SIRIUS 3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Overview

UC operation

The contactors can be operated with AC (40 to 60 Hz) as well as with DC.

Two types of solenoid operation are available:
- Conventional operating mechanism, version 3RT12 . . - . A
- Solid-state operating mechanism, version 3RT12 . . - . N

Withdrawable coils

For simple coil replacement, e. g. if the application is replaced, the solenoid coil can be pulled out upwards after the release mechanism has been actuated and can be replaced by any other coil of the same size.

Vacuum interrupters

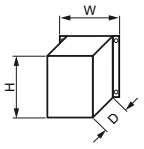
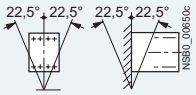
In contrast with the 3RT10 contactors – the main contacts operate in air under atmospheric conditions – the contact gaps of the 3RT12 vacuum contactors are contained in hermetically enclosed vacuum contact tubes. Neither arcs nor arcing gases are produced. The particular benefit of 3RT12 vacuum contactors, however, is that their electrical endurance is at least twice as long as that of 3RT10 contactors. They are therefore particularly well suited to frequent switching in jogging/mixed operation, e. g. in crane control systems.

Note:
Vacuum contactors are basically unsuitable for switching DC voltage.

Auxiliary contact complement

The contactors can be fitted with up to 8 lateral auxiliary contacts (identical auxiliary switch blocks from S2 to S12). Of these, no more than 4 are permitted to be NC contacts.

Technical specifications

Type			**3RT12 64**	**3RT12 65**	**3RT12 66**	**3RT12 75**	**3RT12 76**
Size			**S10**	**S12**			
Dimensions (W x H x D)		mm	145 x 210 x 206			160 x 214 x 225	
General data							
Permissible mounting positions The contactors are designed for operation on a vertical mounting surface.							
Mechanical endurance		Operating cycles	10 million				
Electrical endurance			1)				
Rated insulation voltage U_i (pollution degree 3)		V	1000				
Rated impulse withstand voltage U_{imp}		kV	8				
Protective separation 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		°C	-25 ... +60/+55 with AS-Interface				
• During storage		°C	-55 ... +80				
Degree of protection acc. to EN 60947-1, Appendix C			IP00/open, coil assembly IP20				
Touch protection acc.to EN 50274			Finger-safe with cover				
Shock resistance							
• Rectangular pulse		g/ms	8.5/5 and 4.2/10				
• Sine pulse		g/ms	13.4/5 and 6.5/10				
Conductor cross-sections			2)				
Electromagnetic compatibility (EMC)			3)				
Short-circuit protection							
Main circuit with fuse links gG, NH 3NA, DIAZED 5SB, NEOZED 5SE according to IEC 60947-4-1/ EN 60947-4-1							
• Type of coordination "1"		A	500			800	
• Type of coordination "2"		A	500			800	
• Weld-free[1]		A	400			500	
Auxiliary circuit							
• With fuse links gG, DIAZED 5SB, NEOZED 5SE (weld-free protection at $I_k \geq 1$ kA)		A	10				
• Or with miniature circuit breakers with C characteristic (short-circuit current $I_k \leq 400$ A)							

1) For endurance of the main contacts see page 2/34.
2) For conductor cross-sections see page 2/53.
3) For electromagnetic compatibility (EMC) see page 2/31.
4) Test conditions according to IEC 60947-4-1.

SIRIUS 3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Contactor	Type	3RT12 64	3RT12 65	3RT12 66	3RT12 75	3RT12 76
	Size	S10	S10	S10	S12	S12
Control circuit						
Operating range of the solenoid AC/DC (UC)		0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$				
Power consumption of the solenoid (when coil is cool and rated range $U_{s\,min}$ ... $U_{s\,max}$)						
Conventional operating mechanisms						
• AC operation						
- Closing at $U_{s\,min}$	VA/p.f.	530/0.9			700/0.9	
- Closing at $U_{s\,max}$	VA/p.f.	630/0.9			830/0.9	
- Closed at $U_{s\,min}$	VA/p.f.	6.1/0.9			7.6/0.9	
- Closed at $U_{s\,max}$	VA/p.f.	7.4/0.9			9.2/0.9	
• DC operation						
- Closing at $U_{s\,min}$	W	580			770	
- Closing at $U_{s\,max}$	W	700			920	
- Closed at $U_{s\,min}$	W	6.8			8.5	
- Closed at $U_{s\,max}$	W	8.2			10	
Solid-state operating mechanism						
• AC operation						
- Closing at $U_{s\,min}$	VA/p.f.	420/0.8			560/0.8	
- Closing at $U_{s\,max}$	VA/p.f.	570/0.8			750/0.8	
- Closed at $U_{s\,min}$	VA/p.f.	4.3/0.8			5.4/0.8	
- Closed at $U_{s\,max}$	VA/p.f.	5.6/0.8			7/0.8	
• DC operation						
- Closing at $U_{s\,min}$	W	460			600	
- Closing at $U_{s\,max}$	W	630			800	
- Closed at $U_{s\,min}$	W	3.4			4	
- Closed at $U_{s\,max}$	W	4.2			5	
Operating times (Total break time = Opening delay + Arcing time)						
Conventional operating mechanisms						
• For 0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$						
- Closing delay	ms	30 ... 95			45 ... 100	
- Opening delay	ms	40 ... 80			60 ... 100	
• For $U_{s\,min}$ ... $U_{s\,max}$						
- Closing delay	ms	35 ... 50			50 ... 70	
- Opening delay	ms	50 ... 80			70 ... 100	
• Arcing time	ms	10 ... 15			10 ... 15	

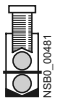
SIRIUS 3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Contactor	Type	3RT12 64	3RT12 65	3RT12 66	3RT12 75	3RT12 76
	Size	S10	S10	S10	S12	S12
Main circuit						
AC capacity						
Utilization category AC-1 Switching resistive loads						
• Rated operational currents I_e						
- At 40 °C up to 1000 V	A	330			610	
- At 60 °C up to 1000 V	A	300			550	
• Rated power for AC loads[1] with p.f.= 0.95 (at 60 °C)						
- At 415 V	kW	197			362	
• Minimum conductor cross-section for loads with I_e						
- At 40 °C	mm²	185			2 x 185	
- At 60 °C	mm²	185			2 x 185	
Utilization categories AC-2 and AC-3						
• Rated operational currents I_e						
- Up to 1000 V	A	225	265	300	400	500
• Rated power for slipring or squirrel-cage motors at 50 and 60 Hz						
- At 230 V	kW	73	85	97	132	164
- At 415 V	kW	128	151	171	231	291
- At 500 V	kW	160	189	215	291	363
- At 690 V	kW	223	265	288	400	507
- At 1000 V	kW	320	378	428	578	728
Thermal load capacity 10 sec current[2]	A	1800	2120	2400	3200	4000
Power loss per conducting path at I_e/AC-3	W	9	12	14	21	32
Utilization category AC-4 (for I_a = 6 x I_e)						
• Rated operational current I_e						
- Up to 690 V	A	195	230	280	350	430
• Rated power for squirrel-cage motors with 50 Hz and 60 Hz						
- At 415 V	kW	110	132	160	200	250
The following applies to a contact endurance of about 200 000 operating cycles:						
• Rated operational currents I_e						
- Up to 690 V	A	97	115	140	175	215
- Up to 1000 V	A	68	81	98	123	151
• Rated power for squirrel-cage motors with 50 Hz and 60 Hz						
- At 230 V	kW	30	37	45	56	70
- At 415 V	kW	55	65	79	98	122
- At 500 V	kW	68	81	98	124	153
- At 690 V	kW	94	112	138	172	212
- At 1000 V	kW	95	114	140	183	217
Switching frequency						
Switching frequency *z* in operating cycles/hour						
Contactors without overload relays						
• No-load switching frequency	h^{-1}	2 000				
• Dependence of the switching frequency z' on the operational current I' and operational voltage U': $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$						
- AC-1	h^{-1}	800	750		700	
- AC-2	h^{-1}	300	250		250	
- AC-3	h^{-1}	750	750		750	
- AC-4	h^{-1}	250	250		250	
Contactors with overload relays						
• Mean value	h^{-1}	60				

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

2) According to IEC 60947-4-1.
For rated values for various start-up conditions see "Protection Equipment" —> "Overload Relays".

SIRIUS 3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Contactor	Type Size		3RT12 6 . S10	3RT12 7 . S12
Conductor cross-sections				
Main conductors:			Screw terminals	
Box terminals			3RT19 66-4G box terminals	
Front clamping point connected				
 NSB0_00479 • Finely stranded with end sleeve		mm²	70 ...240	
• Finely stranded without end sleeve		mm²	70 ...240	
• Stranded		mm²	95 ...300	
• AWG cables, solid or stranded		AWG	3/0 ... 600 kcmil	
• Ribbon cable conductors (number x width x thickness)		mm	Min. 6 x 9 x 0.8; max. 20 x 24 x 0.5	
Rear clamping point connected				
 NSB0_00480 • Finely stranded with end sleeve		mm²	120 ...185	
• Finely stranded without end sleeve		mm²	120 ...185	
• Stranded		mm²	120 ...240	
• AWG cables, solid or stranded		AWG	250 ... 500 kcmil	
• Ribbon cable conductors (number x width x thickness)		mm	Min. 6 x 9 x 0.8; max. 20 x 24 x 0.5	
Both clamping points connected				
 NSB0_00481 • Finely stranded with end sleeve		mm²	Min. 2 x 50, max. 2 x 185	
• Finely stranded without end sleeve		mm²	Min. 2 x 50, max. 2 x 185	
• Stranded		mm²	Min. 2 x 70, max. 2 x 240	
• AWG cables, solid or stranded		AWG	Min. 2 x 1/0, max. 2 x 500 kcmil	
• Ribbon cable conductors (number x width x thickness)		mm	Max. 2 x (20 x 24 x 0.5)	
• Terminal screws - Tightening torque		 Nm	M12 (hexagon socket, A/F 5) 20 ... 22 (180 ... 195 lb.in)	
Auxiliary conductors:				
• Solid		mm²	2 x (0.5 ... 1.5)[2]; 2 x (0.75 ... 2.5)[2] according to IEC 60947; max. 2 x (0.75 ... 4)	
• Finely stranded with end sleeve		mm²	2 x (0.5 ... 1.5)[2]; 2 x (0.75 ... 2.5)[2]	
• AWG cables, solid or stranded		AWG	2 x (18 ... 14)	
• Terminal screws - Tightening torque		 Nm	M3 (PZ 2) 0.8 ... 1.2 (7 ... 10.3 lb.in)	

1) When connecting cable lugs to DIN 46234, the 3RT19 66-4EA1 terminal cover must be used for conductor cross-sections of 240 mm² and more as well as DIN 46235 for conductor cross-sections of 185 mm² and more to keep the phase clearance.

2) If two different conductor cross-sections are connected to one clamping point, both cross-sections must lie in the range specified. If identical cross-sections are used, this restriction does not apply.

Contactor	Type Size		3RT12 64 S10	3RT12 65 S10	3RT12 66 S10	3RT12 75 S12	3RT12 76 S12
cULus rating							
Rated insulation voltage		V AC	600			600	
Uninterrupted current, at 40 °C, open and enclosed		A	330			540	
Maximum horsepower ratings (CSA- and UL approved values)							
• Rated power for induction motors at 60 Hz							
- At 200 V		hp	60	75	100	125	150
- At 230 V		hp	75	100	125	150	200
- At 460 V		hp	150	200	250	300	400
- At 575 V		hp	200	250	300	400	500
Short-circuit protection[1]		kA	10	18	18	18	30
• CLASS L fuse		A	700	800	800	1200	1200
• Circuit breakers acc. to UL 489		A	500	700	900	1000	1200
NEMA/EEMAC ratings							
• NEMA/EEMAC size		hp	—	—	5	—	6
• Uninterrupted current							
- Open		A	—	—	300	—	600
- Enclosed		A	—	—	270	—	540
• Rated power for induction motors at 60 Hz							
- At 200 V		hp	—	—	75	—	150
- At 230 V		hp	—	—	100	—	200
- At 460 V		hp	—	—	200	—	400
- At 575 V		hp	—	—	200	—	400
Overload relays		Type	3RB20 66			3RB20 66	

SIRIUS 3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Selection and ordering data

AC/DC operation *(40 Hz to 60 Hz, DC)*
Auxiliary and control conductors: screw terminals
Withdrawable coils
Integrated coil circuit *(Varistor)*
Main conductors: busbar connections

3RT12 7 .

3RT12 7 .

Size	Rated data						Auxiliary contacts, lateral		Rated control supply voltage U_s	Screw terminals
	AC-2 and AC-3, T_u: Up to 60 °C					AC-1, T_u: 40 °C	Version			Order No.
	Operational current I_e up to	Rating of induction motors at 50 Hz and				Operational current I_e up to				
	1000 V	230 V	**415 V**	500 V	690 V	1000 V				
	A	kW	**kW**	kW	kW	A	NO	NC	V AC/DC	
Conventional operating mechanism										
S10	225	55	**110**	160	200	330	2	2	23 ... 26 110 ... 127 220 ... 240 380 ... 420	**3RT12 64-6AB36** **3RT12 64-6AF36** **3RT12 64-6AP36** **3RT12 64-6AV36**
	265	75	**132**	160	250	330	2	2	23 ... 26 110 ... 127 220 ... 240 380 ... 420	**3RT12 65-6AB36** **3RT12 65-6AF36** **3RT12 65-6AP36** **3RT12 65-6AV36**
	300	90	**160**	200	250	330	2	2	23 ... 26 110 ... 127 220 ... 240 380 ... 420	**3RT12 66-6AB36** **3RT12 66-6AF36** **3RT12 66-6AP36** **3RT12 66-6AV36**
S12	400	132	**200**	250	400	610	2	2	23 ... 26 110 ... 127 220 ... 240 380 ... 420	**3RT12 75-6AB36** **3RT12 75-6AF36** **3RT12 75-6AP36** **3RT12 75-6AV36**
	500	160	**250**	355	500	610	2	2	23 ... 26 110 ... 127 220 ... 240 380 ... 420	**3RT12 75-6AB36** **3RT12 76-6AF36** **3RT12 76-6AP36** **3RT12 75-6AV36**

For accessories, see page 2/176
For spare parts, see page 2/183

1) Built-in surge suppression: varistor circuit.
2) For EMC please refer technical details or please contact Sales Office.

Overview

IEC 60947-4-1, EN 60947-4-1 (VDE 0660 Part 102)

The 3TF68/69 contactors are climate-proof. They are finger-safe according to EN 50274. Terminal covers may have to be fitted onto the connecting bars, depending on the configuration with other devices (see Accessories and Spare Parts).

Function

Main contacts

Contact erosion indication with 3TF68/69 vacuum contactors

The contact erosion of the vacuum interrupters can be checked during operation with the help of 3 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 3 vacuum interrupters.

Auxiliary contacts

Contact reliability

The auxiliary contacts are suitable for solid-state circuits

- With currents ≥ 1 mA
- And voltages from 17 V.

Surge suppression

Control circuit

Protection of coils against overvoltages:

AC operation

- Fitted with varistors as standard

DC operation

Retrofitting options:

- With varistors

If TF68/TF69 is to be used for DC operation, an additional reversing contactor is required; this is included in the scope of supply in the same packaging as the vacuum contactor.

Electromagnetic compatibility

3TF68/69 . . - . **C** contactors for AC operation are fitted with an electronically controlled solenoid operating mechanism with a high interference immunity.

Contactor type	Rated control supply voltage U_s	Overvoltage type (IEC 60801)	Degree of severity (IEC 60801)	Overvoltage strength
3TF68 44-.C.., 3TF69 44-.C..	110 ... 132 V	Burst Surge	3 4 6 kV	2 kV
	200 ... 277 V	Burst Surge	4 4	4 kV 5 kV
	380 ... 600 V	Burst Surge	4 4	4 kV 6 kV

Note:

*During operation in installations in which the emitted interference limits cannot be observed, e.g. when used for output contactors in converters, 3TF68/69 . . - . **Q** contactors without a main conductor path circuit are recommended (see description below).*

Application

The standard 3TF68 . . - . C and 3TF69 . . - . C contactors with electronically controlled contactor mechanism, have high resistance to electromagnetic interference.

3TF6 vacuum contactors, 3-pole, 335 ... 450 kW

The 3TF68 . . - . Q and 3TF69 . . - . Q contactors have been designed for use in installations in which the AC control supply voltage is subject to very high levels of interference.

Causes for such interference can be, for example:

- Frequency converters which are operated nearby can cause periodic overvoltages at the control level of the contactors.
- High-energy pulses cause by switching operations and atmospheric discharges can cause interference on the control cables.

To reduce interference voltages caused by frequency converters, the manufacturer recommends the use of e.g. input filters, output filters, grounding or shielding in the installation.

Further measures that should be applied for overvoltage damping:

- Feeding the contactors using control transformer according to EN 60204 - rather than directly from the network
- Use of surge arresters, if required

For operating conditions where there are high interference voltages and no measures that reduce interference voltage coupling to the control voltage level have been taken, use of 3TF68 . . - . Q and 3TF69 . . - . Q contactors is highly recommended.

Version

The magnetic systems of the 3TF68 . . - . Q and 3TF69 . . - . Q contactors for AC operation are equipped with rectifiers for DC economy circuit.

A 3TC44 reversing contactor with a mounted series resistor is used to switch to the holding excitation.

The reversing contactor can be fitted separately. The reversing contactors is connected to the 3TF6 main contactor by means of a one-meter connecting cable with plug-in connectors.

Connection

Control circuit

The rectifier bridge is connected to varistors for protection against overvoltages. The built-in rectifier bridge affords sufficient protection for the coils.

Main circuit

As standard 3TF6 contactors with integrated RC varistors.

Protection of the main current paths

An integrated RC varistor connection for the main current paths of the contactors dampens the switching overvoltage rises to safe values. This prevents multiple restriking.

The operator of an installation can therefore rest assured that the motor winding cannot be damaged by switching overvoltages with steep voltage rises.

Important note: The overvoltage damping circuit is not required if 3TF68/69 contactors are used in circuits with DC choppers, frequency converters or speed-variable operating mechanisms, for example. It could be damaged by the voltage peaks and harmonics which are generated. This may cause phase-to-phase short-circuits in the contactors.

*Solution: Order special contactor version without overvoltage damping. The Order No. must include "**-Z**" and the order code "**A02**". Without additional charge.*

3TF6 vacuum contactors, 3-pole, 335 ... 450 kW

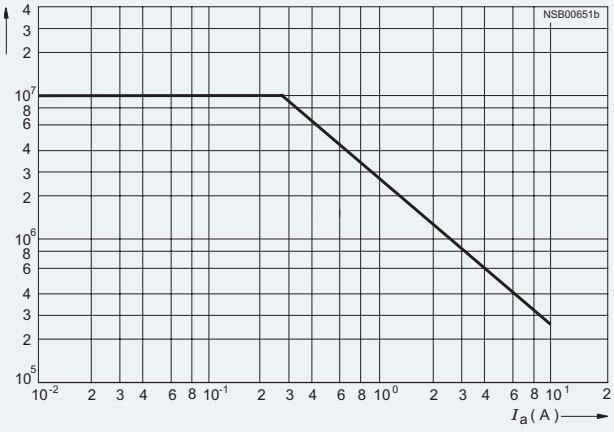
Technical specifications

Contactor	Type		3TF68 and 3TF69
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
	415 V	A	3.6
	500 V	A	2.5
	660 V	A	2.5
	690 V	A	2.3
DC load			
Rated operational current I_e/DC-12 for rated operational voltage U_e			
	24 V	A	10
	60 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 operational current I_e/DC-13 for rated operational voltage U_e			
	24 V	A	10
	60 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
CSA and UL rated data for the auxiliary contacts			
Rated voltage		V AC, max.	600
Switching capacity			A 600, P 600

Endurance of the 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



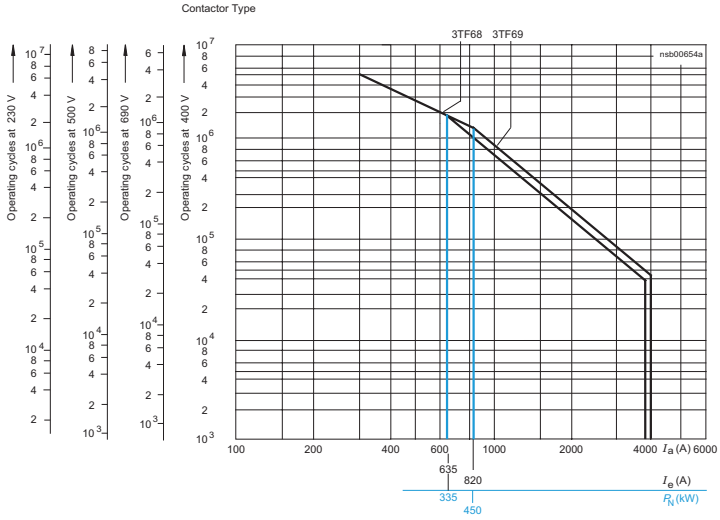
Contact erosion indication with 3TF68 and 3TF69 vacuum contactors

The contact erosion of the vacuum interrupters can be checked during operation with the help of 3 white double slides on the contactor base.

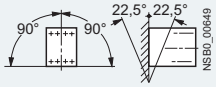
If the distance indicated by one of the double slides is < 0.5 mm while the contactor is in the closed position, the vacuum interrupter must be replaced. To ensure maximum reliability, it is recommended to replace all 3 vacuum interrupters.

3TF6 vacuum contactors, 3-pole, 335 ... 450 kW

Endurance of the main contacts



3TF68 and 3TF69 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

Contactor	Type Size		3TF68 14	3TF69 14
General data				
Permissible mounting position, installation instructions[1) 2)] The contactors are designed for operation on a vertical mounting surface.	AC operation and DC operation			
Mechanical endurance		Operating cycles	5 million	
Electrical endurance		Operating cycles	[3)]	
Rated insulation voltage U_i (degree of pollution 3)		kV	1	
Rated impulse withstand voltage U_{imp}		kV	8	
Safe isolation between the coil and the main contacts acc. to EN 60947-1, Appendix N		kV	1	
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact. One NC contact each must be connected in series for the right and left auxiliary switch block respectively.			Yes, acc. to EN 60947-4-1, Appendix F	
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +55 -55 ... +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	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 Conductor Cross-Sections	
Electromagnetic compatibility (EMC)			See Electromagnetic compatibility (EMC)	
Short-circuit protection				
Main circuit Fuse links, gL/gG LV HRC 3NA, DIAZED 5SB, NEOZED 5SE				
- acc. to IEC 60947-4-1/ EN 60947-4-1	• Type of coordination "1" • Type of coordination "2" • Weld-free[4)]	A A A	1000 500 400	1250 630 500
Auxiliary circuit				
• Fuse links gL/gG LV HRC 3NA, DIAZED 5SB, NEOZED 5SE (weld-free protection at $I_k \geq 1$kA)		A	10	
• Or miniature circuit breakers with C characteristic ($I_k < 400$ A)		A	10	

1) To easily replace the laterally mounted auxiliary switches it is recommended to maintain a minimum distance of 30 mm between the contactors.
2) If mounted at a 90° angle (conducting paths are horizontally above each other), the switching frequency is reduced by 80 % compared with the normal values.
3) See endurance of the auxiliary contacts.
4) Test conditions according to IEC 60947-4-1.

3TF6 vacuum contactors, 3-pole, 335 ... 450 kW

Contactor	Type Size		3TF68 14	3TF69 14
Control				
Magnetic 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	VA/p.f.	1850/1	950/0.98
	- Closed	VA/p.f.	49/0.15	30.6/0.31
• AC operation, $U_{s\,min}$	- Closing	VA/p.f.	1200/1	600/0.98
	- Closed	VA/p.f.	13.5/0.47	12.9/0.43
• DC economy circuit[1]	- Closing at 24 V	W	1010	960
	- Closed	W	28	20.6
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	ms	70 ... 120 (22 ... 65)[2]	80 ... 120
	- Opening delay	ms	70 ... 100	70 ... 80
• DC economy circuit	- Closing delay	ms	76 ... 110	86 ... 280
	- Opening delay	ms	50	19 ... 25
• Arcing time		ms	10 ... 15	10
Operating times at 1.0 x U_s (Total break time = Opening delay + Arcing time)				
• AC operation	- Closing delay	ms	80 ... 100 (30 ... 45)[2]	85 ... 100
	- Opening delay	ms	70 ... 100	70
• DC economy circuit	- Closing delay	ms	80 ... 90	90 ... 125
	- Opening delay	ms	50	19 ... 25
Minimum command duration	Standard	ms	120	120
for closing	Reduced make-time	ms	90	—
Minimum interval time between two ON commands		ms	100	300
Main circuit				
AC capacity				
Utilization category AC-1Switching resistive loads				
Rated operational currents I_e	at 40 °C up to 690 V	A	700	910
	at 55 °C up to 690 V	A	630	850
	at 55 °C up to 1000 V	A	450	800
Rated power for AC loads with p.f. = 0.95 at 55°C	415 V	kW	415	558
Minimum conductor cross-sections for loads	at 40°C	mm^2	2 x 240	$I_e \geq 800$ A: 2 x 60 x 5 (Cu busbars)
with I_e	at 55°C	mm_2	2 x 185	$I_e < 800$ A: 2 x 240
Utilization category AC-2 and AC-3				
Rated operational currents I_e	up to 690 V	A	630	820
	1000 V	A	435	580
Rated power for slipring or squirrel-cage motors	at 230 V	kW	200	260
at 50 Hz and 60 Hz	415 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 operational current I_e	up to 690 V	A	610	690
Rated power for squirrel-cage motors with 50 Hz and 60 Hz	at 415 V	kW	355	400
• The following applies to a contact endurance of about 200000 operating cycles:				
Rated operational currents I_e	up to 690 V	A	300	360
	1000 V	A	210	250
Rated power for squirrel-cage motors with 50 Hz	at 230 V	kW	97	110
and 60 Hz	415 V	kW	168	191
	500 V[3]	kW	210	250
	690 V[3]	kW	278	335
	1000 V[3]	A	290	350
Utilization category AC-6a switching AC transformers				
Rated operational currents I_e	up to 400 V			
•For inrush current n = 20		A	513	675
•For inrush current n = 30		A	342	450
Rating P				
For inrush current n = 20	415 V	kVA	338	445
For inrush current n = 30[4]	415 V	kVA	226	297
Utilization category AC-6b, **switching low-inductance (low-loss, metallized dielectric) AC capacitors**				
Rated operational currents I_e	up to 415 V	A	433	
Rated power for single capacitors at 50 and	at 230 V	kvar	175	
60 Hz	415 V	kvar	300	
	500 V	kvar	400	
	690 V	kvar	300	
Rated power for banks of capacitors	at 230 V	kvar	145	
(minimum inductance is 6 µH between	415 V	kvar	250	
capacitors connected in parallel)	500 V	kvar	333	
at 50 and 60 Hz	690 V	kvar	250	

1) At 24 V DC; for further voltages, deviations of up to ±10 % are possible.

2) Values in brackets apply to contactors with reduced operating times.

3) Max. permissible rated operational current I_e/AC-4 = I_e/AC-3 up to 500 V, for reduced contact endurance and reduced switching frequency.

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

3TF6 vacuum contactors, 3-pole, 335 ... 450 kW

Contactor	Type Size		3TF68 14	3TF69 14
Main circuit				
AC capacity				
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]		A	5040	7000
Power loss per conducting path at I_e/AC-3 /690 V		W	45	70
Switching frequency				
Switching frequency z in operating cycles/hour				
• Contactors without overload relays	No-load switching frequency AC	1/h	2000	1000
	No-load switching frequency DC	1/h	1000	1000
	AC-1	1/h	700	700
	AC-2	1/h	200	200
	AC-3	1/h	500	500
	AC-4	1/h	150	150
• Contactors with overload relays (mean value)		1/h	15	15
Conductor cross-sections				
• **Screw terminals**	**Main conductors:**		**Screw terminals**	
	• Busbar 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 MCM	2/0 ... 500 MCM
	- connecting bar (max. width)	mm	50	60 ($U_e \leq$ 690 V) 50 ($U_e >$ 690 V)
	• Terminal screw		M10 x 30 M12 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. thickness	mm	1 x 26 or 2 x 11	1 x 46 or 2 x 18
	- terminal screw		A/F 6 (hexagon socket)	A/F 8 (hexagon socket)
	- tightening torque	Nm	25 ... 40 (221 ... 354 lb.in)	35 ... 50 (266 ... 443 lb.in)
	Auxiliary conductors:			
	• Solid	mm^2	2 x (0.5 ... 1)[3]/2 x (1 ... 2.5)[3]	
	• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1)[3]/2 x (0.75 ... 2.5)[3]	
	• 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		V AC	600	600
Uninterrupted current	Open and enclosed	A	630	820
Maximum horsepower ratings (CSA and UL approved values)				
Rated 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		hp	6	7
Uninterrupted current	Open	A	600	820
	Enclosed	A	540	810
Rated 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 relays	Type		3RB12	
	Setting range	A	200 ... 820	

For short-circuit protection with overload relays see Protection Equipment: Overload Relays.

1) According to IEC 60947-4-1.

2) See Accessories and Spare Parts.

3) If two different conductor cross-sections are connected to one clamping point, both cross-sections must lie in the range specified. If identical cross-sections are used, this restriction does not apply.

3TF6 vacuum contactors, 3-pole, 335 ... 450 kW

Selection and ordering data

Auxiliary and control conductors: screw terminals Main conductors: busbar connections

Size 14

IEC 60947-4-1, EN 60947-4-1 (VDE 0660 Part 102)

The 3TF68/69 contactors are climate-proof.

They are finger-safe according to EN 50274.

Terminal covers may have to be fitted onto the connecting bars, depending on the configuration with other devices (see Accessories and Spare Parts on page 2/56).

3TF68

Rated data							Auxiliary contacts		Rated control	Screw terminals
AC-2 and AC-3, T_u: Up to 55 °C						AC-1,	Version			Order No.
Operational current I_e up to 690 V	Rating of induction motors at 50 Hz and 230 V	**415 V**	500 V	690 V	1000 V	Operational current I_e up to (at 40°C)				
A	kW	**kW**	kW	kW	kW	A	NO	NC	V	
AC operation[1) 2)] · 50/60 Hz										
630	200	**335**	434	600	—	700	4	4	110 ... 132 AC	**3TF68 44-0CF7**
									200 ... 240 AC	**3TF68 44-0CM7**
									380 ... 460 AC	**3TF68 44-0CQ7**
820	260	**450**	600	800	—	910	4	4	110 ... 132 AC	**3TF69 44-0CF7**
									200 ... 240 AC	**3TF69 44-0CM7**
									380 ... 460 AC	**3TF69 44-0CQ7**
DC operation · DC economy circuit										
630	200	**335**	434	600	—	700	3	3	24 DC	**3TF68 33-1DB4**
									110 DC	**3TF68 33-1DF4**
									220 DC	**3TF68 33-1DM4**
820	260	**450**	600	800	—	910	3	3	24 DC	**3TF69 33-1DB4**
									110 DC	**3TF69 33-1DF4**
									220 DC	**3TF69 33-1DM4**
AC operation · 50/60 Hz · Version for AC controls which are subject to strong electromagnetic interference										
630	200	**335**	434	600	—	700	3	3	110 ... 120 AC	**3TF68 33-1QG7**
									220 ... 240 AC	**3TF68 33-1QL7**
									380 ... 420 AC	**3TF68 33-1QV7**
820	260	**450**	600	800	—	910	3	3	110 ... 120 AC	**3TF69 33-1QG7**
									220 ... 240 AC	**3TF69 33-1QL7**
									380 ... 420 AC	**3TF69 33-1QV7**

For accessories, see page 2/188

For spare parts, see page 2/191

1) Built-in surge suppression: varistor circuit.

2) For EMC please refer technical details or please contact Sales Office.

3TF68/69 for 1000V application is available on request.