNL95 - KNL180	37.551.806	82	1
BA1721	KNL250 - KNL400	37.551.807	140	1
BA1846	KNL500 - KNL630	37.551.808	340	1



BA1595

Bars for 2 poles parallel connection

Type	For contactors	Ordering No.	Weight (g)	Packaging (pcs)
BA1594	KNL95 - KNL180	37.551.812	89	1
BA1720	KNL250 - KNL400	37.551.813	140	1
BA1845	KNL500 - KNL630	37.551.814	320	1



BA1595

Adapter for screw terminal

Type	Ordering No.	Weight (g)	Packaging (pcs)
G370	38.422.685	3	1



G370

Identification plate

Type	Ordering No.	Weight (g)	Packaging (pcs)
BA126/2	37.423.883	1	1

Thermal overload relay accessories

Type	Characteristic		Ordering No.	Weight (g)	Packaging (pcs)	
G372	Adapter for mounting on contactor	BRA180	KNL95 - KNL180	37.551.817	82	1
G373			KNL250 - KNL400	37.551.818	100	1
G375		BRA400	KNL145 - KNL180	37.551.821	103	1
G376			KNL250 - KNL400	37.551.822	165	1
G228	Electric reset	all types	38.422.687	58	1	
G223	Sealing kit	all types	38.423.476	2	1	
G244	Start button	all types	38.422.269	11	1	
RB6	Identification plate	all types	37.423.885	1	1	



G376

BRA180 thermal overload relay

up to 200 A for KNL95-KNL250 contactors

Type	Setting range (A)	Max. backup fuse (A)		Ordering No.	Weight (kg)	Packaging (pcs)
		aM	gL/gG			
BRA180-100	60 ... 100	100	160	30.016.895	2.15	1
BRA180-125	75 ... 125	125	200	30.016.896		
BRA180-150	90 ... 150	160	250	30.016.897		
BRA180-200	120 ... 200	200	315	30.016.898		



BRA400 thermal overload relay

up to 420 A for KNL145-KNL400 contactors

Type	Setting range (A)	Max. backup fuse (A)		Ordering No.	Weight (kg)	Packaging (pcs)
		aM	gL/gG			
BRA400-250	150 ... 250	250	400	30.016.908	2.46	1
BRA400-300	180 ... 300	315	500	30.016.909		
BRA400-420	250 ... 420	400	630	30.016.910		



Ordering data

For contactors KN95 - KNL1000

Standard control voltages and designations (AC or DC)

V	24	48	60	110/125	220/240	380/415	440/480

Ordering data

KNL95 - 00 - 220/240 - 50/60



Note:

The type designation and control voltage are stated when ordering the contactors.



Technical characteristics

Dimensions



TECHNICAL DATA

Type	Symbol	Unit	KNL95	KNL115	KNL145	KNL180
Standards			IEC 60947-4-1, UL 508			
Approvals			CE, UL, EAC			
Module width		mm	3-pole: 120 / 4-pole: 160			
Number of poles			3 or 4			
Pollution degree			3			
Ambient temperature: open		°C	-50 ... +70			
closed		°C	-50 ... +70			
Storage temperature		°C	-60 ... +80			
Maximum altitude U_i and U_e is reduced for 1.2 % and I_e for 0.4 % for every additional 100 m		m	2000			
Number of contactors or switches side-by-side: <40 °C (40 ... 55) °C			no limitation			
Maximum operating frequency with no load		op. c./h	2.400			
Mechanical endurance		op. c.	10.000.000			
Weight		kg	5.96	5.96	6.1	10.6
Power dissipation per pole		W	7	7.7	14.5	20.3
Overload current withstand capability 10 s		A	760	1100	1300	1500
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	160	200	250	315
Rated insulation voltage	U_i	V	1000			
Rated impulse withstand voltage	U_{imp}	kV	8			
Rated operational voltage	U_e	V	690			
Rated frequency	f	Hz	50/60			
Thermal current	I_{th}	A	125	160	250	275
Rated operational current for AC-1, AC-7a and AC-21	I_e	A	125	160	250	275
Operational power for AC-1, AC-7a and AC-21: single-phase 230 V three-phase 230 V three-phase 400 V three-phase 500 V three-phase 690 V	P_e	kW	27 47 82 103 142	35 57 98 129 173	55 91 150 196 270	60 95 160 213 298
Maximum operating frequency for AC-1, AC-7a and AC-21		op. c./h	600			
Rated operational current for AC-3, AC-7b and AC-23 (at 400 V)	I_e	A	95	110	150	185
Operational power for AC-3, AC-7b and AC-23: three-phase 230 V three-phase 400 V three-phase 500 V three-phase 690 V three-phase 1000 V	P_e	kW	27.6 50 56 74 46	33 61 80 100 63	46 80 100 120 75	57 100 123 144 103
Maximum operating frequency for AC-3, AC-7b and AC-23		op. c./h	600			
Electrical endurance for AC-3, AC-7b and AC-23		op. c.	1.100.000	1.100.000	1.100.000	1.000.000
Rated operational current for AC-4 (at 400 V)	I_e	A	43	47	57	65
Operational power for AC-4: three-phase 400 V	P_e	kW	23	25	31	36
Maximum operating frequency for AC-4		op. c./h	300			
Electrical endurance for AC-4		op. c.	200.000			
Rated motor power according to standards UL and CSA: three-phase 230 V three-phase 460 V three-phase 575 V	P_e	HP	30 50 75	40 75 100	50 100 125	75 150 150
Maximum operating frequency for motors acc. to UL and CSA		op. c./h	600			
Electrical endurance for motors acc. to UL and CSA		op. c.	1.100.000	1.100.000	1.100.000	1.000.000

TECHNICAL DATA

Type	Symbol	Unit	KNL95	KNL115	KNL145	KNL180
Switching of capacitors AC-6b and AC-7c (at 230 V)	C	μF	900	1800	2400	2400
Maximum operating frequency for AC-6b and AC-7c		op. c./h	600			
Switching of capacitors AC-6b and AC-7c (at 230 V)		op. c.	100.000			
Rated operational current for DC-1 (L/R ≤ 1 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I _e	A	70 / 8 / 6 100 / 80 / 40 100 / 85 / 55	160 / 100 / - 160 / 130 / 130 160 / 130 / 130	220 / 110 / - 220 / 150 / 150 220 / 150 / 150	260 / 120 / - 260 / 170 / 150 260 / 170 / 170
Maximum operating frequency for DC-1		op. c./h	300			
Rated operational current for DC-3 (L/R ≤ 2 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I _e	A	40 / 3 / 1 60 / 40 / 7 80 / 60 / 35	140 / 70 / - 140 / 100 / 80 140 / 120 / 100	160 / 80 / - 160 / 120 / 90 160 / 140 / 120	180 / 90 / - 180 / 250 / 100 180 / 160 / 140
Maximum operating frequency for DC-1		op. c./h	300			
Rated operational current for DC-5 (L/R ≤ 7.5 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I _e	A	40 / 3 / 1 60 / 40 / 7 80 / 60 / 35	140 / 80 / - 140 / 100 / 80 140 / 120 / 100	160 / 80 / - 160 / 120 / 90 160 / 140 / 120	180 / 90 / - 180 / 140 / 100 180 / 160 / 140
Maximum operating frequency for DC-1		op. c./h	300			
Terminal capacity: wire with lug 1 or 2 bars	S	mm ² mm	70 20x3	70 20x3	120 25x3	150 25x3
Screw		mm	M6	M6	M8	M8
Spanner / wrench size		mm	10	10	13	13
Tightening torque		Nm	3	3	6	6
Range of control voltage for switch-on	U _c	%	80 ... 110			
Range of control voltage for drop out	U _c	%	30 ... 60			
Kind of voltage			AC/DC			
Standard control voltages	U _c	V	24, 48, 60, 110/125, 220/240, 380/415, 440/480			
Frequency of AC control voltage	f	Hz	50/60			
Control mode			remote control with U _c			
Surge immunity withstand voltage 1,2/50 μs acc. to standard IEC/EN 61000-4-5		kV	10			
Coil consumption: switch-on operation		VA/W	300/300 10/10			
Delays: make brake	AC/DC	ms	13-25/60-90 8-12	60-100 25-60		
Terminal capacity: Quick-connect		faston	1x6.35 mm or 2x2.8 mm			
MTTF - Mean time to failure MTTF = 1/λ = B10/(0.1 n _{op})	AC-1 AC-3	h	25.000 27.500	25.000 27.500	20.000 27.500	20.000 25.000
MTTF _d - Mean time to failure dangerous MTTF _d = 1/λ _d = B10 _d /(0.1 n _{op})	AC-1 AC-3	h	33.333 36.666	33.333 36.666	26.666 36.666	26.666 33.333
B10 - Number of operating cycles until 10 % of devices fail	AC-1 AC-3	op. c.	750.000 825.000	750.000 825.000	600.000 825.000	600.000 750.000
B10 _d - Number of operating cycles until 10 % of device dangerous	AC-1 AC-3	op. c.	1.000.000 1.100.000	1.000.000 1.100.000	800.000 1.100.000	800.000 1.000.000
B10 _d = B10/ratio of dangerous failures						
λ - Failure rate λ = (0.1 n _{op})/B10	AC-1 AC-3	1/h	0.00004 0.00004	0.00004 0.00004	0.00005 0.00004	0.00005 0.00004
λ _d - Failure rate dangerous λ _d = (0.1 n _{op})/B10 _d	AC-1 AC-3	1/h	0.00003 0.000003	0.00003 0.000003	0.00004 0.000003	0.00004 0.000003
Ratio of dangerous failures		%	75			
n _{op} - Operating cycles (operating cycles/h)		op. c./h	300			

TECHNICAL DATA

Type	Symbol	Unit	KNL250	KNL400	KNL500	KNL630	KNL1000
Standards			IEC 60947-4-1, UL 508				
Approvals			CE, UL, EAC				
Module width		mm	3-pole: 145 / 4-pole: 192.5		3-pole: 192 / 4-pole: 257		
Number of poles			3 or 4				
Pollution degree			3				
Ambient temperature: open		°C	-50 ... +70				
closed		°C	-50 ... +70				
Storage temperature		°C	-60 ... +80				
Maximum altitude U_i and U_e is reduced for 1.2 % and I_e for 0.4 % for every additional 100 m		m	2000				
Number of contactors or switches side-by-side: <40 °C (40 ... 55) °C			no limitation				
Maximum operating frequency with no load		op. c./h	2.400				
Mechanical endurance		op. c.	10.000.000				
Weight		kg	10.8	10.8	20.8	21.5	25.6
Power dissipation per pole		W	24.5	52	68.6	90	140
Overload current withstand capability 10 s		A	2200	3600	4050	5040	5600
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	400	630	800	1000	/
Rated insulation voltage	U_i	V	1000				
Rated impulse withstand voltage	U_{imp}	kV	8				
Rated operational voltage	U_e	V	690				
Rated frequency	f	Hz	50/60				
Thermal current	I_{th}	A	350	550	700	800	1000
Rated operational current for AC-1, AC-7a and AC-21	I_e	A	350	550	700	800	1000
Operational power for AC-1, AC-7a and AC-21: single-phase 230 V three-phase 230 V three-phase 400 V three-phase 500 V three-phase 690 V	P_e	kW	76 124 214 282 380	120 200 345 452 598	153 252 438 575 755	175 288 500 655 860	218 350 600 750 1000
Maximum operating frequency for AC-1, AC-7a and AC-21		op. c./h	600				
Rated operational current for AC-3, AC-7b and AC-23 (at 400 V)	I_e	A	265	420	520	630	/
Operational power for AC-3, AC-7b and AC-23: three-phase 230 V three-phase 400 V three-phase 500 V three-phase 690 V three-phase 1000 V	P_e	kW	83 140 176 212 156	130 225 271 352 208	156 290 367 416 312	198 335 368 440 368	/ / / / /
Maximum operating frequency for AC-3, AC-7b and AC-23		op. c./h	600				
Electrical endurance for AC-3, AC-7b and AC-23		op. c.	1.100.000	700.000	700.000	700.000	/
Rated operational current for AC-4 (at 400 V)	I_e	A	92	133	175	210	/
Operational power for AC-4: three-phase 400 V	P_e	kW	52	76	99	119	/
Maximum operating frequency for AC-4		op. c./h	300				
Electrical endurance for AC-4		op. c.	200.000				
Rated motor power according to standards UL and CSA: three-phase 230 V three-phase 460 V three-phase 575 V	P_e	HP	100 200 250	150 350 400	200 ¹⁾ 400 ¹⁾ 450 ¹⁾	250 ¹⁾ 500 ¹⁾ 500 ¹⁾	/
Maximum operating frequency for motors acc. to UL and CSA		op. c./h	600				
Electrical endurance for motors acc. to UL and CSA		op. c.	1.100.000	700.000	700.000	700.000	/

¹⁾ No UL/CSA ratings; data only for indication and reference purposes only

TECHNICAL DATA

Type	Symbol	Unit	KNL250	KNL400	KNL500	KNL630	KNL1000	
MAIN CIRCUIT	Rated operational current for DC-1 (L/R ≤ 1 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I_e	A	350 / - / -	400 / 250 / -	650 / 320 / -	800 / 460 / -	/
	350 / 300 / 250			400 / 400 / 350	650 / 550 / 450	800 / 800 / 700	/	
	350 / 300 / 300			400 / 400 / 400	650 / 600 / 600	800 / 800 / 800	/	
	Maximum operating frequency for DC-1		op. c./h	300				
	Rated operational current for DC-3 (L/R ≤ 2 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I_e	A	180 / 150 / -	350 / 200 / -	550 / 320 / -	800 / 460 / -	/
				280 / 250 / 200	350 / 350 / 280	650 / 550 / 450	800 / 800 / 700	/
				180 / 280 / 250	350 / 350 / 350	650 / 550 / 550	800 / 800 / 800	/
	Maximum operating frequency for DC-1		op. c./h	300				
	Rated operational current for DC-5 (L/R ≤ 7.5 ms): 1 pole ... 24 V DC/ 110 V DC/ 220 V DC 2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC 3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC	I_e	A	180 / 150 / -	350 / 200 / -	550 / 320 / -	800 / 460 / -	/
				280 / 250 / 200	350 / 350 / 280	650 / 550 / 450	800 / 800 / 700	/
				180 / 280 / 250	350 / 350 / 350	650 / 550 / 550	800 / 800 / 800	/
	Maximum operating frequency for DC-1		op. c./h	300				
Terminal capacity: wire with lug 1 or 2 bars	S	mm ² mm	240	2x150	2x240	2x240	/	
Screw			M10	M10	M10	M12	M12	
Screw head		mm	17	17	17	19	19	
Tightening torque		Nm	10	10	10	14	14	
COIL	Range of control voltage for switch-on	U_c	%	80 ... 110				
	Range of control voltage for drop out	U_c	%	30 ... 60				
	Kind of voltage			AC/DC				
	Standard control voltages	U_c	V	1)		2)		
	Frequency of AC control voltage	f	Hz	50/60				
	Control mode			remote control with U_c				
	Surge immunity withstand voltage 1,2/50 μs acc. to standard IEC/EN 61000-4-5		kV	10				
	Coil consumption: switch-on operation		VA/W	300/300		400/400		
				10/10		18/18		
	Delays: make brake		ms	80-120		110-180		
30-75				60-100				
Terminal capacity: Quick-connect		faston	1x6.35 mm or 2x2.8 mm					
SAFETY	MTTF - Mean time to failure	AC-1	h	17.500	15.000	16.250	17.500	/
	MTTF = 1/λ = B10/(0.1 n _{op})	AC-3	h	25.000	17.500	17.500	17.500	/
	MTTF _d - Mean time to failure dangerous MTTF _d = 1/λ _d = B10 _d /(0.1 n _{op})	AC-1	h	23.333	20.000	21.666	23.333	/
		AC-3	h	33.333	23.333	23.333	23.333	/
	B10 - Number of operating cycles until 10 % of devices fail	AC-1	op. c.	525.000	450.000	487.500	525.000	/
		AC-3	op. c.	750.000	525.000	525.000	525.000	/
	B10 _d - Number of operating cycles until 10 % of device dangerous B10 _d = B10/ratio of dangerous failures	AC-1	op. c.	700.000	600.000	650.000	700.000	/
		AC-3	op. c.	1.000.000	700.000	700.000	700.000	/
	λ - Failure rate λ = (0.1 n _{op})/B10	AC-1	1/h	0.00006	0.00007	0.00006	0.00006	/
		AC-3	1/h	0.00004	0.00006	0.00006	0.00006	/
	λ _d - Failure rate dangerous λ _d = (0.1 n _{op})/B10 _d	AC-1	1/h	0.00004	0.00005	0.00005	0.00004	/
		AC-3	1/h	0.00003	0.00004	0.00004	0.00004	/
Ratio of dangerous failures		%	75					
n _{op} - Operating cycles (operating cycles/h)		op. c./h	300					

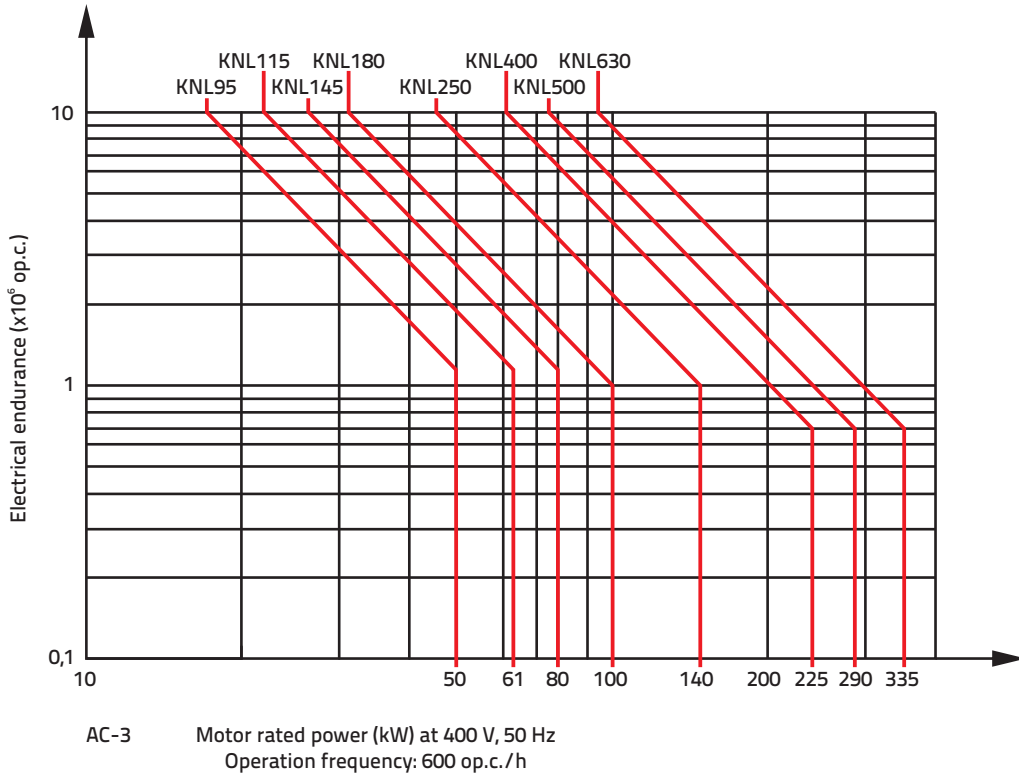
1) 24,48,60,110/125,220/240,380/415,440/480V

2) 48,60,110/125,220/240,380/415,440/480 V

Electrical endurance

Diagram 1

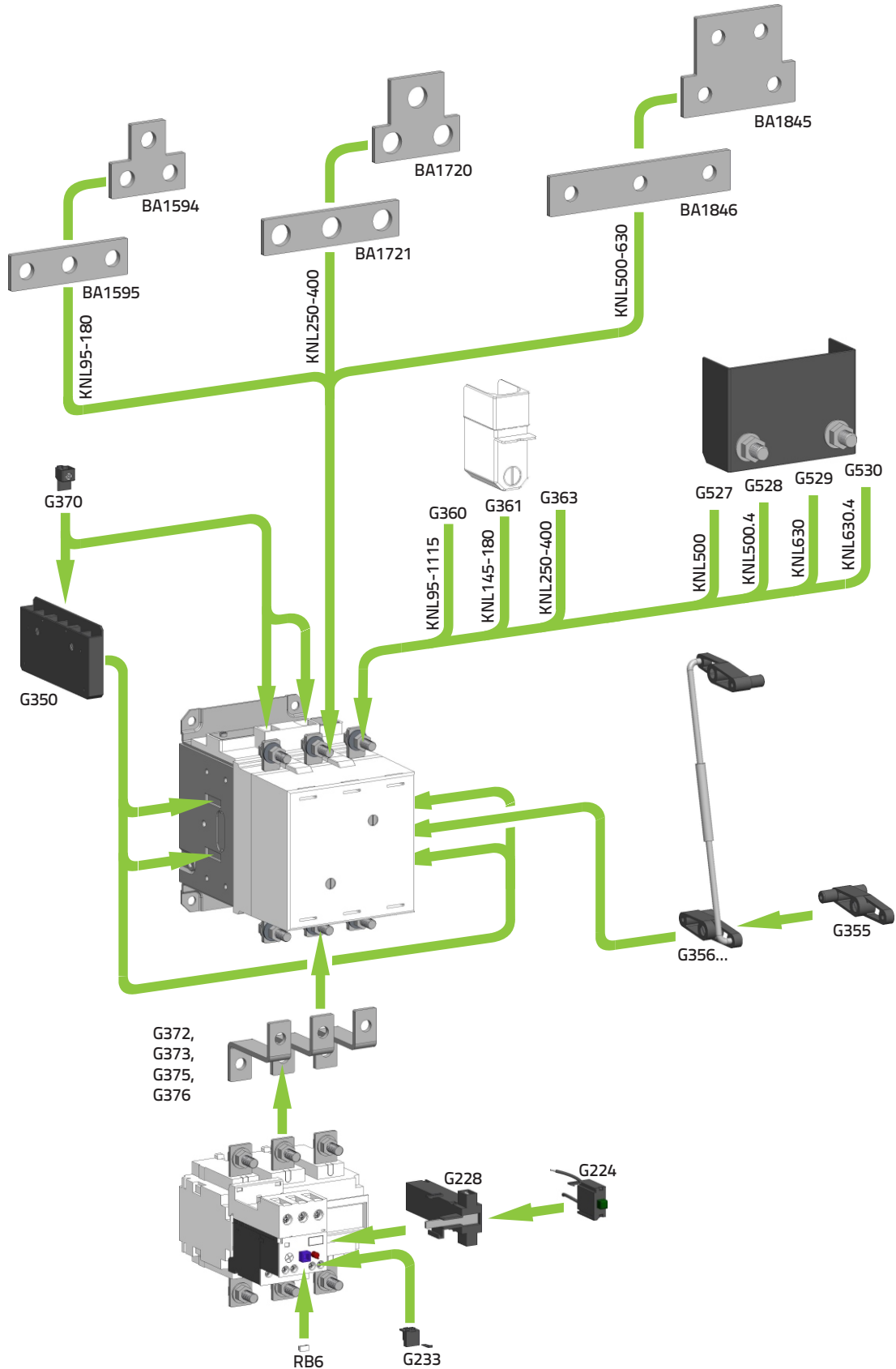
Electrical endurance of motor contactors KNL95 - KNL1000 – AC-3



Contactors KNL95-KNL1000

Accessories

Mounting positions of accessories



Snap-on auxiliary switch blocks

TECHNICAL DATA

		Symbol	Unit	G350
GENERAL	Type			
	Standards			IEC/EN 60947-5-1, UL 508
	Approvals			CE, UL, CSA, GOST, CCC
	For use with			KNL95 ... KNL1000
	Module width			0.5
	Number of poles			3
	Degree of protection			IP20
	Pollution degree			3
	Ambient temperature open		°C	-50 ... +70
	closed			
	Storage temperature		°C	-60 ... +80
Mechanical endurance		op. c.	5.000.000	
Weight		g	80	
AUXILIARY CIRCUIT	Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	16
	Rated insulation voltage	U _i	V	690
	Thermal current	I _{th}	A	16
	Switching of auxiliary loads acc. to standard UL and CSA			A600, P600
	Terminal capacity: Quick-connect		faston	1-6.35 mm or 2-2.8 mm

Mechanical interlock

Type	Characteristics
G355	Side-by-side contactors
	One on top of other contactors L (mm)
G356/1	225 - 365
G356/2	265 - 305
G356/3	305 - 345
G356/4	345 - 385
G356/5	390 - 425
G356/6	470 - 500

Main terminal covers

Type	Characteristics
G360	for KNL95, KNL115
G361	for KNL145, KNL180
G363	for KNL250, KNL400
G527	for KNL500
G528	for KNL500.4
G529	for KNL630
G530	for KNL630.4

Bars for 3-poles star connection

Type	Characteristics
BA1595	for KNL95 - KNL180
BA1721	for KNL250 - KNL400
BA1846	for KNL500 - KNL630

Bars for 2-poles parallel connection

Type	Characteristics
BA1594	for KNL95 - KNL180
BA1720	for KNL250 - KNL400
BA1845	for KNL500 - KNL630

Adapter

Type	Characteristics
BA1595	for KNL95 - KNL180

Identification plate

Type	Characteristics
BA126/2	for KNL95 - KNL630

Contactors KNL95-KNL1000

Accessories



Thermal overload relay BRA180, BRA400

TECHNICAL DATA

		Symbol	Unit	BRA180	BRA400
GENERAL	Type				
	Standards			IEC 60947-1, IEC 60947-4-1, UL508	
	Approvals			CE, UL, CSA, GOST	
	For use with			KNL95 ... KNL250	KNL145 ... KNL400
	Degree of protection			IP00 (main terminals) / IP20 (auxiliary terminals)	
	Ambient temperature operating		°C	-20 ... +55	
	storage			-55 ... +70	
	Dimensions (WxHxD)		mm	127.5 x 137 x 171.5	145 x 146 x 171
	Operating position			vertical	
	Reset type			auto, manual	
Maximum altitude above sea level		m	3000		
Weight		kg	2.15	2.46	
MAIN CIRCUIT	Rated insulation voltage	U_i	V	1000	
	Rated impulse withstand voltage	U_{imp}	kV	8	
	Rated operational voltage	U_e	V	690	
	Adjustable current	I_r	A	60 ... 200	150 ... 420
	Rated frequency	f	Hz	50/60	
	Overvoltage category / pollution degree acc. to IEC/EN 60947-1			III / 3	
	Trip class acc. to IEC/EN 60947-4-1			10	
	Sensitivity to phase failure			yes	
	Temperature compensation range		°C	-15 ... +55	
	Power loss at I_n	P	W	2.1 ... 7.2	
	Terminal capacity		mm ²	150 (with cable lug) ; 20 mm busbar	150 (with cable lug) ; 25 mm busbar
	Conductor insulation stripping length		mm	/	
	Screw			M8	M10
Screw head			screw + hexagonal nut		
Tightening torque		Nm	18	35	
AUXILIARY CIRCUITS	Rated insulation voltage	U_i	V	690	
	Rated impulse withstand voltage	U_{imp}	kV	6	
	Rated operational voltage	U_e	V	690	
	Overvoltage category / pollution degree acc. to IEC/EN 60947-1			III / 3	
	Thermal current (both contacts)	I_{th}	A	10	
	Contact electrical rating			B600 / P600	
	Rated operational current AC-15 220/230 V	both contacts I_e	A	2.5	
	Rated operational current DC-13 110 V	both contacts I_e	A	1.1	
	Terminal capacity		mm ²	max. 2.5	
	Conductor insulation stripping length		mm	9	
	Screw			M3.5	
Screw head			PH1		
Tightening torque		Nm	1		

Thermal overload relay BRA180

Setting ranges and maximum permitted back-up fuses

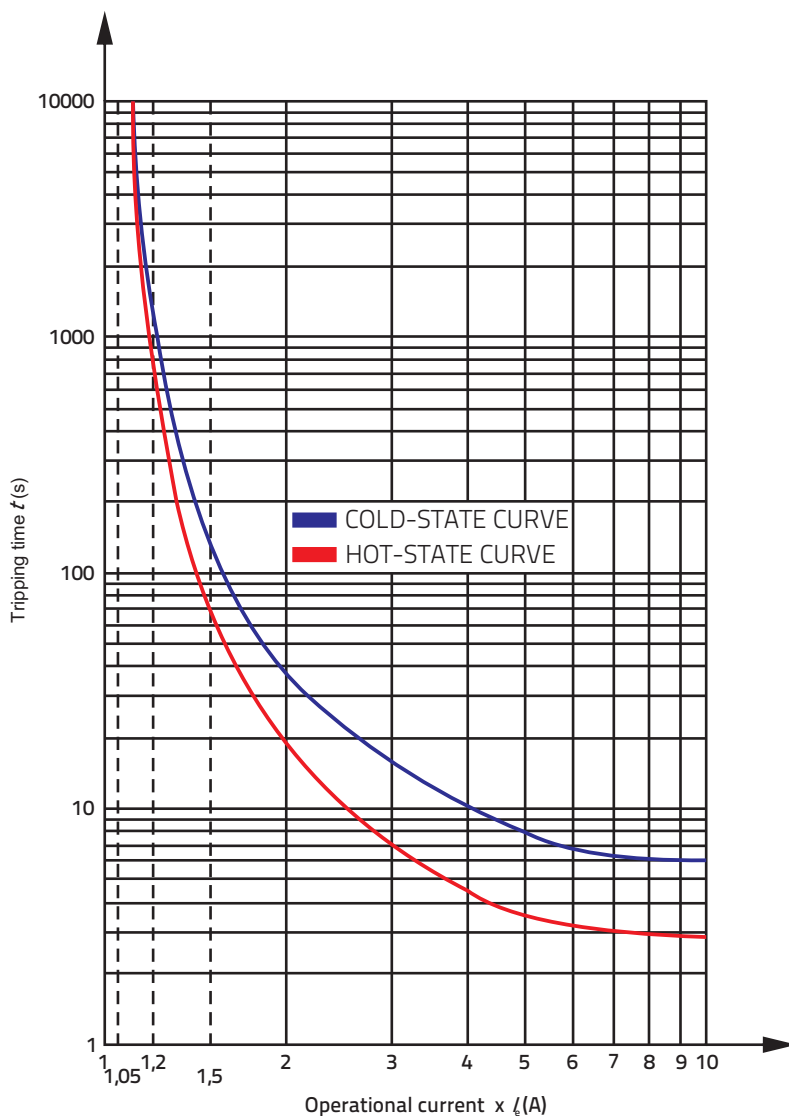
Setting range (A)	aM	Max. back-up fuse gL/gG (A)	
			gL/gG
60 - 100	100		160
75 - 125	125		200
90 - 150	160		250
120 - 200	200		315

Thermal overload relay BRA400

Setting ranges and maximum permitted back-up fuses

Setting range (A)	aM	Max. back-up fuse gL/gG (A)	
			gL/gG
150 - 250	250		400
180 - 300	315		500
250 - 420	400		630

Tripping curve BR90

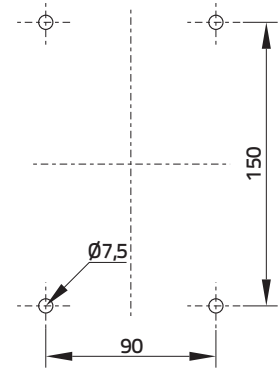
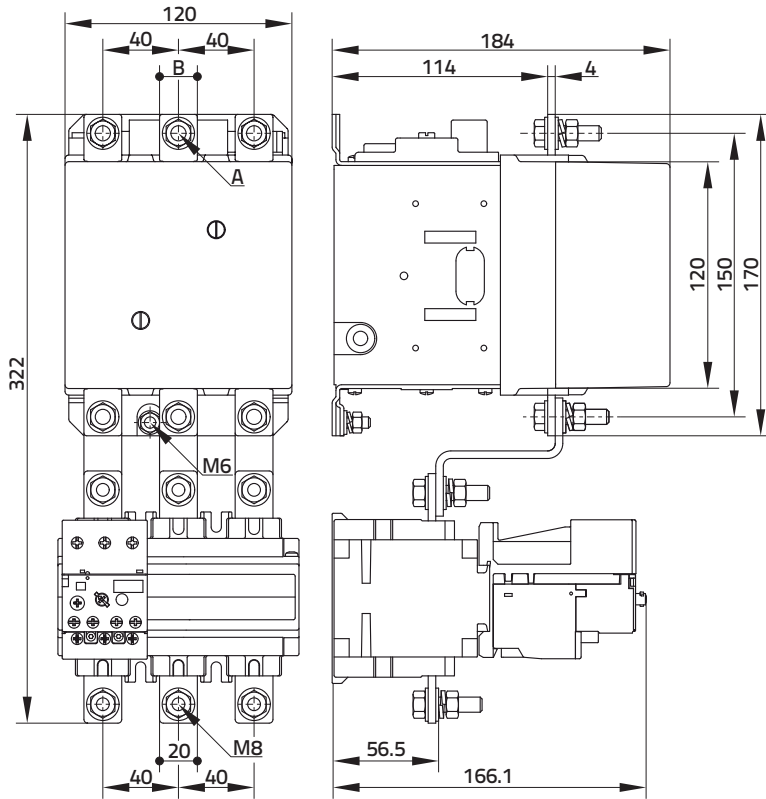


Contactors KNL95-KNL1000

Dimensions

KNL95 ... KNL180 – 3-pole
 Contactor+ thermal overload relay BRA180

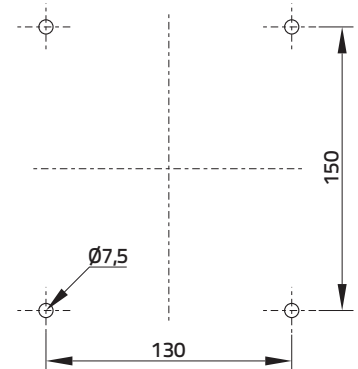
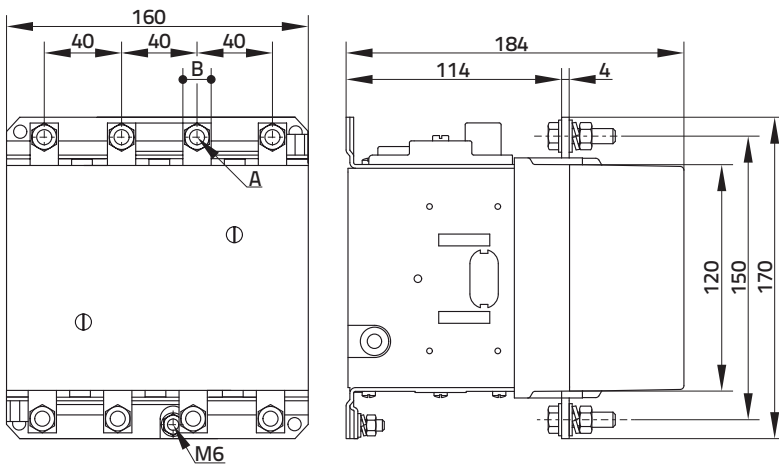
KNL95 ... KNL180 - drilling plan
 3-pole



Type	A	B
KNL95, KNL115	M6	15
KNL145	M8	20
KNL180	M8	20

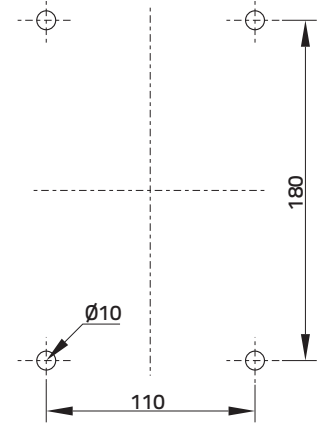
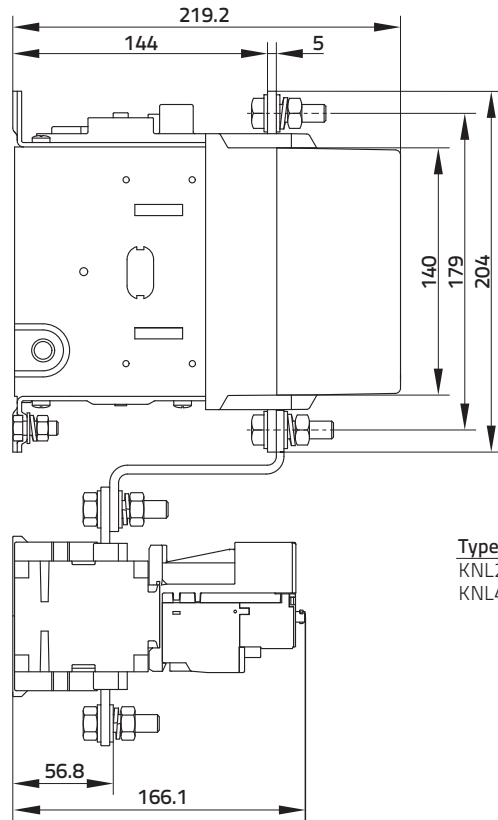
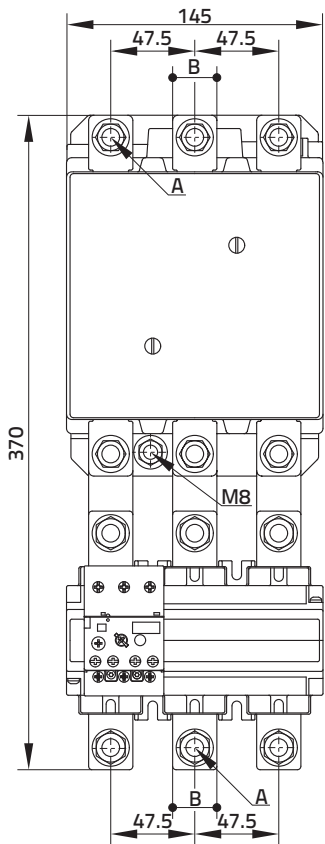
KNL95 ... KNL180 – 4-pole

KNL95 ... KNL180 - drilling plan
 4-pole



KNL250, KNL400 – 3-pole
Contactor + thermal overload relay BRA400

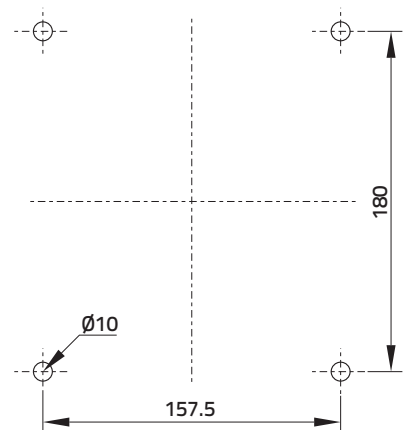
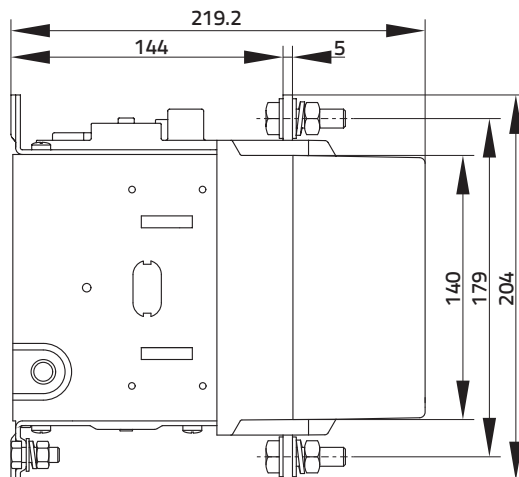
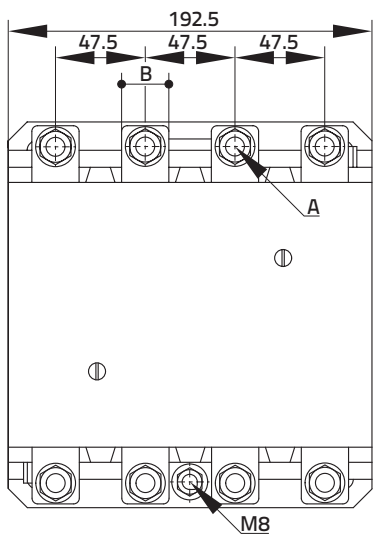
KNL250, KNL400 - drilling plan
3-pole



Type	A	B
KNL250	M10	20
KNL400	M10	25

KNL250, KNL400 – 4-pole

KNL250, KNL400 - drilling plan
4-pole

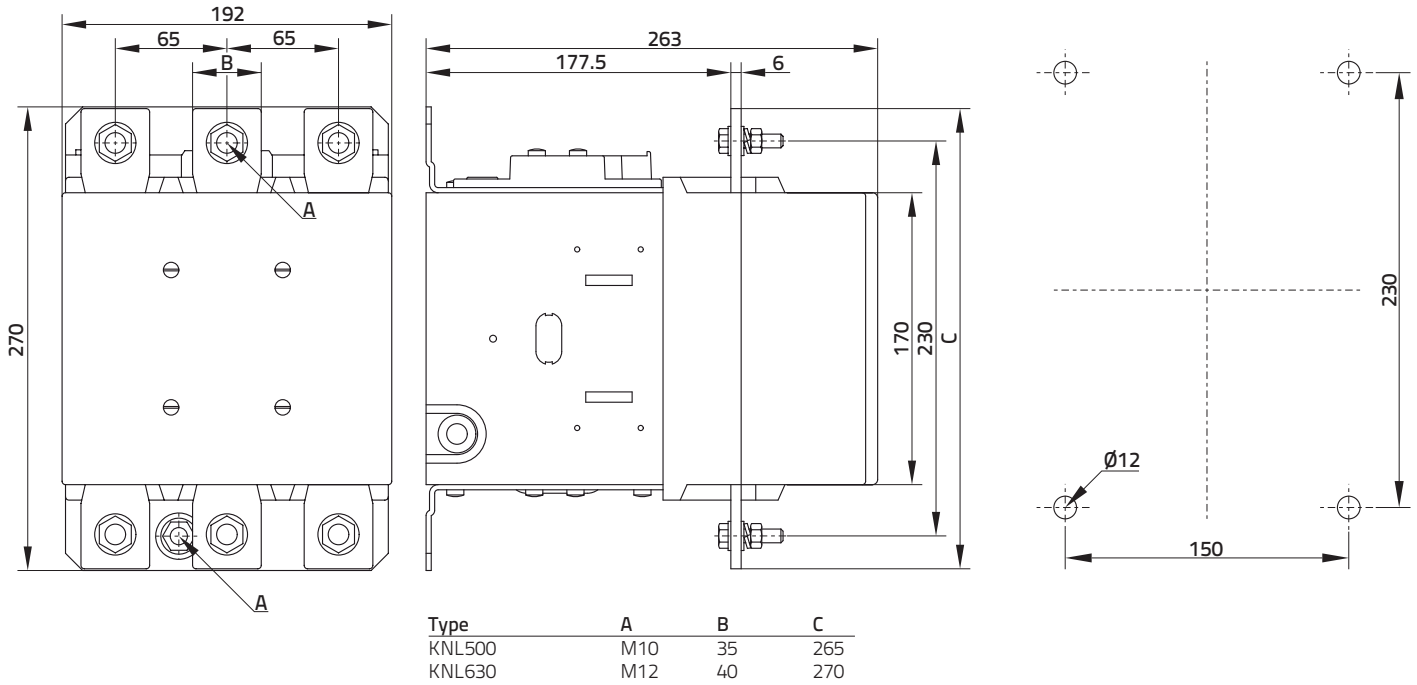


Contactors KNL95-KNL1000

Dimensions

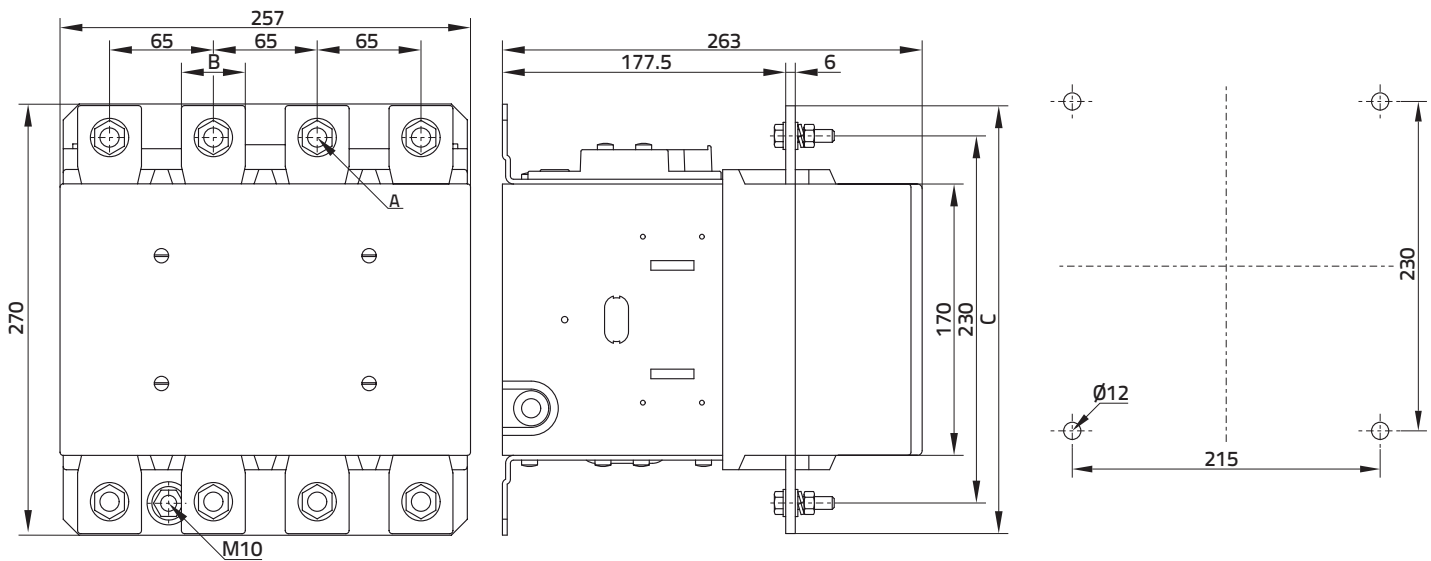
KNL500, KNL630 – 3-pole

KNL500, KNL630 – drilling plan
3-pole

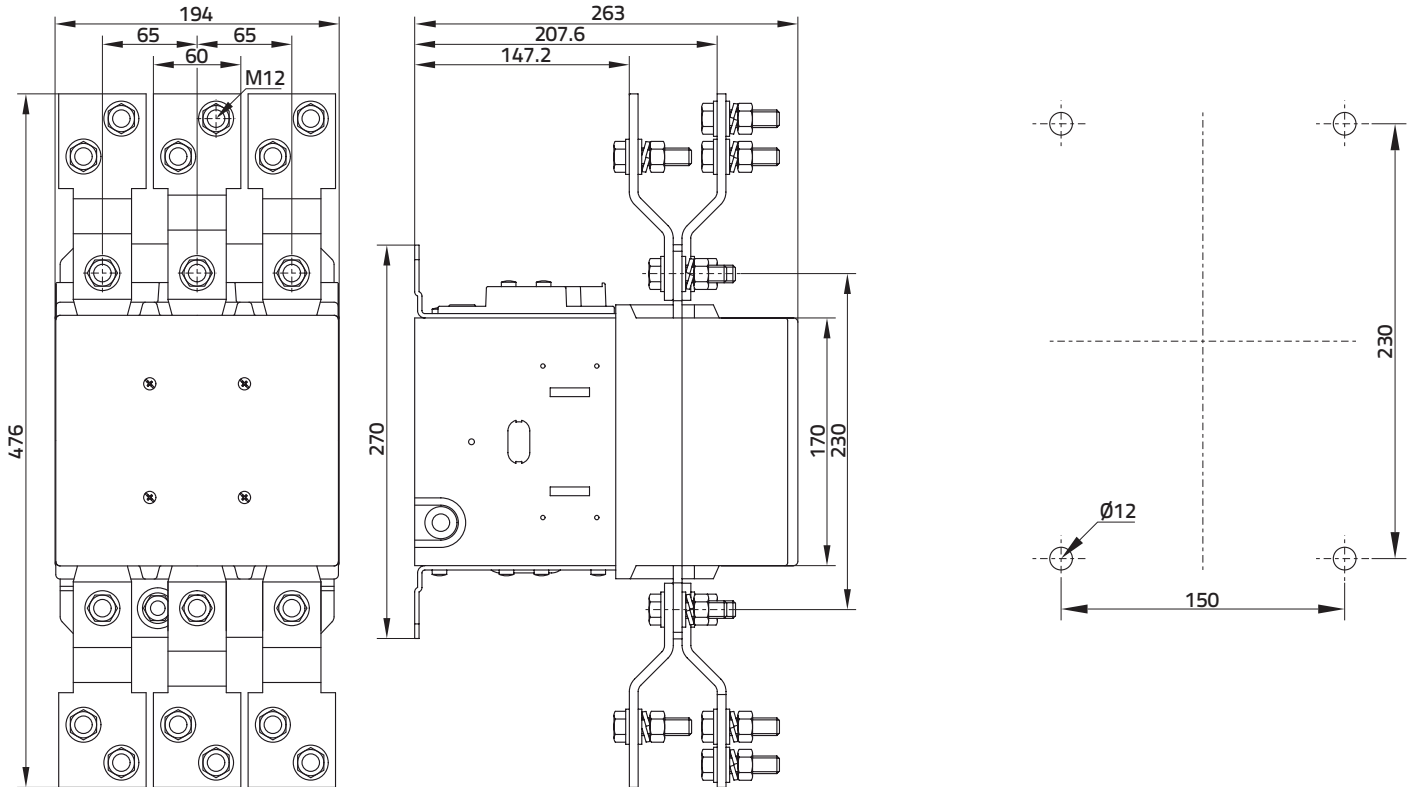


KNL500, KNL630 – 4-pole

KNL500, KNL630 – drilling plan
4-pole



KNL630/1000 – 3-pole

 KNL630/1000 - drilling plan
3-pole


KNL630/1000 – 4-pole

 KNL630/1000 - drilling plan
4-pole
