Vacuum contactors, 3-pole, 335 ... 450 kW

Technical specifications

Contactor Type			3TF68 and 3TF69
Rated data for the auxiliary contacts			to IEC 60947-5-1/DIN VDE 0660 Part 200
Rated insulation voltage U_i (pollution degree 3)		V	690
Conventional thermal current I_{th} = rated operating current I_e/AC-12		A	10
AC load			
Rated operating current I_e/AC-15/AC-14 For rated operating 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	2.3
DC load			
Rated operating current I_e/DC-12 for rated operating voltage U_e			
	24 V	A	10
	48 V	A	10
	110 V	A	3.2
	125 V	A	2.5
	220 V	A	0.9
	440 V	A	0.33
	600 V	A	0.22
Rated operating current I_e/DC-13 For rated operating voltage U_e			
	24 V	A	10
	48 V	A	5
	110 V	A	1.14
	125 V	A	0.98
	220 V	A	0.48
	440 V	A	0.13
	600 V	A	0.07

Contactor Type			3TF68 and 3TF69
CSA and UL rated data for the auxiliary contacts			
Rated voltage		AC V, max.	600
Switching capacity			A 600, P 600

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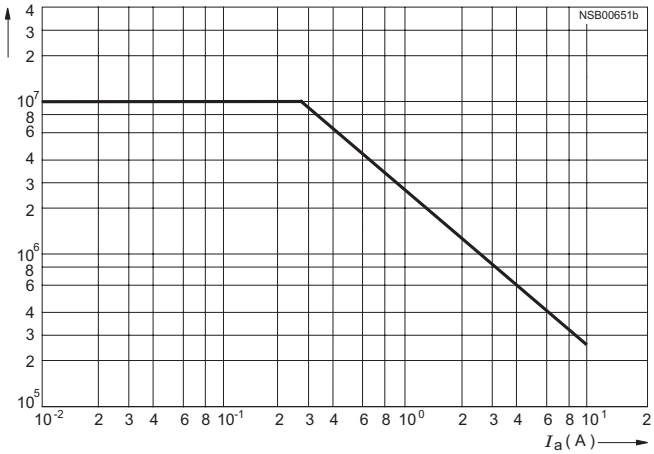
Contact endurance of auxiliary contacts

The contact endurance for utilization category AC-12 or AC-15/AC-14 depends mainly on the breaking current. It is assumed that the operating mechanisms are switched randomly, i.e. not synchronized with the phase angle of the supply system.

3TF68 and 3TF69
contactors at 230 V AC

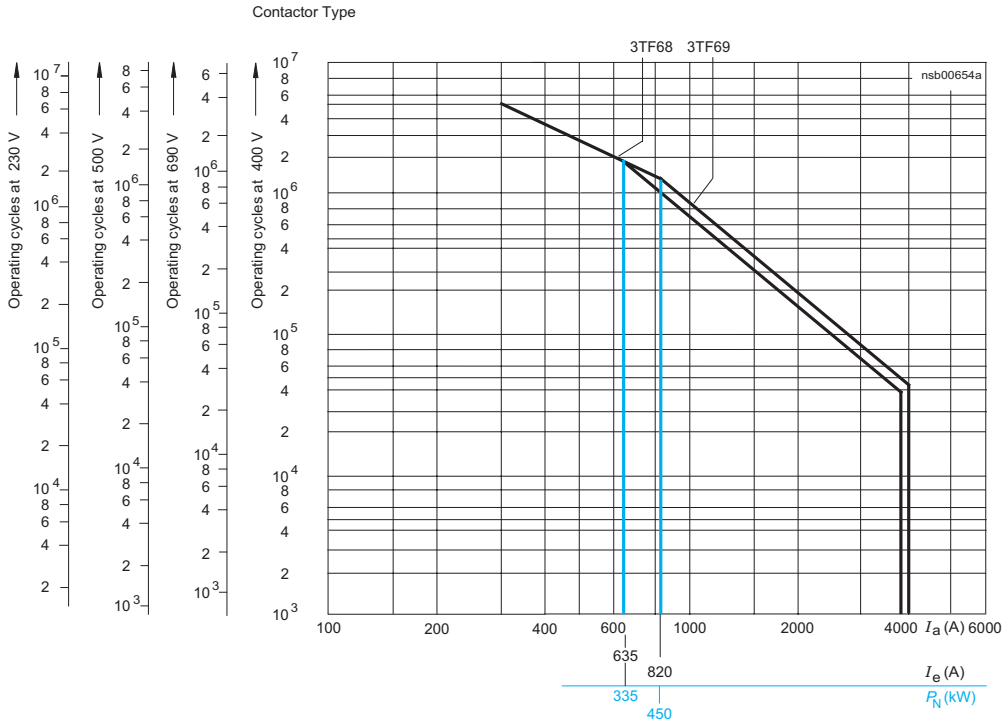


Contact erosion indication for 3TF68 and 3TF69 vacuum contactors

The contact erosion of the vacuum interrupters can be monitored in the closed position by means of three white double slides on the contactor base.

If the distance indicated by one of the double slides is < 0.5 mm while the contactor is in the closed position, the vacuum interrupter must be replaced. To ensure maximum reliability, it is recommended to replace all three vacuum interrupters.

Endurance of the main contacts



3TF68 and 3TF69 contactors

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

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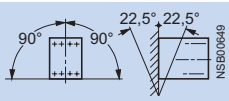
Contactor	Type Size		3TF68 14	3TF69 14
General data				
Permissible mounting position, mounting instructions [1)2)] The contactors have been designed for operation on a vertical mounting surface[3)].	AC operation and DC economy circuit			
Mechanical endurance	Operating cycles		5 million	
Electrical endurance	Operating cycles		[4)]	
Rated insulation voltage U_i (pollution degree 3)		V	1000	
Rated impulse withstand voltage U_{imp}		kV	8	
Safe isolation between coil and main contacts to DIN VDE 0106 Part 101 and A1 (draft 2/89)		V	1000	
Positively-driven/mirror contacts Positively-driven operation applies when the NC and NO contact cannot be closed at the same time. One NC contact each must be connected in series for the right and left auxiliary switch block respectively.			Yes, between main contacts and auxiliary NC contacts as well as within the auxiliary switch blocks to ZH 1/457, IEC 60947-4-1, Appendix F	
Permissible ambient temperature	For operation For storage	°C °C	-25 ... +55 -55 ... +80	
Degree of protection to IEC 60947-1/IEC 60529			IP00/open, drive system IP40	
Shock resistance				
Rectangular pulse	AC operation DC operation	g/ms g/ms	8.1/5 and 4.7/10 9/5 and 5.7/10	9.5/5 and 5.7/10 8.6/5 and 5.1/10
Sine pulse	AC operation DC operation	g/ms g/ms	12.8/5 and 7.4/10 14.4/5 and 9.1/10	13.5/5 and 7.8/10 13.5/5 and 7.8/10
Conductor cross-sections			See Page 2/77	
Electromagnetic compatibility (EMC)			See Page 2/72	
Short-circuit protection				
Main circuit Fuse-links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE				
- to IEC 60947-4-1/ EN 60947-4-1	Type of coordination "1" Type of coordination "2" Weld-free [5)]	A A A	1000 500 400	1250 630 500
Auxiliary circuit Fuse-links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE (weld-free protection at $I_k \geq$ 1kA) or miniature circuit-breaker with C characteristic (I_k < 400 A)		A	10	
Control circuit				
Coil operating range			0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$	
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_s)				
• AC operation, $U_{s\,max}$	- Closing - Closed	VA/p.f. VA/p.f.	1850 / 1 49 /0.15	950 /0.98 30.6 /0.31
• AC operation, $U_{s\,max}$	- Closing - Closed	VA/p.f. VA/p.f.	1200 / 1 13.5 /0.47	600 /0.98 12.9 /0.43
• DC economy circuit[6)]	- Closing at 24 V - Closed	W W	1010 28	960 20.6
For contactors of type 3TF68/69..-**Q**:				
• AC operation, $U_{s\,min}$ [7)]	- Closing - Closed	VA/p.f. VA/p.f.	1000 /0.99 11/1	1150/0.99 11/1
Operating times at 0.8 ... 1.1 x U_s (Total break time = Opening delay + Arcing time)			(values apply to cold and warm coil)	
• AC operation	- Closing delay - Opening delay	ms ms	70 ... 120 (22 ... 65)[8)] 70 ... 100	80 ... 120 70 ... 80
• DC economy circuit	- Closing delay - Opening delay	ms ms	76 ... 110 50	86 ... 280 19 ... 25
• Arcing time		ms	10 ... 15	10
For contactors of type 3TF68/69..-**Q**:				
• AC operation, $U_{s\,max}$	- Closing delay - Opening delay	ms ms	35 ... 90 65 ... 90	45 ... 160 30 ... 80
Operating times at 1.0 x U_s (Total break time = Opening delay + Arcing time)				
• AC operation	- Closing delay - Opening delay	ms ms	80 ... 100 (30 ... 45)[8)] 70 ... 100	85 ... 100 70
• DC economy circuit	- Closing delay - Opening delay	ms ms	80 ... 90 50	90 ... 125 19 ... 25
Minimum command duration for closing	Standard Reduced make time	ms ms	120 90	120 -
Minimum interval time between two ON commands		ms	100	300

1) To easily replace the laterally mounted auxiliary contacts, it is recommended to maintain a minimum distance of 30 mm between the contactors.
2) If mounted at a 90° angle (current paths are horizontally above each other), the operating frequency is reduced by 80% compared with the normal values.
3) The contactors can also be supplied for vertical mounting positions. The Order No. must include **"-Z"** and the order code **"B01"**.
4) See Page 2/74
5) Standard conditions for testing in accordance with IEC 60947-4-1.
6) At DC 24 V; for further voltages, deviations of up to ±10 % are possible.
7) Including reversing contactor.
8) Values in brackets apply to contactors with reduced operating times.

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Contactor Type Size			3TF68 14	3TF69 14
Main circuit				
Load rating with AC				
Utilization category AC-1, switching resistive loads				
Rated operating currents I_e	for 40 °C up to 690 V	A	700	910
	for 55 °C up to 690 V	A	630	850
	for 55 °C up to 1000 V	A	450	800
Rated output power of AC loads p.f. = 0.95 for 55 °C	for 230 V	kW	240	323
	400 V	kW	415	558
	500 V	kW	545	735
	690 V	kW	720	970
	1000 V	kW	780	1385
Minimum conductor cross-section for loads with I_e	for 40 °C	mm^2	2 x 240	$I_e \geq 800$ A: 2 x 260 x 5
	for 55 °C	mm^2	2 x 185	$I_e > 800$ A: 2 x 240
Utilization category AC-2 and AC-3				
Rated operating currents I_e	up to 690 V	A	630	820
	1000 V	A	435	580
Rated output power for slipring or squirrel-cage motors at 50 Hz and 60 Hz	for 230 V	kW	200	260
	400 V	kW	347	450
	500 V	kW	434	600
	690 V	kW	600	800
	1000 V	kW	600	800
Utilization category AC-4 (for $I_a = 6 \times I_e$)				
Rated operating current I_e	up to 690 V	A	610	690
Rating for squirrel-cage motors at 50 and 60 Hz	for 400 V	kW	355	400
• The following applies to contact endurances of about 200,000 operating cycles:				
- Rated operating currents I_e	up to 690 V	A	300	360
	1000 V	A	210	250
- Rated output power for squirrel-cage motors at 50 and 60 Hz	for 230 V	kW	97	110
	400 V	kW	168	191
	500 V [1]	kW	210	250
	690 V [1]	kW	278	335
	1000 V [1]	kW	290	350
Utilization category AC-6a, switching of AC transformers				
Rated operating currents I_e	up to 400 V			
• For inrush current = 20		A	513	675
• For inrush current = 30		A	342	450
Rated output power P				
• For inrush current = 20	230 V	kVA	195	256
	400 V	kVA	338	445
	500 V	kVA	444	584
	690 V	kVA	586	771
	1000 V	kVA	752	1003
• For inrush current n = 30 [2]	230 V	kVA	130	171
	400 V	kVA	226	297
	500 V	kVA	296	389
	690 V	kVA	390	514
	1000 V	kVA	592	778
Utilization category AC-6b, switching of low-inductance (low-loss, metallized dielectric) AC capacitors				
Rated operating currents I_e	up to 400 V	A	433	
Rated output power for single capacitors at 50 and 60 Hz	for 230 V	kvar	175	
	400 V	kvar	300	
	500 V	kvar	400	
	690 V	kvar	300	
Rated output power of bank of capacitors (minimum inductance is 6 µH between capacitors connected in parallel) at 50 and 60 Hz	for 230 V	kvar	145	
	400 V	kvar	250	
	500 V	kvar	333	
	690 V	kvar	250	

1) Maximum permissible operating current I_e/AC-4 = I_e/AC-3 up to 500 V, for reduced contact endurance and operating frequency.

2) For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n30} \cdot 30/x$

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Contactor	Type Size		3TF68 14	3TF69 14
Main circuit				
Load rating with AC				
Short-time current-carrying capacity (5 ... 30 s)				
• CLASS 5 and 10		A	630	820
• CLASS 15		A	630	662
• CLASS 20		A	536	572
• CLASS 25		A	479	531
• CLASS 30		A	441	500
• Thermal current-carrying capacity 10-s-current [1]			5040	7000
• **Power loss per conducting path** at I_e/AC-3/690 V		W	45	70
Operating frequency				
Operating frequency *z* in operating cycles/hour				
• Contactors without overload relay	No-load operating frequency AC	h^{-1}	2000	1000
	No-load operating frequency DC	h^{-1}	1000	1000
	AC-1	h^{-1}	700	700
	AC-2	h^{-1}	200	200
	AC-3	h^{-1}	500	500
	AC-4	h^{-1}	150	150
• Contactors with overload relay (mean value)		h^{-1}	15	15
Conductor cross-sections				
Screw terminals	**Main conductors**			
	• Bar connections			
	- Finely stranded with cable lug	mm^2	50 ... 240	50 ... 240
	- Stranded with cable lug	mm^2	70 ... 240	50 ... 240
	- Solid or stranded	AWG	2/0 ... 500 kcmil	2/0 ... 500 kcmil
	- Connecting bar (max. width)	mm	50	60 ($U_e \leq$ 690 V) 50 ($U_e >$ 690 V)
	• Terminal screw		M 10 x 30	M 12 x 40
	- Tightening torque	Nm	14 ... 24 (124 ... 210 lb.in)	20 ... 35 (177 ... 310 lb.in)
	• with box terminal [2]			
	- Connectable copper bars			
	- Width	mm	15 ... 25	15 ... 38
	- Max. depth	mm	1 x 26 or 2 x 11	1 x 46 or 2 x 18
	• Terminal screw		SW 6 (Inbus)	SW 8 (Inbus)
	- Tightening torque	Nm	25 ... 40 (221 ... 354 lb.in)	35 ... 50 (266 ... 443 lb.in)
	Auxiliary conductors			
	• Solid	mm^2	min. 2 x 0.5, max. 12 x 12.5	
	• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1) / 2 x (0.75 ... 2.5)	
	• Pin-end connector to DIN 46231	mm^2	2 x (1 ... 1.5)	
	• Solid or stranded	AWG	2 x (18 ... 12)	
	• Tightening torque	Nm	0.8 ... 1.4 (7 ... 12 lb.in)	
CSA and UL rated data				
Rated insulation voltage		AC V	600	600
Continuous current	Open and enclosed	A	630	820
Maximum horsepower ratings (CSA and UL approved values)				
Rated output power for induction motors at 60 Hz	at 200 V	hp	231	290
	230 V	hp	266	350
	460 V	hp	530	700
	575 V	hp	664	860
NEMA/EEMAC ratings				
SIZE			6	7
Continuous current	Open	A	600	820
	Enclosed	A	540	810
Rated output power for induction motors at 60 Hz	at 200 V	hp	150	-
	230 V	hp	200	300
	460 V	hp	400	600
	575 V	hp	400	600
Overload relay	Type		3RB12	
	Adjustment range	A	200 ... 820	

Short-circuit protection with overload relays,
see Protection devices: Overload relay -> SIRIUS overload relay.

1) In accordance with IEC 60947-4-1.

2) For accessories, see Page 2/198