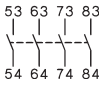
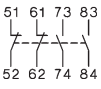
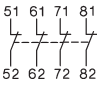
Mini Contactor Relays 4-pole — AC Operated

Ratings AC15 230V A	400V A	Therm. Rated Current I_{th} A	Contacts 2) NO	NC	Distinc. Number acc. to EN50011	Additional Contact Blocks Type	Type	Coil voltage 1) 24 24V 50/60Hz 0; 230 220-230V 50Hz 3; 400 380-400V 50Hz 4 — Order No	Pack pcs.	Weight kg/pc.
4-pole, With Screw Terminals										
3	2	10	4	-	40E	1 HK..	**K1-07D40** . . .	**LA 100 77.**	10	0,16
3	2	10	3	1	31E	1 HK..	**K1-07D31** . . .	**LA 100 78.**	10	0,16
3	2	10	2	2	22E	1 HK..	**K1-07D22** . . .	**LA 100 79.**	10	0,16

Auxiliary Contact Blocks For Contactor Relays

Ratings AC15 230V A	400V A	Thermal Rated Current A	Contacts 2) NO	NC	Type	Order No	Pack pcs.	Weight kg/pc.
3	2	10	1	1	**HK11**	**LA 190 154**	10	0,04
			-	2	**HK02**	**LA 190 155**		
			2	-	**HK20**			
			4	-	**HK40**	**LA 190 156**		
			2	2	**HK22**	**LA 190 153**		
			-	4	**HK04**			

Aux. Contact Blocks	HK11	HK02	HK20	HK40	HK22	HK04
Wiring Diagrams						

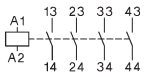
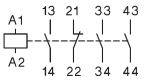
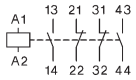
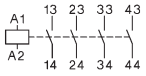
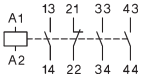
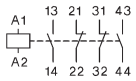
Distinc. Number according to EN50011
for Contactor Relay with Auxiliary Contact Block

K1-07D40	**51E**	**42E**	**60E**	**80E**	**62E**	**44E**
K1-07D31	42Y	33Y	51Y	71Y	53Y	35Y
K1-07D22	33Y	24Y	42Y	62Y	44Y	26Y

Preferable combinations with distinctive letter "E" according to DIN EN 50011

1) Other coil voltages see page 12
2) Contacts suitable for electronic circuits, according to EN947-5-4 for rated voltage 24V DC (test ratings 17V DC, 5mA) Positively guided contacts

DC Solenoid Operated

Type	Coil voltage [1]		Contacts [2]			Additional			
	24 24V= DC **5**				Distinc.	Contact			
	48 48V= DC **6**				Number	Blocks			
	24VS 24V= DC				acc.				
	↓ w. protect. [2] ↓				to		Pack	Weight	
	Order No		NO	NC	EN50011	Type	pcs.	kg/pc.	Wiring Diagrams
4-pole, With Screw Terminals, Coil 2,5W									
	**K1-07D40= ...**	**LA 100 77.**	4	-	40E	1 HK..	10	0,19	
	K1-07D31= ...	**LA 100 78.**	3	1	31E	1 HK..	10	0,19	
	K1-07D22= ...	**LA 100 79.**	2	2	22E	1 HK..	10	0,19	
4-pole, With Screw Terminals, Coil 1,5W, 19 to 30V DC with suppressor [3]									
	**K1-07D40= 24VR**		4	-	40E	-	10	0,20	
	K1-07D31= 24VR		3	1	31E	-	10	0,20	
	K1-07D22= 24VR		2	2	22E	-	10	0,20	

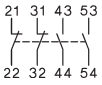
1) Other coil voltages on request
2) Contacts suitable for electronic circuits, according to EN947-5-4 for rated voltage 24V DC (test ratings 17V DC, 5mA) Positively guided contacts
3) with integrated coil suppressor (Transient Voltage Suppressor Diode)

Mini Contactors AC Operated

Power Ratings AC2, AC3 380V 400V 415V kW		Rated Current AC1 690V A	Aux. Contacts[2] Built-in NO	NC	Additional Type	Type	Coil voltage[1] 24 24V 50/60Hz 0 / 230 220-230V 50Hz 3 / 24VS 24V 50/60Hz w. protection[3] / 230VS 220-230V 50Hz w. protection[3] Order No	Pack pcs.	Weight kg/pc.
3-pole, With Screw Terminals									
4	4	20	1	-	1 HKM..	**K1-09D10 . . .**	**LA 100 91.**	10	0,16
5,5	5,5	20	1	-	1 HKM..	**K1-12D10 . . .**	**LA 101 21.**	10	0,16
4	4	20	-	1	1HK..	**K1-09D01 . . .**	**LA 100 92.**	10	0,16
5,5	5,5	20	-	1	1HK..	**K1-12D01 . . .**	**LA 101 22.**	10	0,16
4-pole, With Screw Terminals									
4	4	20	-	-	1HK..	**K1-09D00-40 . . .**	**LA 100 94.**	10	0,16
5,5	5,5	20	-	-	1HK..	**K1-12D00-40 . . .**	**LA 101 24.**	10	0,16

Auxiliary Contact Blocks for Contactors K1-..

Ratings AC15 230V A	400V A	Thermal Rated Current A	Contacts[2] NO	NC	Type	Order No	Pack pcs.	Weight kg/pc.
3	2	10	1	1	**HKM11**	**LA 190 151**	10	0,04
3	2	10	-	2	**HKM02**	**LA 190 152**	10	0,04
3	2	10	2	2	**HKM22**	**LA 190 150**	10	0,04
3	2	10	2	-	**HKM20**	**LA 190 143**	10	0,04

Aux. Contact Blocks	HKM11	HKM02	HKM22
Wiring Diagrams			
Contactors with Auxiliary Contact Block Contacts according to EN50012 K1-..D10	**21**	**12**	**32**

Contactors with Auxiliary Contact Block according to DIN EN50005 see page 8				HK11	HK02	HK40	HK22
K1-..D01	-	-	-	12	03	41	23
K1-..D00-40	-	-	-	11	02	40	22

Prefer combinations according to EN50012

Suppressor Units for Contactors K1-..

Voltage Range V		Type	Order No	Pack pcs.	Weight kg/pc.
12 - 48V AC/DC	1600nF / 22 Ohm	**RC-K1 24**	**LA 190 159**	10	0,01
48 - 127V AC/DC	680nF / 270 Ohm	**RC-K1 110**	**LA 190 162**	10	0,01
110 - 250V AC/DC	220nF / 2200 Ohm	**RC-K1 230**	**LA 190 158**	10	0,01

1) Other coil voltages see page 12
2) Contacts suitable for electronic circuits, according to EN947-5-4 for rated voltage 24V DC (test ratings 17V DC, 5mA) Positively guided contacts
3) with built-in coil suppressor (varistor)

DC Solenoid Operated

Type

Coil voltage [1]
24 24V= DC **5**
24VS 24V= DC B
with protection [3]
Order No

Aux. Contacts [2]
Built in NO NC
Additional

Additional Overload Relay see page102 Type

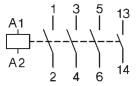
Pack pcs.

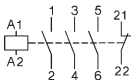
Weight kg/pc.

Wiring Diagrams

3-pole, With Screw Terminals, Coil 2,5W

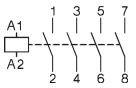
K1-09D10= . . .	**LA 100 91.**	1	-	1 HKM..	U12/16..K1	1	0,19
K1-12D10= . . .	**LA 101 21.**	1	-	1 HKM..	U12/16..K1	1	0,19
K1-09D01= . . .	**LA 100 92.**	-	1	1 HK..	U12/16..K1	1	0,19
K1-12D01= . . .	**LA 101 22.**	-	1	1 HK..	U12/16..K1	1	0,19





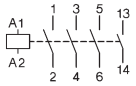
4-pole, With Screw Terminals, Coil 2,5W

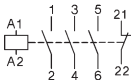
K1-09D00-40= . . .	**LA 100 94.**	-	-	1 HK..	U12/16..K1	1	0,19
K1-12D00-40= . . .	**LA 101 24.**	-	-	1 HK..	U12/16..K1	1	0,19



3-pole, With Screw Terminals, Coil 1,5W, 19 to 30V DC with suppressor [3]

K1-09D10=24VR		1	-	-	U12/16..K1	1	0,20
K1-09D01= 24VR		-	1	-	U12/16..K1	1	0,20





1) Other coil voltages on request
2) Contacts suitable for electronic circuits, according to EN947-5-4 for rated voltage 24V DC (test ratings 17V DC, 5mA) Positively guided contacts
3) with integrated coil suppressor (Transient Voltage Suppressor Diode)

Mini Contactors

Data according to IEC 947-4-1, VDE 0660, EN 60947-4-1

Main Contacts		Type	K1-09D..	K1-09F..	K1-09L..	K1-12D..
Rated insulation voltage U_i		V AC	690 [1]	690 [1]	690 [2]	690 [1]
Making capacity I_{eff}	at U_e = 690V AC	A	165	165	165	165
Breaking capacity I_{eff}	400V AC	A	100	100	100	100
cosφ = 0,65	500V AC	A	90	90	90	90
	690V AC	A	80	80	80	80
Utilization category AC1						
Switching of resistive load						
Rated operational current I_e (=I_{th}) at 40°C, open		**A**	**20**	**16**	**16**	**20**
Rated operational power of three-phase resistive loads	230V	kW	7,9	6	6	7,9
50-60Hz, cosφ = 1	240V	kW	8,3	6,5	6,5	8,3
	400V	kW	13,8	11	11	13,8
	415V	kW	14,3	11,5	11,5	14,3
Rated operational current I_e (=I_{the}) at 60°C, enclosed		A	16	12	12	16
Rated operational power of three-phase resistive loads	230V	kW	6,3	4,5	4,5	6,3
50-60Hz, cosφ = 1	240V	kW	6,7	5	5	6,7
	400V	kW	11	8	8	11
	415V	kW	11,5	8,5	8,5	11,5
Minimum cross-section of conductor at load with I_e (=I_{th})		mm^2	2,5	2,5	-	2,5
Utilization category AC2 and AC3						
Switching of three-phase motors						
Rated operational current I_e	220V	A	12	12	12	15
open and enclosed	230V	A	11,5	11,5	11,5	14,5
	240V	A	11	11	11	14
	380-400V	**A**	**9**	**9**	**9**	**12**
	415-440V	A	8	8	8	11
	500V	A	7	7	7	9
	660-690V	A	5	5	5	6,5
Rated operational power of three-phase motors	220-240V	kW	3	3	3	4
50-60Hz	**380-440V**	**kW**	**4**	**4**	**4**	**5,5**
	500-690V	kW	4	4	4	5,5
Utilization category AC4						
Switching of squirrel cage motors, inching						
Rated operational current I_e	220V	A	12	12	12	15
open and enclosed	230V	A	11,5	11,5	11,5	14,5
	240V	A	11	11	11	14
	380-400V	**A**	**9**	**9**	**9**	**12**
	415-440V	A	8	8	8	11
	500V	A	7	7	7	9
	660-690V	A	5	5	5	6,5
Rated operational power of three-phase motors	220-240V	kW	3	3	3	4
50-60Hz	**380-440V**	**kW**	**4**	**4**	**4**	**5,5**
	500-690V	kW	4	4	4	5,5

1) Suitable at 690V for: earthed-neutral systems, overvoltage category I to IV, pollution degree 3 (standard-industry): Uimp = 8kV.
Data for other conditions on request.
2) Suitable at 690V for pollution degree 2, Uimp = 6kV.
Pollution degree 3 U_i = 690V non-tracking of the printed circuit CTI ≥600
Pollution degree 3 U_i = 500V non-tracking of the printed circuit CTI ≥400
Pollution degree 3 U_i = 400V non-tracking of the printed circuit CTI ≥100

Mini Contactors

Data according to IEC 947-4-1, VDE 0660, EN 60947-4-1

Main Contacts			Type	K1-09D..	K1-09F..	K1-09L..	K1-12D..
Utilization category DC1							
Switching of resistive load	1 pole	24V	A	20	16	16	20
Time constant L/R ≤1ms		60V	A	20	16	16	20
Rated operational current I_e		110V	A	5	5	5	5
		220V	A	0,6	0,6	0,6	0,6
	3 poles in series	24V	A	20	20	20	20
		60V	A	20	20	20	20
		110V	A	20	20	20	20
		220V	A	16	16	16	16
Utilization category DC3 and DC5							
Switching of shunt motors	1 pole	24V	A	20	16	16	20
and series motors		60V	A	5	5	5	5
Time constant L/R ≤15ms		110V	A	1	1	1	1
Rated operational current I_e		220V	A	0,15	0,15	0,15	0,15
	3 poles in series	24V	A	20	16	16	20
		60V	A	20	16	16	20
		110V	A	20	16	16	20
		220V	A	2	2	2	2
Maximum ambient temperature							
Operation		open	°C	-40 to +60 (+90) [1]			
		enclosed	°C	-40 to +40			
with thermal overload relay		open	°C	-25 to +60			
		enclosed	°C	-25 to +40			
Storage			°C	-50 to +90			
Short circuit protection							
for contactors without thermal overload relay							
Coordination-type "1" according to IEC 947-4-1							
Contact welding without hazard of persons							
max. fuse size		gL (gG)	A	40	40	40	40
Coordination-type “2” according to IEC 947-4-1							
Light contact welding accepted							
max. fuse size		gL (gG)	A	25	25	25	25
Contact welding not accepted							
max. fuse size		gL (gG)	A	10	10	10	10
For contactors with thermal overload relay the device with the smaller admissible backup fuse (contactor or thermal overload relay) determines the fuse size.							
Cable cross-sections							
for contactors without thermal overload relay							
main connector		solid or stranded	mm²	0,5 - 2,5	Fast on	Solder connector	0,5 - 2,5
		flexible	mm²	0,5 - 2,5	1x 6,3 x 0,8	Ø 1,15	0,5 - 2,5
		flexible with multicore cable end	mm²	0,5 - 1,5	or		0,5 - 1,5
Cables per clamp				2	2x 2,8 x 0,8	-	2
		solid or stranded	AWG	18 - 14			18 - 14
Frequency of operations z		without load	1/h	10000	10000	10000	10000
Contactors without thermal overload relay		AC3, I_e	1/h	600	600	600	700
		AC4, I_e	1/h	120	120	120	150
		DC3, I_e	1/h	600	600	600	700
Mechanical life	AC operated		S x 10^6	5	5	5	5
	DC operated		S x 10^6	15	15	15	15
Short time current		10s-current	A	96	96	96	120
Power loss per pole		at I_e/AC3 400V	W	0,15	0,15	0,15	0,25
Resistance to shock according to IEC 68-2-27							
Shock time 20ms sine-wave							
AC operated		NO	g	5	5	5	5
		NC	g	5	5	5	5
DC operated		NO	g	8	8	8	8
		NC	g	6	6	6	6

1) With reduced control voltage range 0,9 up to 1,0 x U_s and with reduced rated current I_e /AC1according to I_e /AC3

Mini Contactors

Data according to IEC 947-5-1, VDE 0660, EN 60947-5-1

Auxiliary Contacts		Type	K1-07D.. K1-09D.. K1-12D..	K1-07D..= K1-09D..= K1-12D..=	K1-07D..= 24VR K1-09D..= 24VR	K1-09F..(=)	K1-07L..(=) K1-09L..(=)	HK..
Rated insulation voltage U_i		V AC	690 [1]	690 [1]	690 [1]	690 [1]	690 [2]	690 [1]
Thermal rated current I_{th} to 690V								
Ambient temperature	40°C	A	10	10	10	10	10	10
	60°C	A	6	6	6	6	6	6
Power loss per pole	at I_{th}	W	0,5	0,5	0,5	0,5	0,5	0,5
Utilization category AC15								
Rated operational current I_e	220-240V	A	3	3	3	3	3	3
	380-415V	A	2	2	2	2	2	2
	440V	A	1,6	1,6	1,6	1,6	1,6	1,6
	500V	A	1,2	1,2	1,2	1,2	1,2	1,2
	660-690V	A	0,6	0,6	0,6	0,6	0,6	0,6
Utilization category DC13								
Rated operational current I_e	60V	A	2	2	2	2	2	2
	110V	A	0,4	0,4	0,4	0,4	0,4	0,4
	220V	A	0,1	0,1	0,1	0,1	0,1	0,1
Maximum ambient temperature								
Operation	open	°C			-40 to +60 (+90) [3]			
	enclosed	°C			-40 to +40			
Storage		°C			-40 to +90			
Short circuit protection								
short-circuit current 1kA, contact welding not accepted								
max. fuse size	gL (gG)	A	20	20	20	20	20	20
For contactors with thermal overload relay the device with the smaller admissible control fuse (contactor or thermal overload relay) determines the fuse size.								
Power consumption of coils								
AC operated	inrush	VA	25	-	-	25	25	-
	sealed	VA	4 - 5	-	-	4 - 5	4 - 5	-
		W	1,2	-	-	1,2	1,2	-
DC operated	inrush	W	-	2,5	1,5	2,5	2,5	-
	sealed	W	-	2,5	1,5	2,5	2,5	-
Operation range of coils					19 - 30V DC			
in multiples of control voltage U_s			0,85 - 1,1	0,8 - 1,1		0,85 - 1,1	0,85 - 1,1	-
Switching time at control voltage U_s ±10% [4] [5]								
AC operated	make time	ms	15 - 25	-	-	15 - 25	15 - 25	-
	release time	ms	8 - 25	-	-	8 - 25	8 - 25	-
	arc duration	ms	10 -15	-	-	10 -15	10 -15	-
DC operated	make time	ms	-	15 - 19	15 - 19	15 - 19	15 - 19	-
	release time	ms	-	8 - 25	8 - 25	8 - 25	8 - 25	-
	arc duration	ms	-	10 -15	10 -15	10 -15	10 -15	-
Cable cross-section								
all connectors	solid	mm²	0,5 - 2,5	0,5 - 2,5	0,5 - 2,5	Fast on	Solder connector	0,5 - 2,5
	flexible	mm²	0,5 - 2,5	0,5 - 2,5	0,5 - 2,5	1x 6,3 x 0,8	Ø 1,15	0,5 - 2,5
	flexible with multicore cable end	mm²	0,5 - 1,5	0,5 - 1,5	0,5 - 1,5	or 2x 2,8 x 0,8		0,5 - 1,5
Clamps per pole			2	2	2	-	-	2
	solid or stranded	AWG	18 - 14	18 - 14	18 - 14			18 - 14

1) Suitable at 690V for: earthed-neutral systems, overvoltage category I to IV, pollution degree 3 (standard-industry): Uimp = 8kV.
Data for other conditions on request.
2) Suitable at 690V for pollution degree 2, Uimp = 6kV.
Pollution degree 3 U_i = 690V non-tracking of the printed circuit CTI ≥600
Pollution degree 3 U_i = 500V non-tracking of the printed circuit CTI ≥400
Pollution degree 3 U_i = 400V non-tracking of the printed circuit CTI ≥100
3) With reduced control voltage range 0,9 up to 1,0 x U_s and with reduced thermal rated current I_{th} to I_e /AC15
4) Summary switching time = release time + arc duration
5) Release time of NC make time of NO increase when suppressor units for voltage peak protection are used (Varistor, RC-units, Diode units).