

Technical data

Contactor	Size Type	4 3TB48	6 3TB50	8 3TB52	10 3TB54	12 3TB56
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Short-circuit protection of contactors without overload relays

Main circuit

Fuse links	NH	Type 3NA	I ²)	A	80	125	160	200	315
Utilization category gL/gG	DIAZED	Type 5SB	II ³)	A	160	224	250	315	500

Control circuit (short-circuit current $I_k \geq 1$ kA)

Fuse links	DIAZED	Type 5SB	A	16 (6 if the auxiliary contact of the overload relay is connected in the contactor coil circuit.)
Utilization category gL/gG	NEOZED	Type 5SE	A	10 (3 if the auxiliary contact of the overload relay is connected in the contactor coil circuit.)
Miniature circuit-breaker C-characteristic			A	

For short-circuit protection of contactors with overload relays, see Part 4.

General data

Mechanical endurance	operating cycles		10 million	10 million	10 million	10 million	10 million
Rated insulation voltage	V		1000	1000	1000	1000	1000
Permissible ambient temperature	in operation	°C	-25 to +55				
	when stored	°C	-50 to +80				
Degree of protection acc. to IEC 60 947-1 and DIN 40 050			IP 00 (open type), coil system IP 40				
Power consumption of the coils (with coil in cold state and $1.0 \times U_n$)							
DC operation	closing	W	*)	25	30	60	86
	closed	W	*)	25	30	60	86
Coil voltage tolerance			0.8 to 1.1 x rated operating voltage				
Operating times at 0.8 to 1.1 x U_n			(The values apply up to and including 20% undervoltage and 10% overvoltage, and with the coil in the cold state and at operating temperature)				
DC operation	closing time	ms	90 to 380	105 to 360	115 to 400	105 to 400	110 to 400
	opening time ¹⁾	ms	17 to 28	18 to 30	22 to 35	24 to 55	40 to 110
	arcing time	ms	10 to 15	10 to 15	10 to 15	10 to 15	10 to 15
Operating times at 1.0 x U_n							
DC operation	closing time	ms	100 to 180	120 to 230	130 to 250	115 to 250	120 to 250
	opening time ¹⁾	ms	22 to 25	20 to 26	24 to 32	35 to 50	60 to 95
Shock resistance (rectangular pulse)	AC	g/ms	10/5	9.3/5	11/5	11.2/5	11.2/5
	DC	g/ms	5/10	5/10	5.9/10	5.9/10	5.9/10

Conductor cross-sections

Screw connection (1 or 2 conductor connections possible)	Main conductor:						
	Finely stranded with cable lug	mm ²	6 to 35	16 to 70	35 to 95	50 to 240	50 to 240
	Stranded with cable lug	mm ²	10 to 35	25 to 70	50 to 120	70 to 240	70 to 240
	Busbars	mm	-	15 x 3	20 x 3	25 x 5	2 x (25 x 3)
	Terminal screw		M 6	M 6	M 8	M 10	M 10
	Auxiliary conductor:						
	Solid	mm ²	1 to 2.5	1 to 2.5	1 to 2.5	1 to 2.5	1 to 2.5
	Finely stranded with end sleeve	mm ²	0.75 to 1.5	0.75 to 1.5	0.75 to 1.5	0.75 to 1.5	0.75 to 1.5
	Pin-end connector (DIN 46 231)	mm ²	2 x 1 to 2.5	2 x 1 to 2.5	2 x 1 to 2.5	2 x 1 to 2.5	2 x 1 to 2.5
	Protective conductor:						
	Stranded with cable lug	mm ²	-	-	25 to 70	35 to 70	50 to 120

Operating frequency in operating cycles per hour						
Contactors without overload relays	for AC-1	1/h	1000	1000	1000	1000
Rated operation	for AC-2 and AC-3	1/h	500	500	500	500
	for AC-4	1/h	250	250	250	250
Contactors with overload relays (mean value)		1/h	15	15	15	15

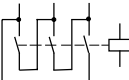
1) The opening times may increase if the contactor coils are protected against voltage peaks.
2) Completely weld-free.

3) Slight, separable contact welding, no further damage.
*) For the power consumption of the coil for 3TB48 17-OL..., see page 3/103.

3TB48 to 3TB56 Contactors

Technical data

Load ratings with AC

Contactor	Size Type		4 3TB48	6 3TB50	8 3TB52	10 3TB54	12 3TB56
AC-1 utilization category, switching resistive load							
Rated operational current $I_e/AC-1$ (at 55 °C)		A	100	160	200	300	400
Ratings of three-phase loads ¹⁾	230 V	kW	38	61	76	114	152
p.f. = 1	400 V	kW	66	105	132	195	262
	500 V	kW	86	138	173	260	345
	690 V	kW	114	183	228	340	455
Minimum conductor cross-section with I_e load		mm ²	35	70	95	185	240
AC-2 and AC-3 utilization categories							
Motors with slipping or squirrel-cage rotor	See selection and ordering data						
AC-4 utilization category⁵⁾							
Rated operational current I_e		A	34	52	72	103	120
Ratings of motors with squirrel-cage rotor at 50 Hz and $I_a \leq 6 \times I_e$	230 V	kW	7.8	15.6	21	31	37.5
	400 V	kW	17	27	37	55	65
	500 V	kW	22	35	48	72	85.5
	690 V	kW	28.5	45	64	92	106
Max. permissible rated operational current $I_e/AC-4$ at	400 V	A	75	110	170	250	400
Switching low-inductance (low-loss, metallized-dielectric) three-phase capacitors²⁾							
Rated operational current I_e	at 400 V	A	58	87	144	217	289
Ratings of single capacitors at 50 Hz	230 V	kvar	24	35	58	87	115
	400 V	kvar	40	60	100	150	200
	500 V	kvar	50	80	130	190	265
	690 V	kvar	40	60	100	150	200
Ratings of capacitor banks (minimum inductance between parallel capacitors 6 μ H) and 50 Hz	230 V	kvar	24	30	40	66	85
	400 V	kvar	40	50	70	115	150
	500 V	kvar	50	66	90	145	195
	690 V	kvar	40	50	70	115	150
Used as stator contactors (AC-2 utilization category) Stator current I_{es} ³⁾							
Relative ON period ⁴⁾ with intermittent duty	20 %	A	153	245	308	462	617
	40 %	A	122	195	245	367	490
	60 %	A	109	174	218	327	436
	80 %	A	100	160	200	300	400
Used as rotor contactors Rotor current I_{er} ³⁾							
Relative ON period ⁴⁾ with intermittent duty	10 %	A	293	395	560	759	1075
	20 %	A	242	388	487	730	975
	40 %	A	193	308	387	580	775
	60 %	A	173	275	345	517	689
	80 %	A	158	252	316	474	632
 NSK-7133 Locked rotor voltages U_{er}	Uninterrupted duty	A	158	252	316	474	632
	Starting	V	2000	2000	2000	2000	2000
	Variable speed	V	1000	1000	1000	1000	1000
	Plugging	V	1000	1000	1000	1000	1000

- 1) Industrial furnaces and electric heaters with resistance heating, for example (higher current input allowed for during heating up).
2) Contact endurance 0.1 million operating cycles.

- 3) For contact endurance at these loads, see characteristic curves on page 3/117.
4) Relative ON period in % = $\frac{\text{ON period}}{\text{Cycle time}} \times 100$, cycle times up to 10 min.

- 5) The contact endurance (approximately 200 000 operating cycles) has been rated for typical applications; see characteristic curves on page 3/117.

3TB48 to 3TB56 Contactors

Technical data

Load ratings with DC

Contactor	Size Type	4 3TB48			6 3TB50			8 3TB52			10 3TB54			12 3TB56		
DC-1 utilization category, switching resistive load ($L/R \leq 1$ ms)																
Rated operational current I_e (at 55 °C)																
Number of conducting paths connected in series		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
	24 V A	100	100	100	160	160	160	200	200	200	300	300	300	400	400	400
	60 V A	80	100	100	80	160	160	80	200	200	300	300	300	330	400	400
	110 V A	12	100	100	18	160	160	18	200	200	33	300	300	33	400	400
	220 V A	2.5	13	100	3.4	20	160	3.4	20	200	3.8	300	300	3.8	400	400
	440 V A	0.8	2.4	6	0.8	3.2	11.5	0.8	3.2	11.5	0.9	4	11	0.9	4	11
	600 V A	0.48	1.3	3.4	0.5	1.6	4	0.5	1.6	4	0.6	2	5.2	0.6	2	5.2

DC-2 to DC-3 utilization categories, shunt and series motors

 ($L/R \leq 15$ ms)

Rated operational current I_e (at 55 °C)																
Number of conducting paths connected in series		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
	24 V A	6	100	100	16	160	160	16	200	200	35	300	300	35	400	400
	60 V A	3	100	100	7.5	160	160	7.5	200	200	11	300	300	11	400	400
	110 V A	1.25	100	100	2.5	160	160	2.5	200	200	3	300	300	3	400	400
	220 V A	0.35	1.75	4	0.6	2.5	160	0.6	2.5	200	0.6	2.5	300	0.6	2.5	400
	440 V A	0.15	0.42	0.8	0.17	0.65	1.4	0.17	0.65	1.4	0.18	0.65	1.4	0.18	0.65	1.4
	600 V A	0.1	0.27	0.45	0.12	0.37	0.75	0.12	0.37	0.75	0.125	0.37	0.75	0.125	0.37	0.75

Ⓢ and Ⓜ ratings

Ap- proved to	Contactor	Size Type		4 3TB48			6 3TB50			8 3TB52			10 3TB54			12 3TB56		
Ⓢ	Conventional thermal current	Free air	A	100	150	170	240	300										
			Enclosed	A	90	135	153	215	270									
	Ratings of three-phase motors at 60 Hz (enclosed type)		115 V	hp	15	25	30	40	50									
			230 V	hp	30	50	60	75	100									
			460 V	hp	50	100	120	150	200									
			575 V	hp	50	125	160	200	250									
	Overload relay	Type		3UA58	3UA62	3UA62	3UA66	3UA66/3UA68										
			Largest setting range	A	50 to 63	135 to 160	135 to 160	250 to 400	250 to 400/ 400 to 630									
	EEMAC SIZE contactors	Starter (contactors und overload relay, enclosed type)	Size		3	4	4	4	5									
					2	3	4	4	5									
Ⓢ and Ⓜ	Conventional thermal current	Free air	A	100	150	150	240	390										
			Enclosed	A	90	135	135	215	350									
	Ratings of three-phase motors at 60 Hz (enclosed type)		115 V	hp	15	25	25	30	–									
			230 V	hp	30	50	50	75	125									
			460 V	hp	50	100	100	150	250									
			575 V	hp	50	125	125	200	300 ¹⁾									
	Overload relay	Type		3UA58	3UA62	3UA62	3UA66	3UA66/3UA68										
			Largest setting range	A	63 to 80	110 to 135	110 to 135	250 to 400	250 to 400/ 400 to 630									
	NEMA SIZE contactors	Starter (= contactors + overload relay, enclosed type)	Size		3	4	4	4	5									
					2	3	4	4	5									
Specified short-circuit protection devices (Ⓢ-approved):																		
Fuses	Class	A		2)	K5 400	K5 400	K5 450	K5 600										
			Circuit-breakers	A		175	175	250	600									

1) Max. rated motor current 325 A and motor starting current 2350 A at AC 575 V (AC 600 V).

2) See overload relays in Part 4.

3TD Contactor Assemblies

Technical data

Ⓢ and Ⓜ ratings

Contactor	Size Type		6 3TD50	8 3TD52	10 3TD54	12 3TD56	14 3TD68
Rated insulation voltage		AC V	600	600	600	600	600
Conventional thermal current	Enclosed	A	150	200	260	400	550
Maximum horsepower ratings (Ⓢ and Ⓜ-approved values)							
Ratings of three-phase motors at 60 Hz	at 200 V	hp	40	50	75	125	200
	230 V	hp	50	60	100	150	229
	460 V	hp	100	125	200	300	464
	575 V	hp	125	150	250	400	582
NEMA/EEMAC ratings							
NEMA/EEMAC SIZE							
Conventional thermal current	Free air	A	–	4	–	5	6
	Enclosed	A	–	150	–	300	600
Ratings of three-phase motors at 60 Hz	at 200 V	hp	–	40	–	75	150
	230 V	hp	–	50	–	100	200
	460 V	hp	–	100	–	200	400
	575 V	hp	–	100	–	200	400
Overload relay	Type		3UA60	3UA62	3UA66	3UA66	3UA68
	Setting range	A	110 to 135	135 to 160	160 to 250	250 to 400	400 to 630

For short-circuit protection with overload relays, see Part 4.

The technical data is identical to that of the 3TF50 to 3TF69 contactors listed on pages 3/115 and 3/133 to 3/140.

The mechanical endurance is 10 million operating cycles, or 5 million operating cycles for 3TD68.

For the unassigned auxiliary contacts of the contactors, see the circuit diagrams of the control circuits on page 3/162.

The Ⓢ and Ⓜ approvals only apply to the complete contactor assemblies and not to the components for customer assembly.

3TE Contactor Assemblies

Technical data

Short-circuit protection of star-delta starters without overload relays

Starters	Size Type		6 3TE50	8 3TE52	10 3TE54	12 3TE56	14 3TE68
Main circuit							
Fuse links, utilization category gL/gG	NH	Type 3NA					
Single or double infeed	DIAZED	Type 5SB					
Circuit-breaker with C-characteristic	NEOZED	Type 5SE					
With fuse links		Type of coord. "1" 1)	400	400	500	800	1000
– acc. to IEC 60 947-4-1/DIN VDE 0660 Part 102		Type of coord. "2" 1)	224	250 ²⁾	400 ²⁾	500 ²⁾	500 ²⁾ 3)
Control circuit (short-circuit current $I_k \geq 1$ kA)							
Fuse links, utilization category gL/gG	DIAZED	Type 5SB	A	16;			
	NEOZED	Type 5SE	A	6 if the auxiliary contact of the overload relay is connected in the contactor coil circuit.			
Miniature circuit-breaker			A	10;			
C-characteristic			A	3 if the auxiliary contact of the overload relay is connected in the contactor coil circuit.			

For short-circuit protection with overload relays, see Part 4.

1) According to IEC 60 947-4-1/DIN VDE 0660 Part 102:
Type of coordination "1":
Destruction of the contactor and the overload relay is permissible. The contactor and/or overload relay must be replaced if necessary.

Type of coordination "2":
No damage can be tolerated to the overload relay, but contact welding on the contactor is permitted if the contacts can be easily separated.

2) Short-circuit protection of the line and delta contactors is required to make full use of the motor power in accordance with type of coordination "2" (double infeed).
3) Up to the maximum rated motor current (866 A).

Short-circuit protection with fuses for motor feeders with short-circuit currents up to 50 kA and 690 V

For size	Rated motor current		Overload relay	Setting range (the overload relays must be set to 0.58 times the rated motor current)	Permissible short-circuit fuses for starters, comprising contactor assemblies and overload relays, single or double infeed ²⁾							
					Fuse links		NH TYP 3ND Utilization category aM	Siemens Canada fuses HRC Style II	©-listed fuses CLASS K5	British Standard fuses BS88	Type of coord. ¹⁾	
Type	A	Type	A	NH	Type 3NA Type 5SB Typ5SE	"1"					"2"	A
6	95 to 138	3UA60 00-2H	55 to 80	250	160	100	150	150	160	160		
3TE50	138 to 190	3UA60 00-2X	80 to 110	400	200	125	200	175	315	160		
	155 to 207	3UA60 00-3H	90 to 120	400	224	160	200	175	315	160		
	190 to 220	3UA60 00-3J	110 to 135 (max. 128)	400	224	160	200	175	315	160		
8	190 to 233	3UA62 00-3J	110 to 135	315	160	160	200	175	315	160		
3TE52	207 to 259	3UA62 00-3K	120 to 150	315	160	200	250	200	315	160		
	233 to 276	3UA62 00-3L	135 to 160	355	224	200	250	200	355	224		
	259 to 300	3UA62 00-3M	150 to 180 (max. 174)	400	250	200	250	200	355	250		
10	215 to 345	3UA66 00-3B	125 to 200	355	224	250	300	300	355	224		
3TE54	276 to 430	3UA66 00-3C	160 to 250	500	400	250	300	300	355	315		
	345 to 480	3UA66 00-3D	200 to 320 (max. 278)	500	400	250	300	300	500	355		
12	276 to 430	3UA66 00-3C	160 to 250	500	400	250	300	300	355	315		
3TE56	345 to 552	3UA66 00-3D	200 to 320	500	400	250	300	300	500	355		
	430 to 690	3UA66 00-3E	250 to 400	800	500	400	400	400	800	450		
14	545 to 866	3UA68 00-3F	320 to 500	800	500	630	400	400	800	450		
3TE68	690 to 1090	3UA68 00-3G	400 to 630	1000	500 ³⁾	630	1000	1200 Class L	1000	500		

For short-circuit protection with overload relays, see Part 4.

Use a double infeed for higher rated motor currents (see circuit diagram on page 3/163).

1) According to IEC 60 947-4-1 and DIN VDE 0660 Part 102:

Type of coordination "1":
Destruction of the contactor and the overload relay is permissible. The contactor and/or overload relay must be replaced if necessary.

Type of coordination "2":

No damage can be tolerated to the overload relay, but contact welding on the contactor is permitted if the contacts can be easily separated.

2) The maximum rated motor current must not be exceeded.

3) Up to the maximum rated motor current (866 A).

3TE Contactor Assemblies

Technical data

Starters	Size			6	8	10	12	14
	Type			3TE50	3TE52	3TE54	3TE56	3TE68
Mechanical endurance		operating cycles		3 million	3 million	3 million	3 million	3 million
Size of contactors	Line	K1	Type	3TF50	3TF52	3TF54	3TF56	3TF68
	Delta	K3	Type	3TF50	3TF52	3TF54	3TF56	3TF68
	Star	K2	Type	3RT10 45	3TF50	3TF52	3TF54	3TF56
Unassigned auxiliary contacts of the contactors				1)	1)	1)	1)	1)
Load rating with AC-3 utilization category								
Reversing time up to 10 s								
Rated operational current	at 400 V	A		220	300	480	690	1090
	500 V	A		220	300	480	690	1090
	690 V	A		195	282	411	631	1043
Ratings of three-phase motors at 50 Hz and	at 230 V	kW		65	92	145	214	355
	400 V	kW		118	160	250	385	612
	500 V	kW		154	210	329	506	800
	690 V	kW		200	273	395	633	1046
	1000 V	kW		95	156	225	420	–
Operating frequency with overload relay			1/h	10	8	6	4	3
Load rating with AC-3 utilization category								
Reversing time up to 15 s								
Rated operational current	at 400 V	A		220	265	404	690	923
	500 V	A		220	265	404	690	923
	690 V	A		195	265	404	631	883
Ratings of three-phase motors at 50 Hz	at 230 V	kW		65	82	125	214	295
	400 V	kW		118	142	218	385	515
	500 V	kW		154	171	289	506	677
	690 V	kW		200	252	382	633	885
	1000 V	kW		95	156	225	420	–
Operating frequency with overload relay			1/h	10	8	6	3	2
Load rating with AC-3 utilization category								
Reversing time up to 20 s								
Rated operational current	at 400 V	A		200	230	350	600	800
	500 V	A		200	230	350	600	800
	690 V	A		195	230	350	574	765
Ratings of three-phase motors at 50 Hz	at 230 V	kW		59	73	108	187	244
	400 V	kW		107	124	189	335	444
	500 V	kW		140	162	244	439	590
	690 V	kW		186	217	330	582	770
	1000 V	kW		95	156	225	420	–
Operating frequency with overload relay			1/h	10	8	6	3	2

1) See the circuit diagrams of the control circuits on page 3/163.

Technical data

Short-circuit protection of contactors

Contactor	Size Type		6 3TK50	8 3TK52	10 3TK54	12 3TK56
Main circuit						
Fuse links, utilization category gL/gG	NH Type 3NA Type of coord. *1 ¹⁾	A	315	355	500	800
Fuse links, utilization category gR	SITOR Type 3NE Type of coord. *2 ¹⁾	A	250	350	500	500
Control circuit (short-circuit current $I_k \geq 1$ kA)						
Fuse links, utilization category gL/gG	DIAZED Type 5SB NEOZED Type 5SE	A	16	6 if the auxiliary contact of the overload relay is connected in the contactor coil circuit.		
Miniature circuit-breaker C-characteristic		A	10	3 if the auxiliary contact of the overload relay is connected in the contactor coil circuit.		

General data

Contactor	Size Type		6 3TK50	8 3TK52	10 3TK54	12 3TK56
Mechanical endurance						
Operating cycles	AC operation		10 million	10 million	10 million	10 million
	DC operation		3 million	3 million	3 million	3 million
Electrical endurance AC-1 utilization category at I_e						
	operating cycles		0.5 million	0.5 million	0.5 million	0.5 million
Rated insulation voltage U_i (pollution degree 3)						
		V	1000	1000	1000	1000
Rated impulse withstand voltage U_{imp}						
		kV	8	8	8	8
Permissible ambient temperature						
	in operation	°C	-25 to +55	-25 to +55	-25 to +55	-25 to +55
	when stored	°C	-55 to +80	-55 to +80	-55 to +80	-55 to +80
Degree of protection acc. to IEC 60 947-1 and DIN 40 050						
			IP 00/open type, coil system IP 40			
Power consumption of the coils (with coil in cold state and $1.0 \times U_s$)						
		Hz	50 60 50/60	50 60 50/60 ²⁾	50 60 50/60 ³⁾	50 60 50/60 ³⁾
AC operation	closing	VA	550 680 660/575	910 1090 1080	1430 1710 1780	2450 2960 3050
	p.f.	VA	0.45 0.4 0.45/0.4	0.38 0.31 0.36	0.34 0.26 0.32	0.21 0.18 0.23
	closed p.f.	VA	39 48 56/36	58 70 80	84 105 122	115 146 165
			0.24 0.25 0.24/0.25	0.26 0.28 0.27	0.24 0.27 0.23	0.33 0.33 0.29
DC economy circuit	closing	W	500	870	1210	1300
	closed	W	2.7	4.8	7.1	7.7
Coil voltage tolerance³⁾						
			0.8 to $1.1 \times U_s$			
Operating times at 0.8 to $1.1 \times U_s$⁴⁾ Break time = opening time + arcing time						
(The values apply with the coil in the cold state and at operating temperature)						
AC operation	closing time	ms	20 to 50	20 to 50	20 to 50	17 to 65
	opening time	ms	8 to 30	10 to 30	10 to 30	8 to 20
DC economy circuit	closing time	ms	25 to 40	25 to 70	30 to 65	35 to 75
	opening time	ms	170 to 210	10 to 20	10 to 20	10 to 20
Arcing time		ms	10 to 15	10 to 15	10 to 15	10 to 15
Operating times at $1.0 \times U_s$⁴⁾						
AC operation	closing time	ms	22 to 37	25 to 40	25 to 40	25 to 40
	opening time	ms	8 to 30	10 to 30	10 to 30	8 to 20
DC economy circuit	closing time	ms	28 to 32	32 to 45	36 to 45	40 to 55
	opening time	ms	185 to 195	10 to 20	10 to 20	10 to 20
Shock resistance						
rectangular pulse	AC	g/ms	9.3/5 5.2/10	10.3/5 5.75/10	9.9/5 5.5/10	8.8/5 4.9/10
	DC	g/ms	9/5 5/10	10.05/5 5.6/10	9.6/5 5.3/10	8.6/5 4.8/10
sine pulse	AC	g/ms	14.6/5 8.2/10	16.1/5 9/10	15.6/5 8.6/10	13.8/5 7.7/10
	DC	g/ms	14/5 7.9/10	15.8/5 8.8/10	15.1/5 8.3/10	13.5/5 7.6/10

1) According to excerpt from IEC 60 947-4-1/
DIN VDE 0660 Part 102:
Type of coordination *1*:
Destruction of the contactor and the overload
relay is permissible. The contactor and/or
overload relay must be replaced if necessary.

Type of coordination *2*:
No damage can be tolerated to the overload
relay, but contact welding on the contactor is
permitted if the contacts can be easily
separated.
2) The values apply at 50 Hz; at 60 Hz they are
slightly lower.

3) Coils for USA and Canada:
 0.85 to $1.1 \times U_s$ at 60 Hz.
4) The opening times of the NO contacts and the
closing times of the NC contacts increase if the
contactor coils are protected against voltage
peaks (varistor +2 ms to +5 ms).

3TK50 to 3TK56 Contactors

Technical data

Contactor	Size Type	6		8		10		12		
		3TK50		3TK52		3TK54		3TK56		
Operating frequency z										
	Operation:		AC	DC	AC	DC	AC	DC	AC	DC
Contactors without overload relays	No-load operating frequency	1/h	5000	1000	5000	1000	3000	1000	3000	1000
Rated operation	AC-1	1/h	650	650	650	650	650	650	650	650
	AC-3	1/h	1000	1000	1000	1000	1000	1000	1000	1000
Dependence of the operating frequency z' on the operational current I' and the operational voltage U':										
$z' = z \cdot \frac{I_e}{I'} \cdot \left(\frac{400V}{U'} \right)^{1.5} \text{ 1/h}$										

Conductor cross-sections

Screw connection

(1 or 2 conductor connections possible)

Main conductor:

Finely stranded with cable lug
Stranded with cable lug
Solid or stranded
Connecting bar (max. width)
Terminal screw
Tightening torque

	6	8	10	12
mm ²	35 to 95	50 to 240	50 to 240	50 to 240
mm ²	50 to 120	70 to 240	70 to 240	70 to 240
AWG	1/0 to 250 MCM	2/0 to 500 MCM	2/0 to 500 MCM	2/0 to 500 MCM
mm	20	25	25	25
	M 8 x 25	M 10 x 30	M 10 x 30	M 10 x 30
	10 to 14 Nm (89 to 124 lb.in)	14 to 24 Nm (124 to 210 lb.in)	14 to 24 Nm (124 to 210 lb.in)	14 to 24 Nm (124 to 210 lb.in)

–with box terminal¹⁾

Connection for laminated copper bar

Width
Max. thickness
Terminal screw
Hexagon socket
Tightening torque

	6	8	10	12
mm	9 to 18	15 to 24	15 to 24	15 to 24
mm	1 x 20 or 2 x 8	1 x 26 or 2 x 11	1 x 26 or 2 x 11	1 x 26 or 2 x 11
mm	5	6	6	6
	12 to 14 Nm (106 to 124 lb.in)	25 to 40 Nm (221 to 354 lb.in)	25 to 40 Nm (221 to 354 lb.in)	25 to 40 Nm (221 to 354 lb.in)

Auxiliary conductor:

Solid
Finely stranded with end sleeve
Pin-end connector (DIN 46 231)
Solid or stranded
Tightening torque

	6	8	10	12
mm ²	2 x (0.5 to 1); 2 x (1 to 2.5)	2 x (0.5 to 1); 2 x (1 to 2.5)	2 x (0.5 to 1); 2 x (1 to 2.5)	2 x (0.5 to 1); 2 x (1 to 2.5)
mm ²	2 x (0.5 to 1); 2 x (0.75 to 2.5)	2 x (0.5 to 1); 2 x (0.75 to 2.5)	2 x (0.5 to 1); 2 x (0.75 to 2.5)	2 x (0.5 to 1); 2 x (0.75 to 2.5)
mm ²	2 x (1 to 1.5)	2 x (1 to 1.5)	2 x (1 to 1.5)	2 x (1 to 1.5)
AWG	2 x (18 to 12)	2 x (18 to 12)	2 x (18 to 12)	2 x (18 to 12)
	0.8 to 1.4 Nm (7 to 12 lb.in)	0.8 to 1.4 Nm (7 to 12 lb.in)	0.8 to 1.4 Nm (7 to 12 lb.in)	0.8 to 1.4 Nm (7 to 12 lb.in)

1) See accessories on page 3/109.

Load ratings with AC

Contactor	Size Type		6 3TK50	8 3TK52	10 3TK54	12 3TK56	
AC-1 utilization category, switching resistive load							
Rated operational currents I_e		at 40 °C up to 690 V	A	200	340	400	530
		at 55 °C up to 690 V	A	190	315	380	500
		at 1000 V	A	80	100	150	200
Ratings of three-phase loads with p.f. = 1 (at 55 °C)		at 230 V	kW	72	120	144	190
		400 V	kW	125	207	250	329
		500 V	kW	164	272	329	433
		690 V	kW	217	360	434	571
		1000 V	kW	139	173	260	346
Minimum conductor cross-section with I_e load		at 40 °C	mm ²	95	185	240	2 x 185
		at 55 °C	mm ²	95	185	240	2 x 150
AC-2 and AC-3 utilization categories							
with an electrical endurance of 1.3 million operating cycles							
Rated operational currents I_e		up to 690 V	A	85	105	138	170
Ratings of motors with slipring or squirrel-cage rotor at 50 Hz and 60 Hz		at 230 V	kW	26	31.8	43.4	52
		400 V	kW	45	55	75	90
		500 V	kW	59	72	98	118
		690 V	kW	78	96	130	156

Load ratings with DC

DC-1 utilization category, switching resistive load ($L/R \leq 1$ ms)

Rated operational currents I_e (at 55 °C)	with 1 conducting path	24 V	A	190	315	380	500	
		60 V	A	140	315	380	500	
		110 V	A	18	18	33	33	
		220 V	A	3.4	3.4	3.8	3.8	
		440 V	A	0.8	0.8	0.9	0.9	
		600 V	A	0.5	0.5	0.6	0.6	
	with 2 conducting paths connected in series	24 V	A	190	315	380	500	
		60 V	A	190	315	380	500	
		110 V	A	190	315	380	500	
		220 V	A	20	20	380	500	
		440 V	A	3.2	3.2	4	4	
		600 V	A	1.6	1.6	2	2	
with 3 conducting paths connected in series	24 V	A	190	315	380	500		
	60 V	A	190	315	380	500		
	110 V	A	190	315	380	500		
	220 V	A	190	315	380	500		
	440 V	A	11.5	11.5	11	11		
	600 V	A	4	4	5.2	5.2		
DC-3 and DC-5 utilization categories, shunt and series motors								
Rated operational currents I_e (at 55 °C)	with 1 conducting path	24 V	A	190	315	380	500	
		60 V	A	7.5	7.5	11	11	
		110 V	A	2.5	2.5	3	3	
		220 V	A	0.6	0.6	0.6	0.6	
		440 V	A	0.17	0.17	0.18	0.18	
		600 V	A	0.12	0.12	0.125	0.125	
	with 2 conducting paths connected in series	24 V	A	190	315	380	500	
		60 V	A	190	315	380	500	
		110 V	A	190	315	380	500	
		220 V	A	2.5	2.5	2.5	2.5	
		440 V	A	0.65	0.65	0.65	0.65	
		600 V	A	0.37	0.37	0.37	0.37	
	with 3 conducting paths connected in series	24 V	A	190	315	380	500	
		60 V	A	190	315	380	500	
		110 V	A	190	315	380	500	
		220 V	A	190	315	380	500	
		440 V	A	1.4	1.4	1.4	1.4	
		600 V	A	0.75	0.75	0.75	0.75	
	Thermal load		10 s current ¹⁾	A	990	1450	1725	2300
	Power loss per conducting path		at $I_e/AC-1$	W	13	19	30	38

1) Acc. to DIN VDE 0660 Part 102.

3TK10 to 3TK17 Contactors

Technical data

Contactor	Type		3TK10	3TK11	3TK12	3TK13	3TK14	3TK15	3TK17							
Mechanical endurance	operat. cycles	mill.	10	10	10	10	5	5	5							
Electrical endurance at $I_e/AC-1$ and 55 °C	operat. cycles	mill.	0.8	0.8	0.8	0.4	0.65	0.5	0.4							
Rated insulation voltage U_i (pollution degree 3)		V	1000	1000	1000	1000	1000	1000	1000							
Permissible ambient temperature																
in operation		°C	-25 to +55													
when stored		°C	-50 to +70													
Degree of protection acc. to IEC 60 947-1 and DIN 40 050			IP 00													
Power consumption of the coils (with coil in cold state and $1.0 \times U_s$)		Hz	50	60	50	60	50	60	50	60	50	60	50	60		
closing		VA	820	990	820	990	1100	1200	1100	1200	3500	4000	3500	4000	3500	4000
p.f.			0.4	0.35	0.4	0.35	0.35	0.31	0.35	0.31	0.26	0.22	0.26	0.22	0.26	0.22
closed		VA	44	52	44	52	52	65	52	65	125	140	125	140	125	140
p.f.			0.34	0.35	0.34	0.35	0.35	0.34	0.35	0.34	0.4	0.43	0.4	0.43	0.4	0.43
Coil voltage tolerance			0.85 to $1.1 \times U_s$													
Operating times at $1.0 \times U_s$ Break time = opening time + arcing time																
closing time		ms	20 to 40		20 to 40		20 to 40		20 to 40		30 to 60		30 to 60		30 to 60	
opening time		ms	7 to 15		7 to 15		7 to 15		7 to 15		10 to 20		10 to 20		10 to 20	
arcing time		ms	10 to 15		10 to 15		10 to 15		10 to 150		10 to 15		10 to 15		10 to 15	
Operating frequency z																
Contactors without overload relays	No-load operating frequency	1/h	3600													
	for AC-1	1/h	600													
	for AC-3	1/h	600													
Dependence of the operating frequency z' on the operational current I' and the operational voltage U' :																
$z' = z \cdot \frac{I_e}{I'} \cdot \left(\frac{400V}{U'} \right)^{1.5}$ 1/h																
Shock resistance	sine pulse	g/ms	10/15													

Short-circuit protection of contactors without overload relays

Main circuit

Fuse links, utilization category gL/gG acc. to IEC 60 947-4/DIN VDE 0660 Part 102

NH Type 3NA
DIAZED Type 5SB
NEOZED Type 5SE

Type of coord. "1" 1)	A	250	250	355	355	800	1000	1000
Type of coord. "2" 1)	A	250	250	315	315	630	850	850

Control circuit

(short-circuit current $I_k \geq 1$ kA)

Fuse links, utilization category gL/gG

DIAZED Type 5SB	A	10	10	10	10	10	10	10
NEOZED Type 5SE	A	10	10	10	10	10	10	10

1) According to IEC 60 947-4-1 and DIN VDE 0660 Part 102:
Type of coordination "1":
Destruction of the contactor and the overload relay is permissible. The contactor and/or overload relay must be replaced if necessary.

Type of coordination "2":
No damage can be tolerated to the overload relay, but contact welding on the contactor is permitted if the contacts can be easily separated.

Conductor cross-sections

Contactor	Type		3TK10	3TK11	3TK12	3TK13	3TK14	3TK15	3TK17
Main conductor:									
Stranded with cable lug		mm ²	2 x 70	2 x 120	2 x 120	2 x 120	2 x 300	2 x 300	2 x 300
Solid or stranded	AWG	MCM	2 x 00	2 x 250	2 x 250	2 x 250	2 x 600	2 x 600	2 x 600
Connecting bars (max. width)		mm	30	30	33	33	55	55	55
Terminal screw			M 6	M 10	M 10	M 10	M 10	M 10	M 10
Tightening torque		Nm	5	16	16	16	16	16	16
		lb. in	42	135	135	135	135	135	135
Auxiliary conductor:									
Solid		mm ²	2 x (0.5 to 2.5)	2 x (0.5 to 2.5)	2 x (0.5 to 2.5)	2 x (0.5 to 2.5)	2 x (0.5 to 2.5)	2 x (0.5 to 2.5)	2 x (0.5 to 2.5)
Finely stranded with end sleeve		mm ²	2 x (0.5 to 2.5)	2 x (0.5 to 2.5)	2 x (0.5 to 2.5)	2 x (0.5 to 2.5)	2 x (0.5 to 2.5)	2 x (0.5 to 2.5)	2 x (0.5 to 2.5)
Solid or stranded	AWG	MCM	2 x (20 to 14)	2 x (20 to 14)	2 x (20 to 14)	2 x (20 to 14)	2 x (20 to 14)	2 x (20 to 14)	2 x (20 to 14)
Tightening torque		Nm	1.2	1.2	1.2	1.2	1.2	1.2	1.2
		lb. in	10	10	10	10	10	10	10

Load ratings with AC

AC-1 utilization category, switching resistive load									
Rated operational currents I_e	at 40 °C up to 690 V	A	200	250	300	350	550	800	1000
	at 55 °C up to 690 V	A	180	230	270	310	470	650	850
Ratings of three-phase loads p.f. = 0.95 (at 40 °C)	at 230 V	kW	76	95	114	132	208	303	378
	400 V	kW	132	165	197	230	362	527	658
	500 V	kW	165	206	247	288	452	658	828
	690 V	kW	227	284	341	397	624	908	1135
Minimum conductor cross-section with I_e load	at 40 °C	mm ²	95	150	185	240	2 x 185	2 x 240	2 x 300
AC-2 and AC-3 utilization categories									
Rated operational currents I_e (at 55 °C)	up to 400 V	A	120	145	210	210	400	550	700
Ratings of motors with slipring or squirrel-cage rotor at 50 Hz and 60 Hz	at 230 V	kW	30	45	75	75	110	160	220
	400 V	kW	55	75	110	110	200	280	370
Short-time current at 40 °C in cold state up to 10 s		A	900	1200	1600	1600	5300	5300	6400

3TC44 to 3TC56 Contactors

Technical data

Contactor	Size Type		2 3TC44	4 3TC48	8 3TC52	12 3TC56
Mechanical endurance	operating cycles		10 million	10 million	10 million	10 million
Rated insulation voltage U_i (pollution degree 3)	V		800	800	1000	1000
Permissible ambient temperature	in operation	°C	-25 to +55			
	when stored	°C	-50 to +80			
Degree of protection acc. to IEC 60 947-1 and DIN 40 050			IP 00/open type, with AC operation, coil system IP 40			
Power consumption of the coils (with coil in cold state and $1.0 \times U_s$)						
DC operation	closing = closed	W	10	19	30	86
		Hz	50 50/60 60 50/60	50 60	50 60	50 60
AC operation	closing	VA	68 79 95 73	300 365	640 730	1780 2140
	p.f.		0.86 0.83 0.79 0.78	0.5 0.45	0.48 0.38	0.30 0.30
	closed	VA	10 11 12 9	26 35	46 56	121 140
	p.f.		0.29 0.28 0.3 0.27	0.24 0.26	0.23 0.24	0.22 0.29
Coil voltage tolerance			0.8 to $1.1 \times U_s$			
Operating times			(The values apply up to and including 20% undervoltage and 10% overvoltage, and with the coil in the cold state and at operating temperature)			
Break time = opening time + arcing time						
DC operation	closing time	ms	35 to 190	90 to 380	120 to 400	110 to 400
	opening time ¹⁾	ms	10 to 25	17 to 28	22 to 35	40 to 110
AC operation	closing time	ms	10 to 40	20 to 50	20 to 50	20 to 50
	opening time ¹⁾	ms	5 to 25	5 to 30	10 to 30	10 to 30
Arcing time	DC-1	ms	20	20	20	20
	DC-3/5	ms	30	30	30	30
Operating frequency z						
DC and AC operation	with resistive load DC-1 utilization category	1/h	1500	1000	1000	1000
	with inductive load DC-3 and DC-5 utilization categories	1/h	750	600	600	600
Shock resistance	rectangular pulse	g/ms	7.5/5 and 3.4/10	10/5 and 5/10	12/5 and 5.5/10	12/5 and 5.6/10

Short-circuit protection of contactors

Main circuit

Fuse links, utilization category gL/gG	NH DIAZED NEOZED	Type 3NA Type 5SB Type 5SE	A	35 50	63 160	80 250	250 400
	I ²)		A				
	II ²)		A				

Control circuit

(short-circuit current $I_k \geq 1$ kA rms)

Fuse links, utilization category gL/gG	DIAZED NEOZED	Type 5SB Type 5SE	A	16; 6 if the auxiliary contact of the overload relay is connected in the contactor coil circuit.
Miniature circuit-breaker C-characteristic			A	10; 3 if the auxiliary contact of the overload relay is connected in the contactor coil circuit.

Conductor cross-sections

Screw connection

(1 or 2 conductor connections possible)

Main conductor:

Solid
Finely stranded with end sleeves
Stranded with cable lug
Pin-end connector (DIN 46 231)
Busbars
Terminal screw

Auxiliary conductor:

Solid
Finely stranded with end sleeve

mm ²	2 x (2.5 to 10)	–	–	–
mm ²	2 x (1.5 to 4)	–	–	–
mm ²	–	10 to 35	50 x 120	2 x 150
mm ²	2 x 1 to 6	–	–	–
mm	–	15 x 2.5	25 x 4	2 x (25 x 3)
	M 5	M 6	M 10	M 10
mm ²	2 x (1 to 2.5)	2 x (1 to 2.5)	2 x (1 to 2.5)	2 x (1 to 2.5)
mm ²	2 x (0.75 to 1.5)	2 x (0.75 to 1.5)	2 x (0.75 to 1.5)	2 x (0.75 to 1.5)

1) The opening times may increase if the contactor coils are protected against voltage peaks. Only 3TC44 contactors are allowed to be fitted with diodes.

2) Completely weld-free.

3) Slight, separable contact welding, no further damage.

3TC44 to 3TC56 Contactors

Technical data

Load ratings with DC

Contactor	Size Type		2 3TC44	4 3TC48	8 3TC52	12 3TC56	
DC-1 utilization category, switching resistive load ($L/R \leq 1$ ms)							
Rated operational currents I_e (at 55 °C)		up to U_e 750 V	A	32	75	220	400
Minimum conductor cross-section			mm ²	6	25	95	240
Ratings		at U_e 220 V	kW	7	16.5	48	88
		440 V	kW	14	33	97	176
		600 V	kW	19.2	45	132	240
		750 V	kW	24	56	165	300
DC-3 and DC-5 utilization categories, shunt and series motors ($L/R \leq 15$ ms)							
Rated operational currents I_e (at 55 °C)		up to U_e 220 V	A	32	75	220	400
		440 V	A	29	75	220	400
		600 V	A	21	75	220	400
		750 V	A	7.5	75	170	400
Ratings		at U_e 110 V	kW	2.5	6.5	20	35
		220 V	kW	5	13	41	70
		440 V	kW	9	27	82	140
		600 V	kW	9	38	110	200
		750 V	kW	4	45	110	250

3TC74, 3TC78 Contactors

Technical data

Contactor	Type		Single-pole contactors 3TC74	2-pole contactors 3TC78	
Mechanical endurance	operating cycles		30 million	30 million	
Rated insulation voltage U_i (pollution degree 3)		V	1500	1500	
Rated impulse withstand voltage U_{imp}		kV	8	8	
Permissible ambient temperature		°C	-25 to +55	-25 to +55	
Degree of protection acc. to IEC 60 947-1 and DIN 40 050			IP 00/open type	IP 00/open type	
Power consumption of the coils (with coil in cold state and $1.0 \times U_s$)					
DC operation	closing and closed ≤ 220 V	W	46	92	
AC operation	closing	VA	80	160	
	p.f.		0.95	0.95	
	closed	VA	80	160	
	p.f.		0.92	0.92	
Coil voltage tolerance					
DC operation	24 V		0.8 to $1.2 \times U_s$ 0.7 to $1.2 \times U_s$	0.8 to $1.2 \times U_s$ 0.7 to $1.2 \times U_s$	
	> 24 V				
AC operation	24 V		0.7 to $1.15 \times U_s$ 0.7 to $1.2 \times U_s$	0.7 to $1.15 \times U_s$ 0.7 to $1.2 \times U_s$	
	> 24 V				
Operating times Break time = opening time + arcing time			(The values apply up to and including 15% undervoltage and 10% overvoltage, and with the coil in the cold state and at operating temperature)		
DC and AC operation	closing time	ms	60 to 100	60 to 100	
	opening time	ms	20 to 35	20 to 35	
	arcing time at 0.06 to $4 \times I_e$	ms	40 to 70	40 to 70	
Operating frequency					
DC and AC operation	with resistive load, DC-1 utilization category	1/h	750	1000	
	with inductive load, DC-3 and DC-5 utilization categories	1/h	500	500	
Short-circuit protection					
Main circuit					
Fuse links, utilization category gL/gG	NH	Type 3NA	A	500	500
Control circuit (short-circuit current $I_k \geq 1$ kA rms)					
Fuse links, utilization category gL/gG	DIAZED NEOZED	Type 5SB Type 5SE	A	16 (6 if the auxiliary contact of the overload relay is connected in the contactor coil circuit).	
Miniature circuit-breaker C-characteristic			A	10 (3 if the auxiliary contact of the overload relay is connected in the contactor coil circuit).	
Conductor cross-sections					
Screw connection for contactors without motor protection	Main conductor: Stranded with cable lug Busbars		mm ²	2 x up to 150	2 x up to 150
			mm	2 x (30 x 4)	2 x (30 x 4)
	Auxiliary conductor: Solid		mm ²	1 to 2.5	1 to 2.5
	Finely stranded with end sleeve		mm ²	0.75 to 1.5	0.75 to 1.5
Load ratings with DC					
DC-1 utilization category, switching resistive load ($L/R \leq 1$ ms)					
Rated operational current I_e /DC-1 (at 55 °C)		A	500	500	
Minimum conductor cross-section		mm ²	2 x 150	2 x 150	
Ratings	at 220 V	kW	110	110	
	440 V	kW	220	220	
	600 V	kW	300	300	
	750 V	kW	375	375	
	1200 V	kW	–	600	
	1500 V	kW	–	750	
Critical currents at which the arc is not extinguished	440 V	A	≤ 7	–	
	600 V	A	≤ 13	–	
	750 V	A	≤ 15	–	
	≤ 880 V	A	–	≤ 7	
	1200 V	A	–	≤ 13	
	1500 V	A	–	≤ 15	
DC-3 and DC-5 utilization categories, switching DC motors			See selection and ordering data		
Permissible rated current for plugging at 110 V to 600 V		A	400		