

3RT10 Contactors for Switching Motors

SIRIUS 3R



Technical data

Ⓢ and Ⓛ ratings of the contactors

Contactor	Size Type		S00 3RT10 15	S00 3RT10 16	S00 3RT10 17	S0 3RT10 24	S0 3RT10 25	S0 3RT10 26
Rated insulation voltage		AC V	600	600	600	600	600	600
Conventional thermal current	Free air and enclosed	A	20	20	20	35	35	35
Maximum horsepower ratings (Ⓢ and Ⓛ-approved values)								
Ratings of three-phase motors at 50/60 Hz		at 200 V hp 230 V hp 460 V hp 575 V hp	3 3 7½ 10	3 3 7½ 10	3 3 7½ 10	3 3 7½ 10	5 5 10 15	7½ 7½ 15 20
Short-circuit protection (contactor or overload relay)		kA	5	5	5	5	5	5
	Fuse or circuit-breaker acc. to UL 489	A	80	80	80	125	125	125
NEMA/EEMAC ratings								
	NEMA/EEMAC SIZE		–	–	0	–	–	1
Conventional thermal current	Free air	A	–	–	18	–	–	27
	Enclosed	A	–	–	18	–	–	27
Ratings of three-phase motors at 60 Hz		at 200 V hp 230 V hp 460 V hp 575 V hp	– – – –	– – – –	3 3 5 5	– – – –	– – – –	7½ 7½ 10 10
Overload relay	Type		3RU11 16			3RU11 2		
	Setting range	A	0.11 to 12			1.8 to 25		

Contactor	Size Type		S2 3RT10 34	S2 3RT10 35	S2 3RT10 36	S3 3RT10 44	S3 3RT10 45	S3 3RT10 46
Rated insulation voltage		AC V	600	600	600	600	600	600
Conventional thermal current	Free air and enclosed	A	45	55	50	90	105	105
Maximum horsepower ratings (Ⓢ and Ⓛ-approved values)								
Ratings of three-phase motors at 50/60 Hz		at 200 V hp 230 V hp 460 V hp 575 V hp	10 10 25 30	10 15 30 40	15 15 40 50	20 25 50 60	25 30 60 75	30 30 75 100
Short-circuit protection (contactor or overload relay)		kA	5	5	5	10	10	10
	Fuse or circuit-breaker acc. to UL 489	A	150	200	200	350	400	400
NEMA/EEMAC ratings								
	NEMA/EEMAC SIZE		–	–	2	–	–	3
Conventional thermal current	Free air	A	–	–	45	–	–	90
	Enclosed	A	–	–	45	–	–	90
Ratings of three-phase motors at 60 Hz		at 200 V hp 230 V hp 460 V hp 575 V hp	– – – –	– – – –	10 15 25 25	– – – –	– – – –	25 30 50 50
Overload relay	Type		3RU11 3			3RU11 4		
	Setting range	A	5.5 to 50			18 to 100		

Ⓢ and Ⓛ ratings of the auxiliary contacts

Contactor	Size		S00 Screw and Cage Clamp connections Integrated or snap-on auxiliary switch block	S0 to S3 Screw and Cage Clamp connections 4-pole, snap-on auxiliary switch block	Screw and Cage Clamp connections Single-pole, snap-on auxiliary switch block	Screw connection Laterally mountable auxiliary switch block
Rated voltage		V AC	600	600	600	600
Making and breaking capacity			A 600, Q 600	A 600, Q 600	A 600, Q 600	A 300, P 500
	Conventional thermal current at AC 240 V	A	10	10	10	10



Auxiliary circuit

Ratings of the auxiliary contacts acc. to IEC 60 947-5-1/EN 60 947-5-1 (VDE 0660 Part 200)

The data is valid for integrated auxiliary contacts and contacts in the auxiliary switch blocks for contactor sizes S00 to S3

Contactor	Sizes	S00 to S3	
Rated insulation voltage U_i (pollution degree 3) For laterally mountable 3RH19 21-1EA... and 3RH19 21-1KA... auxiliary switch blocks	V	690	
	V	max. 500	
Conventional thermal current I_{th} = rated operational current $I_e/AC-12$	A	10	

Load ratings with AC

Rated operational current $I_e/AC-15/AC-14$

at rated operational voltage U_e	V	A	
	24 V	A	6
	110 V	A	6
	125 V	A	6
	220 V	A	6
	230 V	A	6
	380 V	A	3
	400 V	A	3
	500 V	A	2
	660 V ²⁾	A	1
	690 V ²⁾	A	1

Load ratings with DC

Rated operational current $I_e/DC-12$

at rated operational voltage U_e	V	A	
	24 V	A	10
	60 V	A	6
	110 V	A	3
	125 V	A	2
	220 V	A	1
	440 V ²⁾	A	0.3
	600 V ²⁾	A	0.15

Rated operational current $I_e/DC-13$

at rated operational voltage U_e	V	A	
	24 V	A	10 ¹⁾
	60 V	A	2
	110 V	A	1
	125 V	A	0.9
	220 V	A	0.3
	440 V	A	0.14
	600 V ²⁾	A	0.1

Contact reliability at 17 V, 1 mA
acc. to IEC 60 947-5-4

Frequency of contact faults < 10⁻⁸
i.e. less than 1 fault per 100 million operating cycles

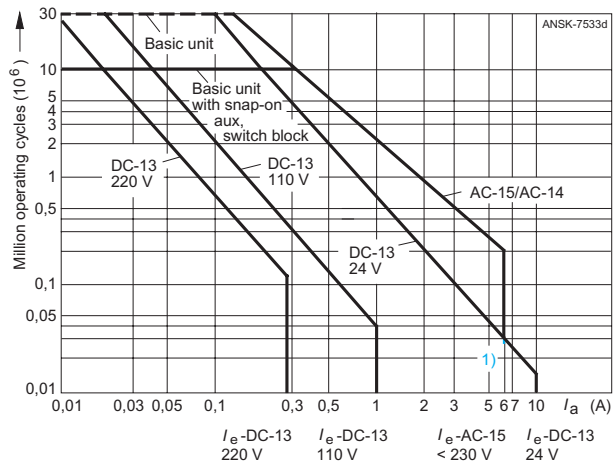
Endurance of the auxiliary contacts

It is assumed that the operating mechanisms are switched randomly, i. e. not synchronized with the phase angle of the supply system.

The contact endurance is mainly dependent on the breaking current.

The characteristic curves apply to:

- Integrated auxiliary contacts for 3RT10
- 3RH19 11 or 3RH19 21 auxiliary switch blocks for contactor sizes S00 to S3.



Legend:
 I_a = Breaking current
 I_e = Rated operational current

1) DC-13: Snap-on auxiliary switch blocks for size S00: 6 A.

2) For laterally mountable 3RH19 21-1EA... and 3RH19 21-1KA... auxiliary switch blocks: max. making and breaking capacity 500 V.

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Endurance of the main contacts

The characteristic curves show the contact endurance of the contactors when used to switch resistive and inductive three-phase loads (AC-1/AC-3), depending on the breaking current and the 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 for the AC-4 utilization category (breaking six times the rated operational current) is designed for a contact endurance of at least 200 000 operating cycles.

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

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

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

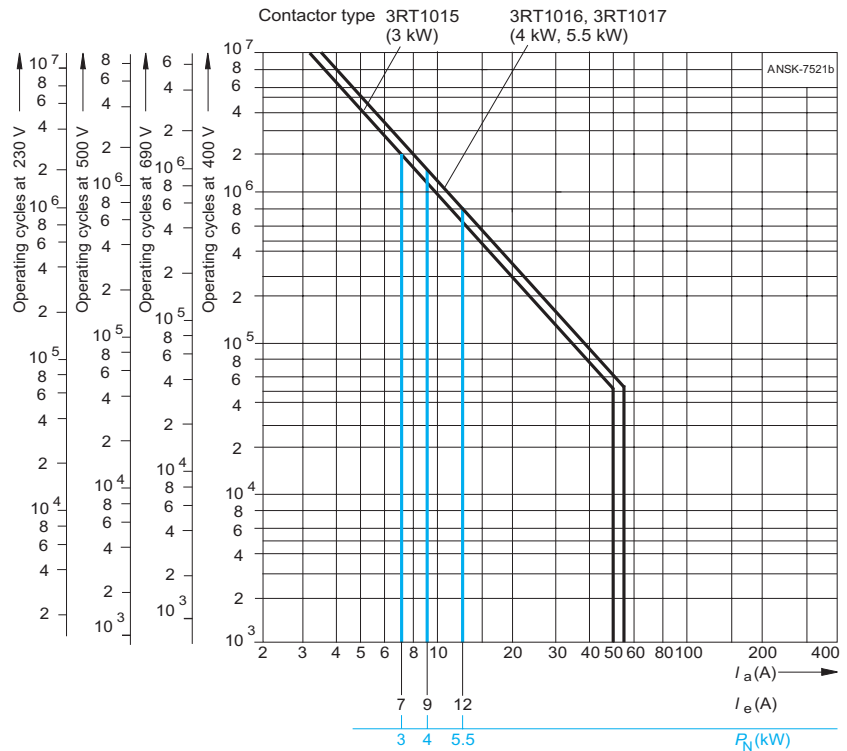
Where:

- 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 ($I_a = \text{multiple of } I_e$) in operating cycles
- C Inching operations as a percentage of total switching operations

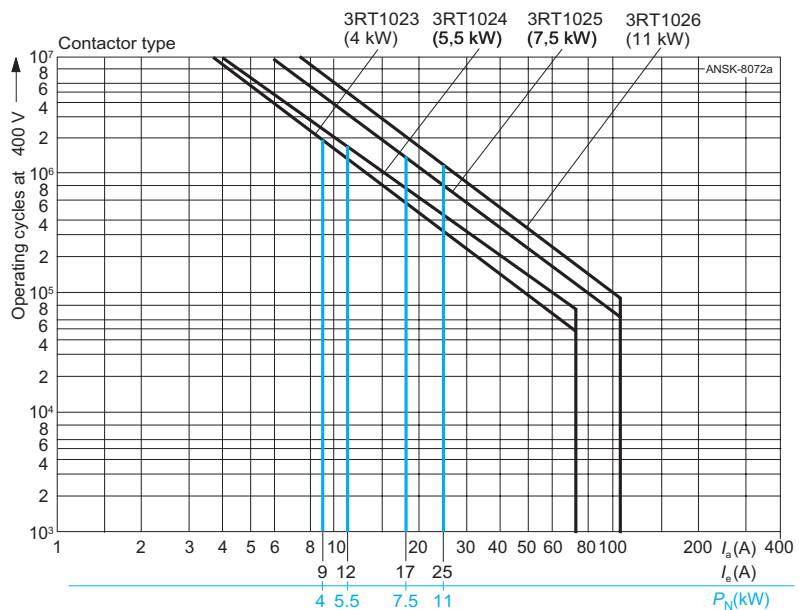
Legend:

- P_N = Ratings of three-phase motors with squirrel-cage rotor at 400 V
- I_a = Breaking current
- I_e = Rated operational current

Size S00



Size S0





Endurance of the main contacts

The characteristic curves show the contact endurance of the contactors when used to switch resistive and inductive three-phase loads (AC-1/AC-3), depending on the breaking current and the 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 for the AC-4 utilization category (breaking six times the rated operational current) is designed for a contact endurance of at least 200 000 operating cycles.

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

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

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

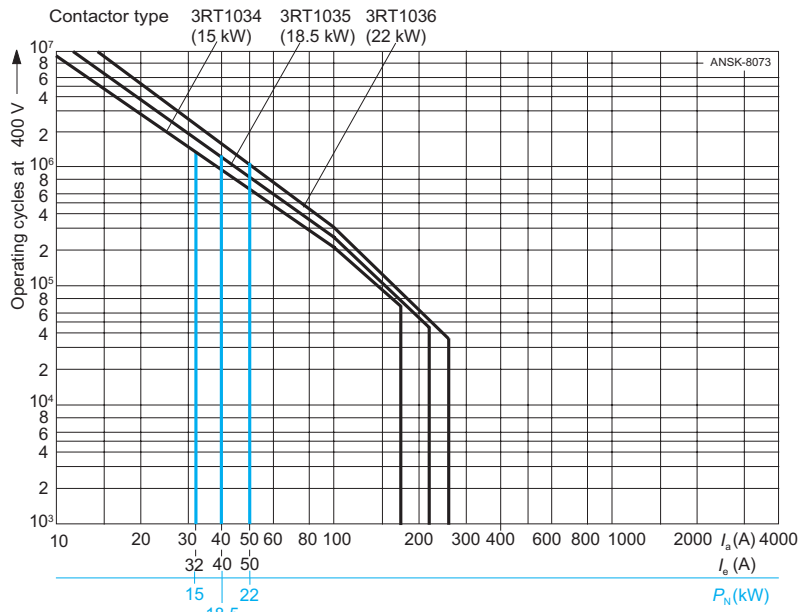
Where:

- 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 ($I_a = \text{multiple of } I_e$) in operating cycles
- C Inching operations as a percentage of total switching operations

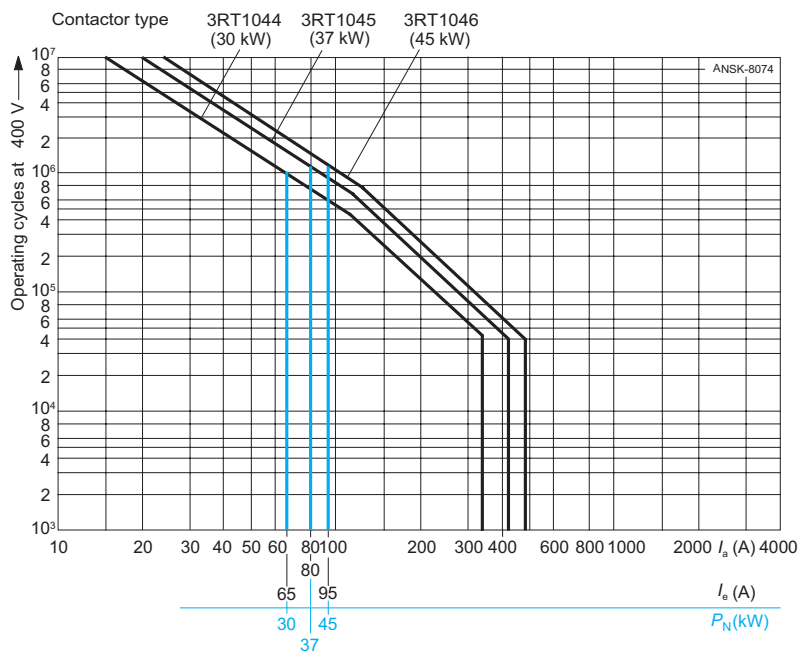
Legend:

- P_N = Ratings of three-phase motors with squirrel-cage rotor at 400 V
- I_a = Breaking current
- I_e = Rated operational current

Size S2



Size S3



3RT1. 1. Contactors for Switching Motors

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Technical data

Contactor	Size Type		S00 3RT1. 1.
Mechanical endurance	Basic units	Oper. cycles	30 million
	Basic unit with snap-on auxiliary switch block		10 million
	Basic unit with snap-on, solid-state compatible auxiliary switch block		5 million
Rated insulation voltage U_i (pollution degree 3)		V	690
Positively driven contacts			Yes, in the basic unit and the auxiliary switch block as well as between the basic unit and the snap-on auxiliary switch block. The solid-state compatible auxiliary switch blocks have no positively driven contacts.
Permissible ambient temperature		in operation °C when stored °C	-25 to +60 -55 to +80
Degree of protection acc. to IEC 60 947-1 and DIN 40 050			IP 20, coil system IP 40
Shock resistance	Rectangular pulse	AC operation	g/ms 7/5 and 4.2/10
		DC operation	g/ms 7/5 and 4.2/10
	Sine pulse	AC operation	g/ms 9.8/5 and 5.9/10
		DC operation	g/ms 9.8/5 and 5.9/10

Conductor cross-sections

Screw connections (1 or 2 conductor connections possible) For screwdriver size 2 and Pozidriv 2	Main and auxiliary conductors:		
	Solid	mm ²	2 x (0.5 to 1.5); 2 x (0.75 to 2.5) acc. to IEC 60 947; max. 2 x (0.75 to 4)
	Finely stranded with end sleeve	mm ²	2 x (0.5 to 1.5); 2 x (0.75 to 2.5)
	AWG conductor connections, solid or stranded	AWG	2 x (18 to 14)
	- Terminal screws		M3
	- Tightening torque	Nm	0.8 to 1.2 (7 to 10.3 lb.in)
Cage Clamp connections (1 or 2 conductor connections possible)	Main and auxiliary conductors; coil terminals:		
	Solid	mm ²	2 x (0.5 to 2.5)
	Finely stranded with end sleeve	mm ²	2 x (0.5 to 1.5)
	Finely stranded without end sleeve	mm ²	2 x (0.5 to 2.5)
	AWG conductor connections, solid or stranded	AWG	2 x (18 to 14)

- An "insulation stop" must be used for conductor cross-sections $\leq 1 \text{ mm}^2$, see accessories on page 3/28.
- Max. outer diameter of conductor insulation: 3.6 mm.
- For information about Cage Clamp connections, see page 6.

Short-circuit protection of contactors without overload relays

For short-circuit protection of contactors with overload relays, see Part 4.
For short-circuit protection of fuseless load feeders, see Part 5.

Main circuit			
Fuse links, utilization category gL/gG			
NH Type 3NA, DIAZED Type 5SB, NEOZED Type 5SE			
- acc. to IEC 60 947-4-1/EN 60 947-4-1 (VDE 0660 Part 102)			
	Type of coord. "1" 1)	A	35
	Type of coord. "2" 1)	A	20
	Weld-free	A	10
or miniature circuit-breaker (up to 230 V) with C-characteristic			A 10
Auxiliary circuit			
Fuse links, utilization category gL/gG			A 10
DIAZED Type 5SB, NEOZED Type 5SE (weld-free protection at $I_k \geq 1 \text{ kA}$)			
or miniature circuit-breaker (up to 230 V) with C-characteristic (short-circuit current $I_k < 400 \text{ A}$)			A 6

1) According to excerpt from IEC 60 947-4-1 (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.

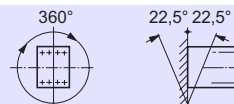


Contactors	Size Type	S00 3RT1. 1.
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Permissible mounting position

The contactors are designed for operation on a vertical mounting surface.

AC and DC operation

**Upright mounting position:**

AC operation



Special design required
Positions 13 to 16 of the Order No. must be changed to **-1AA0**.

DC operation

Standard design (not applicable to coupling relays,
please ask for details)

Control circuit**Coil voltage tolerance**

AC

at 50 Hz: 0.8 to 1.1 x U_s
at 60 Hz: 0.85 to 1.1 x U_s

DC

at +50 °C: 0.8 to 1.1 x U_s
at +60 °C: 0.85 to 1.1 x U_s

Power consumption of the coils (with coil in cold state and 1.0 x U_s)

			Standard design	For USA and Canada	
AC operation		Hz	50/60	50	60
	closing	VA	26.5 / 24.3	26.4	31.7
	p.f. closed	VA	0.79 / 0.75	0.81	0.77
	p.f. opening	VA	4.4 / 3.4	4.7	5.1
			0.27 / 0.27	0.26	0.27
DC operation	closing = closed	W	3.2		

Permissible residual current of the electronics
(with 0 signal)

AC operation

mA

$$< 3 \text{ mA} \times \left(\frac{230 \text{ V}}{U_s} \right)$$

DC operation

mA

$$< 10 \text{ mA} \times \left(\frac{24 \text{ V}}{U_s} \right)$$

The 3RT19 16-1GA00 additional load module is recommended for higher residual currents²⁾

Operating times¹⁾

Break-time = opening time + arcing time

• AC operation at 0.8 to 1.1 x U_s	closing time	ms	8 to 35
	opening time	ms	4 to 18
• DC operation at 0.85 to 1.1 x U_s	closing time	ms	25 to 100
	opening time	ms	7 to 10
Arcing time		ms	10 to 15

Operating times at 1.0 x U_s ¹⁾

AC operation	closing time	ms	10 to 25
	opening time	ms	5 to 18
DC operation	closing time	ms	30 to 50
	opening time	ms	7 to 9

Main circuit**Load ratings with AC**

Contactors	Size Type		S00 3RT1. 15	S00 3RT10 16	S00 3RT1. 17	S00 3RT13 16 3RT15 16	
AC-1 utilization category, switching resistive load							
Rated operational currents I_e		at 40 °C up to 690 V	A	18	22	22	18
		at 60 °C up to 690 V	A	16	20	20	16
Ratings of three-phase loads ³⁾ p.f. = 0.95 (at 60 °C)		at 230 V	kW	6.3	7.5	7.5	6.5
		400 V	kW	11	13	13	11
		500 V	kW	13.8	17	17	14
		690 V	kW	19	22	22	19
Minimum conductor cross-section with I_e load		at 40 °C	mm ²	2.5	2.5	2.5	2.5
		60 °C	mm ²	2.5	2.5	2.5	2.5

1) 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 (suppression diode 6 to 10 times, diode assemblies 2 to 6 times, varistor +2 ms to 5 ms).

2) See accessories on page 3/34.

3) Industrial furnaces and electric heaters with resistance heating, for example (higher current input allowed for during heating up).

3RT1. 1. Contactors for Switching Motors

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Technical data

Main circuit

Load ratings with AC

Contactor	Size Type		S00 3RT1. 15	S00 3RT1. 16	S00 3RT1. 17
AC-2 and AC-3 utilization categories					
Rated operational currents I_e	up to 400 V	A	7	9	12
		500 V A	5	6.5	9
	690 V	A	4	5.2	6.3
Ratings of motors with slipping or squirrel-cage rotor at 50 Hz and 60 Hz	at 127 V	kW	0.85	1.1	1.5
		200 V kW	1.6	2.2	3
		220 V kW	2.2	3	3
		230 V kW	2.2	3	3
		240 V kW	2.2	3	3
		380 V kW	3	4	5.5
		400 V kW	3	4	5.5
		415 V kW	3	4	5.5
		440 V kW	3	4	5.5
		460 V kW	3	4	5.5
		500 V kW	3.5	4.5	5.5
		575 V kW	3.5	4.5	5.5
		660 V kW	4	5.5	5.5
		690 V kW	4	5.5	5.5
		Thermal load	10 s current ¹⁾	A	56
Power loss per conducting path	at $I_e/AC-3$	W	0.42	0.7	1.24
AC-4 utilization category (contact endurance approx. 200 000 operating cycles at $I_a = 6 \times I_e$)					
Rated operational currents I_e	up to 400 V	A	2.6	4.1	4.1
		690 V A	1.8	3.3	3.3
Ratings of motors with squirrel-cage rotor at 50 Hz and 60 Hz	at 127 V	kW	0.3	0.5	0.5
		200 V kW	0.6	1.1	1.1
		220 V kW	0.6	1.1	1.1
		230 V kW	0.67	1.1	1.1
		240 V kW	0.67	1.1	1.1
		380 V kW	1.15	2	2
		400 V kW	1.15	2	2
		415 V kW	1.15	2	2
		440 V kW	1.15	2	2
		460 V kW	1.15	2	2
		500 V kW	1.45	2	2
		575 V kW	1.45	2	2
		660 V kW	1.15	2.5	2.5
		690 V kW	1.15	2.5	2.5
		AC-5a utilization category, switching gas discharge lamps per main conducting path at 230 V			
	Rating per lamp	Rated operational current per lamp (A)			
	uncorrected				
	L 18 W	0.37	units	30	43
	L 36 W	0.43	units	26	37
	L 58 W	0.67	units	16	23
	lead-lag				
	L 18 W	0.11	units	100	144
	L 36 W	0.21	units	54	76
	L 58 W	0.32	units	35	50
Switching gas discharge lamps with correction, electronic ballast per main conducting path at 230 V					
	Rating per lamp	Capacitor (µF)	Rated operational current per lamp (A)		
Parallel correction					
	L 18 W	4.5	0.11	units	16
	L 36 W	4.5	0.21	units	16
	L 58 W	7	0.32	units	10
With electronic ballast, single lamp					
	L 18 W	6.8	0.10	units	44
	L 18 W	6.8	0.18	units	25
	L 36 W	10	0.27	units	16
	L 58 W				63
With electronic ballast, twin lamp					
	L 18 W	10	0.18	units	25
	L 18 W	10	0.35	units	13
	L 36 W	22	0.52	units	8
	L 58 W				12

1) Acc. to VDE 0660 Part 102.



Main circuit

Load ratings with AC

Contactor	Size Type	S00 3RT1. 15		S00 3RT1. 16		S00 3RT1. 17		
AC-5b utilization category, switching incandescent lamps per main conducting path at 230/220 V		kW	1.2		1.6		1.6	
AC-6a utilization category, switching three-phase transformers with inrush		n	30	20	30	20	30	20
Rated operational current I_e	up to 400 V	A	2.4	3.6	3.3	5.1	5.1	7.2
Ratings of three-phase transformers with an inrush of n = 30 or 20. The ratings must be re-calculated for other inrush factors x:	at 230 V	kVA	1.0	1.4	1.3	2	2	2.9
	400 V	kVA	1.6	2.5	2.3	3.5	3.5	5
	500 V	kVA	2.2	3.3	3.1	4.6	4.6	6.2
	690 V	kVA	2.9	4.3	4	6	6	8.6

$$P_x = P_{n30} \cdot \frac{30}{x}$$

Load ratings with DC

Contactor	Size Type	S00 3RT1. 15			S00 3RT1. 16			S00 3RT1. 17		
DC-1 utilization category, switching resistive load (L/R ≤ 1 ms)										
Rated operational current I_e (at 60 °C)										
Number of conducting paths connected in series		1	2	3	1	2	3	1	2	3
up to 24 V	A	15	15	15	20	20	20	20	20	20
60 V	A	15	15	15	20	20	20	20	20	20
110 V	A	1.5	8.4	15	2.1	12	20	2.1	12	20
220 V	A	0.6	1.2	15	0.8	1.6	20	0.8	1.6	20
440 V	A	0.42	0.6	0.9	0.6	0.8	1.3	0.6	0.8	1.3
600 V	A	0.42	0.5	0.7	0.6	0.7	1	0.6	0.7	1
DC-3 and DC-5 utilization categories, shunt and series motors (L/R ≤ 15 ms)										
Rated operational current I_e (at 60 °C)										
Number of conducting paths connected in series		1	2	3	1	2	3	1	2	3
up to 24 V	A	15	15	15	20	20	20	20	20	20
60 V	A	0.35	3.5	15	0.5	5	20	0.5	5	20
110 V	A	0.1	0.25	15	0.15	0.35	20	0.15	0.35	20
220 V	A	–	–	1.2	0.75	1.5	1.75	0.75	1.5	6
440 V	A	–	–	0.14	–	–	0.2	–	–	0.2
600 V	A	–	–	0.14	–	–	0.2	–	–	0.2

Operating frequency

Operating frequency z in operating cycles per hour		AC/DC operation	
Contactors without overload relays	No-load operating frequency	1/h	10 000
Dependence of the operating frequency z' on the rated operational current and the rated operational voltage: $z' = z \cdot \frac{I_e}{I_r} \cdot \left(\frac{400 \text{ V}}{U_r}\right)^{1.5}$ 1/h	Rated operation for AC-1	1/h	1 000
	for AC-2	1/h	750
	for AC-3	1/h	750
	for AC-4	1/h	250
Contactors with overload relays (mean value)		1/h	15

3RT10 2. Contactors for Switching Motors

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Technical data

Contactor	Size Type		S0 3RT10 2.
Mechanical endurance	Basic units	Oper. cycles	10 million
	Basic unit with snap-on auxiliary switch block		10 million
	Basic unit with snap-on, solid-state compatible auxiliary switch block		5 million
Rated insulation voltage U_i (pollution degree 3)		V	690
Positively driven contacts			Yes, between the main contacts and the auxiliary NC contacts as well as in the auxiliary switch blocks. The solid-state compatible auxiliary switch blocks have no positively driven contacts.
Permissible ambient temperature		in operation °C when stored °C	-25 to +60 -55 to +80
Degree of protection acc. to IEC 60 947-1 and DIN 40 050			IP 20, coil system IP 20
Shock resistance	Rectangular pulse	AC operation	g/ms 8.2/5 and 4.9/10
		DC operation	g/ms 10/5 and 7.5/10
	Sine pulse	AC operation	g/ms 12.5/5 and 7.8/10
		DC operation	g/ms 15/5 and 10/10

Conductor cross-sections

Screw connections (1 or 2 conductor connections possible)	Main conductor:		
	Solid	mm ²	2 x (1 to 2.5); 2 x (2.5 to 6)
	Finely stranded with end sleeve	mm ²	2 x (1 to 2.5); 2 x (2.5 to 6) acc. to IEC 60 947; max. 1 x 10
	AWG conductor connections, solid or stranded	AWG	2 x (14 to 10)
	- Terminal screws		M4 (Pozi driv size 2)
	- Tightening torque	Nm	2.0 to 2.5 (18 to 22 lb.in)
	Auxiliary conductor:		
	Solid	mm ²	2 x (0.5 to 1.5); 2 x (0.75 to 2.5) acc. to IEC 60 947; max. 2 x (0.75 to 4)
	Finely stranded with end sleeve	mm ²	2 x (0.5 to 1.5); 2 x (0.75 to 2.5)
	AWG conductor connections, solid or stranded	AWG	2 x (18 to 14)
	- Terminal screws		M3
	- Tightening torque	Nm	0.8 to 1.2 (7 to 10.3 lb.in)
Cage Clamp connections (1 or 2 conductor connections possible)	Auxiliary conductor:		
	Solid	mm ²	2 x (0.5 to 2.5)
	Finely stranded with end sleeve	mm ²	2 x (0.5 to 1.5)
	Finely stranded without end sleeve	mm ²	2 x (0.5 to 2.5)
	AWG conductor connections, solid or stranded	AWG	2 x (18 to 14)

- An "insulation stop" must be used for conductor cross-sections $\leq 1 \text{ mm}^2$, see accessories on page 3/28.
- Max. outer diameter of conductor insulation: 3.6 mm.
- For information about Cage Clamp connections, see page 6.

Short-circuit protection of contactors without overload relays

For short-circuit protection of contactors with overload relays, see Part 4.
For short-circuit protection of weld-free contactors, see Part 5.
(overload and short-circuit protection only with 3RV10 circuit-breaker).
For short-circuit protection of fuseless load feeders, see Part 5.

Contactor	Size Type		S0 3RT10 23, 3RT10 24	S0 3RT10 25	S0 3RT10 26
Main circuit					
Fuse links, utilization category gL/gG					
NH Type 3NA, DIAZED Type 5SB, NEOZED Type 5SE					
With fuse links					
- acc. to IEC 60 947-4-1/EN 60 947-4-1					
(VDE 0660 Part 102)					
Type of coord. "1" 1)					
Type of coord. "2" 1)					
Weld-free ²⁾					
or miniature circuit-breaker with C-characteristic					
Auxiliary circuit					
Fuse links, utilization category gL/gG					
DIAZED Type 5SB, NEOZED Type 5SE					
(weld-free protection at $I_k \geq 1 \text{ kA}$)					
or miniature circuit-breaker with C-characteristic (short-circuit current $I_k < 400 \text{ A}$)					

1) According to excerpt from IEC 60 947-4-1 (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) For 3RT11 weld-free contactors, see Part 5 (overload and short-circuit protection only with 3RV10 circuit-breaker).

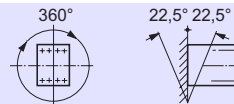


Contactor	Size Type	S0 3RT10 2.
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Permissible mounting position

The contactors are designed for operation on a vertical mounting surface.

AC and DC operation



Upright mounting position:

AC and DC operation



Special design required.
Positions 13 to 16 of the Order No. must be changed to **-1AA0**.

(not applicable to coupling relays, please ask for details)

Control circuit

Coil voltage tolerance	AC/DC	0.8 to 1.1 x U_s
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Power consumption of the coils (with coil in cold state and 1.0 x U_s)

			Standard design		For USA and Canada	
AC operation		Hz	50	50/60	50	60
	closing	VA	61	64 / 63	61	69
	p.f.		0.82	0.72/ 0.74	0.82	0.76
	closed	VA	7.8	8.4 / 6.8	7.8	7.5
	p.f.		0.24	0.24/ 0.28	0.24	0.28
DC operation	closing = closed	W	5.4			

Permissible residual current of the electronics
(with 0 signal)

AC operation	mA	$< 6 \text{ mA} \times \left(\frac{230 \text{ V}}{U_s}\right)$
DC operation	mA	$< 16 \text{ mA} \times \left(\frac{24 \text{ V}}{U_s}\right)$

Coil voltage tolerance 0.8 to 1.1 x U_s

Operating times at 0.8 to 1.1 x U_s ¹⁾

Break-time = opening time + arcing time

AC operation	closing time	ms	8 to 44
	opening time	ms	4 to 20
DC operation	closing time	ms	50 to 170
	opening time	ms	13.5 to 15.5
Arcing time		ms	10

Operating times at 1.0 x U_s ¹⁾

AC operation	closing time	ms	10 to 17
	opening time	ms	4 to 20
DC operation	closing time	ms	55 to 85
	opening time	ms	14 to 15.5

Main circuit

Load ratings with AC

Contactor	Size Type		S0 3RT10 23, 3RT10 24	S0 3RT10 25	S0 3RT10 26	
AC-1 utilization category, switching resistive load						
Rated operational currents I_e		at 40 °C up to 690 V	A	40	40	40
		at 60 °C up to 690 V	A	35	35	35
Ratings of three-phase loads ²⁾ p.f. = 0.95 (at 60 °C)		at 230 V	kW	13.3	13.3	13.3
		400 V	kW	23	23	23
		500 V	kW	29	29	29
		690 V	kW	40	40	40
Minimum conductor cross-section with I_e load		at 40 °C	mm ²	10	10	10
		60 °C	mm ²	10	10	10

1) 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, diode assemblies 2 to 6 times).

2) Industrial furnaces and electric heaters with resistance heating, for example (higher current input allowed for during heating up).

3RT10 2. Contactors for Switching Motors

SIRIUS 3R



Technical data

Main circuit

Load ratings with AC

Contactor	Size Type		S0 3RT10 23	S0 3RT10 24	S0 3RT10 25	S0 3RT10 26
AC-2 and AC-3 utilization categories						
Rated operational currents I_e		up to 400 V A	9	12	17	25
		500 V A	6.5	12	17	18
		690 V A	5.2	9	13	13
Ratings of motors with slipring or squirrel-cage rotor at 50 Hz and 60 Hz		at 110 V kW	1.1	1.5	2.2	3
		120 V kW	1.1	1.5	2.2	3
		127 V kW	1.1	1.5	2.2	3
		200 V kW	2.2	3	4	5.5
		220 V kW	3	3	4	5.5
		230 V kW	3	3	4	5.5
		240 V kW	3	3	4	5.5
		380 V kW	4	5.5	7.5	11
		400 V kW	4	5.5	7.5	11
		415 V kW	4	5.5	7.5	11
		440 V kW	4	5.5	9	11
		460 V kW	4	5.5	9	11
		500 V kW	4.5	7.5	10	11
		575 V kW	4.5	7.5	10	11
		660 V kW	5.5	7.5	11	11
		690 V kW	5.5	7.5	11	11
Thermal load		10 s current ¹⁾ A	110	110	150	200
Power loss per conducting path		at $I_e/AC-3$ W	0.5	0.5	0.9	1.6
AC-4 utilization category (contact endurance approx. 200 000 operating cycles at $I_e = 6 \times I_e$)						
Rated operational currents I_e		up to 400 V A	5.5	5.5	7.7	9
		690 V A	5.5	5.5	7.7	9
Ratings of motors with squirrel-cage rotor at 50 Hz and 60 Hz		at 110 V kW	0.73	0.73	1	1.2
		120 V kW	0.8	0.8	1.1	1.3
		127 V kW	0.85	0.85	1.15	1.4
		200 V kW	1.3	1.3	1.8	2.2
		220 V kW	1.4	1.4	2	2.4
		230 V kW	1.5	1.5	2	2.5
		240 V kW	1.6	1.6	2.1	2.6
		380 V kW	2.5	2.5	3.5	4.2
		400 V kW	2.6	2.6	3.5	4.4
		415 V kW	2.7	2.7	3.5	4.6
		440 V kW	2.9	2.9	4	4.9
		460 V kW	3	3	4.2	5.1
		500 V kW	3.3	3.3	4.6	5.6
		575 V kW	3.8	3.8	5.2	6.4
		660 V kW	4.4	4.4	6	7.4
		690 V kW	4.6	4.6	6	7.7
AC-5a utilization category, switching gas discharge lamps per main conducting path at 230 V ²⁾						
	Rating per lamp uncorrected	Rated operational current per lamp (A)				
	L 18 W	0.37	units	95	95	95
	L 36 W	0.43	units	81	81	81
	L 58 W	0.67	units	52	52	52
	lead-lag					
	L 18 W	0.11	units	318	318	318
	L 36 W	0.21	units	166	166	166
	L 58 W	0.32	units	109	109	109
Switching gas discharge lamps with correction, electronic ballast per main conducting path at 230 V						
Rating per lamp	Capacitor (µF)	Rated operational current per lamp (A)				
Parallel correction						
L 18 W	4.5	0.11	units	37	37	61
L 36 W	4.5	0.21	units	37	37	61
L 58 W	7	0.32	units	23	23	39
With electronic ballast, single lamp						
L 18 W	6.8	0.10	units	105	105	175
L 36 W	6.8	0.18	units	58	58	97
L 58 W	10	0.27	units	38	38	64
With electronic ballast, twin lamp						
L 18 W	10	0.18	units	58	58	97
L 36 W	10	0.35	units	30	30	50
L 58 W	22	0.52	units	20	20	33

1) Acc. to VDE 0660 Part 102.

2) At $I_e/AC-1 = 35$ A (60 °C) and with the corresponding minimum conductor cross-section 10 mm².



Main circuit

Load ratings with AC

Contactor	Size Type	S0 3RT10 23, 3RT10 24			S0 3RT10 25			S0 3RT10 26			
AC-5b utilization category, switching incandescent lamps											
per main conducting path at 230/220 V		kW	3			3			4		
AC-6a utilization category, switching three-phase transformers											
with inrush		n	30 20			30 20			30 20		
Rated operational current I_e		up to 400 V	A			A			A		
			7.6	11.4		7.6	11.4		13.5	20.2	
Ratings of three-phase transformers with an inrush of n = 30 or 20.		at 230 V	kVA			kVA			kVA		
		400 V	3	4.5		3	4.5		5.4	8	
		500 V	5.2	7.9		5.2	7.9		9.3	13.9	
The ratings must be re-calculated for other inrush factors x:		690 V	6.6	9.9		6.6	9.9		11.7	15.5	
		690 V	9.1	13.6		9.1	13.6		15.5	15.5	
			$P_x = P_{n,30} \cdot \frac{30}{x}$								
AC-6b utilization category, switching low-inductance (low-loss, metallized-dielectric) three-phase capacitors											
Rated operational currents I_e		up to 400 V	A			A			A		
			5.8			5.8			10.8		
Ratings of single capacitors at 50 Hz, 60 Hz and		at 230/220 V	kvar			kvar			kvar		
		400/380 V	2.5			2.5			4		
		500 V	4			4			7.5		
		690/660 V	4			4			7.5		
Ratings of capacitor banks (minimum inductance between parallel capacitors 6 μH) at 50 Hz, 60 Hz and		at 230/220 V	kvar			kvar			kvar		
		400/380 V	2.5			2.5			4		
		500 V	4			4			7.5		
		690/660 V	4			4			7.5		

Load ratings with DC

Contactor	Size Type	S0 3RT10 23, 3RT10 24			S0 3RT10 25			S0 3RT10 26			
DC-1 utilization category, switching resistive load (L/R ≤ 1 ms)											
Rated operational current I_e (at 60 °C)											
		Number of conducting paths connected in series									
			1	2	3	1	2	3	1	2	3
up to 24 V		A	35	35	35	35	35	35	35	35	35
60 V		A	20	35	35	20	35	35	20	35	35
110 V		A	4.5	35	35	4.5	35	35	4.5	35	35
220 V		A	1	5	35	1	5	35	1	5	35
440 V		A	0.4	1	2.9	0.4	1	2.9	0.4	1	2.9
600 V		A	0.25	0.8	1.4	0.25	0.8	1.4	0.25	0.8	1.4
DC-3 and DC-5 utilization categories, shunt and series motors (L/R ≤ 15 ms)											
Rated operational current I_e (at 60 °C)											
		Number of conducting paths connected in series									
			1	2	3	1	2	3	1	2	3
up to 24 V		A	20	35	35	20	35	35	20	35	35
60 V		A	5	35	35	5	35	35	5	35	35
110 V		A	2.5	15	35	2.5	15	35	2.5	15	35
220 V		A	1	3	10	1	3	10	1	3	10
440 V		A	0.09	0.27	0.6	0.09	0.27	0.6	0.09	0.27	0.6
600 V		A	0.06	0.16	0.6	0.06	0.16	0.6	0.06	0.16	0.6

Operating frequency

Operating frequency z in operating cycles per hour			AC		DC		AC		DC		AC		DC	
Contactor without overload relays	No-load operating frequency	1/h	5000	1500	5000	1500	5000	1500	5000	1500	5000	1500	5000	1500
Dependence of the operating frequency z' on the rated operational current and the rated operational voltage: $z' = z \cdot \frac{I_e}{I_r} \cdot \left(\frac{400 V}{U_r}\right)^{1.5}$ 1/h	for AC-1	1/h	AC/DC		AC/DC		AC/DC		AC/DC		AC/DC		AC/DC	
	for AC-2	1/h	1000		1000		1000		1000		1000		1000	
	for AC-3	1/h	1000		1000		1000		1000		1000		1000	
	for AC-4	1/h	300		300		300		300		300		300	
Contactor with overload relays (mean value)		1/h	15		15		15		15		15		15	

3RT10 3. Contactors for Switching Motors

SIRIUS 3R



Technical data

Contactor	Size Type		S2 3RT10 3.
Mechanical endurance	Basic units	Oper. cycles	10 million
	Basic unit with snap-on auxiliary switch block		10 million
	Basic unit with snap-on, solid-state compatible auxiliary switch block		5 million
Rated insulation voltage U_i (pollution degree 3)		V	690
Positively driven contacts			Yes, between the main contacts and the auxiliary NC contacts as well as in the auxiliary switch blocks. The solid-state compatible auxiliary switch blocks have no positively driven contacts.
Permissible ambient temperature		in operation °C	-25 to +60
		when stored °C	-55 to +80
Degree of protection acc. to IEC 60 947-1 and DIN 40 050			IP 20 (terminal compartment IP 00), coil system IP 40
Shock resistance	Rectangular pulse	AC and DC operation	g/ms
	Sine pulse	AC and DC operation	g/ms
			10/5 and 5/10
			15/5 and 8/10

Conductor cross-sections

Screw connections (1 or 2 conductor connections possible)	Main conductor: with box terminal (acc. to EN 50 027)		Front terminal connected	Back terminal connected	Both terminals connected
			mm ²	mm ²	mm ²
	Finely stranded with end sleeve	mm ²	0.75 to 25	0.75 to 25	max. 2 x 16
	Finely stranded without end sleeve	mm ²	0.75 to 25	0.75 to 25	max. 2 x 16
	Stranded	mm ²	0.75 to 35	0.75 to 35	max. 2 x 25
	Solid	mm ²	0.75 to 16	0.75 to 16	max. 2 x 16
	Ribbon cable (no. x width x thickness)	mm	6 x 9 x 0.8	6 x 9 x 0.8	2 x (6 x 9 x 0.8)
	AWG conductor connections, solid or stranded	AWG	18 to 2	18 to 2	max. 2 x 2
	- Terminal screws		M6 (Pozi driv size 2)		
	- Tightening torque	Nm	3 to 4.5 (27 to 40 lb.in)		
	Auxiliary conductor:				
	Solid	mm ²	2 x (0.5 to 1.5); 2 x (0.75 to 2.5) acc. to IEC 60 947; max. 2 x (0.75 to 4)		
	Finely stranded with end sleeve	mm ²	2 x (0.5 to 1.5); 2 x (0.75 to 2.5)		
	AWG conductor connections, solid or stranded	AWG	2 x (18 to 14)		
	- Terminal screws		M3		
	- Tightening torque	Nm	0.8 to 1.2 (7 to 10.3 lb.in)		
Cage Clamp connections (1 or 2 conductor connections possible)	Auxiliary conductor:				
	Solid	mm ²	2 x (0.5 to 2.5)		
	Finely stranded with end sleeve	mm ²	2 x (0.5 to 1.5)		
	Finely stranded without end sleeve	mm ²	2 x (0.5 to 2.5)		
	AWG conductor connections, solid or stranded	AWG	2 x (18 to 14)		

- An "insulation stop" must be used for conductor cross-sections $\leq 1 \text{ mm}^2$, see accessories on page 3/28.
- Max. outer diameter of conductor insulation: 3.6 mm.
- For information about Cage Clamp connections, see page 6.

Short-circuit protection of contactors without overload relays

For short-circuit protection of contactors with overload relays, see Part 4. For short-circuit protection of weld-free contactors, see Part 5. (overload and short-circuit protection only with 3RV10 circuit-breaker). For short-circuit protection of fuseless load feeders, see Part 5.

Contactor	Size Type		S2 3RT10 34	S2 3RT10 35	S2 3RT10 36
Main circuit					
Fuse links, utilization category gL/gG					
NH Type 3NA, DIAZED Type 5SB, NEOZED Type 5SE					
- acc. to IEC 60 947-4-1/EN 60 947-4-1					
	Type of coord. "1" 1)	A	125	125	160
	Type of coord. "2" 1)	A	63	63	80
	Weld-free ²⁾	A	16	16	50
Auxiliary circuit					
Fuse links, utilization category gL/gG					
DIAZED Type 5SB, NEOZED Type 5SE					
(weld-free protection at $I_k \geq 1 \text{ kA}$)					
or miniature circuit-breaker with C-characteristic (short-circuit current $I_k < 400 \text{ A}$)					
	A	A	10	10	10
	A	A	10	10	10

1) According to excerpt from IEC 60 947-4-1 (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) For 3RT11 weld-free contactors, see Part 5 (overload and short-circuit protection only with 3RV10 circuit-breaker).

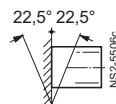
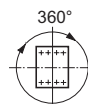


Contactor	Size Type	S2 3RT10 34	S2 3RT10 35	S2 3RT10 36
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Permissible mounting position

The contactors are designed for operation on a vertical mounting surface.

AC and DC operation



For DC operation and forward inclination up to 22.5°:
coil voltage tolerance
0.85 to 1.1 x U_s

Upright mounting position:

AC operation

Special design required.
Positions 13 to 16 of the Order No. must be changed to **-1AA0**.

DC operation

-

Control circuit**Coil voltage tolerance**

AC/DC

0.8 to 1.1 x U_s

Power consumption of the coils (with coil in cold state and 1.0 x U_s)**Standard design**

AC operation		Hz	50		50/60		50		50/60		50		50/60	
			VA	0.76	0.76/	0.8	0.82	0.82/	0.85	0.82	0.82/	0.85	11	11 /
closing	p.f.	VA	90	90	/118	127	127	/160	127	127	/160	0.38	0.38/	0.41
			11	11	/12	13.5	13.5	/14.2	13.5	13.5	/14.2	0.38	0.38/	0.41
closed	p.f.	VA	0.38	0.38/	0.41	0.34	0.34/	0.37	0.34	0.34/	0.37	0.38	0.38/	0.41
			0.34	0.34/	0.37	0.34	0.34/	0.37	0.34	0.34/	0.37	0.34	0.34/	0.37
DC operation	closing = closed	W	13.3			13.3			13.3					

For USA and Canada**Permissible residual current of the electronics**

(with 0 signal)

AC operation

$< 12 \text{ mA} \times \left(\frac{230 \text{ V}}{U_s} \right)$

DC operation

$< 38 \text{ mA} \times \left(\frac{24 \text{ V}}{U_s} \right)$

Operating times at 0.8 to 1.1 x U_s 1)

Break-time = opening time + arcing time

AC operation	closing time	ms	11 to 30		10 to 24		10 to 24	
			7 to 10	7 to 10	7 to 10	7 to 10		
DC operation	closing time	ms	50 to 95	60 to 100	60 to 100	60 to 100	60 to 100	
			20 to 30	20 to 25	20 to 25	20 to 25		
Arcing time	opening time	ms	10	10	10	10	10	

Operating times at 1.0 x U_s 1)

AC operation	closing time	ms	13 to 22		12 to 20		12 to 20	
			7 to 10	7 to 10	7 to 10	7 to 10		
DC operation	closing time	ms	60 to 75	70 to 85	70 to 85	70 to 85	70 to 85	
			20 to 30	20 to 25	20 to 25	20 to 25		

Main circuit**Load ratings with AC**

Contactor	Size Type	S2 3RT10 34	S2 3RT10 35	S2 3RT10 36	
AC-1 utilization category, switching resistive load					
Rated operational currents I_e	at 40 °C up to 690 V	A	50	60	55
	at 60 °C up to 690 V	A	45	55	50
Ratings of three-phase loads ²⁾ p.f. = 0.95 (at 60 °C)	at 230 V	kW	18	22	20
	400 V	kW	31	38	35
	500 V	kW	39	46	43
	690 V	kW	54	66	60
	Minimum conductor cross-section with I_e load	at 40 °C	mm ²	16	16
	60 °C	mm ²	10	16	10

1) 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, diode assemblies 2 to 6 times).

2) Industrial furnaces and electric heaters with resistance heating, for example (higher current input allowed for during heating up).

3RT10 3. Contactors for Switching Motors

SIRIUS 3R



Technical data

Main circuit

Load ratings with AC

Contactor	Size Type		S2 3RT10 34	S2 3RT10 35	S2 3RT10 36
AC-2 and AC-3 utilization categories					
Rated operational currents I_e	up to 400 V	A	32	40	50
	500 V	A	32	40	50
	690 V	A	23	28	32
Ratings of motors with slipring or squirrel-cage rotor at 50 Hz and 60 Hz	at 127 V	kW	4	5.5	7.5
	200 V	kW	7.5	7.5	11
	220 V	kW	7.5	11	11
	230 V	kW	7.5	11	15
	240 V	kW	7.5	11	15
	380 V	kW	15	18.5	22
	400 V	kW	15	18.5	22
	415 V	kW	15	18.5	22
	440 V	kW	18.5	18.5	22
	460 V	kW	18.5	22	30
	500 V	kW	18.5	22	30
	575 V	kW	18.5	22	22
	660 V	kW	18.5	22	22
690 V	kW	18.5	22	30	
Thermal load	10 s current ¹⁾	A	320	400	400
Power loss per conducting path	at $I_e/AC-3$	W	1.8	2.6	5
AC-4 utilization category (contact endurance approx. 200 000 operating cycles at $I_a = 6 \times I_e$)					
Rated operational currents I_e	up to 400 V	A	15.6	18.5	24
	690 V	A	15.6	18.5	24
Ratings of motors with squirrel-cage rotor at 50 Hz and 60 Hz	at 127 V	kW	2.6	3	3
	200 V	kW	4.1	4.7	4.7
	220 V	kW	4.5	5.2	5.2
	230 V	kW	4.7	5.4	7.3
	240 V	kW	4.9	5.7	5.7
	380 V	kW	7.8	9	9
	400 V	kW	8.2	9.5	12.6
	415 V	kW	8.2	9.5	12.6
	440 V	kW	8.2	9.5	12.6
	460 V	kW	8.2	9.5	12.6
	500 V	kW	9.8	11.8	15.8
575 V	kW	8.3	11.8	15.8	
660 V	kW	9.6	13.5	18	
690 V	kW	13	15.5	21.8	
AC-5a utilization category, switching gas discharge lamps per main conducting path at 230 V					
	Rating per lamp	Rated operational current per lamp (A)			
	uncorrected				
	L 18 W	0.37	units	122	149
	L 36 W	0.43	units	105	128
	L 58 W	0.67	units	67	82
	lead-lag				
	L 18 W	0.11	units	409	500
	L 36 W	0.21	units	214	262
	L 58 W	0.32	units	141	172
Switching gas discharge lamps with correction, electronic ballast per main conducting path at 230 V					
	Rating per lamp	Capacitor (μF)	Rated operational current per lamp (A)		
Parallel correction					
	L 18 W	4.5	0.11	units	78
	L 36 W	4.5	0.21	units	78
	L 58 W	7	0.32	units	50
With electronic ballast, single lamp					
	L 18 W	6.8	0.10	units	224
	L 36 W	6.8	0.18	units	124
	L 58 W	10	0.27	units	83
With electronic ballast, twin lamp					
	L 18 W	10	0.18	units	124
	L 36 W	10	0.35	units	64
	L 58 W	22	0.52	units	43

1) Acc. to VDE 0660 Part 102.



Main circuit

Load ratings with AC

Contactor	Size Type	S2 3RT10 34			S2 3RT10 35			S2 3RT10 36						
		AC-5b utilization category, switching incandescent lamps per main conducting path at 230/220 V		kW			5.8			7.3			9.1	
AC-6a utilization category, switching three-phase transformers with inrush		n	30			20			30			20		
Rated operational current I_e	up to 400 V	A	20.7			31			24.3			36.5		
Ratings of three-phase transformers with an inrush of n = 30 or 20.	at 230 V	kVA	8.2			12.3			9.7			14.5		
The ratings must be re-calculated for other inrush factors x:	400 V	kVA	14.3			21.5			16.8			25.3		
	500 V	kVA	17.9			26.8			21			31.6		
	690 V	kVA	23.9			23.9			28.7			28.7		
AC-6b utilization category, switching low-inductance (low-loss, metallized-dielectric) three-phase capacitors Ambient temperature 40 °C														
Rated operational currents I_e	up to 400 V	A	29			36			36					
Ratings of single capacitors at 50 Hz, 60 Hz and	at 230/220 V	kvar	12			15			15			15		
	400/380 V	kvar	20			25			25			25		
	525 V	kvar	25			33			33			33		
	690/660 V	kvar	20			25			25			25		
Ratings of capacitor banks (minimum inductance between parallel capacitors 20 µH) at 50 Hz, 60 Hz and	at 230/220 V	kvar	12			15			15			15		
	400/380 V	kvar	20			25			25			25		
	525 V	kvar	25			33			33			33		
	690/660 V	kvar	20			25			25			25		

$$P_x = P_{n,30} \cdot \frac{30}{x}$$

Load ratings with DC

Contactor	Size Type	S2 3RT10 34			S2 3RT10 35			S2 3RT10 36			
		DC-1 utilization category, switching resistive load (L/R ≤ 1 ms) Rated operational current I_e (at 60 °C)									
Number of conducting paths connected in series		1	2	3	1	2	3	1	2	3	
	up to 24 V	A	45	45	45	55	55	55	50	50	50
	60 V	A	20	45	45	23	45	45	23	45	45
	110 V	A	4.5	45	45	4.5	45	45	4.5	45	45
	220 V	A	1	5	45	1	5	45	1	5	45
	440 V	A	0.4	1	2.9	0.4	1	2.9	0.4	1	2.9
	600 V	A	0.25	0.8	1.4	0.25	0.8	1.4	0.25	0.8	1.4
DC-3 and DC-5 utilization categories, shunt and series motors (L/R ≤ 15 ms) Rated operational current I_e (at 60 °C)											
Number of conducting paths connected in series		1	2	3	1	2	3	1	2	3	
	up to 24 V	A	35	80	80	35	80	80	35	80	80
	60 V	A	6	45	80	6	45	80	6	45	80
	110 V	A	2.5	25	80	2.5	25	80	2.5	25	80
	220 V	A	1	5	25	1	5	25	1	5	25
	440 V	A	0.1	0.27	0.6	0.1	0.27	0.6	0.1	0.27	0.6
	600 V	A	0.06	0.16	0.35	0.06	0.16	0.35	0.06	0.16	0.35

Operating frequency

Operating frequency z in operating cycles per hour	Contactors without overload relays	No-load operating frequency	1/h	AC	DC	AC	DC	AC	DC
				5000	1500	5000	1500	5000	1500
Dependence of the operating frequency z' on the rated operational current and the rated operational voltage: $z' = z \cdot \frac{I_e}{I'} \cdot \left(\frac{400V}{U'}\right)^{1.5}$ 1/h	Contactors with overload relays (mean value)	1/h	1/h	AC/DC	1200	AC/DC	1200	AC/DC	1000
				750	600	400			
				1000	1000	800			
				250	300	300			

3RT10 4. Contactors for Switching Motors

SIRIUS 3R



Technical data

Contactor	Size Type		S3 3RT10 4.
Mechanical endurance	Basic units	Oper. cycles	10 million
	Basic unit with snap-on auxiliary switch block		10 million
	Basic unit with snap-on, solid-state compatible auxiliary switch block		5 million
Rated insulation voltage U_i (pollution degree 3)		V	1000
Positively driven contacts			Yes, between the main contacts and the auxiliary NC contacts as well as in the auxiliary switch blocks. The solid-state compatible auxiliary switch blocks have no positively driven contacts.
Permissible ambient temperature		in operation when stored	°C °C
			-25 to +60 -55 to +80
Degree of protection acc. to IEC 60 947-1 and DIN 40 050			IP 20 (terminal compartment IP 00), coil system IP 40
Shock resistance	Rectangular pulse	AC and DC operation	g/ms
	Sine pulse	AC and DC operation	g/ms
			6.8/5 and 4/10 10.6/5 and 6.2/10

Conductor cross-sections

Screw connections (1 or 2 conductor connections possible)	Main conductor: with box terminal (acc. to EN 50 027)		Front terminal connected	Back terminal connected	Both terminals connected
Connection for drilled copper bars	Finely stranded with end sleeve	mm ²	2.5 to 25	2.5 to 50	max. 2 x 35
	Finely stranded without end sleeve	mm ²	4 to 50	10 to 50	max. 2 x 35
	Solid	mm ²	2.5 to 16	2.5 to 16	max. 2 x 16
	Stranded	mm ²	4 to 70	10 to 70	max. 2 x 50
	Ribbon cable (no. x width x thickness)	mm	6 x 9 x 0.8	6 x 9 x 0.8	2 x (6 x 9 x 0.8)
	AWG conductor connections	AWG	10 to 2/0	10 to 2/0	max. 2 x 1/0
Without box terminal With cable lugs (1 or 2 conductor connections possible)	Finely stranded with cable lug	mm ²	10 to 50	If bars larger than 12 x 10 mm are connected, a 3RT19 46-4EA 1 terminal cover is necessary to comply with the phase clearance	
	Stranded with cable lug	mm ²	10 to 70	If conductors larger than 25 mm ² are connected, a 3RT19 46-4EA 1 terminal cover is necessary to comply with the phase clearance	
	AWG conductor connections, solid or stranded		7 to 1/0		
	- Terminal screws - Tightening torque	Nm	M6 (hexagon socket) 4 to 6 (36 to 53 lb.in)		
Auxiliary conductor:	Solid	mm ²	2 x (0.5 to 1.5); 2 x (0.75 to 2.5) acc. to IEC 60 947; max. 2 x (0.75 to 4)		
	Finely stranded with end sleeve	mm ²	2 x (0.5 to 1.5); 2 x (0.75 to 2.5)		
	AWG conductor connections, solid or stranded	AWG	2 x (18 to 14)		
	- Terminal screws - Tightening torque	Nm	M3 0.8 to 1.2 (7 to 10.3 lb.in)		
Cage Clamp connections (1 or 2 conductor connections possible)	Auxiliary conductor:				
	Solid	mm ²	2 x (0.5 to 2.5)		
	Finely stranded with end sleeve	mm ²	2 x (0.5 to 1.5)		
	Finely stranded without end sleeve	mm ²	2 x (0.5 to 2.5)		
	AWG conductor connections, solid or stranded	AWG	2 x (18 to 14)		

- An "insulation stop" must be used for conductor cross-sections $\leq 1 \text{ mm}^2$, see accessories on page 3/28.
- Max. outer diameter of conductor insulation: 3.6 mm.
- For information about Cage Clamp connections, see page 6.

Short-circuit protection of contactors without overload relays



For short-circuit protection of contactors with overload relays, see Part 4.
For short-circuit protection of fuseless load feeders, see Part 5.

Contactor	Size Type		S3 3RT10 44	S3 3RT10 45	S3 3RT10 46
Main circuit					
Fuse links, utilization category gL/gG					
NH Type 3NA, DIAZED Type 5SB, NEOZED Type 5SE					
- acc. to IEC 60 947-4-1/EN 60 947-4-1					
(VDE 0660 Part 102)					
	Type of coord. "1" 1)	A	250	250	250
	Type of coord. "2" 1)	A	125	160	160
	Weld-free	A	63	100	100
Auxiliary circuit					
Fuse links, utilization category gL/gG					
(weld-free protection at $I_k \geq 1 \text{ kA}$)					
DIAZED Type 5SB, NEOZED Type 5SE					
or miniature circuit-breaker with C-characteristic (short-circuit current $I_k < 400 \text{ A}$)					
		A	10	10	10
		A	10	10	10

1) According to excerpt from IEC 60 947-4-1 (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.



Contactors	Size Type	S3 3RT10 44	S3 3RT10 45	S3 3RT10 46				
Permissible mounting position								
The contactors are designed for operation on a vertical mounting surface.		AC and DC operation		  For DC operation and forward inclination up to 22.5°: coil voltage tolerance 0.85 to 1.1 x U _s				
Upright mounting position:								
		AC operation		Special design required. Positions 13 to 16 of the Order No. must be changed to -1AA0 .				
		DC operation		-				
Control circuit								
Coil voltage tolerance		AC/DC		0.8 to 1.1 x U _s				
Power consumption of the coils (with coil in cold state and 1.0 x U _s)								
AC operation		Standard design						
		Hz	50	50/60	50	50/60	50	50/60
	closing	VA	218	247 / 211	270	298 / 274	270	298 / 274
	p.f.		0.61	0.62 / 0.57	0.68	0.7 / 0.62	0.68	0.7 / 0.62
	closed	VA	21	25 / 18	22	27 / 20	22	27 / 20
	p.f.		0.26	0.27 / 0.3	0.27	0.29 / 0.31	0.27	0.29 / 0.31
		For USA and Canada						
		Hz	50	60	50	60	50	60
	closing	VA	218	232	270	300	270	300
	p.f.		0.61	0.55	0.68	0.52	0.68	0.52
	closed	VA	21	20	22	21	22	21
	p.f.		0.26	0.28	0.27	0.29	0.27	0.29
DC operation		W	15		15		15	
Permissible residual current of the electronics (with 0 signal)								
AC operation		mA	$< 25 \text{ mA} \times \left(\frac{230 \text{ V}}{U_s} \right)$					
DC operation		mA	$< 43 \text{ mA} \times \left(\frac{24 \text{ V}}{U_s} \right)$					
Operating times at 0.8 to 1.1 x U_s¹⁾								
Break-time = opening time + arcing time								
AC operation		ms	16 to 57		17 to 90		17 to 90	
	closing time	ms	10 to 19		10 to 25		10 to 25	
DC operation		ms	90 to 230		90 to 230		90 to 230	
	opening time	ms	14 to 20		14 to 20		14 to 20	
Arcing time		ms	10 to 15		10 to 15		10 to 15	
Operating times at 1.0 x U_s¹⁾								
AC operation		ms	18 to 34		18 to 30		18 to 30	
	opening time	ms	11 to 18		11 to 23		11 to 23	
DC operation		ms	100 to 120		100 to 120		100 to 120	
	opening time	ms	16 to 20		16 to 20		16 to 20	

Main circuit						
<i>Load ratings with AC</i>						
Contactors	Size Type	S3 3RT10 44	S3 3RT10 45	S3 3RT10 46		
AC-1 utilization category, switching resistive load						
Rated operational currents I _e		at 40 °C up to 690 V	A	100	120	120
		at 60 °C up to 690 V	A	90	100	100
Ratings of three-phase loads ²⁾		at 230 V	kW	34	38	38
p.f. = 0.95 (at 60 °C)		400 V	kW	59	66	66
		500 V	kW	74	82	82
		690 V	kW	102	114	114
Minimum conductor cross-section with I _e load		at 40 °C	mm ²	35	50	50
		60 °C	mm ²	35	35	35

1) 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, diode assemblies 2 to 6 times).

2) Industrial furnaces and electric heaters with resistance heating, for example (higher current input allowed for during heating up).

3RT10 4. Contactors for Switching Motors

SIRIUS 3R



Technical data

Main circuit

Load ratings with AC

Contactor	Size Type		S3 3RT10 44	S3 3RT10 45	S3 3RT10 46		
AC-2 and AC-3 utilization categories							
Rated operational currents I_e		up to 400 V	A	65	80	95	
		500 V	A	65	80	95	
Ratings of motors with slipring or squirrel-cage rotor at 50 Hz and 60 Hz		690 V	A	58	65	65	
		at 127 V	kW	7.5	11	15	
		200 V	kW	15	18.5	22	
		220 V	kW	18.5	22	22	
		230 V	kW	18.5	22	22	
		240 V	kW	18.5	22	30	
		380 V	kW	30	37	45	
		400 V	kW	30	37	45	
		415 V	kW	30	45	45	
		440 V	kW	37	45	55	
		460 V	kW	37	45	55	
		500 V	kW	37	45	55	
		575 V	kW	45	55	55	
		660 V	kW	45	55	55	
690 V	kW	55	55	55			
Thermal load		10 s current ¹⁾	A	600	760	760	
Power loss per conducting path		at $I_e/AC-3$	W	4.6	7.7	10.8	
AC-4 utilization category (contact endurance approx. 200 000 operating cycles at $I_e = 6 \times I_c$)							
Rated operational currents I_e		up to 400 V	A	28	34	42	
		690 V	A	28	34	42	
Ratings of motors with squirrel-cage rotor at 50 Hz and 60 Hz		at 127 V	kW	4.8	5.6	6.7	
		200 V	kW	7.6	8.7	10.5	
		220 V	kW	8.3	9.6	11.6	
		230 V	kW	8.7	10.4	12	
		240 V	kW	9.1	10.5	12.6	
		380 V	kW	14.4	16.6	20	
		400 V	kW	15.1	17.9	22	
		415 V	kW	15.7	18.2	21.8	
		440 V	kW	16.6	19.3	23.2	
		460 V	kW	17.4	20.1	24.2	
		500 V	kW	18.4	22.4	27	
		575 V	kW	18.4	22.4	27	
		660 V	kW	24.3	29.5	36	
		690 V	kW	25.4	30.9	38	
AC-5a utilization category, switching gas discharge lamps per main conducting path at 230 V							
	Rating per lamp	Rated operational current per lamp (A)					
	uncorrected						
	L 18 W	0.37	units	243	270	270	
	L 36 W	0.43	units	209	232	232	
	L 58 W	0.67	units	134	149	149	
	lead-lag						
	L 18 W	0.11	units	818	909	909	
	L 36 W	0.21	units	428	476	476	
	L 58 W	0.32	units	281	312	312	
Switching gas discharge lamps with correction, electronic ballast per main conducting path at 230 V							
	Rating per lamp	Capacitor (μ F)	Rated operational current per lamp (A)				
	Parallel correction						
	L 18 W	4.5	0.11	units	160	197	234
	L 36 W	4.5	0.21	units	160	197	234
	L 58 W	7	0.32	units	103	127	150
	With electronic ballast, single lamp						
	L 18 W	6.8	0.10	units	455	560	665
	L 36 W	6.8	0.18	units	253	311	369
	L 58 W	10	0.27	units	168	207	246
	With electronic ballast, twin lamp						
	L 18 W	10	0.18	units	253	311	369
	L 36 W	10	0.35	units	130	160	190
	L 58 W	22	0.52	units	88	108	128

1) Acc. to VDE 0660 Part 102.



Main circuit

Load ratings with AC

Contactor	Size Type	S3 3RT10 44		S3 3RT10 45		S3 3RT10 46		
AC-5b utilization category, switching incandescent lamps per main conducting path at 230/220 V		kW	9	14.6	17.3			
AC-6a utilization category, switching three-phase transformers with inrush		n	30	20	30	20	30	20
Rated operational current I_e	up to 400 V	A	42.3	63.5	56.3	80	56.3	84.4
		A	42.3	47	56.3	58	56.3	58
Ratings of three-phase transformers with an inrush of n = 30 or 20. The ratings must be re-calculated for other inrush factors x:	at 230 V	kVA	16.8	25.3	22.4	31.9	22.4	33.6
	400 V	kVA	29.3	43.9	39	55.4	39	58
	500 V	kVA	36.6	54.9	48.7	69.3	48.7	73.1
	690 V	kVA	50.5	56.2	67.3	69.3	67.3	69.3
$P_x = P_{n30} \cdot \frac{30}{x}$								
AC-6b utilization category, switching low-inductance (low-loss, metallized-dielectric) three-phase capacitors Ambient temperature 40 °C								
Rated operational currents I_e	up to 400 V	A	57	72	72			
Ratings of single capacitors at 50 Hz, 60 Hz and	at 230/220 V	kvar	24	29	29			
	400/380 V	kvar	40	50	50			
	525 V	kvar	50	65	65			
	690/660 V	kvar	40	50	50			
Ratings of capacitor banks (minimum inductance between parallel capacitors 6 μH) at 50 Hz, 60 Hz and	at 230/220 V	kvar	24	29	29			
	400/380 V	kvar	40	50	50			
	525 V	kvar	50	65	65			
	690/660 V	kvar	40	50	50			

Load ratings with DC

Contactor	Size Type	S3 3RT10 44			S3 3RT10 45			S3 3RT10 46		
DC-1 utilization category, switching resistive load (L/R ≤ 1 ms)										
Rated operational current I_e (at 60 °C)										
Number of conducting paths connected in series		1	2	3	1	2	3	1	2	3
up to 24 V	A	90	90	90	80	80	80	80	80	80
	60 V	23	90	90	60	80	80	60	80	80
	110 V	4.5	90	90	9	80	80	9	80	80
	220 V	1	5	70	2	10	80	2	10	80
	440 V	0.4	1	2.9	0.6	1.8	4.5	0.6	1.8	4.5
600 V	A	0.26	0.8	1.4	0.4	1	2.6	0.4	1	2.6
DC-3 and DC-5 utilization categories, shunt and series motors (L/R ≤ 15 ms)										
Rated operational current I_e (at 60 °C)										
Number of conducting paths connected in series		1	2	3	1	2	3	1	2	3
up to 24 V	A	40	90	90	40	100	100	40	100	100
	60 V	6	90	90	6.5	100	100	6.5	100	100
	110 V	2.5	90	90	2.5	100	100	2.5	100	100
	220 V	1	7	35	1	7	35	1	7	35
	440 V	0.15	0.42	0.8	0.15	0.42	0.8	0.15	0.42	0.8
600 V	A	0.06	0.16	0.35	0.06	0.16	0.35	0.06	0.16	0.35

Operating frequency

Operating frequency z in operating cycles per hour		1/h	AC		DC		AC		DC		AC		DC	
Contactors without overload relays	No-load operating frequency	1/h	5000	1000	5000	1000	5000	1000	5000	1000	5000	1000	5000	1000
Dependence of the operating frequency z' on the rated operational current and the rated operational voltage:	for AC-1	1/h	AC/DC		AC/DC		AC/DC		AC/DC		AC/DC		AC/DC	
	for AC-2	1/h	1000		1000		900		900		350		350	
	for AC-3	1/h	400		400		400		400		850		850	
	for AC-4	1/h	1000		1000		1000		1000		850		850	
$z' = z \cdot \frac{I_e}{I_r} \cdot \left(\frac{400 \text{ V}}{U_r} \right)^{1.5}$		1/h	300		300		300		300		250		250	
Contactors with overload relays (mean value)		1/h	15		15		15		15		15		15	