

## MINIATURE CONTACTORS

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- Width 35 and 45 mm
- 4 to 7.5 kW (400 V) ... AC3
- 8.5 to 15.5 A (400 V) ... AC3
- UL, CSA, EAC
- AC or DC control voltages
- Accessories

## CONTACTORS KNL6 - KNL38

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- Width 45 mm
- 4 to 18.5 kW (400 V) ... AC3
- 9 to 38 A (400 V) ... AC3
- UL, CSA, EAC
- AC control voltages
- Accessories

## CONTACTORS KNL6G - KNL38G

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- Width 45 mm
- 4 to 18.5 kW (400 V) ... AC3
- 9 to 38 A (400 V) ... AC3
- UL, CSA, EAC
- DC control voltages
- Accessories

## CONTACTORS KNL43 - KNL75

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- Width 65 mm
- 22 to 37 kW (400 V) ... AC3
- 43 to 70 A (400 V) ... AC3
- UL, EAC
- AC control voltages
- Accessories

## CONTACTORS KNL80 - KNL110

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- Width 75 mm
- 41 to 61 kW (400 V) ... AC3
- UL, EAC
- AC control voltages
- Accessories

## CONTACTORS KNL95 - KNL630/1000

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- 50 to 335 kW (400 V) ... AC3
- UL, EAC
- AC/DC control voltages
- Accessories

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.



CONTACTORS ARE ELECTRICALLY REMOTE CONTROLLED SWITCHES USED FOR SWITCHING A POWER CIRCUIT. CONTACTORS ARE MAINLY USED FOR SWITCHING MOTORS, BUILDING AUTOMATION SYSTEMS AND APPLICATIONS INCLUDING USE IN MACHINES.



## 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

## ORDERING DATA

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# CONTACTORS - MINIATURE CONTACTORS

## CONTACTOR RELAYS

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

Type	Rated current $I_n$	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



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

Type	Rated current $I_n$	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	10
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	10
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



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

Type	Rated current $I_n$	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

DC



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ORDERING DATA

# CONTACTORS - MINIATURE CONTACTORS

## MOTOR CONTACTORS

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

Type	Rated current I <sub>e</sub>	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
K03M-01	8.5 A	380/415 V	A1 1  3  5  2  A2 2  4  6  22	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	A1 1  3  5  13  A2 2  4  6  14	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	A1 1  3  5  7  A2 2  4  6  8	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



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

Type	Rated current I <sub>e</sub>	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
K07M-01	11.3 A	380/415 V	A1 1  3  5  2  A2 2  4  6  22	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	A1 1  3  5  13  A2 2  4  6  14	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	A1 1  3  5  7  A2 2  4  6  8	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	A1 1  R3  R5  7  A2 2  R4  R6  8	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	A1 R1  R3  R5  R7  A2 R2  R4  R6  R8	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	A1 1  3  5  R7  A2 2  4  6  R8	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	A1 1  R3  R5  7  A2 2  R4  R6  8	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

AC



### 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

# CONTACTORS - MINIATURE CONTACTORS

## MOTOR CONTACTORS

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

DC

Type	Rated current I <sub>e</sub>	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
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
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

### 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
- G** - DC contactor



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ORDERING DATA

## SNAP-ON AUXILIARY SWITCH BLOCKS

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

Type	Rated current I <sub>e</sub>	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 <sub>e</sub>	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
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



# CONTACTORS - MINIATURE CONTACTORS (ACCESSORIES)

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## Mechanical interlock

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



## Adapter for pin conection

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



ORDERING DATA



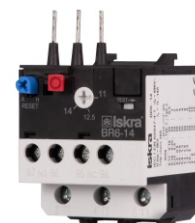
# CONTACTORS - MINIATURE CONTACTORS (ACCESSORIES)

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## 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

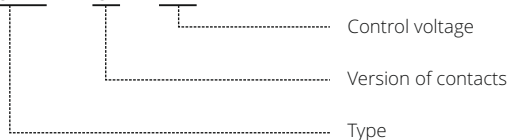
### Standard control voltages and designations (AC)

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

### Standard control voltages and designations (DC)

V	12	24	48	60	72	110	125	220
Designations	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**

ORDERING DATA



# CONTACTORS - MINIATURE CONTACTORS

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

	Type	Symbol	Unit					
				K03M	K07M K07MF K07MX	K07MG K07MGF K07MGX	K08MG	K08M
<b>GENERAL</b>	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 <sub>i</sub> and U <sub>e</sub> is reduced for 1.2 % and I <sub>e</sub> 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	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	
<b>MAIN CIRCUIT</b>	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 <sub>i</sub>	V				690	
	Rated impulse withstand voltage	U <sub>imp</sub>	kV				6	
	Rated operational voltage	U <sub>e</sub>	V				690	
	Rated frequency	f	Hz				50/60	
	Thermal current	I <sub>th</sub>	A				20	
	Rated operational current for AC-1, AC-7a and AC-21	I <sub>e</sub>	A				20	
	Operational power for AC-1, AC-7a and AC-21:							
	single-phase 230 V						4.4	
	three-phase 230 V	P <sub>e</sub>	kW				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 <sub>e</sub>	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			0.75	1.1	1.1	1.1	1.1
	three-phase 230 V	P <sub>e</sub>	kW	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 <sub>e</sub>	A	/	5	5	5	5
Operational power for AC-4:								
three-phase 230 V			/	0.75	0.75	0.75	0.75	
three-phase 400 V	P <sub>e</sub>	kW	/	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			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	P <sub>e</sub>	HP	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

1

TECHNICAL DATA

# CONTACTORS - MINIATURE CONTACTORS

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

1

	Type	Symbol	Unit	K03M	K07M K07MF K07MX	K07MG K07MGF K07MGX	K08MG	K08M
<b>MAIN CIRCUIT</b>	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 <sup>2</sup>			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		
<b>AUXILIARY CIRCUIT</b>	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 <sub>i</sub>	V			690		
	Rated operational current for AC-15: single-phase 230 V	I <sub>e</sub>	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 <sup>2</sup>			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			
<b>COIL</b>	Range of control voltage for switch-on	U <sub>c</sub>	%			85 ... 110		
	Range of control voltage for drop out	U <sub>c</sub>	%		20 ... 75	10 ... 75	10 ... 75	20 ... 75
	Kind of voltage				AC	DC	DC	AC
	Standard control voltages	U <sub>c</sub>	V	1)	2)	3)	3)	2)
	Frequency of AC control voltage	f	Hz		50/60	/	/	50/60
	Control mode					remote control with U <sub>c</sub>		
	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 <sup>2</sup>			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			
<b>SAFETY</b>	MTTF - Mean time to failure MTTF = 1/λ = B10/(0.1 n <sub>op</sub> )	AC-1 AC-3	h			5.000 25.000		
	MTTF <sub>d</sub> - Mean time to failure dangerous MTTF <sub>d</sub> = 1/λ <sub>d</sub> = B10 <sub>d</sub> /(0.1 n <sub>op</sub> )	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 <sub>d</sub> - Number of operating cycles until 10 % of device dangerous B10 <sub>d</sub> = B10/ratio of dangerous failures	AC-1 AC-3	op. c.			200.000 1.000.000		
	λ - Failure rate λ = (0.1 n <sub>op</sub> )/B10	AC-1 AC-3	1/h			0.0002 0.00004		
	λ <sub>d</sub> - Failure rate dangerous λ <sub>d</sub> = (0.1 n <sub>op</sub> )/B10 <sub>d</sub>	AC-1 AC-3	1/h			0.00015 0.00003		
	Ratio of dangerous failures		%			75		
	n <sub>op</sub> - 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

# CONTACTORS - MINIATURE CONTACTOR RELAYS

K03C, K07C, K07CF, K07CX, K07CG, K07CGF, K07CGX

1

	Type	Symbol	Unit	K03C	K07C K07CF K07CX	K07CG K07CGF K07CGX
<b>GENERAL</b>	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 <sub>i</sub> and U <sub>e</sub> is reduced for 1.2 % and I <sub>e</sub> 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	
<b>MAIN CIRCUIT</b>	Contact reliability			≥17 V; ≥50 mA		
	Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2				25	
	Rated insulation voltage	U <sub>i</sub>	V		690	
	Rated impulse withstand voltage	U <sub>imp</sub>	kV		6	
	Rated operational voltage	U <sub>e</sub>	V		690	
	Rated frequency	f	Hz		50/60	
	Thermal current	I <sub>th</sub>	A		20	
	Rated operational current for AC-1, AC-7a and AC-21	I <sub>e</sub>	A		20	
	Rated operational current for AC-15:					
	single-phase 230 V				6	
	single-phase 400 V	I <sub>e</sub>	A		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 <sup>2</sup>		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		
<b>COIL</b>	Range of control voltage for switch-on	U <sub>c</sub>	%		85 ... 110	
	Range of control voltage for drop out	U <sub>c</sub>	%		20 ... 75	10 ... 75
	Kind of voltage				AC	DC
	Standard control voltages	U <sub>c</sub>	V	1)	2)	3)
	Frequency of AC control voltage	f	Hz		50/60	/
	Control mode				remote control with U <sub>c</sub>	
	Coil consumption:					
	switch-on		VA/W		39/34	- / 3
	operation				8,1/4	- / 3
	Delays:					
	make		ms	10 ... 15	10 ... 15	25 ... 30
	brake			6 ... 15	5 ... 10	10 ... 25
	Terminal capacity:					
	rigid (solid and stranded)		mm <sup>2</sup>		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

# CONTACTORS - MINIATURE CONTACTOR RELAYS

K03C, K07C, K07CF, K07CX, K07CG, K07CGF, K07CGX

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

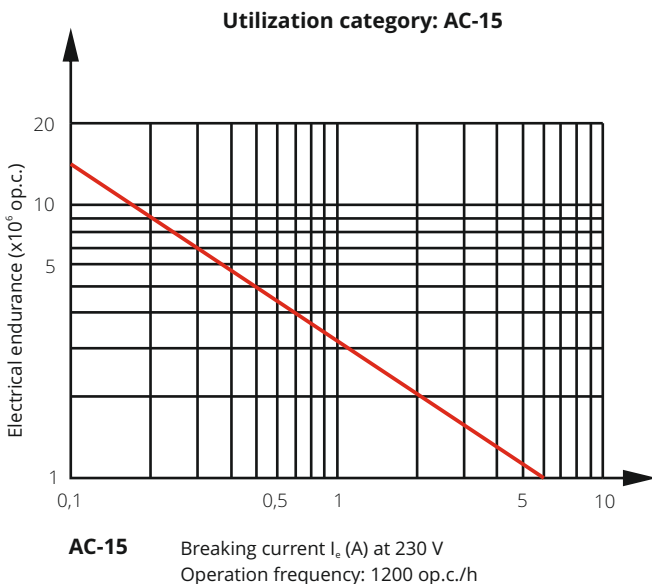
1

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

## Electrical endurance

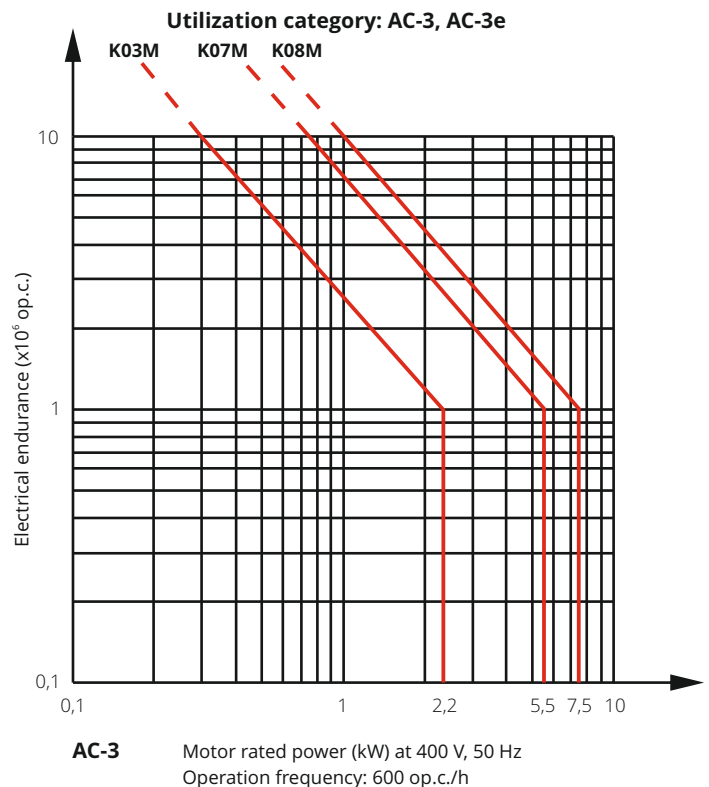
**Diagram 1**

Electrical endurance of contactor relays and auxiliary contacts of motor contactors



**Diagram 2**

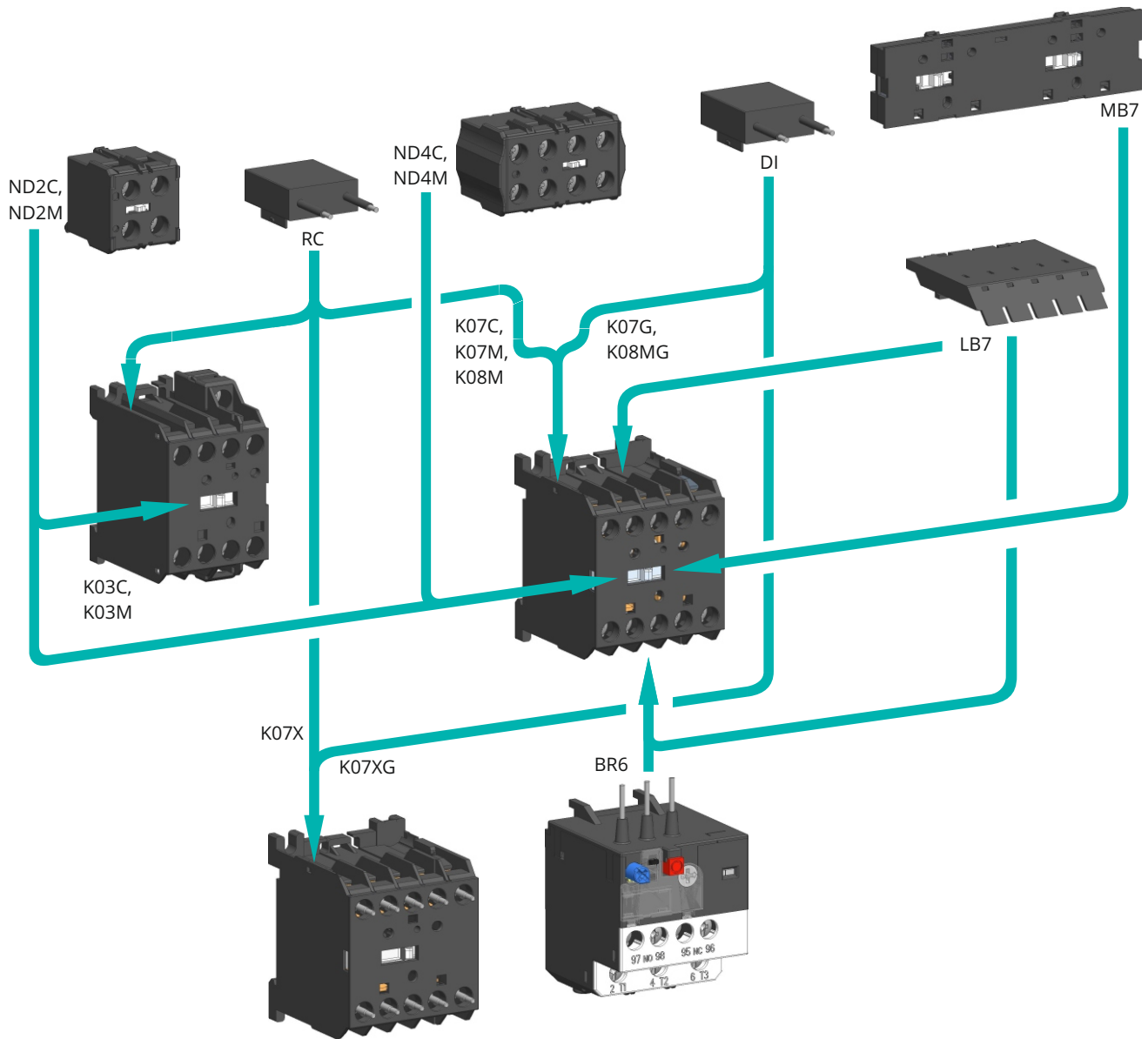
Electrical endurance of main contacts of motor contactors



TECHNICAL DATA

# CONTACTORS - MINIATURE CONTACTORS (ACCESSORIES)

## Mounting positions of accessories



# CONTACTORS - MINIATURE CONTACTORS (ACCESSORIES)

1

## Snap-on auxiliary switch blocks

Type	Symbol	Unit	ND2C ND2M	ND4C ND4M
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		m	2000	
U <sub>i</sub> and U <sub>e</sub> is reduced for 1.2 % and I <sub>e</sub> 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	20	40
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 <sub>i</sub>	V	690	
Rated impulse withstand voltage	U <sub>imp</sub>	kV	6	
Rated operational voltage	U <sub>e</sub>	V	690	
Rated frequency	f	Hz	50 /60	
Thermal current	I <sub>th</sub>	A	20	
Rated operational current for AC-15:				
single-phase 230 V		I <sub>e</sub>	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, 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)	S	mm <sup>2</sup>	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	

TECHNICAL DATA

# CONTACTORS - MINIATURE CONTACTORS (ACCESSORIES)

1

## BR6 Thermal overload relay

Type	Symbol	Unit	BR6
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
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 <sup>2</sup>	0.75 ... 2.5
Conductor insulation stripping length		mm	9
Screw			M3.5
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			C600 / P600
Rated operational current AC-15			
220/240 V			0.5
380/415 V	NO		0.5
500 V		$I_e$ A	0.3
220/240 V			1.5
380/415 V	NC		0.7
500 V			0.5
Rated operational current DC-13			
220/240 V			1.5
380/415 V	both contacts	$I_e$ A	0.7
500 V			0.5
Terminal capacity		mm <sup>2</sup>	0.75 ... 2.5
Conductor insulation stripping length		mm	9
Screw			M3.5
Screw head			PZ2
Tightening torque		Nm	1

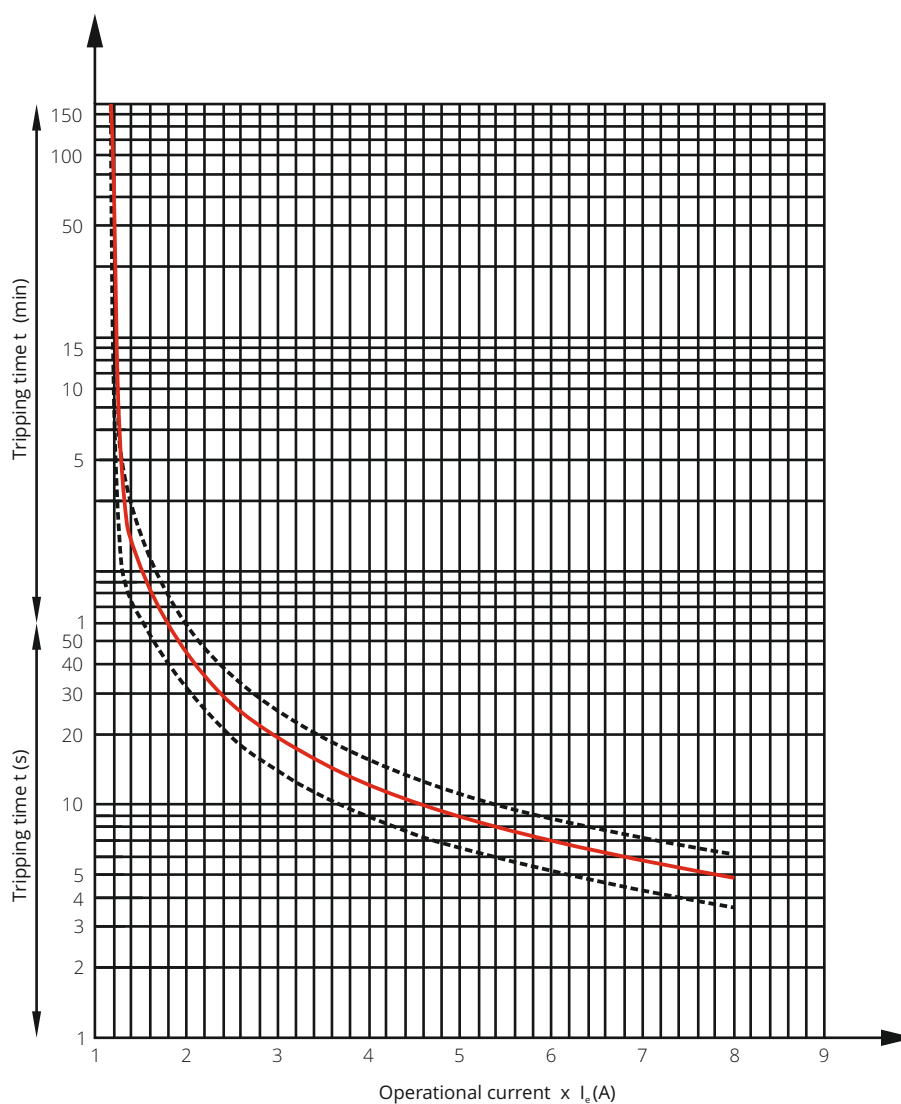
TECHNICAL DATA



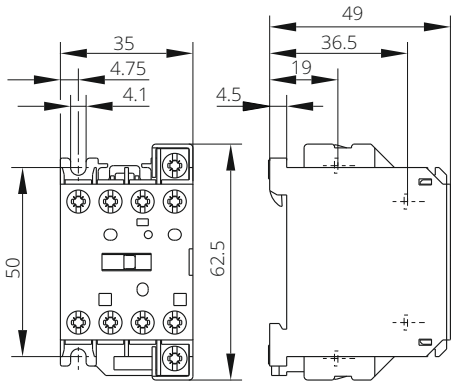
## Setting ranges and maximum permitted back-up fuses

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

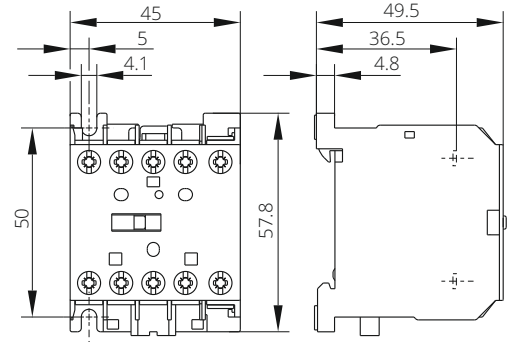
## Tripping curve BR6



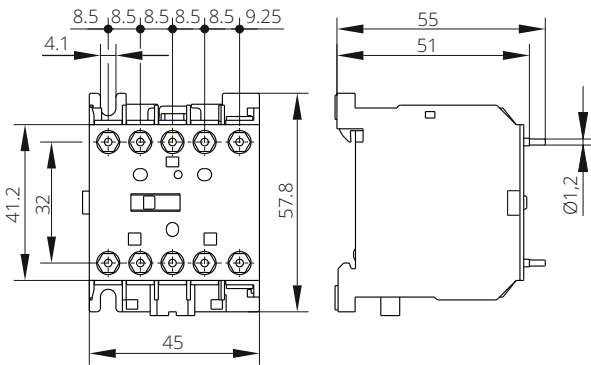
**K03C, K03M, K03MX**



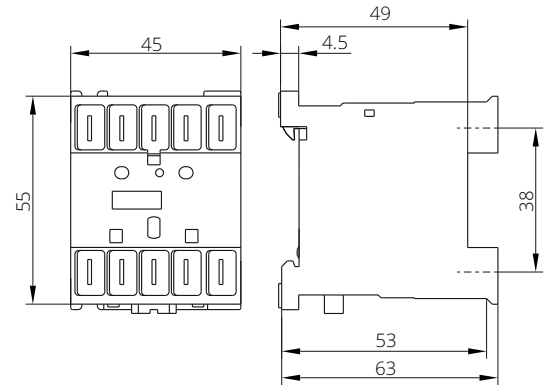
**K07C, K07M, K08M, K07CG, K07MG, K08MG**



**K07CX, K07CGX, K07MX, K07MGX**

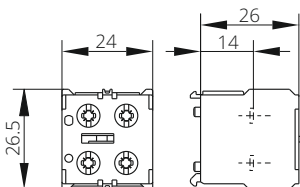


**K07CF, K07MF, K07MGF, K07CGF**



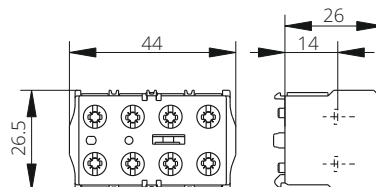
**ND2**

Two pole snap-on auxiliary switch blocks

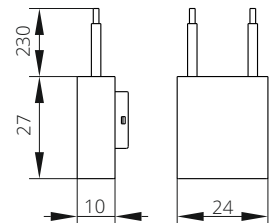


**ND4**

Four pole snap-on auxiliary switch blocks

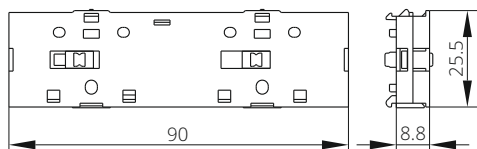


**RC, DI suppressor**



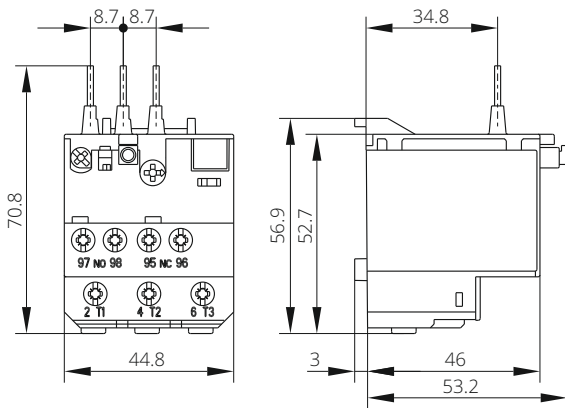
**MB7**

Mechanical interlock

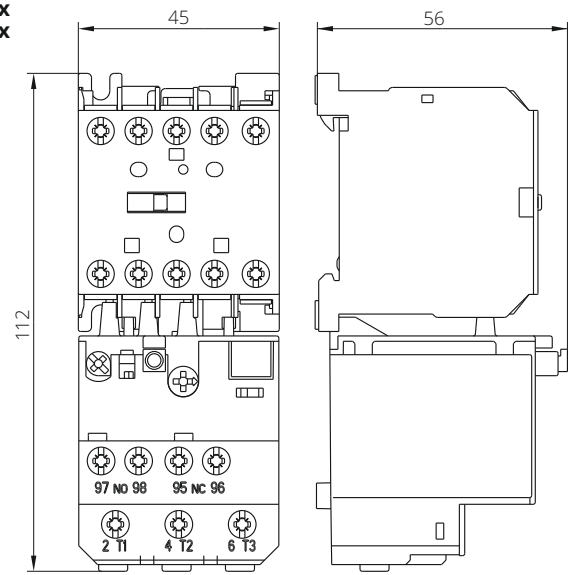


# CONTACTORS - MINIATURE CONTACTORS

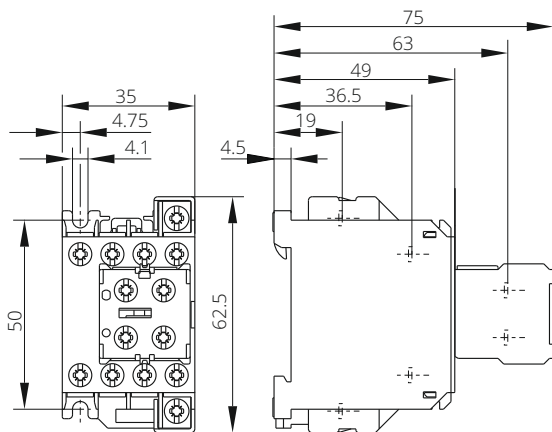
**BR6**  
Thermal overload relay



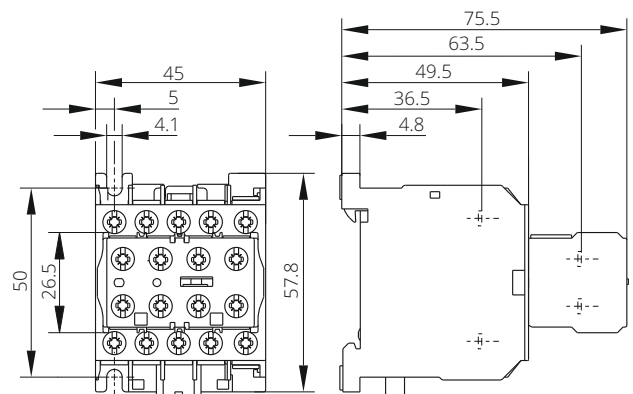
**BR6 + K07x**  
**BR6 + K08x**



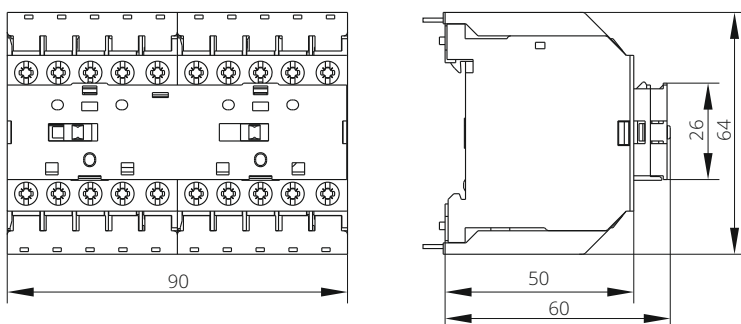
**K03x + ND2**



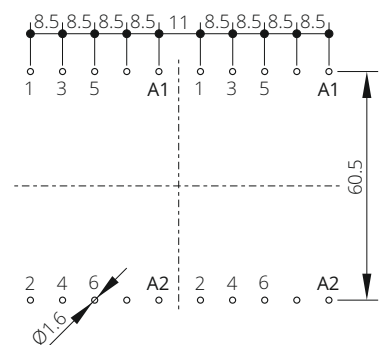
**K07x + ND4**  
**K08x + ND4**



**K07x + MB7 + LB7**  
**K08x + MB7 + LB7**



**LB7 - raster**





CONTACTORS ARE ELECTRICALLY REMOTE CONTROLLED SWITCHES USED FOR SWITCHING A POWER CIRCUIT. THOSE CONTACTORS ARE MAINLY USED FOR SWITCHING ELECTRIC MOTORS AND OTHER RESISTIVE, INDUCTIVE AND CAPACITIVE LOADS. .



## FOR UNIVERSAL SWITCHING:

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

## ADVANCED OPERATION:

- Control combinations

## OTHER BENEFITS:

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

## ORDERING DATA

Contactors KNL6 - KNL38 .....	page 1-20
DC contactors KNL6G - KNL38G .....	page 1-25
Accessories for contactors KNL6 - KNL38 .....	page 1-40

Example for Ordering data .....	page 1-27
Technical characteristics .....	page 1-28
Dimensions .....	page 1-43

# CONTACTORS - KNL6 - KNL38

## CONTACTOR RELAY

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

AC

Type	Rated current $I_n$	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL6-22	4 A	380/415 V		30.050.631	300	10
KNL6-22	4 A	220/240 V		30.050.486	300	10
KNL6-22	4 A	24 V		30.050.619	300	10
KNL6-22ü	4 A	380/415 V		30.051.046	300	10
KNL6-22ü	4 A	220/240 V		30.051.037	300	10
KNL6-22ü	4 A	24 V		30.051.047	300	10
KNL6-31	4 A	380/415 V		30.050.632	300	10
KNL6-31	4 A	220/240 V		30.050.469	300	10
KNL6-31	4 A	24 V		30.050.620	300	10
KNL6-40	4 A	380/415 V		30.050.700	300	10
KNL6-40	4 A	220/240 V		30.050.468	300	10
KNL6-40	4 A	24 V		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 $I_n$	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL9-01	9 A	380/415 V		30.050.639	300	10
KNL9-01	9 A	220/240 V		30.050.475	300	10
KNL9-01	9 A	24 V		30.050.615	300	10
KNL9-10	9 A	380/415 V		30.050.640	300	10
KNL9-10	9 A	220/240 V		30.050.474	300	10
KNL9-10	9 A	24 V		30.050.616	300	10
KNL9-10/Sp4	9 A	380/415 V		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		30.051.049	300	10
KNL9-01/Sp4	9 A	380/415 V		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		30.051.052	300	10
KNL9-22/Sp4	10 A	380/415 V		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		30.051.054	300	10
KNL9-13/Sp4	9 A	380/415 V		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		30.051.057	300	10
KNL9-04/Sp4	9 A	380/415 V		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		30.051.059	300	10



### TAGS IN TITLE:

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

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ORDERING DATA

# CONTACTORS - KNL6 - KNL38

## MOTOR CONTACTORS

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

AC

Type	Rated current I <sub>n</sub>	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL12-01	12 A	380/415 V		30.050.657	300	10
KNL12-01	12 A	220/240 V		30.050.656	300	10
KNL12-01	12 A	24 V		30.050.648	300	10
KNL12-10	12 A	380/415 V		30.050.658	300	10
KNL12-10	12 A	220/240 V		30.050.488	300	10
KNL12-10	12 A	24 V		30.050.649	300	10
KNL12-10/Sp4	12 A	380/415 V		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		30.051.061	300	10
KNL12-01/Sp4	12 A	380/415 V		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		30.051.064	300	10
KNL12-22/Sp4	12 A	380/415 V		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		30.051.066	300	10
KNL12-13/Sp4	12 A	380/415 V		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		30.051.069	300	10
KNL12-04/Sp4	12 A	380/415 V		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		30.051.072	300	10



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

AC

Type	Rated current I <sub>n</sub>	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL16-01	16 A	380/415 V		30.050.674	300	10
KNL16-01	16 A	220/240 V		30.050.673	300	10
KNL16-01	16 A	24 V		30.050.665	300	10
KNL16-10	16 A	380/415 V		30.050.675	300	10
KNL16-10	16 A	220/240 V		30.050.489	300	10
KNL16-10	16 A	24 V		30.050.666	300	10
KNL16-10/Sp4	16 A	380/415 V		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		30.051.073	300	10
KNL16-01/Sp4	16 A	380/415 V		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		30.051.075	300	10
KNL16-22/Sp4	17 A	380/415 V		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		30.051.077	300	10
KNL16-13/Sp4	16 A	380/415 V		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		30.051.079	300	10
KNL16-04/Sp4	16 A	380/415 V		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		30.051.081	300	10
KNL16-10/St4	16 A	380/415 V		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		30.051.083	300	10
KNL16-01/St4	16 A	380/415 V		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		30.051.085	300	10



### TAGS IN TITLE:

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

ORDERING DATA

# CONTACTORS - KNL6 - KNL38

## MOTOR CONTACTORS

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

Type	Rated current $I_n$	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)

Type	Rated current $I_n$	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)

Type	Rated current $I_n$	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)

Type	Rated current $I_n$	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  $I_{tmax} = 25$  A and  $I_{max} = 25$  A.



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ORDERING DATA



# CONTACTORS - KNL6 - KNL38 (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)	
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		
NDL2 (for KNL9, KNL12, KNL16, KNL18)	6 A		-11	38.423.834	66	10
			-02	38.422.835		
			-20	38.423.457		
			-22	38.422.779		
			-31	38.422.754		
			-13	38.422.941		
			-40	38.422.780		
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 $I_n$	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



Meachanical 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

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ORDERING DATA

# CONTACTORS - KNL6 - KNL38 (ACCESSORIES)

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## 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

## BR 16 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		



## BR 30 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 BR 30 thermal overload relays

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



ORDERING DATA

# CONTACTORS - KNL6G - KNL38G (WITH DC CONTROL CIRCUIT)

## CONTACTOR RELAYS

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

Type	Rated current I <sub>e</sub>	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

DC



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## MOTOR CONTACTORS

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

Type	Rated current I <sub>e</sub>	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

DC



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

Type	Rated current I <sub>e</sub>	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 <sup>1)</sup>	22 A	220 V		30.052.073	310	10
KNL22G-00 + NPLG <sup>1)</sup>	22 A	48 V		30.052.480	310	10
KNL22G-00 + NPLG <sup>1)</sup>	22 A	24 V		30.052.143	310	10

DC



ORDERING DATA

<sup>1)</sup> 57 mm widths

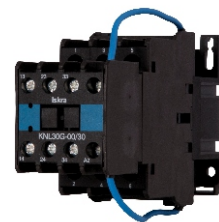
# CONTACTORS - KNL6G - KNL38G (WITH DC CONTROL CIRCUIT)

## 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)
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 <sup>1)</sup>	30 A	220 V		30.052.028	310	10
KNL30G-00 + NPLG <sup>1)</sup>	30 A	48 V		30.052.492	310	10
KNL30G-00 + NPLG <sup>1)</sup>	30 A	24 V		30.052.169	310	10



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 + NDLG-03	38 A	220 V		30.052.493	340	10
KNL38G-00 + NDLG-03	38 A	48 V		30.052.494	340	10
KNL38G-00 + NDLG-03	38 A	24 V		30.052.495	340	10
KNL38G-00 + NDLG-30	38 A	220 V		30.052.496	340	10
KNL38G-00 + NDLG-30	38 A	48 V		30.052.497	340	10
KNL38G-00 + NDLG-30	38 A	24 V		30.052.498	340	10
KNL38G-00 + NDLG-21	38 A	220 V		30.052.499	340	10
KNL38G-00 + NDLG-21	38 A	48 V		30.052.500	340	10
KNL38G-00 + NDLG-21	38 A	24 V		30.052.501	340	10
KNL38G-00 + NDLG-12	38 A	220 V		30.052.502	340	10
KNL38G-00 + NDLG-12	38 A	48 V		30.052.503	340	10
KNL38G-00 + NDLG-12	38 A	24 V		30.052.504	340	10
KNL38G-00 + NDLG-10	38 A	220 V		30.052.505	340	10
KNL38G-00 + NDLG-10	38 A	48 V		30.052.506	340	10
KNL38G-00 + NDLG-10	38 A	24 V		30.052.507	340	10
KNL38G-00 + NDLG-01	38 A	220 V		30.052.508	340	10
KNL38G-00 + NDLG-01	38 A	48 V		30.052.509	340	10
KNL38G-00 + NDLG-01	38 A	24 V		30.052.510	340	10
KNL38G-00 + NPLG <sup>1)</sup>	38 A	220 V		30.052.511	310	10
KNL38G-00 + NPLG <sup>1)</sup>	38 A	48 V		30.052.512	310	10
KNL38G-00 + NPLG <sup>1)</sup>	38 A	24 V		30.052.513	310	10



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

<sup>1)</sup> 57 mm widths

ORDERING DATA

# CONTACTORS - KNL6G - KNL38G (WITH DC CONTROL CIRCUIT)

## ORDERING DATA

### Standard control voltages and designations (AC)

#### for contactors KNL6 - KNL38

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

### Standard control voltages and designations (DC)

#### for contactors KNL6G - KNL38G

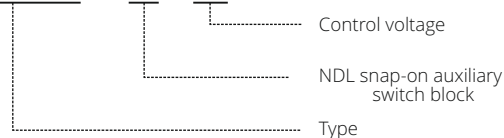
V	12	24	48	60	72	110	125	220	240
Designations	JD	BD	ED	ND	SD	FD	GD	MD	MUD

**KNL16 - 10 - M7**



#### KNLG + NDL

**KNL22G-00 - 22 - BD**



#### NOTE:

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

### 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

# CONTACTORS - CONTACTOR RELAYS

## KNL6(G)

	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 <sub>i</sub> and U <sub>e</sub> is reduced for 1.2 % and I <sub>e</sub> 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	
Maximum operating frequency with no load		op. c./h			3.000		
Mechanical endurance		op. c.			10.000.000		
Weight		g	300		300		
MAIN CIRCUIT	Contact reliability			≥17 V; ≥50 mA			
	Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2					20	
	Rated insulation voltage	U <sub>i</sub>	V			690	
	Rated impulse withstand voltage	U <sub>imp</sub>	kV			6	
	Rated operational voltage	U <sub>e</sub>	V			690	
	Rated frequency	f	Hz			50/60	
	Thermal current	I <sub>th</sub>	A			20	
	Rated operational current for AC-1, AC-7a and AC-21	I <sub>e</sub>	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					6	
	single-phase 400 V	I <sub>c</sub>	A			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 <sup>2</sup>			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		
COIL	Range of control voltage for switch-on	U <sub>c</sub>	%			85 ... 110	
	Range of control voltage for drop out	U <sub>c</sub>	%	20 ... 75		10 ... 75	
	Kind of voltage			AC		DC	
	Standard control voltages	U <sub>c</sub>	V	1)		2)	
	Frequency of AC control voltage	f	Hz	50/60		/	
	Control mode					remote control with U <sub>c</sub>	
	Coil consumption:						
	switch-on		VA/W	66/48		-/110	
	operation			8/2.5		-/3	
	Delays:						
	make		ms	10 ... 25		10 ... 20	
	brake			10 ... 15		5 ... 15	
	Terminal capacity:						
	rigid (solid and stranded)		mm <sup>2</sup>			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		

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 - CONTACTOR RELAYS

## KNL6(G)

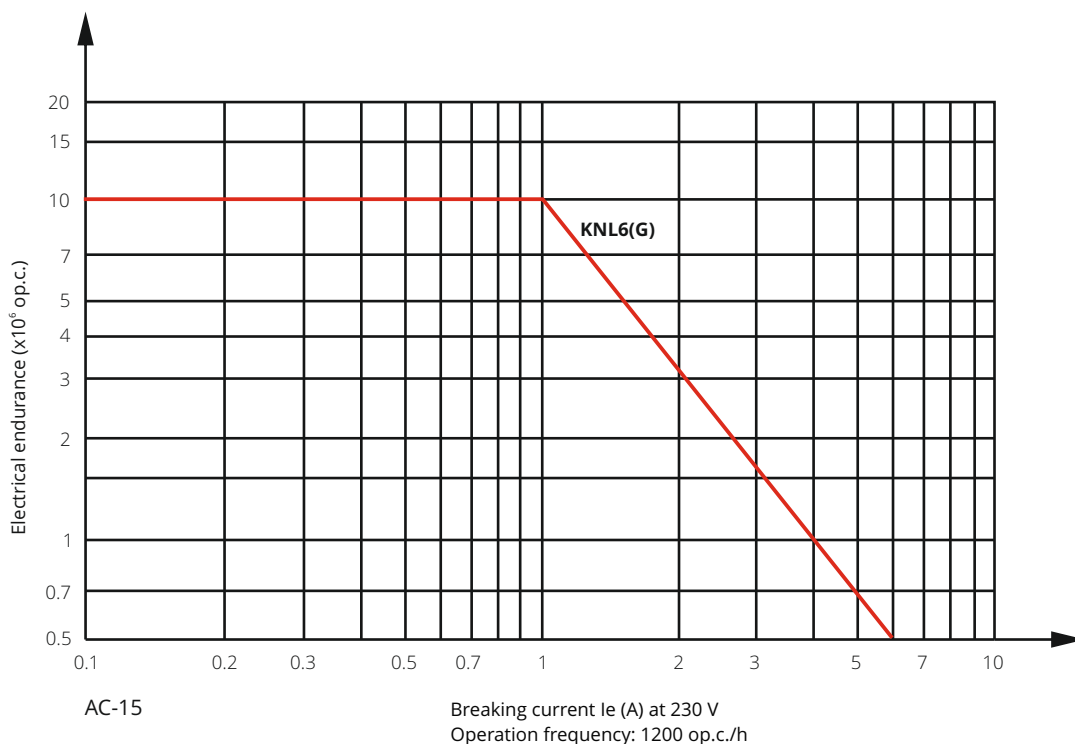
1

SAFETY	Type	Symbol	Unit	KNL6	KNL6G
	MTTF - Mean time to failure $MTTF = 1/\lambda = B10/(0.1 n_{op})$	AC-15 DC-13		h	
MTTF <sub>d</sub> - 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 <sub>d</sub> = B10/ratio of dangerous failures	AC-15 DC-13		op. c.		1.000.000 800.000
$\lambda$ - Failure rate $\lambda = (0.1 n_{op})/B10$	AC-15 DC-13		1/h		0.00008 0.0001
$\lambda_d$ - 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 <sub>op</sub> - Operating cycles (operating cycles/h)			op. c./h		600

### Electrical endurance

**Diagram 1**

Electrical endurance of contactor relays



TECHNICAL DATA



# CONTACTORS - MOTOR CONTACTORS

## KNL9(G) - KNL12(G)

	Type	Symbol	Unit	KNL9	KNL9G	KNL12	KNL12G
GENERAL	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 <sub>i</sub> and U <sub>e</sub> is reduced for 1.2 % and I <sub>e</sub> 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	
MAIN CIRCUIT	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 <sub>i</sub>	V	690			
	Rated impulse withstand voltage	U <sub>imp</sub>	kV	6			
	Rated operational voltage	U <sub>e</sub>	V	690			
	Rated frequency	f	Hz	50/60			
	Thermal current	I <sub>th</sub>	A	25			
	Rated operational current for AC-1, AC-7a and AC-21	I <sub>e</sub>	A	25			
	Operational power for AC-1, AC-7a and AC-21:						
	single-phase 230 V			5,5			
	three-phase 230 V	P <sub>e</sub>	kW	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 <sub>e</sub>	A	9	9	12	12
	Operational power for AC-3, AC-3e, AC-7b and AC-23:						
	single-phase 230 V			1,1			
	three-phase 230 V	P <sub>e</sub>	kW	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 <sub>e</sub>	A	3,6	3,6	4,9	4,9
Operational power for AC-4:							
three-phase 230 V			0,75				
three-phase 400 V	P <sub>e</sub>	kW	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 <sup>1)</sup>	1	1 <sup>1)</sup>	
single-phase 230 V	P <sub>e</sub>	HP	1,5	1,5 <sup>1)</sup>	2	2 <sup>1)</sup>	
three-phase 230 V			3	3 <sup>1)</sup>	3	3 <sup>1)</sup>	
three-phase 460 V			5	5 <sup>1)</sup>	5	5 <sup>1)</sup>	
three-phase 575 V			7,5	7,5 <sup>1)</sup>	7,5	7,5 <sup>1)</sup>	
Electrical endurance for motors acc. to UL and CSA		op. c.	1.000.000				

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

# CONTACTORS - MOTOR CONTACTORS

## KNL9(G) - KNL12(G)

1

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): 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 <sub>e</sub>	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 <sub>e</sub>	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 <sub>e</sub>	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)	S	mm <sup>2</sup>		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		
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A		20		
Rated insulation voltage	U <sub>i</sub>	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 <sub>e</sub>	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)	S	mm <sup>2</sup>		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 <sub>c</sub>	%		85 ... 110		
Range of control voltage for drop out	U <sub>c</sub>	%	20 ... 75	10 ... 75	20 ... 75	10 ... 75
Kind of voltage			AC	DC	AC	DC
Standard control voltages	U <sub>c</sub>	V	1)	2)	1)	2)
Frequency of AC control voltage	f	Hz	50/60	/	50/60	/
Control mode				remote control with U <sub>c</sub>		
Coil consumption: switch-on	VA/W		66/48	-/110	66/48	-/110
operation			8/2.5	-/3	8/2.5	-/3
Delays: make		ms	10 ... 25	10 ... 20	10 ... 25	10 ... 20
brake			10 ... 15	5 ... 15	10 ... 15	5 ... 15
Terminal capacity: rigid (solid and stranded)		mm <sup>2</sup>		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) 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

# CONTACTORS - MOTOR CONTACTORS

## KNL9(G) - KNL12(G)

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

## KNL16(G) - KNL18(G)

GENERAL	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				-25 ... +45			
Storage temperature			°C	-30 ... +80			
Maximum altitude			m	2000			
U <sub>i</sub> and U <sub>e</sub> is reduced for 1.2 % and I <sub>e</sub> 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

1

TECHNICAL DATA

# CONTACTORS - MOTOR CONTACTORS

## KNL16(G) - KNL18(G)

Type	Symbol	Unit	KNL16	KNL16G	KNL18	KNL18G
Contact reliability				≥17 V; ≥50 mA		
Power dissipation per pole			1.3	1.3	1.9	1.9
Overload current withstand capability						
10 s			128	128	144	144
5 s		A	150	150	170	170
1 s			180	180	200	200
0.001 s			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	2.2	2.2
three-phase 230 V			4	4	4	4
three-phase 400 V			7.5	7.5	9	9
three-phase 500 V			7.5	7.5	9	9
three-phase 690 V			7.5	7.5	9	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	1.5	1.5
three-phase 400 V			3	3	3	3
three-phase 500 V			3	3	3	3
three-phase 690 V			3	3	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	1.5 <sup>1)</sup>	1.5 <sup>1)</sup>	1.5 <sup>1)</sup>
single-phase 230 V			3	3 <sup>1)</sup>	3 <sup>1)</sup>	3 <sup>1)</sup>
three-phase 230 V			5	5 <sup>1)</sup>	5 <sup>1)</sup>	5 <sup>1)</sup>
three-phase 460 V			7.5	7.5 <sup>1)</sup>	7.5 <sup>1)</sup>	7.5 <sup>1)</sup>
three-phase 575 V			10	10 <sup>1)</sup>	10 <sup>1)</sup>	10 <sup>1)</sup>
Electrical endurance for motors acc. to UL and CSA		op. c.		900.000		800.000

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

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TECHNICAL DATA

# CONTACTORS - MOTOR CONTACTORS

## KNL16(G) - KNL18(G)

1

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 <sub>e</sub>	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 <sub>e</sub>	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 <sub>e</sub>	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)	S	mm <sup>2</sup>	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			
Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	20			
Rated insulation voltage	U <sub>i</sub>	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 <sub>e</sub>	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)	S	mm <sup>2</sup>	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 <sub>c</sub>	%	85 ... 110			
Range of control voltage for drop out	U <sub>c</sub>	%	20 ... 75	10 ... 75	20 ... 75	10 ... 75
Kind of voltage			AC	DC	AC	DC
Standard control voltages	U <sub>c</sub>	V	1)	2)	1)	2)
Frequency of AC control voltage	f	Hz	50/60	/	50/60	/
Control mode			remote control with U <sub>c</sub>			
Coil consumption: switch-on		VA/W	66/48	-/110	66/48	-/110
operation			8/2,5	-/3	8/2,5	-/3
Delays: make		ms	10 ... 25	10 ... 20	10 ... 25	10 ... 20
brake			10 ... 15	5 ... 15	10 ... 15	5 ... 15
Terminal capacity: rigid (solid and stranded)		mm <sup>2</sup>	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			

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

# CONTACTORS - MOTOR CONTACTORS

## KNL16(G) - KNL18(G)

SAFETY	Type	Symbol	Unit	KNL16	KNL16G	KNL18	KNL18G
	MTTF - Mean time to failure MTTF = $1/\lambda = B10/(0.1 n_{op})$	AC-1 AC-3		h		5.000	
MTTF <sub>d</sub> - Mean time to failure dangerous MTTF <sub>d</sub> = $1/\lambda_d = B10_d/(0.1 n_{op})$	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 <sub>d</sub> - Number of operating cycles until 10 % of device dangerous B10 <sub>d</sub> = B10/ratio of dangerous failures	AC-1 AC-3		op. c.	675.000		600.000	
$\lambda$ - Failure rate $\lambda = (0.1 n_{op})/B10$	AC-1 AC-3		1/h		0.0002		
$\lambda_d$ - 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	

## KNL22(G) - KNL38(G)

GENERAL	Type	Symbol	Unit	KNL22	KNL22G NPLG/NDLG	KNL30	KNL30G NPLG/NDLG	KNL38	KNL38G 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		
			m				2000		
Number of contactors or switches side-by-side: ≤40 °C (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

1

TECHNICAL DATA

# CONTACTORS - MOTOR CONTACTORS

## KNL22(G) - KNL38(G)

Type	Symbol	Unit	KNL22	KNL22G NPLG/NDLG	KNL30	KNL30G NPLG/NDLG	KNL38	KNL38G NPLG/NDLG
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			176	176	240	240	304	304
5 s		A	220	220	280	280	320	320
1 s			250	250	330	330	350	350
0.001 s			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				8			10	
three-phase 230 V	$P_e$	kW		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			2.2	2.2	3.7	3.7	4	4
three-phase 230 V	$P_e$	kW	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			2.2	2.2	4	4	4.5	4.5
three-phase 400 V	$P_e$	kW	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			2	2 <sup>*)</sup>	2	2 <sup>*)</sup>	2	2 <sup>*)</sup>
single-phase 230 V			3	3 <sup>*)</sup>	5	5 <sup>*)</sup>	5	5 <sup>*)</sup>
three-phase 230 V	$P_e$	HP	7.5	7.5 <sup>*)</sup>	10	10 <sup>*)</sup>	10	10 <sup>*)</sup>
three-phase 460 V			15	15 <sup>*)</sup>	20	20 <sup>*)</sup>	20	20 <sup>*)</sup>
three-phase 575 V			15	15 <sup>*)</sup>	20	20 <sup>*)</sup>	20	20 <sup>*)</sup>
Electrical endurance for motors acc. to UL and CSA		op. c.	800.000		400.000			

<sup>\*)</sup> No UL/CSA ratings; data only for indication and reference purposes only



# CONTACTORS - MOTOR CONTACTORS

## KNL22(G) - KNL38(G)

1

	Type	Symbol	Unit	KNL22	KNL22G NPLG/NDLG	KNL30	KNL30G NPLG/NDLG	KNL38	KNL38G NPLG/NDLG
MAIN CIRCUIT	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 <sub>e</sub>	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 <sub>e</sub>	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 <sub>e</sub>	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)	S	mm <sup>2</sup>	2.5 ... 10					
	flexible			1.5 ... 10					
	Length of removed wire insulation		mm	10					
	Screw			M4					
	Screw head			PZ2					
	Tightening torque		Nm	1.8					
COIL	Range of control voltage for switch-on	U <sub>c</sub>	%	85 ... 110					
	Range of control voltage for drop out	U <sub>c</sub>	%	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 <sub>c</sub>	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 <sub>c</sub>					
	Coil consumption: switch-on	VA/W		66/48	-/110	66/48	-/110	66/48	-/110
	operation			8/2.5	-/3	8/2.5	-/3	8/2.5	-/3
	Delays: make	ms		10 ... 20	15 ... 20	10 ... 20	15 ... 20	10 ... 20	15 ... 20
	brake			5 ... 15	5 ... 10	5 ... 15	5 ... 10	5 ... 15	5 ... 10
	Terminal capacity: rigid (solid and stranded)		mm <sup>2</sup>	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						
SAFETY	MTTF - Mean time to failure MTTF = 1/λ = B10/(0.1 n <sub>op</sub> )	AC-1 AC-3	h	5.000 20.000 10.000					
	MTTF <sub>d</sub> - Mean time to failure dangerous MTTF <sub>d</sub> = 1/λ <sub>d</sub> = B10 <sub>d</sub> /(0.1 n <sub>op</sub> )	AC-1 AC-3	h	6.666 26.666 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 <sub>d</sub> - Number of operating cycles until 10 % of device dangerous B10 <sub>d</sub> = B10/ratio of dangerous failures	AC-1 AC-3	op. c.	200.000 800.000 400.000					
	λ - Failure rate λ = (0.1 n <sub>op</sub> )/B10	AC-1 AC-3	1/h	0.0002 0.00005 0.0001					
	λ <sub>d</sub> - Failure rate dangerous λ <sub>d</sub> = (0.1 n <sub>op</sub> )/B10 <sub>d</sub>	AC-1 AC-3	1/h	0.00015 0.00004 0.000075					
	Ratio of dangerous failures		%	75					
	n <sub>op</sub> - 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

TECHNICAL DATA

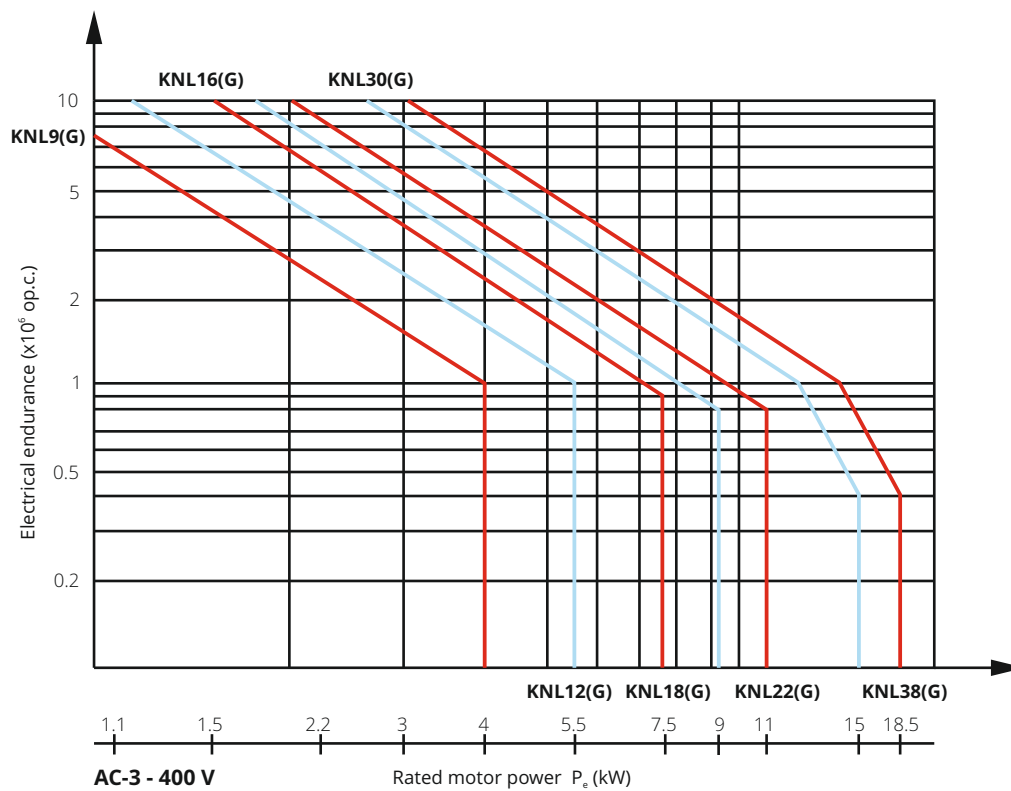
# CONTACTORS - MOTOR CONTACTORS

## KNL22(G) - KNL38(G)

### Electrical endurance

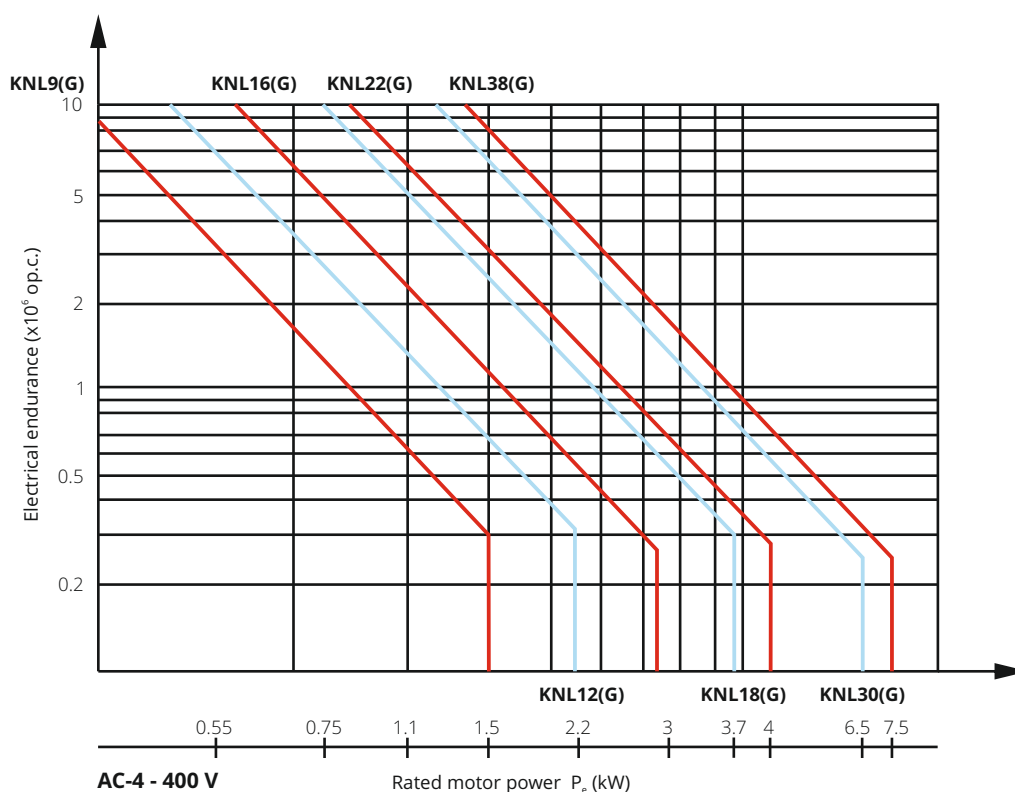
**Diagram 2**

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

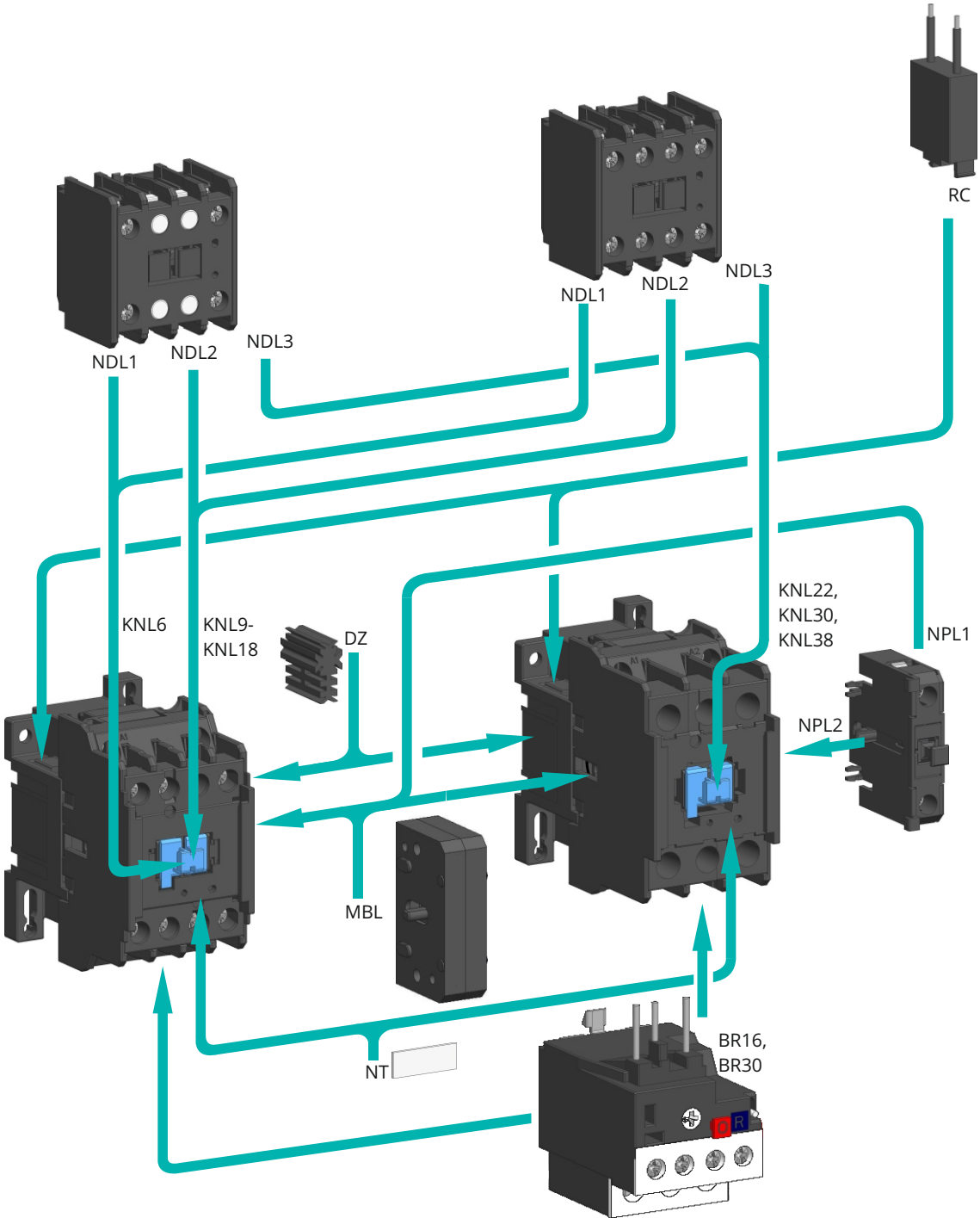


**Diagram 3**

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



Mounting positions of accessories



# CONTACTORS - ACCESSORIES

## KNL6(G) - KNL38(G)

### Snap-on auxiliary switch blocks

1

	Type	Symbol	Unit	NDL1, NDL2 NDL3, NDLG		NPL1 NPL2	
<b>GENERAL</b>	Standards			IEC/EN 60947-5-1, VDE 0660, UL 508			
	Approvals			CE, UL, CSA <sup>1)</sup>			
	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		m		2000		
	U <sub>i</sub> and U <sub>e</sub> is reduced for 1.2 % and I <sub>e</sub> 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		20
	<b>AUXILIARY CIRCUIT</b>	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 <sub>i</sub>	V		690		
Rated impulse withstand voltage		U <sub>imp</sub>	kV		6		
Rated operational voltage		U <sub>e</sub>	V		690		
Rated frequency		f	Hz		50 /60		
Thermal current		I <sub>th</sub>	A		16		10
Rated operational current for AC-15:							
single-phase 230 V					6		
single-phase 400 V		I <sub>e</sub>	A		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 <sup>2</sup>		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	

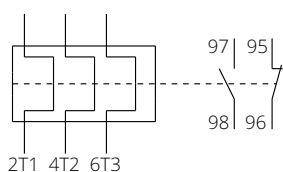
<sup>1)</sup> No UL and CSA for NDLG

## KNL6(G) - KNL38(G)

### BR16 and BR30 Thermal overload relay

Type		Symbol	Unit	BR16	BR30	
<b>GENERAL</b>	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			
<b>MAIN CIRCUIT</b>	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 <sup>2</sup>	1 ... 10		
	Conductor insulation stripping length		mm	10		
	Screw			M4		
Screw head			PZ2			
Tightening torque		Nm	1.2			
<b>AUXILIARY CIRCUITS</b>	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	$I_e$	A	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 <sup>2</sup>	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



## THERMAL OVERLOAD RELAY BR16

Setting ranges and maximum permitted back-up fuses

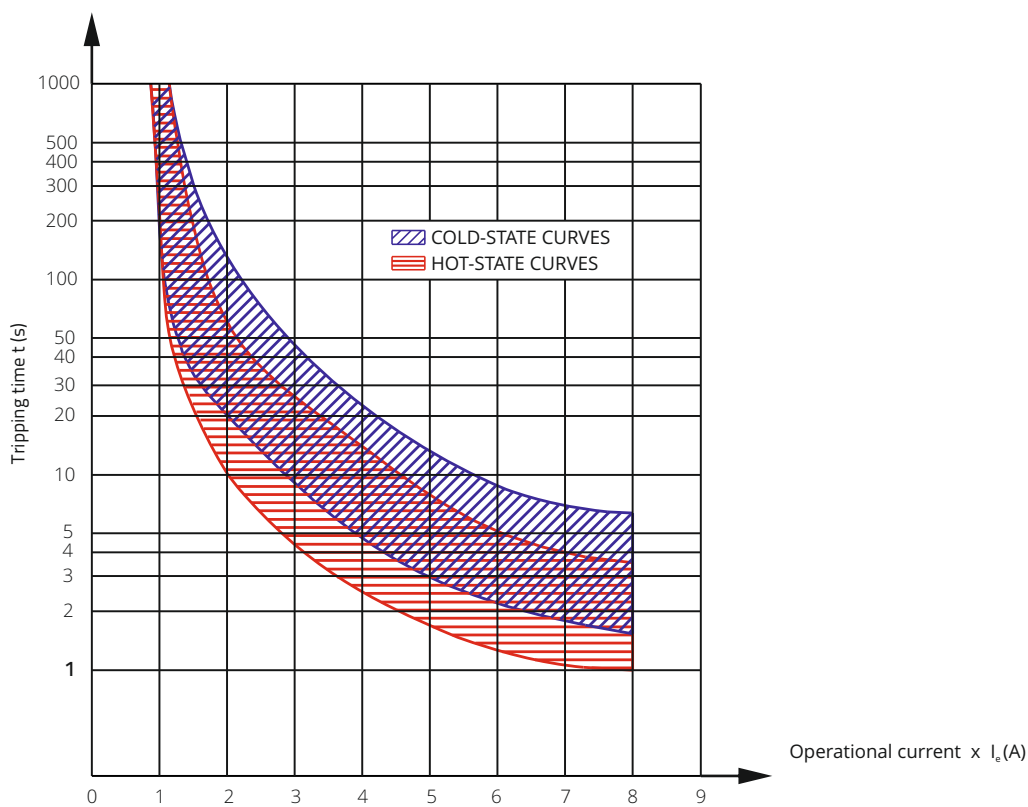
Setting range (A)	Max. back-up fuse gL/gG - UL 508 (A)	Max. back-up fuse gL/gG (A)
0.16 - 0.25	1	1
0.25 - 0.4	1	1
0.35 - 0.5	1	1
0.45 - 0.63	1	1
0.55 - 0.8	3	2
0.75 - 1	3	2
0.9 - 1.3	3	2
1.1 - 1.6	3	2
1.4 - 2	6	4
1.8 - 2.5	6	4
2.3 - 3.2	6	4
2.9 - 4	10	8
3.5 - 4.8	10	8
4.5 - 6.3	15	10
5.5 - 7.5	15	10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

## THERMAL OVERLOAD RELAY BR30

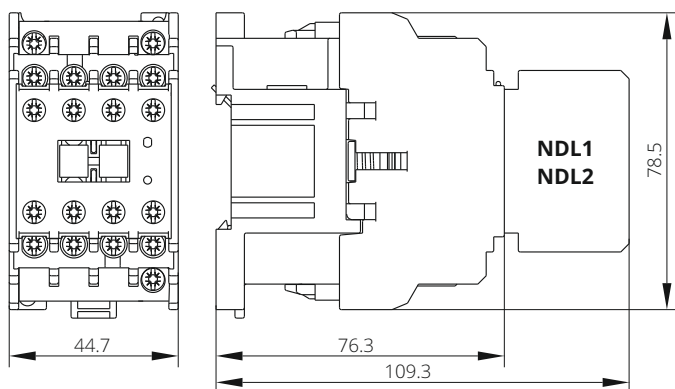
Setting ranges and maximum permitted back-up fuses

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

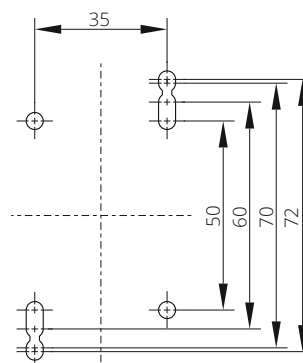
Tripping curve BR16 and BR30



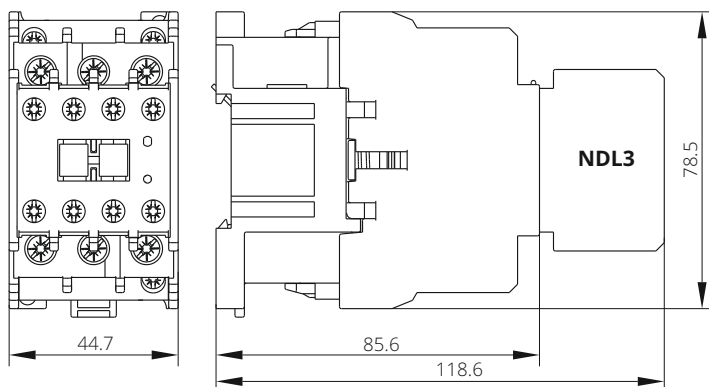
## KNL6 ... KNL18



## KNL6 ... KNL38 - drilling plan



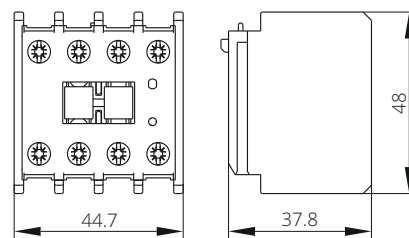
## KNL22 ... KNL38



## NDL1, NDL2, NDL3

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

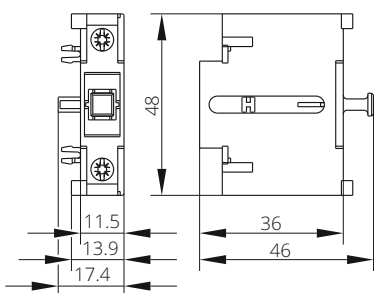
- NDL1 - for KNL6(G)
- NDL2 - for KNL9(G) - KNL18(G)
- NDL3 - for KNL22(G) - KNL38(G)



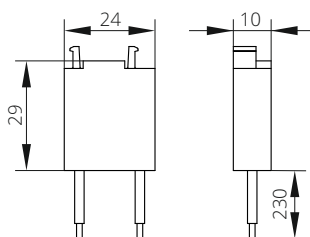
## NPL1, NPL2

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

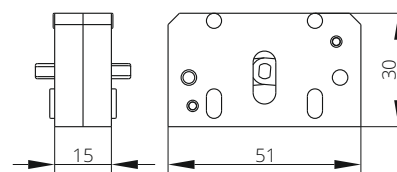
- NPL1 - for KNL9(G) - KNL18(G)
- NPL2 - for KNL22(G) - KNL38(G)



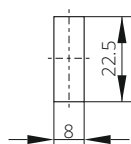
## RC suppressor



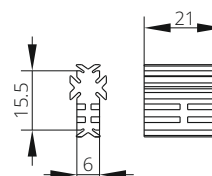
## MBL mechanical interlock



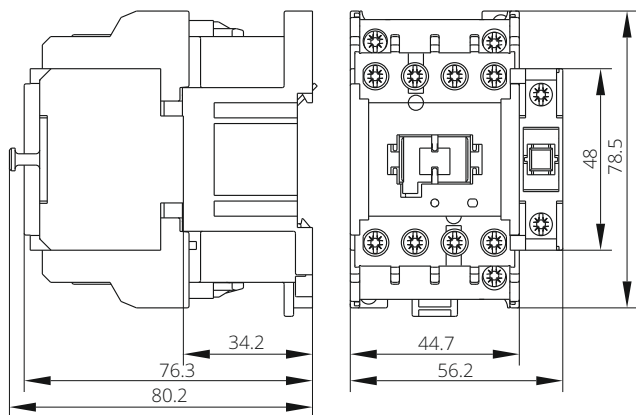
## NT identification plate



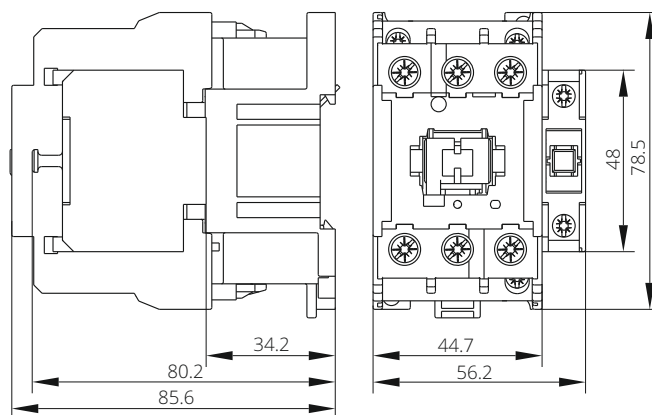
## DZ distance spacer



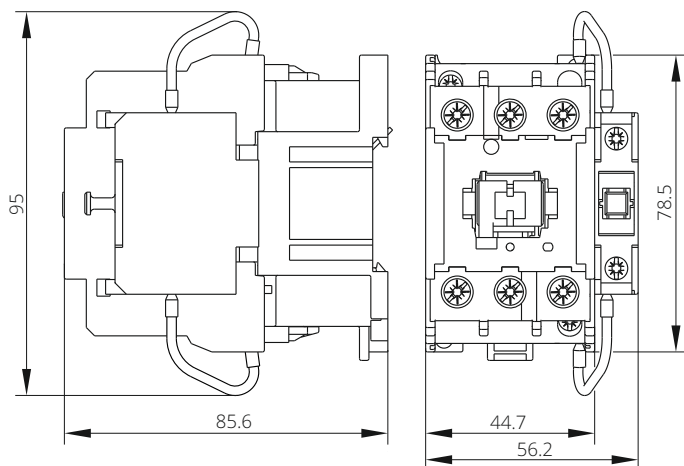
**KNL9-KNL18 + NPL1**



**KNL22-KNL38 + NPL2**

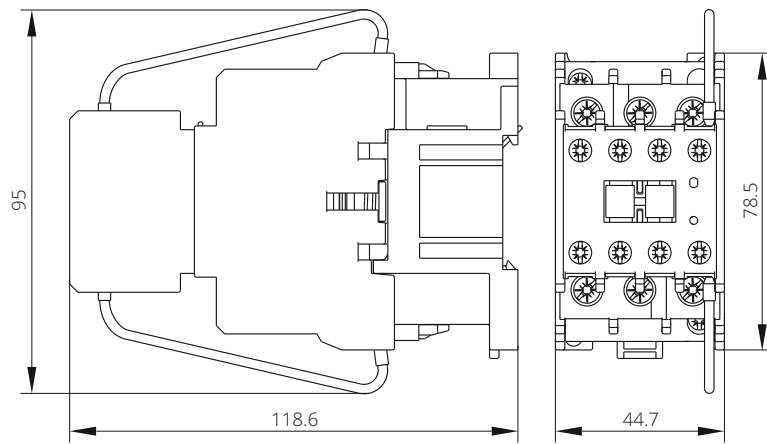


**KNL22G-KNL38G + NPLG**

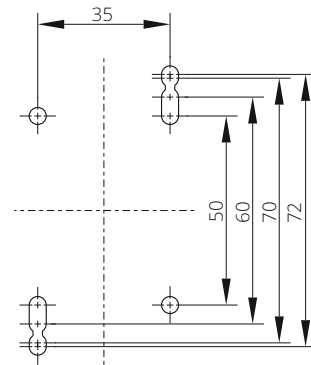




**KNL22G-KNL38G + NDLG**

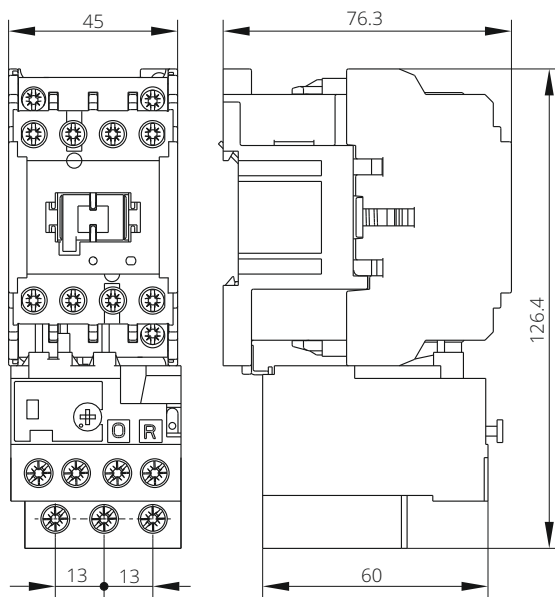


**KNL6 ... KNL38 - drilling plan**



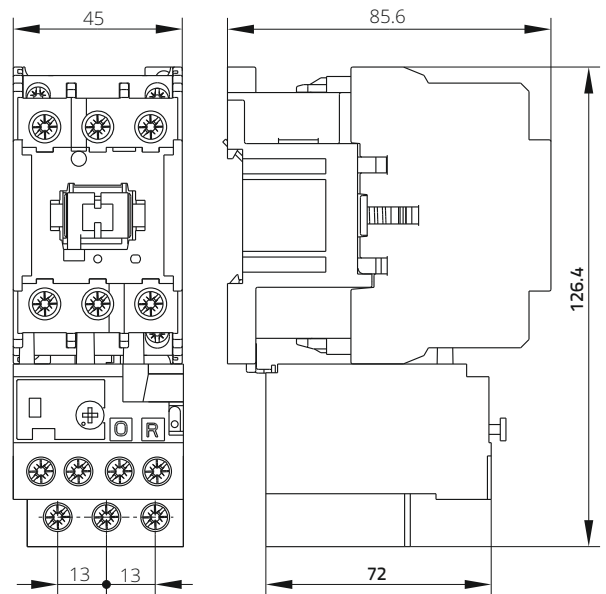
**KNL6 ... KNL18 + BR16**

Contactor + thermal overload relay

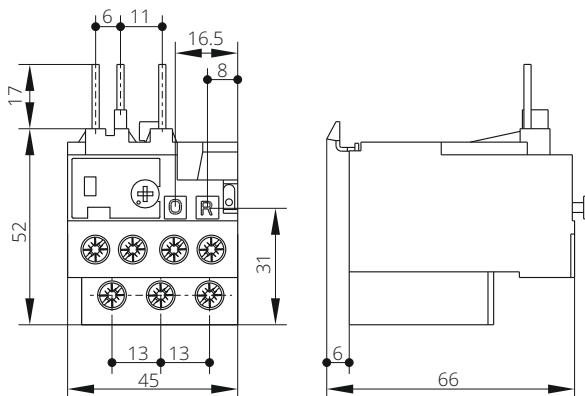


**KNL22 ... KNL38 + BR30**

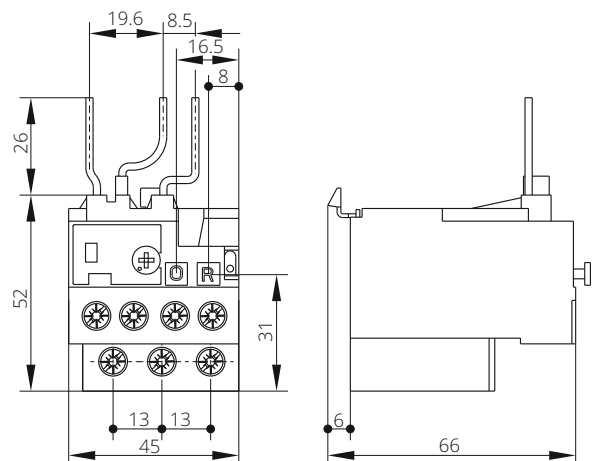
Contactor + thermal overload relay



**BR16 thermal overload relay**



**BR30 thermal overload relay**





CONTACTORS ARE AN ELECTRICALLY REMOTE CONTROLLED SWITCHES USED FOR SWITCHING A POWER CIRCUIT. THOSE CONTACTORS ARE MAINLY USED FOR SWITCHING ELECTRIC MOTORS, PUMPS, COMPRESSORS, SYSTEMS FOR ENERGY ALTERNATIVE SOURCES, LAMPS ETC.



## FOR UNIVERSAL SWITCHING:

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

## ADVANCED OPERATION:

- Control combinations

## OTHER BENEFITS:

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

## ORDERING DATA

Contactors KNL43 - KNL75 .....	page 1-47
Accessorries for contactors KNL43 - KNL75 .....	page 1-48
Example for Ordering data .....	page 1-47
Technical characteristics .....	page 1-49
Dimensions .....	page 1-56

# CONTACTORS - KNL43 - KNL75

## MOTOR CONTACTORS

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

Type	Rated current I <sub>e</sub>	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 <sub>e</sub>	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 <sub>e</sub>	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 <sub>e</sub>	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 <sub>e</sub>	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

Standard control voltages and designations (AC)

for contactors KNL43, KNL43UL, KNL63, KNL63UL, KNL75

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

**KNL63 - 11 - M7 - 50/60**



### NOTE:

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

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ORDERING DATA

# CONTACTORS - ACCESSORIES

## KNL43 - KNL75

### SNAP-ON AUXILIARY SWITCH BLOCKS

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

Type	Rated current I <sub>e</sub>	Rated voltage U <sub>e</sub>	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 <sub>c</sub>	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		



1

ORDERING DATA

	Type	Symbol	Unit	KNL43	KNL63	KNL75
				KNL43UL	KNL63UL	
GENERAL	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		m		2000	
	U <sub>i</sub> and U <sub>s</sub> is reduced for 1.2 % and I <sub>e</sub> 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	
Maximum operating frequency with no load		op. c./h		3.000		
Mechanical endurance		op. c.		3.000.000		
Weight		g		930		
MAIN CIRCUIT	Contact reliability			≥17 V; ≥50 mA		
	Power dissipation per pole		W	5	6	6
	Overload current withstand capability		A	344	504	528
	10 s		A	344	504	528
	Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2		A	80 (125 <sup>1)</sup> )	125	125
	Rated insulation voltage	U <sub>i</sub>	V		1000	
	Rated impulse withstand voltage	U <sub>imp</sub>	kV		6	
	Rated operational voltage	U <sub>e</sub>	V		1000	
	Rated frequency	f	Hz		50/60	
	Thermal current	I <sub>th</sub>	A	75 (85 <sup>1)</sup> )	85 (100 <sup>1)</sup> )	100
	Rated operational current for AC-1, AC-7a and AC-21	I <sub>e</sub>	A	75 (85 <sup>1)</sup> )	85 (100 <sup>1)</sup> )	100
	Operational power for AC-1, AC-7a and AC-21:					
	single-phase 230 V	P <sub>e</sub>	kW	16 (19 <sup>1)</sup> )	19 (22 <sup>1)</sup> )	22
	three-phase 230 V			28 (32 <sup>1)</sup> )	32 (38 <sup>1)</sup> )	38
	three-phase 400 V			50 (56 <sup>1)</sup> )	56 (66 <sup>1)</sup> )	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 <sub>e</sub>	A	43	63	70
	Operational power for AC-3, AC-3e, AC-7b and AC-23:					
	single-phase 230 V	P <sub>e</sub>	kW	5.5	7.5	9
	three-phase 230 V			12.5	15	18.5
	three-phase 400 V			22	30	37
	three-phase 500 V			30	40	45
	three-phase 690 V			30	40	45
	three-phase 1000 V			22	30	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 <sub>e</sub>	A	29	41	41
	Operational power for AC-4:					
	three-phase 400 V	P <sub>e</sub>	kW	15	22	22
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.	40.000	20.000	20.000	
Rated motor power according to standards UL and CSA:						
single-phase 120 V	P <sub>e</sub>	HP	3	5	5	
single-phase 240 V			7.5	10	10	
three-phase 240 V			15	20	25	
three-phase 480 V			25	30	40	
three-phase 600 V			30	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	

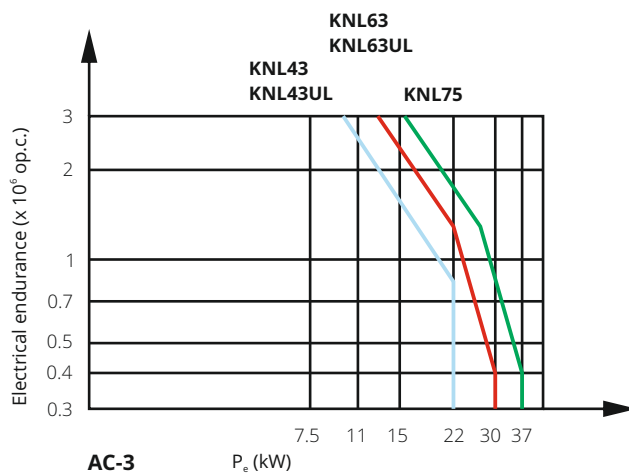
<sup>1)</sup> Ratings for KNL43/63UL version

	Type	Symbol	Unit	KNL43 KNL43UL	KNL63 KNL63UL	KNL75	
<b>MAIN CIRCUIT</b>	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 <sub>e</sub>	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 <sup>2</sup>		35 25		
	Length of removed wire insulation		mm		16		
	Screw				M6		
	Screw head				PZ2		
	Tightening torque		Nm		4		
	<b>AUXILIARY CIRCUIT</b>	Maximum back-up fuse for short-circuit protection gL and gG: coordination type 2	I <sub>v</sub>	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 <sub>e</sub>	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 <sup>2</sup>		1 ... 2.5 1 ... 2.5		
Length of removed wire insulation			mm		10		
Screw					M3.5		
Screw head					PZ2		
Tightening torque			Nm		0.8		
<b>COIL</b>		Range of control voltage for switch-on	U <sub>c</sub>	%		85 ... 110	
		Range of control voltage for drop out	U <sub>c</sub>	%		20 ... 75	
		Kind of voltage				AC	
	Standard control voltages	U <sub>c</sub>	V		12 ... 500		
	Frequency of AC control voltage	f	Hz		50/60		
	Control mode				remote control with U <sub>c</sub>		
	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 <sup>2</sup>		1 ... 2.5 1 ... 2.5		
	Length of removed wire insulation		mm		11		
	Screw				M3.5		
	Screw head				PZ2		
Tightening torque		Nm		0.8			
<b>SAFETY</b>	MTTF - Mean time to failure MTTF = 1/λ = B10/(0.1 n <sub>op</sub> )	AC-1 AC-3	h		5.000	10.000	
	MTTF <sub>d</sub> - Mean time to failure dangerous MTTF <sub>d</sub> = 1/λ <sub>d</sub> = B10 <sub>d</sub> /(0.1 n <sub>op</sub> )	AC-1 AC-3	h	20.000 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 <sub>d</sub> - Number of operating cycles until 10 % of device dangerous B10 <sub>d</sub> = B10/ratio of dangerous failures	AC-1 AC-3	op. c.	800.000	200.000	400.000	
	λ - Failure rate λ = (0.1 n <sub>op</sub> )/B10	AC-1 AC-3	1/h	0.00005	0.0002	0.0001	
	λ <sub>d</sub> - Failure rate dangerous λ <sub>d</sub> = (0.1 n <sub>op</sub> )/B10 <sub>d</sub>	AC-1 AC-3	1/h	0.00004	0.00015	0.000075	
	Ratio of dangerous failures		%		75		
	n <sub>op</sub> - Operating cycles (operating cycles/h)		op. c./h		300		

Electrical endurance

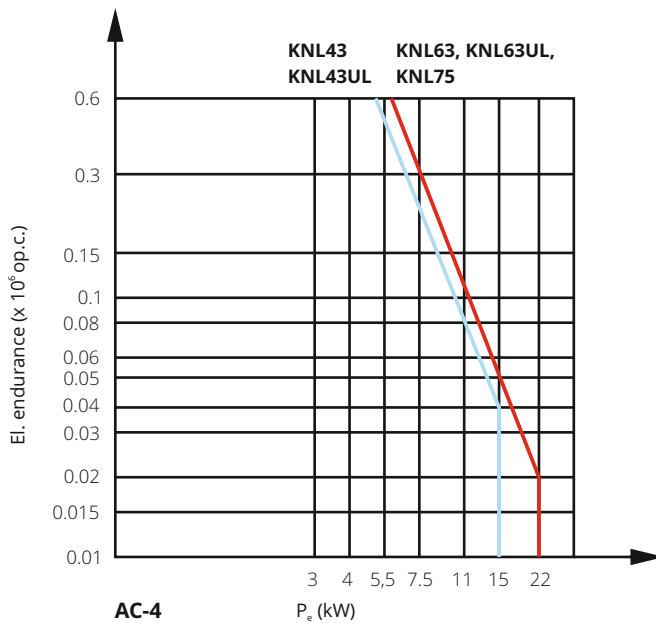
**Diagram 1**

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**

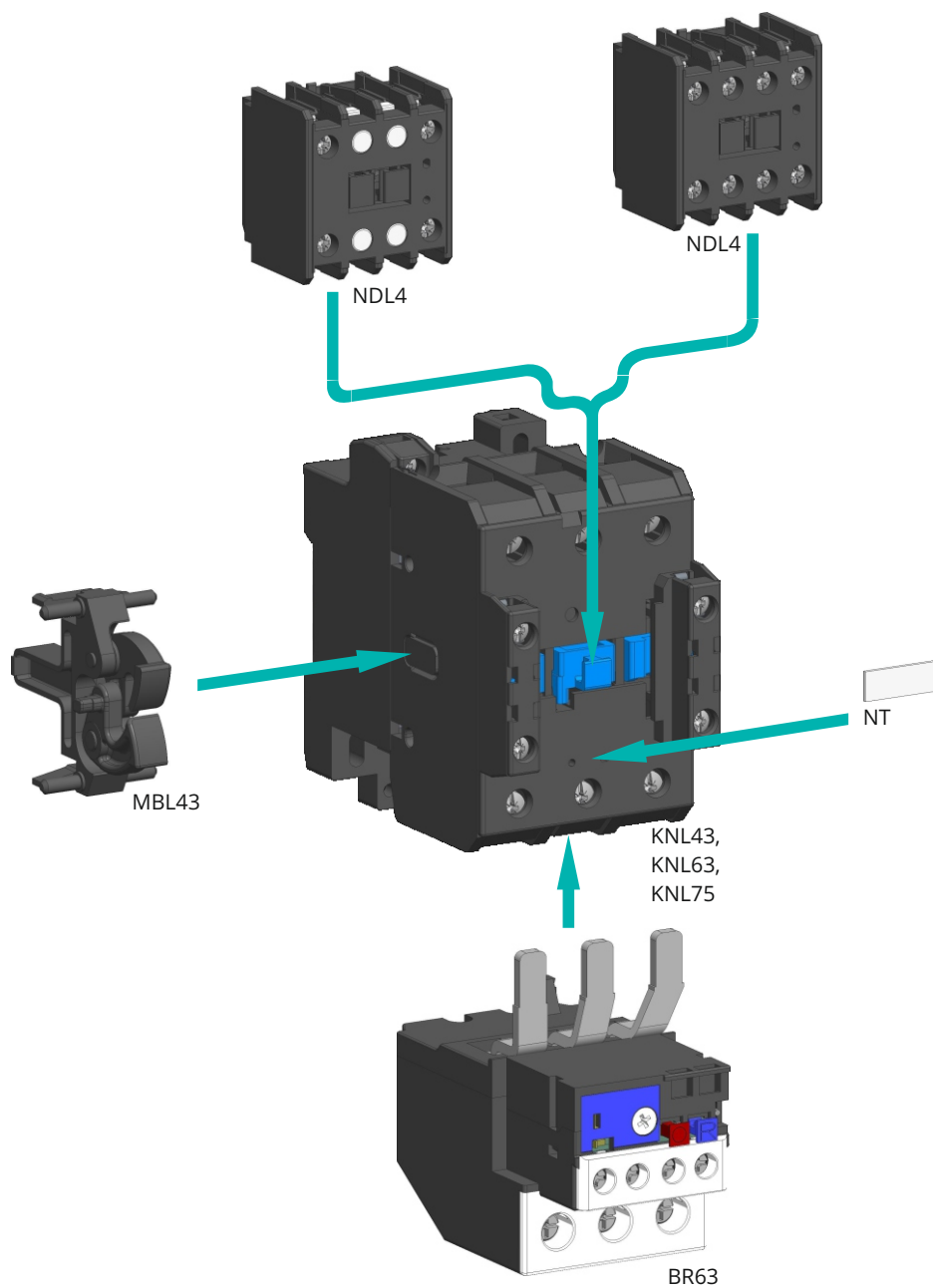


# CONTACTORS - ACCESSORIES

KNL43 - KNL75

Mounting positions of accessories

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TECHNICAL DATA



## KNL43 - KNL75

### Snap-on auxiliary switch blocks

1

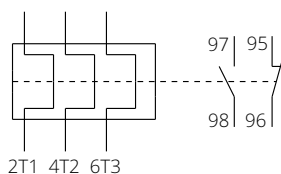
Type	Symbol	Unit	NDL4
Standards			IEC/EN 60947-5-1, VDE 0660, UL 508
Approvals			CE, UL, CSA
For use with			KNL43, KNL43UL, KNL63, KNL63UL, KNL75
Module width			2
Number of poles			2 or 4
Degree of protection			IP20
Pollution degree			3
Ambient temperature			
open		°C	-25 ... +55
closed			-25 ... +45
Storage temperature		°C	-30 ... +80
Maximum altitude		m	2000
U <sub>i</sub> and U <sub>e</sub> is reduced for 1.2 % and I <sub>e</sub> 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
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 <sub>i</sub>	V	690
Rated impulse withstand voltage	U <sub>imp</sub>	kV	6
Rated operational voltage	U <sub>e</sub>	V	690
Rated frequency	f	Hz	50 /60
Thermal current	I <sub>th</sub>	A	16
Rated operational current for AC-15:			
single-phase 230 V			6
single-phase 400 V	I <sub>e</sub>	A	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 <sup>2</sup>	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

## KNL43 - KNL75

### BR63 Thermal overload relay

Type	Symbol	Unit	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	
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 <sup>2</sup>	6 ... 35	
Conductor insulation stripping length		mm	12	
Screw			M5	
Screw head			PZ2	
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			6	
240 V			3	
380 V	$I_e$	A	both contacts	
480 V				1.9
500 V				1.5
500 V				1.4
600 V				1.2
Rated operational current DC-13				
125 V	$I_e$	A	both contacts	
250 V				0.55
Terminal capacity		mm <sup>2</sup>	0.75 ... 2.5	
Conductor insulation stripping length		mm	8	
Screw			M3.5	
Screw head			PZ2	
Tightening torque		Nm	0.8	

### Connection diagram BR63



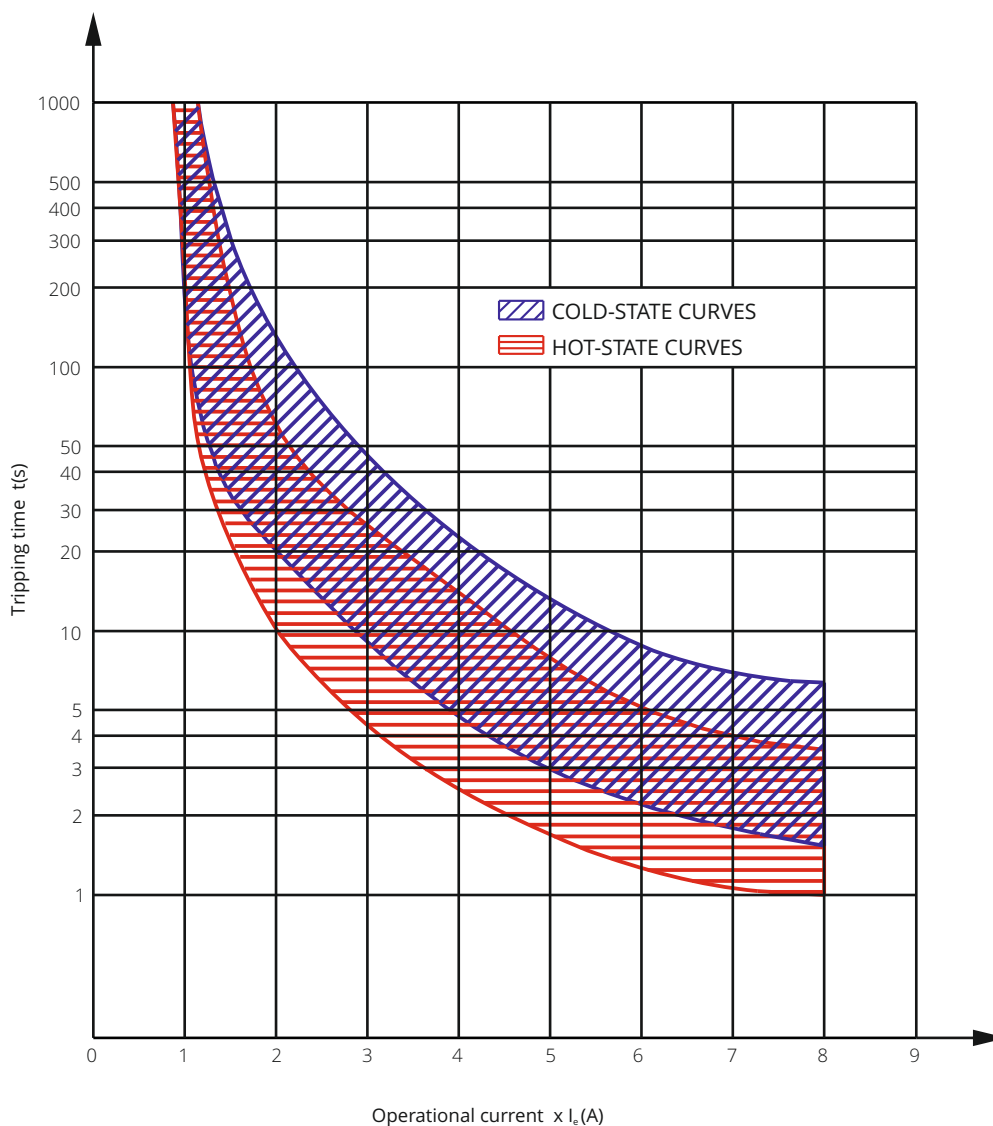
## KNL43 - KNL75

### BR63 THERMAL OVERLOAD RELAY

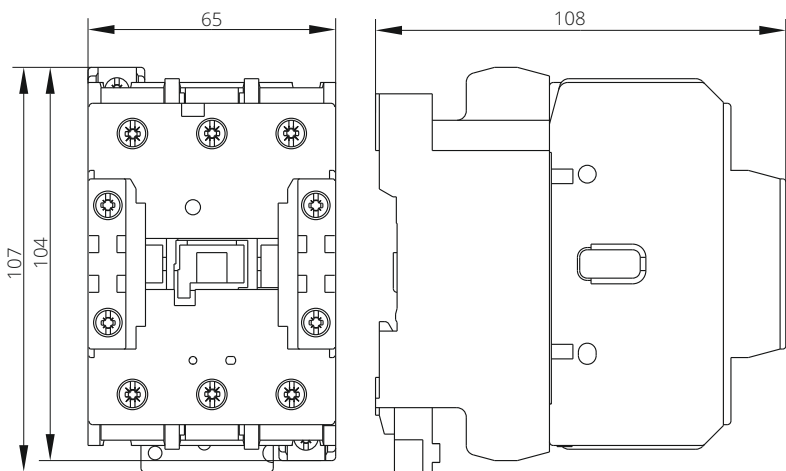
Setting ranges and maximum permitted back-up fuses

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

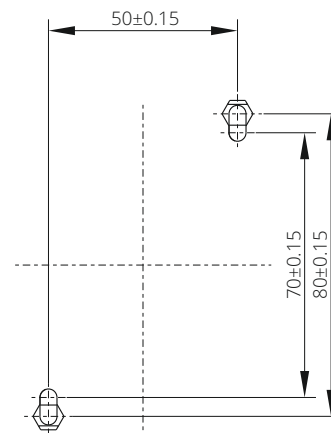
Tripping curve BR63



**KNL43 ... KNL75**  
**KNL43UL, KNL63UL**

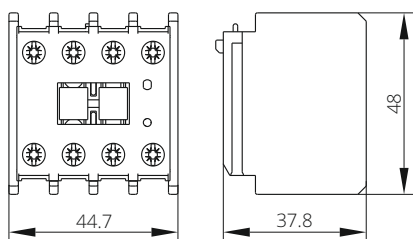


**KNL43 ... KNL75 - drilling plan**  
**KNL43UL, KNL63UL**

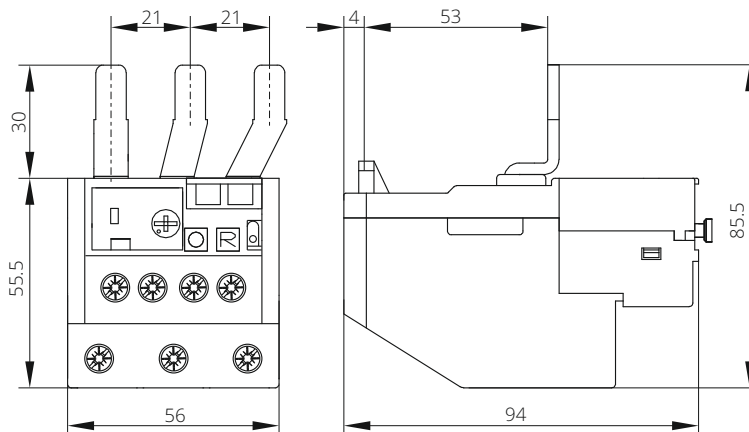


**NDL4**

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

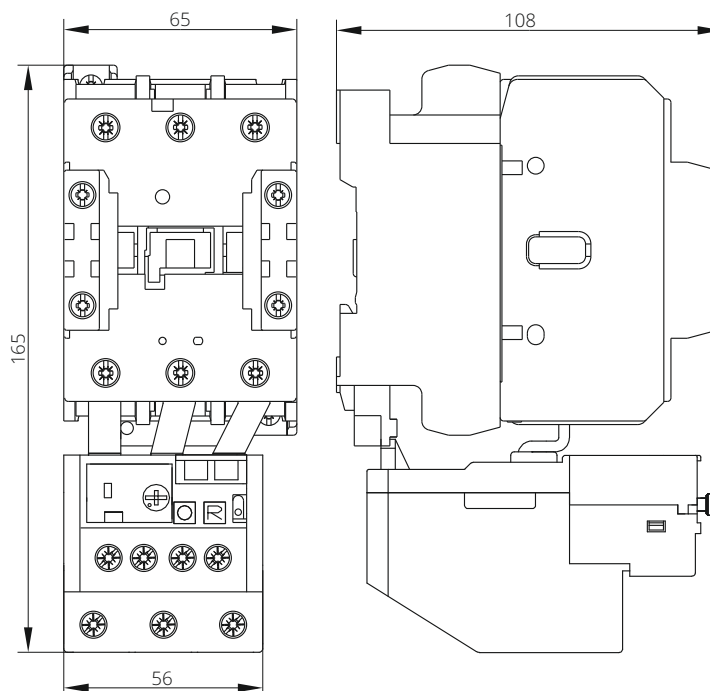


**BR63 thermal overload relay**



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

Contactor + thermal overload relay





CONTACTORS ARE USED FOR SWITCHING ELECTRIC MOTORS AND OTHER RESISTIVE, INDUCTIVE AND CAPACITIVE LOADS (LIFTING EQUIPMENT, PUMPS, FANS, INDUSTRY, ETC.).



## FOR UNIVERSAL SWITCHING:

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

## ADVANCED OPERATION:

- Control 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

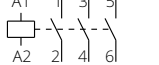
## ORDERING DATA

Contactors KNL80 - KNL110 .....	page 1-58
Accessories for contactors KNL80 - KNL 110 .....	page 1-59
Example for Ordering data .....	page 1-59
Technical characteristics .....	page 1-60
Dimensions .....	page 1-66

# CONTACTORS - KNL80 - KNL110

## MOTOR CONTACTORS

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

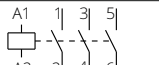
Type	Rated current I <sub>e</sub>	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL80-00	80 A	380/400 V	A1 1  3  5	786020036000	1.28	1
KNL80-00	80 A	220/230 V		786020034000	1.28	1
KNL80-00	80 A	24 V	A2 2  4  6	786020030000	1.28	1

AC



1

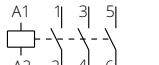
AC-3 acc. to IEC/EN 60947-4-1 (3-pole, 75 mm widths)

Type	Rated current I <sub>e</sub>	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL90-00	90 A	380/400 V	A1 1  3  5	786020044000	1.28	1
KNL90-00	90 A	220/230 V		786020042000	1.28	1
KNL90-00	90 A	24 V	A2 2  4  6	786020038000	1.28	1

AC



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

Type	Rated current I <sub>e</sub>	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (g)	Packaging (pcs)
KNL110-00	110 A	380/400 V	A1 1  3  5	786020052000	1.28	1
KNL110-00	110 A	220/230 V		786020050000	1.28	1
KNL110-00	110 A	24 V	A2 2  4  6	786020046000	1.28	1

AC



ORDERING DATA

# CONTACTORS - ACCESSORIES

## KNL80 - KNL110

### SNAP-ON AUXILIARY SWITCH BLOCKS

AC-15 acc. to IEC/EN 60947-5-1 (3- and 4-pole)

Type	Rated current I <sub>e</sub>	Rated voltage U <sub>e</sub>	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		



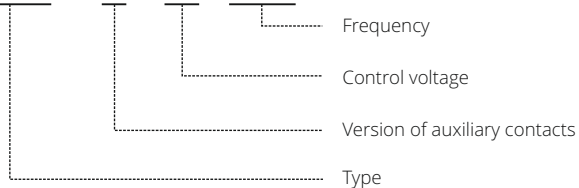
## ORDERING DATA

Standard control voltages and designations (AC)

for contactors KNL80 - KNL110

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

**KNL80 - 00 - M7 - 50/60**



#### NOTE:

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

1

ORDERING DATA

# CONTACTORS - KNL80 - KNL110

1

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 <sub>i</sub> and U <sub>e</sub> is reduced for 1.2 % and I <sub>e</sub> 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	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 <sub>i</sub>	V	1000		
Rated impulse withstand voltage	U <sub>imp</sub>	kV	8		
Rated operational voltage	U <sub>e</sub>	V	690		
Rated frequency	f	Hz	50/60		
Thermal current	I <sub>th</sub>	A	125		
Rated operational current for AC-1, AC-7a and AC-21	I <sub>e</sub>	A	125		
Operational power for AC-1, AC-7a and AC-21:					
single-phase 230 V			27		
three-phase 230 V	P <sub>e</sub>	kW	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 <sub>e</sub>	A	80	90	110
Operational power for AC-3, AC-7b and AC-23:					
three-phase 230 V			23	27.6	33
three-phase 400 V	P <sub>e</sub>	kW	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 <sub>e</sub>	A	38	43	43
Operational power for AC-4:					
three-phase 400 V			20	23	23
three-phase 500 V	P <sub>e</sub>	kW	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			30	30	40
three-phase 460 V	P <sub>e</sub>	HP	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

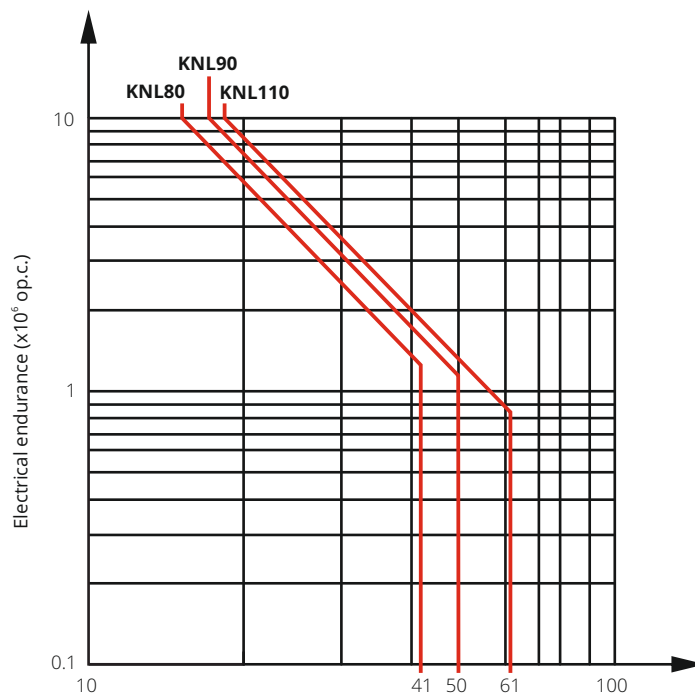


Type	Symbol	Unit	KNL80	KNL90	KNL110
Switching of capacitors AC-6b and AC-7c (at 230 V)	C	μF		850	
Maximum operating frequency for AC-6b and AC-7c		op. c./h		600	
Electrical endurance for AC-6b and AC-7c		op. c.		100.000	
Rated operational current for DC-1 (L/R ≤ 1 ms): 1 pole ... 24 V DC/ 48 V DC/ 60 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 <sub>e</sub>	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 <sub>e</sub>	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 <sub>e</sub>	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)	S	mm <sup>2</sup>		6 ... 50	
flexible				6 ... 50	
Screw				M6	
Screw head				hexogen socket oval head	
Tightening torque		Nm		4 - 5	
Range of control voltage for switch-on	U <sub>c</sub>	%		85 ... 110	
Range of control voltage for drop out	U <sub>c</sub>	%		20 ... 75	
Kind of voltage				AC	
Standard control voltages	U <sub>c</sub>	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 <sub>c</sub>	
Coil consumption: switch-on		VA		210	
operation				18	
Delays: make		ms		13-25	
brake				8-12	
Terminal capacity: rigid (solid and stranded)		mm <sup>2</sup>		2.5	
flexible				2.5	
Screw				M3.5	
Screw head				Philips1	
Tightening torque		Nm		0.8 - 1	
MTTF - Mean time to failure MTTF = 1/λ = B10/(0.1 n <sub>op</sub> )	AC-1 AC-3	h	32.500	25.000 30.000	20.000
MTTF <sub>d</sub> - Mean time to failure dangerous MTTF <sub>d</sub> = 1/λ <sub>d</sub> = B10 <sub>d</sub> /(0.1 n <sub>op</sub> )	AC-1 AC-3	h	43.333	33.333 40.000	26.666
B10 - Number of operating cycles until 10 % of devices fail	AC-1 AC-3	op. c.	975.000	750.000 900.000	600.000
B10 <sub>d</sub> - Number of operating cycles until 10 % of device dangerous	AC-1 AC-3	op. c.	1.300.000	1.000.000 1.200.000	800.000
B10 <sub>d</sub> = B10/ratio of dangerous failures					
λ - Failure rate λ = (0.1 n <sub>op</sub> )/B10	AC-1 AC-3	1/h	0.00003	0.00004 0.00003	0.00005
λ <sub>d</sub> - Failure rate dangerous λ <sub>d</sub> = (0.1 n <sub>op</sub> )/B10 <sub>d</sub>	AC-1 AC-3	1/h	0.00002	0.00003 0.00003	0.00004
Ratio of dangerous failures		%		75	
n <sub>op</sub> - Operating cycles (operating cycles/h)		op. c./h		300	

Electrical endurance

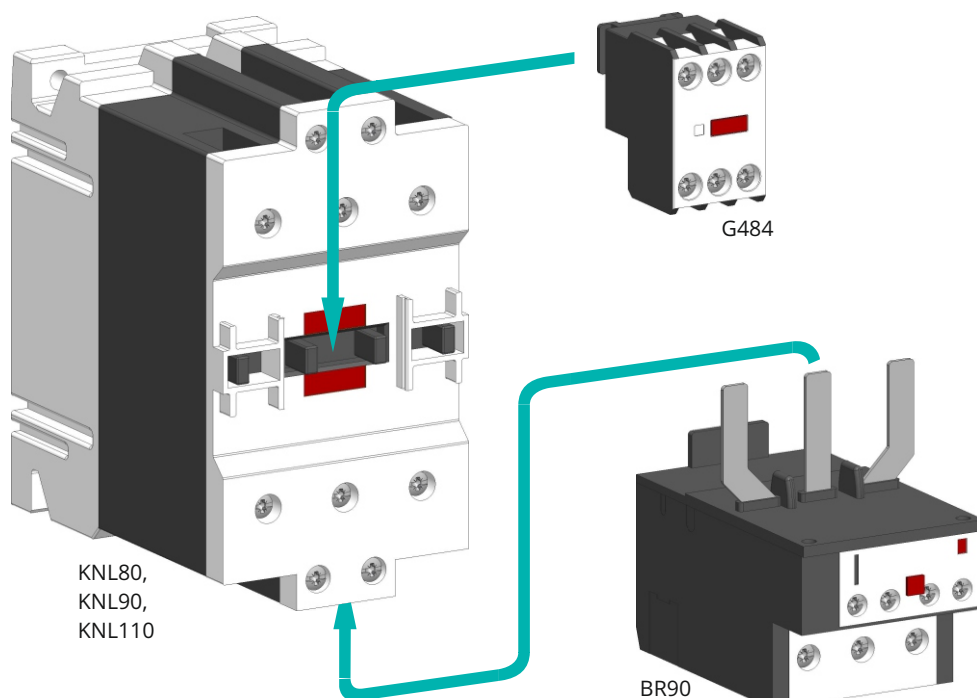
**Diagram 1**

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



**AC-3** Motor rated power (kW) at 400 V, 50 Hz  
Operation frequency: 600 op.c./h

Mounting positions of accessories



TECHNICAL DATA

## KNL80 - KNL110

### Snap-on auxiliary switch blocks

Type	Symbol	Unit	G484	BFX10
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		
closed			-50 ... +70	
Storage temperature		°C	-60 ... +80	
Mechanical endurance		op. c.	10.000.000	
Weight		g	39	48
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 <sup>2</sup>	2,5	
flexible			2,5	
Screw			M3	
Tightening torque		Nm	1	

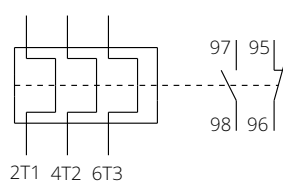
## KNL80 - KNL110

### BR90 Thermal overload relay

1

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 <sup>2</sup>	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	$I_e$	A	2.5
	Rated operational current DC-13 110 V	$I_e$	A	1.1
	Terminal capacity		mm <sup>2</sup>	max. 2.5
	Conductor insulation stripping length		mm	9
Screw			M3.5	
Screw head			PH1	
Tightening torque		Nm	1	

### Connection diagram BR90



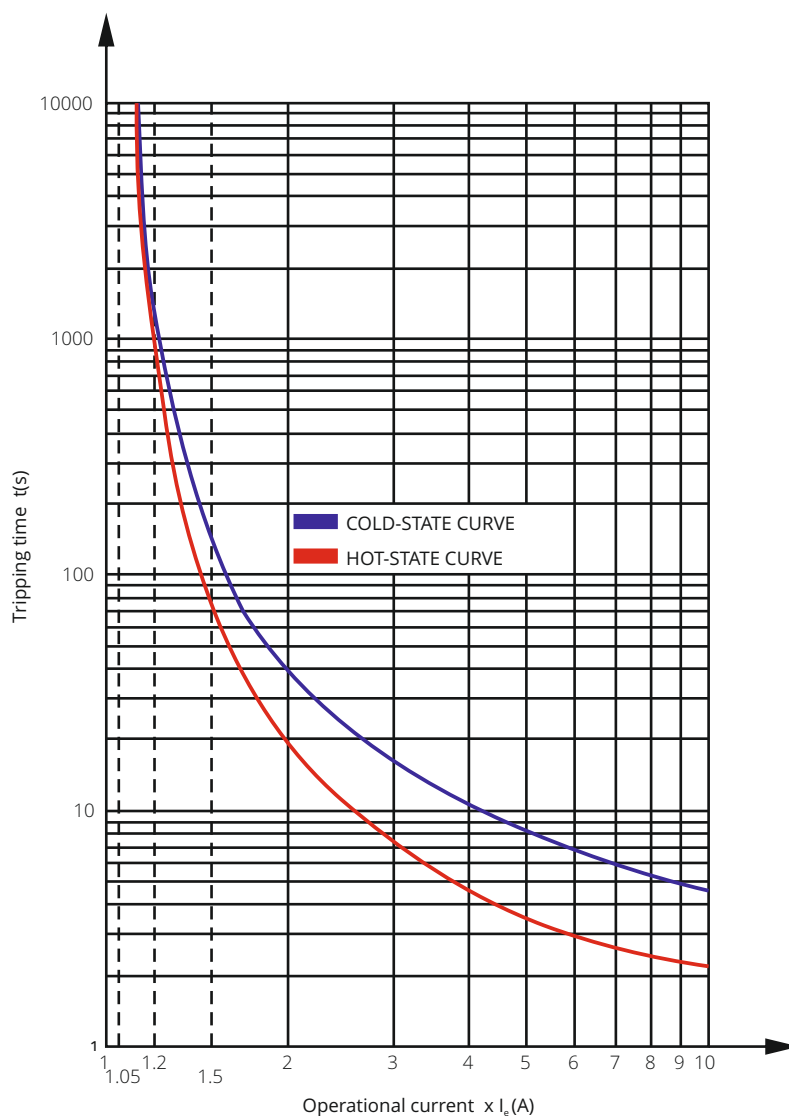
## KNL80 - KNL110

### BR90 THERMAL OVERLOAD RELAY

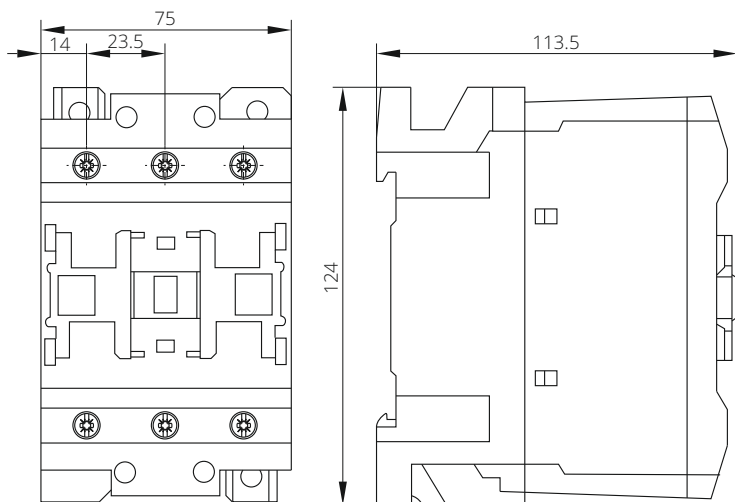
Setting ranges and maximum permitted back-up fuses

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

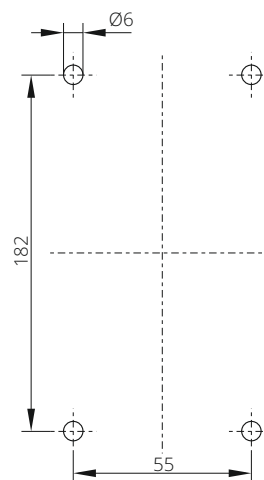
### Tripping curve BR90



## KNL80 ... KNL110

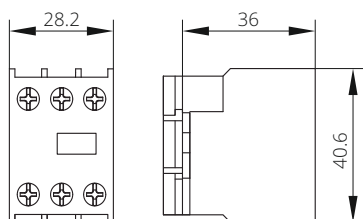


## KNL80 ... KNL110 - drilling plan

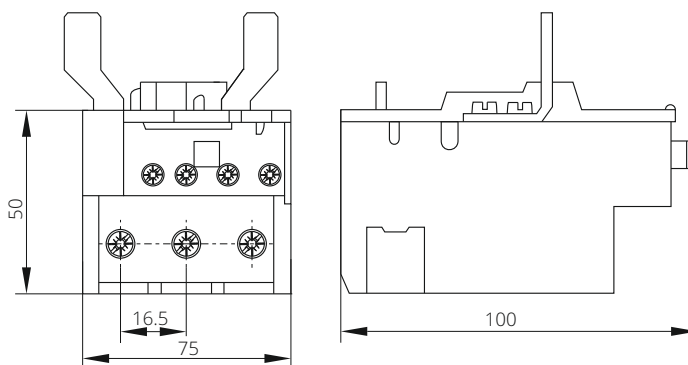


## G484

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

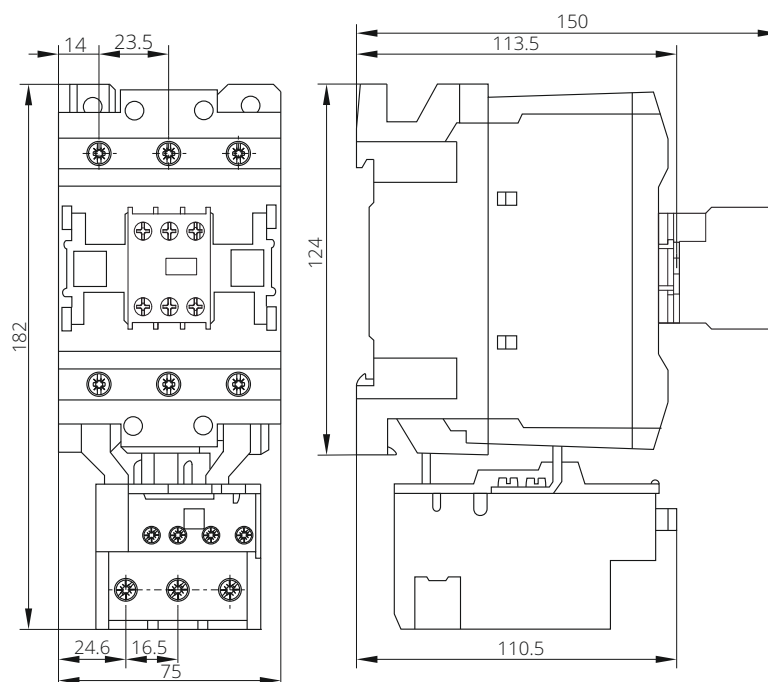


## BR90 thermal overload relay



## KNL80 ... KNL110 + G484 + BR90

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





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## FOR UNIVERSAL SWITCHING:

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

## ADVANCED OPERATION:

- Control 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

## ORDERING DATA

Contactors KNL95 - KNL1000 .....	page 1-68
Accessories for contactors KNL95 - KNL1000 .....	page 1-70
Example for Ordering data .....	page 1-71
Technical characteristics .....	page 1-72
Dimensions .....	page 1-81

# CONTACTORS - KNL95 - KNL1000

## 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-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-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-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-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-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



1

ORDERING DATA



# CONTACTORS - KNL95 - KNL1000

## MOTOR CONTACTORS

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

Type	Rated current I <sub>e</sub>	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL500-00	520 A	380 V	A1 1  3  5	30.050.138	17.6	1
KNL500-00	520 A	220 V		30.050.137	17.6	1
KNL500-00	520 A	24 V	A2 2  4  6	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 <sub>e</sub>	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL630-00	630 A	380 V	A1 1  3  5	30.050.150	17.9	1
KNL630-00	630 A	220 V		30.050.149	17.9	1
KNL630-00	630 A	24 V	A2 2  4  6	30.051.120	17.9	1

AC/DC



AC-3 acc. to IEC/EN 60947-4-1 (4-pole, 260 mm widths)

Type	Rated current I <sub>e</sub>	Control voltage 50/60 Hz	Wiring diagram	Ordering No.	Weight (kg)	Packaging (pcs)
KNL1000.4-00	1000 A	380 V	A1 1  3  5  7	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	A2 2  4  6  8	30.051.123	21.5	1

AC/DC

# CONTACTORS - ACCESSORIES

## KNL95 - KNL1000

### SNAP-ON AUXILIARY SWITCH BLOCKS

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

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

<sup>1)</sup> 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	38.902.073	104
G356/2		265 - 305	38.902.074	110
G356/3		305 - 345	38.902.075	116
G356/4		345 - 385	38.902.076	122
G356/5		390 - 425	38.902.077	124
G356/6		470 - 500	38.902.078	134



G355

### Main terminal cover

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

# CONTACTORS - ACCESSORIES

## KNL95 - KNL1000

### 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		



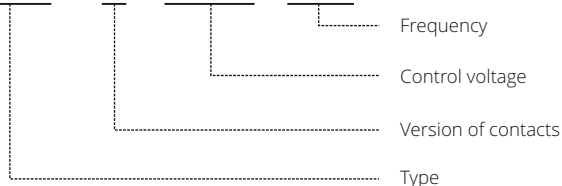
## ORDERING DATA

Standard control voltages and designations (AC)

for contactors KNL95 - KNL1000

V (50/60 Hz)	24	48	60	110/125	220/240	380/415	440/480
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**KNL95 - 00 - 220/240 - 50/60**



#### NOTE:

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

# CONTACTORS - KNL95 - KNL1000

1

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		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			
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			27	35	55	60
three-phase 230 V			47	57	91	95
three-phase 400 V			82	98	150	160
three-phase 500 V			103	129	196	213
three-phase 690 V			142	173	270	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)		A	95	110	150	185
Operational power for AC-3, AC-7b and AC-23:						
three-phase 230 V			27.6	33	46	57
three-phase 400 V			50	61	80	100
three-phase 500 V			56	80	100	123
three-phase 690 V			74	100	120	144
three-phase 1000 V			46	63	75	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			
Rated operational current for AC-4 (at 400 V)		A	43	47	57	65
Operational power for AC-4:						
three-phase 400 V			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			30	40	50	75
three-phase 460 V			50	75	100	150
three-phase 575 V			75	100	125	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			

TECHNICAL DATA

# CONTACTORS - KNL95 - KNL1000

1

	Type	Symbol	Unit	KNL95	KNL115	KNL145	KNL180	
MAIN CIRCUIT	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 <sub>e</sub>	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 <sub>e</sub>	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 <sub>e</sub>	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 Screw Spanner / wrench size Tightening torque	S	mm <sup>2</sup> mm mm mm Nm		70 20x3 M6 10 3	70 20x3 M6 10 3	120 25x3 M8 13 6	150 25x3 M8 13 6
	COIL	Range of control voltage for switch-on	U <sub>c</sub>	%		80 ... 110		
		Range of control voltage for drop out	U <sub>c</sub>	%		30 ... 60		
		Kind of voltage				AC/DC		
		Standard control voltages	U <sub>c</sub>	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 <sub>c</sub>			
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			
SAFETY	MTTF - Mean time to failure MTTF = 1/λ = B10/(0.1 n <sub>op</sub> )	AC-1 AC-3	h	25.000 27.500	25.000 27.500	20.000 27.500	20.000 25.000	
	MTTF <sub>d</sub> - Mean time to failure dangerous MTTF <sub>d</sub> = 1/λ <sub>d</sub> = B10 <sub>d</sub> /(0.1 n <sub>op</sub> )	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 <sub>d</sub> - 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	
	λ - Failure rate λ = (0.1 n <sub>op</sub> )/B10	AC-1 AC-3	1/h	0.00004 0.00004	0.00004 0.00004	0.00005 0.00004	0.00005 0.00004	
	λ <sub>d</sub> - Failure rate dangerous λ <sub>d</sub> = (0.1 n <sub>op</sub> )/B10 <sub>d</sub>	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 <sub>op</sub> - Operating cycles (operating cycles/h)		op. c./h		300			

TECHNICAL DATA

# CONTACTORS - KNL95 - KNL1000

1

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		m	2000				
U <sub>i</sub> and U <sub>e</sub> is reduced for 1.2 % and I <sub>e</sub> for 0.4 % for every additional 100 m							
Number of contactors or switches side-by-side:							
≤40 °C			no limitation				
(40 ... 55) °C							
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 <sub>i</sub>	V	1000				
Rated impulse withstand voltage	U <sub>imp</sub>	kV	8				
Rated operational voltage	U <sub>e</sub>	V	690				
Rated frequency	f	Hz	50/60				
Thermal current	I <sub>th</sub>	A	350	550	700	800	1000
Rated operational current for AC-1, AC-7a and AC-21	I <sub>e</sub>	A	350	550	700	800	1000
Operational power for AC-1, AC-7a and AC-21:							
single-phase 230 V	P <sub>e</sub>	kW	76	120	153	175	218
three-phase 230 V			124	200	252	288	350
three-phase 400 V			214	345	438	500	600
three-phase 500 V			282	452	575	655	750
three-phase 690 V			380	598	755	860	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 <sub>e</sub>	A	265	420	520	630	/
Operational power for AC-3, AC-7b and AC-23:							
three-phase 230 V	P <sub>e</sub>	kW	83	130	156	198	/
three-phase 400 V			140	225	290	335	/
three-phase 500 V			176	271	367	368	/
three-phase 690 V			212	352	416	440	/
three-phase 1000 V			156	208	312	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 <sub>e</sub>	A	92	133	175	210	/
Operational power for AC-4:							
three-phase 400 V	P <sub>e</sub>	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	P <sub>e</sub>	HP	100	150	200 <sup>1)</sup>	250 <sup>1)</sup>	
three-phase 460 V			200	350	400 <sup>1)</sup>	500 <sup>1)</sup>	
three-phase 575 V			250	400	450 <sup>1)</sup>	500 <sup>1)</sup>	
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	/

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

TECHNICAL DATA

# CONTACTORS - KNL95 - KNL1000

1

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		$I_e$	A	350 / - / -	400 / 250 / -	650 / 320 / -	800 / 460 / -	/
	2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC				350 / 300 / 250	400 / 400 / 350	650 / 550 / 450	800 / 800 / 700	/
	3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC				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		$I_e$	A	180 / 150 / -	350 / 200 / -	550 / 320 / -	800 / 460 / -	/
	2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC				280 / 250 / 200	350 / 350 / 280	650 / 550 / 450	800 / 800 / 700	/
	3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC				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		$I_e$	A	180 / 150 / -	350 / 200 / -	550 / 320 / -	800 / 460 / -	/
	2 poles in series ... 24 V DC/ 110 V DC/ 220 V DC				280 / 250 / 200	350 / 350 / 280	650 / 550 / 450	800 / 800 / 700	/
3 poles in series ... 24 V DC/ 110 V DC/ 220 V DC				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		S	mm <sup>2</sup>	240	2x150	2x240	2x240	/	
1 or 2 bars			mm	30x4	30x5	50x5	60x5	60x5	
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			VA/W		300/300		400/400	
	operation					10/10		18/18	
	Delays: make			ms		80-120		110-180	
brake					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 <sub>op</sub> )		AC-3		25.000	17.500	17.500	17.500	/
	MTTF <sub>d</sub> - Mean time to failure dangerous		AC-1	h	23.333	20.000	21.666	23.333	/
	MTTF <sub>d</sub> = 1/λ <sub>d</sub> = B10 <sub>d</sub> /(0.1 n <sub>op</sub> )		AC-3		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		750.000	525.000	525.000	525.000	/
	B10 <sub>d</sub> - Number of operating cycles until 10 % of device dangerous		AC-1	op. c.	700.000	600.000	650.000	700.000	/
	B10 <sub>d</sub> = B10/ratio of dangerous failures		AC-3		1.000.000	700.000	700.000	700.000	/
	λ - Failure rate		AC-1	1/h	0.00006	0.00007	0.00006	0.00006	/
	λ = (0.1 n <sub>op</sub> )/B10		AC-3		0.00004	0.00006	0.00006	0.00006	/
λ <sub>d</sub> - Failure rate dangerous		AC-1	1/h	0.00004	0.00005	0.00005	0.00004	/	
λ <sub>d</sub> = (0.1 n <sub>op</sub> )/B10 <sub>d</sub>		AC-3		0.00003	0.00004	0.00004	0.00004	/	
Ratio of dangerous failures			%			75		/	
n <sub>op</sub> - Operating cycles (operating cycles/h)			op. c./h			300		/	

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

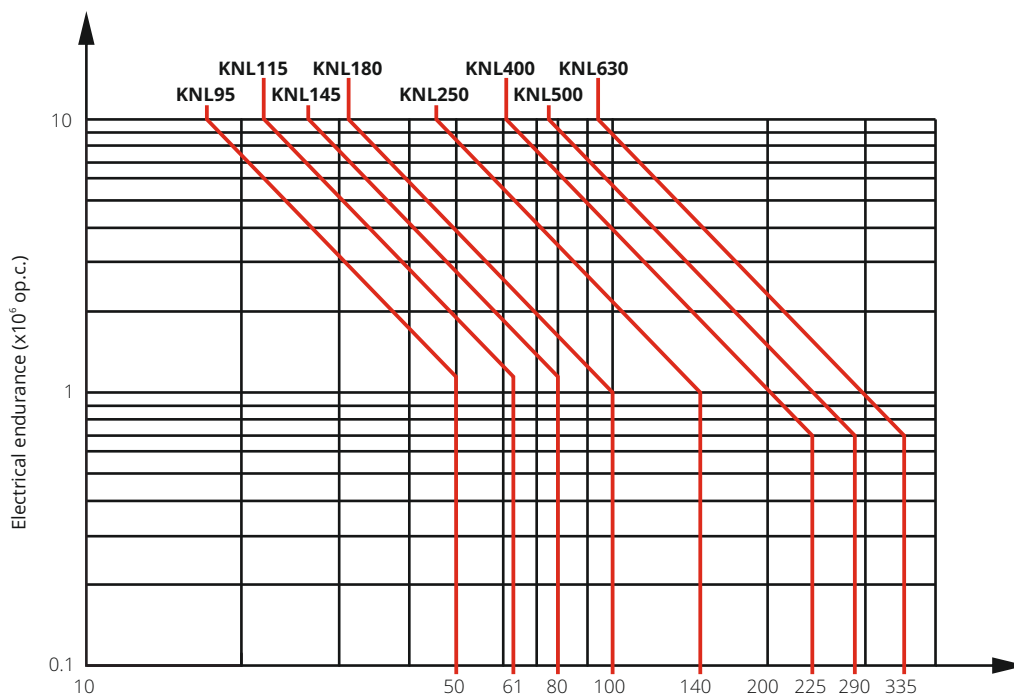
2) 48,60,110/125,220/240,380/415,440/480 V

TECHNICAL DATA

Electrical endurance

**Diagram 1**

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



**AC-3** Motor rated power (kW) at 400 V, 50 Hz  
Operation frequency: 600 op.c./h

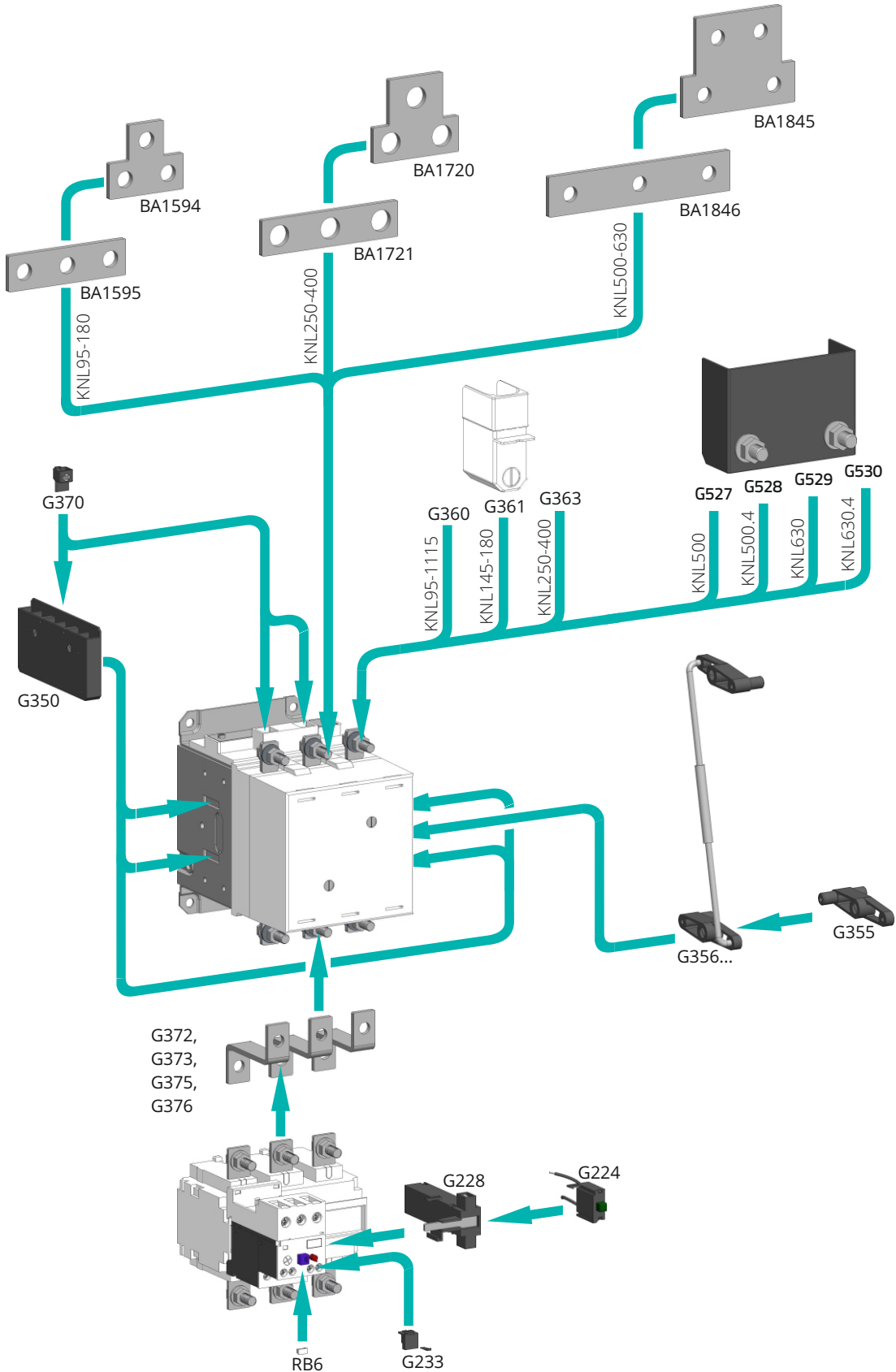


# CONTACTORS - ACCESSORIES

KNL95 - KNL1000

Mounting positions of accessories

1



TECHNICAL DATA

# CONTACTORS - ACCESSORIES

## KNL95 - KNL1000

### Snap-on auxiliary switch blocks

	Type	Symbol	Unit	G350
	<b>GENERAL</b>	Standards		
	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	
	closed			-50 ... +70
	Storage temperature		°C	-60 ... +80
	Mechanical endurance		op. c.	5,000,000
	Weight		g	80
<b>AUXILIARY CIRCUIT</b>	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 terminals cover

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

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TECHNICAL DATA

## KNL95 - KNL1000

### BRA180, BRA400 Thermal overload relay

		Symbol	Unit	BRA180	BRA400
<b>GENERAL</b>	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	
<b>MAIN CIRCUIT</b>	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 $I_r$	P	W	2.1 ... 7.2	
	Terminal capacity		mm <sup>2</sup>	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	
<b>AUXILIARY CIRCUITS</b>	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	$I_e$	A	2.5	
	Rated operational current DC-13 110 V	$I_e$	A	1.1	
	Terminal capacity		mm <sup>2</sup>	max. 2.5	
	Conductor insulation stripping length		mm	9	
Screw			M3.5		
Screw head			PH1		
Tightening torque		Nm	1		

## KNL95 - KNL1000

### BRA180 THERMAL OVERLOAD RELAY

Setting ranges and maximum permitted back-up fuses

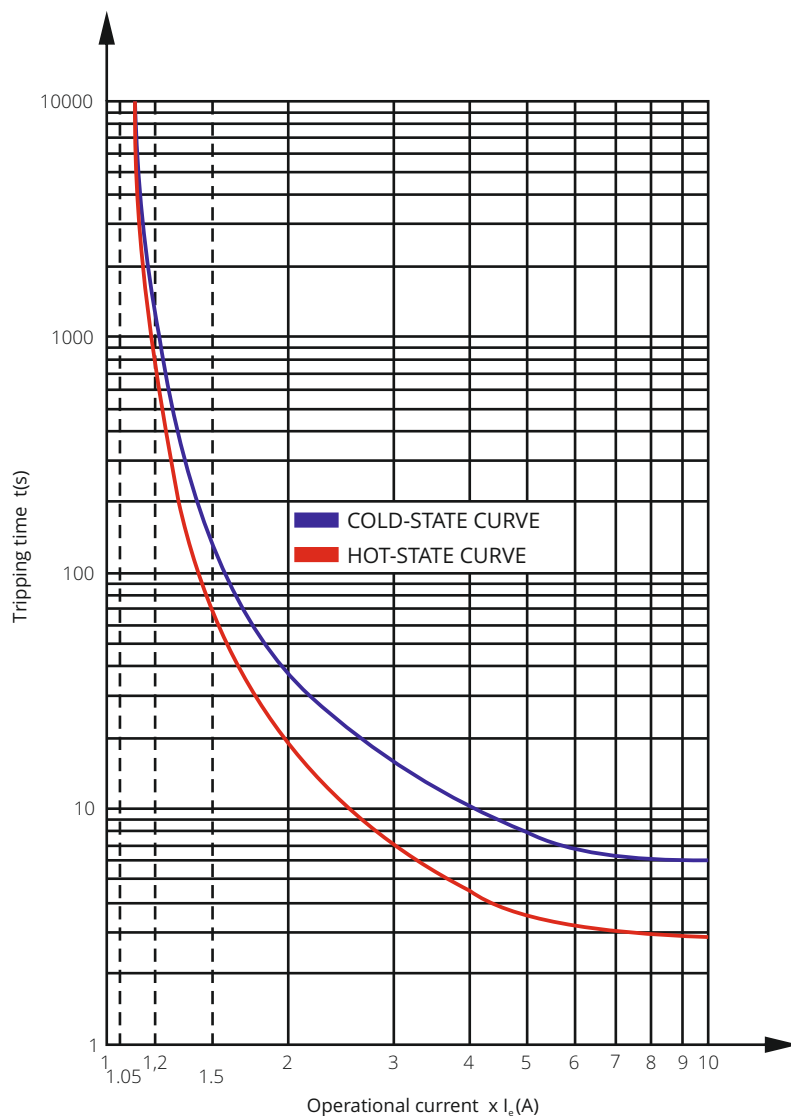
Setting range (A)	aM	Max. back-up fuse gL/gG (A)	gL/gG
60 - 100	100		160
75 - 125	125		200
90 - 150	160		250
120 - 200	200		315

### BRA400 THERMAL OVERLOAD RELAY

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

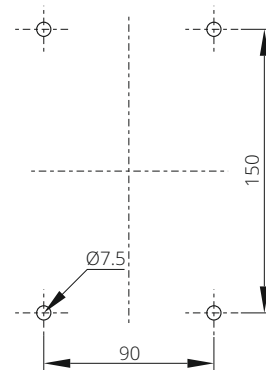
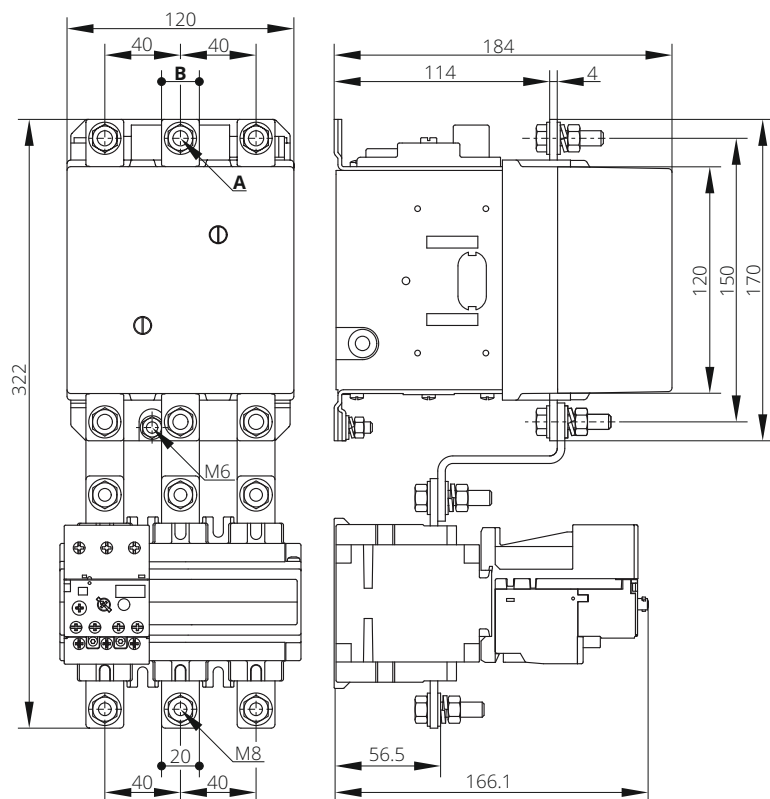


## KNL95 ... KNL180 - 3-pole

Contactor + thermal overload relay BRA180

## KNL95 ... KNL180 - drilling plan

3-pole

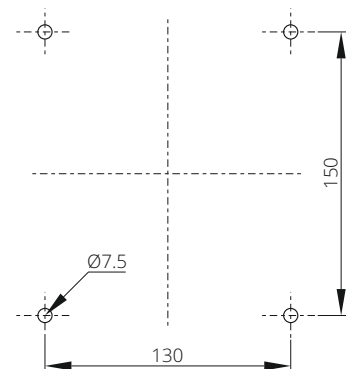
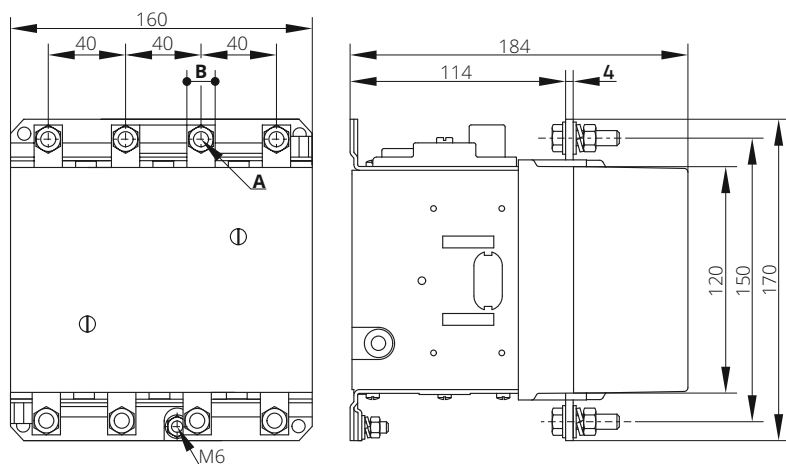


Type	A	B
KNL95, KNL115	M6	15
KNL145	M8	20
KNL180	M8	20

## KNL95 ... KNL180 - 4-pole

## KNL95 ... KNL180 - drilling plan

4-pole



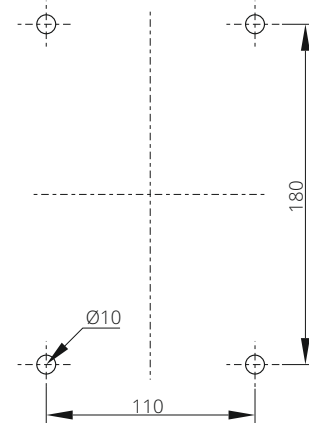
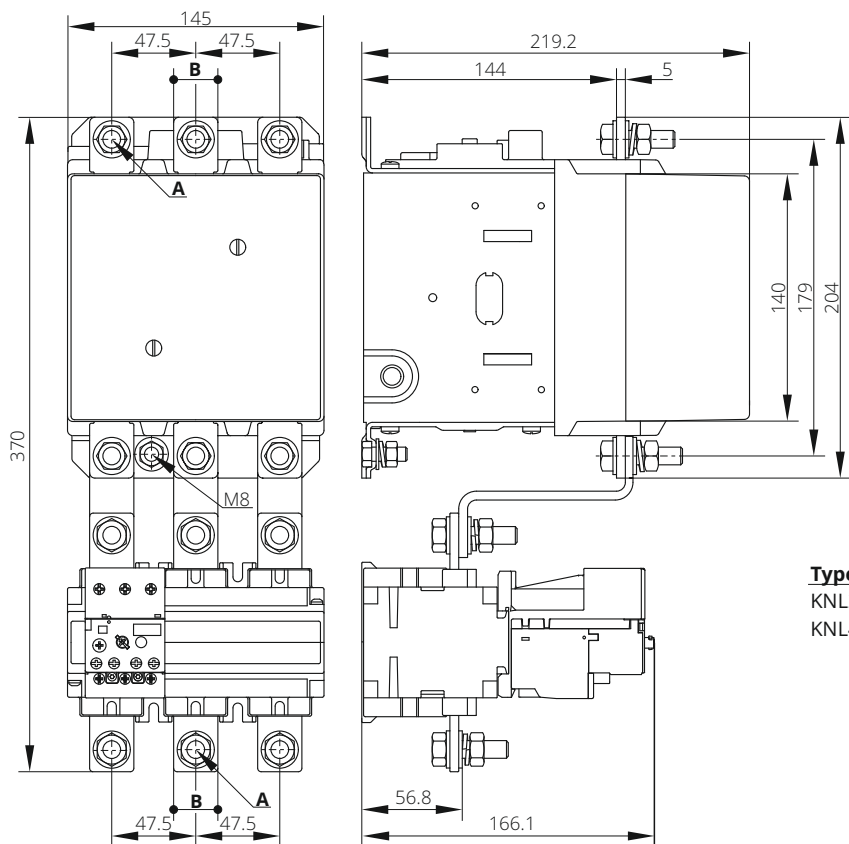
Type	A	B
KNL95, KNL115	M6	15
KNL145	M8	20
KNL180	M8	20

## KNL250, KNL400 - 3-pole

Contactor + thermal overload relay BRA400

## KNL250, KNL400 - drilling plan

3-pole

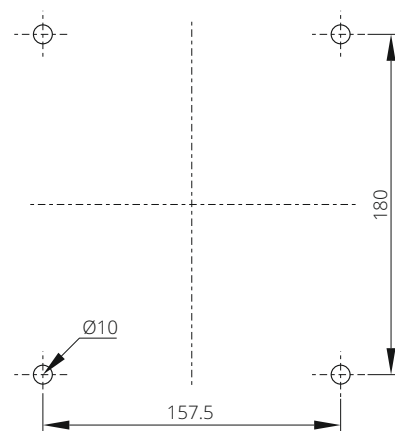
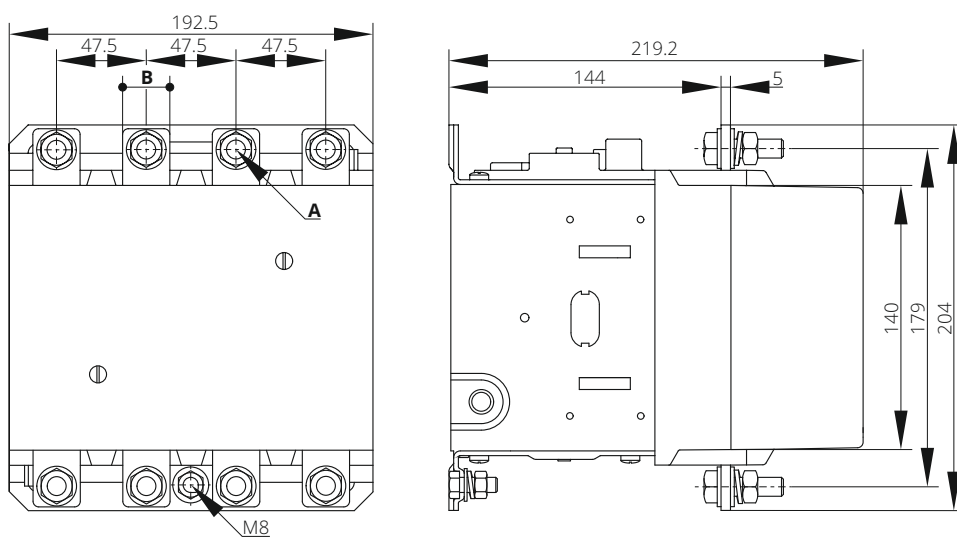


Type	A	B
KNL250	M10	20
KNL400	M10	25

## KNL250, KNL400 - 4-pole

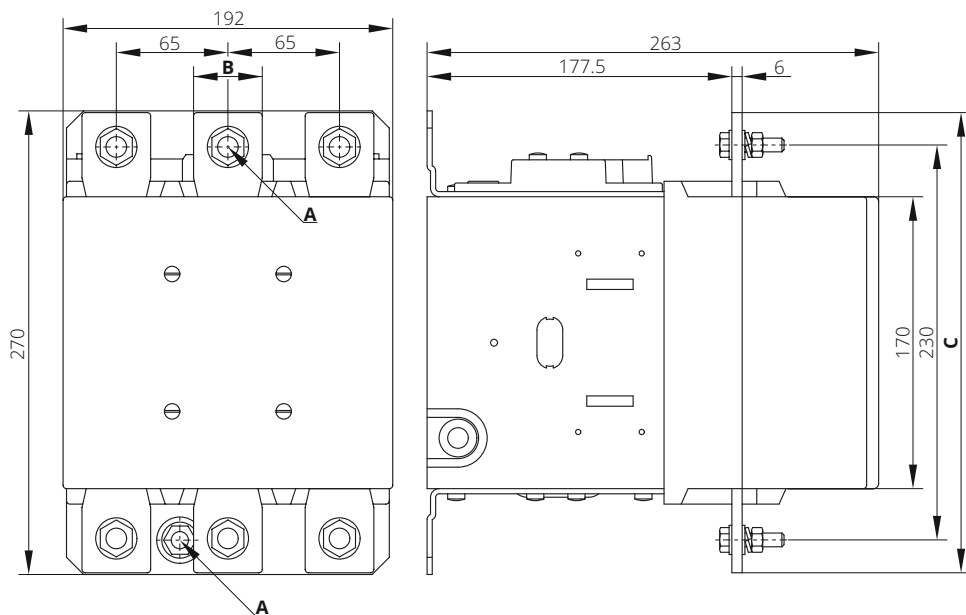
## KNL250, KNL400 - drilling plan

4-pole



Type	A	B
KNL250	M10	20
KNL400	M10	25

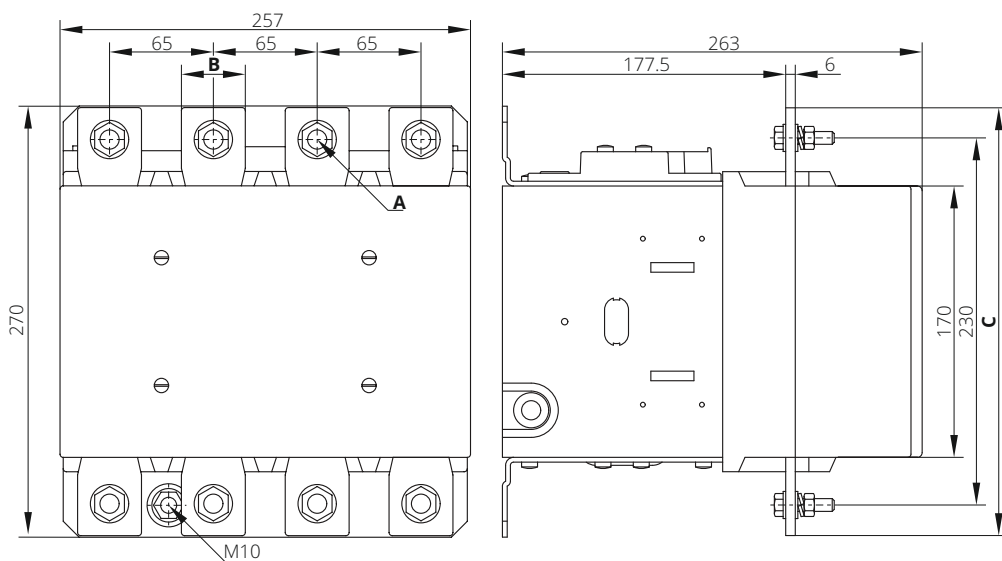
**KNL500, KNL630 - 3-pole**



**KNL500, KNL630 - drilling plan**  
3-pole

Type	A	B	C
KNL500	M10	35	265
KNL630	M12	40	270

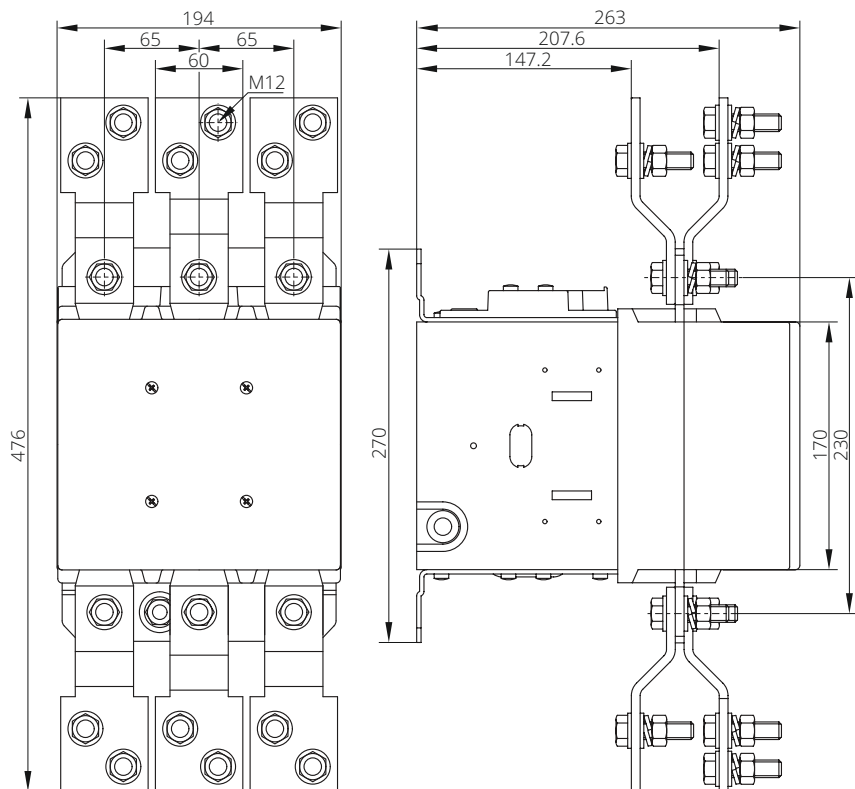
**KNL500, KNL630 - 4-pole**



**KNL500, KNL630 - drilling plan**  
4-pole

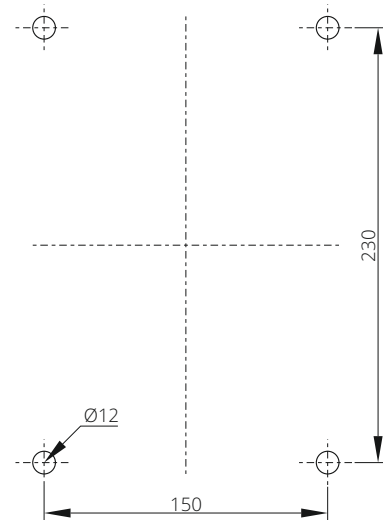
Type	A	B	C
KNL500	M10	35	265
KNL630	M12	40	270

**KNL630/1000 - 3-pole**

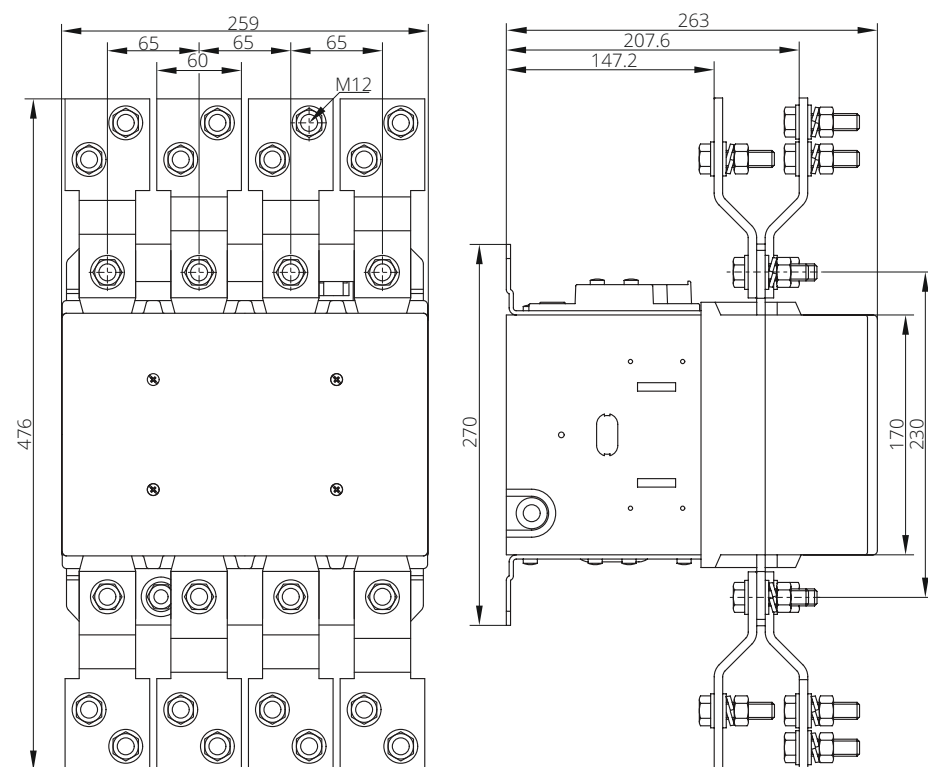


**KNL630/1000 - drilling plan**

3-pole



**KNL630/1000 - 4-pole**



**KNL630/1000 - drilling plan**

4-pole

