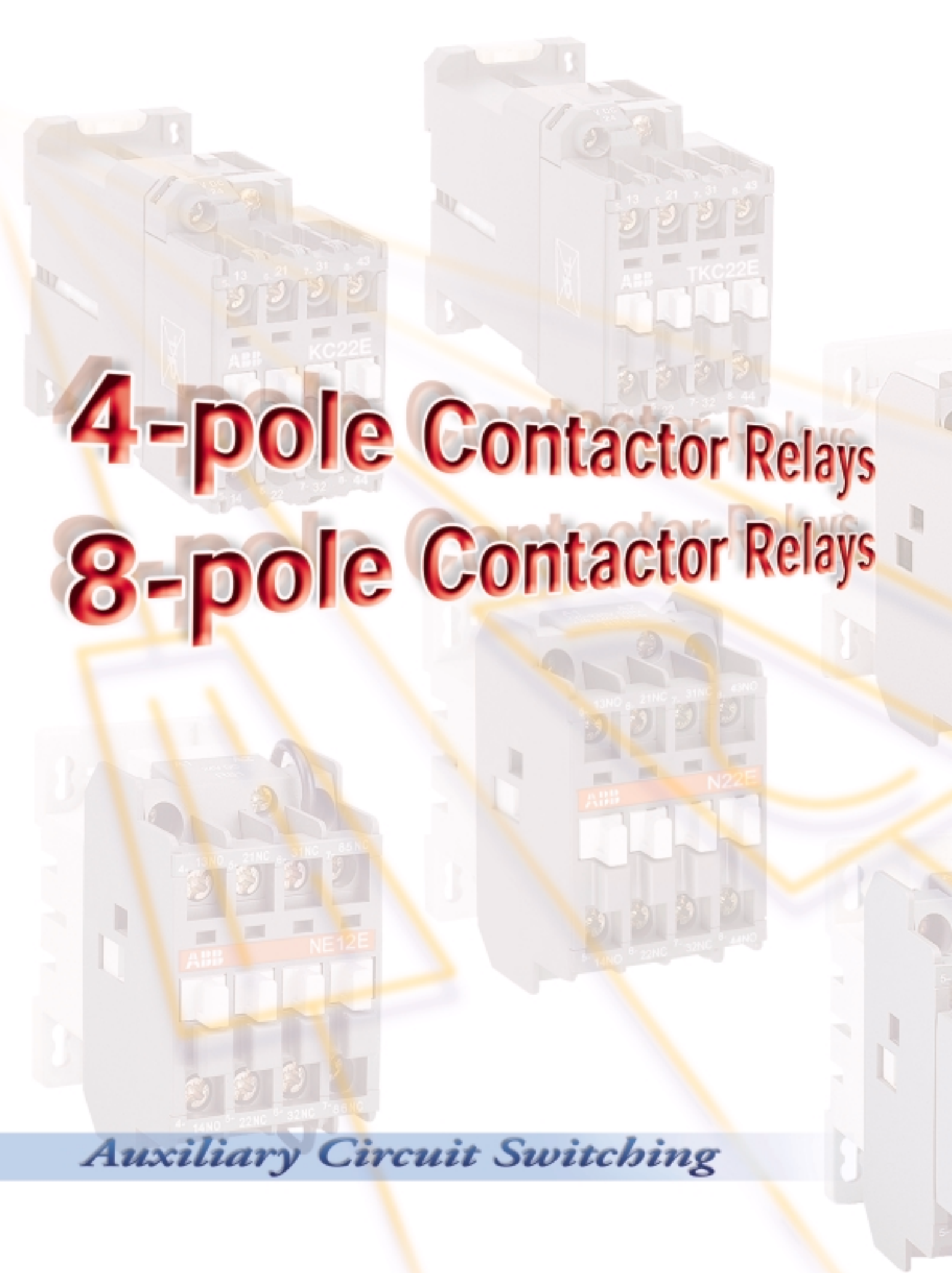

4-pole Contactor Relays
8-pole Contactor Relays

Auxiliary Circuit Switching

Contactor Relays

Contents

N... Contactor Relays, a.c. Operated

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NE... Contactor Relays, d.c. Operated with Double-Winding coil

Description **3**/6
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KC... and TKC... Contactor Relays, d.c. Operated with Solid Magnetic Circuit

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Additional Information

Accessories and Coils ..... Section **4**
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Terminal Marking and Positioning ..... Section **8**
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N... Contactor Relays

a.c. Operated

Application

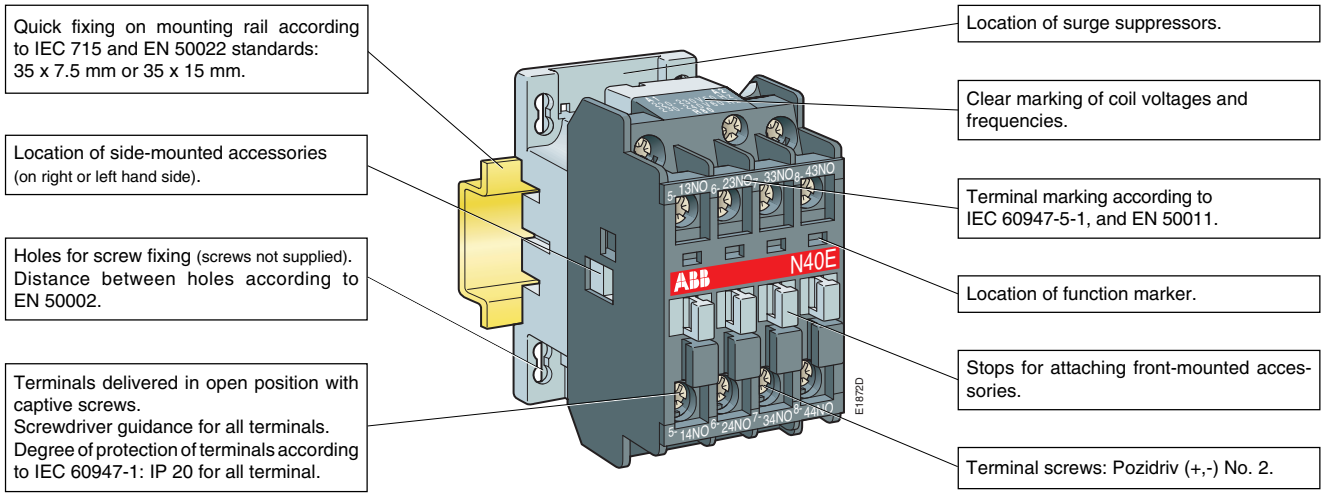
N... contactor relays are used for switching auxiliary circuits and control circuits.

Description

- Poles:
  - 1-stack contactor relays: 4-pole.
    Auxiliary contacts for safety circuits: ☞ page **7**/4.
  - 2-stack contactor relays: 8-pole, with mechanically linked contact elements.
    The width of 8-pole devices is identical to that of 4-pole devices; only the depth is increased.
- Control circuit: a.c. operated with laminated magnet circuit.
- Accessories: a wide range of accessories is available (☞ next pages and section **4**).

Variant ☞ next pages in this section

- d.c. operated: NE... contactor relays.



N 40 E

N 44 E

Ordering Details

Number of contacts 1st stack		2nd stack				Type state coil voltage ⌊⌋ (see table below)	Order code state coil voltage code □□ (see table below)	Weight kg Packing 1 piece
4-pole, 1-stack								
2	2	–	–	–	–	N 22 E ⌊⌋ (1)	1SBH 14 1001 R□□22	0.340
3	1	–	–	–	–	N 31 E ⌊⌋ (1)	1SBH 14 1001 R□□31	0.340
4	–	–	–	–	–	N 40 E ⌊⌋	1SBH 14 1001 R□□40	0.340

(1) In mounting position 5, (☞ page **3**/13) max. 2 x N.C. front-mounted contacts only are acceptable. The **CAL 5-11** side-mounted blocks offer additional N.C. contacts.

8-pole, 2-stack								
4	–	–	4	–	–	N 44 E ⌊⌋	1SBH 14 1001 R□□44	0.400
4	–	1	3	–	–	N 53 E ⌊⌋	1SBH 14 1001 R□□53	0.400
4	–	2	2	–	–	N 62 E ⌊⌋	1SBH 14 1001 R□□62	0.400
4	–	3	1	–	–	N 71 E ⌊⌋	1SBH 14 1001 R□□71	0.400
4	–	4	–	–	–	N 80 E ⌊⌋	1SBH 14 1001 R□□80	0.400
with overlapping of lagging / leading contacts (☞ section 8)								
3	1	–	2	1	1	N 33/11 ⌊⌋	1SBH 14 1001 R□□39	0.400
4	–	1	1	1	1	N 51/11 ⌊⌋	1SBH 14 1001 R□□59	0.400

Coil voltages and codes

Voltage ⌊⌋ V - 50Hz	Voltage ⌊⌋ V - 60Hz	Code □□
24	24	8 1
48	48	8 3
110	110 ... 120	8 4
220 ... 230	230 ... 240	8 0
230 ... 240	240 ... 260	8 8
380 ... 400	400 ... 415	8 5
400 ... 415	415 ... 440	8 6

☞ Other voltages: page **0**/1.

>> Auxiliary Contacts for Safety Circuits ..... page 7/4
>> General - Approvals ..... section 7
>> Terminal Marking and Positioning ..... section 8
>> Main Accessories ..... page 3/4
>> Technical Data ..... page 3/10
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Fitting Details

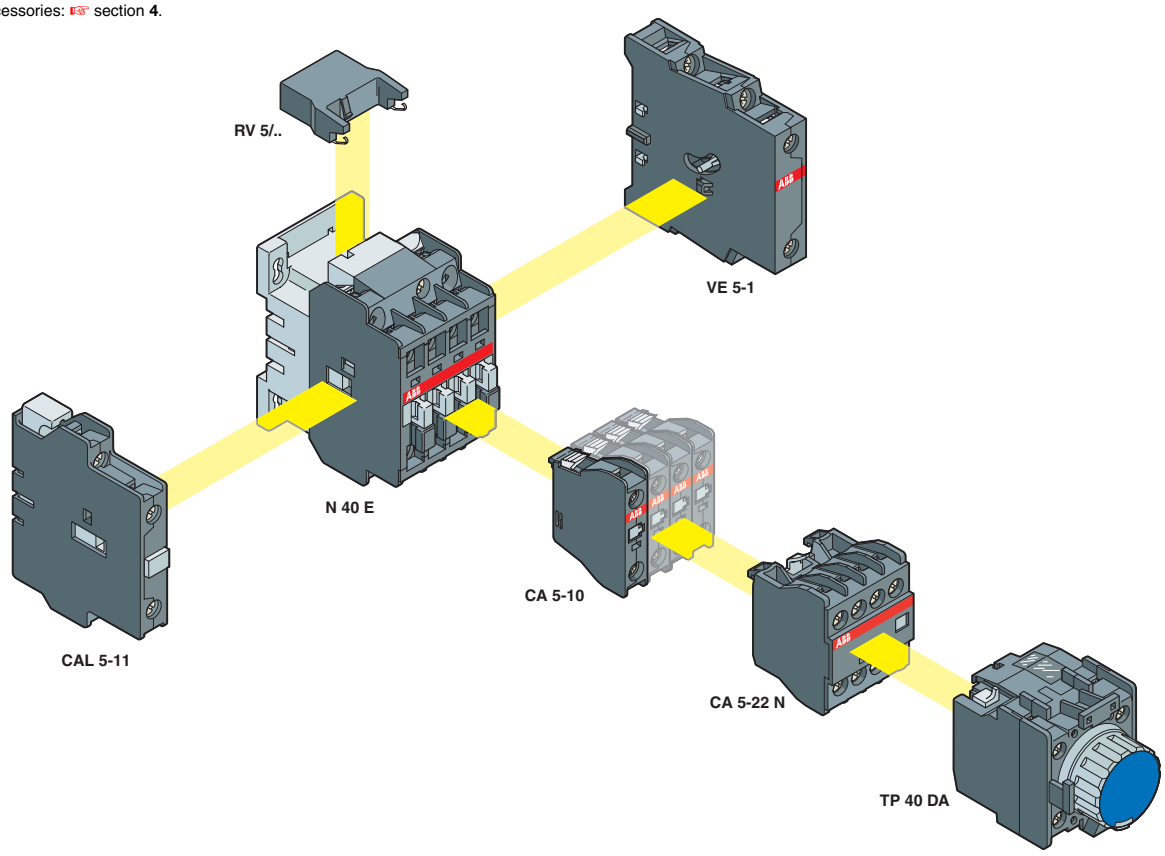
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor type	Front mounted accessories: Auxiliary contact 1-pole CA 5-..		Front mounted accessories: Auxiliary contact 4-pole CA 5-..		Front mounted accessories: Pneumatic timer TP .. A		Side mounted accessories: Auxiliary contact 2-pole CAL 5-11		Side mounted accessories: Interlock unit VM 5-.. or VE 5-..
N 22 E (1) **N 31 E** (1) **N 40 E**	1 to 4 x CA 5-..	or	1 x CA 5-.. (4-pole)	or	1 x TP .. A	+	1 to 2 x CAL 5-11	or	1 x VM 5-1 / VE 5-1 + 1 x CAL 5-11
N 44 E **N 53 E** **N 62 E** **N 71 E** **N 80 E**	–		–		–		1 to 2 x CAL 5-11	or	1 x VM 5-1 / VE 5-1 + 1 x CAL 5-11

(1) In mounting position 5 (☞ page **3**/13), max. 2 x N.C. front-mounted auxiliary contacts only are acceptable. The **CAL 5-11** side-mounted blocks offer additional N.C. contacts.

Contactor relay and main accessories

Other accessories: ☞ section **4**.

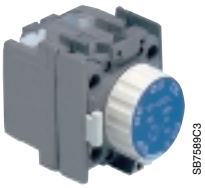


N... Contactor Relays

Main Accessories

CAL 5-11

CA 5-10



TP 40 DA

VE 5-1

RV 5/50

RC 5-1/50

Ordering Details

Auxiliary Contact Blocks

Mounting on contactor relays	Positioning	Contacts		Type	Order Code	Packing piece	Weight kg 1 piece
N...	Front face	1	–	CA 5-10	1SBN 01 0010 R1010	10	0.014
		–	1	CA 5-01	1SBN 01 0010 R1001	10	0.014
		4	–	CA 5-40 N	1SBN 01 0040 R1240	2	0.060
		2	2	CA 5-22 N	1SBN 01 0040 R1222	2	0.060
		–	4	CA 5-04 N	1SBN 01 0040 R1204	2	0.060
	Side	1	1	CAL 5-11	1SBN 01 0020 R1011	2	0.050

Pneumatic Timers

Mounting on contactor relays	Timing range	Contacts		Type	Order Code	Packing piece	Weight kg 1 piece
N...	Direct 0.1 ... 40 s	1	1	TP 40 DA	1SBN 02 0300 R1000	1	0.070
	Direct 10 ... 180 s	1	1	TP 180 DA	1SBN 02 0300 R1001	1	0.070
	Inverse 0.1 ... 40 s	1	1	TP 40 IA	1SBN 02 0301 R1000	1	0.070
	Inverse 10 ... 180 s	1	1	TP 180 IA	1SBN 02 0301 R1001	1	0.070

Interlocks

Mounting on contactor relays	Feature	Contacts		Type	Order Code	Packing piece	Weight kg 1 piece
N...	Mech. / electrical	–	2	VE 5-1	1SBN 03 0110 R1000	1	0.076
	Mechanical	–	–	VM 5-1	1SBN 03 0100 R1000	1	0.066

Surge Suppressors

Mounting on contactor relays	Feature	Voltage range	Type	Order Code	Packing piece	Weight kg 1 piece
N...	Varistor	24 ... 50 V a.c./d.c.	RV 5/50	1SBN 05 0010 R1000	2	0.015
		50 ... 133 V a.c./d.c.	RV 5/133	1SBN 05 0010 R1001	2	0.015
		110 ... 250 V a.c./d.c.	RV 5/250	1SBN 05 0010 R1002	2	0.015
		250 ... 440 V a.c./d.c.	RV 5/440	1SBN 05 0010 R1003	2	0.015
	RC	24 ... 50 V a.c.	RC 5-1/50	1SBN 05 0100 R1000	2	0.012
		50 ... 133 V a.c.	RC 5-1/133	1SBN 05 0100 R1001	2	0.012
		110 ... 250 V a.c.	RC 5-1/250	1SBN 05 0100 R1002	2	0.012
		250 ... 440 V a.c.	RC 5-1/440	1SBN 05 0100 R1003	2	0.012

Other accessories

A wide range of accessories is available: ☞ **section 4**

– various auxiliary contact blocks for specific controls and use,
– interface relays,
– fuse holder blocks,
– function marker.

>> Technical Data of Accessories ..... section 4 >> Dimensions ..... section 9

NE... Contactor Relays

d.c. Operated with Double-Winding Coil

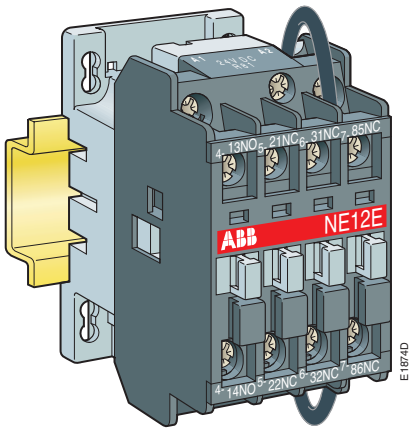
Application

NE... contactor relays are used for switching auxiliary circuits and control circuits.

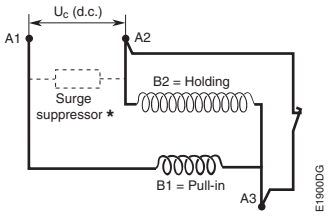
Description

- 3-pole 1-stack version
- Control circuit: laminated magnet circuit and double-winding coil fed from d.c. supply via an insertion contact mounted on the device
- Accessories: a wide range of accessories is available (☞ section **4**).
  Auxiliary contacts for safety circuits: ☞ page **7**/4.

NE... contactor relays specific design (☞ page **3**/2 for general design)

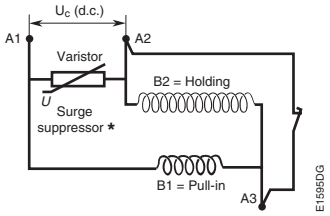


- Built-in lagging contact for insertion of the second winding



U_c < 110 V d.c.

* Addition of RT 5 or RV 5 surge suppressor, if required.
Please order separate (☞ page **3**/5).



$U_c \geq$ 110 V d.c.

* RV 5 surge supressor fitted as standard (RT 5 type on request).

NE... Contactor Relays

d.c. Operated with Double-Winding Coil

NE 12 E

Ordering Details

Contacts		Type	Order code	Weight kg
		state coil voltage ⌊...⌋ (see table below)	state coil voltage code □□ (see table below)	Pack[ing] 1 piece
1	2	NE 12 E ⌊...⌋	1SBH 14 9001 R□□12	0.340
2	1	NE 21 E ⌊...⌋	1SBH 14 9001 R□□21	0.340
3	0	NE 30 E ⌊...⌋	1SBH 14 9001 R□□30	0.340

Note: – If extra auxiliary contact blocks are required, use **CA5-..** or **CC5-..** single pole add-on auxiliary contact blocks. (☞ section **4**).
– In mounting position 5 (☞ page **3**/13), max. 2 x N.C. front mounted contact only are acceptable. The **CAL 5-11** side-mounted blocks offer additional N.C. contacts.

Coil voltages and codes

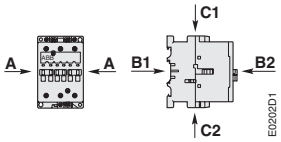
Voltage ⌊...⌋ V d.c	Code □□
12	8 0
24	8 1
42	8 2
48	8 3
50	2 1
60	8 4
75	8 5
110	8 6
125	8 7
220	8 8
240	8 9
250	3 8

3

>> Auxiliary Contacts for Safety Circuits ..... page 7/4
>> General - Approvals ..... section 7
>> Terminal Marking and Positioning ..... section 8
>> Main Accessories ..... page 3/4
>> Technical Data ..... page 3/10
>> Dimensions ..... section 9

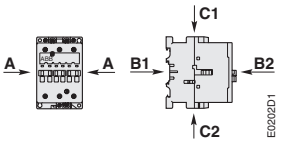
General Technical Data for N... and NE... Contactor Relays

Contactor relay types		N...	NE...
Rated insulation voltage U_i			
according to IEC 60947-4-1	V	690	
according to UL/CSA	V	600	
Rated impulse withstand voltage $U_{imp.}$	kV	8	
Standards		Devices complying with international standards IEC 60947-5-1 / 60947-4-1 and European standards EN 60947-5-1 / 60947-4-1	
Certifications - Approvals		☞ section **7**	
Air temperature close to contactor		☞ "Conditions for use", page **3**/13, for control voltage limits, and authorized mounting positions	
– for operation in free air	°C	-40 to +70	
– for storage	°C	-60 to +80	
Climatic withstand		acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II	
Operating altitude	m	≤ 3000	
Shock withstand acc. IEC 60068-2-27 and EN 60068-2-27 Mounting position 1 (☞ page **3**/13)		1/2 sinusoidal shock for 11 ms: no change in contact position Shock direction A, C1, C2: 20 g B1: 5 g B2: 15 g	



General Technical Data for KC... and TKC... Contactor Relays

Contactor relay types		KC...	TKC...
Rated insulation voltage U_i			
according to IEC 60947-4-1	V	690	
according to UL/CSA	V	600	
Rated impulse withstand voltage $U_{imp.}$	kV	8	
Standards		Devices complying with international standards IEC 60947-5-1 / 60947-4-1 and European standards EN 60947-5-1 / 60947-4-1	
Certifications - Approvals		☞ section **7**	
Air temperature close to contactor		☞ "Conditions for use", page **3**/13, for control voltage limits, and authorized mounting positions	
– for operation in free air	°C	-40 to +70	-40 to +55
– for storage	°C	-60 to +80	
Climatic withstand		acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II	
Operating altitude	m	≤ 3000	
Shock withstand acc. IEC 60068-2-27 and EN 60068-2-27 Mounting position 1 (☞ page **3**/13)		1/2 sinusoidal shock for 11 ms: no change in contact position	



Shock direction	
A, C1, C2	20 g
B1	5 g
B2	15 g

Shock direction	Making position	Breaking position
A	15 g	10 g
B1	10 g	5 g (1)
B2	10 g	6 g (2)
C1	10 g	4 g
C2	10 g	4 g

Exceptions: (1) 4 g for TKC 22, 3 g for TKC 62
(2) 5 g for TKC 31, 3 g for TKC 62
Consult us for TKC 44

Contact Utilization Characteristics

Contactor relay types			N...	NE...	KC...	TKC...
Rated operational voltage U_e max.		**V**	690			
Rated frequency limits		**Hz**	25 ... 400			
Conventional free-air thermal current I_{th} according to IEC 60947-5-1, open contactors $\theta \leq 40$ °C		**A**	16		10	
Rated operational current I_e / AC-15 according to IEC 60947-5-1						
24-127 V	50/60 Hz	**A**	6			
230-240 V	50/60 Hz	**A**	4			
400-415 V	50/60 Hz	**A**	3			
500 V	50/60 Hz	**A**	2			
690 V	50/60 Hz	**A**	2			
Rated operational current I_e / DC-13 according to IEC 60947-5-1						
24 V d.c.		**A / W**	6 / 144			
48 V d.c.		**A / W**	2.8 / 134			
72 V d.c.		**A / W**	1 / 72			
125 V d.c.		**A / W**	0.55 / 69			
250 V d.c.		**A / W**	0.3 / 75			
Rated making capacity according to IEC 60947-5-1			10 x I_e / AC-15			
Rated breaking capacity according to IEC 60947-5-1			10 x I_e / AC-15			
Short-circuit protection $U_e \leq 500$ V a.c. - gG type fuse		**A**	10			
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air, from a cold state	1.0 s	**A**	100		50	
	0.1 s	**A**	140		100	
Minimum switching capacity with failure rate bellow 10^{-6}			17 V / 5 mA		24 V / 5 mA	
Heat dissipation per pole at 6 A		**W**	0.10		0.15	
Non-overlapping time between N.O. and N.C. contacts		**ms**	≥ 2			
Insulation resistance at 500 V d.c. after durability test		**MOhm**	5			
Max. electric switching frequency		**cycles/h**	1200			
Electrical durability			☞ page **4**/35			
Mechanical durability						
– millions of operating cycles			> 20		30	
– max. mechanical switching frequency		**cycles/h**	6000			

3

Magnet System Characteristics for N... Contactor Relays

Contactor relay types			N...
Rated control circuit voltage U_c			
50/60 Hz		**V**	20 ... 690
Coil operating limits			θ ≤ 55 °C
acc. to IEC 60947-5-1:			0.85 ... 1.1 x U_c
Drop-out voltage in % of U_c			40 ... 65 %
Coil consumption			
Average pull-in value	50 Hz	**VA**	70
	60 Hz	**VA**	80
	50/60 Hz (1)	**VA / VA**	74 / 70
Average holding value	50 Hz	**VA / W**	8 / 2
	60 Hz	**VA / W**	8 / 2
	50/60 Hz (1)	**VA / W**	8 / 2
Operating time			
between coil energization and:			
– N.O. contact closing		**ms**	10 ... 26
– N.C. contact opening		**ms**	7 ... 21
between coil de-energization and:			
– N.O. contact opening		**ms**	4 ... 11
– N.C. contact closing		**ms**	9 ... 16

(1) 50/60 Hz coils: voltage codes **8 0** to **8 8**. ☞ page **0**/1.

Magnet System Characteristics for NE..., KC..., and TKC... Contactor Relays

Contactor relay types			NE...	KC...	TKC...
Rated control circuit voltage U_c		**V d.c.**	12 ... 250	24 ... 240	
Coil operating limits			θ ≤ 55 °C		
acc. to IEC 60947-5-1:			0.85 ... 1.1 x U_c		U_c min. ... U_c max.
Drop-out voltage in % of U_c			10 ... 30 %		9 ... 25 % of U_c max.
Coil consumption (3)					
– pull-in value		**W**	90	7	9
– holding value		**W**	2	7	9
Coil time constant					
– open	L/R	**ms**	2	40	
– closed	L/R	**ms**	9	90	
Operating time					
between coil energization and:					
– N.O. contact closing		**ms**	10 ... 16	50 ... 75	50 ... 75
– N.C. contact opening		**ms**	8 ... 12	45 ... 70	45 ... 70
between coil de-energization and:					
– N.O. contact opening		**ms**	5 ... 14 (1) (2)	15 ... 30 (1)	15 ... 30 (1)
– N.C. contact closing		**ms**	11 ... 17 (1) (2)	17 ... 32 (1)	17 ... 32 (1)

(1) The use of surge suppressors increases the opening time on a scale of 1.1 to 1.5 for a varistor suppressor and on a scale of 4 to 8 for a diode.
(2) NE Contactor Relays, and U_c ≥ 110 V d.c.: table values for contactor relays with RV5 surge suppressors (factory mounted).
(3) Average values for NE... and KC... contactor relays, at U_c max. and θ = 20 °C for TKC types.

Note: For the influence of the length of conductors used in control circuit, use the curves in pages **2**/90 and **2**/91

Mounting Characteristics

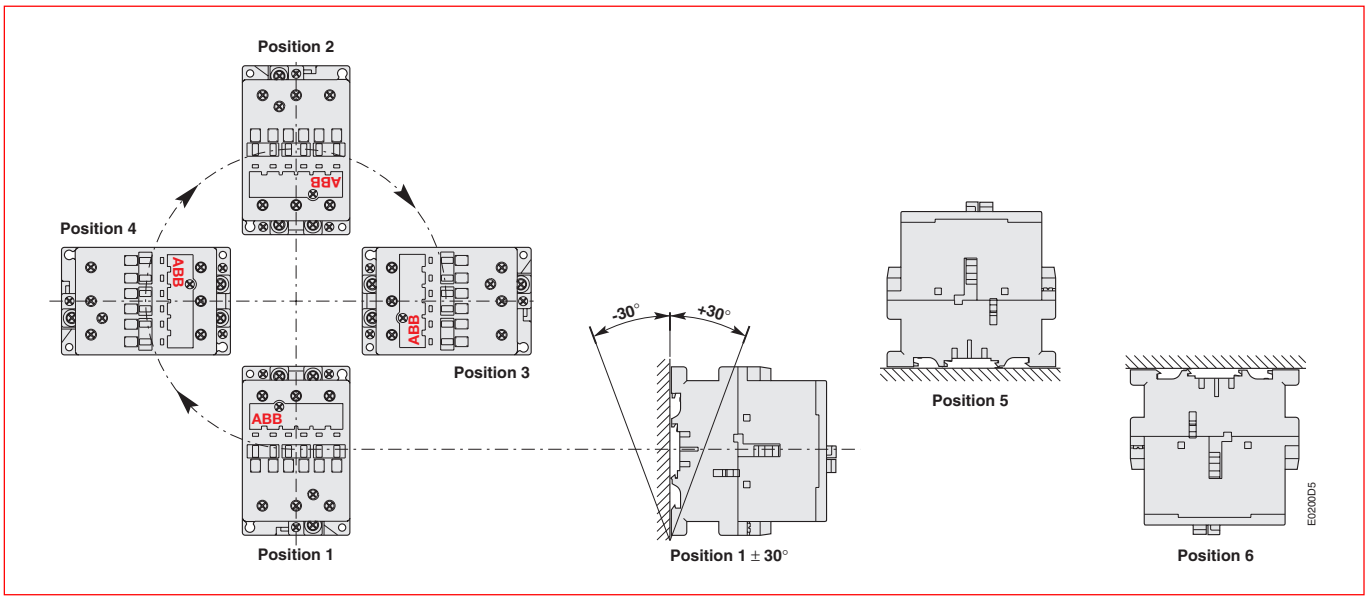
Contactor relay types	N...	NE...	KC...	TKC...
Mounting positions	☞ "Conditions for use"			
Mounting distances	No mounting distance required between contactors		☞ "Dimension drawings" (section **9**) for distances required between contactors	
Fixing				
on DIN rail according to IEC 715 and EN 50022	⊓ 35 x 7.5 mm			
	⊓ 35 x 15 mm			
by screws (not supplied)	2 x M4			

Conditions for Use

Sustainable utilization conditions for contactors involving at the same time the Mounting position, Ambient temperature and Control Voltage operating limits are summarized in the table below.

Contactor relays	Mounting position	Ambient temperature	Control voltage
N..., NE...	1, 1 ± 30°, 2, 3, 4, 5	≤ 55 °C	0.85 ... 1.1 x U_c
		55 ... 70 °C	U_c
	6	≤ 55 °C	0.95 ... 1.1 x U_c
		> 55 °C unauthorized	–
KC...	1, 3, 4, 5	≤ 55 °C	0.85 ... 1.1 x U_c
		55 ... 70 °C	U_c
	1 ± 30°, 2	≤ 55 °C	0.95 ... 1.1 x U_c
		55 ... 70 °C	U_c
	6	≤ 55 °C	0.95 ... 1.1 x U_c
		> 55 °C unauthorized	–
TKC...	1, 1 ± 30°, 3, 4	≤ 55 °C	U_c min. ... U_c max.
		> 55 °C unauthorized	–
	2, 5, 6 unauthorized	–	–

Mounting Positions (see the above table for authorized positions)



Connecting Characteristics

Contactor relay types		N...	NE...	KC...	TKC...
Terminals		with cable clamp			
Connecting capacity (min. ... max.) (Poles and coil terminals)					
Rigid solid	**1 x mm²**	1 ... 4			
	2 x mm²	1 ... 4			
Flexible with cable end	**1 x mm²**	0.75 ... 2.5		1 ... 2.5	
	2 x mm²	0.75 ... 2.5			
Lugs	L **mm** ≤	8			
	l **mm** >	3.7			
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		Protection against direct contact acc. to VDE 0106 - Part. 100			
– Pole terminals		IP 20		IP 10	
– Coil terminals		IP 20			
Screw terminals					
– Pole terminals		M 3.5 (+, -) pozidriv 2 screws with cable clamp			
– Coil terminals		M 3.5 (+, -) pozidriv 2 screws with cable clamp			
Tightening torque					
Pole terminals					
– recommended	**Nm / lb.in**	1.00 / 9			
– max.	**Nm**	1.20			
Coil terminals					
– recommended	**Nm / lb.in**	1.00 / 9			
– max.	**Nm**	1.20			
Terminal marking and positioning		☞ section **8**			

N... and NE... Contactor Relays

Basic unit	Built-in contacts 1st stack	Built-in contacts 2nd stack	Front-mounted accessories: Auxiliary contact 1-pole CA 5-..	Front-mounted accessories: Auxiliary contact 4-pole CA 5-..	Front-mounted accessories: Pneumatic timer TP .. A	Side-mounted accessories: Auxiliary contact 2-pole CAL 5-11	Side-mounted accessories: Interlock unit VM 5-.. or VE 5-..
N 22 E (1)	2 2	– –	1 to 4 x CA 5-.. or	1 x CA 5-.. (4-pole) or	1 x TP .. A +	1 to 2 x CAL 5-11 or	1 x VM 5-1 or VE 5-1 + 1 x CAL 5-11
N 31 E (1)	3 1	– –					
N 40 E	4 –	– –					
NE 12 E	1 2	– –					
NE 21 E	2 1	– –					
NE 30 E	3 –	– –					
N 44 E	4 –	– 4	–	–	–	1 to 2 x CAL 5-11 or	1 x VM 5-1 or VE 5-1 + 1 x CAL 5-11
N 53 E	4 –	1 3					
N 62 E	4 –	2 2					
N 71 E	4 –	3 1					
N 80 E	4 –	4 –					

(1) In mounting position 5 (☞ page **3**/13), max. 2 x N.C. front-mounted auxiliary contacts only are acceptable. The **CAL 5-11** side-mounted blocks offer additional N.C. contacts.
For **N 22 E** and **N 31 E** + **TP..DA** in mounting position 5, please consult us.

3

KC... Contactor Relays

Basic unit	Built-in contacts 1st stack	Built-in contacts 2nd stack	Front-mounted accessories (1): Auxiliary contact 1-pole CA 5-..	Auxiliary contact 4-pole CA 5-..	Pneumatic timer TP .. A	Interlocking unit VBC 30	Add-on auxiliary contact CA 5-.. for each contactor
KC 22 E (2)	2 2	– –	1 to 4 x CA 5-.. or	1 x CA 5-.. (4-pole)	– or	1 x VBC 30 +	1 to 2 x CA 5-.. (1-pole)
KC 31 E	3 1	– –	1 to 4 x CA 5-.. or	1 x CA 5-.. (4-pole) or	1 x TP.. A or	1 x VBC 30 +	1 to 2 x CA 5-.. (1-pole)
KC 40 E	4 –	– –					
KC 44 E	4 –	– 4	–	–	–	–	–
KC 62 E	4 –	2 2					

(1) In mounting position 5 (☞ page **3**/13) max. 2 x N.C. auxiliary contacts only are acceptable, and use only the TP .. DA pneumatic timer (TP .. IA unauthorized).
(2) Whatever the mounting position max. 2 x N.C. auxiliary contacts only are acceptable. In mounting position 1 ±30°, front-mounted accessories unauthorized.

TKC... Contactor Relays

Basic unit	Built-in contacts 1st stack	Built-in contacts 2nd stack	Front-mounted accessories: Auxiliary contact 1-pole CA 5-..	Auxiliary contact 4-pole CA 5-..	Pneumatic timer TP .. A	Interlocking unit VBC 30	Add-on auxiliary contact CA 5-.. for each contactor
TKC 22 E (1)	2 2	– –	1 to 4 x CA 5-.. or	1 x CA 5-.. (4-pole)	– or	1 x VBC 30 +	1 to 2 x CA 5-.. (1-pole)
TKC 31 E (2)	3 1	– –	1 to 4 x CA 5-.. or	1 x CA 5-.. (4-pole)	– or	1 x VBC 30 +	1 to 2 x CA 5-.. (1-pole)
TKC 40 E (3)	4 –	– –					
TKC 44 E	4 –	– 4	–	–	–	–	–
TKC 62 E	4 –	2 2					

(1) Whatever the mounting position the N.C. auxiliary contacts are unauthorized.
(2) In mounting position 1, 3 or 4 (☞ page **3**/13) max. 2 x N.C. auxiliary contacts only are acceptable. In mounting position 1 ±30°, front-mounted accessories unauthorized.
(3) In mounting position 1, 3 or 4 (☞ page **3**/13) max. 1 x N.C. auxiliary contact only is acceptable. In mounting position 1 ±30°, front-mounted accessories unauthorized.

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