3TB5 contactors with DC solenoid system, 3-pole, 55 ... 200 kW

Overview

3TB5 contactors with DC solenoid system, 3-pole, 55 ... 200 kW

EN 60947-4-1.

The contactors are climate-proof and finger-safe according to EN 50274.

Technical specifications

Contactor Type			3TB50	3TB52 to 3TB56
Rated data of the auxiliary contacts			Acc. to IEC 60947-5-1 (VDE 0660 Part 200)	
Rated insulation voltage U_i (degree of pollution 3)		V	690	
Continuous thermal current I_{th} =Rated operational current I_e/AC-12		A	10	
AC load **Rated operational current I_e/AC-15/AC-14** for rated operational voltage U_e				
	24 V	A	10	
	110 V	A	10	
	125 V	A	10	
	220 V	A	6	
	230 V	A	5.6	
	380 V	A	4	
	400 V	A	3.6	
	500 V	A	2.5	
	660 V	A	2.5	
	690 V	A	--	
DC load **Rated operational current I_e/DC-12** for rated operational voltage U_e				
	24 V	A	10	10
	60 V	A	10	10
	110 V	A	3.2	8
	125 V	A	2.5	6
	220 V	A	0.9	2
	440 V	A	0.33	0.6
	600 V	A	0.22	0.4
Rated operational current I_e/DC-13[1] for rated operational voltage U_e				
	24 V	A	10 (10)	10 (10)
	60 V	A	5 (7)	5 (4)
	110 V	A	1.14 (3.2)	2.4 (1.8)
	125 V	A	0.98 (2.5)	2.1 (1.6)
	220 V	A	0.48 (0.9)	1.1 (0.9)
	440 V	A	0.13 (0.33)	0.32 (0.27)
	600 V	A	0.075 (0.22)	0.21 (0.18)

Contactor Type		3TB50 to 3TB56
CSA and UL rated data for the auxiliary contacts		
Rated voltage	V AC, max.	600
Switching capacity		A 600, P 600

[1] Values in brackets apply to auxiliary contacts with delayed NC contact.

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Endurance of the main contacts

The characteristic curves show the contact endurance of the contactors when switching resistive and inductive AC loads (AC-1/AC-3) depending on the breaking current and rated operational voltage. It is assumed that the operating mechanisms are switched randomly, i.e. not synchronized with the phase angle of the supply system.

The rated operational current I_e complies with utilization category AC-4 (breaking six times the rated operational current) and is intended for a contact endurance of approx. 200 000 operating cycles.

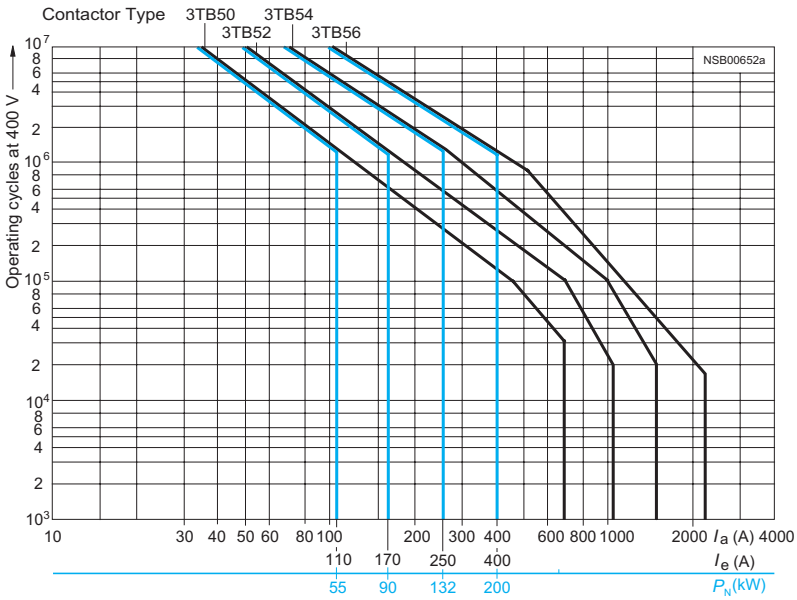
If a shorter endurance is sufficient, the rated operational current I_e/AC-4 can be increased.

If the contacts are used for mixed operation, i.e. normal switching (breaking the rated operational current according to utilization category AC-3) in combination with intermittent inching (breaking several times the rated operational current according to utilization category AC-4), the contact endurance can be calculated approximately from the following equation:

$$X = \frac{A}{1 + \frac{C}{100}\left(\frac{A}{B} - 1\right)}$$

Characters in the equation:
- X Contact endurance for mixed operation in operating cycles
- A Contact endurance for normal operation ($I_a = I_e$) in operating cycles
- B Contact endurance for inching (I_a = multiple of I_e) in operating cycles
- C Inching operations as a percentage of total switching operations

3TB50 to 3TB56 contactors



Legend for the diagrams:
P_N = Rated power for squirrel-cage motors at 400 V
I_a = Breaking current
I_e = Rated operational current

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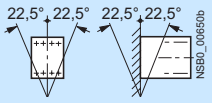
Contactor / Type / Size				3TB50 6	3TB52 8	3TB54 10	3TB56 12
General data							
Permissible mounting position **Installation instructions**[1] The contactors are designed for operation on a vertical mounting surface.							
Mechanical endurance			Operating cycles	10 million			
Electrical endurance				[2]			
Rated insulation voltage U_i			V	1000			
Safe isolation between the coil and the main contacts acc. to EN 60947-1, Appendix N			V	690			
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.				Yes, acc. to EN 60947-4-1, Appendix F			
Permissible ambient temperature	During operation During storage		°C °C	-25 ... +55 -50 ... +80			
Degree of protection acc. to EN 60947-1, Appendix C **Touch protection** acc. to EN 50274				IP00 (open), coil assembly IP40 Finger-safe with cover			
Shock resistance (rectangular pulse)			g/ ms	5/10	5.9/10	5.9/10	5.9/10
Short-circuit protection							
Main circuit Fuse links gL/gG LV HRC 3NA, DIAZED 5SB	Type of coordination "1" Type of coordination "2"		A A	250 224	315 250	400 315	630 500
Auxiliary circuit short-circuit current I_k ≥1 kA							
• Fuse links gL/gG, DIAZED 5SB, NEOZED 5SE			A	16			
• Miniature circuit breaker with C characteristic			A	10			
Control							
Magnetic coil operating range				0.8 ... 1.1 x U_s			
Power consumption of the magnetic coil (for cold coil and 1.0 x U_s) Closing = Closed			W	25	30	60	86
Operating times at 0.8 ... 1.1 x U_s Total break time = Opening delay + Arcing time				(The values apply up to and including 20 % undervoltage, 10 % overvoltage, as well as when the coil is cold and warm)			
• Closing delay			ms	105 ... 360	115 ... 400	105 ... 400	110 ... 400
• Opening delay[3]			ms	18 ... 30	22 ... 35	24 ... 55	40 ... 110
• Arcing time			ms	10 ... 15	10 ... 15	10 ... 15	10 ... 15
Operating times at 1.0 x U_s							
• Closing delay			ms	120 ... 230	130 ... 250	115 ... 250	120 ... 250
• Opening delay[3]			ms	20 ... 26	24 ... 32	35 ... 50	60 ... 95
Main circuit							
AC capacity							
Utilization category AC-1, switching resistive loads							
Rated operational current I_e	at 40 °C up to 690 V at 55 °C up to 690 V		A A	170 160	230 200	325 300	425 400
Rated power for AC loads[4] P.f. = 0.95 (at 55 °C)		230 V 400 V 500 V 690 V	kW kW kW kW	61 105 138 183	76 132 173 228	114 195 260 340	152 262 345 455
Minimum conductor cross-sections for loads with I_e			mm^2	70	95	185	240
Utilization category AC-2 and AC-3				[5]			
Utilization category AC-4 (for I_a = 6 x I_e)							
• The following applies to a contact endurance of about 200000 operating cycles:							
Rated operational current I_e			A	52	72	103	120
Rated power for squirrel-cage motors with 50 Hz and 60 Hz		230 V 400 V 500 V 690 V	kW kW kW kW	15.6 27 35 45	21 37 48 64	31 55 72 92	37.5 65 85.5 106
Max. rated operational current I_e /AC-4		at 400 V	A	110	170	250	400

1) For reversing duty, deviations from the vertical axis are not permitted.

2) See endurance of the main contacts.

3) The opening delay times can increase if the contactor coils are damped against voltage peaks.

4) Industrial furnaces and electric heaters with resistance heating, etc. (increased power consumption on heating up has been taken into account).

5) See selection table in Catalog LV 1.

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Contactor	Type Size			3TB50 6	3TB52 8	3TB54 10	3TB56 12
Main circuit							
AC capacity							
Switching low-inductance (low-loss, metallized dielectric) AC capacitors[1]							
Rated operational current I_e at 400 V			A	87	144	217	289
Rated power for single capacitors at 50 Hz	230 V		kvar	35	58	87	115
	400 V		kvar	60	100	150	200
	500 V		kvar	80	130	190	265
	690 V		kvar	60	100	150	200
Rated power for banks of capacitors (minimum inductance is 6 µH between capacitors connected in parallel) at 50 Hz	230 V		kvar	30	40	66	85
	400 V		kvar	50	70	115	150
	500 V		kvar	66	90	145	195
	690 V		kvar	50	70	115	150
DC capacity							
Utilization category DC-1 **Switching resistive loads (*L/R* ≤ 1ms)**							
Rated operational current I_e (at 55 °C)							
• 1 conducting path	24 V		A	160	200	300	400
	60 V		A	80	80	300	330
	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
• 2 conducting paths in series	24 V		A	160	200	300	400
	60 V		A	160	200	300	400
	110 V		A	160	200	300	400
	220 V		A	20	20	300	400
	440 V		A	3.2	3.2	4	4
	600 V		A	1.6	1.6	2	2
• 3 conducting paths in series	24 V		A	160	200	300	400
	60 V		A	160	200	300	400
	110 V		A	160	200	300	400
	220 V		A	160	200	300	400
	440 V		A	11.5	11.5	11	11
	600 V		A	4	4	5.2	5.2
Utilization category DC-3/DC-5 **Shunt-wound and series-wound motors (*L/R* ≤ 15 ms)**							
Rated operational current I_e (at 55 °C)							
• 1 conducting path	24 V		A	16	16	35	35
	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
• 2 conducting paths in series	24 V		A	160	200	300	400
	60 V		A	160	200	300	400
	110 V		A	160	200	300	400
	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
• 3 conducting paths in series	24 V		A	160	200	300	400
	60 V		A	160	200	300	400
	110 V		A	160	200	300	400
	220 V		A	160	200	300	400
	440 V		A	1.4	1.4	1.4	1.4
	600 V		A	0.75	0.75	0.75	0.75
Switching frequency							
Switching frequency *z* in operating cycles/hour							
• Contactors without overload relays	AC-1		h^{-1}	1000			
	AC-2		h^{-1}	500			
	AC-3		h^{-1}	500			
	AC-4		h^{-1}	250			
• Contactors with overload relays (mean value)			h^{-1}	15			

[1] Contact endurance 0.1 million operating cycles.

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Contactor	Type Size			3TB50 6	3TB52 8	3TB54 10	3TB56 12
Conductor cross-sections							
Screw terminals	**Main conductors:**			**Screw terminals**			
	• Finely stranded with cable lug		mm^2	16 ... 70	35 ... 95	50 ... 240	50 ... 240
	• Stranded with cable lug		mm^2	25 ... 70	50 ... 120	70 ... 240	70 ... 240
	• Busbars		mm	15 x 3	20 x 3	25 x 5	2 x (25 x 3)
	• Terminal screw			M6	M8	M10	M10
	Auxiliary conductors:						
	• Solid		mm^2	1 ... 2.5			
	• Finely stranded with end sleeve		mm^2	0.75 ... 1.5			
	• Pin-end connector (DIN 46231)		mm^2	2 x 1 ... 2.5			
	Protective conductors: Stranded with cable lug		mm^2	--	25 ... 70	35 ... 70	50 ... 120
CSA and UL rated data							
CSA rated data							
Uninterrupted current	Open		A	150	170	240	300
	Enclosed		A	135	153	215	270
Rated power for induction motors at 60 Hz (enclosed)		115 V	hp	25	30	40	50
		230 V	hp	50	60	75	100
		460 V	hp	100	120	150	200
		575 V	hp	125	160	200	250
Overload relays	Type			3RB20 56	3RB20 56	3RB20 66	3RB20 66
	Setting range		A	50 ... 200	50 ... 200	50 ... 250	200 ... 540
NEMA/EEMAC size	Contactors			4	4	4	5
	Starters (= contactors + overload relay, enclosed)			3	4	4	5
UL rated data							
Uninterrupted current	Open		A	150	150	240	390
	Enclosed		A	135	135	215	350
Rated power for induction motors at 60 Hz		115 V	hp	25	25	30	--
		230 V	hp	50	50	75	125
		460 V	hp	100	100	150	250
		575 V	hp	125	125	200	300[1]
Overload relays	Type			3RB20 56	3RB20 56	3RB20 66	3RB20 66
	Setting range		A	50 ... 200	50 ... 200	50 ... 250	200 ... 540
NEMA/EEMAC size	Contactors			4	4	4	5
	Starters (= contactors + overload relay, enclosed)			3	4	4	5
Short-circuit protection devices							
• CLASS RK5 fuses			A	400	400	450	600
• Circuit breakers acc. to UL 489			A	175	175	250	600

[1] At AC 575/AC 600 V max. rated motor current 325 A and motor starting current 3250 A.