

Capacitor Switching Contactors



Quality made in 

D385E201

**Contactors
Motor-Starter**



Mini-Contactors
Contactors
Overload Relays
Capacitor Switching Contactors
Motor-Starters
Modular Contactors

 **Catalogue D677E..**

**Circuit
Breakers**



M4-32T... up to 32A
M4-32R... up to 32A
M4-63R... up to 63A
M4-100R... up to 100A

 **Catalogue D795E..**

Switches



On- Off Switches
Changeover Switches
Motor Switches
Step Switches
Main Switches
Modular Switches
Key Operated Switches

 **Catalogue D371E..**

**Main Switch-
es**



Emergency Off
Main Switches
On-Off-Switches
Add-On-Module

 **Catalogue D656E..**

**Capacitor Switching
Contactors**



Contactors
for reactive
and non reactive
capacitor banks

 **Catalogue D385E..**

**Manual
Motorstarter**



MU25A up to 25A

Auxiliary Contact Blocks
Trip Alarm Auxiliary Switches
Busbar Connectors
Enclosure

 **Catalogue D509E..**

Push Buttons



Push Buttons
Emergency Stop
Key Operated Rotary Switches
Rotary Knobs
Illuminated Push Buttons
Assembled Stations

 **Catalogue D580E..**

**Modular-Contac-
tors**



Modular Contactors
Accessories
Emergency Off Switches
Main Switches
On-Off Switches
Control Switches

 **Catalogue D681E..**

**Low Voltage-
Control Gear**



Contactors
D.O.L. Starters
Overload Relays
Manual Motor Starters
Main Switches
Circuit Breakers
Cam Switches
Push Buttons

 **Catalogue D651E..**

**Switch Disconnectors
for Photovoltaic**



Emergency Off
Main Switches
On-Off-Switches

 **Catalogue D836E..**



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Capacitor Switching Contactors

for use with reactive or non-reactive capacitor banks



Rated Operational Power at 50/60Hz

Ambient Temperature

50°C	60°C
380V 415V 660V	380V 415V 660V
400V 440V 690V	400V 440V 690V
kVAr	kVAr

Aux.
Contacts
Built-in Add.
NO NC pcs.

Type

Coil voltage ¹⁾
230 220-240V 50Hz
Pack Weight
pcs. kg/pc.

0-12,5	0-13	0-20	0-12,5	0-13	0-20	1	-	1 ²⁾	K3-18NK10 ...	1	0,34
0-12,5	0-13	0-20	0-12,5	0-13	0-20	-	1	1 ²⁾	K3-18NK01 ...	1	0,34
0-12,5	0-13	0-20	0-12,5	0-13	0-20	1	-	1 ²⁾	K3-18NBK10 ...	1	0,40
0-12,5	0-13	0-20	0-12,5	0-13	0-20	-	1	1 ²⁾	K3-18NBK01 ...	1	0,40
10-20	10,5-22	17-33	10-20	10,5-22	17-33	-	-	3 ³⁾	K3-24K00 ...	1	0,62
10-25	10,5-27	17-41	10-25	10,5-27	17-41	-	-	3 ³⁾	K3-32K00 ...	1	0,62
20-33,3	23-36	36-55	20-33,3	23-36	36-55	-	-	3 ³⁾	K3-50K00 ...	1	1,0
20-50	23-53	36-82	20-50	23-53	36-82	-	-	3 ³⁾	K3-62K00 ...	1	1,0
20-75 ⁴⁾	23-75 ⁴⁾	36-120 ⁴⁾	20-60	23-64	36-100	-	-	3 ³⁾	K3-74K00 ...	1	1,0
33-80	36-82	57-120	33-75	36-77	57-120	-	-	6 ⁵⁾	K3-90K00 ... / VS ⁷⁾	1	2,3
33-100 ⁶⁾	36-103 ⁶⁾	57-148 ⁶⁾	33-90 ⁶⁾	36-93 ⁶⁾	57-148 ⁶⁾	-	-	6 ⁵⁾	K3-115K00 ... / VS ⁷⁾	1	2,3

Specification: Contactors K3-..K are suitable for switching low-inductive and low loss capacitors in capacitor banks (IEC70 and 831, VDE 0560) without and with reactors.

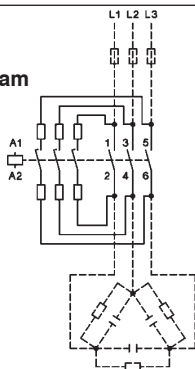
Capacitor switching contactors are fitted with early make contacts and damping resistors, to reduce the value of make current <70 x I_e.

Operating Conditions: Capacitor switching contactors are protected against contact welding for a prospective making current of 200 x I_e.

Technical Data acc. to IEC 947-4-1, IEC 947-5-1, EN 60947-4-1, EN 60947-5-1, VDE 0660

Type		K3-18NK	K3-18NBK ⁸⁾	K3-24K	K3-32K	K3-50K	K3-62K	K3-74K	K3-90K	K3-115K
Max. frequency of operations z	1/h	120	120	120	120	120	120	80	80	80
Contact life non reactive cap. banks	S x 10 ³	250	250	150	150	150	150	120	120	120
reactive cap. banks	S x 10 ³	400	400	300	300	300	300	200	200	200
Rated operational current I_e	at 50°C A	0-18	0-18	14-28	14-36	30-48	30-72	30-108	50-115	50-144
AC6b	at 60°C A	0-18	0-18	14-28	14-36	30-48	30-72	30-87	50-108	50-130
Rated operational current I _{th}	at 50°C A	32	45	45	60	100	110	120	155	190
AC1	at 60°C A	32	40	40	55	90	100	110	145	170
Overload factor	at 50°C %	78	150	60	67	108	53	11	35	32
acc. to EN 61921: 30% min.	at 60°C %	78	122	43	53	88	39	26	34	31
Fuses gL (gG)	from / to A	35 / 63	35 / 63	50 / 80	63 / 100	80 / 160	125 / 160	160/200	160/200	160/250

Typical Circuit Diagram

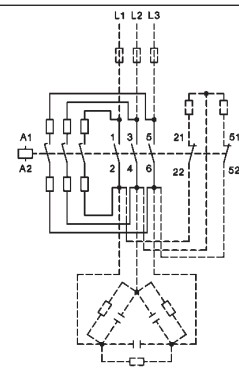


Wiring Diagram for Quick Discharge Resistors

Make sure that the current of the discharge resistors is not higher than the rated current (AC1) of the auxiliary contacts

Mounting instructions:

In the area of capacitor switching contactors, difficultly inflammable and self-extinguishing materials shall be used only, because abnormal temperatures within the area of the resistor spirals cannot be excluded.



- 1) Coil voltage range and non-standard coil voltages see page 57
- 2) 1 HN.. or HA.. snap-on
- 3) 2HB.. for side mounting and 1 HN.. or HA.. snap-on
- 4) Consider the max. thermal current of the contactor K3-74A: I_{th} 130A
- 5) 2 HB.. on the left or right side and 4 HN.. or HA.. snap-on
- 6) Consider the min. cross-section of conductor at max. load
- 7) Type 230 for AC- and DC-operating 220-240V 50/60Hz and 220V DC (with integrated coil suppressor)
Type 230VS for AC-operating 220-240V 50Hz (with integrated coil suppressor)
- 8) Cable cross sections: 2,5 - 16mm²

Contactors

for use with reactive capacitor banks

	Rated Operational Power at 50/60Hz Ambient Temperature						Aux. Contacts			Type	Coil Voltage 220-240V 50Hz	Pack pcs.	Weight kg/pc.
	50°C			60°C			Built-in	Add.					
	380V 400V kVAr	415V 440V kVAr	660V 690V kVAr	380V 400V kVAr	415V 440V kVAr	660V 690V kVAr							
	5 9	5,5 9,5	8 15	5 9	5,5 9,5	8 15	1 1	- -	4 ¹⁾ 4 ¹⁾	K3-10ND10 ... K3-14ND10 ...	1 1	0,23 0,23	
	12,5 13	13 14	20 22	12,5 13	13 14	20 22	1 1	- -	4 ¹⁾ 4 ¹⁾	K3-18ND10 ... K3-22ND10 ...	1 1	0,23 0,23	
	20 25 27,5	22 27 30	33 41 48	20 25 27,5	22 27 30	33 41 48	- - -	- - -	6 ²⁾ 6 ²⁾ 6 ²⁾	K3-24A00 ... K3-32A00 ... K3-40A00 ...	1 1 1	0,48 0,48 0,48	
	33,3 50 75 ³⁾	36 53 75 ³⁾	55 82 100	33,3 50 60	36 53 64	55 82 100	- - -	- - -	6 ²⁾ 6 ²⁾ 6 ²⁾	K3-50A00 ... K3-62A00 ... K3-74A00 ...	1 1 1	0,85 0,85 0,85	
	80 100 ⁵⁾	82 103 ⁵⁾	120 148 ⁵⁾	75 90 ⁵⁾	77 93 ⁵⁾	120 148 ⁵⁾	- -	- -	9 ⁴⁾ 9 ⁴⁾	K3-90A00 ... / VS ⁷⁾ K3-115A00 ... / VS ⁷⁾	1 1	2,2 2,2	

Auxiliary Contact Blocks

	Rated Operational Current				Contacts		Type	Pack	Weight
	AC15 230V A	400V A	AC1 690V A	For Contactors	 NO	 NC			
	6	4	25	K3-10.. to K3-115..	-	1	HA01	10	0,03
	3	2	10	K3-24.. to K3-115..	1	1	HB11	10	0,02
	3	2	10	for side mounting	-	2	HB02	10	0,02
	3	2	10	K3-10.. to K3-115..	1	-	HN10	10	0,02
3	2	10	K3-10.. to K3-115..	-	1	HN01	10	0,02	

Suffix to contactor type e.g. K3-18NK10 24	for contactor-Type K3-10.. to K3-74..						Suffix to contactor type z.B.: K3-90K00 230	for contactor-Type K3-90.. to K3-115..					
	Voltage Marking		Rated Control Voltage U _s					Voltage Marking		Rated Control Voltage U _s			
	at the coil for		range for 50Hz		for 60Hz			at the coil for		range for 50Hz		for 60Hz	
	50Hz	for 60Hz	min.	max.	min.	max.		50/60Hz	DC	min.	max.	min.	max.
	V	V	V	V	V	V		V	V	V	V	V	V
24	24	24	22	24	24	27	24	24	24	22	24	22	24
48	48	48	44	48	48	52	48	48	48	44	48	44	48
110	110	110-120	100	110	110	122	110	110-120	110	110	120	110	120
180	180-210	200-240	180	210	200	240	200	200-220	200	200	220	200	220
230	220-240	230-264	220	240	230	264	230	220-240	220	220	240	220	240
400	380-415	400-440	380	415	400	460	400	380-415	-	380	415	380	415

1) 4 HN.. or HA.. snap-on

2) 2 HB.. on the left or right side and 4 HN.. or HA.. snap-on

3) Consider the max. thermal current: I_{th} 130A

7) Type 230 for AC- and DC-operating 220-240V 50/60Hz and 220V DC (with integrated coil suppressor)

Type 230VS for AC-operating 220-240V 50Hz (with integrated coil suppressor)

4) 2 HB.. on the left or right side and 7 HN.. or HA.. snap-on

5) Consider the min. cross-section of conductor at max. load

Capacitor Switching Contactors

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

Main Contacts	Type	K3-18N(B)K	K3-24K	K3-32K	K3-50K	K3-62K	K3-74K	K3-90K	K3-115K
Utilization category AC6b Switching of non-reactive and reactiv 3-phase capacitor banks Ambient temperature ≤50°C Rated operational current I _e									
	690V A	0-18	14-28	14-36	30-48	30-72	30-108 ¹⁾	50-115	50-144 ²⁾
Rated operational power	220-240V kVAr	0-7	5-11	5-14	12-20	12-28	12-33	20-45	20-55 ²⁾
	380-400V kVAr	0-12,5	10-20	10-25	20-33,3	20-50	20-75 ¹⁾	33-80	33-100 ²⁾
	415-440V kVAr	0-13	10,5-22	10,5-27	23-36	23-53	23-75 ¹⁾	36-82	36-103 ²⁾
	500V kVAr	0-15	12-25	12-30	26-40	26-60	26-75	43-100	43-120 ²⁾
	525V kVAr	0-15	12-25	12-32	26-43	26-64	26-80	45-105	45-125 ²⁾
	660-690V kVAr	0-20	17-33	17-41	36-55	36-82	36-120	57-120	57-148 ²⁾
	750V kVAr	-	-	-	-	-	-	65-130	65-165 ²⁾
	1000V kVAr	-	-	-	-	-	-	85-150	85-180 ²⁾
Ambient temperature ≤60°C Rated operational current I _e									
	690V A	0-18	14-28	14-36	30-48	30-72	30-87	50-108	50-130 ²⁾
Rated operational power	220-240V kVAr	0-7	5-11	5-14	12-20	12-28	12-30	20-40	20-50 ²⁾
	380-400V kVAr	0-12,5	10-20	10-25	20-33,3	20-50	20-60	33-75	33-90 ²⁾
	415-440V kVAr	0-13	10,5-22	10,5-27	23-36	23-53	23-64	36-77	36-93 ²⁾
	500V kVAr	0-15	12-25	12-30	26-40	26-60	26-70	43-90	43-110 ²⁾
	525V kVAr	0-15	12-25	12-32	26-43	26-64	26-75	45-95	45-115 ²⁾
	660-690V kVAr	0-20	17-33	17-41	36-55	36-82	36-100	57-120	57-148 ²⁾
	750V kVAr	-	-	-	-	-	-	65-130	65-165 ²⁾
	1000V kVAr	-	-	-	-	-	-	85-150	85-180 ²⁾

Contactors

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

Main Contacts	Type	K3-10	K3-14K	K3-18(B)K	K3-22	K3-24	K3-32	K3-40	K3-50	K3-62	K3-74	K3-90	K3-115
Utilization category AC6b Switching of reactive capacitor banks Ambient temperature ≤50°C Rated operational current I _e													
	690V A	8	13	18	20	28	36	42	48	72	108 ¹⁾	115	144 ²⁾
Rated operational power	220-240V kVAr	2,9	5	7	7,5	11	14	16	20	28	33	45	55 ²⁾
	380-400V kVAr	5	9	12,5	13	20	25	27,5	33,3	50	75 ¹⁾	80	100 ²⁾
	415-440V kVAr	5,5	9,5	13	14	22	27	30	36	53	75 ¹⁾	82	103 ²⁾
	500V kVAr	6	11	15	17	25	30	36	40	60	75	100	125 ²⁾
	525V kVAr	6	11	15	17	25	32	36	43	64	80	105	125 ²⁾
	660-690V kVAr	8	15	20	22	33	41	48	55	82	120	120	148 ²⁾
	750V kVAr	-	-	-	-	-	-	-	-	-	-	130	165 ²⁾
	1000V kVAr	-	-	-	-	-	-	-	-	-	-	150	180 ²⁾
Ambient temperature ≤60°C Rated operational current I _e													
	690V A	8	13	18	20	28	36	42	48	72	87	108	130 ²⁾
Rated operational power	220-240V kVAr	2,9	5	7	7,5	11	14	16	20	28	30	40	50 ²⁾
	380-400V kVAr	5	9	12,5	13	20	25	27,5	33,3	50	60	75	90 ²⁾
	415-440V kVAr	5,5	9,5	13	14	22	27	30	36	53	64	77	93 ²⁾
	500V kVAr	6	11	15	17	25	30	36	40	60	70	90	110 ²⁾
	525V kVAr	6	11	15	17	25	32	36	43	64	75	95	115 ²⁾
	660-690V kVAr	8	15	20	22	33	41	48	55	82	100	120	148 ²⁾
	750V kVAr	-	-	-	-	-	-	-	-	-	-	130	165 ²⁾
	1000V kVAr	-	-	-	-	-	-	-	-	-	-	150	180 ²⁾

1) Consider the max. thermal current: I_{th} 130A

2) Consider the min. cross-section of conductor at max. load

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

Main Contacts		Type	K3-10	K3-14	K3-18	K3-22	K3-24	K3-32	K3-40	K3-50	K3-62	K3-74	K3-90	K3-115
Rated insulation voltage U_i ¹⁾		V AC	690	690	690	690	690	690	690	830	830	830	1000	1000
Rated operational current I_e ($=I_{th}$) at 40°C, open 690V		A	25	25	32	32	50	65	80	110	120	130	160	200
Maximum ambient temperature														
Operation		open °C	-40 to +60 (+90) ²⁾											
		enclosed °C												
Storage		°C	-50 to +90											
Short circuit protection														
Coordination-type „1“ acc. to IEC 947-4-1														
Contact welding without hazard of persons														
fuse size		from gL (gG) A	35	35	35	35	50	63	63	80	125	160	160	160
to		gL (gG) A 63	63	63	63	80	100	100	160	160	200	200	250	250
Cable cross-sections														
for contactors without thermal overload relay														
1 cable per clamp														
main connector		solid or stranded mm ²												
10 - 120														
		flexible mm ²												
25 - 95														
		flexible with multicore cable end mm ²												
10 - 95														
2 cables per clamp														
		solid or stranded mm ²												
		flexible mm ²												
Cables per clamp														
Screw / screw driver														
Tightening torque		Nm/lb.inch												
for main connector		solid AWG												
		flexible AWG												
Cables per clamp														
		solid AWG												
		flexible AWG												
Cables per clamp														
Mechanical life														
AC operated		S x 10 ⁶												
DC operated		S x 10 ⁶												
Short time current		10s-current A	96	120	144	176	184	240	296	360	504	592	680	880
Power loss														
per pole		at I_e /AC3 400V W	0,21	0,35	0,5	0,75	0,7	1,3	2	2,2	3,9	5,5	4,3	6,0
Auxiliary Contacts														
Rated insulation voltage U_i ¹⁾		V~												
Thermal rated current I_{th} to 690V														
Ambient temperature		40°C A												
		60°C A												
Utilization category AC15 220-240V A														
Rated operational		380-415V A												
current I_e		440V A												
		500V A												
		660-690V A												
Utilization category DC13 60V A														
Rated operational		110V A												
current I_e		220V A												

Short circuit protection

short-circuit current 1kA,
contact welding not accepted

max. fuse size gL (gG) A

1) Suitable at 690V for: earthed-neutral systems, overvoltage category I to IV, pollution degree 3 (standard-industry): $U_{imp} = 8kV$.

Data for other conditions on request.

2) With reduced control voltage range 0,9 up to $1,0 \times U_s$ and with reduced rated current I_e /AC1 according to I_e /AC3

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

Type			K3-10	K3-14	K3-18(B)	K3-22	K3-24	K3-32	K3-40	K3-50	K3-62	K3-74	K3-90	K3-115
Control Circuit														
Power consumption of coils														
AC operated	inrush	VA	33-45				90-115			140-165			190-280	
	sealed	VA	7-10				9-13			13-18			2,5-5	
		W	2,6-3				2,7-4			5,4-7			2,5-5	
DC operated	inrush	W	75				140			200			190-280	
	sealed	W	2				2			6			2,5-5	
Operation range of coils														
in multiples of control voltage U _s														
AC operated			0,85-1,1				0,85-1,1			0,85-1,1			0,85-1,1	
DC operated			0,8-1,1				0,8-1,1			0,8-1,1			0,8-1,1	
Switching time														
at control voltage U _s ± 10% ^{1) 2)}														
AC operated	make time	ms	8-16				10-25			12-28			20-35	
	release time	ms	5-13				8-15			8-15			35-50	
	arc duration	ms	10-15				10-15			10-15			10-15	
DC operated	make time	ms	8-12				10-20			12-23			20-35	
	release time	ms	8-13				10-15			10-18			35-50	
	arc duration	ms	10-15				10-15			10-15			10-15	
Cable cross-section														
Auxiliary connector	solid	mm ²	0,75-6				-			-			-	
	flexible	mm ²	1-4				-			-			-	
	flexible with multicore cable end	mm ²	0,75-4				-			-			-	
Magnet coil	solid	mm ²	0,75-2,5				0,75-2,5			0,75-2,5			0,75-2,5	
	flexible	mm ²	0,5-2,5				0,5-2,5			0,5-2,5			0,5-2,5	
	flexible with multicore cable end	mm ²	0,5-1,5				0,5-1,5			0,5-1,5			0,5-1,5	
Clamps per pole			2				2			2			2	
Screw / screw driver			M3,5 / Pz2				M3,5 / Pz2			M3,5 / Pz2			M3,5 / Pz2	
Tightening torque			Nm/lb.inch				0,8-1,4 / 7-12			0,8-1,4 / 7-12			0,8-1,4 / 7-12	
Auxiliary connector	solid	AWG	18 - 10-				-			-			-	
	flexible	AWG	18 - 10				-			-			-	
Magnet coil	solid	AWG	14 - 12				14 - 12			14 - 12			14 - 12	
	flexible	AWG	18 - 12				18 - 12			18 - 12			18 - 12	
Clamps per pole			2				2			2			2	

Capacitor Switching Contactors for North America

Data according to UL508

Main Contacts (cULus)			Type	K3-18N(B)K	K3-24K	K3-32K	K3-50K	K3-62K	K3-74K	K3-90K	K3-115K
Rated operational power of 3-phase capacitor banks at 60Hz (3ph)	110-120V	kVAr		0-3,5	3-5,5	3-7	6,5-10	6,5-15	6,5-18 ³⁾	10-24	10-28 ⁴⁾
	200V	kVAr		0-6	4,5-10	4,5-12,5	10-16,7	10-25	10-32 ³⁾	17-40	17-46 ⁴⁾
	220-240V	kVAr		0-7	5,5-11	5,5-15	12,5-20	12,5-30	12,5-36 ³⁾	20-47	20-56 ⁴⁾
	440-480V	kVAr		0-15	11,5-25	11,5-30	25-40	25-60	25-72 ³⁾	40-95	40-114 ⁴⁾
	550-600V	kVAr		0-18	14,5-30	14,5-35	31-50	31-75	31-90 ³⁾	50-120	50-143 ⁴⁾
Fuse Class RK5 / Short-circuit current			A/kA	50/5	90/5	125/5	200/5	250/5	300/5	300/10	300/10
Fuse Class T / Short-circuit current			A/kA	70/100	110/100	150/100	175/100	175/100	175/100	300/100 ⁵⁾	300/100 ⁵⁾
Rated voltage			V	600	600	600	600	600	600	600	600
Auxiliary Contacts (cULus)				A600	-	-	-	-	-	-	-

1) Total breaking time = release time + arc duration

2) Values for delay of the release time of the make contact and the make time of the break contact will be increased, if magnet coils are protected against voltage peaks (varistor, RC-unit, diode-unit)

3) Consider the max. thermal current of the contactor K3-74A: I_{th} 130A

4) Consider the min. cross-section of conductor at max. load

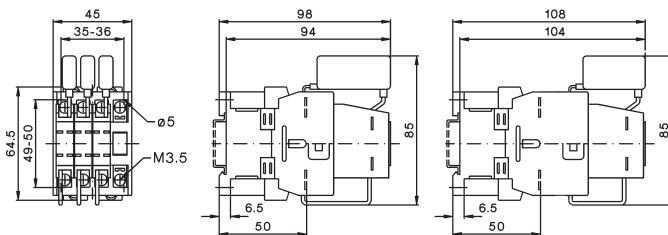
5) Class T and Class RK1

Contactors

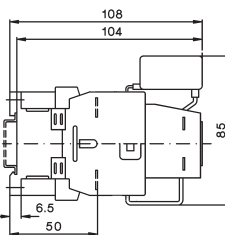
Dimensions

Capacitor switching contactors, AC operated

K3-18NK..

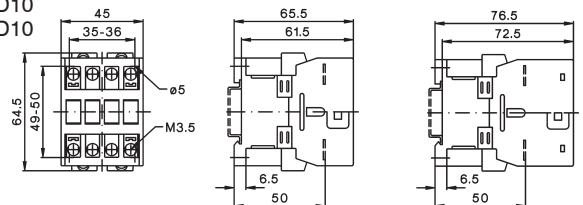


K3-18NBK..

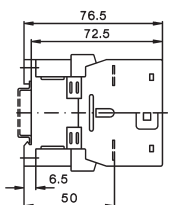


Contactors AC-operated

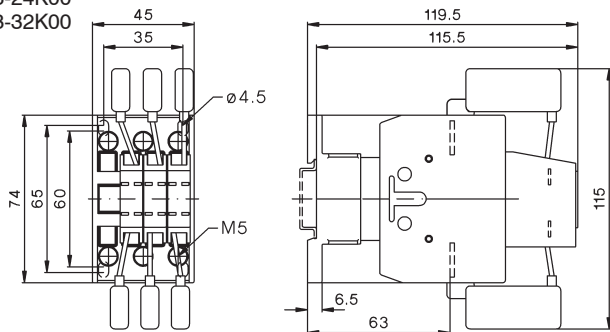
K3-10ND10
K3-14ND10
K3-18ND10
K3-22ND10



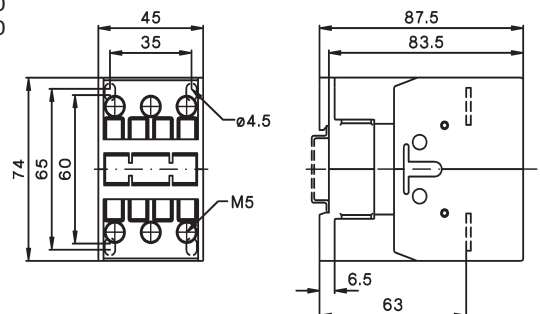
K3-18NB..



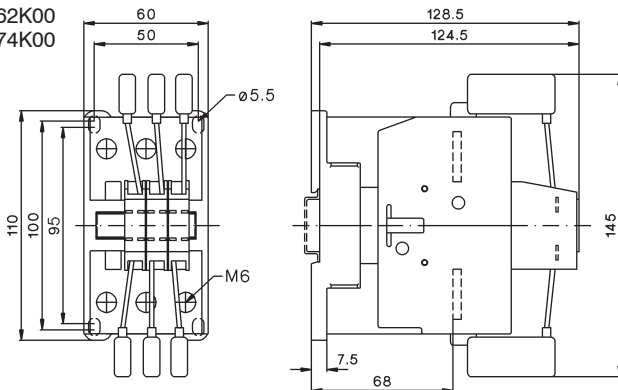
K3-24K00
K3-32K00



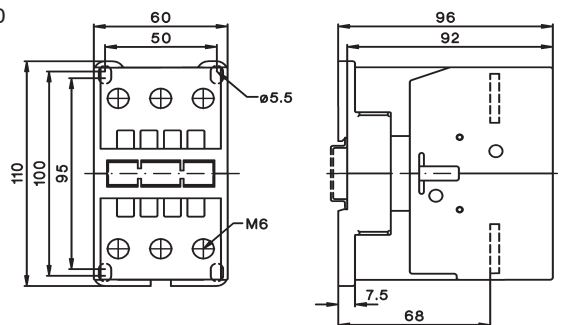
K3-24A00
K3-32A00
K3-40A00



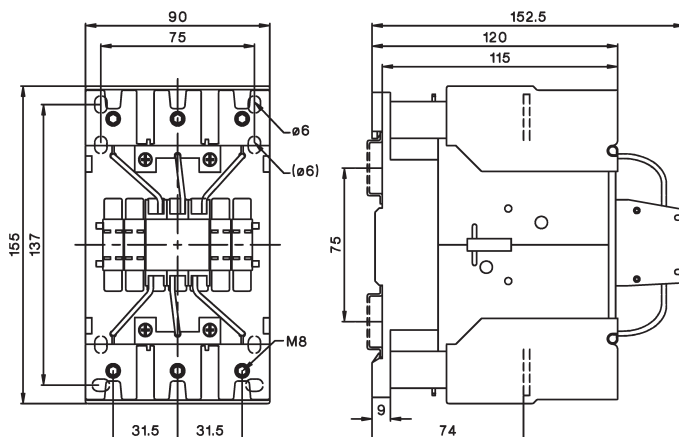
K3-50K00
K3-62K00
K3-74K00



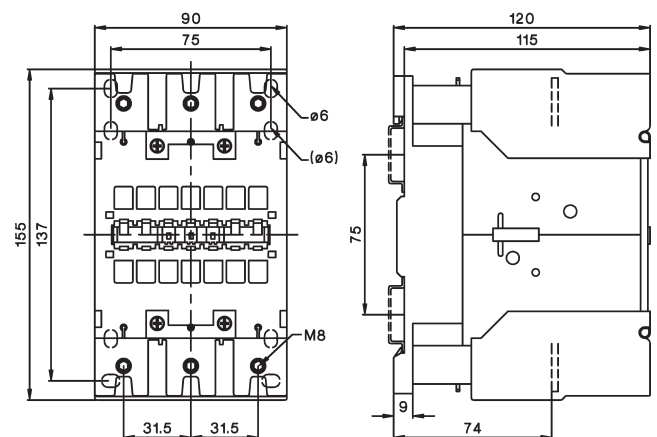
K3-50A00
K3-62A00
K3-74A00



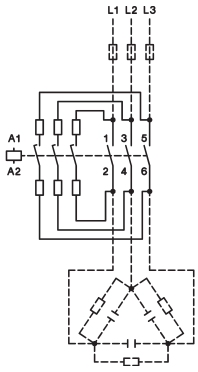
K3-90K00
K3-115K00



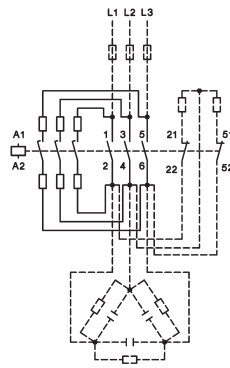
K3-90A00
K3-115A00



Typical Circuit Diagram of Capacitor Switching Contactors



Typical Circuit Diagram



Wiring Diagram for Quick Discharge Resistors

Make sure that the current of the discharge resistors is not higher than the rated current (AC1) of the auxiliary contacts

Contactor operation at direct switching of capacitors

Theoretic view of function

Make

In case of the pre-contacts during make, the current peaks are attenuate by resistor wires. These current peaks would weld the main-contacts of contactor and they are also not good for the capacitors.

The total resistance of the resistor wires is mostly ohmic, the inductive one can be ignored. The looking like a coil is only a case of construction.

The single controlled pre-contacts are increasing the safety of operating, in opposite of contamination during operation.

Operation:

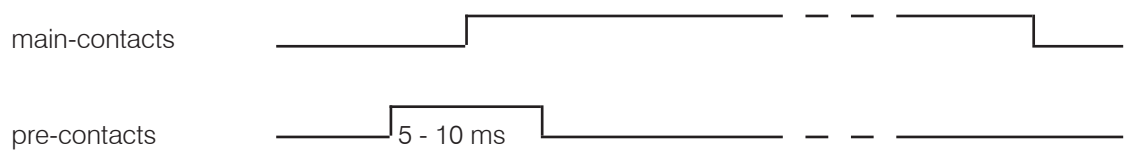
During operation the resistor wires are not getting warmer, because they are not in the circuit.

Break:

Important: these contactors can be used for both installations, because the pre-contacts have no function during break, thus means that the peaks of the break-over voltage (power) of the chokes can't make any damage.

Description

Function diagram



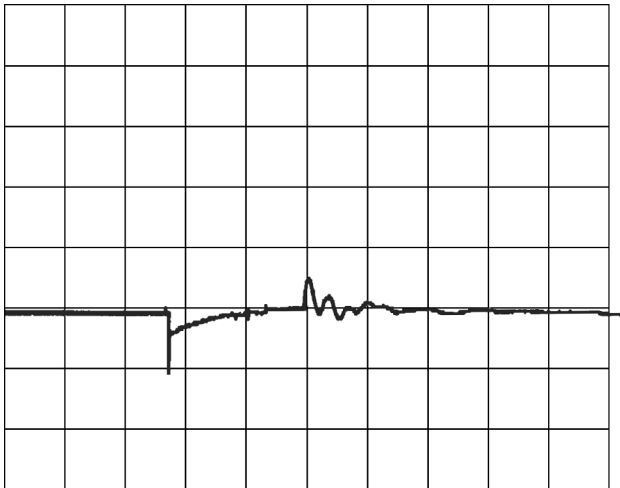
Practical function - oscillogram

make with pre-contacts (B&J\Oszi11)

K3-18NK 12.5kVAr (18A / 400V)

vertical: **250A** / div
1ms / div

horizontal: 1ms / div



Description:

The difference of the diagrams is the current scale only.

First current peak due to make of pre-contacts.

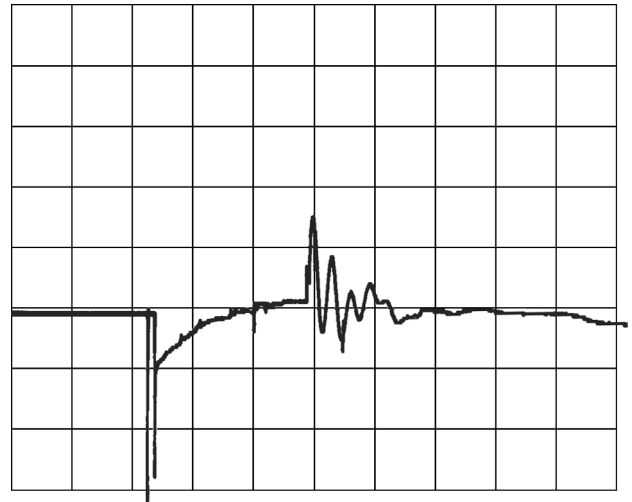
Second current peak due to building-up the main-circuit with noteable lower amplitude as the first and not so steep, that means lower frequency.

make with pre-contacts (B&J\Oszi10)

K3-18NK 12.5kVAr (18A / 400V)

vertical: **100A** / div

horizontal:

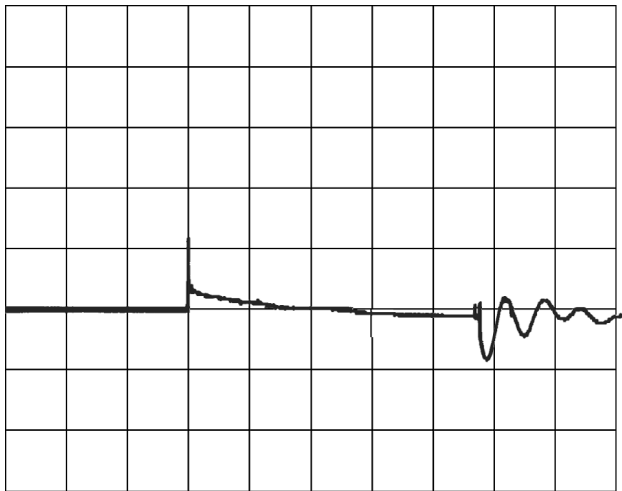


Description

make **with** pre-contacts (B&J\Oszi13)

K3-18NK 12.5kVAr (18A / 400V)

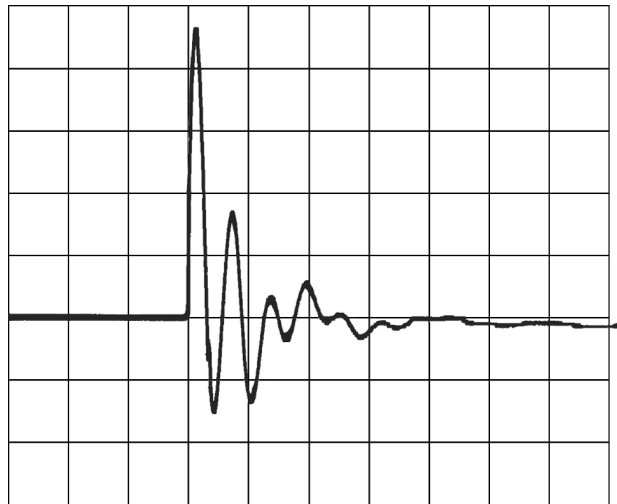
vertical: 250A / div horizontal: 0.5ms / div
0.5ms / div



make **without** pre-contacts (B&J\Oszi12)

K3-18ND 12.5kVAr (18A / 400V)

vertical: 250A / div horizontal:



The right picture shows a make current peak without pre-contacts with about 1200A with high power in opposite to 280A with low power (power = integrated area).

Of course, the contactors endure a few switches without pre-contacts.

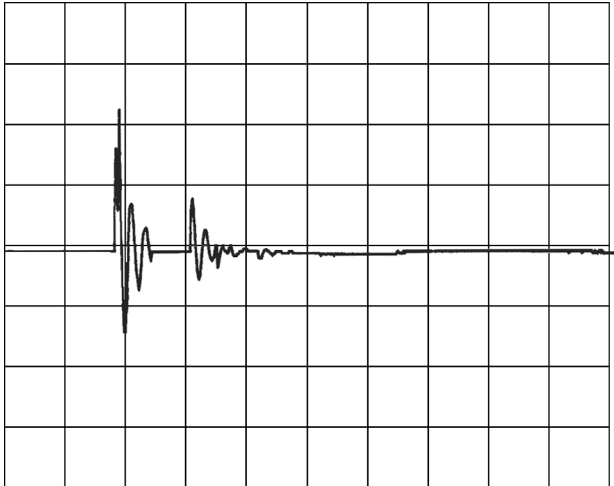
Switching of capacitor banks at different conditions

make **without** pre-contacts (B&J\Oszi16)
without chokes

K3-62A 50kVAr (72A / 690V)

vertical: **2000A** / div
10ms / div

horizontal: 0.625ms / div

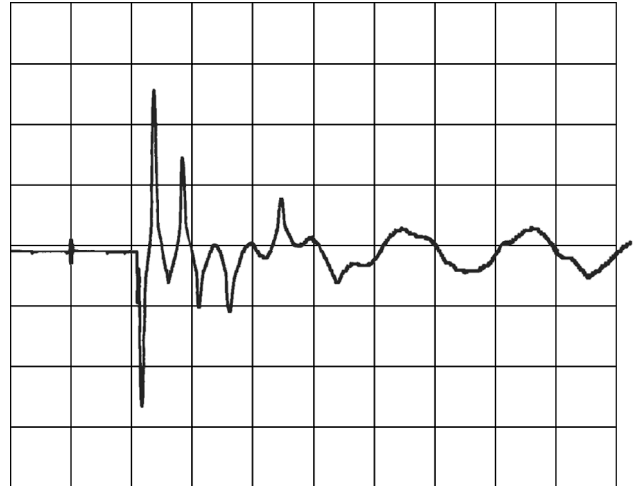


make **without** pre-contacts (B&J\Oszi15)
with chokes

K3-62A 50kVAr (72A / 690V)

vertical: **200A** / div

horizontal:

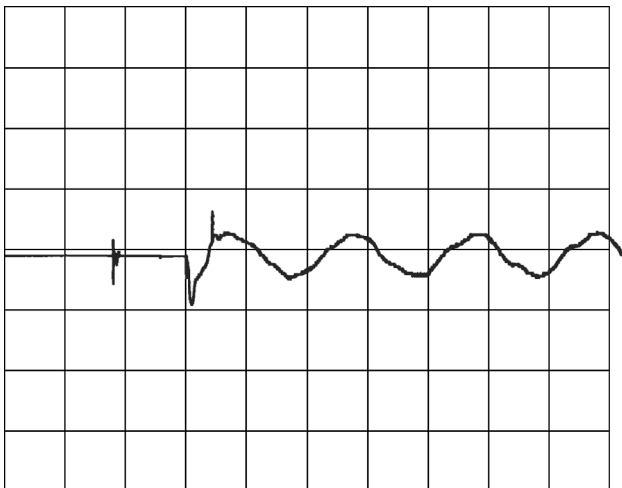


make **with** pre-contacts (B&J\Oszi14)
with chokes

K3-62K 50kVAr (72A / 690V)

vertical: **200A** / div

horizontal: 10ms / div



The make current peak without pre-contacts and without chokes is higher than 4000A.

This peak can be reduced by the influence of chokes to approx. 500A.

In the last case we see the influence of chokes and pre-contacts of the „capacitor contactor“. The peak is reduced to approx. 200A.

Also the sinus-wave is very clear by the influence of chokes because you have reduced harmonic frequencies.

Notice:

Notice:



Quality made in 

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