

# Controls

## Contactors and Contactor Assemblies

Reference Manual · October 2011



# Industrial Controls

**SIEMENS**



# Switching Devices – Contactors and Contactor Assemblies



2	<b>Introduction</b>	
	<b>3RT, 3TB, 3TF Contactors for Switching Motors</b>	
5	General data	
11	3RT10 contactors, 3-pole, 3 ... 250 kW	130
55	3RT12 vacuum contactors, 3-pole, 110 ... 250 kW	136
64	3TF6 vacuum contactors, 3-pole, 335 ... 450 kW	137
71	3TB5 contactors with DC solenoid system, 3-pole, 55 ... 200 kW	141
76	3TF2 contactors, 3-pole, 2.2 ... 4 kW	145
	<b>3RA13, 3RA14 Contactor Assemblies</b>	
	<u>3RA13 Reversing Contactor Assemblies</u>	
84	3RA13 complete units, 3 ... 45 kW	148
	<u>3RA14 Contactor Assemblies for Wye-Delta Starting</u>	
86	3RA14 complete units, 3 ... 75 kW	152
	<b>3TD, 3TE Contactor Assemblies</b>	
90	3TD6 reversing contactor assemblies, 335 kW	153
91	3TE6 contactor assemblies for wye-delta starting, 630 kW	157
	<b>3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications</b>	
	<u>3RT14 Contactors for Switching Resistive Loads (AC-1)</u>	
93	3-pole, 140 ... 690 A	164
	<u>3RT13 Contactors for Switching Resistive Loads (AC-1)</u>	
102	4-pole, 4 NO, 18 ... 140 A	
	<u>3TK1 Contactors for Switching Resistive Loads (AC-1)</u>	
106	4-pole, 4 NO, 200 ... 1000 A	
	<u>3TK20 Contactors</u>	
109	4-pole, 4 kW	
	<u>3RT15 Contactors</u>	
116	4-pole, 2 NO + 2 NC, 4 ... 18.5 kW	
	<u>3RT16 Capacitor Contactors</u>	
118	12.5 ... 50 kvar	
	<u>Contactors with Extended Operating Range <math>0.7 \dots 1.25 \times U_{s}</math> for Railway Applications</u>	
120	3RH11 contactor relays	178
121	3TH4 contactor relays	179
122	3RT10 motor contactors, 5.5 ... 45 kW	221
124	3TB5 motor contactors, 55 ... 200 kW	
125	3TC contactors for switching DC voltage, 2-pole	
	<u>3TC Contactors for Switching DC Voltage</u>	
126	1- and 2-pole, 32 ... 400 A	
	<b>3RH, 3TH Contactor Relays</b>	
	3RH1 contactor relays, 4- and 8-pole	
	3RH14 latched contactor relays, 4-pole	
	3TH4 contactor relays, 8- and 10-pole	
	3TH2 contactor relays, 4- and 8-pole	
	3RH11 coupling relays for switching auxiliary circuits, 4-pole	
	<b>3RT Coupling Relays</b>	
146	3RT10 coupling relays (interface), 3-pole, 3 ... 11 kW	
	<b>3TX7, 3RS18 Coupling Relays</b>	
	<u>3TX7 Coupling Relays, Narrow Design</u>	
	Relay couplers	
	Relay couplers with plug-in design	
	Semiconductor couplers	
	<u>3RS18 Coupling Relays with Industrial Housing</u>	
	Relay couplers	
	<b>Coupling Relays with LZS/LZX Plug-In Relays</b>	
160	Plug-in relay couplers	
	<b>3TG10 Power Relays/Miniature Contactors</b>	
164	4-pole, 4 kW	
	<b>Accessories and Spare Parts</b>	
	<u>For 3RT, 3RH Contactors and Contactor Relays</u>	
167	Accessories for 3RT, 3RH contactors and contactor relays	
	<u>For 3T Contactors and Contactor Relays</u>	
176	Accessories for 3TB, 3TC, 3TF, 3TG, 3TK contactors	
177	Accessories for 3TH contactor relays	
	<b>Project Planning Aids</b>	
	- Overview	
	- Dimensional drawings	
	- Schematics	

# Switching Devices – Contactors and Contactor Assemblies

## Introduction

## Overview



Size	<b>S00</b>			<b>S0</b>				<b>S2</b>			
Type	3RT10 1			3RT10 2				3RT10 3			

### 3RT10 contactors • 3RT12 and 3TF68/69 vacuum contactors

Type	3RT10 15	3RT10 16	3RT10 17	3RT10 23	3RT10 24	3RT10 25	3RT10 26	3RT10 34	3RT10 35	3RT10 36
AC, DC operation										
Type	--			--				--		

### AC-3

$I_e$ /AC-3/400 V	A	7	9	12	9	12	17	25	32	40	50
400 V	kW	3	4	5.5	4	5.5	7.5	11	15	18.5	22
230 V	kW	2.2	3	3	3	3	4	5.5	7.5	11	15
500 V	kW	3.5	4.5	5.5	4.5	7.5	10	11	18.5	22	30
690 V	kW	4	5.5	5.5	5.5	7.5	11	11	18.5	22	22
1000 V	kW	--	--	--	--	--	--	--	--	--	--

### AC-4 (for $I_a = 6 \times I_e$ )

400 V	kW	3	4	4	4	5.5	7.5	7.5	15	18.5	22
400 V	kW	1.15	2	2	2	2.6	3.5	4.4	8.2	9.5	12.6
(200 000 operating cycles)											

### AC-1 (40 °C, ≤ 690 V)

$I_e$	3RT10/12	A	18	22	22	40	40	40	40	50	60	60
-------	----------	---	----	----	----	----	----	----	----	----	----	----

### 3RT14 AC-1 contactors

Type	--			--				--			
$I_e$ /AC-1/40 °C/≤ 690 V	A	--		--				--			

### Accessories for contactors

Auxiliary switch blocks	front lateral	3RH19 11		3RH19 21							
		--		3RH19 21							
Terminal covers		--		--					3RT19 36-4EA2		
Box terminal blocks		--		--					--		
Surge suppressors		3RT19 16		3RT19 26					3RT19 26/36		

### 3RU11 and 3RB20/21 overload relays (protection equipment: overload relays)

3RU11, thermal, CLASS 10	3RU11 16	0.1 ... 12 A	3RU11 26	1.8 ... 25 A	3RU11 36	5.5 ... 50 A
3RB20/21, solid-state, CLASS 5, 10, 20 and 30	3RB20 16	0.1 ... 12 A	3RB20 26	3 ... 25 A	3RB20 36	6 ... 50 A
	3RB21 16		3RB21 26		3RB21 36	
3RB22/23, solid-state, CLASS 5, 10, 20 and 30	3RB2. 83 + 3RB29 06	0.3 ... 25 A			3RB2. 83 + 3RB29 06	10 ... 100 A

### 3RV10 motor starter protectors (protection equipment: motor starter protectors)

Type	3RV10 11	0.18 ... 12 A	3RV10 21	9 ... 25 A	3RV10 31	22 ... 50 A
Link modules	3RA19 11		3RA19 21		3RA19 31	

### 3RA13 reversing contactor assemblies

Complete units	Type	3RA13 15	3RA13 16	3RA13 17	3RA13 24	3RA13 25	3RA13 26	3RA13 34	3RA13 35	3RA13 36
400 V	kW	3	4	5.5	5.5	7.5	11	15	18.5	22
Assembly kits/wiring modules		3RA19 13-2A			3RA19 23-2A			3RA19 33-2A		
Mechanical interlocks		3RA19 12-2H			3RA19 24-1A/-2B					

### 3RA14 contactor assemblies for wye-delta starting

Complete units	Type	3RA14 15	3RA14 16	3RA14 23	3RA14 25	3RA14 34	3RA14 35	3RA14 36
400 V	kW	5.5	7.5	11	15/18.5	22/30	37	45
Assembly kits/wiring modules		3RA19 13-2B		3RA19 23-2B		3RA19 33-2B/-2C		

Note:

For safety characteristics for contactors see LV 1 "Appendix" --> "Standards and approvals" --> "Overview".

# Switching Devices – Contactors and Contactor Assemblies

## Introduction



**S3**  
3RT1. 4

**S6**  
3RT1. 5

**S10**  
3RT1. 6

**S12**  
3RT1. 7

**S14**  
3TF6

	<b>3RT10 44</b>	<b>3RT10 45</b>	<b>3RT10 46</b>	<b>3RT10 54</b>	<b>3RT10 55</b>	<b>3RT10 56</b>	<b>3RT10 64</b>	<b>3RT10 65</b>	<b>3RT10 66</b>	<b>3RT10 75</b>	<b>3RT10 76</b>	--			
	--			--			<b>3RT12 64</b>	<b>3RT12 65</b>	<b>3RT12 66</b>	<b>3RT12 75</b>	<b>3RT12 76</b>	<b>3TF68</b>	<b>3TF69</b>		
	65	80	95	115	150	185	225	265	300	400	500	630	820		
	<b>30</b>	<b>37</b>	<b>45</b>	<b>55</b>	<b>75</b>	<b>90</b>	<b>110</b>	<b>132</b>	<b>160</b>	<b>200</b>	<b>250</b>	<b>335</b>	<b>450</b>		
	18.5	22	22	37	45	55	55	75	90	132	160	200	260		
	37	45	55	75	90	110	160	160	200	250	355	434	600		
	45	55	55	110	132	160	200	250	250	400	400/500	600	800		
	30	37	37	75	90	90	90/315	132/355	132/400	250/560	250/710	600	800		
	<b>30</b>	<b>37</b>	<b>45</b>	<b>55</b>	<b>75</b>	<b>90</b>	<b>110</b>	<b>132</b>	<b>160</b>	<b>200</b>	<b>250</b>	<b>355</b>	<b>400</b>		
	15.1	17.9	22	29	38	45	54/78	66/93	71/112	84/140	98/161	168	191		
	<b>100</b>	<b>120</b>	<b>120</b>	<b>160</b>	<b>185</b>	<b>215</b>	<b>275/330</b>	<b>330</b>	<b>330</b>	<b>430/610</b>	<b>610</b>	<b>700</b>	<b>910</b>		
	<b>3RT14 46</b>			<b>3RT14 56</b>			<b>3RT14 66</b>			<b>3RT14 76</b>		--			
	140			275			400			690		--			
	--			--			--			--		--			
	--			--			--			--		--			
	<b>3RT19 46-4EA1/2</b>			<b>3RT19 56-4EA1/2/3</b>			<b>3RT19 66-4EA1/2/3</b>			--		<b>3TY7 561</b>			
	--			<b>3RT19 55/56-4G</b>			<b>3RT19 66-4G</b>			--		<b>3TX7 686/696</b>			
	--			<b>3RT19 56-1C (RC element)</b>			--			--		--			
	--			--			--			--		--			
	<b>3RU11 46</b>	18 ... 100 A		--	--		--	--		--	--		--		
	<b>3RB20 46</b>	12.5 ... 100 A		<b>3RB20 56</b>	50 ... 200 A		<b>3RB20 66</b>	55 ... 630 A		<b>3RB20 66</b>	160 ... 630 A		<b>3RB20 66</b>	160 ... 630 A	
	<b>3RB21 46</b>	--		<b>3RB21 56</b>	--		<b>3RB21 66</b>	--		<b>3RB21 66</b>	--		<b>3RB21 66</b>	--	
	--			<b>3RB2. 83 + 3RB29 56</b>	20 ... 200 A		<b>3RB2. 83 + 3RB29 66</b>	63 ... 630 A		--					
	<b>3RV10 41</b>	45 ... 100 A		--	--		--	--		--	--		--	--	
	<b>3RA19 41</b>	--		--	--		--	--		--	--		--	--	
	<b>3RA13 44</b>	<b>3RA13 45</b>	<b>3RA13 46</b>	--	--		--	--		--	--		<b>3TD68 04</b>		
	30	37	45	<b>55</b>	<b>75</b>	<b>90</b>	<b>110</b>	<b>132</b>	<b>160</b>	<b>200</b>	<b>250</b>	<b>335</b>	<b>335</b>		
	<b>3RA19 43-2A</b>			<b>3RA19 53-2A</b>			<b>3RA19 63-2A</b>			<b>3RA19 73-2A</b>		<b>3TX7 680-1A</b>			
	--			<b>3RA19 54-2A</b>			--			--		<b>3TX7 686-1A</b>			
	<b>3RA14 44</b>	<b>3RA14 45</b>		--	--		--	--		--	--		<b>3TE68 04</b>		
	55	75		--	--		--	--		--	--		<b>630</b>		
	<b>3RA19 43-2B/-2C</b>			<b>3RA19 53-2B</b>			<b>3RA19 63-2B</b>			<b>3RA19 73-2B</b>		<b>3TX7 680-1B</b>			

# Switching Devices – Contactors and Contactor Assemblies

## Introduction

### The advantages at a glance



3TX7



3RS18



LZS/LZX



3TG10

		Order No.	Page
<b>Coupling links, narrow design</b>			
<b>Relay couplers</b>	<ul style="list-style-type: none"> <li>Width 6.2 mm (1 NO, 1 CO), 12.5 mm and 17.5 mm</li> <li>Output coupling links</li> <li>Input coupling links with hard gold-plating</li> </ul>	3TX7 002, 3TX7 003, 3TX7 004, 3TX7 005	148
<b>Plug-in base couplers, complete with relay</b>	<ul style="list-style-type: none"> <li>Width 6.2 mm (1 NO, 1 CO)</li> <li>Relays, replaceable</li> </ul>	3TX7 014-1..00	152
<b>Plug-in base couplers, complete with relay and hard gold-plating</b>	<ul style="list-style-type: none"> <li>Width 6.2 mm (1 CO)</li> </ul>	3TX7 014-1..02	152
<b>Semiconductor couplers</b>	<ul style="list-style-type: none"> <li>Output 1 semiconductor, triac or transistor</li> </ul>	3TX7 002, 3TX7 004, 3TX7 005	152
<b>Coupling relays in industrial housing</b>			
<b>Relay couplers</b>	<ul style="list-style-type: none"> <li>Protective separation up to 300 V between contacts and relay circuits</li> <li>1, 2 and 3 changeover contacts</li> <li>Hard gold-plated contacts in combination and wide voltage range versions</li> </ul>	3RS18	157
<b>Coupling relays with plug-in relays</b>			
<b>Plug-in relay couplers with 2, 3 and 4 changeover contacts</b>	<ul style="list-style-type: none"> <li>Switching capacity 12 A/10 A/6 A</li> <li>Width 27 mm</li> <li>Base optionally with or without logical isolation</li> </ul>	LZS/LZX:PT	160
<b>Plug-in relay couplers with 1, 2 changeover contacts</b>	<ul style="list-style-type: none"> <li>Switching capacity 16 A/8 A</li> <li>Width 15.5 mm</li> <li>Base optionally with or without logical isolation</li> </ul>	LZS/LZX:RT	160
<b>Plug-in relay couplers with 3 changeover contacts and circular base</b>	<ul style="list-style-type: none"> <li>Switching capacity 6 A</li> <li>11-pole circular base</li> <li>Width 38 mm</li> </ul>	LZS/LZX:MT	160
<b>Power relays</b>			
<b>With screw and flat connectors</b>		3TG10	164

### Connection method

The contactors and relays are available with screw terminals (box terminals and connecting bars) or with Cage Clamp terminals or spring-type terminals. Some device types are also available with plug-type connectors.



Screw terminals



Cage Clamp terminals or spring-type terminals



Flat connectors



Plug-in terminals



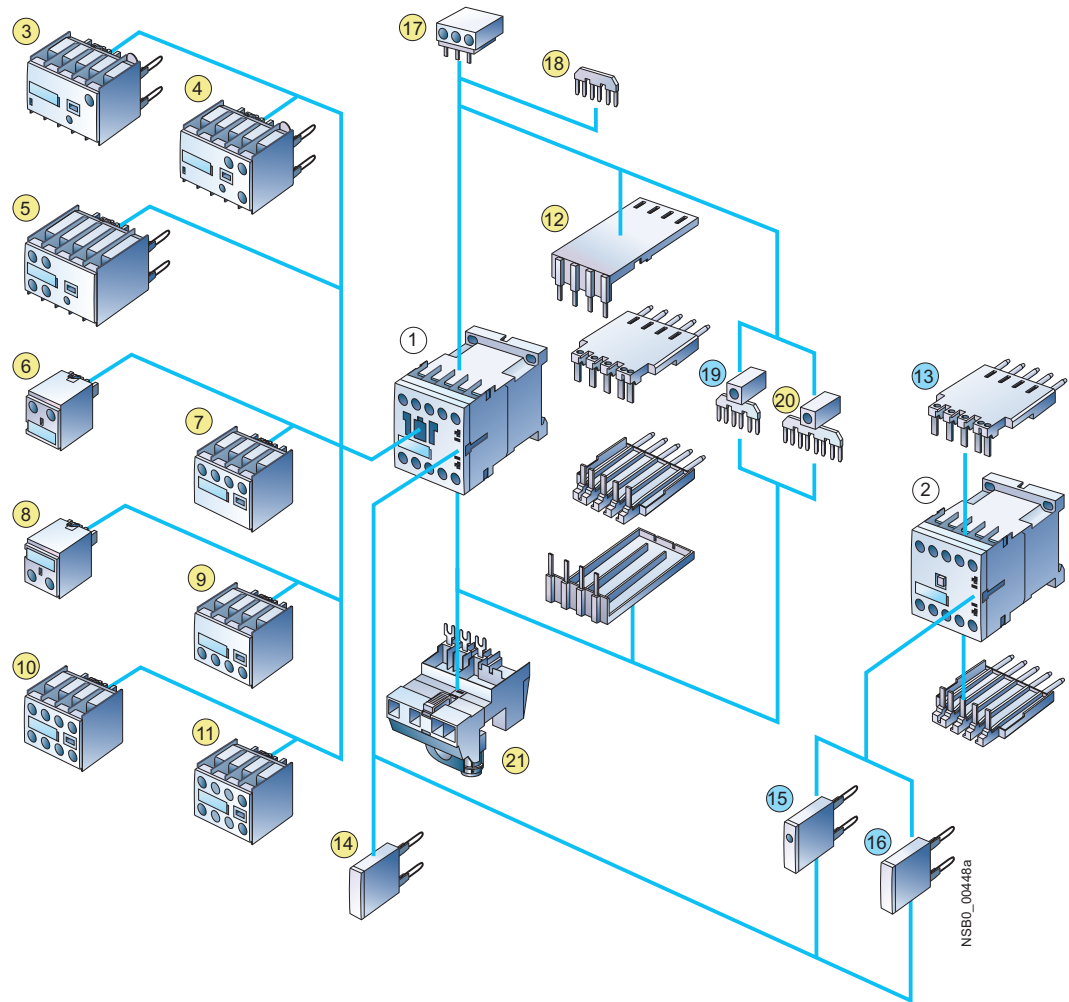
Solder pin connections

These connections are indicated in the Technical specifications by orange backgrounds.

## Overview

### 3RT1 contactors and coupling relays Size S00 with mountable accessories

The SIRIUS generation of controls is a complete, modular system family, logically designed right down to the last detail, from the basic units to the accessories.



- ① Contactor
- ② Coupling relay

- ③ Solid-state timing relay block, with ON-delay
- ④ Solid-state timing relay block, with OFF-delay
- ⑤ Auxiliary switch block with solid-state time delay (ON or OFF-delay or wye-delta function)
- ⑥ 1-pole auxiliary switch block, cable entry from above
- ⑦ 2-pole auxiliary switch block, cable entry from above
- ⑧ 1-pole auxiliary switch block, cable entry from below
- ⑨ 2-pole auxiliary switch block, cable entry from below
- ⑩ 4-pole auxiliary switch block (terminal designations according to EN 50012 or EN 50005)
- ⑪ 2-pole auxiliary switch block, standard version or solid-state compatible version (terminal designations according to EN 50005)
- ⑫ Solder pin adapter for contactors with 4-pole auxiliary switch block
- ⑬ Solder pin adapter for contactors and coupling relays

- ⑭ Additional load module for increasing the permissible residual current
- ⑮ Surge suppressor with LED
- ⑯ Surge suppressor without LED
- ⑰ 3-phase feeder terminal
- ⑱ Link for paralleling (star jumper), 3-pole, without connection terminal
- ⑲ Link for paralleling, 3-pole, with terminal
- ⑳ Link for paralleling, 4-pole, with terminal
- ㉑ Connection module (adapter and connector) for contactors with screw-type connection

- For contactors
- For contactors and coupling relays (interface)

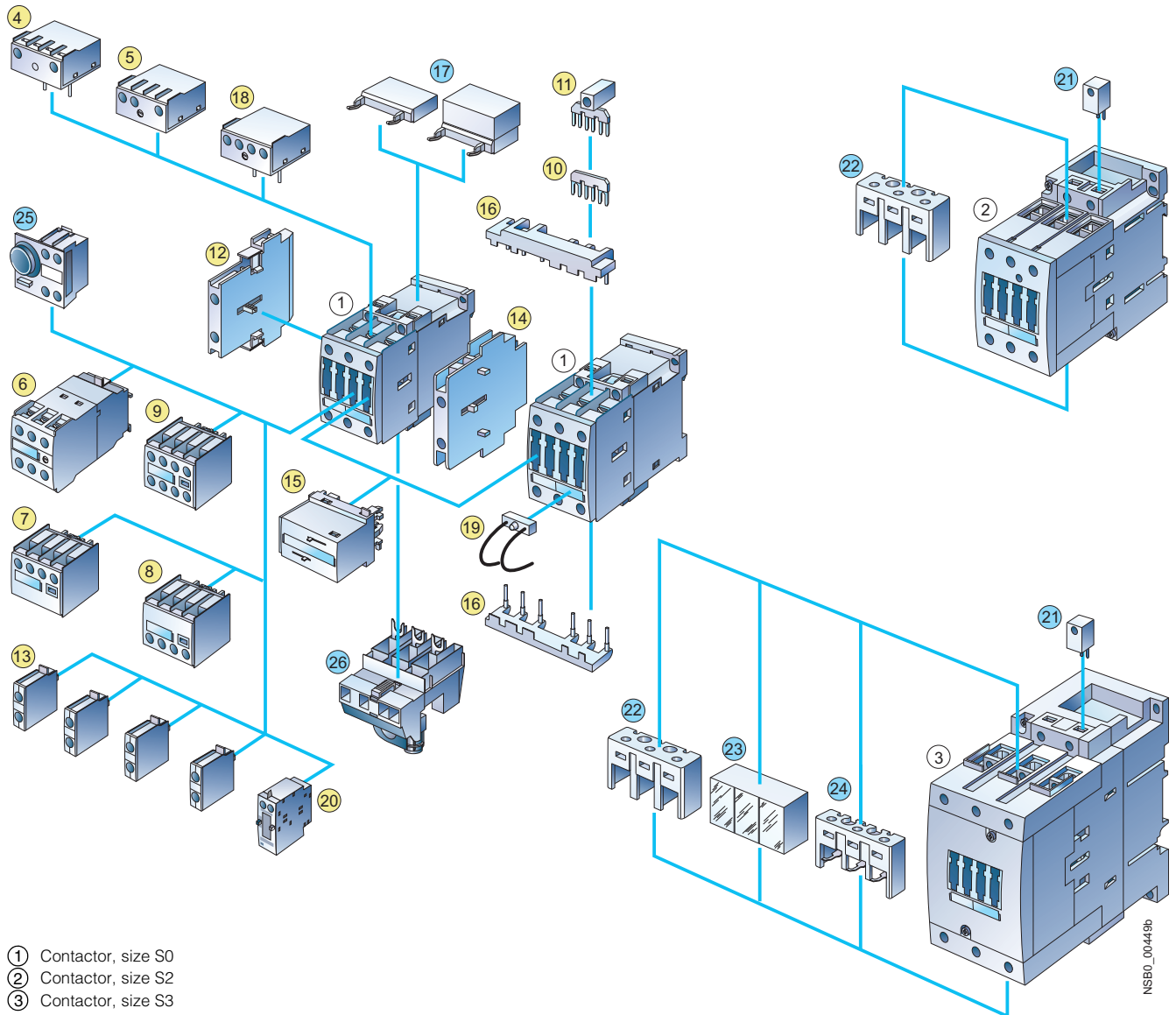
For contactor assemblies see pages 84 to 85.  
 For assembly kit for reversing contactor assemblies (mech. interlocking, wiring modules) see Catalog LV 1.  
 For mountable overload relays see "Protection Equipment --> Overload Relays".

For fuseless load feeders, see "Load Feeders and Motor Starters --> 3RA Fuseless Load Feeders".

# 3RT, 3TB, 3TF Contactors for Switching Motors

## General data

### 3RT1 contactors Sizes S0 to S3 with mountable accessories



- ① Contactor, size S0
- ② Contactor, size S2
- ③ Contactor, size S3

#### For sizes S0 to S3:

- ④ Solid-state timing relay block, with ON-delay
- ⑤ Solid-state timing relay block, with OFF-delay
- ⑥ Auxiliary switch block with solid-state time delay (ON or OFF-delay or wye-delta function)
- ⑦ 2-pole auxiliary switch block, cable entry from above
- ⑧ 2-pole auxiliary switch block, cable entry from below
- ⑨ 4-pole auxiliary switch block (terminal designations according to EN 50012 or EN 50005)
- ⑩ Link for paralleling (star jumper), 3-pole, without connection terminal
- ⑪ Link for paralleling, 3-pole, with terminal
- ⑫ 2-pole auxiliary switch block, laterally mountable left or right (terminal designations according to EN 50012 or EN 50005)
- ⑬ Single-pole auxiliary switch block (up to 4 can be snapped on)
- ⑭ Mechanical interlock, laterally mountable
- ⑮ Mechanical interlock, mountable on the front
- ⑯ Wiring module on the top and bottom (reversing duty)
- ⑰ Surge suppressor (varistor, RC element, diode assembly), can be mounted on the top or bottom (different for S0 and S2/S3)

- ⑱ Coupling link for mounting directly onto contactor coil
- ⑲ LED module for indicating contactor operation

#### Only for size S0:

- ⑳ Pneumatic delay block
- ㉑ Connection module (adapter and connector) for contactors with screw-type connection

#### Only for sizes S0 and S2:

- ㉒ Mechanical latching

#### Only for sizes S2 and S3:

- ㉓ Coil repeat terminal for making contactor assemblies
- ㉔ Terminal cover for box terminals

#### Only for size S3:

- ㉕ Terminal cover for cable lugs and busbar connections
- ㉖ Auxiliary terminal, 3-pole

- Accessories identical for sizes S0 to S3
- Accessories differ according to size

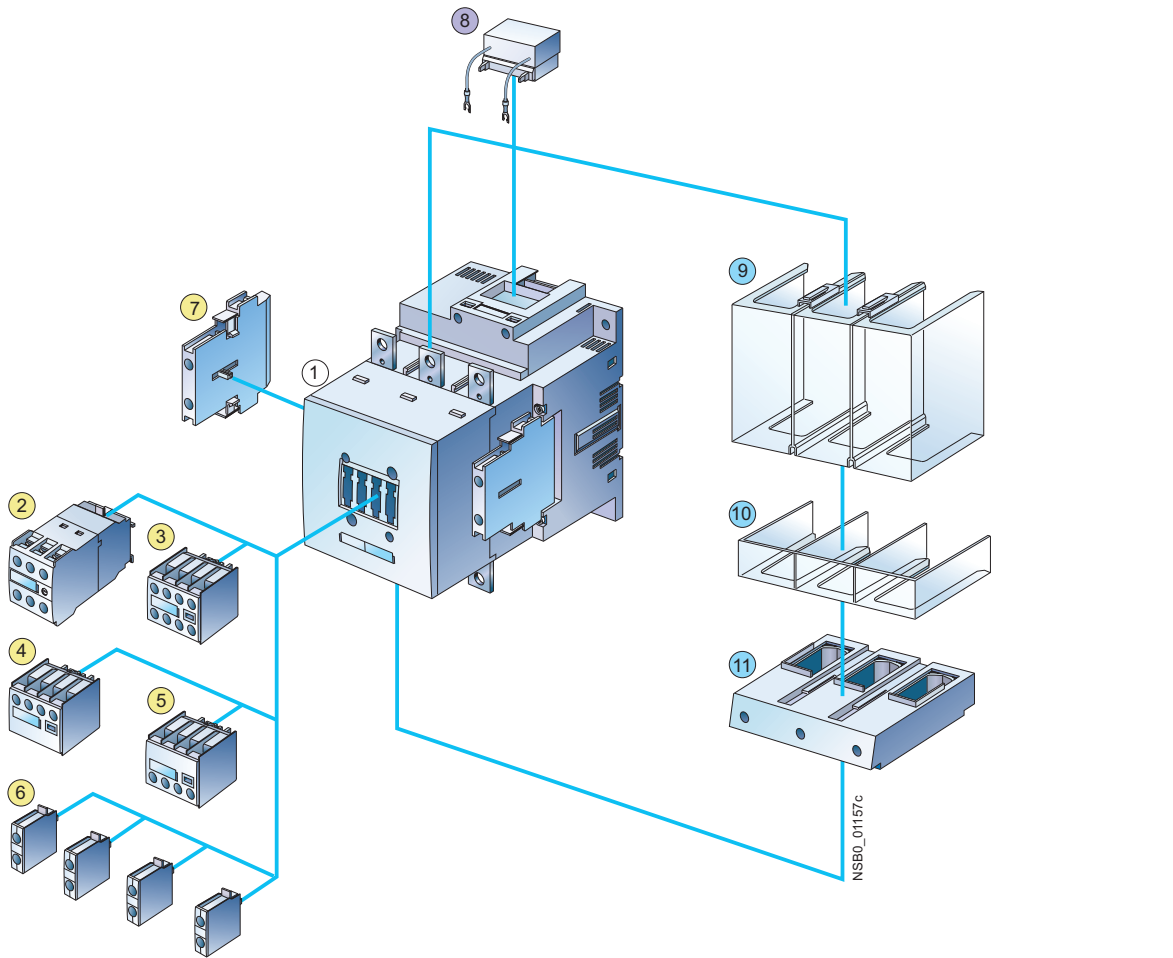
NSB0\_00449b



# 3RT, 3TB, 3TF Contactors for Switching Motors

General data

**3RT1 contactors**  
 Sizes S6 to S12 with accessories  
 (illustration for basic unit)



- ① 3RT10 and 3RT14 air-break contactor, sizes S6, S10 and S12
- ② Auxiliary switch block with solid-state time delay (ON or OFF-delay or wye-delta function)
- ③ 4-pole auxiliary switch block (terminal designations according to EN 50012 or EN 50005)
- ④ 2-pole auxiliary switch block, cable entry from above
- ⑤ 2-pole auxiliary switch block, cable entry from below
- ⑥ Single-pole auxiliary switch block (up to 4 can be snapped on)
- ⑦ 2-pole auxiliary switch block, laterally mountable left or right (terminal designations according to EN 50012 or EN 50005) (identical for S0 to S12)
- ⑧ Surge suppressor (RC element), for plugging into top of withdrawable coil

- ⑨ Terminal cover for cable lug and busbar connection, different for sizes S6 and S10/S12
- ⑩ Terminal cover for box terminal, different for sizes S6 and S10/S12
- ⑪ Box terminal block, different for sizes S6 and S10/S12

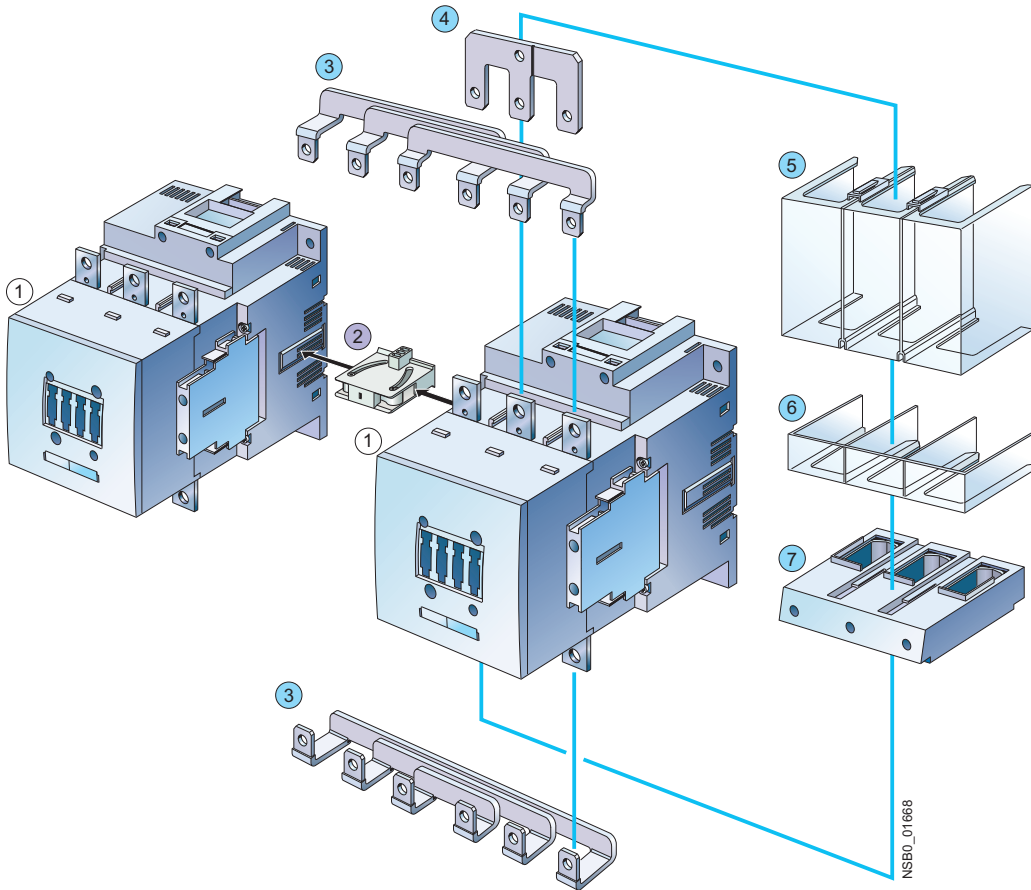
- Accessories identical for sizes S0 to S12
- Accessories identical for sizes S6 to S12
- Accessories differ according to size

For mountable overload relays see "Protection Equipment --> Overload Relays".

# 3RT, 3TB, 3TF Contactors for Switching Motors

## General data

3RA1 contactor assemblies, 3RT1 contactors  
Size S6 with accessories



- ① 3RT10 and 3RT14 air-break contactor, size S6
- ② 3RA19 54-2A mechanical interlock, laterally mountable
- ③ 3RA19 53-2A wiring modules on the top and bottom
- ④ 3RT19 56-4BA31 link for paralleling (star jumper), 3-pole, with through hole
- ⑤ Terminal cover for cable lug and busbar connection, different for sizes S6 and S10/S12
- ⑥ Terminal cover for box terminal, different for sizes S6 and S10/S12
- ⑦ Box terminal block, different for sizes S6 and S10/S12

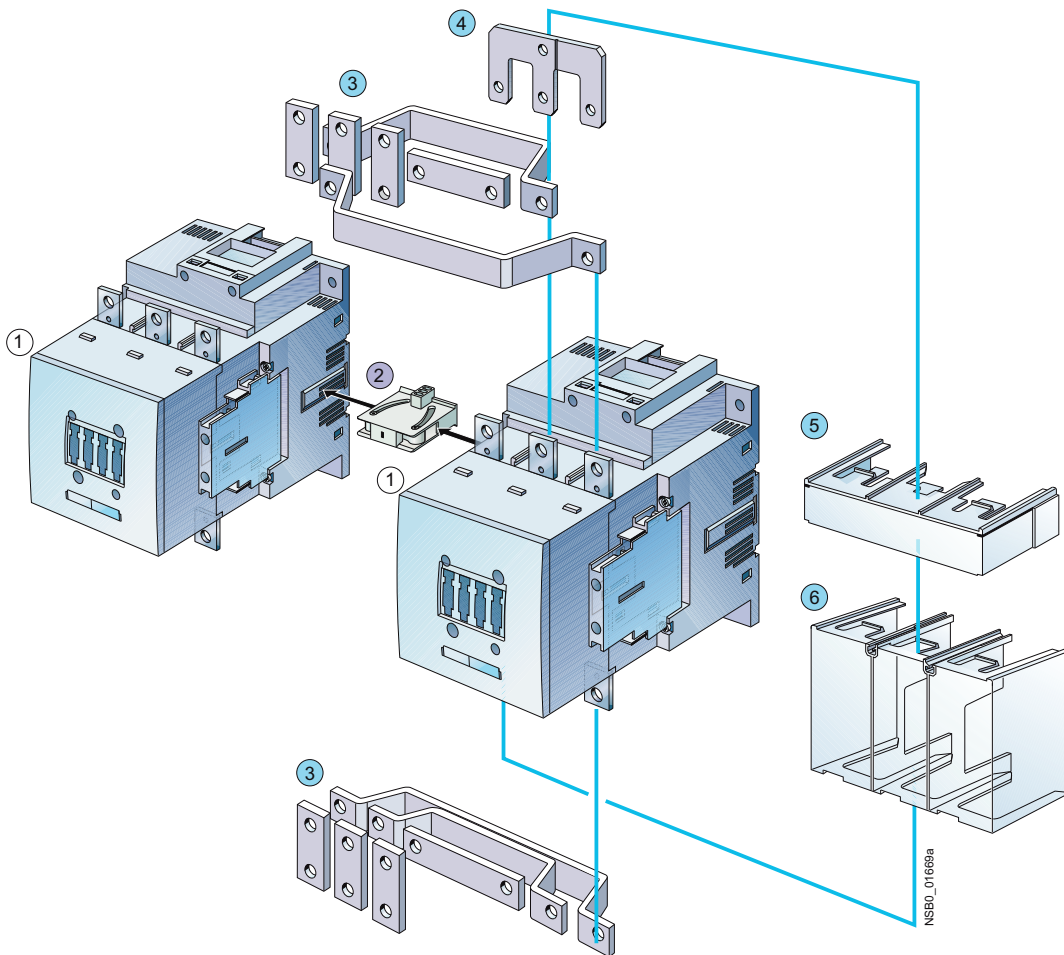
- Accessories identical for sizes S6 to S12
- Accessories differ according to size

For mountable overload relays see "Protection Equipment --> Overload Relays".

# 3RT, 3TB, 3TF Contactors for Switching Motors

General data

**3RA1 contactor assemblies, 3RT1 contactors**  
**Sizes S10 and S12 with accessories**



① 3RT10 and 3RT14 air-break contactor, sizes S6, S10 and S12 or  
 3RT12 vacuum contactor, sizes S10 and S12

② Mechanical interlock, laterally mountable

③ 3RA19 wiring modules on the top and bottom

④ 3RT19 56-4BA31 link for paralleling (star jumper), 3-pole,  
 with through hole

⑤ Terminal cover for box terminal,  
 different for sizes S6 and S10/S12

⑥ Terminal cover for cable lug and busbar connection,  
 different for sizes S6 and S10/S12

● Accessories identical for sizes S6 to S12

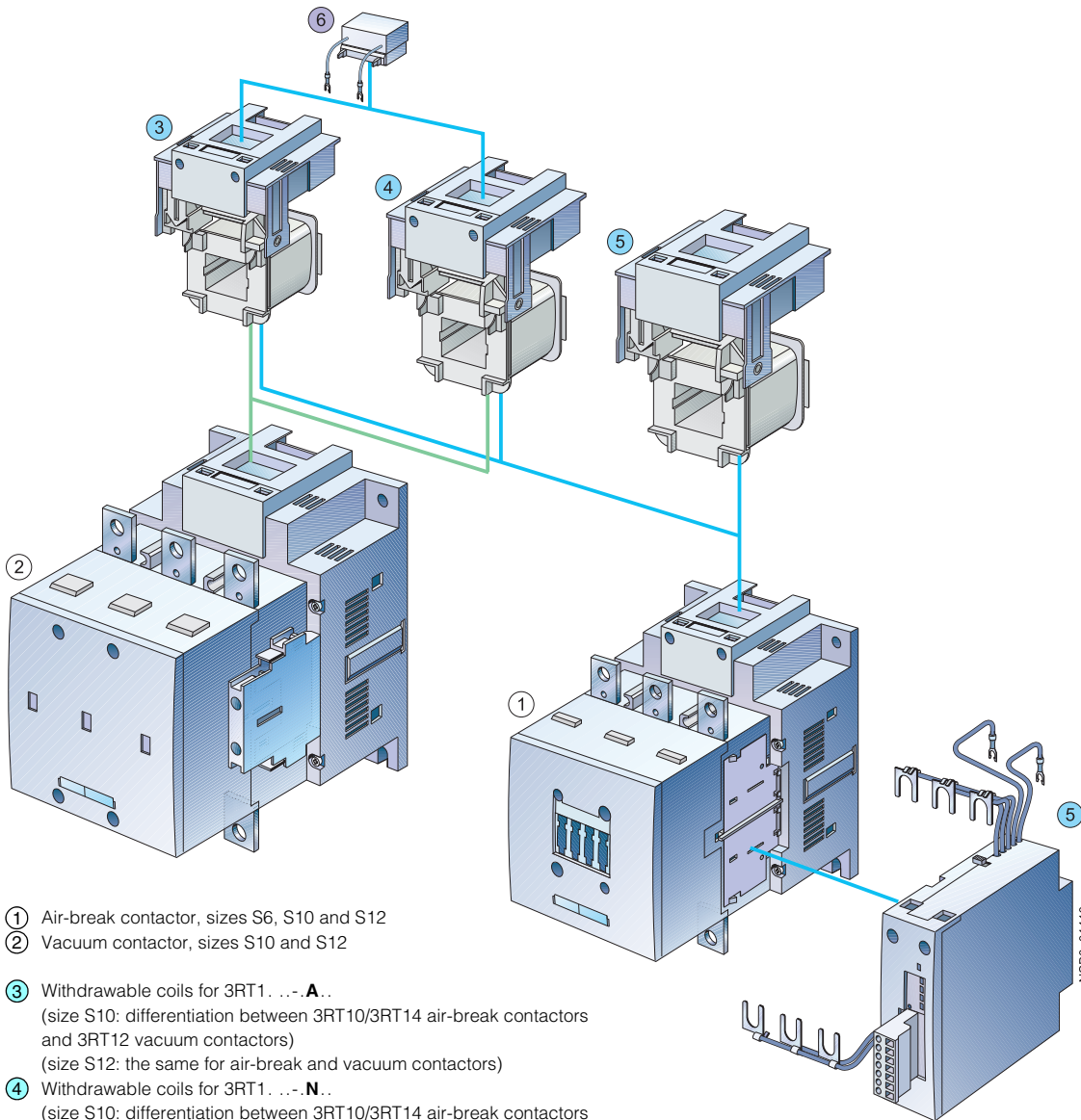
● Accessories differ according to size

For mountable overload relays see "Protection Equipment -->  
 Overload Relays".

# 3RT, 3TB, 3TF Contactors for Switching Motors

## General data

**3RT1 contactors**  
 Sizes S6 to S12 with accessories



- ① Air-break contactor, sizes S6, S10 and S12
- ② Vacuum contactor, sizes S10 and S12
- ③ Withdrawable coils for 3RT1...-A...  
 (size S10: differentiation between 3RT10/3RT14 air-break contactors and 3RT12 vacuum contactors)  
 (size S12: the same for air-break and vacuum contactors)
- ④ Withdrawable coils for 3RT1...-N...  
 (size S10: differentiation between 3RT10/3RT14 air-break contactors and 3RT12 vacuum contactors)  
 (size S12: the same for air-break and vacuum contactors)
- ⑤ Withdrawable coils and laterally mountable module (plug-on) for air-break contactors with solid-state operating mechanism and remaining lifetime indicator 3RT1...-P... and 3RT1...-Q...
- ⑥ Surge suppressor (RC element), plug-mountable on withdrawable coils
  - With conventional operating mechanism 3RT1...-A...
  - With solid-state operating mechanism 3RT1...-N...

- Identical for sizes S6 to S12
- Different according to size

For mountable overload relays see "Protection Equipment --> Overload Relays".

### Overview

#### 3RT10 contactors, 3-pole, sizes S00 to S3, up to 45 kW

##### AC and DC operation

IEC 60947, EN 60947 (VDE 0660)

The 3RT1 contactors are climate-proof. They are finger-safe according to EN 50274.

Size S00 contactors have an auxiliary contact integrated in the basic unit. The basic units of sizes S0 to S3 contain only the main current paths.

All basic units can be extended with auxiliary switch blocks. For size S0 and higher, complete units with 2 NO + 2 NC are available (connection designation according to EN 50012). The auxiliary switch block can be removed ([for more information see Integration](#)).

In addition, complete units with permanently mounted auxiliary switch block (2 NO + 2 NC according to EN 50012) are offered for sizes S00 and S0. These versions are built according to special Swiss regulations "SUVA" and are distinguished externally by a red labeling plate.

##### Connection method

The 3RT1 contactors are available with screw terminals (box terminals and connecting bars) or with Cage Clamp terminals.

The size S3 contactors have removable box terminals for the main conductor connections. This permits connection of ring terminal lugs or busbars.

##### Contact reliability

If voltages  $\leq 110$  V and current  $\leq 100$  mA are to be switched, the auxiliary contacts of the 3RT1 contactor or 3RH11 contactor relay should be used as they guarantee a high level of contact reliability.

These auxiliary contacts are suitable for solid-state circuits with currents  $\geq 1$  mA at a voltage of 17 V.

##### Short-circuit protection of the contactors

[Short-circuit protection of the contactors without overload relay, see "Technical specifications"](#). [For short-circuit protection of the contactors with overload relay, see "Overload Relays"](#). To assemble fuseless motor feeders you must select combinations of motor starter protector and contactor as explained in "Fuseless Load Feeders".

##### Motor protection

3RU11 thermal overload relays or 3RB20 solid-state overload relays can be fitted to the 3RT1 contactors for protection against overload. The overload relays must be ordered separately.

##### Ratings of induction motors

The quoted rating (in kW) refers to the output power on the motor shaft (according to the nameplate).

##### Surge suppression

3RT1 contactors can be retrofitted with RC elements, varistors, diodes or diode assemblies (assembly of diode and Zener diode for short break times) for damping opening surges in the coil.

The surge suppressors are plugged onto the front of size S00 contactors. Space is provided for them next to a snap-on auxiliary switch block.

For size S0 to S3 contactors, varistors and RC elements can be snapped on either on the top or directly below the coil terminals. Diode assemblies are available in 2 different versions on account of their polarity. Depending on the application they can be connected either only at the bottom (assembly with motor starter protector) or only at the top (assembly with overload relay).

The plug-in direction of the diodes and diode assemblies is specified by coding.

Exceptions:

3RT19 26-1T.00 and

3RT19 36-1T.00, in this case the plug-in direction is marked with "+" and "-".

Coupling relays are supplied either without overvoltage damping or with a varistor or diode connected as standard, according to the version.

##### Note:

*The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are damped against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).*

#### 3RT10 contactors, 3-pole, sizes S6 to S12, > 45 to 250 kW

- 3RT10, contactors for switching motors,
- 3RT12, vacuum contactors for switching motors,
- 3RT14, contactors for AC-1 applications.

##### Operating mechanism types

Two types of solenoid operation are available:

- Conventional operating mechanism
- Solid-state operating mechanism (with 3 performance levels)

##### UC operation

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

##### Withdrawable coils

For simple coil replacement, e. g., if the application is replaced, the magnetic 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.

##### Auxiliary contact complement

[For details of the auxiliary switch fittings per S0-S12 contactor see page 16.](#)

- 3RT10 and 3RT14 contactors:  
Auxiliary contacts mounted laterally and on front
- 3RT12 vacuum contactors:  
Auxiliary contacts mounted laterally

##### Note:

*Auxiliary contact complement according to SUVA.*

Contactors with permanently mounted auxiliary switch block for safety applications according to SUVA.

##### Contactors with conventional operating mechanism

##### Version 3RT1. ...A:

The magnetic coil is switched directly on and off with the control supply voltage  $U_s$  by way of terminals A1/A2.

Multi-voltage range for the control supply voltage  $U_s$ : Several closely adjacent control supply voltages, available around the world, are covered by just one coil, for example 110-115-120-127 V UC or 220-230-240 V UC.

In addition, allowance is also made for a coil operating range of 0.8 times the lower ( $U_{s \min}$ ) and 1.1 times the upper ( $U_{s \max}$ ) rated control supply voltage within which the contactor switches reliably and no thermal overloading occurs.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

### Contactors with solid-state operating mechanism

The magnetic coil is supplied selectively with the power required for reliable switching and holding by upstream control electronics.

- Wide voltage range for the control supply voltage  $U_s$ :  
Compared with the conventional operating mechanism, the solid-state operating mechanism covers an even broader range of control supply voltages used worldwide within one coil variant. For example, the coil for 200 to 277 V UC ( $U_{s\min}$  to  $U_{s\max}$ ) covers the voltages 200-208-220-230-240-254-277 V used worldwide.
- Extended operating range  $0.7$  to  $1.25 \times U_s$ :  
The wide range for the rated control supply voltage and the additionally allowed coil operating range of  $0.8 \times U_{s\min}$  to  $1.1 \times U_{s\max}$  results in an extended coil operating range of at least  $0.7$  to  $1.25 \times U_s$ , within which the contactors will operate reliably, for the most common control supply voltages of 24, 110 and 230 V.
- Bridging temporary voltage dips:  
Control voltage failures dipping to 0 V (at A1/A2) are bridged for up to approx. 25 ms to avoid unintentional tripping.
- Defined ON and OFF thresholds:  
For voltages of  $\geq 0.8 \times U_{s\min}$  and higher the electronics will reliably switch the contactor ON, and as of  $\leq 0.5 \times U_{s\min}$  it is reliably switched off. The hysteresis in the switching thresholds prevents the main contacts from chattering as well as increased wear or welding when operated in weak, unstable networks. This also prevents thermal overloading of the contactor coil if the voltage applied is too low (contactor does not close properly and is continuously operated with overexcitation).
- Low control power consumption when closing and in the closed state.

### Electromagnetic compatibility (EMC)

The contactors with solid-state operating mechanism comply with the requirements for operation in industrial plants.

- Interference immunity
  - Burst (IEC 61000-4-4): 4 kV
  - Surge (IEC 61000-4-5): 4 kV
  - Electrostatic discharge, ESD (IEC 61000-4-2): 8/15 kV
  - Electromagnetic field (IEC 61000-4-3): 10 V/m
- Emitted interference
  - Limit value class A according to EN 55011

### Note:

*In connection with converters, the control cables should be installed separately from the load cables of the converter.*

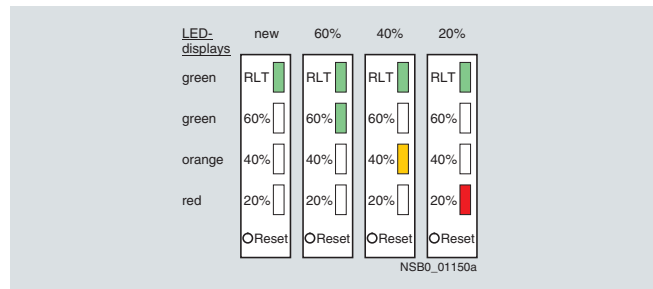
### Indication of remaining lifetime (RLT)

Main contactor contacts are working parts which must be replaced in good time when the end of their service life has been reached. The degree of contact erosion and thus the electrical endurance (= number of operating cycles) depends on the loading, utilization category, operating mode, etc. Up to now, routine checks/visual inspections by the maintenance personnel were needed in order to gain an insight into the state of the main contacts. The remaining lifetime indication function now takes over this task. It does not count the number of operating cycles – which does not provide information about contact erosion – but instead electronically identifies, evaluates and stores the actual progress of erosion of each one of the three main contacts, and outputs a warning when specified limits are reached. The stored data are not lost even if the control supply voltage for A1/A2 fails. After replacement of the main contacts, measurement the remaining lifetime must be reset using the "RESET" button (hold down RESET button for about 2 seconds using a pen or similar tool).

### Advantages:

- Signaling through relay contact or AS-i when remaining lifetime is 20 %, i. e. contact material wear is 80 %

- Additional visual indication of various levels of erosion by means of LEDs on the laterally mounted solid-state module when remaining lifetime is 60 % (green), 40 % (orange) and 20 % (red)



- Early warning to replace contacts
- Optimum utilization of contact material
- Visual inspection of the condition of contacts no longer necessary
- Reduction of ongoing operating costs
- Optimum planning of maintenance measures
- Avoidance of unforeseen plant downtimes

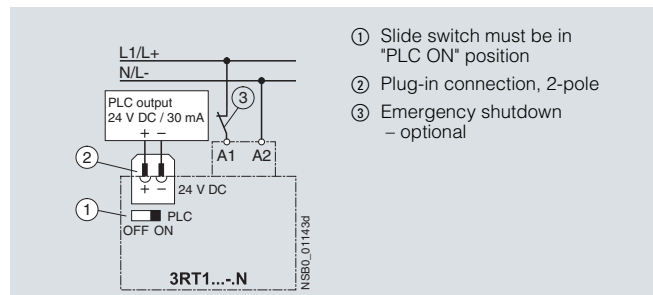
### 3RT1. ...-N version: for 24 V DC PLC output

#### 2 control options:

- Control without a coupling link directly through a 24 V DC  $\geq 30$  mA PLC output (EN 61131-2). Connection by means of 2-pole plug-in connection. The screwless spring-type connection is part of the scope of supply. The control supply voltage which supplies the solenoid operating mechanism must be connected to A1/A2.

### Note:

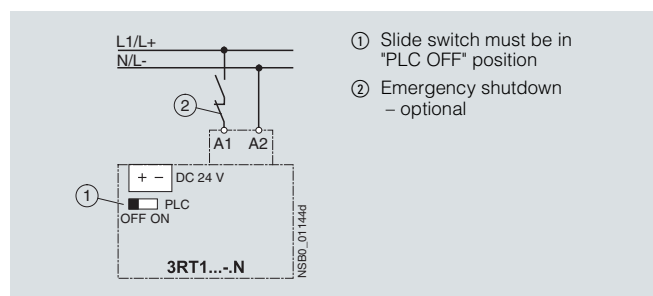
*Before start-up, the slide switch for PLC operation must be moved to the "PLC ON" position (setting ex works: "PLC OFF").*



- Conventional control by applying the control supply voltage at A1/A2 through a switching contact.

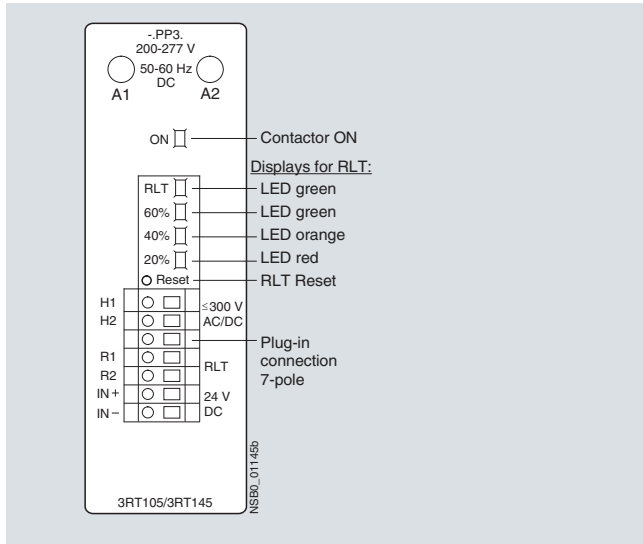
### Note:

*The slide switch must be in the "PLC OFF" position (= setting ex works).*



# 3RT, 3TB, 3TF Contactors for Switching Motors

3RT1...-P version: For 24 V DC PLC output or PLC relay output, with remaining lifetime indicator (RLT).

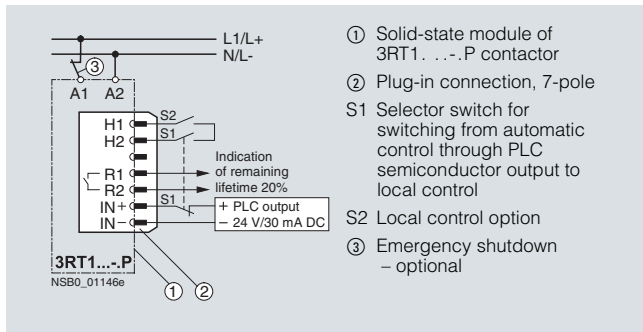


To supply the solenoid and the remaining lifetime indicator with power, the control supply voltage  $U_s$  must be connected to terminals A1/A2 of the laterally mounted solid-state module. The control inputs of the contactor are connected to a 7-pole plug-in connection; the screwless spring-type connection is part of the scope of supply.

- The "Remaining Lifetime RLT" status signal is available at terminals R1/R2 through a floating relay contact (hard gold-plated, enclosed) and can be input to SIMOCODE, PLC or other devices for processing, for example. Permissible current-carrying capacity of the R1/R2 relay output:
  - $I_{th}/AC$ -15/24 to 230 V: 3 A
  - $I_{th}/DC$ -13/24 V: 1 A
- LED indications  
The following states are indicated by means of LEDs on the laterally mounted solid-state module:
  - Contactor ON (energized state): green LED ("ON")
  - Indication of remaining lifetime

## 2 control options:

- Contactor control without a coupling link directly through a 24 V DC/ $\geq 30$  mA PLC output (EN 61131-2) by way of terminals IN+/IN-.

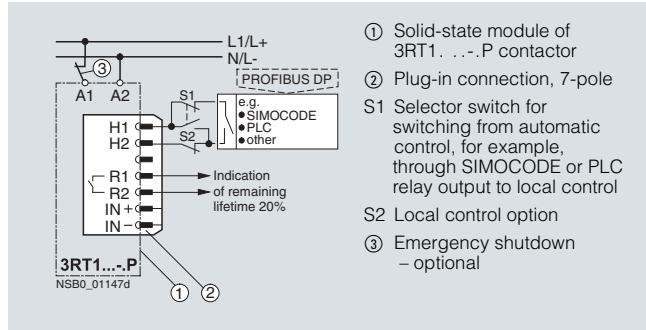


Possibility of switching from automatic control to local control by way of terminals H1/H2, i. e. automatic control through PLC or SIMOCODE/PROFIBUS DP can be deactivated e. g. at start-up or in the event of a fault and the contactor can be controlled manually.

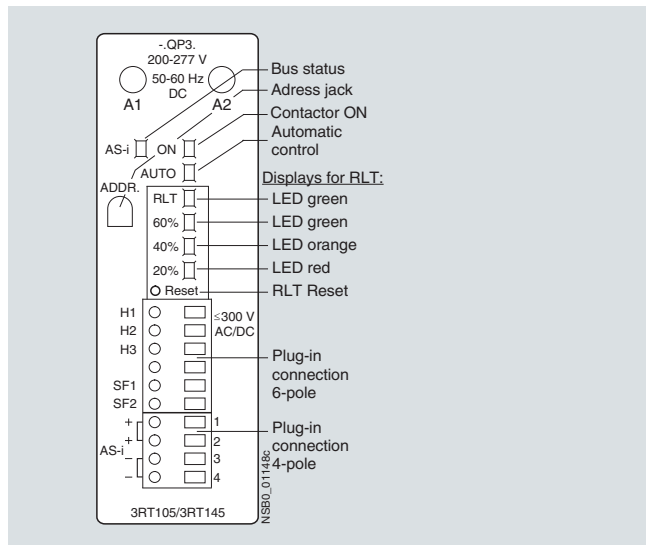
## 3RT10 contactors, 3-pole, 3 ... 250 kW

- Contactor control through relay outputs, e. g. by
  - PLC
  - SIMOCODE

by way of terminals H1/H2. Contact loading:  $U_g$ /approx. 5 mA. When operated through SIMOCODE, a communication link to PROFIBUS DP is also provided.



3RT1...-Q version: Communication-capable with integrated AS-Interface and remaining lifetime indicator (RLT)



To supply the solenoid and the remaining lifetime indicator with power, the control supply voltage  $U_s$  must be connected to terminals A1/A2 of the laterally mounted solid-state module. The contactor itself is controlled by way of the integrated AS-Interface interface. The inputs and outputs are connected to a 10-pole plug-in connection; the screwless spring-type connections (6-pole for external connection and 4-pole for AS-Interface connection) are part of the scope of supply.

- LED indications  
The following states are indicated by means of LEDs on the laterally mounted solid-state module:
  - Contactor ON (energized state): green LED ("ON")
  - Automatic/Local control: green LED ("AUTO")
  - Bus status: green/red dual LED ("AS-i")
  - Remaining lifetime indicator (RLT)
- AS-Interface addressing socket "ADDR":  
The contactor address can be assigned after installation.

# 3RT, 3TB, 3TF Contactors for Switching Motors

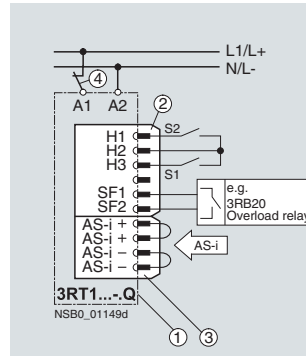
## 3RT10 contactors, 3-pole, 3 ... 250 kW

### Control circuit:

- Contactor control through AS-Interface by way of terminals AS-i +/AS-i -. Each of these terminals is jumpered and connected twice to a 4-pole connector which is separate from the other control inputs.

### Advantages:

- The AS-Interface cable is not interrupted if the connector is pulled out
- The contactor remains functional through the local control inputs and its own 6-pole connector
- Control signals through AS-i:
  - Contactor ON/OFF
- Status signals through AS-i:
  - Contactor ON/OFF
  - Automatic/local control
  - Remaining lifetime indicator (RLT)
  - Signal through free input, e. g. overload relay tripped.



- ① Solid-state module of 3RT1...-Q contactor
- ② Plug-in connection, 6-pole
- ③ Plug-in connection, 4-pole
- S1 Selector switch for switching from automatic control, for example, through AS-Interface to local control  
S1 open: Automatic mode
- S2 Local control option
- ④ Emergency shutdown – optional

Possibility of switching from automatic control to local control by means of terminals H1/H2/H3, i. e. automatic control through AS-Interface can be deactivated e. g. during startup or in the event of a fault and the contactor can be controlled manually.

<b>I/O configuration (hex)</b>	7
<b>ID code (hex)</b>	F
<b>Power supply</b>	V 26.5 ... 31.6 (acc. to AS-Interface specification)
<b>AS-Interface power consumption</b>	mA Max. 20
<b>Contact loading at SF1/2</b>	mA 3 ... 6
<b>Watchdog function</b> (disconnects outputs in the event of AS-Interface fault)	Built-in

### Indication behavior

During operation, the LEDs on the contactor indicate the states shown on the right.

LEDs	States	Description of state
AS-Interface (Green, Red)	On (Green), On (Red), Flashing (Yellow), Flashing (Red)	Station address 0 No AS-Interface communication AS-Interface communication OK

### Contactor diagnostics using the user program

#### • Inputs

Input signals	Device status
D10 "Ready"	0 Device not ready/manual operation 1 Device ready/automatic mode
D11 "Running"	0 Contactor off 1 Contactor on
D12 "Remaining lifetime"	0 Remaining lifetime RLT > 20 % 1 Remaining lifetime RLT ≤ 20 %
D13 "Free input"	0 No input signal at SF1/2 1 Input signal at SF1/2

#### • Outputs

Output signals	Device status
DO0 "Running"	0 Contactor off 1 Contactor on
DO1	0 -- 1 --
DO2	0 -- 1 --
DO3	0 -- 1 --



### Integration

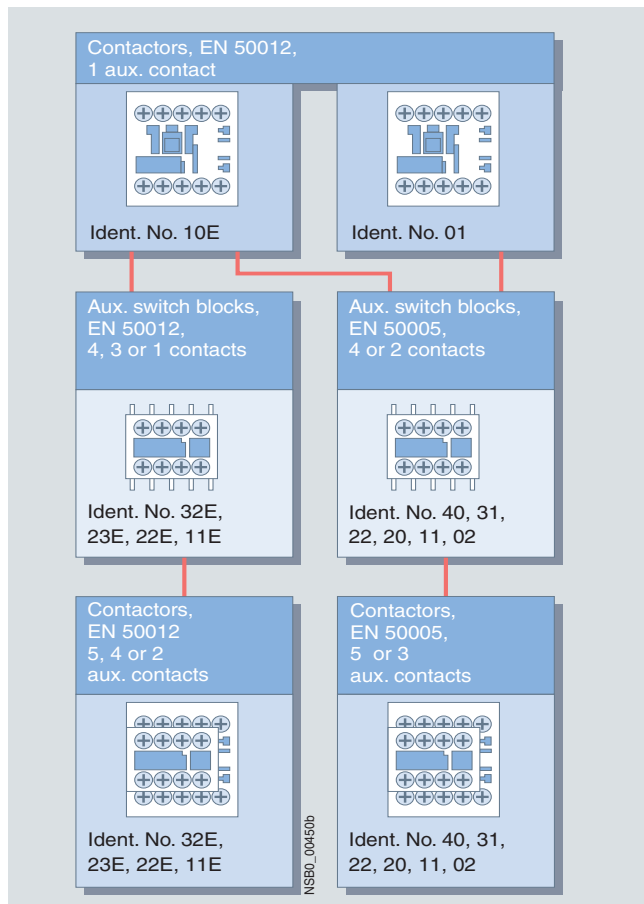
#### Auxiliary switch blocks

Various auxiliary switch blocks can be added to the 3RT1 basic units depending on the application:

#### Size S00

#### 3RT10 1. contactors

Terminal designations according to EN 50012 or EN 50005.



Size S00 contactors have an auxiliary contact integrated in the basic unit.

Contactors with a NO contact as auxiliary contact with screw or Cage Clamp terminals, identification number 10E, can be expanded into contactors with 2, 4 and 5 auxiliary contacts according to EN 50012 using auxiliary switch blocks. The identification numbers 11E, 22E, 23E and 32E on the auxiliary switch blocks apply to the complete contactors. These auxiliary switch blocks cannot be combined with contactors which have a NC contact in the basic unit (identification number 01) as they are coded.

All contactors of size S00 with one auxiliary contact (identification numbers 10E or 01) and the contactors with 4 main contacts can be expanded into contactors with 3 or 5 auxiliary contacts using auxiliary switch blocks with the identification numbers 40 to 02 (in the case of contactors with 4 main contacts: 2 or 4 auxiliary contacts) according to EN 50005.

The identification numbers on the auxiliary switch blocks apply only to the attached auxiliary switches. Single- or two-pole auxiliary switch blocks with connection options from above or below enable easy and clearly arranged wiring especially for the installation of network access junctions. These auxiliary switch blocks are offered only with screw terminals.

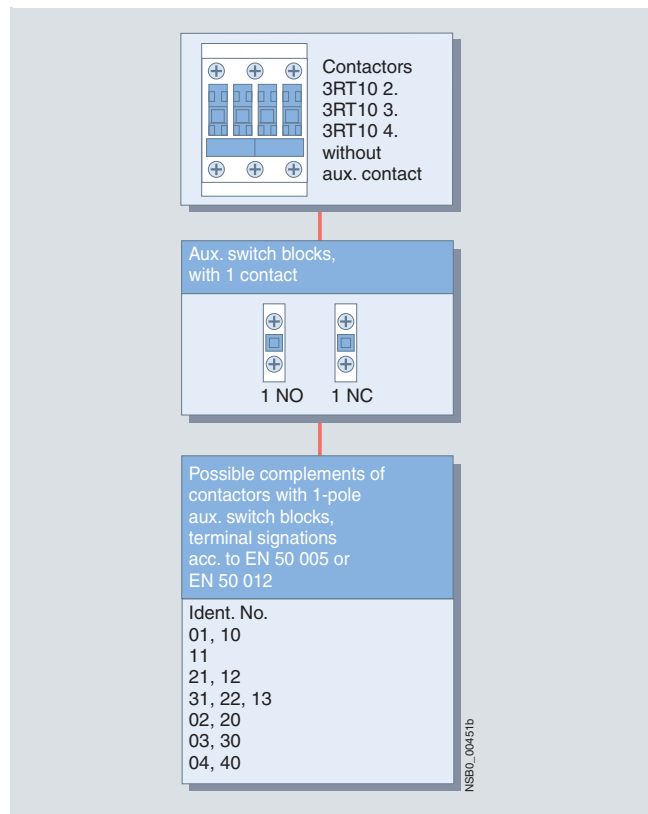
The solid-state compatible 3RH19 11-1NF auxiliary switch blocks for contactors of size S00 include 2 enclosed contacts. They are suitable in particular for switching small voltages and currents (hard gold-plated contacts) and for operation in dusty atmospheres. The NC auxiliary contacts are not mirror contacts.

All the previously mentioned auxiliary switch variants can be snap-fitted onto the front of the contactor. The auxiliary switch block has a centrally positioned release lever for disassembly.

#### Sizes S0 to S3

#### 3RT10 2. to 3RT10 4. contactors, 1-pole auxiliary switch blocks,

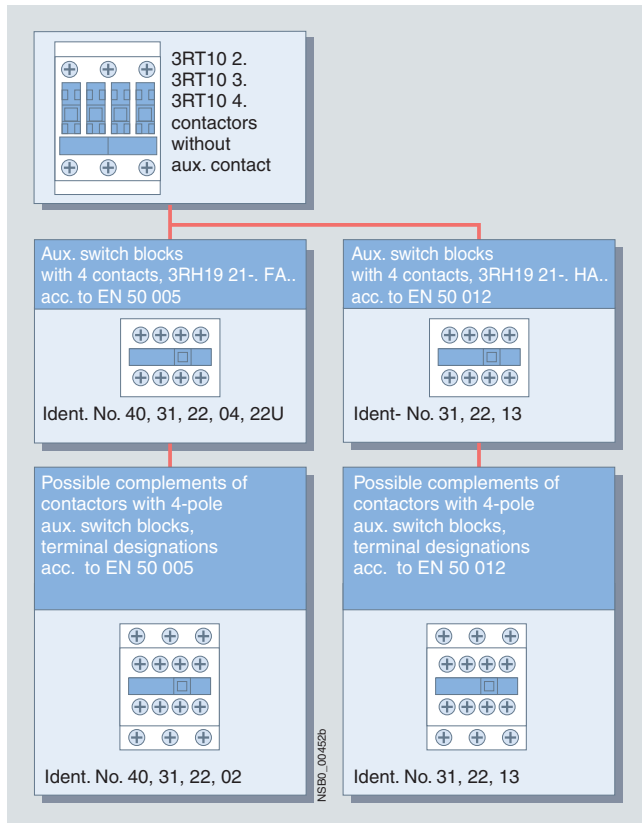
terminal designations according to EN 50005 or EN 50012.



# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

**3RT10 2. to 3RT10 4. contactors, 4-pole auxiliary switch blocks,** terminal designations according to EN 50005 or EN 50012



A diverse range of auxiliary switch blocks is available for various applications. The contactors themselves have no integrated conducting path.

**The auxiliary switch variants are uniform for the contactors of size S0 to S12.**

One 4-pole or up to four single-pole auxiliary switch blocks (screw or Cage Clamp terminals) can be snapped on. When the contactors are switched on, the NC contacts are opened first and then the NO contacts are closed.

The terminal designations of the single-pole auxiliary switch blocks are comprised of identification numbers (location identifiers) on the basic unit and of function numbers on the auxiliary switch blocks.

Also available are 2-pole auxiliary switch blocks (screw terminals) for cable entry from above or below in the design of a quad block (feeder auxiliary switch).

If the installation space is limited in depth, 2-pole auxiliary switch blocks (screw or Cage Clamp terminals) can be attached laterally for use on the left or on the right.

The auxiliary switch blocks attached to the front can be disassembled with the help of a centrally arranged release lever; the laterally attached auxiliary switch blocks are easy to remove by pressing on the checkered surfaces.

The terminal designation of the individual auxiliary switch blocks corresponds to EN 50005 or EN 50012, that of the complete contactor with auxiliary switch block 2 NO + 2 NC corresponds to EN 50012.

The laterally attachable auxiliary switch blocks according to EN 50012 can be used only when no 4-pole auxiliary switch blocks are snapped onto the front. If single-pole auxiliary switch blocks are used in addition, the location identifiers on the contactor must be noted.

Two enclosed and 2 standard contacts are available with the 3RH19 21-.FE22 solid-state compatible auxiliary switch block, which can be attached to the front. The 3RH19 21-2DE11 laterally mountable auxiliary switch block contains 2 enclosed contacts (1 NO + 1 NC). The enclosed contacts are suitable in particular for switching small voltages and currents (hard gold-plated contacts) and for operation in dusty atmospheres. The NC auxiliary contacts are mirror contacts.

### Sizes S0 and S2

A maximum of 4 auxiliary contacts can be attached; the auxiliary switch blocks used can be of any version. For reasons of symmetry, when two 2-pole laterally mountable auxiliary switch blocks are used, one block must be attached on the right and one on the left.

More auxiliary contacts are permissible with size S2 under certain conditions (please ask).

For 4-pole contactors see 3RT13 and 3RT15.

### Size S3 to S12

A maximum of 8 auxiliary contacts can be attached; please note the following:

- Of these 8 auxiliary contacts, there must be no more than 4 NC contacts
- Ensure the symmetry of laterally mounted auxiliary switch blocks

For 4-pole contactors see 3RT13 and 3RT15.

# 3RT, 3TB, 3TF Contactors for Switching Motors

3RT10 contactors, 3-pole, 3 ... 250 kW

## Technical specifications

SIRIUS controls are climate-proof and are suitable and tested for use worldwide.

If the devices are used in ambient conditions which deviate from common industrial conditions (EN 60721-3-3 "Stationary Use,

Weather-Protected"), the manufacturer must be consulted about possible restrictions with regard to the reliability and endurance of the device and possible protective measures.

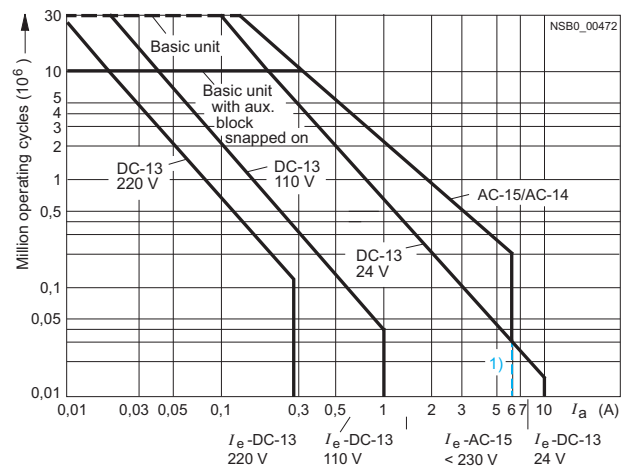
Contactors	Type Size	3RT1 S00 ... S12	
<b>Rated data of the auxiliary contacts</b>			
<b>Acc. to IEC 60947-5-1/EN 60947-5-1 (VDE 0660 Part 200)</b>			
The data apply to integrated auxiliary contacts and contacts in the auxiliary switch blocks for contactor sizes S00 to S12 <sup>1)</sup>			
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	690	
For 3RH19 21-.. laterally mountable auxiliary switch blocks	V	Max. 500	
<b>Continuous thermal current <math>I_{th}</math> = Rated operational current <math>I_e</math>/AC-12</b>	A	10	
<b>AC load</b>			
<b>Rated operational current <math>I_e</math>/AC-15/AC-14</b>			
• For rated operational voltage $U_e$			
	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 <sup>2)</sup>	A	1
	690 V <sup>2)</sup>	A	1
<b>DC load</b>			
<b>Rated operational current <math>I_e</math>/DC-12</b>			
• For rated operational voltage $U_e$			
	24 V	A	10
	60 V	A	6
	110 V	A	3
	125 V	A	2
	220 V	A	1
	440 V	A	0.3
	600 V <sup>2)</sup>	A	0.15
<b>Rated operational current <math>I_e</math>/DC-13</b>			
• For rated operational voltage $U_e$			
	24 V	A	10 <sup>1)</sup>
	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 <sup>2)</sup>	A	0.1
<b>Contact reliability at 17 V, 1 mA</b> acc. to EN 60947-5-4		Frequency of contact faults $< 10^{-8}$ i. e. $< 1$ 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 on 3RT10
- Auxiliary switch blocks 3RH19 11, 3RH19 21 for contactors of size S00 to S12



1) Snap-on auxiliary switch blocks for size S00 and laterally mountable auxiliary switch blocks for S0 to S12: 6 A.

2) Up to 500 V switching capacity for laterally mountable auxiliary switch blocks.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

### Endurance of the main contacts

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

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

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

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

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

Characters in the equation:

- X Contact endurance for mixed operation in operating cycles
- A Contact endurance for normal operation ( $I_a = I_e$ ) in operating cycles
- B Contact endurance for inching ( $I_a = \text{multiple of } I_e$ ) in operating cycles
- C Inching operations as a percentage of total switching operations

Diagram legend:

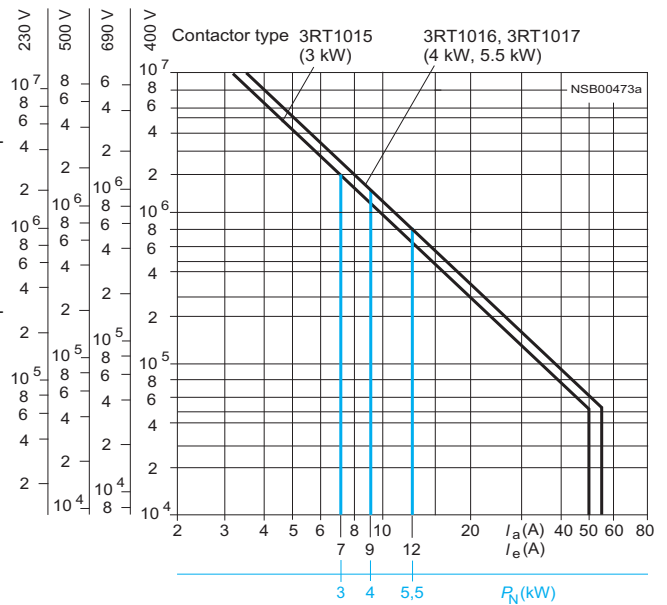
$P_N$  = Rated power for squirrel-cage motors at 400 V

$I_a$  = Breaking current

$I_e$  = Rated operational current

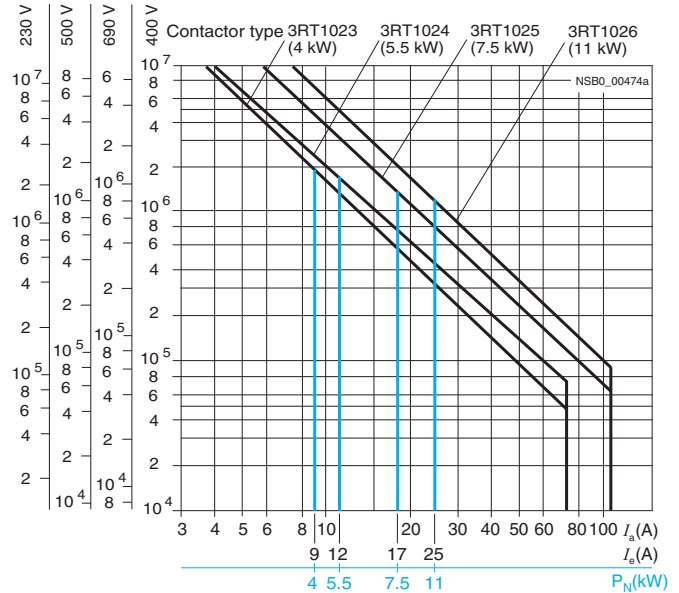
### Size S00

Operating cycles at



### Size S0

Operating cycles at

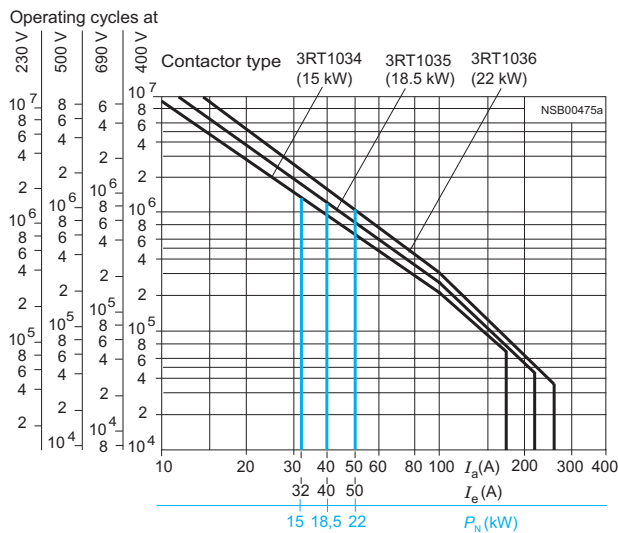


# 3RT, 3TB, 3TF Contactors for Switching Motors

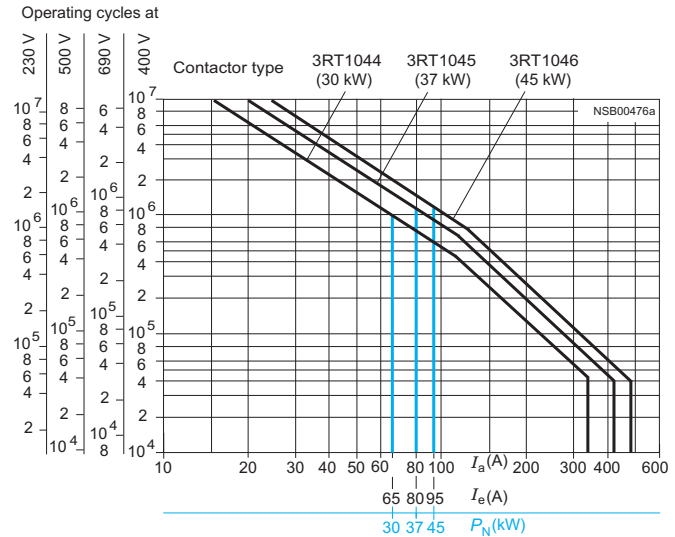
3RT10 contactors, 3-pole, 3 ... 250 kW

## Endurance of the main contacts

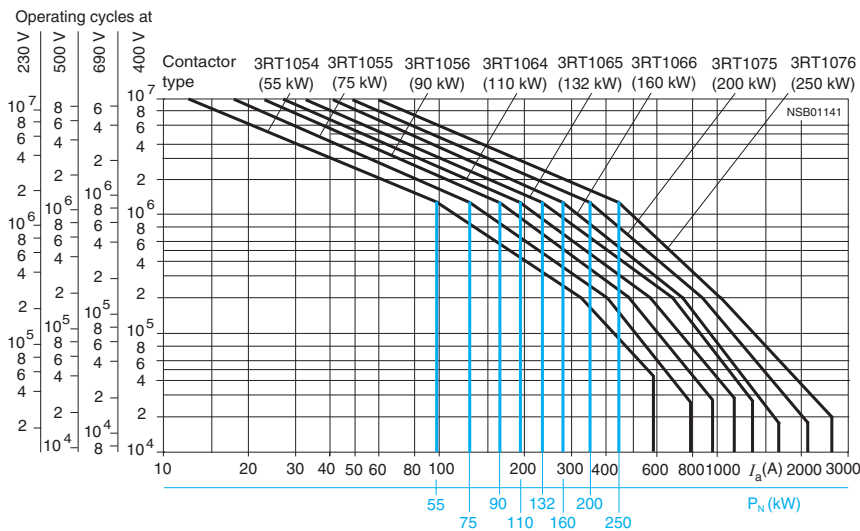
### Size S2



### Size S3



### Sizes S6 to S12



### 3RT12 vacuum contactors Sizes S10 and S12

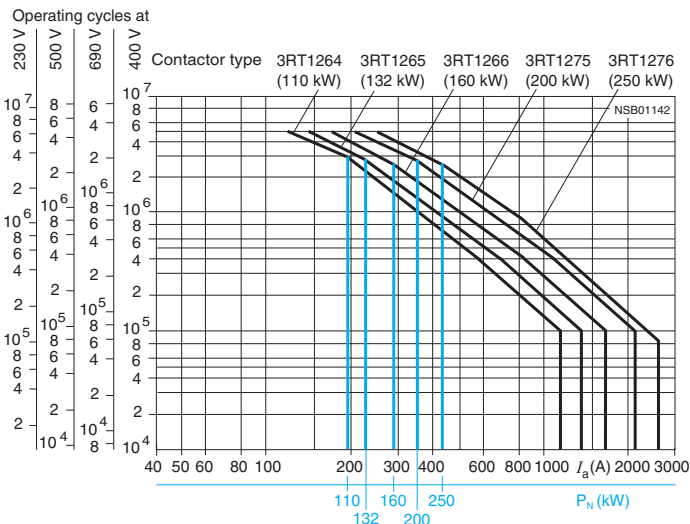


Diagram legend:

$P_N$  = Rated power for squirrel-cage motors at 400 V

$I_a$  = Breaking current

$I_e$  = Rated operational current

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size	3RT10 1. S00		
<b>General data</b>				
<b>Permissible mounting position</b> The contactors are designed for operation on a vertical mounting surface.	<ul style="list-style-type: none"> <li>AC and DC operation</li> </ul>			
Upright mounting position:	<ul style="list-style-type: none"> <li>AC operation</li> <li>DC operation</li> </ul>	 Special version required. Standard version		
<b>Mechanical endurance</b>	<ul style="list-style-type: none"> <li>Basic units</li> <li>Basic unit with snap-on auxiliary switch block</li> <li>Solid-state compatible auxiliary switch block</li> </ul>	Operating cycles	30 million 10 million 5 million	
<b>Electrical endurance</b>			1)	
<b>Rated insulation voltage</b> $U_i$ (degree of pollution 3)		V	690	
<b>Rated impulse withstand voltage</b> $U_{imp}$		kV	6	
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N		V	400	
<b>Mirror contacts</b>	<ul style="list-style-type: none"> <li>A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.</li> <li>No mirror contacts for the solid-state compatible auxiliary switch blocks</li> </ul>	<ul style="list-style-type: none"> <li>- 3RT10 1., 3RT13 1. (removable auxiliary switch block)</li> <li>- 3RT10 1., 3RT13 1. (non-removable auxiliary switch block)</li> <li>- 3RH19 11-.NF..</li> </ul>	Yes, this applies to both the basic unit as well as to between the basic unit and the mounted auxiliary switch block acc. to EN 60947-4-1, Appendix F. Yes, acc. to EN 60947-4-1, Appendix F, SUVA	
<b>Ambient temperature</b>	<ul style="list-style-type: none"> <li>During operation</li> <li>During storage</li> </ul>	°C °C	-25 ... +60 -55 ... +80	
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C			IP20, coil assembly IP40	
<b>Touch protection</b> acc. to EN 50274			Finger-safe	
<b>Shock resistance</b> rectangular pulse	<ul style="list-style-type: none"> <li>AC operation</li> <li>DC operation</li> </ul>	g/ms g/ms	7/5 and 4.2/10 7/5 and 4.2/10	
<b>Shock resistance</b> sine pulse	<ul style="list-style-type: none"> <li>AC operation</li> <li>DC operation</li> </ul>	g/ms g/ms	9.8/5 and 5.9/10 9.8/5 and 5.9/10	
<b>Conductor cross-sections</b>			2)	
<b>Short-circuit protection for contactors without overload relays</b>				
For short-circuit protection for contactors with overload relays see "Protection Equipment -> Overload Relays" For short-circuit protection for fuseless load feeders see "Load Feeders and Motor Starters -> 3RA Fuseless Load Feeders".				
<b>Main circuit</b>	<ul style="list-style-type: none"> <li>Fuse links gL/gG LV HRC 3NA, DIAZED 5SB, NEOZED 5SE acc. to IEC 60947-4-1/EN 60947-4-1</li> <li>Miniature circuit breakers (up to 230 V) with C characteristic Short-circuit current 1 kA, type of coordination "1"</li> </ul>	<ul style="list-style-type: none"> <li>- Type of coordination "1"</li> <li>- Type of coordination "2"</li> <li>- Weld-free<sup>3)</sup></li> </ul>	A A A A	35 20 10 10
<b>Auxiliary circuit</b>	<ul style="list-style-type: none"> <li>Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection <math>I_k \geq 1</math> kA)</li> <li>Miniature circuit breakers up to 230 V with C characteristic Short-circuit current <math>I_k &lt; 400</math> A</li> </ul>		A A	10 6

1) For endurance of the main contacts see page 18.

2) For conductor cross-sections see page 23.

3) Test conditions according to IEC 60947-4-1.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size	3RT10 1. S00	
<b>Control</b>			
<b>Magnetic coil operating range</b>			
• AC operation	50 Hz 60 Hz	0.8 ... 1.1 x $U_s$ 0.85 ... 1.1 x $U_s$	
• DC operation	Up to 50 °C Up to 60 °C	0.8 ... 1.1 x $U_s$ 0.85 ... 1.1 x $U_s$	
<b>Power consumption of the magnetic coils</b> (when coil is cold and 1.0 x $U_s$ )			
AC operation, 50/60 Hz			
• Standard version	- Closing - P.f. - Closed - P.f.	VA VA	27/24,3 0.8/0.75 4.4/3.4 0.27/0.27
• AC operation, 50 Hz, USA/Canada	- Closing - P.f. for closing - Closed - P.f. for closed	VA VA	26.4 0.81 4.7 0.26
• AC operation, 60 Hz, USA/Canada	- Closing - P.f. for closing - Closed - P.f. for closed	VA VA	31.7 0.77 5.1 0.27
• DC operation	Closing = Closed	W	3.3
<b>Permissible residual current of the electronics</b> (with 0 signal)			
• AC operation			< 3 mA x (230 V/ $U_s$ ), the 3RT19 16-1GA00 additional load module is recommended for a higher residual current
• DC operation			< 10 mA x (24 V/ $U_s$ ), the 3RT19 16-1GA00 additional load module is recommended for a higher residual current
<b>Operating times</b> <sup>1)</sup>			
Total break time = Opening delay + Arcing time			
• AC operation at 0.8 ... 1.1 x $U_s$	- Closing delay - Opening delay	ms ms	8 ... 35 4 ... 30
• DC operation at 0.85 ... 1.1 x $U_s$	- Closing delay - Opening delay	ms ms	25 ... 100 7 ... 10
• Arcing time		ms	10 ... 15
<b>Operating times for 1.0 x <math>U_s</math></b> <sup>1)</sup>			
• AC operation	- Closing delay - Opening delay	ms ms	10 ... 25 5 ... 30
• DC operation	- Closing delay - Opening delay	ms ms	30 ... 50 7 ... 9

1) The OFF-delay of the NO contact and the ON-delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).

Contactors	Type Size	3RT10 15 S00		3RT10 16 S00	3RT10 17 S00
<b>Main circuit</b>					
<b>AC capacity</b>					
<b>Utilization category AC-1</b>					
<b>Switching resistive loads</b>					
• Rated operational current $I_e$	At 40 °C up to 690 V At 60 °C up to 690 V	A A	18 16	22 20	22 20
• Rated power for AC loads <sup>1)</sup> P.f.= 0.95 (at 60 °C)	230 V 400 V 500 V 690 V	kW kW kW kW	6.3 11 13.8 19	7.5 13 17 22	7.5 13 17 22
• Minimum conductor cross-section for loads with $I_e$	At 40 °C At 60 °C	mm <sup>2</sup> mm <sup>2</sup>	2.5 2.5	2.5 2.5	2.5 2.5
<b>Utilization categories AC-2 and AC-3</b>					
• Rated operational currents $I_e$	Up to 400 V 440 V 500 V 690 V	A A A A	7 7 5 4	9 9 6.5 5.2	12 11 9 6.3
• Rated power for slipping or squirrel-cage motors at 50 and 60 Hz	At 230 V 400 V 500 V 690 V	kW kW kW kW	2.2 3 3.5 4	3 4 4.5 5.5	3 5.5 5.5 5.5
<b>Thermal load capacity</b>	10 s current <sup>2)</sup>	A	56	72	96

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".

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size			3RT10 15 S00	3RT10 16 S00	3RT10 17 S00
<b>Main circuit</b>						
<b>AC capacity</b>						
<b>Power loss per conducting path</b>			At $I_e/AC-3$ W	0.42	0.7	1.24
<b>Utilization category AC-4</b> (for $I_a = 6 \times I_e$ ) <sup>1)</sup>						
• Rated operational current $I_e$	Up to 400 V	A		6.5	8.5	8.5
• Rated power for squirrel-cage motors with 50 Hz and 60 Hz	Up to 400 V	kW		3	4	4
• The following applies to a contact endurance of about 200000 operating cycles:						
- 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
- Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 230 V	kW		0.67	1.1	1.1
	400 V	kW		1.15	2	2
	500 V	kW		1.45	2	2
	690 V	kW		1.15	2.5	2.5
<b>Utilization category AC-5a</b>						
<b>Switching gas discharge lamps, inductive ballast</b>						
per main current path at 230 V						
• Uncorrected, rated power per lamp/rated operational current per lamp						
	L 18 W/0.37 A	Units		54	59	59
	L 36 W/0.43 A	Units		46	51	51
	L 58 W/0.67 A	Units		29	32	32
	L 80 W/0.79 A	Units		25	27	27
• DUO switching (two-lamp)	L 18 W/0.22 A	Units		90 (≅ 2 x 90 lamps)	100 (≅ 2 x 100 lamps)	100 (≅ 2 x 100 lamps)
	L 36 W/0.42 A	Units		47 (≅ 2 x 47 lamps)	52 (≅ 2 x 52 lamps)	52 (≅ 2 x 52 lamps)
	L 58 W/0.63 A	Units		31 (≅ 2 x 31 lamps)	34 (≅ 2 x 34 lamps)	34 (≅ 2 x 34 lamps)
	L 80 W/0.87 A	Units		22 (≅ 2 x 22 lamps)	25 (≅ 2 x 25 lamps)	25 (≅ 2 x 25 lamps)
<b>Switching gas discharge lamps with correction</b>						
per main current path at 230 V						
• Shunt compensation with inductive ballast, rated power per lamp/capacitance/ rated operational current per lamp						
	L 18 W/4.5 μF/0.11 A	Units		17	22	22
	L 36 W/4.5 μF/0.21 A	Units		16	22	22
	L 58 W/7.0 μF/0.32 A	Units		10	14	14
	L 80 W/7.0 μF/0.49 A	Units		6	9	9
• With solid-state ballast <sup>2)</sup> single lamp	L 18 W/6.8 μF/0.10 A	Units		49	63	63
	L 36 W/6.8 μF/0.18 A	Units		27	35	35
	L 58 W/10 μF/0.29 A	Units		16	23	23
	L 80 W/10 μF/0.43 A	Units		11	14	14
• With solid-state ballast <sup>2)</sup> two-lamp	L 18 W/10 μF/0.18 A	Units		27 (≅ 2 x 27 lamps)	35 (≅ 2 x 35 lamps)	35 (≅ 2 x 35 lamps)
	L 36 W/10 μF/0.35 A	Units		14 (≅ 2 x 14 lamps)	18 (≅ 2 x 18 lamps)	18 (≅ 2 x 18 lamps)
	L 58 W/22 μF/0.52 A	Units		9 (≅ 2 x 9 lamps)	12 (≅ 2 x 12 lamps)	12 (≅ 2 x 12 lamps)
	L 80 W/22 μF/0.86 A	Units		5 (≅ 2 x 5 lamps)	7 (≅ 2 x 7 lamps)	7 (≅ 2 x 7 lamps)
<b>Utilization category AC-5b, switching incandescent lamps</b>			kW	1.3	1.7	1.7
per main current path at 230/220 V						
<b>Utilization category AC-6a</b>						
<b>switching AC transformers</b>						
• Rated operational current $I_e$						
- For inrush current n = 20	Up to 400 V	A		3.6	5.1	7.2
- For inrush current n = 30	Up to 400 V	A		2.4	3.3	5.1
• Rated power P						
- For inrush current n = 20	At 230 V	kVA		1.4	2	2.9
	400 V	kVA		2.5	3.5	5
	500 V	kVA		3.3	4.6	6.2
	690 V	kVA		4.3	6	8.6
- For inrush current n = 30	At 230 V	kVA		1	1.3	2
	400 V	kVA		1.6	2.3	3.5
	500 V	kVA		2.2	3.1	4.6
	690 V	kVA		2.9	4	6

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

- 1) The data only apply to 3RT15 16 and 3RT15 17 (2 NO + 2 NC) up to a rated operational voltage of 400 V.
- 2) Depending on the electronic ballast used, higher lamp numbers are also possible.



# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size	3RT10 15 S00	3RT10 16 S00	3RT10 17 S00
------------	--------------	-----------------	-----------------	-----------------

### Main circuit

#### Load rating with DC

##### Utilization category DC-1

##### Switching resistive loads ( $L/R \leq 1$ ms)

- Rated operational current  $I_e$  (at 60 °C)

- 1 conducting path	Up to 24 V	A	15	20
	60 V	A	15	20
	110 V	A	1.5	2.1
	220 V	A	0.6	0.8
	440 V	A	0.42	0.6
	600 V	A	0.42	0.6
- 2 conducting paths in series	Up to 24 V	A	15	20
	60 V	A	15	20
	110 V	A	8.4	12
	220 V	A	1.2	1.6
	440 V	A	1.6	0.8
	600 V	A	0.5	0.7
- 3 conducting paths in series	Up to 24 V	A	15	20
	60 V	A	15	20
	110 V	A	15	20
	220 V	A	15	20
	440 V	A	0.9	1.3
	600 V	A	0.7	1

##### Utilization category DC-3 and DC-5

##### Shunt-wound and series-wound motors ( $L/R \leq 15$ ms)

- Rated operational current  $I_e$  (at 60 °C)

- 1 conducting path	Up to 24 V	A	15	20
	60 V	A	0.35	0.5
	110 V	A	0.1	0.15
	220 V	A	--	--
	440 V	A	--	--
	600 V	A	--	--
- 2 conducting paths in series	Up to 24 V	A	15	20
	60 V	A	3.5	5
	110 V	A	0.25	0.35
	220 V	A	--	--
	440 V	A	--	--
	600 V	A	--	--
- 3 conducting paths in series	Up to 24 V	A	15	20
	60 V	A	15	20
	110 V	A	15	20
	220 V	A	1.2	1.5
	440 V	A	0.14	0.2
	600 V	A	0.14	0.2

#### Switching frequency

##### Switching frequency $z$ in operating cycles/hour


• Contactors without overload relay	No-load switching frequency AC	$h^{-1}$	10000
	No-load switching frequency DC	$h^{-1}$	10000
Dependence of the switching frequency $z'$ on the operational current $I'$ and operational voltage $U'$ : $z' = z \cdot (I_e/I') \cdot (400 V/U')^{1.5} \cdot 1/h$	Rated operation		
	AC-1 (AC/DC)	$h^{-1}$	1000
	AC-2 (AC/DC)	$h^{-1}$	750
	AC-3 (AC/DC)	$h^{-1}$	750
	AC-4 (AC/DC)	$h^{-1}$	250
• Contactors with overload relays (mean value)		$h^{-1}$	15

### Conductor cross-sections

#### Main and auxiliary conductors:

(1 or 2 conductors can be connected) For standard screwdriver size 2 and Pozidriv 2	• Solid	$mm^2$
	• Finely stranded with end sleeve	$mm^2$
	• Solid or stranded, AWG cables	AWG
	• Terminal screw	M3
	- Tightening torque	Nm


#### Screw terminals

	$2 \times (0.5 \dots 1.5)^{1)}$ ; $2 \times (0.75 \dots 2.5)^{1)}$ acc. to IEC 60947; max. $2 \times (1 \dots 4)$
	$2 \times (0.5 \dots 1.5)^{1)}$ ; $2 \times (0.75 \dots 2.5)^{1)}$
	$2 \times (20 \dots 16)^{1)}$ ; $2 \times (18 \dots 14)^{1)}$ ; $1 \times 12$
	0.8 ... 1.2 (7 ... 10.3 lb.in)

#### Main and auxiliary conductors; coil terminals:

(1 or 2 conductors can be connected)	• Solid	$mm^2$
	• Finely stranded with end sleeve	$mm^2$
	• Finely stranded without end sleeve	$mm^2$
	• AWG cables, solid or stranded	AWG

#### Cage Clamp terminals

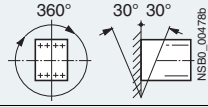

	$2 \times (0.25 \dots 2.5)$
	$2 \times (0.25 \dots 1.5)$
	$2 \times (0.25 \dots 2.5)$
	$2 \times (24 \dots 14)$

For tools for opening Cage Clamp terminals see Catalog LV 1, Chapter 3, Accessories and Spare Parts.  
Maximum external diameter of the conductor insulation: 3.6 mm.  
For conductor cross-sections  $\leq 1 \text{ mm}^2$  an "insulation stop" must be used, see Catalog LV 1, Chapter 3, "Accessories and Spare Parts".

1) 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.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		3RT10 23 S0	3RT10 24 S0	3RT10 25 S0	3RT10 26 S0
<b>General data</b>						
<b>Permissible mounting position</b> The contactors are designed for operation on a vertical mounting surface.	• AC and DC operation					
Upright mounting position:	• AC operation		 Standard version			
	• DC operation		Special version required, also applies to 3RT10 2.-K.40. coupling relays.			
<b>Mechanical endurance</b>	• Basic units	Operating cycles	10 million			
	• Basic unit with snap-on auxiliary switch block		10 million			
	• Solid-state compatible auxiliary switch block		5 million			
<b>Electrical endurance</b>			1)			
<b>Rated insulation voltage</b> $U_i$ (degree of pollution 3)		V	690			
<b>Rated impulse withstand voltage</b> $U_{imp}$		kV	6			
<b>Protective separation</b> between the coil and the main contacts (acc. to EN 60947-1, Appendix N)		V	400			
<b>Mirror contacts</b>	• A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.					
	- 3RT10 2., 3RT13 2. (removable auxiliary switch block)		Yes, acc. to EN 60947-4-1, Appendix F			
	- 3RT10 2., 3RT13 2. (non-removable auxiliary switch block)		Acc. to SUVA requirements on request			
<b>Permissible ambient temperature</b>	• During operation	°C	-25 ... +60			
	• During storage	°C	-55 ... +80			
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C			IP20, coil assembly IP20			
<b>Touch protection</b> acc. to EN 50274			Finger-safe			
<b>Shock resistance</b> rectangular pulse	• AC operation	g/ms	8.2/5 and 4.9/10			
	• DC operation	g/ms	10/5 and 7.5/10			
<b>Shock resistance</b> sine pulse	• AC operation	g/ms	12.5/5 and 7.8/10			
	• DC operation	g/ms	15/5 and 10/10			
<b>Conductor cross-sections</b>			2)			
<b>Short-circuit protection for contactors without overload relays</b>						
<b>Main circuit</b>						
• 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"	A	63			100
	- Type of coordination "2"	A	25			35
	- Weld-free <sup>3)</sup>	A	10			16
	• Miniature circuit breakers with C characteristic (short-circuit current 3 kA, type of coordination "1")	A	25			32
<b>Auxiliary circuit</b>						
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection at $I_k \geq 1$ kA)						
		A	10			
• Miniature circuit breaker with C characteristic (short-circuit current $I_k < 400$ A)						
		A	10			

1) For endurance of the main contacts see page 18.

2) For conductor cross-sections see page 28.

3) Test conditions according to IEC 60947-4-1.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size	3RT10 2. S0	
<b>Control</b>			
<b>Magnetic coil operating range</b>	AC/DC	0.8 ... 1.1 x $U_s$	
<b>Power consumption of the magnetic coils</b> (when coil is cold and 1.0 x $U_s$ )			
• AC operation, 50 Hz, standard version	- Closing	VA	61
	- P.f.		0.82
	- Closed	VA	7.8
	- P.f.		0.24
• AC operation, 50/60 Hz, standard version	- Closing	VA	64/63
	- P.f.		0.72/0.74
	- Closed	VA	8.4/6.8
	- P.f.		0.24/0.28
• AC operation, 50 Hz, USA/Canada	- Closing	VA	61
	- P.f.		0.82
	- Closed	VA	7.8
	- P.f.		0.24
• AC operation, 60 Hz, USA/Canada	- Closing	VA	69
	- P.f.		0.76
	- Closed	VA	7.5
	- P.f.		0.28
• DC operation	Closing = Closed	W	5.4
<b>Permissible residual current of the electronics</b> (with 0 signal)			
	• AC operation	mA	< 6 mA x (230 V/ $U_s$ )
	• DC operation	mA	< 16 mA x (24 V/ $U_s$ )
<b>Operating times for 0.8 ... 1.1 x <math>U_s</math><sup>1)</sup></b>			
Total break time = Opening delay + Arcing time			
• AC operation	- Closing delay	ms	8 ... 44
	- Opening delay	ms	4 ... 20
• DC operation	- Closing delay	ms	50 ... 170
	- Opening delay	ms	13.5 ... 15.5
• Arcing time		ms	10
<b>Operating times for 1.0 x <math>U_s</math><sup>1)</sup></b>			
• AC operation	- Closing delay	ms	10 ... 17
	- Opening delay	ms	4 ... 20
• DC operation	- Closing delay	ms	55 ... 85
	- Opening delay	ms	14 ... 15.5

1) The OFF-delay of the NO contact and the ON-delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (varistor +2 ms to 5 ms, diode assembly: 2 to 6 times).

Contactors	Type Size	3RT10 23 S0		3RT10 24 S0		3RT10 25 S0		3RT10 26 S0	
<b>Main circuit</b>									
<b>AC capacity</b>									
<b>Utilization category AC-1 Switching resistive loads</b>									
• Rated operational current $I_e$		At 40 °C up to 690 V	A	40					
		At 60 °C up to 690 V	A	35					
• Rated power for AC loads <sup>1)</sup> P.f. = 0.95 (at 60 °C)		230 V	kW	13.3					
		400 V	kW	23					
		500 V	kW	29					
		690 V	kW	40					
• Minimum conductor cross-section for loads with $I_e$		At 40 °C	mm <sup>2</sup>	10					
		At 60 °C	mm <sup>2</sup>	10					
<b>Utilization category AC-2 and AC-3</b>									
• Rated operational currents $I_e$		Up to 400 V	A	9	12	17	25		
		440 V	A	9	12	17	22		
		500 V	A	6.5	12	17	18		
		690 V	A	5.2	9	13	13		
• Rated power for slipping or squirrel-cage motors at 50 Hz and 60 Hz		At 110 V	kW	1.1	1.5	2.2	3		
		230 V	kW	3	3	4	5.5		
		400 V	kW	4	5.5	7.5	11		
		500 V	kW	4.5	7.5	10	11		
		660 V/690 V	kW	5.5	7.5	11	11		
<b>Thermal load capacity</b>		10 s current <sup>2)</sup>	A	80	110	150	200		
<b>Power loss per conducting path</b>		At $I_e$ /AC-3	W	0.4	0.5	0.9	1.6		

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".

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		3RT10 23 S0	3RT10 24 S0	3RT10 25 S0	3RT10 26 S0
<b>Main circuit</b>						
<b>AC capacity</b>						
<b>Utilization category AC-4</b> (for $I_a = 6 \times I_e$ )						
• Rated operational current $I_e$	Up to 400 V	A	8.5	12.5	15.5	15.5
• Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 400 V	kW	4	5.5	7.5	7.5
• The following applies to a contact endurance of about 200000 operating cycles:						
- Rated operational currents $I_e$	Up to 400 V	A	4.1	5.5	7.7	9
	690 V	A	3.3	5.5	7.7	9
- Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 110 V	kW	0.5	0.73	1	1.2
	230 V	kW	1.1	1.5	2	2.5
	400 V	kW	2	2.6	3.5	4.4
	500 V	kW	2	3.3	4.6	5.6
	690 V	kW	2.5	4.6	6	7.7
<b>Utilization category AC-5a</b>						
<b>Switching gas discharge lamps, inductive ballast</b>						
Per main current path at 230 V <sup>1)</sup>						
• Rated power per lamp/rated operational current per lamp						
- Uncorrected	L 18 W/0.37 A	Units	108			
	L 36 W/0.43 A	Units	93			
	L 58 W/0.67 A	Units	59			
	L 80 W/0.79 A	Units	50			
- DUO switching (two-lamp)	L 18 W/0.22 A	Units	181 (≅ 2 x 181 lamps)			
	L 36 W/0.42 A	Units	95 (≅ 2 x 95 lamps)			
	L 58 W/0.63 A	Units	63 (≅ 2 x 63 lamps)			
	L 80 W/0.87 A	Units	45 (≅ 2 x 45 lamps)			
<b>Switching gas discharge lamps with correction</b>						
Per main current path at 230 V						
• Rated power per lamp/capacitance/rated operational current per lamp						
- Shunt compensation with inductive ballast	L 18 W/4.5 μF/0.11 A	Units	37		41	61
	L 36 W/4.5 μF/0.21 A	Units	30		30	51
	L 58 W/7.0 μF/0.32 A	Units	20		20	33
	L 80 W/7.0 μF/0.49 A	Units	13		13	22
- With solid-state ballast <sup>2)</sup> single lamp	L 18 W/6.8 μF/0.10 A	Units	105		119	175
	L 36 W/6.8 μF/0.18 A	Units	58		66	97
	L 58 W/10 μF/0.29 A	Units	36		41	60
	L 80 W/10 μF/0.43 A	Units	24		27	40
- With solid-state ballast <sup>2)</sup> two-lamp	L 18 W/10 μF/0.18 A	Units	58 (≅ 2 x 58 lamps)		66 (≅ 2 x 66 l.)	97 (≅ 2 x 97 l.)
	L 36 W/10 μF/0.35 A	Units	30 (≅ 2 x 30 lamps)		34 (≅ 2 x 34 l.)	50 (≅ 2 x 50 l.)
	L 58 W/22 μF/0.52 A	Units	20 (≅ 2 x 20 lamps)		22 (≅ 2 x 22 l.)	33 (≅ 2 x 33 l.)
	L 80 W/22 μF/0.86 A	Units	12 (≅ 2 x 12 lamps)		13 (≅ 2 x 13 l.)	20 (≅ 2 x 20 l.)
<b>Utilization category AC-5b, switching incandescent lamps</b>						
per main current path at 230/220 V						
kW						
			2.8		3.2	4.7
<b>Utilization category AC-6a</b>						
<b>switching AC transformers</b>						
• Rated operational current $I_e$						
- For inrush current n = 20	Up to 400 V	A	11.4			20.2
- For inrush current n = 30	Up to 400 V	A	7.6			13.5
• Rating P						
- For inrush current n = 20	At 230 V	kVA	4.5			8
	400 V	kVA	7.9			13.9
	500 V	kVA	9.9			15.5
	690 V	kVA	13.6			15.5
- For inrush current n = 30	At 230 V	kVA	3			5.4
	400 V	kVA	5.2			9.3
	500 V	kVA	6.6			11.7
	690 V	kVA	9.1			15.5
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n30} \cdot 30/x$						
<b>Utilization category AC-6b,</b>						
<b>switching low-inductance (low-loss, metallized dielectric) AC capacitors</b>						
• Rated operational currents $I_e$	Up to 400 V	A	5.8			10.8
• Rated power for single capacitors or banks of capacitors (minimum inductance of 6 μH between capacitors connected in parallel) at 50 Hz, 60 Hz and	At 230 V	kvar	2.5			4
	400 V	kvar	4			7.5
	500 V	kvar	4			7.5
	690 V	kvar	4			7.5

1) For  $I_e/AC-1 = 35$  A (60 °C) and the corresponding minimum conductor cross-section 10 mm<sup>2</sup>.

2) Depending on the electronic ballast used, higher lamp numbers are also possible.



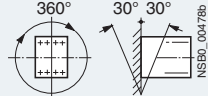

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size	3RT10 23 S0	3RT10 24 S0	3RT10 25 S0	3RT10 26 S0
<b>Main circuit</b>					
<i>Load rating with DC</i>					
<b>Utilization category DC-1</b>					
<b>Switching resistive loads (<math>L/R \leq 1</math> ms)</b>					
• Rated operational current $I_e$ (at 60 °C)					
- 1 conducting path	Up to 24 V A	35			
	60 V A	20			
	110 V A	4.5			
	220 V A	1			
	440 V A	0.4			
	600 V A	0.25			
- 2 conducting paths in series	Up to 24 V A	35			
	60 V A	35			
	110 V A	35			
	220 V A	5			
	440 V A	1			
	600 V A	0.8			
- 3 conducting paths in series	Up to 24 V A	35			
	60 V A	35			
	110 V A	35			
	220 V A	35			
	440 V A	2.9			
	600 V A	1.4			
<b>Utilization category DC-3 and DC-5</b>					
<b>Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>					
• Rated operational current $I_e$ (at 60 °C)					
- 1 conducting path	Up to 24 V A	20			
	60 V A	5			
	110 V A	2.5			
	220 V A	1			
	440 V A	0.09			
	600 V A	0.06			
- 2 conducting paths in series	Up to 24 V A	35			
	60 V A	35			
	110 V A	15			
	220 V A	3			
	440 V A	0.27			
	600 V A	0.16			
- 3 conducting paths in series	Up to 24 V A	35			
	60 V A	35			
	110 V A	35			
	220 V A	10			
	440 V A	0.6			
	600 V A	0.6			
<i>Switching frequency</i>					
<b>Switching frequency <math>z</math></b> in operating cycles/hour					
• Contactors without overload relays					
	No-load switching frequency AC	$h^{-1}$	5000		
	No-load switching frequency DC	$h^{-1}$	1500		
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 (AC/DC)	$h^{-1}$	1000		
	AC-2 (AC/DC)	$h^{-1}$	1000		750
	AC-3 (AC/DC)	$h^{-1}$	1000		750
	AC-4 (AC/DC)	$h^{-1}$	300		250
• Contactors with overload relays (mean value)					
		$h^{-1}$	15		

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size	3RT10 23 S0	3RT10 24 S0	3RT10 25 S0	3RT10 26 S0
<b>Conductor cross-sections (1 or 2 conductors connectable)</b>					
<b>Main conductors</b>		<b>Screw terminals</b>			
Conductor cross-section					
<ul style="list-style-type: none"> <li>• Solid</li> <li>• Finely stranded with end sleeve</li> <li>• AWG cables, solid</li> <li>• AWG cables, solid or stranded</li> <li>• AWG cables, stranded</li> <li>• Terminal screws</li> <li>- Tightening torque</li> </ul>	mm <sup>2</sup> mm <sup>2</sup> AWG AWG AWG Nm	2 x (1 ... 2.5) <sup>1)</sup> ; 2 x (2.5 ... 6) <sup>1)</sup> acc. to IEC 60947; max. 1 x 10 2 x (1 ... 2.5) <sup>1)</sup> ; 2 x (2.5 ... 6) <sup>1)</sup> 2 x (16 ... 12) 2 x (14 ... 10) 1 x 8 M4 (Pozidriv size 2) 2 ... 2.5 (18 ... 22 lb.in)			
<b>Auxiliary conductors</b>		<b>Cage Clamp terminals</b>			
Conductor cross-section					
<ul style="list-style-type: none"> <li>• Solid</li> <li>• Finely stranded with end sleeve</li> <li>• solid or stranded AWG (2 x)</li> <li>• Terminal screws</li> <li>- Tightening torque</li> </ul>	mm <sup>2</sup> mm <sup>2</sup> AWG Nm	2 x (0.5 ... 1.5) <sup>1)</sup> ; 2 x (0.75 ... 2.5) <sup>1)</sup> acc. to IEC 60947; max. 2 x (0.75 ... 4) 2 x (0.5 ... 1.5) <sup>1)</sup> ; 2 x (0.75 ... 2.5) <sup>1)</sup> 2 x (20 ... 16) <sup>1)</sup> ; 2 x (18 ... 14) <sup>1)</sup> ; 1 x 12 M3 0.8 ... 1.2 (7 ... 10.3 lb.in)			
<b>Auxiliary conductors</b>		<b>Cage Clamp terminals</b>			
<ul style="list-style-type: none"> <li>• Solid</li> <li>• Finely stranded with end sleeve</li> <li>• Finely stranded without end sleeve</li> <li>• AWG cables, solid or stranded</li> </ul>	mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> AWG	2 x (0.25 ... 2.5) 2 x (0.25 ... 1.5) 2 x (0.25 ... 2.5) 2 x (24 ... 14)			
1) 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	3RT10 34 S2	3RT10 35 S2	3RT10 36 S2	
<b>General data</b>					
<b>Permissible mounting position</b>	<ul style="list-style-type: none"> <li>• AC and DC operation</li> </ul>				
The contactors are designed for operation on a vertical mounting surface.		For DC operation and 22.5 ° inclination towards the front, operating range 0.85 ... 1.1 x U <sub>s</sub>			
Upright mounting position:	<ul style="list-style-type: none"> <li>• AC and DC operation</li> </ul>	 Special version required.			
<b>Mechanical endurance</b>	<ul style="list-style-type: none"> <li>• Basic units</li> <li>• Basic unit with snap-on auxiliary switch block</li> <li>• Solid-state compatible auxiliary switch block</li> </ul>	Operating cycles	10 million 10 million 5 million		
<b>Electrical endurance</b>			1)		
<b>Rated insulation voltage U<sub>i</sub></b> (degree of pollution 3)		V	690		
<b>Rated impulse withstand voltage U<sub>imp</sub></b>		kV	6		
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N		V	400		
<b>Mirror contacts</b>	<ul style="list-style-type: none"> <li>• A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.</li> </ul>	<ul style="list-style-type: none"> <li>- 3RT10 3., 3RT13 3. (removable auxiliary switch block)</li> <li>- 3RT10 3., 3RT13 3. (non-removable auxiliary switch block)</li> </ul>	Yes, acc. to EN 60947-4-1, Appendix F Acc. to SUVA requirements on request.		
<b>Permissible ambient temperature</b>	<ul style="list-style-type: none"> <li>• During operation</li> <li>• During storage</li> </ul>	°C	-25 ... +60		
		°C	-55 ... +80		
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C			IP20 (terminal compartment IP00), AC coil assembly IP40, DC coil assembly IP30		
<b>Touch protection</b> acc. to EN 50274			Finger-safe		
<b>Shock resistance</b>					
<ul style="list-style-type: none"> <li>• Rectangular pulse</li> <li>• Sine pulse</li> </ul>	AC and DC operation	g/ms	10/5 and 5/10		
	AC and DC operation	g/ms	15/5 and 8/10		
<b>Conductor cross-sections</b>					
2)					

1) For endurance of the main contacts see page 19.

2) For conductor cross-sections see page 32.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		3RT10 34 S2	3RT10 35 S2	3RT10 36 S2
<b>Short-circuit protection for contactors without overload relays</b>					
<b>Main circuit</b> 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"	A	125	125	160
	• Type of coordination "2"	A	63	63	80
	• Weld-free <sup>1)</sup>	A	16	16	50
<b>Auxiliary circuit</b>					
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection at $I_k \geq 1$ kA)		A	10		
• Miniature circuit breakers with C characteristic (short-circuit current $I_k \leq 400$ A)		A	10		
<b>Control</b>					
<b>Magnetic coil operating range</b>	AC/DC		0.8 ... 1.1 x $U_s$		
<b>Power consumption of the magnetic coils</b> (when coil is cold and 1.0 x $U_s$ )					
• AC operation, 50 Hz, standard version	- Closing	VA	104	145	
	- P.f.		0.78	0.79	
	- Closed	VA	9.7	12.5	
	- P.f.		0.42	0.36	
• AC operation, 50/60 Hz, standard version	- Closing	VA	127/113	170/155	
	- P.f.		0.73/0.69	0.76/0.72	
	- Closed	VA	11.3/9.5	15/11.8	
	- P.f.		0.41/0.42	0.35/0.38	
• AC operation, 50 Hz, USA/Canada	- Closing	VA	108	150	
	- P.f.		0.76	0.77	
	- Closed	VA	9.6	12.5	
	- P.f.		0.42	0.35	
• AC operation, 60 Hz, USA/Canada	- Closing	VA	120	166	
	- P.f.		0.7	0.71	
	- Closed	VA	10.1	12.6	
	- P.f.		0.42	0.37	
• DC operation	Closing = Closed	W	13.3	13.3	
<b>Permissible residual current of the electronics</b> (with 0 signal)					
	• AC operation	mA	< 12 mA x (230 V/ $U_s$ )		
	• DC operation	mA	< 38 mA x (24 V/ $U_s$ )		
<b>Operating times for 0.8 ... 1.1 x <math>U_s</math><sup>2)</sup></b> (Total break time = Opening delay + Arcing time)					
• AC operation	- Closing delay	ms	11 ... 30	10 ... 24	
	- Opening delay	ms	7 ... 10	7 ... 10	
• DC operation	- Closing delay	ms	50 ... 95	60 ... 100	
	- Opening delay	ms	20 ... 30	20 ... 25	
• Arcing time		ms	10	10	
<b>Operating times for 1.0 x <math>U_s</math><sup>2)</sup></b>					
• AC operation	- Closing delay	ms	13 ... 22	12 ... 20	
	- Opening delay	ms	7 ... 10	7 ... 10	
• DC operation	- Closing delay	ms	60 ... 75	70 ... 85	
	- Opening delay	ms	20 ... 30	20 ... 25	

1) Test conditions according to IEC 60947-4-1.

2) The OFF-delay of the NO contact and the ON-delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (varistor +2 ms to 5 ms, diode assembly: 2 to 6 times).

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		3RT10 34 S2	3RT10 35 S2	3RT10 36 S2
<b>Main circuit</b>					
<b>AC capacity</b>					
<b>Utilization category AC-1 Switching resistive loads</b>					
• Rated operational currents $I_e$	At 40 °C up to 690 V	A	50	60	60
	At 60 °C up to 690 V	A	45	55	55
• Rated power for AC loads <sup>1)</sup> P.f. = 0.95 (at 60 °C)	230 V	kW	18	22	22
	400 V	kW	31	38	38
	500 V	kW	39	46	46
	690 V	kW	54	66	66
• Minimum conductor cross-section for loads with $I_e$	At 40 °C	mm <sup>2</sup>	16	16	16
	At 60 °C	mm <sup>2</sup>	10	16	16
<b>Utilization category AC-2 and AC-3</b>					
• Rated operational currents $I_e$	Up to 500 V	A	32	40	50
	690 V	A	20	24	24
• Rated power for slipping or squirrel-cage motors at 50 and 60 Hz	230 V	kW	7.5	11	15
	400 V	kW	15	18.5	22
	500 V	kW	18.5	22	30
	690 V	kW	18.5	22	22
<b>Thermal load capacity</b>					
	10 s current <sup>2)</sup>	A	320	400	400
<b>Power loss per conducting path</b>					
	At $I_e$ /AC-3	W	1.8	2.6	5
<b>Utilization category AC-4 (for <math>I_a = 6 \times I_e</math>)</b>					
• Rated operational current $I_e$	Up to 400 V	A	29	35	41
• Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 400 V	kW	15	18.5	22
• The following applies to a contact endurance of about 200000 operating cycles:					
- Rated operational currents $I_e$	Up to 400 V	A	15.6	18.5	24
	690 V	A	15.6	18.5	24
- Rated power for squirrel-cage motors with 50 Hz and 60 Hz	230 V	kW	4.7	5.4	7.3
	400 V	kW	8.2	9.5	12.6
	500 V	kW	9.8	11.8	15.8
	690 V	kW	13	15.5	21.8
<b>Utilization category AC-5a Switching gas discharge lamps, inductive ballast</b>					
Per main current path at 230 V					
• Uncorrected, rated power per lamp/rated operational current per lamp					
	L 18 W/0.37 A	Units	135	162	162
	L 36 W/0.43 A	Units	116	139	139
	L 58 W/0.67 A	Units	74	89	89
	L 80 W/0.79 A	Units	63	75	75
• DUO switching (two-lamp)					
	L 18 W/0.22 A	Units	227 (≅ 2 x 227 lamps)	272 (≅ 2 x 272 lamps)	272 (≅ 2 x 272 lamps)
	L 36 W/0.42 A	Units	119 (≅ 2 x 119 lamps)	142 (≅ 2 x 142 lamps)	142 (≅ 2 x 142 lamps)
	L 58 W/0.63 A	Units	79 (≅ 2 x 79 lamps)	95 (≅ 2 x 95 lamps)	95 (≅ 2 x 95 lamps)
	L 80 W/0.87 A	Units	57 (≅ 2 x 57 lamps)	68 (≅ 2 x 68 lamps)	68 (≅ 2 x 68 lamps)
<b>Switching gas discharge lamps with correction</b>					
Per main current path at 230 V					
• Shunt compensation with inductive ballast, rated power per lamp/capacitance/rated operational current per lamp					
	L 18 W/4.5 μF/0.11 A	Units	78	98	123
	L 36 W/4.5 μF/0.21 A	Units	78	98	123
	L 58 W/7 μF/0.32 A	Units	50	63	79
	L 80 W/7 μF/0.49 A	Units	50	63	73
• With solid-state ballast <sup>3)</sup> single lamp					
	L 18 W/6.8 μF/0.10 A	Units	224	280	350
	L 36 W/6.8 μF/0.18 A	Units	124	155	194
	L 58 W/10 μF/0.29 A	Units	77	96	120
	L 80 W/10 μF/0.43 A	Units	52	65	81
• With solid-state ballast <sup>3)</sup> two-lamp					
	L 18 W/10 μF/0.18 A	Units	124 (≅ 2 x 124 lamps)	155 (≅ 2 x 155 lamps)	194 (≅ 2 x 194 lamps)
	L 36 W/10 μF/0.35 A	Units	64 (≅ 2 x 64 lamps)	80 (≅ 2 x 80 lamps)	100 (≅ 2 x 100 lamps)
	L 58 W/22 μF/0.52 A	Units	43 (≅ 2 x 43 lamps)	54 (≅ 2 x 54 lamps)	67 (≅ 2 x 67 lamps)
	L 80 W/22 μF/0.86 A	Units	26 (≅ 2 x 26 lamps)	32 (≅ 2 x 32 lamps)	40 (≅ 2 x 40 lamps)

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".

3) Depending on the electronic ballast used, higher lamp numbers are also  
possible.



# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW





Contactors	Type Size		3RT10 34 S2	3RT10 35 S2	3RT10 36 S2
<b>Main circuit</b>					
<b>AC capacity</b>					
<b>Utilization category AC-5b Switching incandescent lamps</b>		kW	6.0	7.6	9.5
Per main current path at 230/220 V					
<b>Utilization category AC-6a switching AC transformers</b>					
• Rated operational current $I_e$					
- For inrush current n = 20	Up to 400 V	A	31	36.5	43.2
- For inrush current n = 30	Up to 400 V	A	20.7	24.3	28.8
• Rating $P$					
- For inrush current n = 20	At 230 V	kVA	12.3	14.5	17.2
	400 V	kVA	21.5	25.3	29.9
	500 V	kVA	26.8	31.6	37.4
	690 V	kVA	23.9	28.7	28.7
- For inrush current n = 30	230 V	kVA	8.2	9.7	11.5
	400 V	kVA	14.3	16.8	20
	500 V	kVA	17.9	21	24.9
	690 V	kVA	23.9	28.7	28.7
For deviating inrush current factors x, the power must be recalculated as follows. $P_x = P_{n30} \cdot 30/x$					
<b>Utilization category AC-6b Switching low-inductance (low-loss, metallized dielectric) AC capacitors</b>					
Ambient temperature 40 °C					
• Rated operational currents $I_e$					
	Up to 400 V	A	29	36	36
• Rated power for single capacitors or banks of capacitors (minimum inductance of 20 µH between capacitors connected in parallel) at 50 Hz, 60 Hz and					
	At 230 V	kvar	12	15	15
	400 V	kvar	20	25	25
	525 V	kvar	25	33	33
	690 V	kvar	20	25	25
<b>Load rating with DC</b>					
<b>Utilization category DC-1 Switching resistive loads (<math>L/R &lt; 1</math> ms)</b>					
• Rated operational current $I_e$ (at 60 °C)					
- 1 conducting path	Up to 24 V	A	45	55	55
	60 V	A	20	23	23
	110 V	A	4.5	4.5	4.5
	220 V	A	2	2	2
	440 V	A	0.4	0.4	0.4
	600 V	A	0.25	0.25	0.25
- 2 conducting paths in series	Up to 24 V	A	45	55	55
	60 V	A	45	45	45
	110 V	A	45	45	45
	220 V	A	5	5	5
	440 V	A	1	1	1
	600 V	A	0.8	0.8	0.8
- 3 conducting paths in series	Up to 24 V	A	45	55	55
	60 V	A	45	55	55
	110 V	A	45	55	55
	220 V	A	45	45	45
	440 V	A	2.9	2.9	2.9
	600 V	A	1.4	1.4	1.4
<b>Utilization category DC-3 and DC-5 Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>					
• Rated operational current $I_e$ (at 60 °C)					
- 1 conducting path	Up to 24 V	A	35	35	35
	60 V	A	6	6	6
	110 V	A	2.5	2.5	2.5
	220 V	A	2	2	2
	440 V	A	0.1	0.1	0.1
	600 V	A	0.06	0.06	0.06
- 2 conducting paths in series	Up to 24 V	A	45	55	55
	60 V	A	45	45	45
	110 V	A	25	25	25
	220 V	A	5	5	5
	440 V	A	0.27	0.27	0.27
	600 V	A	0.16	0.16	0.16
- 3 conducting paths in series	Up to 24 V	A	45	55	55
	60 V	A	45	55	55
	110 V	A	45	55	55
	220 V	A	25	25	25
	440 V	A	0.6	0.6	0.6
	600 V	A	0.6	0.6	0.6

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		3RT10 34 S2	3RT10 35 S2	3RT10 36 S2	
<b>Switching frequency</b>						
<b>Switching frequency z</b> in operating cycles/hour						
<ul style="list-style-type: none"> <li>• Contactors without overload relays</li> </ul>	No-load switching frequency AC	h <sup>-1</sup>	5000	5000	5000	
	No-load switching frequency DC	h <sup>-1</sup>	1500	1500	1500	
	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 (AC/DC)	h <sup>-1</sup>	1200	1200	1000
		AC-2 (AC/DC)	h <sup>-1</sup>	750	600	400
		AC-3 (AC/DC)	h <sup>-1</sup>	1000	1000	800
<ul style="list-style-type: none"> <li>• Contactors with overload relays (mean value)</li> </ul>	AC-4 (AC/DC)	h <sup>-1</sup>	250	300	300	
		h <sup>-1</sup>	15	15	15	

Contactor	Type Size		3RT10 3. S2		
<b>Conductor cross-sections (1 or 2 conductors connectable)</b>					
<b>Front clamping point connected</b> 	<b>Main conductors:</b> With box terminal		 <b>Screw terminals</b>		
	• Finely stranded with end sleeve	mm <sup>2</sup>		0.75 ... 25	
	• Finely stranded without end sleeve	mm <sup>2</sup>		0.75 ... 25	
	• Stranded	mm <sup>2</sup>		0.75 ... 35	
	• Solid	mm <sup>2</sup>		0.75 ... 16	
	• Ribbon cable conductors (number x width x thickness)	mm		6 x 9 x 0.8	
	• AWG cables, solid or stranded	AWG		18 ... 2	
	<b>Rear clamping point connected</b> 	• Finely stranded with end sleeve		mm <sup>2</sup>	0.75 ... 25
		• Finely stranded without end sleeve		mm <sup>2</sup>	0.75 ... 25
		• Stranded		mm <sup>2</sup>	0.75 ... 35
• Solid		mm <sup>2</sup>	0.75 ... 16		
• Ribbon cable conductors (number x width x thickness)		mm	6 x 9 x 0.8		
<b>Both clamping points connected</b> 	• Finely stranded with end sleeve	mm <sup>2</sup>	2 x (0.75 ... 16)		
	• Finely stranded without end sleeve	mm <sup>2</sup>	2 x (0.75 ... 16)		
	• Stranded	mm <sup>2</sup>	2 x (0.75 ... 25)		
	• Solid	mm <sup>2</sup>	2 x (0.75 ... 16)		
	• Ribbon cable conductors (number x width x thickness)	mm	2 x (6 x 9 x 0.8)		
	• AWG cables, solid or stranded	AWG	2 x (18 ... 2)		
	• Terminal screw - Tightening torque	Nm	M6 (Pozidriv size 2) 3 ... 4.5 (27 ... 40 lb.in)		
<b>Auxiliary conductors:</b>					
• Solid	mm <sup>2</sup>	2 x (0.5 ... 1.5) <sup>1)</sup> ; 2 x (0.75 ... 2.5) <sup>1)</sup> acc. to IEC 60947; max. 2 x (0.75 ... 4)			
• Finely stranded with end sleeve	mm <sup>2</sup>	2 x (0.5 ... 1.5) <sup>1)</sup> ; 2 x (0.75 ... 2.5) <sup>1)</sup>			
• AWG cables, solid or stranded	AWG	2 x (20 ... 16) <sup>1)</sup> ; 2 x (18 ... 14) <sup>1)</sup> ; 1 x 12			
• Terminal screw - Tightening torque	Nm	M3 0.8 ... 1.2 (7 ... 10.3 lb.in)			
<b>Auxiliary conductors:</b>					
• Solid	mm <sup>2</sup>	2 x (0.25 ... 2.5)			
• Finely stranded with end sleeve	mm <sup>2</sup>	2 x (0.25 ... 1.5)			
• Finely stranded without end sleeve	mm <sup>2</sup>	2 x (0.25 ... 2.5)			
• AWG cables, solid or stranded	mm <sup>2</sup>	2 x (24 ... 14)			

For tools for opening Cage Clamp terminals see Catalog LV 1, Chapter 3, Accessories and Spare Parts.  
 Maximum external diameter of the conductor insulation: 3.6 mm.  
 For conductor cross-sections ≤ 1 mm<sup>2</sup> an "insulation stop" must be used, see Catalog LV 1, Chapter 3, "Accessories and Spare Parts".

1) 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.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size	3RT10 44 S3	3RT10 45 S3	3RT10 46 S3
<b>General data</b>				
<b>Permissible mounting position</b> The contactors are designed for operation on a vertical mounting surface.	<ul style="list-style-type: none"> <li>AC and DC operation</li> </ul>	<p>For DC operation and 22.5° inclination towards the front, operating range <math>0.85 \dots 1.1 \times U_s</math></p> <p>Special version required.</p>		
Upright mounting position:	<ul style="list-style-type: none"> <li>AC operation</li> <li>DC operation</li> </ul>			
<b>Mechanical endurance</b>	<ul style="list-style-type: none"> <li>Basic units</li> <li>Basic unit with snap-on auxiliary switch block</li> <li>Solid-state compatible auxiliary switch block</li> </ul>	Operating cycles	10 million	10 million 5 million
<b>Electrical endurance</b>			1)	
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)		V	1000	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>		kV	6	
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N		V	690	
<b>Mirror contacts</b>	<ul style="list-style-type: none"> <li>A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.</li> </ul>	<ul style="list-style-type: none"> <li>3RT10 4., 3RT13 4., 3RT14 4. (removable auxiliary switch block)</li> <li>3RT10 4., 3RT13 4., 3RT14 4. (non-removable auxiliary switch block)</li> </ul>	Yes, acc. to EN 60947-4-1, Appendix F Acc. to Swiss regulations (SUVA) on request.	
<b>Permissible ambient temperature</b>	<ul style="list-style-type: none"> <li>During operation</li> <li>During storage</li> </ul>	°C	-25 ... +60	
		°C	-55 ... +80	
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C			IP20 (terminal compartment IP00), AC coil assembly IP40, DC coil assembly IP30 Finger-safe	
<b>Touch protection</b> acc. to EN 50274				
<b>Shock resistance</b>				
<ul style="list-style-type: none"> <li>Rectangular pulse</li> <li>Sine pulse</li> </ul>	<ul style="list-style-type: none"> <li>AC and DC operation</li> <li>AC and DC operation</li> </ul>	g/ms g/ms	6.8/5 and 4/10 10.6/5 and 6.2/10	
<b>Conductor cross-sections</b>			2)	
<b>Short-circuit protection for contactors without overload relays</b>				
<b>Main circuit</b>	<ul style="list-style-type: none"> <li>Fuse links gL/gG LV HRC 3NA, DIAZED 5SB, NEOZED 5SE acc. to IEC 60947-4-1/ EN 60947-4-1</li> </ul>		For short-circuit protection for contactors with overload relays see "Protection Equipment --> Overload Relays". For short-circuit protection for fuseless load feeders see "Load Feeders and Motor Starters --> 3RA Fuseless Load Feeders".	
	- Type of coordination "1"	A	250	250
	- Type of coordination "2"	A	125	160
	- Weld-free <sup>3)</sup>	A	63	100
<b>Auxiliary circuit</b>				
<ul style="list-style-type: none"> <li>Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection at <math>I_k \geq 1 \text{ kA}</math>)</li> <li>Miniature circuit breakers with C characteristic (short-circuit current <math>I_k &lt; 400 \text{ A}</math>)</li> </ul>		A	10	
		A	10	

1) For endurance of the main contacts see page 19.

2) For conductor cross-sections see page 37.

3) Test conditions according to IEC 60947-4-1.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		3RT10 44 S3	3RT10 45 S3	3RT10 46 S3
<b>Control</b>					
<b>Magnetic coil operating range</b>	AC/DC		0.8 ... 1.1 x $U_s$		
<b>Power consumption of the magnetic coils</b> (when coil is cold and 1.0 x $U_s$ )					
• AC operation, 50 Hz, standard version	- Closing	VA	218	270	
	- P.f.		0.61	0.68	
	- Closed	VA	21	22	
	- P.f.		0.26	0.27	
• AC operation, 50/60 Hz, standard version	- Closing	VA	247/211	298/274	
	- P.f.		0.62/0.57	0.7/0.62	
	- Closed	VA	25/18	27/20	
	- P.f.		0.27/0.3	0.29/0.31	
• AC operation, 50 Hz, USA/Canada	- Closing	VA	218	270	
	- P.f.		0.61	0.68	
	- Closed	VA	21	22	
	- P.f.		0.26	0.27	
• AC operation, 60 Hz, USA/Canada	- Closing	VA	232	300	
	- P.f.		0.55	0.52	
	- Closed	VA	20	21	
	- P.f.		0.28	0.29	
• DC operation	Closing = Closed	W	15	15	
<b>Permissible residual current of the electronics</b> (with 0 signal)					
• AC operation			< 25 mA x (230 V/ $U_s$ )		
• DC operation			< 43 mA x (24 V/ $U_s$ )		
<b>Operating times for 0.8 ... 1.1 x <math>U_s</math><sup>1)</sup></b>					
Total break time = Opening delay + Arcing time					
• AC operation	- Closing delay	ms	16 ... 57	17 ... 90	
	- Opening delay	ms	10 ... 19	10 ... 25	
• DC operation	- Closing delay	ms	90 ... 230	90 ... 230	
	- Opening delay	ms	14 ... 20	14 ... 20	
• Arcing time		ms	10 ... 15	10 ... 15	
<b>Operating times for 1.0 x <math>U_s</math><sup>1)</sup></b>					
• AC operation	- Closing delay	ms	18 ... 34	18 ... 30	
	- Opening delay	ms	11 ... 18	11 ... 23	
• DC operation	- Closing delay	ms	100 ... 120	100 ... 120	
	- Opening delay	ms	16 ... 20	16 ... 20	
<b>Main circuit</b>					
<b>AC capacity</b>					
<b>Utilization category AC-1</b>					
<b>Switching resistive loads</b>					
• Rated operational currents $I_e$	At 40 °C up to 690 V A		100	120	120
		1000 V A	50	60	70
	At 60 °C up to 690 V A		90	100	100
		1000 V A	40	50	60
• Rated output of AC loads <sup>2)</sup> P.f. = 0.95 (at 60 °C)	At 230 V kW		34	38	38
	400 V kW		59	66	66
	500 V kW		74	82	82
	690 V kW		102	114	114
	1000 V kW		66	82	98
• Minimum conductor cross-section for loads with $I_e$	At 40 °C mm <sup>2</sup>		35	50	50
	At 60 °C mm <sup>2</sup>		35	35	35
<b>Utilization categories AC-2 and AC-3</b>					
• Rated operational currents $I_e$	Up to 500 V A		65	80	95
	690 V A		47	58	58
	1000 V A		25	30	30
• Rated power of slipping or squirrel-cage motors at 50 and 60 Hz	At 230 V kW		18.5	22	22
	400 V kW		30	37	45
	500 V kW		37	45	55
	690 V kW		45	55	55
	1000 V kW		30	37	37
<b>Thermal load capacity</b>					
	10 s current <sup>3)</sup> A		600	760	760
<b>Power loss per conducting path</b>					
	At $I_e$ /AC-3 W		4.6	7.7	10.8

1) The OFF-delay of the NO contact and the ON-delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (varistor +2 ms to 5 ms, diode assembly: 2 to 6 times).

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

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

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		3RT10 44 S3	3RT10 45 S3	3RT10 46 S3
<b>Main circuit</b>					
<b>AC capacity</b>					
<b>Utilization category AC-4</b> (for $I_a = 6 \times I_e$ )					
• Rated operational current $I_e$	Up to 400 V	A	55	66	80
• Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 400 V	kW	30	37	45
• The following applies to a contact endurance of about 200000 operating cycles:					
- Rated operational currents $I_e$	Up to 400 V	A	28	34	42
	690 V	A	28	34	42
	1000 V	A	20	23	23
- Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 230 V	kW	8.7	10.4	12
	400 V	kW	15.1	17.9	22
	500 V	kW	18.4	22.4	27
	690 V	kW	25.4	30.9	38
	1000 V	kW	22	30	30
<b>Utilization category AC-5a</b>					
<b>Switching gas discharge lamps, inductive ballast</b>					
Per main current path at 230 V					
• Uncorrected, rated power per lamp/rated operational current per lamp					
	L 18 W/0.37 A	Units	270	324	
	L 36 W/0.43 A	Units	232	279	
	L 58 W/0.67 A	Units	149	179	
	L 80 W/0.79 A	Units	126	151	
• DUO switching (two-lamp)					
	L 18 W/0.21 A	Units	454 (≅ 2 x 454 lamps)	545 (≅ 2 x 545 lamps)	
	L 36 W/0.42 A	Units	238 (≅ 2 x 238 lamps)	285 (≅ 2 x 285 lamps)	
	L 58 W/0.63 A	Units	158 (≅ 2 x 158 lamps)	190 (≅ 2 x 190 lamps)	
	L 80 W/0.87 A	Units	114 (≅ 2 x 114 lamps)	137 (≅ 2 x 137 lamps)	
<b>Switching gas discharge lamps with correction</b>					
Per main current path at 230 V					
• Shunt compensation with inductive ballast, rated power per lamp/capacitance/rated operational current per lamp					
	L 18 W/4.5 μF/0.11 A	Units	160	197	234
	L 36 W/4.5 μF/0.21 A	Units	160	197	234
	L 58 W/7 μF/0.32 A	Units	103	127	150
	L 80 W/7 μF/0.49 A	Units	103	126	146
• With solid-state ballast <sup>1)</sup> single lamp					
	L 18 W/6.8 μF/0.10 A	Units	455	560	665
	L 36 W/6.8 μF/0.18 A	Units	253	311	369
	L 58 W/10 μF/0.29 A	Units	156	193	229
	L 80 W/10 μF/0.43 A	Units	105	130	154
• With solid-state ballast <sup>1)</sup> two-lamp					
	L 18 W/10 μF/0.18 A	Units	253 (≅ 2 x 253 lamps)	311 (≅ 2 x 311 lamps)	369 (≅ 2 x 369 lamps)
	L 36 W/10 μF/0.35 A	Units	130 (≅ 2 x 130 lamps)	160 (≅ 2 x 160 lamps)	190 (≅ 2 x 190 lamps)
	L 58 W/22 μF/0.52 A	Units	88 (≅ 2 x 88 lamps)	108 (≅ 2 x 108 lamps)	128 (≅ 2 x 128 lamps)
	L 80 W/22 μF/0.86 A	Units	52 (≅ 2 x 52 lamps)	65 (≅ 2 x 65 lamps)	77 (≅ 2 x 77 lamps)
<b>Utilization category AC-5b</b>					
<b>Switching incandescent lamps</b>					
Per main current path at 230/220 V					
		kW	12.3	15.2	18.1

1) Depending on the electronic ballast used, higher lamp numbers are also possible.

# 3RT, 3TB, 3TF Contactors for Switching Motors




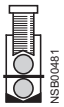

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size	3RT10 44 S3	3RT10 45 S3	3RT10 46 S3
<b>Main circuit</b>				
<b>AC capacity</b>				
<b>Utilization category AC-6a switching AC transformers</b>				
• Rated operational current $I_{\theta}$ (60 °C)				
- For inrush current n = 20	Up to 400 V A Up to 690 V A	63.5 47	80 58	84.4 58
- For inrush current n = 30	Up to 400 V A Up to 690 V A	42.3 42.3	56.3 56.3	56.3 56.3
• Rating P				
- For inrush current n = 20	230 V kVA 400 V kVA 500 V kVA 690 V kVA	25.3 43.9 54.9 56.2	31.9 55.4 69.3 69.3	33.6 58 73.1 69.3
- For inrush current n = 30	230 V kVA 400 V kVA 500 V kVA 690 V kVA	16.8 29.3 36.6 50.3	22.4 39 48.7 67.3	22.4 39 48.7 67.3
For deviating inrush current factors x, the power must be recalculated as follows. $P_x = P_{n30} \cdot 30/x$				
<b>Utilization category AC-6b Switching low-inductance (low-loss, metallized dielectric) AC capacitors</b>				
• Rated operational current $I_{\theta}$ (60 °C)	Up to 400 V A	57	72	
• Rated power for single capacitors or banks of capacitors (minimum inductance of 6 $\mu$ H between capacitors connected in parallel) at 50 Hz, 60 Hz and	At 230 V kvar 400 V kvar 525 V kvar 690 V kvar	24 40 50 40	29 50 65 50	
<b>Load rating with DC</b>				
<b>Utilization category DC-1 Switching resistive load (<math>L/R \leq 1</math> ms)</b>				
• Rated operational current $I_{\theta}$ (60 °C)				
- 1 conducting path	Up to 24 V A 60 V A 110 V A 220 V A 440 V A 600 V A	90 23 4.5 1 0.4 0.26	100 60 9 2 0.6 0.4	100 60 9 2 0.6 0.4
- 2 conducting paths in series	Up to 24 V A 60 V A 110 V A 220 V A 440 V A 600 V A	90 90 90 5 1 0.8	100 100 100 10 1.8 1	100 100 100 10 1.8 1
- 3 conducting paths in series	Up to 24 V A 60 V A 110 V A 220 V A 440 V A 600 V A	90 90 90 70 2.9 1.4	100 100 100 80 1.8 1	100 100 100 80 4.5 2.6
<b>Utilization category DC-3 and DC-5 Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>				
• Rated operational current $I_{\theta}$ (60 °C)				
- 1 conducting path	Up to 24 V A 60 V A 110 V A 220 V A 440 V A 600 V A	40 6 2.5 1 0.15 0.06	40 6.5 2.5 1 0.15 0.06	40 6.5 2.5 1 0.15 0.06
- 2 conducting paths in series	Up to 24 V A 60 V A 110 V A 220 V A 440 V A 600 V A	90 90 90 7 0.42 0.16	100 100 100 7 0.42 0.16	100 100 100 7 0.42 0.16
- 3 conducting paths in series	Up to 24 V A 60 V A 110 V A 220 V A 440 V A 600 V A	90 90 90 35 0.8 0.35	100 100 100 35 0.8 0.35	100 100 100 35 0.8 0.35

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size	3RT10 44 S3	3RT10 45 S3	3RT10 46 S3
<b>Main circuit</b>				
<b>Switching frequency</b>				
<b>Switching frequency z</b> in operating cycles/hour				
• Contactors without overload relays	No-load switching frequency AC	h <sup>-1</sup> 5000	5000	5000
	No-load switching frequency DC	h <sup>-1</sup> 1000	1000	1000
Dependence of the switching frequency z' on the operational current I' and operational voltage U':	AC-1 (AC/DC)	h <sup>-1</sup> 1000	900	900
	AC-2 (AC/DC)	h <sup>-1</sup> 400	400	350
	AC-3 (AC/DC)	h <sup>-1</sup> 1000	1000	850
	AC-4 (AC/DC)	h <sup>-1</sup> 300	300	250
• Contactors with overload relays (mean value)		h <sup>-1</sup> 15	15	15

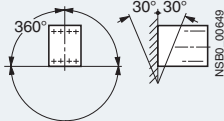
Contactors	Type Size	3RT10 4. S3
<b>Conductor cross-sections (1 or 2 conductors connectable)</b>		
	<b>Main conductors:</b> <u>With box terminal</u>	 <b>Screw terminals</b>
<b>Front clamping point connected</b> 	<ul style="list-style-type: none"> <li>• Finely stranded with end sleeve mm<sup>2</sup> 2.5 ... 35</li> <li>• Finely stranded without end sleeve mm<sup>2</sup> 4 ... 50</li> <li>• Solid mm<sup>2</sup> 2.5 ... 16</li> <li>• Stranded mm<sup>2</sup> 4 ... 70</li> <li>• Ribbon cable conductors (number x width x thickness) mm 6 x 9 x 0.8</li> <li>• AWG cables, solid or stranded AWG 10 ... 2/0</li> </ul>	
<b>Rear clamping point connected</b> 	<ul style="list-style-type: none"> <li>• Finely stranded with end sleeve mm<sup>2</sup> 2.5 ... 50</li> <li>• Finely stranded without end sleeve mm<sup>2</sup> 10 ... 50</li> <li>• Solid mm<sup>2</sup> 2.5 ... 16</li> <li>• Stranded mm<sup>2</sup> 10 ... 70</li> <li>• Ribbon cable conductors (number x width x thickness) mm 6 x 9 x 0.8</li> <li>• AWG cables, solid or stranded AWG 10 ... 2/0</li> </ul>	
<b>Both clamping points connected</b> 	<ul style="list-style-type: none"> <li>• Finely stranded with end sleeve mm<sup>2</sup> 2 x (2.5 ... 35)</li> <li>• Finely stranded without end sleeve mm<sup>2</sup> 2 x (4 ... 35)</li> <li>• Solid mm<sup>2</sup> 2 x (2.5 ... 16)</li> <li>• Stranded mm<sup>2</sup> 2 x (4 ... 50)</li> <li>• Ribbon cable conductors (number x width x thickness) mm 2 x (6 x 9 x 0.8)</li> <li>• AWG cables, solid or stranded AWG 2 x (10 ... 1/0)</li> <li>• Terminal screw - Tightening torque Nm M6 (hexagon socket, A/F 4) 4 ... 6 (36 ... 53 lb.in)</li> </ul>	
Connection for drilled copper bars <sup>1)</sup>	Max. width	mm 10
Without box terminal with cable lugs <sup>2)</sup> (1 or 2 conductors can be connected)	<ul style="list-style-type: none"> <li>• Finely stranded with cable lug mm<sup>2</sup> 10 ... 50<sup>3)</sup></li> <li>• Stranded with cable lug mm<sup>2</sup> 10 ... 70<sup>3)</sup></li> <li>• AWG cables, solid or stranded AWG 7 ... 1/0</li> </ul>	
	<b>Auxiliary conductors:</b>	
	• Solid	mm <sup>2</sup> 2 x (0.5 ... 1.5) <sup>4)</sup> ; 2 x (0.75 ... 2.5) <sup>4)</sup> acc. to IEC 60947; max. 2 x (0.75 ... 4)
	• Finely stranded with end sleeve	mm <sup>2</sup> 2 x (0.5 ... 1.5) <sup>4)</sup> ; 2 x (0.75 ... 2.5) <sup>4)</sup>
	• AWG cables, solid or stranded	AWG 2 x (20 ... 16) <sup>4)</sup> ; 2 x (18 ... 14) <sup>4)</sup> ; 1 x 12
	• Terminal screw - Tightening torque	Nm M3 0.8 ... 1.2 (7 ... 10.3 lb.in)
	<b>Auxiliary conductors:</b>	 <b>Cage Clamp terminals</b>
	• Solid	mm <sup>2</sup> 2 x (0.25 ... 2.5)
	• Finely stranded with end sleeve	mm <sup>2</sup> 2 x (0.25 ... 1.5)
	• Finely stranded without end sleeve	mm <sup>2</sup> 2 x (0.25 ... 2.5)
	• AWG cables, solid or stranded	AWG 2 x (24 ... 14)

For tools for opening Cage Clamp terminals see Catalog LV 1, Chapter 3, Accessories and Spare Parts.  
Maximum external diameter of the conductor insulation: 3.6 mm.  
For conductor cross-sections ≤ 1 mm<sup>2</sup> an "insulation stop" must be used, see Catalog LV 1, Chapter 3, "Accessories and Spare Parts".

- 1) If bars larger than 12 x 10 mm are connected, a 3RT19 46-4EA1 terminal cover is needed to comply with the phase clearance.
- 2) If conductors larger than 25 mm<sup>2</sup> are connected, a 3RT19 46-4EA1 terminal cover is needed to comply with the phase clearance.
- 3) Only with crimped cable lugs according to DIN 46234. Cable lug max. 20 mm wide.
- 4) 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.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size	3RT10 54 S6	3RT10 55 S6	3RT10 56 S6				
<b>General data</b>								
<b>Permissible mounting position</b> The contactors are designed for operation on a vertical mounting surface.								
<b>Mechanical endurance</b>	Operating cycles	10 million						
<b>Electrical endurance</b>		1)						
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	1000						
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	kV	8						
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N	V	690						
<b>Mirror contacts</b> 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							
<b>Permissible ambient temperature</b>	<ul style="list-style-type: none"> <li>• During operation</li> <li>• During storage</li> </ul>	°C °C	-25 ... +60/+55 with AS-Interface -55 ... +80					
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C	IP00/open, coil assembly IP20							
<b>Touch protection</b> acc. to EN 50274	Finger-safe with cover							
<b>Shock resistance</b>	<ul style="list-style-type: none"> <li>• Rectangular pulse</li> <li>• Sine pulse</li> </ul>	g/ms g/ms	8.5/5 and 4.2/10 13.4/5 and 6.5/10					
<b>Conductor cross-sections</b>		2)						
<b>Electromagnetic compatibility (EMC)</b>		3)						
<b>Short-circuit protection</b>								
<b>Main circuit</b> Fuse links, gL/gG LV HRC 3NA, DIAZED 5SB, NEOZED 5SE acc. to IEC 60947-4-1/ EN 60947-4-1		<ul style="list-style-type: none"> <li>• Type of coordination "1"</li> <li>• Type of coordination "2"</li> <li>• Weld-free<sup>4)</sup></li> </ul>	A A A	355 315 80	355 315 160			
<b>Auxiliary circuit</b>		<ul style="list-style-type: none"> <li>• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection at <math>I_k \geq 1</math> kA)</li> <li>• Or miniature circuit breakers with C characteristic (<math>I_k &lt; 400</math> A)</li> </ul>			A	10	For short-circuit protection for contactors with overload relays see "Protection Equipment --> Overload Relays".	

1) For endurance of the main contacts see page 19.

2) For conductor cross-sections see page 42.

3) For electromagnetic compatibility (EMC) see page 12.

4) Test conditions according to IEC 60947-4-1.



# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size	3RT10 5. S6																																																	
<b>Control</b>																																																			
<b>Operating range of the solenoid AC/DC (UC)</b>		0.8 x $U_{s \min}$ ... 1.1 x $U_{s \max}$																																																	
<b>Power consumption of the solenoid</b> (when coil is cool and rated range $U_{s \min}$ ... $U_{s \max}$ )																																																			
<ul style="list-style-type: none"> <li>Conventional operating mechanism           <ul style="list-style-type: none"> <li>- AC operation               <table border="0"> <tr> <td>Closing at <math>U_{s \min}</math></td> <td>VA/p.f.</td> <td>250/0.9</td> </tr> <tr> <td>Closing at <math>U_{s \max}</math></td> <td>VA/p.f.</td> <td>300/0.9</td> </tr> <tr> <td>Closed at <math>U_{s \min}</math></td> <td>VA/p.f.</td> <td>4.8/0.8</td> </tr> <tr> <td>Closed at <math>U_{s \max}</math></td> <td>VA/p.f.</td> <td>5.8/0.8</td> </tr> </table> </li> <li>- DC operation               <table border="0"> <tr> <td>Closing at <math>U_{s \min}</math></td> <td>W</td> <td>300</td> </tr> <tr> <td>Closing at <math>U_{s \max}</math></td> <td>W</td> <td>360</td> </tr> <tr> <td>Closed at <math>U_{s \min}</math></td> <td>W</td> <td>4.3</td> </tr> <tr> <td>Closed at <math>U_{s \max}</math></td> <td>W</td> <td>5.2</td> </tr> </table> </li> </ul> </li> <li>Solid-state operating mechanism           <ul style="list-style-type: none"> <li>- AC operation               <table border="0"> <tr> <td>Closing at <math>U_{s \min}</math></td> <td>VA/p.f.</td> <td>190/0.8</td> </tr> <tr> <td>Closing at <math>U_{s \max}</math></td> <td>VA/p.f.</td> <td>280/0.8</td> </tr> <tr> <td>Closed at <math>U_{s \min}</math></td> <td>VA/p.f.</td> <td>3.5/0.5</td> </tr> <tr> <td>Closed at <math>U_{s \max}</math></td> <td>VA/p.f.</td> <td>4.4/0.4</td> </tr> </table> </li> <li>- DC operation               <table border="0"> <tr> <td>Closing at <math>U_{s \min}</math></td> <td>W</td> <td>250</td> </tr> <tr> <td>Closing at <math>U_{s \max}</math></td> <td>W</td> <td>320</td> </tr> <tr> <td>Closed at <math>U_{s \min}</math></td> <td>W</td> <td>2.3</td> </tr> <tr> <td>Closed at <math>U_{s \max}</math></td> <td>W</td> <td>2.8</td> </tr> </table> </li> </ul> </li> </ul>				Closing at $U_{s \min}$	VA/p.f.	250/0.9	Closing at $U_{s \max}$	VA/p.f.	300/0.9	Closed at $U_{s \min}$	VA/p.f.	4.8/0.8	Closed at $U_{s \max}$	VA/p.f.	5.8/0.8	Closing at $U_{s \min}$	W	300	Closing at $U_{s \max}$	W	360	Closed at $U_{s \min}$	W	4.3	Closed at $U_{s \max}$	W	5.2	Closing at $U_{s \min}$	VA/p.f.	190/0.8	Closing at $U_{s \max}$	VA/p.f.	280/0.8	Closed at $U_{s \min}$	VA/p.f.	3.5/0.5	Closed at $U_{s \max}$	VA/p.f.	4.4/0.4	Closing at $U_{s \min}$	W	250	Closing at $U_{s \max}$	W	320	Closed at $U_{s \min}$	W	2.3	Closed at $U_{s \max}$	W	2.8
Closing at $U_{s \min}$	VA/p.f.	250/0.9																																																	
Closing at $U_{s \max}$	VA/p.f.	300/0.9																																																	
Closed at $U_{s \min}$	VA/p.f.	4.8/0.8																																																	
Closed at $U_{s \max}$	VA/p.f.	5.8/0.8																																																	
Closing at $U_{s \min}$	W	300																																																	
Closing at $U_{s \max}$	W	360																																																	
Closed at $U_{s \min}$	W	4.3																																																	
Closed at $U_{s \max}$	W	5.2																																																	
Closing at $U_{s \min}$	VA/p.f.	190/0.8																																																	
Closing at $U_{s \max}$	VA/p.f.	280/0.8																																																	
Closed at $U_{s \min}$	VA/p.f.	3.5/0.5																																																	
Closed at $U_{s \max}$	VA/p.f.	4.4/0.4																																																	
Closing at $U_{s \min}$	W	250																																																	
Closing at $U_{s \max}$	W	320																																																	
Closed at $U_{s \min}$	W	2.3																																																	
Closed at $U_{s \max}$	W	2.8																																																	
<b>PLC control input</b> (EN 61131-2/type 2)		24 V DC/≤ 30 mA power consumption, (operating range 17 ... 30 V DC)																																																	
<b>Operating times</b> (Total break time = Opening delay + Arcing time)																																																			
<ul style="list-style-type: none"> <li>Conventional operating mechanism           <ul style="list-style-type: none"> <li>- With 0.8 x <math>U_{s \min}</math> ... 1.1 x <math>U_{s \max}</math> <table border="0"> <tr> <td>Closing delay</td> <td>ms</td> <td>20 ... 95</td> </tr> <tr> <td>Opening delay</td> <td>ms</td> <td>40 ... 60</td> </tr> </table> </li> <li>- With <math>U_{s \min}</math> ... <math>U_{s \max}</math> <table border="0"> <tr> <td>Closing delay</td> <td>ms</td> <td>25 ... 50</td> </tr> <tr> <td>Opening delay</td> <td>ms</td> <td>40 ... 60</td> </tr> </table> </li> </ul> </li> <li>Solid-state operating mechanism, actuated via PLC input           <ul style="list-style-type: none"> <li>- With 0.8 x <math>U_{s \min}</math> ... 1.1 x <math>U_{s \max}</math> <table border="0"> <tr> <td>Closing delay</td> <td>ms</td> <td>35 ... 75</td> </tr> <tr> <td>Opening delay</td> <td>ms</td> <td>80 ... 90</td> </tr> </table> </li> <li>- With <math>U_{s \min}</math> ... <math>U_{s \max}</math> <table border="0"> <tr> <td>Closing delay</td> <td>ms</td> <td>40 ... 60</td> </tr> <tr> <td>Opening delay</td> <td>ms</td> <td>80 ... 90</td> </tr> </table> </li> </ul> </li> <li>Solid-state operating mechanism, actuated via A1/A2           <ul style="list-style-type: none"> <li>- With 0.8 x <math>U_{s \min}</math> ... 1.1 x <math>U_{s \max}</math> <table border="0"> <tr> <td>Closing delay</td> <td>ms</td> <td>95 ... 135</td> </tr> <tr> <td>Opening delay</td> <td>ms</td> <td>80 ... 90</td> </tr> </table> </li> <li>- With <math>U_{s \min}</math> ... <math>U_{s \max}</math> <table border="0"> <tr> <td>Closing delay</td> <td>ms</td> <td>100 ... 120</td> </tr> <tr> <td>Opening delay</td> <td>ms</td> <td>80 ... 90</td> </tr> </table> </li> </ul> </li> <li>Arcing time           <table border="0"> <tr> <td></td> <td>ms</td> <td>10 ... 15</td> </tr> </table> </li> </ul>				Closing delay	ms	20 ... 95	Opening delay	ms	40 ... 60	Closing delay	ms	25 ... 50	Opening delay	ms	40 ... 60	Closing delay	ms	35 ... 75	Opening delay	ms	80 ... 90	Closing delay	ms	40 ... 60	Opening delay	ms	80 ... 90	Closing delay	ms	95 ... 135	Opening delay	ms	80 ... 90	Closing delay	ms	100 ... 120	Opening delay	ms	80 ... 90		ms	10 ... 15									
Closing delay	ms	20 ... 95																																																	
Opening delay	ms	40 ... 60																																																	
Closing delay	ms	25 ... 50																																																	
Opening delay	ms	40 ... 60																																																	
Closing delay	ms	35 ... 75																																																	
Opening delay	ms	80 ... 90																																																	
Closing delay	ms	40 ... 60																																																	
Opening delay	ms	80 ... 90																																																	
Closing delay	ms	95 ... 135																																																	
Opening delay	ms	80 ... 90																																																	
Closing delay	ms	100 ... 120																																																	
Opening delay	ms	80 ... 90																																																	
	ms	10 ... 15																																																	

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		3RT10 54 S6	3RT10 55 S6	3RT10 56 S6
<b>Main circuit</b>					
<b>AC capacity</b>					
<b>Utilization category AC-1 Switching resistive loads</b>					
• Rated operational currents $I_e$	At 40 °C up to 690 V	A	160	185	215
	At 60 °C up to 690 V	A	140	160	185
	At 60 °C up to 1000 V	A	80	90	100
• Rated power for AC loads <sup>1)</sup> P.f. = 0.95 (at 60 °C)	At 230 V	kW	53	60	70
	400 V	kW	92	105	121
	500 V	kW	115	131	152
	690 V	kW	159	181	210
	1000 V	kW	131	148	165
• Minimum conductor cross-section for loads with $I_e$	At 40 °C	mm <sup>2</sup>	70	95	95
	At 60 °C	mm <sup>2</sup>	50	70	95
<b>Utilization category AC-2 and AC-3</b>					
• Rated operational currents $I_e$	Up to 500 V	A	115	150	185
	690 V	A	115	150	170
	1000 V	A	53	65	65
• Rated power of slipping or squirrel-cage motors at 50 and 60 Hz	At 230 V	kW	37	50	61
	400 V	kW	64	84	104
	500 V	kW	81	105	132
	690 V	kW	113	146	167
	1000 V	kW	75	90	90
<b>Thermal load capacity</b>	10 s current <sup>2)</sup>	A	1100	1300	1480
<b>Power loss per main current path</b>	At $I_e/AC-3/500$ V	W	7	9	13
<b>Utilization category AC-4 (for <math>I_a = 6 \times I_e</math>)</b>					
• Rated operational current $I_e$	Up to 400 V	A	97	132	160
• Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 400 V	kW	55	75	90
• The following applies to a contact endurance of about 200 000 operating cycles:					
- Rated operational currents $I_e$	Up to 500 V	A	54	68	81
	690 V	A	48	57	65
	1000 V	A	34	38	42
- Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 230 V	kW	16	20	25
	400 V	kW	29	38	45
	500 V	kW	37	47	57
	690 V	kW	48	55	65
	1000 V	kW	49	55	60
<b>Utilization category AC-6a switching AC transformers</b>					
• Rated operational current $I_e$					
- For inrush current n = 20	Up to 690 V	A	115	148	148
- For inrush current n = 30	Up to 690 V	A	90	99	99
• Rating P					
- For inrush current n = 20	At 230 V	kVA	45	58	58
	400 V	kVA	79	102	102
	500 V	kVA	99	128	128
	690 V	kVA	137	176	176
	1000 V	kVA	80	98	117
- For inrush current n = 30	At 230 V	kVA	35	39	39
	400 V	kVA	62	68	68
	500 V	kVA	77	85	85
	690 V	kVA	107	118	118
	1000 V	kVA	80	98	117
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n,30} \cdot 30/x$					
<b>Utilization category AC-6b Switching low-inductance (low-loss, metallized dielectric) AC capacitors</b>					
Ambient temperature 40 °C					
• Rated operational currents $I_e$	Up to 500 V	A	105	125	145
• Rated power for single capacitors or banks of capacitors (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz, 60 Hz	At 230 V	kvar	42	50	58
	400 V	kvar	72	86	100
	500 V	kvar	90	108	125
	690 V	kvar	72	86	100

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".









# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size	3RT10 54 S6	3RT10 55 S6	3RT10 56 S6
<b>Main circuit</b>				
<i>Load rating with DC</i>				
<b>Utilization category DC-1</b>				
<b>Switching resistive load (<math>L/R \leq 1</math> ms)</b>				
• Rated operational current $I_e$ (at 60 °C)				
- 1 conducting path		Up to 24 V A	160	
		60 V A	160	
		110 V A	18	
		220 V A	3.4	
		440 V A	0.8	
		600 V A	0.5	
- 2 conducting paths in series		Up to 24 V A	160	
		60 V A	160	
		110 V A	160	
		220 V A	20	
		440 V A	3.2	
		600 V A	1.6	
- 3 conducting paths in series		Up to 24 V A	160	
		60 V A	160	
		110 V A	160	
		220 V A	160	
		440 V A	11.5	
		600 V A	4	
<b>Utilization category DC-3 and DC-5</b>				
<b>Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>				
• Rated operational current $I_e$ (at 60 °C)				
- 1 conducting path		Up to 24 V A	160	
		60 V A	7.5	
		110 V A	2.5	
		220 V A	0.6	
		440 V A	0.17	
		600 V A	0.12	
- 2 conducting paths in series		Up to 24 V A	160	
		60 V A	160	
		110 V A	160	
		220 V A	2.5	
		440 V A	0.65	
		600 V A	0.37	
- 3 conducting paths in series		Up to 24 V A	160	
		60 V A	160	
		110 V A	160	
		220 V A	160	
		440 V A	1.4	
		600 V A	0.75	
<b>Switching frequency</b>				
<b>Switching frequency z</b> in operating cycles/hour				
• Contactors without overload relays	No-load switching frequency	h <sup>-1</sup>	2000	2000
Dependence of the switching frequency z' on the operational current I' and operational voltage U':				
	AC-1	h <sup>-1</sup>	800	800
	AC-2	h <sup>-1</sup>	400	300
	AC-3	h <sup>-1</sup>	1000	750
	AC-4	h <sup>-1</sup>	130	130
z' = z · (I <sub>e</sub> /I') · (400 V/U') <sup>1.5</sup> · 1/h				
• Contactors with overload relays (mean value)		h <sup>-1</sup>	60	60

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

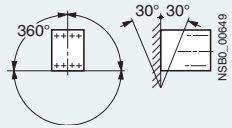
Contactor	Type Size	3RT10 5. S6	
<b>Conductor cross-sections of main conductors with box terminal</b>			
(1 or 2 conductors can be connected)	<b>Main conductors:</b> With 3RT19 55-4G box terminal (55 kW)		 <b>Screw terminals</b>
<b>Front or rear clamping point connected</b>  	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> <li>AWG cables, solid or stranded</li> </ul>	mm <sup>2</sup> 16 ... 70 mm <sup>2</sup> 16 ... 70 mm <sup>2</sup> 16 ... 70 mm Min. 3 x 9 x 0.8, max. 6 x 15.5 x 0.8 AWG 6 ... 2/0	
<b>Both clamping points connected</b> 	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> <li>AWG cables, solid or stranded</li> <li>Terminal screw - Tightening torque</li> </ul>	mm <sup>2</sup> Max. 1 x 50, 1 x 70 mm <sup>2</sup> Max. 1 x 50, 1 x 70 mm <sup>2</sup> max. 2 x 70 mm Max. 2 x (6 x 15.5 x 0.8) AWG Max. 2 x 1/0 Nm M10 (hexagon socket, A/F 4) 10 ... 12 (90 ... 110 lb.in)	
(1 or 2 conductors can be connected)	<b>Main conductors:</b> With 3RT19 56-4G box terminal		
<b>Front or rear clamping point connected</b>  	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> <li>AWG cables, solid or stranded</li> </ul>	mm <sup>2</sup> 16 ... 120 mm <sup>2</sup> 16 ... 120 mm <sup>2</sup> 16 ... 120 mm Min. 3 x 9 x 0.8, max. 10 x 15.5 x 0.8 AWG 6 ... 250 kcmil	
<b>Both clamping points connected</b> 	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> <li>AWG cables, solid or stranded</li> <li>Terminal screw - Tightening torque</li> </ul>	mm <sup>2</sup> Max. 1 x 95, 1 x 120 mm <sup>2</sup> Max. 1 x 95, 1 x 120 mm <sup>2</sup> Max. 2 x 120 mm Max. 2 x (10 x 15.5 x 0.8) AWG Max. 2 x 3/0 Nm M10 (hexagon socket, A/F 4) 10 ... 12 (90 ... 110 lb.in)	
	<b>Main conductors:</b> Without box terminal/busbar connection		
	<ul style="list-style-type: none"> <li>Finely stranded with cable lug<sup>1)</sup></li> <li>Stranded with cable lug<sup>1)</sup></li> <li>AWG cables, solid or stranded</li> <li>Connecting bar (max. width)</li> <li>Terminal screw - Tightening torque</li> </ul>	mm <sup>2</sup> 16 ... 95 mm <sup>2</sup> 25 ... 120 AWG 4 ... 250 kcmil mm 17 Nm M8 x 25 (A/F 13) 10 ... 14 (89 ... 124 lb.in)	
	<b>Auxiliary conductors:</b>		
	<ul style="list-style-type: none"> <li>Solid</li> <li>Finely stranded with end sleeve</li> <li>AWG cables, solid or stranded</li> <li>Terminal screw - Tightening torque</li> </ul>	mm <sup>2</sup> 2 x (0.5 ... 1.5) <sup>2)</sup> ; 2 x (0.75 ... 2.5) <sup>2)</sup> acc. to IEC 60947; max. 2 x (0.75 ... 4) mm <sup>2</sup> 2 x (0.5 ... 1.5) <sup>2)</sup> ; 2 x (0.75 ... 2.5) <sup>2)</sup> AWG 2 x (18 ... 14) Nm M3 (PZ 2) 0.8 ... 1.2 (7 ... 10.3 lb.in)	
	<b>Auxiliary conductors:</b>		 <b>Cage Clamp terminals</b>
	<ul style="list-style-type: none"> <li>Solid</li> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>AWG cables, solid or stranded</li> </ul>	mm <sup>2</sup> 2 x (0.25 ... 2.5) mm <sup>2</sup> 2 x (0.25 ... 1.5) mm <sup>2</sup> 2 x (0.25 ... 2.5) AWG 2 x (24 ... 14)	

For tools for opening Cage Clamp terminals see Catalog LV 1, Chapter 3, Accessories and Spare Parts.  
 Maximum external diameter of the conductor insulation: 3.6 mm.  
 For conductor cross-sections ≤ 1 mm<sup>2</sup> an "insulation stop" must be used, see Catalog LV 1, Chapter 3, "Accessories and Spare Parts".

- When connecting cable lugs to DIN 46235, use 3RT19 56-4EA1 terminal cover for conductor cross-sections from 95 mm<sup>2</sup> to ensure phase spacing.
- 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.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size	3RT10 64 S10	3RT10 65 S10	3RT10 66 S10
<b>General data</b>				
<b>Permissible mounting position</b> The contactors are designed for operation on a vertical mounting surface.				
<b>Mechanical endurance</b>	Operating cycles	10 million		
<b>Electrical endurance</b>		1)		
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	1000		
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	kV	8		
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N	V	690		
<b>Mirror contacts</b> 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		
<b>Permissible ambient temperature</b>	<ul style="list-style-type: none"> <li>• During operation</li> <li>• During storage</li> </ul>	°C	-25 ... +60/+55 with AS-Interface	
		°C	-55 ... +80	
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C			IP00/open, coil assembly IP20	
<b>Touch protection</b> acc. to EN 50274			Finger-safe with cover	
<b>Shock resistance</b>	<ul style="list-style-type: none"> <li>• Rectangular pulse</li> <li>• Sine pulse</li> </ul>	g/ms g/ms	8.5/5 and 4.2/10 13.4/5 and 6.5/10	
<b>Conductor cross-sections</b>			2)	
<b>Electromagnetic compatibility (EMC)</b>			3)	
<b>Short-circuit protection</b>				
<b>Main circuit</b>				
Fuse links, gL/gG				
LV HRC 3NA, DIAZED 5SB, NEOZED 5SE				
acc. to IEC 60947-4-1/				
EN 60947-4-1				
	<ul style="list-style-type: none"> <li>• Type of coordination "1"</li> <li>• Type of coordination "2"</li> <li>• Weld-free<sup>4)</sup></li> </ul>	A A A	500 400 250	
<b>Auxiliary circuit</b>				
<ul style="list-style-type: none"> <li>• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection at <math>I_k \geq 1</math> kA)</li> <li>• Or miniature circuit breakers with C characteristic (short-circuit current <math>I_k &lt; 400</math> A)</li> </ul>				
		A	10	

1) For endurance of the main contacts see page 19.

2) For conductor cross-sections see page 47.

3) For electromagnetic compatibility (EMC) see page 12.

4) Test conditions according to IEC 60947-4-1.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		3RT10 64 S10	3RT10 65 S10	3RT10 66 S10
<b>Control</b>					
<b>Operating range of the solenoid AC/DC (UC)</b>			$0.8 \times U_{s \text{ min}} \dots 1.1 \times U_{s \text{ max}}$		
<b>Power consumption of the solenoid</b> (when coil is cool and rated range $U_{s \text{ min}} \dots U_{s \text{ max}}$ )					
• Conventional operating mechanism					
- AC operation	Closing at $U_{s \text{ min}}$	VA/p.f.	490/0.9		
	Closing at $U_{s \text{ max}}$	VA/p.f.	590/0.9		
	Closed at $U_{s \text{ min}}$	VA/p.f.	5.6/0.9		
	Closed at $U_{s \text{ max}}$	VA/p.f.	6.7/0.9		
- DC operation	Closing at $U_{s \text{ min}}$	W	540		
	Closing at $U_{s \text{ max}}$	W	650		
	Closed at $U_{s \text{ min}}$	W	6.1		
	Closed at $U_{s \text{ max}}$	W	7.4		
• Solid-state operating mechanism					
- AC operation	Closing at $U_{s \text{ min}}$	VA/p.f.	400/0.8		
	Closing at $U_{s \text{ max}}$	VA/p.f.	530/0.8		
	Closed at $U_{s \text{ min}}$	VA/p.f.	4/0.5		
	Closed at $U_{s \text{ max}}$	VA/p.f.	5/0.4		
- DC operation	Closing at $U_{s \text{ min}}$	W	440		
	Closing at $U_{s \text{ max}}$	W	580		
	Closed at $U_{s \text{ min}}$	W	3.2		
	Closed at $U_{s \text{ max}}$	W	3.8		
<b>PLC control input (EN 61131-2/type 2)</b>			24 V DC/≤ 30 mA power consumption, (operating range 17 ... 30 V DC)		
<b>Operating times</b> (Total break time = Opening delay + Arcing time)					
• Conventional operating mechanism					
- With $0.8 \times U_{s \text{ min}} \dots 1.1 \times U_{s \text{ max}}$	Closing delay	ms	30 ... 95		
	Opening delay	ms	40 ... 80		
- For $U_{s \text{ min}} \dots U_{s \text{ max}}$	Closing delay	ms	35 ... 50		
	Opening delay	ms	50 ... 80		
• Solid-state operating mechanism, actuated via A1/A2					
- With $0.8 \times U_{s \text{ min}} \dots 1.1 \times U_{s \text{ max}}$	Closing delay	ms	105 ... 145		
	Opening delay	ms	80 ... 100		
- For $U_{s \text{ min}} \dots U_{s \text{ max}}$	Closing delay	ms	110 ... 130		
	Opening delay	ms	80 ... 100		
• Solid-state operating mechanism, actuated via PLC input					
- With $0.8 \times U_{s \text{ min}} \dots 1.1 \times U_{s \text{ max}}$	Closing delay	ms	45 ... 80		
	Opening delay	ms	80 ... 100		
- For $U_{s \text{ min}} \dots U_{s \text{ max}}$	Closing delay	ms	50 ... 65		
	Opening delay	ms	80 ... 100		
• Arcing time					
		ms	10 ... 15		

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		3RT10 64 S10	3RT10 65 S10	3RT10 66 S10
<b>Main circuit</b>					
<i>AC capacity</i>					
<b>Utilization category AC-1</b>					
<b>Switching resistive loads</b>					
• Rated operational currents $I_e$	At 40 °C up to 690 V	A	275	330	
	At 60 °C up to 690 V	A	250	300	
	At 60 °C up to 1000 V	A	100	150	
• Rated power for AC loads <sup>1)</sup> P.f. = 0.95 (at 60 °C)	At 230 V	kW	94	113	
	400 V	kW	164	197	
	500 V	kW	205	246	
	690 V	kW	283	340	
	1000 V	kW	164	246	
• Minimum conductor cross-section for loads with $I_e$	At 40 °C	mm <sup>2</sup>	150	185	
	At 60 °C	mm <sup>2</sup>	120	185	
<b>Utilization category AC-2 and AC-3</b>					
• Rated operational currents $I_e$	Up to 500 V	A	225	265	300
	690 V	A	225	265	280
	1000 V	A	68	95	95
• Rated power of slipring or squirrel-cage motors at 50 and 60 Hz	At 230 V	kW	73	85	97
	400 V	kW	128	151	171
	500 V	kW	160	189	215
	690 V	kW	223	265	280
	1000 V	kW	90	132	132
<b>Thermal load capacity</b>	10 s current <sup>2)</sup>	A	1800	2400	2400
<b>Power loss per main current path</b>	At $I_e/AC-3/500$ V	W	17	18	22
<b>Utilization category AC-4</b> (for $I_a = 6 \times I_e$ )					
• Rated operational current $I_e$	Up to 400 V	A	195	230	280
• Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 400 V	kW	110	132	160
• The following applies to a contact endurance of about 200 000 operating cycles:					
- Rated operational currents $I_e$	Up to 500 V	A	96	117	125
	690 V	A	85	105	115
	1000 V	A	42	57	57
- Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 230 V	kW	30	37	40
	400 V	kW	54	66	71
	500 V	kW	67	82	87
	690 V	kW	82	102	112
	1000 V	kW	59	80	80
<b>Utilization category AC-6a</b>					
<b>switching AC transformers</b>					
• Rated operational current $I_e$					
- For inrush current n = 20	Up to 690 V	A	227	265	273
- For inrush current n = 30	Up to 690 V	A	151	182	182
• Rated power $P$					
- For inrush current n = 20	At 230 V	kVA	90	105	109
	400 V	kVA	157	183	189
	500 V	kVA	196	229	236
	690 V	kVA	271	317	326
	1000 V	kVA	117	164	164
- For inrush current n = 30	At 230 V	kVA	60	72	72
	400 V	kVA	105	126	126
	500 V	kVA	130	158	158
	690 V	kVA	180	217	217
	1000 V	kVA	117	164	164
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n,30} \cdot 30/x$					
<b>Utilization category AC-6b</b>					
<b>Switching low-inductance (low-loss, metallized dielectric) AC capacitors</b>					
Ambient temperature 40 °C					
• Rated operational currents $I_e$	Up to 500 V	A	183	220	
• Rated power for single capacitors or banks of capacitors (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz, 60 Hz and	At 230 V	kvar	73	88	
	400 V	kvar	127	152	
	500 V	kvar	159	191	
	690 V	kvar	127	152	

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".

# 3RT, 3TB, 3TF Contactors for Switching Motors




## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		3RT10 64 S10	3RT10 65 S10	3RT10 66 S10
<b>Main circuit</b>					
<i>Load rating with DC</i>					
<b>Utilization category DC-1</b>					
<b>Switching resistive load (<math>L/R \leq 1</math> ms)</b>					
• Rated operational current $I_{\theta}$ (at 60 °C)					
- 1 conducting path		Up to 24 V A	200	300	
		60 V A	200	300	
		110 V A	18	33	
		220 V A	3.4	3.8	
		440 V A	0.8	0.9	
		600 V A	0.5	0.6	
- 2 conducting paths in series		Up to 24 V A	200	300	
		60 V A	200	300	
		110 V A	200	300	
		220 V A	20	300	
		440 V A	3.2	4	
		600 V A	1.6	2	
- 3 conducting paths in series		Up to 24 V A	200	300	
		60 V A	200	300	
		110 V A	200	300	
		220 V A	200	300	
		440 V A	11.5	11	
		600 V A	4	5.2	
<b>Utilization category DC-3 and DC-5</b>					
<b>Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>					
• Rated operational current $I_{\theta}$ (at 60 °C)					
- 1 conducting path		Up to 24 V A	200	300	
		60 V A	7.5	11	
		110 V A	2.5	3	
		220 V A	0.6	0.6	
		440 V A	0.17	0.18	
		600 V A	0.12	0.125	
- 2 conducting paths in series		Up to 24 V A	200	300	
		60 V A	200	300	
		110 V A	200	300	
		220 V A	2.5	2.5	
		440 V A	0.65	0.65	
		600 V A	0.37	0.37	
- 3 conducting paths in series		Up to 24 V A	200	300	
		60 V A	200	300	
		110 V A	200	300	
		220 V A	200	300	
		440 V A	1.4	1.4	
		600 V A	0.75	0.75	
<b>Switching frequency</b>					
<b>Switching frequency z</b> in operating cycles/hour					
• Contactors without overload relays	No-load switching frequency	h <sup>-1</sup>	2000	2000	2000
Dependence of the switching frequency z' on the operational current I' and operational voltage U':	AC-1	h <sup>-1</sup>	750	800	750
$z' = z \cdot (I_{\theta}/I') \cdot (400 V/U')^{1.5} \cdot 1/h$	AC-2	h <sup>-1</sup>	250	300	250
	AC-3	h <sup>-1</sup>	500	700	500
	AC-4	h <sup>-1</sup>	130	130	130
• Contactors with overload relays (mean value)		h <sup>-1</sup>	60	60	60



# 3RT, 3TB, 3TF Contactors for Switching Motors

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size	3RT10 6. S10		
<b>Conductor cross-sections</b>				
<b>Front clamping point connected</b>		 <b>Screw terminals</b>		
	<b>Main conductors:</b> With 3RT19 66-4G box terminal <ul style="list-style-type: none"> <li>Finely stranded with end sleeve mm<sup>2</sup></li> <li>Finely stranded without end sleeve mm<sup>2</sup></li> <li>Stranded mm<sup>2</sup></li> <li>AWG cables, solid or stranded AWG</li> <li>Ribbon cable conductors (number x width x thickness) mm</li> </ul>			70 ... 240 70 ... 240 95 ... 300 3/0 ... 600 kcmil Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5
<b>Rear clamping point connected</b>	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve mm<sup>2</sup></li> <li>Finely stranded without end sleeve mm<sup>2</sup></li> <li>Stranded mm<sup>2</sup></li> <li>AWG cables, solid or stranded AWG</li> <li>Ribbon cable conductors (number x width x thickness) mm</li> </ul>			120 ... 185 120 ... 185 120 ... 240 250 ... 500 kcmil Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5
<b>Both clamping points connected</b>	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve mm<sup>2</sup></li> <li>Finely stranded without end sleeve mm<sup>2</sup></li> <li>Stranded mm<sup>2</sup></li> <li>AWG cables, solid or stranded AWG</li> <li>Ribbon cable conductors (number x width x thickness) mm</li> <li>Terminal screws - Tightening torque Nm</li> </ul>	Min. 2 x 50, max. 2 x 185 Min. 2 x 50, max. 2 x 185 Min. 2 x 70, max. 2 x 240 Min. 2 x 2/0, max. 2 x 500 kcmil Max. 2 x (20 x 24 x 0.5) M12 (hexagon socket, A/F 5) 20 ... 22 (180 ... 195 lb.in)		
<b>Main conductors:</b> Without box terminal/ busbar connection		<ul style="list-style-type: none"> <li>Finely stranded with cable lug<sup>1)</sup> mm<sup>2</sup></li> <li>Stranded with cable lug<sup>1)</sup> mm<sup>2</sup></li> <li>AWG cables, solid or stranded AWG</li> <li>Connecting bar (max. width) mm</li> <li>Terminal screws - Tightening torque Nm</li> </ul>		
<b>Auxiliary conductors:</b>		<ul style="list-style-type: none"> <li>Solid mm<sup>2</sup></li> <li>Finely stranded with end sleeve mm<sup>2</sup></li> <li>AWG cables, solid or stranded AWG</li> <li>Terminal screws - Tightening torque Nm</li> </ul>		
<b>Auxiliary conductors:</b>		2 x (0.5 ... 1.5) <sup>2)</sup> ; 2 x (0.75 ... 2.5) <sup>2)</sup> acc. to IEC 60947; max. 2 x (0.75 ... 4) 2 x (0.5 ... 1.5) <sup>2)</sup> ; 2 x (0.75 ... 2.5) <sup>2)</sup> 2 x (18 ... 14) M3 (PZ 2) 0.8 ... 1.2 (7 ... 10.3 lb.in)		
<b>Auxiliary conductors:</b>		 <b>Cage Clamp terminals</b>		
<ul style="list-style-type: none"> <li>Solid mm<sup>2</sup></li> <li>Finely stranded with end sleeve mm<sup>2</sup></li> <li>Finely stranded without end sleeve mm<sup>2</sup></li> <li>AWG cables, solid or stranded AWG</li> </ul>		2 x (0.25 ... 2.5) 2 x (0.25 ... 1.5) 2 x (0.25 ... 2.5) 2 x (24 ... 14)		

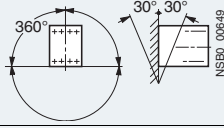
For tools for opening Cage Clamp terminals see Catalog LV 1, Chapter 3, Accessories and Spare Parts.

Maximum external diameter of the conductor insulation: 3.6 mm. For conductor cross-sections ≤ 1 mm<sup>2</sup> an "insulation stop" must be used, see Catalog LV 1, Chapter 3, "Accessories and Spare Parts".

- When connecting cable lugs to DIN 46234, the 3RT19 66-4EA1 terminal cover must be used for conductor cross-sections of 240 mm<sup>2</sup> and more as well as DIN 46235 for conductor cross-sections of 185 mm<sup>2</sup> and more to keep the phase clearance.
- 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.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size	3RT10 75 S12	3RT10 76 S12
<b>General data</b>			
<b>Permissible mounting position</b> The contactors are designed for operation on a vertical mounting surface.			
<b>Mechanical endurance</b>	Operating cycles	10 million	
<b>Electrical endurance</b>		1)	
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	1000	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	kV	8	
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N	V	690	
<b>Mirror contacts</b> 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	
<b>Permissible ambient temperature</b>	<ul style="list-style-type: none"> <li>• During operation</li> <li>• During storage</li> </ul>	°C -25 ... +60/+55 with AS-Interface °C -55 ... +80	
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C		IP00/open, coil assembly IP20	
<b>Touch protection</b> acc. to EN 50274		Finger-safe with cover	
<b>Shock resistance</b>	<ul style="list-style-type: none"> <li>• Rectangular pulse</li> <li>• Sine pulse</li> </ul>	g/ms 8.5/5 and 4.2/10 g/ms 13.4/5 and 6.5/10	
<b>Conductor cross-sections</b>		2)	
<b>Electromagnetic compatibility (EMC)</b>		3)	
<b>Short-circuit protection</b>			
<b>Main circuit</b>			
Fuse links, gL/gG LV HRC 3NA, DIAZED 5SB, NEOZED 5SE acc. to IEC 60947-4-1/ EN 60947-4-1			
	<ul style="list-style-type: none"> <li>• Type of coordination "1"</li> <li>• Type of coordination "2"</li> <li>• Weld-free<sup>4)</sup></li> </ul>	A	630
		A	500
		A	250
			630
			500
			315
<b>Auxiliary circuit</b>			
	<ul style="list-style-type: none"> <li>• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection for <math>I_k \geq 1</math> kA)</li> <li>• Or miniature circuit breakers with C characteristic (short-circuit current <math>I_k &lt; 400</math> A)</li> </ul>	A	10

1) For endurance of the main contacts see page 19.

2) For conductor cross-sections see page 52.

3) For electromagnetic compatibility (EMC) see page 12.

4) Test conditions according to IEC 60947-4-1.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		<b>3RT10 75 S12</b>	<b>3RT10 76 S12</b>																																																
<b>Control</b>																																																				
<b>Operating range of the solenoid AC/DC (UC)</b>			0.8 x $U_{s \min}$ ... 1.1 x $U_{s \max}$																																																	
<b>Power consumption of the solenoid</b> (when coil is cool and rated range $U_{s \min}$ ... $U_{s \max}$ )																																																				
<ul style="list-style-type: none"> <li>Conventional operating mechanism           <ul style="list-style-type: none"> <li>- AC operation               <table border="0"> <tr> <td>Closing at <math>U_{s \min}</math></td> <td>VA/p.f.</td> <td>700/0.9</td> </tr> <tr> <td>Closing at <math>U_{s \max}</math></td> <td>VA/p.f.</td> <td>830/0.9</td> </tr> <tr> <td>Closed at <math>U_{s \min}</math></td> <td>VA/p.f.</td> <td>7.6/0.9</td> </tr> <tr> <td>Closed at <math>U_{s \max}</math></td> <td>VA/p.f.</td> <td>9.2/0.9</td> </tr> </table> </li> <li>- DC operation               <table border="0"> <tr> <td>Closing at <math>U_{s \min}</math></td> <td>W</td> <td>770</td> </tr> <tr> <td>Closing at <math>U_{s \max}</math></td> <td>W</td> <td>920</td> </tr> <tr> <td>Closed at <math>U_{s \min}</math></td> <td>W</td> <td>8.5</td> </tr> <tr> <td>Closed at <math>U_{s \max}</math></td> <td>W</td> <td>10</td> </tr> </table> </li> </ul> </li> <li>Solid-state operating mechanism           <ul style="list-style-type: none"> <li>- AC operation               <table border="0"> <tr> <td>Closing at <math>U_{s \min}</math></td> <td>VA/p.f.</td> <td>560/0.8</td> </tr> <tr> <td>Closing at <math>U_{s \max}</math></td> <td>VA/p.f.</td> <td>750/0.8</td> </tr> <tr> <td>Closed at <math>U_{s \min}</math></td> <td>VA/p.f.</td> <td>5.4/0.8</td> </tr> <tr> <td>Closed at <math>U_{s \max}</math></td> <td>VA/p.f.</td> <td>7/0.8</td> </tr> </table> </li> <li>- DC operation               <table border="0"> <tr> <td>Closing at <math>U_{s \min}</math></td> <td>W</td> <td>600</td> </tr> <tr> <td>Closing at <math>U_{s \max}</math></td> <td>W</td> <td>800</td> </tr> <tr> <td>Closed at <math>U_{s \min}</math></td> <td>W</td> <td>4</td> </tr> <tr> <td>Closed at <math>U_{s \max}</math></td> <td>W</td> <td>5</td> </tr> </table> </li> </ul> </li> </ul>					Closing at $U_{s \min}$	VA/p.f.	700/0.9	Closing at $U_{s \max}$	VA/p.f.	830/0.9	Closed at $U_{s \min}$	VA/p.f.	7.6/0.9	Closed at $U_{s \max}$	VA/p.f.	9.2/0.9	Closing at $U_{s \min}$	W	770	Closing at $U_{s \max}$	W	920	Closed at $U_{s \min}$	W	8.5	Closed at $U_{s \max}$	W	10	Closing at $U_{s \min}$	VA/p.f.	560/0.8	Closing at $U_{s \max}$	VA/p.f.	750/0.8	Closed at $U_{s \min}$	VA/p.f.	5.4/0.8	Closed at $U_{s \max}$	VA/p.f.	7/0.8	Closing at $U_{s \min}$	W	600	Closing at $U_{s \max}$	W	800	Closed at $U_{s \min}$	W	4	Closed at $U_{s \max}$	W	5
Closing at $U_{s \min}$	VA/p.f.	700/0.9																																																		
Closing at $U_{s \max}$	VA/p.f.	830/0.9																																																		
Closed at $U_{s \min}$	VA/p.f.	7.6/0.9																																																		
Closed at $U_{s \max}$	VA/p.f.	9.2/0.9																																																		
Closing at $U_{s \min}$	W	770																																																		
Closing at $U_{s \max}$	W	920																																																		
Closed at $U_{s \min}$	W	8.5																																																		
Closed at $U_{s \max}$	W	10																																																		
Closing at $U_{s \min}$	VA/p.f.	560/0.8																																																		
Closing at $U_{s \max}$	VA/p.f.	750/0.8																																																		
Closed at $U_{s \min}$	VA/p.f.	5.4/0.8																																																		
Closed at $U_{s \max}$	VA/p.f.	7/0.8																																																		
Closing at $U_{s \min}$	W	600																																																		
Closing at $U_{s \max}$	W	800																																																		
Closed at $U_{s \min}$	W	4																																																		
Closed at $U_{s \max}$	W	5																																																		
<b>PLC control input (EN 61131-2/type 2)</b>			24 V DC/≤ 30 mA power consumption, (operating range 17 ... 30 V DC)																																																	
<b>Operating times</b> (Total break time = Opening delay + Arcing time)																																																				
<ul style="list-style-type: none"> <li>Conventional operating mechanism           <ul style="list-style-type: none"> <li>- With 0.8 x <math>U_{s \min}</math> ... 1.1 x <math>U_{s \max}</math> <table border="0"> <tr> <td>Closing delay</td> <td>ms</td> <td>45 ... 100</td> </tr> <tr> <td>Opening delay</td> <td>ms</td> <td>60 ... 100</td> </tr> </table> </li> <li>- For <math>U_{s \min}</math> ... <math>U_{s \max}</math> <table border="0"> <tr> <td>Closing delay</td> <td>ms</td> <td>50 ... 70</td> </tr> <tr> <td>Opening delay</td> <td>ms</td> <td>70 ... 100</td> </tr> </table> </li> </ul> </li> <li>Solid-state operating mechanism, actuated via A1/A2           <ul style="list-style-type: none"> <li>- With 0.8 x <math>U_{s \min}</math> ... 1.1 x <math>U_{s \max}</math> <table border="0"> <tr> <td>Closing delay</td> <td>ms</td> <td>120 ... 150</td> </tr> <tr> <td>Opening delay</td> <td>ms</td> <td>80 ... 100</td> </tr> </table> </li> <li>- For <math>U_{s \min}</math> ... <math>U_{s \max}</math> <table border="0"> <tr> <td>Closing delay</td> <td>ms</td> <td>125 ... 150</td> </tr> <tr> <td>Opening delay</td> <td>ms</td> <td>80 ... 100</td> </tr> </table> </li> </ul> </li> <li>Solid-state operating mechanism, actuated via PLC input           <ul style="list-style-type: none"> <li>- With 0.8 x <math>U_{s \min}</math> ... 1.1 x <math>U_{s \max}</math> <table border="0"> <tr> <td>Closing delay</td> <td>ms</td> <td>60 ... 90</td> </tr> <tr> <td>Opening delay</td> <td>ms</td> <td>80 ... 100</td> </tr> </table> </li> <li>- For <math>U_{s \min}</math> ... <math>U_{s \max}</math> <table border="0"> <tr> <td>Closing delay</td> <td>ms</td> <td>65 ... 80</td> </tr> <tr> <td>Opening delay</td> <td>ms</td> <td>80 ... 100</td> </tr> </table> </li> </ul> </li> <li>Arcing time           <table border="0"> <tr> <td></td> <td>ms</td> <td>10 ... 15</td> </tr> </table> </li> </ul>					Closing delay	ms	45 ... 100	Opening delay	ms	60 ... 100	Closing delay	ms	50 ... 70	Opening delay	ms	70 ... 100	Closing delay	ms	120 ... 150	Opening delay	ms	80 ... 100	Closing delay	ms	125 ... 150	Opening delay	ms	80 ... 100	Closing delay	ms	60 ... 90	Opening delay	ms	80 ... 100	Closing delay	ms	65 ... 80	Opening delay	ms	80 ... 100		ms	10 ... 15									
Closing delay	ms	45 ... 100																																																		
Opening delay	ms	60 ... 100																																																		
Closing delay	ms	50 ... 70																																																		
Opening delay	ms	70 ... 100																																																		
Closing delay	ms	120 ... 150																																																		
Opening delay	ms	80 ... 100																																																		
Closing delay	ms	125 ... 150																																																		
Opening delay	ms	80 ... 100																																																		
Closing delay	ms	60 ... 90																																																		
Opening delay	ms	80 ... 100																																																		
Closing delay	ms	65 ... 80																																																		
Opening delay	ms	80 ... 100																																																		
	ms	10 ... 15																																																		

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		3RT10 75 S12	3RT10 76 S12
<b>Main circuit</b>				
<b>AC capacity</b>				
<b>Utilization category AC-1</b>				
<b>Switching resistive loads</b>				
• Rated operational currents $I_e$	At 40 °C up to 690 V	A	430	610
	At 60 °C up to 690 V	A	400	550
	At 60 °C up to 1000 V	A	200	200
• Rated power for AC loads <sup>1)</sup> P.f. = 0.95 (at 60 °C)	At 230 V	kW	151	208
	400 V	kW	263	362
	500 V	kW	329	452
	690 V	kW	454	624
	1000 V	kW	329	329
• Minimum conductor cross-section for loads with $I_e$	At 40 °C	mm <sup>2</sup>	2 x 150	2 x 185
	At 60 °C	mm <sup>2</sup>	240	2 x 185
<b>Utilization category AC-2 and AC-3</b>				
• Rated operational currents $I_e$	Up to 500 V	A	400	500
	690 V	A	400	450
	1000 V	A	180	180
• Rated power of slipping or squirrel-cage motors at 50 and 60 Hz	At 230 V	kW	132	164
	400 V	kW	231	291
	500 V	kW	291	363
	690 V	kW	400	453
	1000 V	kW	250	250
<b>Thermal load capacity</b>	10 s current <sup>2)</sup>	A	3200	4000
<b>Power loss per main current path</b>	At $I_e/AC-3/500$ V	W	35	55
<b>Utilization category AC-4 (for <math>I_a = 6 \times I_e</math>)</b>				
• Rated operational current $I_e$	Up to 400 V	A	350	430
• Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 400 V	kW	200	250
• The following applies to a contact endurance of about 200 000 operating cycles:				
- Rated operational current $I_e$	Up to 500 V	A	150	175
	690 V	A	135	150
	1000 V	A	80	80
- Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 230 V	kW	48	56
	400 V	kW	85	98
	500 V	kW	105	123
	690 V	kW	133	148
	1000 V	kW	113	113
<b>Utilization category AC-6a switching AC transformers</b>				
• Rated operational current $I_e$				
- For inrush current n = 20	Up to 690 V	A	377	404
- For inrush current n = 30	Up to 690 V	A	251	270
• Rating $P$				
- For inrush current n = 20	At 230 V	kVA	150	161
	400 V	kVA	261	280
	500 V	kVA	326	350
	690 V	kVA	450	483
	1000 V	kVA	311	311
- For inrush current n = 30	At 230 V	kVA	100	107
	400 V	kVA	173	187
	500 V	kVA	217	234
	690 V	kVA	300	323
	1000 V	kVA	311	311
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n,30} \cdot 30/x$				
<b>Utilization category AC-6b</b>				
<b>Switching low-inductance (low-loss, metallized dielectric) AC capacitors</b>				
Ambient temperature 40 °C				
• Rated operational currents $I_e$	Up to 500 V	A	287	407
• Rated power for single capacitors or banks of capacitors (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz, 60 Hz and	At 230 V	kvar	114	162
	400 V	kvar	199	282
	500 V	kvar	248	352
	690 V	kvar	199	282

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

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


# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size	3RT10 75 S12	3RT10 76 S12
<b>Main circuit</b>			
<i>Load rating with DC</i>			
<b>Utilization category DC-1</b>			
<b>Switching resistive load (<math>L/R \leq 1</math> ms)</b>			
• Rated operational current $I_e$ (at 60 °C)			
- 1 conducting path		Up to 24 V A 400 60 V A 330 110 V A 33 220 V A 3.8 440 V A 0.9 600 V A 0.6	
- 2 conducting paths in series		Up to 24 V A 400 60 V A 400 110 V A 400 220 V A 400 440 V A 4 600 V A 2	
- 3 conducting paths in series		Up to 24 V A 400 60 V A 400 110 V A 400 220 V A 400 440 V A 11 600 V A 5.2	
<b>Utilization category DC-3 and DC-5</b>			
<b>Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>			
• Rated operational current $I_e$ (at 60 °C)			
- 1 conducting path		Up to 24 V A 400 60 V A 11 110 V A 3 220 V A 0.6 440 V A 0.18 600 V A 0.125	
- 2 conducting paths in series		Up to 24 V A 400 60 V A 400 110 V A 400 220 V A 2.5 440 V A 0.65 600 V A 0.37	
- 3 conducting paths in series		Up to 24 V A 400 60 V A 400 110 V A 400 220 V A 400 440 V A 1.4 600 V A 0.75	
<i>Switching frequency</i>			
<b>Switching frequency <math>z</math></b> in operating cycles/hour			
• Contactors without overload relays	No-load switching frequency	h <sup>-1</sup> 2000	2000
Dependence of the switching frequency $z'$ on the operational current $I'$ and operational voltage $U'$ :	AC-1	h <sup>-1</sup> 700	500
$z' = z \cdot (I_e/I') \cdot (400 V/U')^{1.5} \cdot 1/h$	AC-2	h <sup>-1</sup> 200	170
	AC-3	h <sup>-1</sup> 500	420
	AC-4	h <sup>-1</sup> 130	130
• Contactors with overload relays (mean value)		h <sup>-1</sup> 60	60

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size	3RT10 7. S12	
<b>Conductor cross-sections</b>			
<b>Front clamping point connected</b>		<b>Main conductors:</b> With 3RT19 66-4G box terminal	<b>Screw terminals</b>
		<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>AWG cables, solid or stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> </ul>	<ul style="list-style-type: none"> <li>70 ... 240</li> <li>70 ... 240</li> <li>95 ... 300</li> <li>3/0 ... 600 kcmil</li> <li>Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5</li> </ul>
<b>Rear clamping point connected</b>		<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>AWG cables, solid or stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> </ul>	<ul style="list-style-type: none"> <li>120 ... 185</li> <li>120 ... 185</li> <li>120 ... 240</li> <li>250 ... 500 kcmil</li> <li>Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5</li> </ul>
<b>Both clamping points connected</b>		<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>AWG cables, solid or stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> <li>Terminal screws</li> <li>- Tightening torque</li> </ul>	<ul style="list-style-type: none"> <li>Min. 2 x 50, max. 2 x 185</li> <li>Min. 2 x 50, max. 2 x 185</li> <li>Min. 2 x 70, max. 2 x 240</li> <li>Min. 2 x 2/0, max. 2 x 500 kcmil</li> <li>Max. 2 x (20 x 24 x 0.5)</li> <li>M12 (hexagon socket, A/F 5)</li> <li>20 ... 22 (180 ... 195 lb.in)</li> </ul>
<b>Main conductors:</b> Without box terminal/ busbar connection			
		<ul style="list-style-type: none"> <li>Finely stranded with cable lug<sup>1)</sup></li> <li>Stranded with cable lug<sup>1)</sup></li> <li>AWG cables, solid or stranded</li> <li>Connecting bar (max. width)</li> <li>Terminal screws</li> <li>- Tightening torque</li> </ul>	<ul style="list-style-type: none"> <li>50 ... 240</li> <li>70 ... 240</li> <li>2/0 ... 500 kcmil</li> <li>25</li> <li>M10 x 30 (A/F 17)</li> <li>14 ... 24 (124 ... 210 lb.in)</li> </ul>
<b>Auxiliary conductors:</b>			
		<ul style="list-style-type: none"> <li>Solid</li> <li>Finely stranded with end sleeve</li> <li>AWG cables, solid or stranded</li> <li>Terminal screws</li> <li>- Tightening torque</li> </ul>	<ul style="list-style-type: none"> <li>2 x (0.5 ... 1.5)<sup>2)</sup>; 2 x (0.75 ... 2.5)<sup>2)</sup> acc. to IEC 60947; max. 2 x (0.75 ... 4)</li> <li>2 x (0.5 ... 1.5)<sup>2)</sup>; 2 x (0.75 ... 2.5)<sup>2)</sup></li> <li>2 x (18 ... 14)</li> <li>M3 (PZ 2)</li> <li>0.8 ... 1.2 (7 ... 10.3 lb.in)</li> </ul>
<b>Auxiliary conductors:</b>			
		<ul style="list-style-type: none"> <li>Solid</li> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>AWG cables, solid or stranded</li> </ul>	<ul style="list-style-type: none"> <li>2 x (0.25 ... 2.5)</li> <li>2 x (0.25 ... 1.5)</li> <li>2 x (0.25 ... 2.5)</li> <li>2 x (24 ... 14)</li> </ul>

For tools for opening Cage Clamp terminals see Catalog LV 1, Chapter 3, Accessories and Spare Parts.

Maximum external diameter of the conductor insulation: 3.6 mm.  
For conductor cross-sections  $\leq 1 \text{ mm}^2$  an "insulation stop" must be used, see Catalog LV 1, Chapter 3, "Accessories and Spare Parts".

- 1) When connecting cable lugs according to DIN 46234 for conductor cross-sections of 185 mm<sup>2</sup> and more and according to DIN 46235 for conductor cross-sections of 240 mm<sup>2</sup> and more, the 3RT19 66-4EA1 terminal cover must be used 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.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		3RT10 15 S00	3RT10 16 S00	3RT10 17 S00	3RT10 23 S0	3RT10 24 S0	3RT10 25 S0	3RT10 26 S0
<b>and ratings</b>									
<b>Rated insulation voltage</b>		V AC	600			600			
<b>Uninterrupted current</b> , at 40 °C	• Open and enclosed	A	20			35			
<b>Maximum horsepower ratings</b> (and approved values)									
• Rated power for induction motors at 60 Hz		At 200 V hp	1.5	2	3	2	3	5	7.5
		230 V hp	2	3	3	3	3	5	7.5
		460 V hp	3	5	7.5	5	7.5	10	15
		575 V hp	5	7.5	10	7.5	10	15	20
<b>Short-circuit protection<sup>1)</sup></b> (contactor or overload relay)	• CLASS RK5 fuse	At 600 V kA	5	5	5	5	5	5	5
	• Circuit breakers with overload protection acc. to UL 489	A	60	60	60	70	70	70	100
		A	50	50	50	70	70	70	100
• Combination motor controllers type E acc. to UL 508									
	- At 480 V	Type	--	--	--	3RV10 2			
		A	--	--	--	8	10	16	22
		kA	--	--	--	65	65	65	65
	- At 600 V	Type	--	--	--	3RV10 2			
		A	--	--	--	8	10	12.5	12.5
		kA	--	--	--	25	25	25	25
<b>NEMA/EEMAC ratings</b>									
NEMA/EEMAC size		hp	--		0	--			1
• Uninterrupted current	- Open	A	--		18	--			27
	- Enclosed	A	--		18	--			27
• Rated power for induction motors at 60 Hz		At 200 V hp	--		3	--			7.5
		230 V hp	--		3	--			7.5
		460 V hp	--		5	--			10
		575 V hp	--		5	--			10
<b>Overload relay</b>	• Type		3RU11 16			3RU11 2			
	• Setting range	A	0.11 ... 12			1.8 ... 25			

Contactors	Type Size		3RT10 34 S2	3RT10 35 S2	3RT10 36 S2	3RT10 44 S3	3RT10 45 S3	3RT10 46 S3
<b>and ratings</b>								
<b>Rated insulation voltage</b>		V AC	600			600		
<b>Uninterrupted current</b> , at 40 °C	• Open and enclosed	A	45	55	50	90	105	105
<b>Maximum horsepower ratings</b> (and approved values)								
• Rated power for induction motors at 60 Hz		At 200 V hp	10	10	15	20	25	30
		230 V hp	10	15	15	25	30	30
		460 V hp	25	30	40	50	60	75
		575 V hp	30	40	50	60	75	100
<b>Short-circuit protection<sup>1)</sup></b> (contactor or overload relay)	• CLASS RK5 fuse	At 600 V kA	5	5	5	10	10	10
	• Circuit breakers with overload protection acc. to UL 489	A	125	150	200	250	300	350
		A	125	150	200	250	300	400
• Combination motor controllers type E acc. to UL 508								
	- At 480 V	Type	3RV10 3			3RV10 4		
		A	32	40	50	63	75	100
		kA	65	65	65	65	65	65
	- At 600 V	Type	3RV10 4			3RV10 4		
		A	32	40	50	63	75	75
		kA	25	25	25	30	30	30
<b>NEMA/EEMAC ratings</b>								
NEMA/EEMAC size		hp	--		2	--		3
• Uninterrupted current	- Open	A	--		45	--		90
	- Enclosed	A	--		45	--		90
• Rated power for induction motors with 60 Hz		At 200 V hp	--		10	--		25
		230 V hp	--		15	--		30
		460 V hp	--		25	--		50
		575 V hp	--		25	--		50
<b>Overload relay</b>	• Type		3RU11 3			3RU11 4		
	• Setting range	A	5.5 ... 50			18 ... 100		

1) For more information about short-circuit values, e. g. for protection against short-circuit currents, see the UL guides (Order No.: A5E02118883 for German) or UL reports (<http://www.siemens.com/lowvoltage/ul-europe>) for the individual devices.

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Size	S00 Screw terminals and Cage Clamp terminals	S0 ... S12 Screw terminals and Cage Clamp terminals	Screw terminals and Cage Clamp terminals
		Integrated or snap-on auxiliary switch block	1- and 4-pole snap-on auxiliary switch block	Laterally mountable auxiliary switch block
<b>UL and IEC ratings of the auxiliary contacts</b>				
Rated voltage	V AC	600	600	600
Switching capacity		A 600, Q 600	A 600, Q 600	A 300, Q 300
	• Uninterrupted current at 240 V AC	A	10	10

Contactor	Type Size	3RT10 54 S6	3RT10 55 S6	3RT10 56 S6	3RT10 64 S10	3RT10 65 S10	3RT10 66 S10
<b>UL and IEC ratings</b>							
Rated insulation voltage	V AC	600			600		
Uninterrupted current, at 40 °C	• Open and enclosed	A	140	195	195	250	330
<b>Maximum horsepower ratings</b> (UL and IEC approved values)							
• Rated power for induction motors at 60 Hz		At 200 V hp	40	50	60	60	75
		230 V hp	50	60	75	75	100
		460 V hp	100	125	150	150	200
		575 V hp	125	150	200	200	250
		At 600 V kA	10	10	10	10	18
	• CLASS RK5/L fuse	A	450	500	500	700	800
	• Circuit breakers with overload protection acc. to UL 489	A	350	450	500	500	700
<b>NEMA/EEMAC ratings</b>							
NEMA/EEMAC size		hp	--	4	--	--	5
• Uninterrupted current	- Open	A	--	150	--	--	300
	- Enclosed	A	--	135	--	--	270
• Rated power for induction motors with 60 Hz		At 200 V hp	--	40	--	--	75
		230 V hp	--	50	--	--	100
		460 V hp	--	100	--	--	200
		575 V hp	--	100	--	--	200
Overload relay	• Type		3RB20 56			3RB20 66	

Contactor	Type Size	3RT10 75 S12	3RT10 76 S12
<b>UL and IEC ratings</b>			
Rated insulation voltage	V AC	600	
Uninterrupted current, at 40 °C	• Open and enclosed	A	400
<b>Maximum horsepower ratings</b> (UL and IEC approved values)			
• Rated power for induction motors at 60 Hz		At 200 V hp	125
		230 V hp	150
		460 V hp	300
		575 V hp	400
		At 600 V kA	18
	• CLASS L fuse	A	1000
	• Circuit breakers with overload pro- tection acc. to UL 489	A	900
<b>NEMA/EEMAC ratings</b>			
NEMA/EEMAC size		hp	--
• Uninterrupted current	- Open	A	--
	- Enclosed	A	--
• Rated power for induction motors at 60 Hz		At 200 V hp	--
		230 V hp	--
		460 V hp	--
		575 V hp	--
Overload relay	• Type		3RB20 66

1) For more information about short-circuit values, e. g. for protection against short-circuit currents, see the UL guide (Order No.: A5E02118883 for German) or UL reports (<http://www.siemens.com/lowvoltage/ul-europe>) for the individual devices.



### Overview

- 3RT12 vacuum contactors for switching motors

### Operating mechanism types

Two types of solenoid operation are available:

- Conventional operating mechanism, version 3RT12...A
- Solid-state operating mechanism, version 3RT12...N

### UC operation

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

### Withdrawable coils

For simple coil replacement, e. g. if the application is replaced, the magnetic 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.

### Auxiliary contact complement

The contactors can be fitted with up to 8 lateral auxiliary contacts (identical auxiliary switch blocks from S0 to S12). Of these, no more than 4 are permitted to be NC contacts.

### Function

#### 3RT12 vacuum contactors

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, for example in crane control systems.

#### Advantages:

- Very long electrical endurance
- High short-time loading capacity for heavy starting
- No reduction of rated operational currents up to 1000 V
- No open arcs, no arcing gases, i. e. no minimum clearances from grounded parts required either
- Longer maintenance intervals
- Increased plant availability

#### Notes on operation:

- *Switching motors with operational voltages  $U_e > 500$  V: To damp overvoltages and protect the motor coil insulation against reignition when switching off induction motors, it is recommended to connect the 3RT19 66-1PV surge suppression module – RC varistor – to the outgoing side (2/T1, 4/T2, 6/T3) of the contactors (accessory). This additional equipment is not required for use in circuits with converters. It could be destroyed by the voltage peaks and harmonics which are generated.*
- *Switching DC voltage: Vacuum contactors are basically unsuitable for switching DC voltage.*

### Contactors with conventional operating mechanism

#### 3RT1...-A version:

The magnetic coil is switched directly on and off with the control supply voltage  $U_s$  by way of terminals A1/A2.

#### Multi-voltage range for the control supply voltage $U_s$ :

Several closely adjacent control supply voltages, available around the world, are covered by just one coil, for example 110-115-120-127 V AC/DC or 220-230-240 V AC/DC.

In addition, allowance is also made for a coil operating range of 0.8 times the lower ( $U_{s\ min}$ ) and 1.1 times the upper ( $U_{s\ max}$ ) rated control supply voltage within which the contactor switches reliably and no thermal overloading occurs.

### Contactors with solid-state operating mechanism

The magnetic coil is supplied selectively with the power required for reliable switching and holding by upstream control electronics.

- **Wide voltage range for the control supply voltage  $U_s$ :**  
Compared with the conventional operating mechanism, the solid-state operating mechanism covers an even broader range of control supply voltages used worldwide within one coil variant. For example, the coil for 200 to 277 V UC ( $U_{s\ min}$  to  $U_{s\ max}$ ) covers the voltages 200-208-220-230-240-254-277 V used worldwide.
- **Extended operating range  $0.7$  to  $1.25 \times U_s$ :**  
The wide range of the rated control supply voltage and the additional coil operating range of  $0.8 \times U_{s\ min}$  to  $1.1 \times U_{s\ max}$  results in an extended coil tolerance of at least  $0.7$  to  $1.25 \times U_s$  for the most common control supply voltages 24, 110 and 230 V for which the contactors operate reliably.
- **Bridging temporary voltage dips:**  
Control voltage failures dipping to 0 V (at A1/A2) are bridged for up to approx. 25 ms to avoid unintentional tripping.
- **Defined ON and OFF thresholds:**  
For voltages of  $\geq 0.8 \times U_{s\ min}$  and higher, the electronics will reliably switch the contactors on and off  $\leq 0.5 \times U_{s\ min}$ . The hysteresis in the switching thresholds prevents the main contacts from chattering as well as increased wear or welding when operated in weak, unstable networks. This also prevents thermal overloading of the contactor coil if the voltage applied is too low (contactor does not close properly and is continuously operated with overexcitation).
- **Low control power consumption when closing and in the closed state.**

### Electromagnetic compatibility (EMC)

The contactors with solid-state operating mechanism conform to the requirements for operation in industrial plants.

- **Interference immunity**
  - Burst (IEC 61000-4-4): 4 kV
  - Surge (IEC 61000-4-5): 4 kV
  - Electrostatic discharge, ESD (IEC 61000-4-2): 8/15 kV
  - Electromagnetic field (IEC 61000-4-3): 10 V/m
- **Emitted interference**
  - Limit value class A according to EN 55011

#### Note:

*In connection with converters, the control cables must be routed separately from the load cables to the converter.*

# 3RT, 3TB, 3TF Contactors for Switching Motors

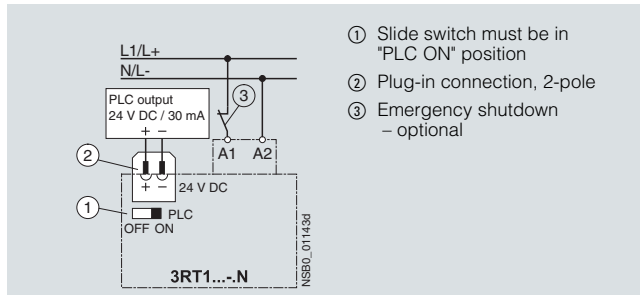
## 3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

### 3RT1...-N version: for 24 V DC PLC output

#### 2 control options:

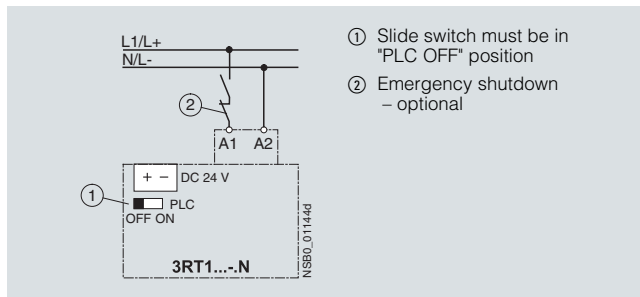
- Control without a coupling link directly through a 24 V DC  $\geq 30$  mA PLC output (EN 61131-2). Connection by means of 2-pole plug-in connection. The screwless spring-type connection is part of the scope of supply. The control supply voltage which supplies the solenoid operating mechanism must be connected to A1/A2.

*Note: Before start-up, the slide switch for PLC operation must be moved to the "PLC ON" position (setting ex works: "PLC OFF").*



- Conventional control by applying the control supply voltage at A1/A2 through a switching contact.

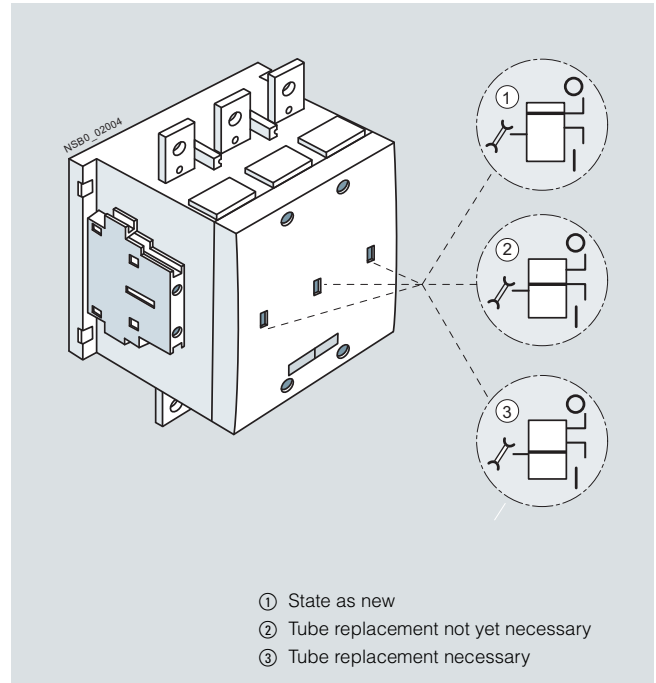
*Note: The slide switch must be in the "PLC OFF" position (= setting ex works).*



### Vacuum contactors S10 and S12 contact erosion indication

If the contact erosion indicator on the contactor head part indicates an excessive erosion of the vacuum contact tubes (indicating line is on level with the tool symbol), the tubes must be replaced.

To ensure greater reliability, it is recommended to replace all 3 contact tubes.



## Technical specifications

Contactors	Type	3RT12 64 S10	3RT12 65 S10	3RT12 66 S10
	Size			
<b>General data</b>				
<b>Permissible mounting position</b> The contactors are designed for operation on a vertical mounting surface.				
<b>Mechanical endurance</b>	Operating cycles	10 million		
<b>Electrical endurance</b>		1)		
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	1000		
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	kV	8		
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N	V	690		
<b>Mirror contacts</b> 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		
<b>Permissible ambient temperature</b>	<ul style="list-style-type: none"> <li>During operation</li> <li>During storage</li> </ul>	°C °C	-25 ... +60/+55 with AS-Interface -55 ... +80	
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C		IP00/open, coil assembly IP20		
<b>Touch protection</b> acc. to EN 50274		Finger-safe with cover		
<b>Shock resistance</b>	<ul style="list-style-type: none"> <li>Rectangular pulse</li> <li>Sine pulse</li> </ul>	g/ms g/ms	8.5/5 and 4.2/10 13.4/5 and 6.5/10	
<b>Conductor cross-sections</b>		2)		
<b>Electromagnetic compatibility (EMC)</b>		3)		

1) For endurance of the main contacts see page 19.

2) For conductor cross-sections see page 59.

3) For electromagnetic compatibility (EMC) see page 12.

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

Contactors	Type Size	3RT12 64 S10	3RT12 65 S10	3RT12 66 S10
<b>Short-circuit protection</b>				
<b>Main circuit</b>				
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"	A	500	
	• Type of coordination "2"	A	500	
	• Weld-free <sup>1)</sup>	A	400	
<b>Auxiliary circuit</b>				
	• Fuse links gL/gG	A	10	
DIAZED 5SB, NEOZED 5SE				
(weld-free protection for $I_k \geq 1$ kA)				
• Or miniature circuit breakers with C characteristic				
(short-circuit current $I_k$ 400 A)				

1) Test conditions according to IEC 60947-4-1.

Contactors	Type Size	3RT12 64 S10	3RT12 65 S10	3RT12 66 S10
<b>Control</b>				
<b>Operating range of the solenoid AC/DC (UC)</b>				
$0.8 \times U_{s \text{ min}} \dots 1.1 \times U_{s \text{ max}}$				
<b>Power consumption of the solenoid</b>				
(when coil is cool and rated range $U_{s \text{ min}} \dots U_{s \text{ max}}$ )				
• Conventional operating mechanism				
- AC operation	Closing at $U_{s \text{ min}}$	VA/p.f.	530/0.9	
	Closing at $U_{s \text{ max}}$	VA/p.f.	630/0.9	
	Closed at $U_{s \text{ min}}$	VA/p.f.	6.1/0.9	
	Closed at $U_{s \text{ max}}$	VA/p.f.	7.4/0.9	
- DC operation	Closing at $U_{s \text{ min}}$	W	580	
	Closing at $U_{s \text{ max}}$	W	700	
	Closed at $U_{s \text{ min}}$	W	6.8	
	Closed at $U_{s \text{ max}}$	W	8.2	
• Solid-state operating mechanism				
- AC operation	Closing at $U_{s \text{ min}}$	VA/p.f.	420/0.8	
	Closing at $U_{s \text{ max}}$	VA/p.f.	570/0.8	
	Closed at $U_{s \text{ min}}$	VA/p.f.	4.3/0.8	
	Closed at $U_{s \text{ max}}$	VA/p.f.	5.6/0.8	
- DC operation	Closing at $U_{s \text{ min}}$	W	460	
	Closing at $U_{s \text{ max}}$	W	630	
	Closed at $U_{s \text{ min}}$	W	3.4	
	Closed at $U_{s \text{ max}}$	W	4.2	
<b>PLC control input (EN 61131-2/type 2)</b>				
24 V DC/≤ 30 mA power consumption, (operating range 17 ... 30 V DC)				
<b>Operating times (Total break time = Opening delay + Arcing time)</b>				
• Conventional operating mechanism				
- With $0.8 \times U_{s \text{ min}} \dots 1.1 \times U_{s \text{ max}}$	Closing delay	ms	30 ... 95	
	Opening delay	ms	40 ... 80	
- For $U_{s \text{ min}} \dots U_{s \text{ max}}$	Closing delay	ms	35 ... 50	
	Opening delay	ms	50 ... 80	
• Solid-state operating mechanism, actuated via A1/A2				
- With $0.8 \times U_{s \text{ min}} \dots 1.1 \times U_{s \text{ max}}$	Closing delay	ms	105 ... 145	
	Opening delay	ms	80 ... 100	
- For $U_{s \text{ min}} \dots U_{s \text{ max}}$	Closing delay	ms	110 ... 130	
	Opening delay	ms	80 ... 100	
• Solid-state operating mechanism, actuated via PLC input				
- With $0.8 \times U_{s \text{ min}} \dots 1.1 \times U_{s \text{ max}}$	Closing delay	ms	45 ... 80	
	Opening delay	ms	80 ... 100	
- For $U_{s \text{ min}} \dots U_{s \text{ max}}$	Closing delay	ms	50 ... 65	
	Opening delay	ms	80 ... 100	
• Arcing time				
		ms	10 ... 15	

# 3RT, 3TB, 3TF Contactors for Switching Motors

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





Contactors	Type Size	3RT12 64 S10	3RT12 65 S10	3RT12 66 S10
<b>Main circuit</b>				
<b>AC capacity</b>				
<b>Utilization category AC-1</b>				
<b>Switching resistive loads</b>				
• Rated operational currents $I_e$	At 40 °C up to 1000 V A At 60 °C up to 1000 V A	330 300		
• Rated power for AC loads <sup>1)</sup> P.f. = 0.95 (at 60 °C)	At 230 V kW 400 V kW 500 V kW 690 V kW 1000 V kW	113 197 246 340 492		
• Minimum conductor cross-section for loads with $I_e$	At 40 °C mm <sup>2</sup> At 60 °C mm <sup>2</sup>	185 185		
<b>Utilization category AC-2 and AC-3</b>				
• Rated operational currents $I_e$	Up to 1000 V A	225	265	300
• Rated power for slipping or squirrel-cage motors at 50 and 60 Hz	At 230 V kW 400 V kW 500 V kW 690 V kW 1000 V kW	73 128 160 223 320	85 151 189 265 378	97 171 215 288 428
<b>Thermal load capacity</b>	10 s current <sup>2)</sup> A	1800	2120	2400
<b>Power loss per conducting path</b>	At $I_e$ /AC-3 W	9	12	14
<b>Utilization category AC-4 (for <math>I_a = 6 \times I_e</math>)</b>				
• Rated operational current $I_e$	Up to 690 V A	195	230	280
• Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 400 V kW	110	132	160
• The following applies to a contact endurance of about 200 000 operating cycles:				
- Rated operational currents $I_e$	Up to 690 V A 1000 V A	97 68	115 81	140 98
- Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 230 V kW 400 V kW 500 V kW 690 V kW 1000 V kW	30 55 68 94 95	37 65 81 112 114	45 79 98 138 140
<b>Utilization category AC-6a</b>				
<b>Switching AC transformers</b>				
Rated operational current $I_e$				
• For inrush current n = 20	Up to 690 V A	278		
• For inrush current n = 30	Up to 690 V A	185		
Rating P				
• For inrush current n = 20	At 230 V kVA 400 V kVA 500 V kVA 690 V kVA 1000 V kVA	111 193 241 332 482		
• For inrush current n = 30	At 230 V kVA 400 V kVA 500 V kVA 690 V kVA 1000 V kVA	74 128 160 221 320		
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n30} \cdot 30/x$				
<b>Utilization category AC-6b</b>				
<b>Switching low-inductance (low-loss, metallized dielectric) AC capacitors</b>				
Ambient temperature 40 °C				
• Rated operational currents $I_e$	Up to 500 V A	220		
• Rated power for single capacitors or banks of capacitors (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz, 60 Hz and	At 230 V kvar 400 V kvar 500 V kvar 690 V kvar	88 152 191 152		
<b>Switching frequency</b>				
<b>Switching frequency z</b> in operating cycles/hour				
• Contactors without overload relays	No-load switching frequency h <sup>-1</sup>	2000	2000	
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 <sup>-1</sup> AC-2 h <sup>-1</sup> AC-3 h <sup>-1</sup> AC-4 h <sup>-1</sup>	800 300 750 250	750 250 750 250	
• Contactors with overload relays (mean value)	h <sup>-1</sup>	60	60	

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

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

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

Contactors	Type Size	<b>3RT12 6. S10</b>	
<b>Main conductor cross-sections</b>			
<b>Front clamping point connected</b> 	<b>Main conductors:</b> With 3RT19 66-4G box terminal		 <b>Screw terminals</b>
	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>AWG cables, solid or stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> </ul>	mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> mm	
<b>Rear clamping point connected</b> 	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>AWG cables, solid or stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> </ul>		mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> mm Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5
	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>AWG cables, solid or stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> <li>Terminal screws - Tightening torque</li> </ul>		mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> mm Nm Min. 2 x 50, max. 2 x 185 Min. 2 x 50, max. 2 x 185 Min. 2 x 70, max. 2 x 240 Min. 2 x 1/0, max. 2 x 500 kcmil Max. 2 x (20 x 24 x 0.5) M12 (hexagon socket, A/F 5) 20 ... 22 (180 ... 195 lb.in)
<b>Both clamping points connected</b> 	<b>Main conductors:</b> Without box terminal/ busbar connection		mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> mm Nm M12 (hexagon socket, A/F 5) 14 ... 24 (124 ... 210 lb.in)
	<ul style="list-style-type: none"> <li>Finely stranded with cable lug<sup>1)</sup></li> <li>Stranded with cable lug<sup>1)</sup></li> <li>AWG cables, solid or stranded</li> <li>Connecting bar (max. width)</li> <li>Terminal screws - Tightening torque</li> </ul>	mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> mm Nm 50 ...240 70 ...240 2/0 ...500 kcmil 25 M12 (hexagon socket, A/F 5) 14 ... 24 (124 ... 210 lb.in)	
<b>Auxiliary conductors:</b>		<ul style="list-style-type: none"> <li>Solid</li> <li>Finely stranded with end sleeve</li> <li>AWG cables, solid or stranded</li> <li>Terminal screws - Tightening torque</li> </ul>	mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> Nm 2 x (0.5 ... 1.5) <sup>2)</sup> ; 2 x (0.75 ... 2.5) <sup>2)</sup> acc. to IEC 60947; max. 2 x (0.75 ... 4) 2 x (0.5 ... 1.5) <sup>2)</sup> ; 2 x (0.75 ... 2.5) <sup>2)</sup> 2 x (18 ... 14) M3 (PZ 2) 0.8 ... 1.2 (7 ... 10.3 lb.in)

1) When connecting cable lugs according to DIN 46234 for conductor cross-sections of 185 mm<sup>2</sup> and more and according to DIN 46235 for conductor cross-sections of 240 mm<sup>2</sup> and more, the 3RT19 66-4EA1 terminal cover must be used 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.

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

Contactor	Type Size		3RT12 75 S12	3RT12 76 S12
<b>General data</b>				
<b>Permissible mounting position</b> The contactors are designed for operation on a vertical mounting surface.				
<b>Mechanical endurance</b>			Operating cycles	10 million
<b>Electrical endurance</b>				1)
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)			V	1000
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>			kV	8
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N			V	690
<b>Mirror contacts</b> 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
<b>Permissible ambient temperature</b>			°C	-25 ... +60/+55 with AS-Interface
			°C	-55 ... +80
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C				IP00/open, coil assembly IP20
<b>Touch protection</b> acc. to EN 50274				Finger-safe with cover
<b>Shock resistance</b>			g/ms	8.5/5 and 4.2/10
			g/ms	13.4/5 and 6.5/10
<b>Conductor cross-sections</b>				2)
<b>Electromagnetic compatibility (EMC)</b>				3)
<b>Short-circuit protection</b>				
<b>Main circuit</b>				
Fuse links, gL/gG				
LV HRC 3NA, DIAZED 5SB, NEOZED 5SE				
acc. to IEC 60947-4-1/			• Type of coordination "1"	A
EN 60947-4			• Type of coordination "2"	A
			• Weld-free <sup>4)</sup>	A
				800
				800
				500
<b>Auxiliary circuit</b>				
• Fuse links gL/gG			A	10
DIAZED 5SB, NEOZED 5SE				
(weld-free protection for $I_k \geq 1$ kA)				
• Or miniature circuit breakers with C characteristic				
(short-circuit current $I_k < 400$ A)				

1) See endurance of the main contacts on page 19.

2) See conductor cross-sections on page 63.

3) See Electromagnetic Compatibility (EMC) on page 12.

4) Test conditions according to IEC 60947-4-1.

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

Contactors	Type Size		<b>3RT12 75 S12</b>	<b>3RT12 76 S12</b>
<b>Control</b>				
<b>Operating range of the solenoid</b>	AC/DC (UC)		0.8 x $U_{s \min}$ ... 1.1 x $U_{s \max}$	
<b>Power consumption of the solenoid</b> (when coil is cool and rated range $U_{s \min}$ ... $U_{s \max}$ )				
• Conventional operating mechanism				
- AC operation	Closing at $U_{s \min}$	VA/p.f.	700/0.9	
	Closing at $U_{s \max}$	VA/p.f.	830/0.9	
	Closed at $U_{s \min}$	VA/p.f.	7.6/0.9	
	Closed at $U_{s \max}$	VA/p.f.	9.2/0.9	
- DC operation	Closing at $U_{s \min}$	W	770	
	Closing at $U_{s \max}$	W	920	
	Closed at $U_{s \min}$	W	8.5	
	Closed at $U_{s \max}$	W	10	
• Solid-state operating mechanism				
- AC operation	Closing at $U_{s \min}$	VA/p.f.	560/0.8	
	Closing at $U_{s \max}$	VA/p.f.	750/0.8	
	Closed at $U_{s \min}$	VA/p.f.	5.4/0.8	
	Closed at $U_{s \max}$	VA/p.f.	7/0.8	
- DC operation	Closing at $U_{s \min}$	W	600	
	Closing at $U_{s \max}$	W	800	
	Closed at $U_{s \min}$	W	4	
	Closed at $U_{s \max}$	W	5	
<b>PLC control input</b> (EN 61131-2/type 2)			24 V DC/≤ 30 mA power consumption, (operating range 17 ... 30 V DC)	
<b>Operating times</b> (Total break time = Opening delay + Arcing time)				
• Conventional operating mechanism				
- With 0.8 x $U_{s \min}$ ... 1.1 x $U_{s \max}$	Closing delay	ms	45 ... 100	
	Opening delay	ms	60 ... 100	
- For $U_{s \min}$ ... $U_{s \max}$	Closing delay	ms	50 ... 70	
	Opening delay	ms	70 ... 100	
• Solid-state operating mechanism, actuated via A1/A2				
- With 0.8 x $U_{s \min}$ ... 1.1 x $U_{s \max}$	Closing delay	ms	120 ... 150	
	Opening delay	ms	80 ... 100	
- For $U_{s \min}$ ... $U_{s \max}$	Closing delay	ms	125 ... 150	
	Opening delay	ms	80 ... 100	
• Solid-state operating mechanism, actuated via PLC input				
- With 0.8 x $U_{s \min}$ ... 1.1 x $U_{s \max}$	Closing delay	ms	60 ... 90	
	Opening delay	ms	80 ... 100	
- For $U_{s \min}$ ... $U_{s \max}$	Closing delay	ms	65 ... 80	
	Opening delay	ms	80 ... 100	
• Arcing time				
		ms	10 ... 15	
<b>Main circuit</b>				
<b>AC capacity</b>				
<b>Utilization category AC-1</b>				
<b>Switching resistive loads</b>				
• Rated operational currents $I_e$	At 40 °C up to 1000 V	A	610	
	At 60 °C up to 1000 V	A	550	
• Rated power for AC loads <sup>1)</sup>	At 230 V	kW	208	
P.f. = 0.95 (at 60 °C)	400 V	kW	362	
	500 V	kW	452	
	690 V	kW	624	
	1000 V	kW	905	
• Minimum conductor cross-section for loads with $I_e$	At 40 °C	mm <sup>2</sup>	2 x 185	
	At 60 °C	mm <sup>2</sup>	2 x 185	
<b>Utilization category AC-2 and AC-3</b>				
• Rated operational currents $I_e$	Up to 1000 V	A	400	500
• Rated power for slipping or squirrel-cage motors at 50 and 60 Hz	At 230 V	kW	132	164
	400 V	kW	231	291
	500 V	kW	291	363
	690 V	kW	400	507
	1000 V	kW	578	728
<b>Thermal load capacity</b>			10 s current <sup>2)</sup>	A
			3200	4000
<b>Power loss per conducting path</b>			At $I_e$ /AC-3	W
			21	32

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

2) According to IEC 60947-4-1.

For rated values for various start-up conditions see "Protection Equipment --> Overload Relays".

# 3RT, 3TB, 3TF Contactors for Switching Motors




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

Contactor	Type Size			3RT12 75 S12	3RT12 76 S12
<b>Main circuit</b>					
<b>AC capacity</b>					
<b>Utilization category AC-4</b> (for $I_a = 6 \times I_e$ )					
• Rated operational current $I_e$	Up to 690 V	A		350	430
• Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 400 V	kW		200	250
• The following applies to a contact endurance of about 200 000 operating cycles:					
- Rated operational currents $I_e$	690 V	A		175	215
	1000 V	A		123	151
• Rated power for squirrel-cage motors with 50 Hz and 60 Hz	At 230 V	kW		56	70
	400 V	kW		98	122
	500 V	kW		124	153
	690 V	kW		172	212
	1000 V	kW		183	217
<b>Utilization category AC-6a switching AC transformers</b>					
• Rated operational current $I_e$					
- For inrush current $n = 20$	Up to 690 V	A		419	
- For inrush current $n = 30$	Up to 690 V	A		279	
• Rating $P$					
- For inrush current $n = 20$	At 230 V	kVA		167	
	400 V	kVA		290	
	500 V	kVA		363	
	690 V	kVA		501	
	1000 V	kVA		726	
- For inrush current $n = 30$	At 230 V	kVA		111	
	400 V	kVA		193	
	500 V	kVA		241	
	690 V	kVA		332	
	1000 V	kVA		482	
For deviating inrush current factors $x$ , the power must be recalculated as follows: $P_x = P_{n30} \cdot 30/x$					
<b>Utilization category AC-6b Switching low-inductance (low-loss, metallized dielectric) AC capacitors</b> Ambient temperature 40 °C					
• Rated operational currents $I_e$	Up to 500 V	A		407	
• Rated power for single capacitors or banks of capacitors (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz, 60 Hz and	At 230 V	kvar		162	
	400 V	kvar		282	
	500 V	kvar		352	
	690 V	kvar		282	
<b>Switching frequency</b>					
<b>Switching frequency <math>z</math></b> in operating cycles/hour					
• Contactors without overload relays	No-load switching frequency	$h^{-1}$		2000	
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	$h^{-1}$		700	
	AC-2	$h^{-1}$		250	
	AC-3	$h^{-1}$		750	
	AC-4	$h^{-1}$		250	
• Contactors with overload relays (mean value)		$h^{-1}$		60	



# 3RT, 3TB, 3TF Contactors for Switching Motors

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

Contactors	Type Size	<b>3RT12 7. S12</b>				
<b>Conductor cross-sections</b>		<b>⊕ Screw terminals</b>				
<b>Front clamping point connected</b> 	<b>Main conductors:</b> With 3RT19 66-4G box terminal	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>AWG cables, solid or stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> </ul>	mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> AWG mm	70 ... 240 70 ... 240 95 ... 300 3/0 ... 600 kcmil	Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5	
	<b>Rear clamping point connected</b> 	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>AWG cables, solid or stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> </ul>	mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> AWG mm	120 ... 185 120 ... 185 120 ... 240 250 ... 500 kcmil	Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5	
<b>Both clamping points connected</b> 	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>AWG cables, solid or stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> </ul>	mm <sup>2</sup> mm <sup>2</sup> mm <sup>2</sup> AWG mm	Min. 2 x 50, max. 2 x 185 Min. 2 x 50, max. 2 x 185 Min. 2 x 70, max. 2 x 240 Min. 2 x 2/0, max. 2 x 500 kcmil	Max. 2 x (20 x 24 x 0.5)		
	<ul style="list-style-type: none"> <li>Terminal screws - Tightening torque</li> </ul>	Nm	M12 (hexagon socket, A/F 5) 20 ... 22 (180 ... 195 lb.in)			
<b>Main conductors:</b> Without box terminal/ busbar connection		<ul style="list-style-type: none"> <li>Finely stranded with cable lug<sup>1)</sup></li> <li>Stranded with cable lug<sup>1)</sup></li> <li>AWG cables, solid or stranded</li> <li>Connecting bar (max. width)</li> <li>Terminal screws - Tightening torque</li> </ul>	mm <sup>2</sup> mm <sup>2</sup> AWG mm Nm	50 ... 240 70 ... 240 2/0 ... 500 kcmil 25	M10 x 30 (hexagon socket, A/F 17) 14 ... 24 (124 ... 240 lb.in)	
<b>Auxiliary conductors:</b>		<ul style="list-style-type: none"> <li>Solid</li> <li>Finely stranded with end sleeve</li> <li>AWG cables, solid or stranded</li> <li>Terminal screws - Tightening torque</li> </ul>	mm <sup>2</sup> mm <sup>2</sup> AWG Nm	2 x (0.5 ... 1.5) <sup>2)</sup> ; 2 x (0.75 ... 2.5) <sup>2)</sup> acc. to IEC 60947; max. 2 x (0.75 ... 4) 2 x (0.5 ... 1.5) <sup>2)</sup> ; 2 x (0.75 ... 2.5) <sup>2)</sup> 2 x (18 ... 14)	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 mm <sup>2</sup> and more as well as DIN 46235 for conductor cross-sections of 185 mm <sup>2</sup> 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.				

Contactors	Type Size	<b>3RT12 64 S10</b>	<b>3RT12 65 S10</b>	<b>3RT12 66 S10</b>	<b>3RT12 75 S12</b>	<b>3RT12 76 S12</b>
<b>Ⓢ and Ⓜ ratings</b>						
<b>Rated insulation voltage</b>	V AC	600			600	
<b>Uninterrupted current, at 40 °C</b>	• Open and enclosed	A 330			540	
<b>Maximum horsepower ratings</b> (Ⓢ and Ⓜ approved values)						
• Rated power for induction motors at 60 Hz	At 200 V	hp 60	75	100	125	150
	230 V	hp 75	100	125	150	200
	460 V	hp 150	200	250	300	400
	575 V	hp 200	250	300	400	500
<b>Short-circuit protection<sup>1)</sup></b>		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
<b>NEMA/EEMAC ratings</b>	NEMA/EEMAC size	hp --	--	5	--	6
	• Uninterrupted current	- Open - Enclosed	A -- A --	-- 300 270	-- --	600 540
• Rated power for induction motors at 60 Hz	At 200 V	hp --	--	75	--	150
	230 V	hp --	--	100	--	200
	460 V	hp --	--	200	--	400
	575 V	hp --	--	200	--	400
<b>Overload relay</b>	• Type	3RB20 66			3RB20 66	

1) For more information about short-circuit values, e. g. for protection against short-circuit currents, see the UL guide (Order No.: A5E02118883 for German) or UL reports (<http://www.siemens.com/lowvoltage/ul-europe>) for the individual devices.

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

### 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  $\geq 1$  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	2 kV 6 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.

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 caused 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 (see [page 239](#)).

#### 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.

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 price.

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

## Technical specifications

Contactors	Type	<b>3TF68 and 3TF69</b>	
<b>Rated data of the auxiliary contacts</b>		Acc. to IEC 60947-5-1 (VDE 0660 Part 200)	
<b>Rated insulation voltage</b> $U_i$ (degree of pollution 3)	V	690	
<b>Continuous thermal current</b> $I_{th}$ = <b>Rated operational current</b> $I_e/AC-12$	A	10	
<b>AC load</b>			
<b>Rated operational current</b> $I_e/AC-15/AC-14$			
• For rated operational voltage $U_e$			
	24 V	A	10
	110 V	A	10
	125 V	A	10
	220 V	A	6
	230 V	A	5.6
	380 V	A	4
	400 V	A	3.6
	500 V	A	2.5
	660 V	A	2.5
	690 V	A	2.3
<b>DC load</b>			
<b>Rated operational current</b> $I_e/DC-12$			
• 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
<b>Rated operational current</b> $I_e/DC-13$			
• 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
<b>Ⓢ and Ⓞ ratings of the auxiliary contacts</b>			
Rated voltage	V AC, max.	600	
Switching capacity		A 600, P 600	

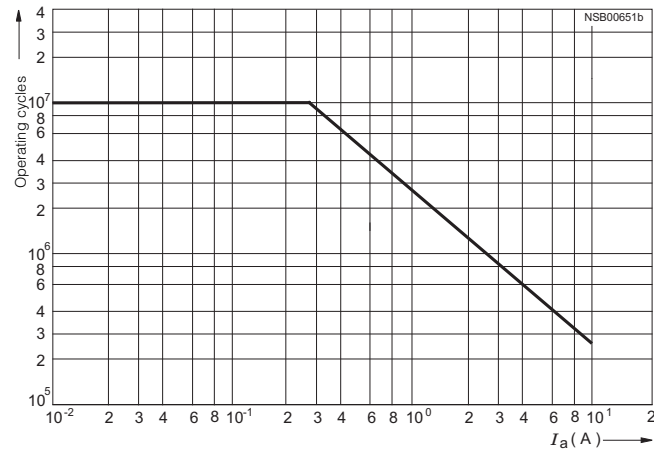
# 3RT, 3TB, 3TF Contactors for Switching Motors

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

### 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

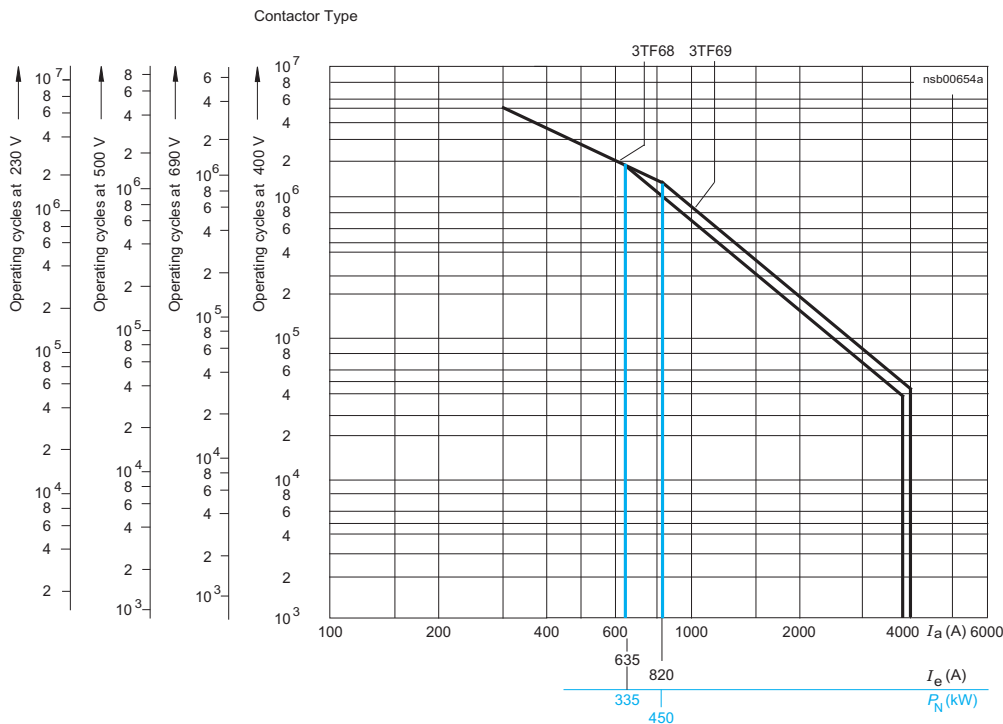


### Contact erosion indication with 3TF68 and 3TF69 vacuum contactors

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.

### Endurance of the main contacts



3TF68 and 3TF69 contactors

Diagram legend:

$P_N$  = Rated power for squirrel-cage motors at 400 V

$I_a$  = Breaking current

$I_e$  = Rated operational current

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

Contactors	Type Size		<b>3TF68 14</b>	<b>3TF69 14</b>
<b>General data</b>				
<b>Permissible mounting position, installation instructions</b> <sup>1) 2)</sup> The contactors are designed for operation on a vertical mounting surface.	AC operation and DC operation			
<b>Mechanical endurance</b>	Operating cycles	5 million		
<b>Electrical endurance</b>	Operating cycles	<sup>3)</sup>		
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	kV	1		
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	kV	8		
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N	kV	1		
<b>Mirror contacts</b> 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		
<b>Permissible ambient temperature</b>	<ul style="list-style-type: none"> <li>• During operation</li> <li>• During storage</li> </ul>	°C -25 ... +55 °C -55 ... +80		
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C		IP00/open, coil assembly IP40		
<b>Touch protection</b> acc. to EN 50274		Finger-safe with cover		
<b>Shock resistance</b>				
• Rectangular pulse	<ul style="list-style-type: none"> <li>- AC operation</li> <li>- DC operation</li> </ul>	<i>g/ms</i> 8.1/5 and 4.7/10 <i>g/ms</i> 9/5 and 5.7/10	9.5/5 and 5.7/10 8.6/5 and 5.1/10	
• Sine pulse	<ul style="list-style-type: none"> <li>- AC operation</li> <li>- DC operation</li> </ul>	<i>g/ms</i> 12.8/5 and 7.4/10 <i>g/ms</i> 14.4/5 and 9.1/10	13.5/5 and 7.8/10 13.5/5 and 7.8/10	
<b>Conductor cross-sections</b>			See "Conductor Cross-Sections".	
<b>Electromagnetic compatibility (EMC)</b>			See "Electromagnetic Compatibility (EMC)".	
<b>Short-circuit protection</b>				
<b>Main circuit</b>				
Fuse links, gL/gG				
LV HRC 3NA, DIAZED 5SB, NEOZED 5SE				
acc. to IEC 60947-4-1/EN 60947-4-1				
	<ul style="list-style-type: none"> <li>• Type of coordination "1"</li> <li>• Type of coordination "2"</li> <li>• Weld-free<sup>4)</sup></li> </ul>	A	1000	1250
		A	500	630
		A	400	500
<b>Auxiliary circuit</b>				
• Fuse links gL/gG		A	10	
LV HRC 3NA, DIAZED 5SB, NEOZED 5SE (weld-free protection at $I_k \geq 1$ kA)				
• 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.

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

Contactor	Type Size		3TF68 14	3TF69 14
<b>Control</b>				
<b>Magnetic coil operating range</b>			$0.8 \times U_{s \text{ min}} \dots 1.1 \times U_{s \text{ max}}$	
<b>Power consumption of the magnetic coils</b> (when coil is cold and $1.0 \times U_s$ )				
• AC operation, $U_{s \text{ max}}$	- Closing - Closed	VA/p.f. VA/p.f.	1850/1 49/0.15	950/0.98 30.6/0.31
• AC operation, $U_{s \text{ min}}$	- Closing - Closed	VA/p.f. VA/p.f.	1200/1 13.5/0.47	600/0.98 12.9/0.43
• DC economy circuit <sup>1)</sup>	- Closing at 24 V - Closed	W W	1010 28	960 20.6
For contactors of type 3TF68/69...-Q:				
• AC operation, $U_{s \text{ min}}$ <sup>2)</sup>	- Closing - Closed	VA/p.f. VA/p.f.	1000/0.99 11/1	1150/0.99 11/1
<b>Operating times at <math>0.8 \dots 1.1 \times U_s</math></b> (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) <sup>3)</sup> 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	- Closing delay - Opening delay	ms ms	35 ... 90 65 ... 90	45 ... 160 30 ... 80
<b>Operating times at <math>1.0 \times U_s</math></b> (Total break time = Opening delay + Arcing time)				
• AC operation	- Closing delay - Opening delay	ms ms	80 ... 100 (30 ... 45) <sup>3)</sup> 70 ... 100	85 ... 100 70
• DC economy circuit	- Closing delay - Opening delay	ms ms	80 ... 90 50	90 ... 125 19 ... 25
<b>Minimum command duration for closing</b>	Standard	ms	120	120
	Reduced make-time	ms	90	--
<b>Minimum interval time</b> between two ON commands		ms	100	300

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

2) Including reversing contactor.

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

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

Contactors	Type Size		3TF68 14	3TF69 14
<b>Main circuit</b>				
<b>AC capacity</b>				
<b>Utilization category AC-1</b>				
<b>Switching resistive loads</b>				
• 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	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-sections for loads with $I_e$	At 40°C	mm <sup>2</sup>	2 x 240	$I_e \geq 800$ A: 2 x 60 x 5 (copper busbars)
	At 55°C	mm <sup>2</sup>	2 x 185	$I_e < 800$ A: 2 x 240
<b>Utilization category AC-2 and AC-3</b>				
• Rated operational currents $I_e$	Up to 690 V	A	630	820
	1000 V	A	435	580
• Rated power for slipping or squirrel-cage motors at 50 Hz and 60 Hz	At 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
<b>Utilization category AC-4 (for <math>I_a = 6 \times I_e</math>)</b>				
• 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 400 V	kW	355	400
• The following applies to a contact endurance of about 200 000 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 and 60 Hz	At 230 V	kW	97	110
	400 V	kW	168	191
	500 V <sup>1)</sup>	kW	210	250
	690 V <sup>1)</sup>	kW	278	335
	1000 V <sup>1)</sup>	A	290	350
<b>Utilization category AC-6a switching AC transformers</b>				
• 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	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 <sup>2)</sup>	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
<b>Utilization category AC-6b, switching low-inductance (low-loss, metallized dielectric) AC capacitors</b>				
• Rated operational currents $I_e$	Up to 400 V	A	433	
• Rated power for single capacitors at 50 and 60 Hz	At 230 V	kvar	175	
	400 V	kvar	300	
	500 V	kvar	400	
	690 V	kvar	300	
• Rated power for banks of capacitors (minimum inductance is 6 µH between capacitors connected in parallel) at 50 and 60 Hz	At 230 V	kvar	145	
	400 V	kvar	250	
	500 V	kvar	333	
	690 V	kvar	250	

1) 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.

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

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

Contactor	Type Size	3TF68 14	3TF69 14	
<b>Main circuit</b>				
<b>AC capacity</b>				
<b>Short-time loading capacity</b> (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 <sup>1)</sup>	A	5040	7000	
<b>Power loss per conducting path</b> at $I_e/AC-3/690\text{ V}$	W	45	70	
<b>Switching frequency</b>				
<b>Switching frequency z</b> 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
	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
<b>Conductor cross-sections</b>				
<b>Main conductors:</b>		<b>Screw terminals</b>		
• Busbar connections				
- Finely stranded with cable lug	mm <sup>2</sup>	50 ... 240	50 ... 240	
- Stranded with cable lug	mm <sup>2</sup>	70 ... 240	50 ... 240	
- Solid or stranded	AWG	2/0 ... 500 MCM	2/0 ... 500 MCM	
- Connecting bar (max. width)	mm	50	60 ( $U_0 \leq 690\text{ V}$ ) 50 ( $U_0 > 690\text{ V}$ )	
• Terminal screw				
- Tightening torque	Nm	M10 x 30 14 ... 24 (124 ... 210 lb.in)	M12 x 40 20 ... 35 (177 ... 310 lb.in)	
• With box terminal <sup>2)</sup>				
- 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)	
<b>Auxiliary conductors:</b>				
• Solid	mm <sup>2</sup>	2 x (0.5 ... 1) <sup>3)</sup> /2 x (1 ... 2.5) <sup>3)</sup>		
• Finely stranded with end sleeve	mm <sup>2</sup>	2 x (0.5 ... 1) <sup>3)</sup> /2 x (0.75 ... 2.5) <sup>3)</sup>		
• Pin-end connector to DIN 46231	mm <sup>2</sup>	2 x (1 ... 1.5)		
• Solid or stranded	AWG	2 x (18 ... 12)		
• Tightening torque	Nm	0.8 ... 1.4 (7 ... 12 lb.in)		
<b>IEC and UL ratings</b>				
<b>Rated insulation voltage</b>	V AC	600	600	
<b>Uninterrupted current</b>	• Open and enclosed	A	630	820
<b>Maximum horsepower ratings</b> (IEC 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
<b>NEMA/EEMAC ratings</b>				
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
<b>Overload relay</b>	• Type • Setting range	A	3RB12 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.



# 3RT, 3TB, 3TF Contactors for Switching Motors

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

## Overview

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

EN 60947-4-1.

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

## Technical specifications

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

Contactor	Type	3TB50 to 3TB56
<b>Ⓢ and Ⓣ ratings of the auxiliary contacts</b>		
Rated voltage	V AC, max.	600
Switching capacity		A 600, P 600

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

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

## Endurance of the main contacts

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

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

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

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

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

Characters in the equation:

- X Contact endurance for mixed operation in operating cycles
- A Contact endurance for normal operation ( $I_a = I_e$ ) in operating cycles
- B Contact endurance for inching ( $I_a = \text{multiple of } I_e$ ) in operating cycles
- C Inching operations as a percentage of total switching operations

3TB50 to 3TB56 contactors

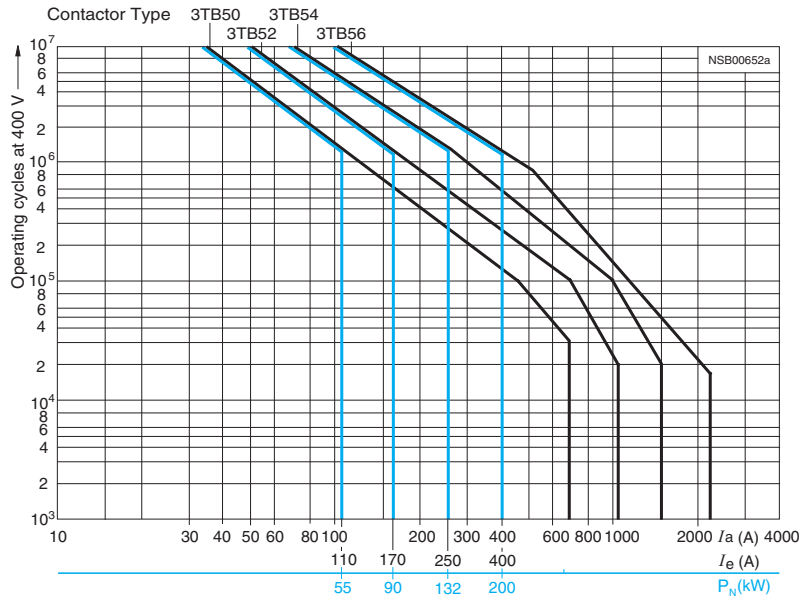
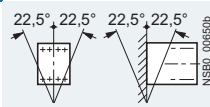


Diagram legend:

- $P_N$  = Rated power for squirrel-cage motors at 400 V
- $I_a$  = Breaking current
- $I_e$  = Rated operational current

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

Contactors	Type Size	3TB50 6	3TB52 8	3TB54 10	3TB56 12
<b>General data</b>					
<b>Permissible mounting position</b> <b>Installation instructions</b> <sup>1)</sup> The contactors are designed for operation on a vertical mounting surface.					
<b>Mechanical endurance</b>		Operating cycles 10 million			
<b>Electrical endurance</b>		2)			
<b>Rated insulation voltage</b> $U_i$		V 1000			
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N		V 690			
<b>Mirror contacts</b> 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			
<b>Permissible ambient temperature</b>		°C -25 ... +55 °C -50 ... +80			
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C		IP00 (open), coil assembly IP40			
<b>Touch protection</b> acc. to EN 50274		Finger-safe with cover			
<b>Shock resistance</b> (rectangular pulse)		g/ms 5/10 5.9/10 5.9/10 5.9/10			
<b>Short-circuit protection</b>					
<b>Main circuit</b>					
Fuse links gL/gG		• Type of coordination "1"			
LV HRC 3NA, DIAZED 5SB		• Type of coordination "2"			
<b>Auxiliary circuit</b> short-circuit current $I_k \geq 1$ kA					
• Fuse links gL/gG, DIAZED 5SB, NEOZED 5SE		A 16			
• Miniature circuit breaker with C characteristic		A 10			
<b>Control</b>					
<b>Magnetic coil operating range</b>		0.8 ... 1.1 x $U_s$			
<b>Power consumption of the magnetic coil</b> (for cold coil and 1.0 x $U_s$ ) Closing = Closed		W 25 30 60 86			
<b>Operating times at 0.8 ... 1.1 x <math>U_s</math></b> Total break time = Opening delay + Arcing time		(The values apply up to and including 20 % undervoltage, 10 % overvoltage, as well as when the coil is cold and warm)			
• Closing delay		ms 105 ... 360 115 ... 400 105 ... 400 110 ... 400			
• Opening delay <sup>3)</sup>		ms 18 ... 30 22 ... 35 24 ... 55 40 ... 110			
• Arcing time		ms 10 ... 15 10 ... 15 10 ... 15 10 ... 15			
<b>Operating times at 1.0 x <math>U_s</math></b>					
• Closing delay		ms 120 ... 230 130 ... 250 115 ... 250 120 ... 250			
• Opening delay <sup>3)</sup>		ms 20 ... 26 24 ... 32 35 ... 50 60 ... 95			
<b>Main circuit</b>					
<b>AC capacity</b>					
<b>Utilization category AC-1, switching resistive loads</b>					
• Rated operational current $I_e$		At 40 °C up to 690 V A 170 230 325 425 At 55 °C up to 690 V A 160 200 300 400			
• Rated power for AC loads <sup>4)</sup> P.f. = 0.95 (at 55 °C)		230 V kW 61 76 114 152 400 V kW 105 132 195 262 500 V kW 138 173 260 345 690 V kW 183 228 340 455			
• Minimum conductor cross-sections for loads with $I_e$		mm <sup>2</sup> 70 95 185 240			
<b>Utilization category AC-2 and AC-3</b>					
5)					
<b>Utilization category AC-4</b> (for $I_a = 6 \times I_e$ )					
• The following applies to a contact endurance of about 200 000 operating cycles:					
- Rated operational current $I_e$		A 52 72 103 120			
- Rated power for squirrel-cage motors with 50 Hz and 60 Hz		230 V kW 15.6 21 31 37.5 400 V kW 27 37 55 65 500 V kW 35 48 72 85.5 690 V kW 45 64 92 106			
- Max. rated operational current $I_e$ / AC-4		At 400 V A 110 170 250 400			

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

2) See "Endurance of the Main Contacts".

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

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

5) See selection table in Catalog LV 1.

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

Contactor	Type Size		3TB50 6	3TB52 8	3TB54 10	3TB56 12
<b>Main circuit</b>						
<b>AC capacity</b>						
<b>Switching low-inductance (low-loss, metallized dielectric) AC capacitors<sup>1)</sup></b>						
• Rated operational current $I_{\theta}$ at 400 V		A	87	144	217	289
• Rated power for single capacitors at 50 Hz	230 V	kvar	35	58	87	115
	400 V	kvar	60	100	150	200
	500 V	kvar	80	130	190	265
	690 V	kvar	60	100	150	200
	• Rated power for banks of capacitors (minimum inductance is 6 $\mu$ H between capacitors connected in parallel) at 50 Hz	230 V	kvar	30	40	66
	400 V	kvar	50	70	115	150
	500 V	kvar	66	90	145	195
	690 V	kvar	50	70	115	150
<b>Load rating with DC</b>						
<b>Utilization category DC-1</b>						
<b>Switching resistive loads (<math>L/R \leq 1</math> ms)</b>						
• Rated operational current $I_{\theta}$ (at 55 °C)						
- 1 conducting path	24 V	A	160	200	300	400
	60 V	A	80	80	300	330
	110 V	A	18	18	33	33
	220 V	A	3.4	3.4	3.8	3.8
	440 V	A	0.8	0.8	0.9	0.9
	600 V	A	0.5	0.5	0.6	0.6
- 2 conducting paths in series	24 V	A	160	200	300	400
	60 V	A	160	200	300	400
	110 V	A	160	200	300	400
	220 V	A	20	20	300	400
	440 V	A	3.2	3.2	4	4
	600 V	A	1.6	1.6	2	2
- 3 conducting paths in series	24 V	A	160	200	300	400
	60 V	A	160	200	300	400
	110 V	A	160	200	300	400
	220 V	A	160	200	300	400
	440 V	A	11.5	11.5	11	11
	600 V	A	4	4	5.2	5.2
<b>Utilization category DC-3/DC-5</b>						
<b>Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>						
• Rated operational current $I_{\theta}$ (at 55 °C)						
- 1 conducting path	24 V	A	16	16	35	35
	60 V	A	7.5	7.5	11	11
	110 V	A	2.5	2.5	3	3
	220 V	A	0.6	0.6	0.6	0.6
	440 V	A	0.17	0.17	0.18	0.18
	600 V	A	0.12	0.12	0.125	0.125
- 2 conducting paths in series	24 V	A	160	200	300	400
	60 V	A	160	200	300	400
	110 V	A	160	200	300	400
	220 V	A	2.5	2.5	2.5	2.5
	440 V	A	0.65	0.65	0.65	0.65
	600 V	A	0.37	0.37	0.37	0.37
- 3 conducting paths in series	24 V	A	160	200	300	400
	60 V	A	160	200	300	400
	110 V	A	160	200	300	400
	220 V	A	160	200	300	400
	440 V	A	1.4	1.4	1.4	1.4
	600 V	A	0.75	0.75	0.75	0.75
<b>Switching frequency</b>						
<b>Switching frequency z</b> in operating cycles/hour						
• Contactors without overload relays	AC-1	h <sup>-1</sup>	1000			
	AC-2	h <sup>-1</sup>	500			
	AC-3	h <sup>-1</sup>	500			
	AC-4	h <sup>-1</sup>	250			
• Contactors with overload relays (mean value)		h <sup>-1</sup>	15			

1) Contact endurance 0.1 million operating cycles.

# 3RT, 3TB, 3TF Contactors for Switching Motors

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

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

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

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3TF2 contactors, 3-pole, 2.2 ... 4 kW

### Overview

#### AC and DC operation

IEC 60947 (VDE 0660).

The contactors are suitable for use in any climate. The contactors with screw terminals are finger-safe according to EN 50274.

The contactors are available in versions with screw terminals, 6.3 mm plug-in terminals and solder pin connections for soldering in printed circuit boards.

### Design

#### Auxiliary contacts

##### Contact reliability

To switch voltages  $\leq 110$  V and currents  $\leq 100$  mA the 3TF2 contactor relays should be used as they guarantee a high level of contact reliability.

These auxiliary contacts are suitable for solid-state circuits with currents  $\geq 1$  mA at a voltage of 17 V and higher.

#### Short-circuit protection of the contactors

For short-circuit protection of the contactors without overload relays see "Technical specifications".

#### Version

The 3TF2 contactors are available with SIGUT screw terminals, 6.3 mm x 0.8 mm flat connectors and solder pin connectors.

The contactors with 6.3 mm x 0.8 mm flat connectors can be used in the plug-in base with solder pin connectors for printed circuit boards. The contactors are coded and the plug-in base is codable in order to ensure non-interchangeability.

#### Auxiliary switch blocks

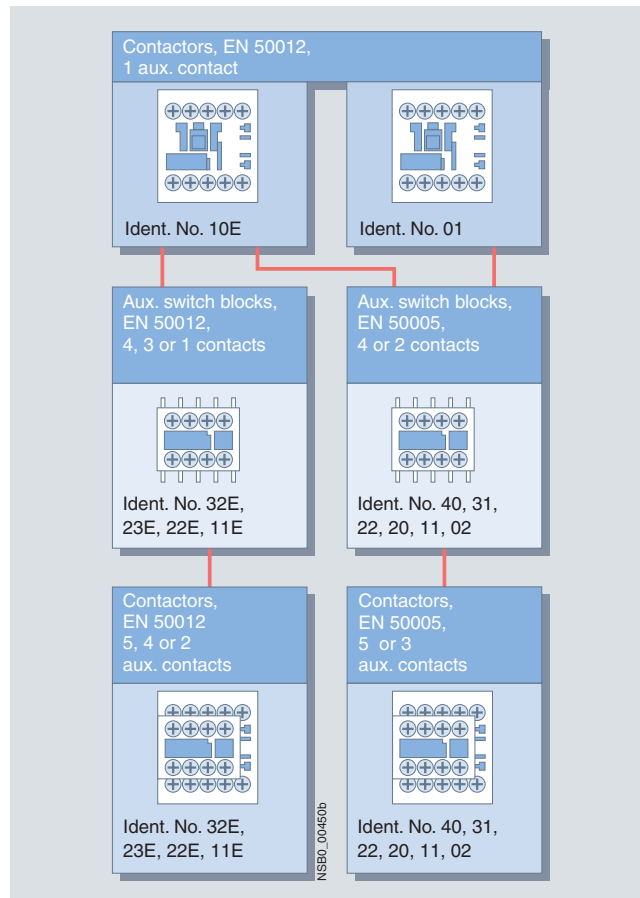
The contactors with 1 auxiliary contact with screw terminals can be expanded by up to four contacts by the addition of snap-on auxiliary switch blocks.

The contactors according to EN 50012 with identification number 10E can be expanded into contactors with 2, 4 and 5 auxiliary contacts according to EN 50012 using auxiliary switch blocks.

The identification numbers 11E, 22E, 23E and 32E on the auxiliary switch blocks apply to the complete contactors (see the graphic on the right). These auxiliary switch blocks cannot be combined with contactors with identification number 01E.

All contactors with screw terminals and 1 auxiliary contact according to EN 50012, identification number 10E and 01E, can be extended with auxiliary switch blocks 40, 31, 22, 20, 11 and 02 to obtain contactors with 3 or 5 auxiliary contacts according to EN 50005. The identification numbers on the auxiliary switch blocks apply only to the attached auxiliary switches.

3TF20-0 motor contactors according to EN 50012 or EN 50005



#### Surge suppression

RC elements, varistors, diodes or diode assemblies (combination of a diode and a Zener diode for short break times) can be plugged onto all 3TF2 contactors and auxiliary switch blocks with screw terminals from the front in order to damp opening surges in the coil. The unit labeling plate must be removed for this purpose. It can be snapped onto the attached surge suppressor.

##### Note:

The OFF-delay of the NO contacts and the ON-delay of the NC contacts increase if the contactor coils are protected against voltage peaks (noise suppression diode 6 to 10 times, diode assemblies 2 to 6 times, varistor +2 to 5 ms).

#### Reversing duty

To use the 3TF2 AC-operated contactor in reversing or Dahlander mode an additional dead interval of 50 ms is required along with an NC contact interlock.

### Technical specifications

Contactors Type **3TF2**

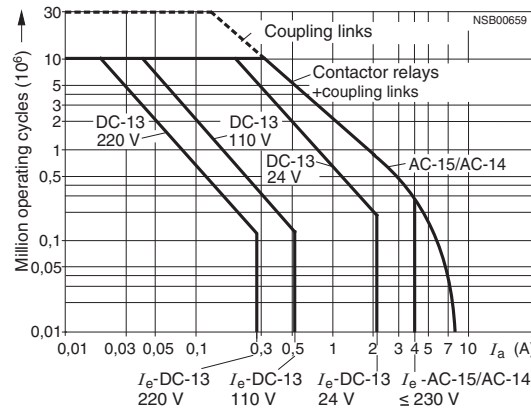
#### Endurance of the auxiliary contacts

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.

Diagram legend:

$I_a$  = Breaking current

$I_e$  = Rated operational current



**3TF2**

#### Endurance of the main contacts

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

The rated operational current  $I_e$  complies with utilization category AC-4 (breaking six times the rated operational current) and is intended for a contact endurance of at least 200 000 operating cycles. If a shorter endurance is sufficient, the rated operational current  $I_e/AC-4$  can be increased.

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

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

Characters in the equation:

X = Contact endurance for mixed operation in operating cycles

A = Contact endurance for normal operation ( $I_a = I_e$ ) in operating cycles

B = Contact endurance for inching

( $I_a =$  multiple of  $I_e$ ) in operating cycles

C = Inching operations as a percentage of total switching operations

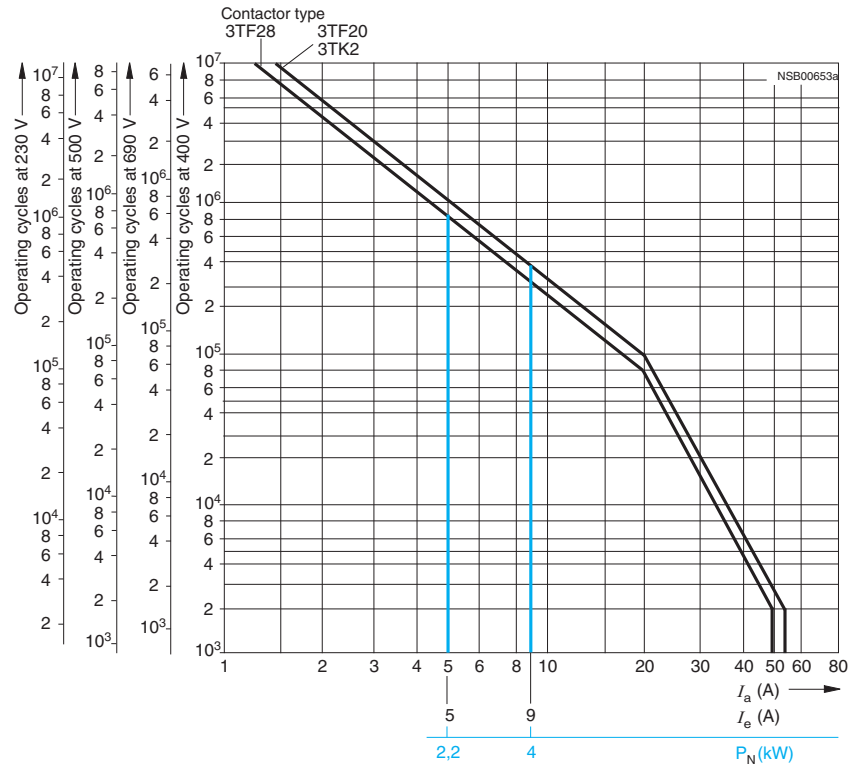


Diagram legend:

$P_N$  = Rated power for squirrel-cage motors at 400 V

$I_a$  = Breaking current

$I_e$  = Rated operational current

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3TF2 contactors, 3-pole, 2.2 ... 4 kW

Contactors	Type		3TF20/3TF28	3TF22/3TF29
<b>General data</b>				
<b>Permissible mounting position</b>	AC and DC operation		Any	
<b>Mechanical endurance</b>	<ul style="list-style-type: none"> <li>AC operation</li> <li>DC operation</li> <li>Auxiliary switch block</li> </ul>	Operating cycles	10 million 30 million 10 million	
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)				
• Screw terminals		V	690	690 <sup>1)</sup>
• Flat connector 6.3 mm x 0.8 mm		V	500	--
• Solder pin connections		V	500	--
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (degree of pollution 3)				
• Screw terminals		kV	8	8 <sup>2)</sup>
• Flat connector 6.3 mm x 0.8 mm		kV	6	--
• Solder pin connections		kV	6	--
<b>Protective separation</b> between coil and main contacts (acc. to EN 61140)		V	Up to 300	
<b>Mirror contacts</b> A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.			Yes, this applies to both the basic unit as well as to between the basic unit and the mounted auxiliary switch block acc. to EN 60947-4-1, Appendix F	Yes, acc. to EN 60947-4-1 Appendix F SUVA
<b>Permissible ambient temperature<sup>3)</sup></b>	<ul style="list-style-type: none"> <li>During operation</li> <li>During storage</li> </ul>	°C	-25 ... +55 -55 ... +80	
<b>Degree of protection</b> acc. to EN 60947-1 Appendix C			IP00 open IP20 for screw terminals IP40 coil assembly	
<b>Touch protection acc. to EN 50274</b>			Finger-safe for screw terminals	
<b>Shock resistance</b>				
• Without 3TX44 auxiliary switch block				
- Rectangular pulse	- AC operation	g/ms	8.3/5 and 5.2/10	--
	- DC operation	g/ms	11.3/5 and 9.2/10	--
- Sine pulse	- AC operation	g/ms	13/5 and 8/10	--
	- DC operation	g/ms	17.4/5 and 12.9/10	--
• With 3TX44 auxiliary switch block				
- Rectangular pulse	- AC operation	g/ms	5/5 and 3.6/10	5/5 and 3.6/10
	- DC operation	g/ms	9/5 and 6.9/10	9/5 and 7.3/10
- Sine pulse	- AC operation	g/ms	7.8/5 and 5.6/10	7.8/5 and 5.6/10
	- DC operation	g/ms	13.9/5 and 10.1/10	14/5 and 11/10
<b>Conductor cross-sections</b>			4)	
<b>Short-circuit protection for contactors without overload relays</b>				
<b>Main circuit<sup>5)</sup></b>				
• Fuse links gL/gG LV HRC 3NA, DIAZED 5SB, NEOZED 5SE acc. to IEC 60947-4-1 (VDE 0660, Part 102)	- Type of coordination "1" - Type of coordination "2" <sup>6)</sup> - Weld-free	A A A	25 10 10	
• Miniature circuit breaker with C characteristic		A	10	
<b>Auxiliary circuit</b> Short-circuit current $I_k \geq 1$ kA				
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE		A	6	

1) Auxiliary contacts 500 V.

2) Auxiliary contacts 6 kV.

3) Applies to 50/60 Hz coil:  
At 50 Hz,  $1.1 \times U_{s,}$ , side-by-side mounting and 100 % ON period the max. ambient temperature is +40 °C.

4) See "Conductor Cross-Sections".

5) According to excerpt from IEC 60947-4-1 (VDE 0660 Part 102)  
Type of coordination "1":  
Destruction of the contactor and the overload relay is permissible. The contactor and/or overload relay can be replaced if necessary.  
Type of coordination "2":  
The overload relay must not suffer any damage. Contact welding on the contactor is permissible, however, if the contacts can be easily separated.

6) A short-circuit current of  $I_q \leq 6$  kA applies to type of coordination "2".



# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3TF2 contactors, 3-pole, 2.2 ... 4 kW

Contactor	Type	3TF2	
<b>Control</b>			
<b>Magnetic coil operating range<sup>1)</sup></b>		0.8 ... 1.1 x $U_s$	
<b>Power consumption of the magnetic coils (when coil is cold and 1.0 x <math>U_s</math>)</b>			
<b>Standard version:</b>			
• AC operation, 50 Hz	Closing	VA	15
	P.f.		0.41
	Closed	VA	6.8
	P.f.		0.42
• AC operation, 60 Hz	Closing	VA	14.4
	P.f.		0.36
	Closed	VA	6.1
	P.f.		0.46
• AC operation, 50/60 Hz <sup>1)</sup>	Closing	VA	16.5/13.2
	P.f.		0.43/0.38
	Closed	VA	8.0/5.4
	P.f.		0.48/0.42
<b>For USA and Canada:</b>			
• AC operation, 50 Hz	Closing	VA	14.6
	P.f.		0.38
	Closed	VA	6.5
	P.f.		0.40
• AC operation, 60 Hz	Closing	VA	14.4
	P.f.		0.30
	Closed	VA	6.0
	P.f.		0.44
• DC operation	Closing = Closed	W	3
<b>Permissible residual current of the electronic circuit<sup>2)</sup> (for 0 signal)</b>			
	• AC operation	mA	$\leq 3 \times (230 \text{ V}/U_s)$
	• DC operation	mA	$\leq 1 \times (230 \text{ V}/U_s)$
<b>Operating times at 0.8 ... 1.1 x <math>U_s</math><sup>3)</sup></b>			
Total break time = Opening delay + Arcing time			
Values apply with coil in cold state and at operating temperature for operating range			
• AC operation	Closing delay	ms	5 ... 19
	Opening delay	ms	2 ... 22
- Dead interval			To use the 3TF2 AC-operated contactor in reversing an additional dead interval of 50 ms is required along with an NC contact interlock.
• DC operation	Closing delay	ms	16 ... 65
	Opening delay	ms	2 ... 5
• Arcing time		ms	10 ... 15
<b>Operating times at 1.0 x <math>U_s</math><sup>3)</sup></b>			
• AC operation	Closing delay	ms	5 ... 18
	Opening delay	ms	3 ... 21
- Dead interval			To use the 3TF2 AC-operated contactor in reversing an additional dead interval of 50 ms is required along with an NC contact interlock.
• DC operation	Closing delay	ms	19 ... 31
	Opening delay	ms	3 ... 4
• Arcing time		ms	10 ... 15

- 1) Applies to 50/60 Hz coil:  
At 50 Hz, 1.1 x  $U_s$ , side-by-side mounting and 100 % ON period the max. ambient temperature is +40 °C.
- 2) The 3TX4 490-1J additional load module is recommended for higher residual currents (see "Accessories and Spare Parts").
- 3) The OFF-delay of the NO contact and the ON-delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3TF2 contactors, 3-pole, 2.2 ... 4 kW

Contactors	Type	3TF28		3TF20 ..-0..., 3TF22 ..-0...		3TF20 ..-3..., 3TF20 ..-6..., 3TF20 ..-7...		
		3TF29		S00		S00		
		Size		S00		S00		
<b>Main circuit</b>								
<i>AC capacity</i>								
<b>Utilization category AC-1</b>								
<b>Switching resistive loads</b>								
• Rated operational current $I_e$ (at 40 °C)	Up to 400/380 V	A	18	18	18	18	18	
	690/660 V	A	18	18	18	18	--	
• Rated operational current $I_e$ (at 55 °C)	400/380 V	A	16	16	16	16	16	
	690/660 V	A	16	16	16	16	--	
• Rated power of AC loads P.f. = 1	At 230/220 V	kW	6.0	6.0	6.0	6.0	6.0	
	400/380 V	kW	10	10	10	10	10	
	500 V	kW	13	13	13	13	13	
	690/660 V	kW	17	17	17	17	--	
• Minimum conductor cross-section for loads with $I_e$		mm <sup>2</sup>	2.5	2.5	2.5	2.5	2.5	
<b>Utilization category AC-2 and AC-3</b>								
• Rated operational current $I_e$	Up to 220 V	A	5.1	9.0	9.0	9.0	9.0	
	230 V	A	5.1	9.0	9.0	9.0	9.0	
	380 V	A	5.1	9.0	9.0	9.0	9.0	
	400 V	A	5.1	8.4	8.4	8.4	8.4	
	500 V	A	4.8	6.5	6.5	6.5	6.5	
	660 V	A	4.8	5.2	5.2	--	--	
	690 V	A	4.8	5.2	5.2	--	--	
	• Rated power for motors with slipping or squirrel cage at 50 and 60 Hz and	At 110 V	kW	0.7	1.2	1.2	1.2	1.2
		115 V	kW	0.7	1.2	1.2	1.2	1.2
120 V		kW	0.7	1.3	1.3	1.3	1.3	
127 V		kW	0.8	1.4	1.4	1.4	1.4	
200 V		kW	1.2	2.2	2.2	2.2	2.2	
220 V		kW	1.3	2.4	2.4	2.4	2.4	
230 V		kW	1.4	2.5	2.5	2.5	2.5	
240 V		kW	1.5	2.6	2.6	2.6	2.6	
380 V		kW	2.2	4.0	4.0	4.0	4.0	
400 V		kW	2.2	4.0	4.0	4.0	4.0	
415 V		kW	2.5	4.0	4.0	4.0	4.0	
440 V		kW	2.5	4.0	4.0	4.0	4.0	
460 V		kW	2.7	4.0	4.0	4.0	4.0	
500 V	kW	2.9	4.0	4.0	4.0	4.0		
575 V	kW	3.2	4.0	4.0	--	--		
660 V	kW	3.8	4.0	4.0	--	--		
690 V	kW	4.0	4.0	4.0	--	--		
<b>Utilization category AC-4</b>								
(contact endurance approx. 200 000 operating cycles at $I_a = 6 \times I_e$ )								
• Rated operational current $I_e$	Up to 400 V	A	1.9	2.6	2.6	2.6	2.6	
	690 V	A	1.4	1.8	1.8	--	--	
• Rated power for motors with squirrel cage at 50 and 60 Hz and	At 110 V	kW	0.23	0.32	0.32	0.32	0.32	
	115 V	kW	0.24	0.33	0.33	0.33	0.33	
	120 V	kW	0.26	0.35	0.35	0.35	0.35	
• Max. permissible rated operational current $I_e/AC-4 \cong I_e/AC-3$ up to 500 V, for reduced contact endurance and reduced switching frequency	127 V	kW	0.27	0.37	0.37	0.37	0.37	
	200 V	kW	0.42	0.58	0.58	0.58	0.58	
	220 V	kW	0.47	0.64	0.64	0.64	0.64	
	230 V	kW	0.49	0.67	0.67	0.67	0.67	
	240 V	kW	0.51	0.70	0.70	0.70	0.70	
	380 V	kW	0.81	1.10	1.10	1.10	1.10	
	400 V	kW	0.85	1.15	1.15	1.15	1.15	
	415 V	kW	0.93	1.20	1.20	1.20	1.20	
	440 V	kW	1.0	1.27	1.27	1.27	1.27	
	460 V	kW	1.0	1.33	1.33	1.33	1.33	
	500 V	kW	1.1	1.45	1.45	1.45	1.45	
	575 V	kW	1.0	1.30	1.30	--	--	
	660 V	kW	0.86	1.10	1.10	--	--	
690 V	kW	0.89	1.15	1.15	--	--		




# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3TF2 contactors, 3-pole, 2.2 ... 4 kW

Contactors	Type	3TF28 3TF29			3TF20 ...-0..., 3TF22 ...-0...			3TF20 ...-3..., 3TF20 ...-6..., 3TF20 ...-7...		
		S00			S00			S00		
<b>Main circuit</b>										
<b>AC capacity</b>										
<b>Utilization category AC-5a</b>										
<b>Switching gas discharge lamps</b>										
Per main current path at 230/220 V										
• Rated power per lamp		Rated operational current per lamp (A)								
- Uncorrected										
L 18 W		0.37	Units		43					
L 36 W		0.43	Units		37					
L 58 W		0.67	Units		23					
- DUO switching										
L 18 W		0.11	Units		144					
L 36 W		0.21	Units		76					
L 58 W		0.32	Units		50					
<b>Switching gas discharge lamps with correction, solid-state ballast</b>										
Per main current path at 230/220 V										
• Rated power per lamp	Capacitance (µF)	Rated operational current per lamp (A)								
- Parallel correction										
L 18 W	4.5	0.11	Units		22					
L 36 W	4.5	0.21	Units		22					
L 58 W	7	0.31	Units		14					
- With solid-state ballast (single lamp)										
L 18 W	6.8	0.10	Units		63					
L 36 W	6.8	0.18	Units		35					
L 58 W	10	0.27	Units		23					
- With solid-state ballast (two lamps)										
L 18 W	10	0.18	Units		35					
L 36 W	10	0.35	Units		18					
L 58 W	22	0.52	Units		12					
<b>Utilization category AC-5b, switching incandescent lamps</b>				kW	1.6				--	
Per main current path at 230/220 V										
<b>Utilization category AC-6a, switching AC transformers</b>										
• Rated operational current $I_e$										
- For inrush current n = 20			At 400 V	A	2.9		5.1		5.1	
- For inrush current n = 30			At 400 V	A	1.9		3.3		3.3	
• Rated power P										
- For inrush current n = 20			Up to 230/220 V	kVA	1.14		2.0		2.0	
			400/380 V	kVA	2		3.5		3.5	
			500 V	kVA	4.1		4.6		4.6	
			690/660 V	kVA	5.4		6.0		--	
- For inrush current n = 30			Up to 230/220 V	kVA	0.74		1.3		1.3	
			400/380 V	kVA	1.3		2.3		2.3	
			500 V	kVA	2.8		3.1		3.1	
			690/660 V	kVA	3.6		4.0		--	
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n30} \times (30/x)$										
<b>Utilization category AC-6b</b>				No switching capacity						
<b>Switching low-inductance (low-loss, metallized dielectric) AC capacitors</b>										
<b>Utilization category AC-7a</b>										
<b>Switching low inductive loads in household appliances</b>										
• Rated operational current $I_e$ (at 55 °C)			At 400/380 V	A	16		16		16	
			690/660 V	A	16		16		--	
• Rated power at 50 and 60 Hz			At 230/220 V	kW	6		6		6	
			400/380 V	kW	10		10		10	
• Minimum conductor cross-section for loads with $I_e$				mm <sup>2</sup>	2.5		2.5		2.5	
<b>Utilization category AC-7b</b>										
<b>Switching motor loads in household appliances</b>										
• Rated operational current $I_e$			Up to 220 V	A	5.1		9.0		9.0	
			230 V	A	5.1		9.0		9.0	
			380 V	A	5.1		9.0		9.0	
			400 V	A	5.1		8.4		8.4	
• Rated power of motors at 50 and 60 Hz and			At 110 V	kW	0.68		1.2		1.2	
			220 V	kW	1.3		2.4		2.4	
			230 V	kW	1.4		2.5		2.5	
			240 V	kW	1.5		2.6		2.6	
			380 V	kW	2.2		4.0		4.0	
			400 V	kW	2.4		4.0		4.0	

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3TF2 contactors, 3-pole, 2.2 ... 4 kW

Contactor	Type	3TF28 3TF29	3TF20 ...-0..., 3TF22 ...-0...	3TF20 ...-3..., 3TF20 ...-6..., 3TF20 ...-7...
	Size	S00	S00	S00
<b>Main circuit</b>				
<i>Load rating with DC</i>				
<b>Utilization category DC-1</b>				
<b>Switching resistive loads</b>				
(contact endurance $0.1 \times 10^6$ operating cycles; $L/R \leq 1$ ms)				
• Rated operational current $I_{\theta}$ (at 55 °C)				
- 1 conducting path	Up to 24 V A 60 V A 110 V A 220/240 V A	10 4 1.5 0.6	16 6 2 1	16 6 2 1
- 2 conducting paths in series	Up to 24 V A 60 V A 110 V A 220/240 V A	10 10 4 1.5	16 16 6 2	16 16 6 2
- 3 conducting paths in series	Up to 24 V A 60 V A 110 V A 220/240 V A	10 10 10 4	16 16 16 6	16 16 16 6
<b>Utilization category DC-3 and DC-5</b>				
<b>Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>				
• Rated operational current $I_{\theta}$ (at 55 °C)				
- 1 conducting path	Up to 24 V A 60 V A 110 V A 220/240 V A	4 1.8 0.3 --	6 3 0.5 0.1	6 3 0.5 0.1
- 2 conducting paths in series	Up to 24 V A 60 V A 110 V A 220/240 V A	6 3 1.5 0.3	10 5 2 0.5	10 5 2 0.5
- 3 conducting paths in series	Up to 24 V A 60 V A 110 V A 220/240 V A	10 10 10 1.5	16 16 16 2	16 16 16 2
<b>Thermal load capacity</b>	10 s current A	70		
<b>Power loss per conducting path</b>	At $I_{\theta}/AC-3$ W	0.3		
<i>Switching frequency</i>				
<b>Switching frequency z</b> in operating cycles/hour				
• Contactors without overload relays	No-load switching frequency	h <sup>-1</sup>	10000	
Dependence of the switching frequency z' on the operational current I' and operational voltage U':	AC-1	h <sup>-1</sup>	1000	
	AC-2	h <sup>-1</sup>	500	
	AC-3	h <sup>-1</sup>	1000	
$z' = z \cdot (I_{\theta}/I') \cdot (400 V/U')^{1.5} \cdot 1/h$				
• Contactors with overload relays (mean value)		h <sup>-1</sup>	15	
<b>Conductor cross-sections</b>				
<b>Main and auxiliary conductors</b>				
• Solid		mm <sup>2</sup>	 <b>Screw terminals</b> 2 x (0.5 ... 2.5), 1 x 4 2 x (20 ... 14) AWG, 1 x 12 AWG	
• Finely stranded with end sleeve		mm <sup>2</sup>	2 x (0.5 ... 1.5), 1 x 2.5	
• Pin-end connector (DIN 46231)		mm <sup>2</sup>	1 x 1 ... 2.5	
• Terminal screw			M3	
• Prescribed tightening torque for terminal screws		Nm	0.8 ... 1.3 (7 ... 11lb.in)	
• When using a plug-in sleeve	6.3 ... 1	mm <sup>2</sup>	 <b>Flat connectors</b> 0.5 ... 1	
• Finely stranded	6.3 ... 2.5	mm <sup>2</sup>	1 ... 2.5	
 <b>Solder pin connections</b> (only for printed circuit boards)				

# 3RT, 3TB, 3TF Contactors for Switching Motors

## 3TF2 contactors, 3-pole, 2.2 ... 4 kW

Contactors	Type	3TF20 ...-0...	3TF20 ...-3..., 3TF20 ...-6..., 3TF20 ...-7...
	Size	S00	S00
<b>Ⓢ and Ⓛ rated data of the 3TF20 contactors</b>			
<b>Rated insulation voltage <math>U_i</math></b>	V AC	600	300
<b>Uninterrupted current</b>	• Open and enclosed A	16	16 (10 for solder pin connection)
<b>Maximum horsepower ratings</b> (Ⓢ and Ⓛ approved values)			
• Rated power for induction motors at 60 Hz			
- 1-phase	At 115 V hp	0.5	--
	200 V hp	1	1
	230 V hp	1.5	1
	460/575 V hp	--	--
- 3-phase	At 115 V hp	--	--
	200 V hp	3	3 (1 for 3TF20 ...-6)
	230 V hp	3	3 (1 for 3TF20 ...-6)
	460/575 V hp	5	--
<b>Overload relay</b>	• Type/Setting range	3UA7/EB 8 ... 10 A	

Contactors	Type	3TF2
	Size	
<b>Rated data of the auxiliary contacts acc. to IEC 60947-5-1 (VDE 0660 Part 200)</b>		
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	690
<b>Continuous thermal current <math>I_{th}</math> = Rated operational current <math>I_e/AC-12</math></b>	A	10
<b>AC load</b> <b>Rated operational current <math>I_e/AC-15/AC-14</math></b>		
• For rated operational voltage $U_e$		
	24 V A	4
	110 V A	4
	125 V A	4
	220 V A	4
	230 V A	4
	380 V A	3
	400 V A	3
	500 V A	2
	660 V A	1
	690 V A	1
<b>DC load</b> <b>Rated operational current <math>I_e/DC-12</math></b>		
• For rated operational voltage $U_e$		
	24 V A	4
	48 V A	2.2
	110 V A	1.1
	125 V A	1.1
	220 V A	0.5
	440 V A	--
	600 V A	--
<b>Rated operational current <math>I_e/DC-13</math></b>		
• For rated operational voltage $U_e$		
	24 V A	2.1
	48 V A	1.1
	110 V A	0.52
	125 V A	0.52
	220 V A	0.27
	440 V A	--
	600 V A	--
<b>Ⓢ, Ⓛ and Ⓜ rated data of the auxiliary contacts</b>		
<b>Rated voltage, max.</b>	V AC	600
Auxiliary switch blocks, max.	V AC	300
<b>Switching capacity</b>		A 600, Q 300
Uninterrupted current at 240 V AC	A	10

# 3RA13, 3RA14 Contactor Assemblies

## 3RA13 Reversing Contactor Assemblies

3RA13 complete units, 3 ... 45 kW

### Overview

The 3RA13 reversing contactor assemblies can be ordered as follows:

#### Sizes S00 to S3

Fully wired and tested, with mechanical and electrical interlock. For assemblies with AC operation and 50/60 Hz, a dead interval of 50 ms must be provided when used with voltages  $\geq 500$  V; a dead interval of 30 ms is recommended for use with voltages  $\geq 400$  V. These dead times do not apply to assemblies with DC operation.

#### Sizes S00 to S12

As individual parts for customer assembly.

There is also a range of accessories (auxiliary switch blocks, surge suppressors, etc.) that must be ordered separately.

For overload relays for motor protection, see "Protection Equipment --> Overload Relays".

The 3RA13 contactor assemblies have screw terminals and are suitable for screwing or snapping onto 35 mm standard mounting rails.

### Complete units

The fully wired reversing contactor assemblies are suitable for use in any climate. They are finger-safe according to EN 50274.

The contactor assemblies consist of 2 contactors with the same power, with one NC contact in the basic unit. The contactors are mechanically and electrically interlocked (NC contact interlock).

For motor protection, either 3RU11 or 3RB2... overload relays for direct mounting or stand-alone installation or thermistor motor protection tripping units must be ordered separately.

### Components for customer assembly

Assembly kits for all sizes are available for customer assembly of reversing contactor assemblies.

Contactors, overload relays, the mechanical interlock (as of size S0) and – for momentary-contact operation – auxiliary switch blocks for latching must be ordered separately.

Rated data AC-2 and AC-3 at AC 50 Hz 400 V		Size	Order No.				Assembly kit	Fully wired and tested contactor assemblies
Rating kW	Operational current $I_e$ A		Contactors	Mechanical interlock <sup>1)</sup>	Mechanical interlock <sup>2)</sup>	Mechanical interlock <sup>3)</sup>		
3	7	S00	3RT10 15	-- <sup>4)</sup>	--	--	3RA19 13-2A <sup>5)</sup>	3RA13 15-8XB30-1 ..
4	9		3RT10 16					3RA13 16-8XB30-1 ..
5.5	12		3RT10 17					3RA13 17-8XB30-1 ..
5.5	12	S0	3RT10 24	3RA19 24-1A	3RA19 24-2B	--	3RA19 23-2A <sup>6)</sup>	3RA13 24-8XB30-1 ..
7.5	17		3RT10 25					3RA13 25-8XB30-1 ..
11	25		3RT10 26					3RA13 26-8XB30-1 ..
15	32	S2	3RT10 34	3RA19 24-1A	3RA19 24-2B	--	3RA19 33-2A <sup>7)</sup>	3RA13 34-8XB30-1 ..
18.5	40		3RT10 35					3RA13 35-8XB30-1 ..
22	50		3RT10 36					3RA13 36-8XB30-1 ..
30	65	S3	3RT10 44	3RA19 24-1A	3RA19 24-2B	--	3RA19 43-2A <sup>7)</sup>	3RA13 44-8XB30-1 ..
37	80		3RT10 45					3RA13 45-8XB30-1 ..
45	95		3RT10 46					3RA13 46-8XB30-1 ..
55	115	S6	3RT10 54	--	--	3RA19 54-2A	3RA19 53-2M <sup>8)</sup>	--
75	150		3RT10 55					
90	185		3RT10 56					
110	225	S10	3RT10 64	--	--	3RA19 54-2A	3RA19 63-2A <sup>8)</sup>	--
132	265		3RT10 65					
160	300		3RT10 66					
200	400	S12	3RT10 75	--	--	3RA19 54-2A	3RA19 73-2A <sup>8)</sup>	--
250	500		3RT10 76					

1) Can be mounted onto the front.

2) Laterally mountable with one auxiliary contact.

3) Laterally mountable without auxiliary contact.

4) Interlock can only be ordered with assembly kit.

5) Assembly kit contains: mechanical interlock; connecting clips for 2 contactors; wiring modules on the top and bottom.

6) Assembly kit contains: wiring modules on the top and bottom.

7) Assembly kit contains: 2 connecting clips for contactors; wiring modules on the top and bottom.

8) Assembly kit contains: wiring module on the top and bottom.

### Function

The operating times of the individual 3RT10 contactors are rated in such a way that no overlapping of the contact making and the arcing time between two contactors can occur on reversing, providing they are interlocked by way of their auxiliary switches (NC contact interlock) and the mechanical interlock. For assemblies with AC operation and 50/60 Hz, a dead interval of 50 ms must be provided when used with voltages  $\geq 500$  V; a dead interval of 30 ms is recommended for use with voltages  $\geq 400$  V. These dead times do not apply to assemblies with DC operation.

The operating times of the individual contactors are not affected by the mechanical interlock.

The following points should be noted:

#### Size S00

- For maintained-contact operation:  
Use contactors with an NC contact in the basic unit for the electrical interlock.
- For momentary-contact operation:  
Use contactors with an NC contact in the basic unit for the electrical interlock; in addition, an auxiliary switch block with at least one NO contact for latching is required per contactor.

#### Sizes S0 to S3

- For maintained-contact operation:  
The contactors have no auxiliary contact in the basic unit; NC contacts for the electrical interlock are therefore integrated in the mechanical interlock that can be mounted on the side of each contactor (one contact each for the left and right-hand contactors).
- For momentary-contact operation:  
Electrical interlock as for maintained-contact operation; for the purpose of latching an auxiliary contact with an NO contact is additionally required for each contactor. This contact can be snapped onto the top of the contactors. Alternatively, auxiliary switch blocks mounted on the side can be used; they must be fitted onto the outside of each contactor.

If the front-mounted mechanical interlock is used for size S0 to S3 contactors, two location holes for single-pole auxiliary switch blocks are provided on the front of each S0 or S2 contactor, while three additional, single-pole auxiliary switch blocks can be snapped onto S3 contactors. The maximum auxiliary switch fittings per contactor must not be exceeded.

When size S2 and S3 contactors are combined with a front-mounted mechanical interlock, the assembly kits for 3RA19 33-2B and 3RA19 43-2B contactor assemblies cannot be used.

#### Sizes S6 to S12

To insert the mechanical interlock, the prestamped location holes positioned opposite on the contactor must be knocked out. The internal auxiliary contacts (up to 1 NO + 1 NC per contactor) can be used for the electrical interlock and latching. The mechanical interlock itself does not contain any auxiliary contacts. Additional auxiliary contacts can be used on the outside and front (on the front in the case of 3RT10) of the reversing contactor assembly.

#### Surge suppression

##### Sizes S00 to S3

All contactor assemblies can be fitted with RC elements or varistors for damping opening surges in the coil.



As with the individual contactors, the surge suppressors can either be plugged onto the top of the contactors (S00) or fitted onto the coil terminals on the top or bottom (S0 to S3).

##### Sizes S6 to S12

The contactors are fitted with varistors as standard.

### Technical specifications

The technical specifications are identical to those of the 3RT10 .. contactors listed on page 17 onwards.

The  and  approvals only apply to the complete contactor assemblies and not to the individual parts for customer assembly.

# 3RA13, 3RA14 Contactor Assemblies

## 3RA14 Contactor Assemblies for Wye-Delta Starting

3RA14 complete units, 3 ... 75 kW

### Overview

These 3RA14 contactor assemblies for wye-delta starting are designed for standard applications.

#### Note:

Contactor assemblies for wye-delta starting in special applications such as very heavy starting or wye-delta starting of special motors must be customized. Help with designing such special applications is available from Technical Assistance.

The 3RA14 contactor assemblies for wye-delta starting can be ordered as follows:

#### Sizes S00 to S3:

Fully wired and tested, with electrical interlock, dead interval of up to 10 s on reversing (size S00 with electrical and mechanical interlocks)

#### Sizes S00 to S12:

As individual parts for customer assembly.

A dead interval of 50 ms on reversing is already integrated in the time relay function.

There is also a range of accessories (auxiliary switch blocks, surge suppressors, etc.) that must be ordered separately.

For overload relays for motor protection see "Protection Equipment --> Overload Relays --> 3RB2 Solid-State Overload Relays".

The 3RA14 contactor assemblies have screw terminals and are suitable for screwing or snapping onto 35 mm standard mounting rails.

Fully wired and tested 3RA14 contactor assemblies have one unassigned NO contact which is mounted onto the front of the K3 delta contactor.

A solid-state time-delay auxiliary switch block is snapped onto the front of the complete contactor assemblies, size S00 up to 7.5 kW, while a timing relay is mounted onto the side of sizes S0 to S3, 11 kW to 75 kW.

Rated data at AC 50 Hz 400 V			Size			Accessories for customer assembly			
Rating kW	Operational current $I_e$ A	Motor current A		Line/delta contactor	Star contactor	Order No. complete	Timing relay	Assembly kit A, for double infeed	
5.5	12	9.5 ... 13.8	<b>S00-S00-S00</b>	3RT10 15	3RT10 15	<b>3RA14 15-8XB31-1...</b> <b>3RA14 16-8XB31-1...</b>	3RT19 16-2G.51	--	
7.5	17	12.1 ... 17		3RT10 17			3RP15 74-1N.30		
11	25	19 ... 25	<b>S0-S0-S0</b>	3RT10 24	3RT10 24	<b>3RA14 23-8XC21-1...</b> <b>3RA14 25-8XC21-1...</b>	3RP15 74-1N.30	--	
15	32	24.1 ... 34		3RT10 26					
18.5	40	34.5 ... 40							
22	50	31 ... 43	<b>S2-S2-S0</b>	3RT10 34	3RT10 26	<b>3RA14 34-8XC21-1...</b> --	3RP15 74-1N.30	3RA19 33-2C <sup>3)</sup>	
30	50	48.3 ... 65		3RT10 35					
37	80	62.1 ... 77.8	<b>S2-S2-S2</b>		3RT10 34	<b>3RA14 35-8XC21-1...</b> <b>3RA14 36-8XC21-1...</b>		3RA19 33-2B <sup>3)</sup>	
45	86	69 ... 86		3RT10 36					
55	115	77.6 ... 108.6	<b>S3-S3-S2</b>	3RT10 44	3RT10 35	<b>3RA14 44-8XC21-1...</b> <b>3RA14 45-8XC21-1...</b>	3RP15 74-1N.30	3RA19 43-2C <sup>3)</sup>	
75	150	120.7 ... 150		3RT10 45	3RT10 36				
90	160	86 ... 160	<b>S6-S6-S3</b>	3RT10 54	3RT10 44	--	3RP15 74-1N.30	--	
110	195	86 ... 195							
132	230	86 ... 230		3RT10 55	3RT10 45				
160	280	86 ... 280			3RT10 56		3RT10 46		
200	350	95 ... 350	<b>S10-S10-S6</b>	3RT10 64	3RT10 54	--	3RP15 74-1N.30	--	
250	430	95 ... 430		3RT10 65	3RT10 55				
315	540	277 ... 540	<b>S12-S12-S10</b>	3RT10 75	3RT10 64	--	3RP15 74-1N.30	--	
355	610	277 ... 610							
400	690	277 ... 690							
500	850	277 ... 850		3RT10 76	3RT10 65 3RT10 66				

- 1) Assembly kit contains mechanical interlock, 3 connecting clips; wiring modules on the top (connection between line and delta contactor) and on the bottom (connection between delta and star contactor); star jumper.
- 2) Assembly kit contains 5 connecting clips; wiring modules on the top (connection between line and delta contactor) and on the bottom (connection between delta and star contactor); star jumper.

- 3) Assembly kit contains wiring module on the bottom (connection between delta and star contactor) and star jumper.
- 4) Wiring module on top from reversing contactor assembly (note conductor cross-sections).



# 3RA13, 3RA14 Contactor Assemblies

## 3RA14 Contactor Assemblies for Wye-Delta Starting

3RA14 complete units, 3 ... 75 kW

### Components for customer assembly

Assembly kits with wiring modules and, if necessary, mechanical connectors are available for contactor assemblies for wye-delta starting. Contactors, overload relays, wye-delta timing relays, auxiliary switches for electrical interlock – if required also feeder terminals, mechanical interlocks (exception: In the case of the assembly kit for size S00 contactor assemblies the mechanical interlock between the delta contactor and the star contactor is included in the kit) and base plates – must be ordered separately.

The wiring kits for sizes S00 and S0 contain the top and bottom main conducting path connections between the line and delta contactors (top) and between the delta and star contactors (bottom).

In the case of sizes S2 to S12 only the bottom main conducting path connection between the delta and star contactors is included in the wiring module, owing to the larger conductor cross-section at the infeed.

### Motor protection

Overload relays or thermistor motor protection tripping units can be used for overload protection.

The overload relay can be either mounted onto the line contactor or separately fitted. It must be set to 0.58 times the rated motor current.

### Note:

The selection of contactor types refers to fused configurations (see table on page 88).

Assembly kit B, for single infeed	Star jumper	Base plates	Overload relay, thermal (CLASS 10 trip class)		Overload relay, solid-state (CLASS 10 trip class)	
			Setting range	Order No.	Setting range	Order No.
3RA19 13-2B <sup>1)</sup>	3RT19 16-4BA31	--	A 5.5 ... 8 7 ... 10	<b>3RU11 16-1HB0</b> <b>3RU11 16-1JB0</b>	A 3 ... 12	<b>3RB20 16-1SB0</b>
3RA19 23-2B <sup>2)</sup>	3RT19 26-4BA31	--	11 ... 16 14 ... 20 20 ... 25	<b>3RU11 26-4AB0</b> <b>3RU11 26-4BB0</b> <b>3RU11 26-4DB0</b>	6 ... 25	<b>3RB20 26-1QB0</b>
3RV19 35-1A	3RT19 26-4BA31	3RA19 32-2E	18 ... 25 28 ... 40	<b>3RU11 36-4DB0</b> <b>3RU11 36-4FB0</b>	12.5 ... 50	<b>3RB20 36-1UB0</b>
	3RT19 36-4BA31	3RA19 32-2F	36 ... 45 40 ... 50	<b>3RU11 36-4GB0</b> <b>3RU11 36-4HB0</b>		
--	3RT19 36-4BA31	3RA19 42-2E	45 ... 63 70 ... 90	<b>3RU11 46-4JB0</b> <b>3RU11 46-4LB0</b>	25 ... 100	<b>3RB20 46-1EB0</b>
3RA19 53-3D <sup>4)</sup>	3RT19 46-4BA31	3RA19 52-2E	--	--	50 ... 200	<b>3RB20 56-1FW2</b>
						<b>3RB20 56-1FC2</b>
--	3RT19 56-4BA31	3RA19 62-2E	--	--	55 ... 250	<b>3RB20 66-1GC2</b>
--	3RT19 66-4BA31	3RA19 72-2E	--	--	160 ... 630	<b>3RB20 66-1MC2</b>

For footnotes see page 86.

# 3RA13, 3RA14 Contactor Assemblies

## 3RA14 Contactor Assemblies for Wye-Delta Starting

3RA14 complete units, 3 ... 75 kW

### Function

Wye-delta starting can only be used either if the motor normally operates in a  $\Delta$  connection or starts softly or if the load torque during Y starting is low and does not increase sharply. On the Y step the motors can carry approximately 50 % (class KL 16) or 30 % (class KL 10) of their rated torque; The tightening torque is approximately 1/3 of that during direct on-line starting. The starting current is approximately 2 to 2.7 times the rated motor current.

The changeover from Y to  $\Delta$  must not be effected until the motor has run up to rated speed. Operating mechanisms which require this changeover to be performed earlier are unsuitable for wye-delta starting.

The ratings given in the table are only applicable to motors with a starting current ratio  $I_A \leq 8.4 \times I_N$  and using either a 3RT19 16-2G or 3RT19 26-2G solid-state time-delay auxiliary

switch block with a wye-delta function or a 3RP15 74. wye-delta timing relay with a dead interval on reversing of approximately 50 ms.

### Surge suppression

#### Sizes S00 to S3:

All contactor assemblies can be fitted with RC elements, varistors or diode assemblies for damping opening surges in the coil.

As with the individual contactors, the surge suppressors can either be plugged onto the top of the contactors (S00) or fitted onto the coil terminals on the top or bottom (S0 to S3).

#### Sizes S6 to S12:

The contactors are fitted with varistors as standard.

### Technical specifications

**Short-circuit protection with fuses for motor feeders with short-circuit currents up to 50 kA and 690 V.**  
For overload relays see "Protection Equipment --> Overload Relays --> 3RB2 Solid-State Overload Relays".

Rating kW	Sizes of contactors K1-K3-K2	Rated motor current A	Overload relay Type	Setting range A (the overload relays must be set to 0.58 times the rated motor current)	Permissible back-up fuses for starters, comprising contactor assemblies and overload relays.					
					Single or double infeed <sup>1)</sup> Fuse links LV HRC DIAZED NEOZED gL/gG operational class Type of coordination		LV HRC TYPE 3ND Operational class aM Type of coordination	@ listed fuses CLASS RK5/L	British Standard Fuses BS88 Type of coordination	
					"1" A	"2" A	"2" A	A	"1" A	"2" A
5.5	S00-S00-S00	12	3RU11 16-1HB0	5.5 ... 8	35	20	10	30	35	20
7.5	S00-S00-S00	16	3RU11 16-1JB0	7 ... 10	35	20	16	40	35	20
11	S0-S0-S0	22	3RU11 26-4AB0	11 ... 16	63	25	20	60	63	25
15	S0-S0-S0	29	3RU11 26-4BB0	14 ... 20	100	35	20	80	100	35
18.5	S0-S0-S0	35	3RU11 26-4DB0	20 ... 25	100	35	20	100	100	35
22	S2-S2-S0	41	3RU11 36-4EB0	22 ... 32	125	63	35	125	125	63
30	S2-S2-S0	55	3RU11 36-4FB0	28 ... 40	125	63	50	150	125	63
37	S2-S2-S2	66	3RU11 36-4GB0	36 ... 45	125	63	50	175	125	63
45	S2-S2-S2	80	3RU11 36-4HB0	40 ... 50	160	80	50	200	160	80
55	S3-S3-S2	97	3RU11 46-4KB0	57 ... 75	250	125	63	300	250	125
75	S3-S3-S2	132	3RU11 46-4LB0	70 ... 90	250	160	80	350	250	160
90	S6-S6-S3	160	3RB20 56-1FC2	50 ... 200	355	315	160	450	355	250
110	S6-S6-S3	195	3RB20 56-1FC2	50 ... 200	355	315	160	450	355	250
132	S6-S6-S3	230	3RB20 56-1FC2	50 ... 200	355	315	160	500	355	315
160	S6-S6-S3	280	3RB20 56-1FC2	50 ... 200	355	315	200	500	355	315
200	S10-S10-S6	350	3RB20 66-1GC2	55 ... 250	500	400	250 <sup>2)</sup>	700	500	400
250	S10-S10-S6	430	3RB20 66-1MC2	160 ... 630	500	400 <sup>2)</sup>	315 <sup>2)</sup>	800	500	400
315	S12-S12-S10	540	3RB20 66-1MC2	160 ... 630	630	500 <sup>2)</sup>	400 <sup>2)</sup>	1000	630	450 <sup>2)</sup>
355	S12-S12-S10	610	3RB20 66-1MC2	160 ... 630	630	500 <sup>2)</sup>	400 <sup>2)</sup>	1000	630	450 <sup>2)</sup>
400	S12-S12-S10	690	3RB20 66-1MC2	160 ... 630	630 <sup>2)</sup>	500 <sup>2)</sup>	400 <sup>2)</sup>	1000	630 <sup>2)</sup>	450 <sup>2)</sup>
500	S12-S12-S10	850	3RB20 66-1MC2	160 ... 630	630 <sup>2)</sup>	500 <sup>2)</sup>	500 <sup>2)</sup>	1200	630 <sup>2)</sup>	500 <sup>2)</sup>

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

2) Only double infeed with separately fused feeder lines for line and delta contactor is possible because the maximum possible fuse value lies far below the rated motor current.

# 3RA13, 3RA14 Contactor Assemblies

## 3RA14 Contactor Assemblies for Wye-Delta Starting

3RA14 complete units, 3 ... 75 kW

Starter	Sizes <b>S..S..S..</b> Type <b>3RA... ..</b>		<b>00-00-00</b> <b>14 15</b>	<b>00-00-00</b> <b>14 16</b>	<b>0-0-0</b> <b>14 23</b>	<b>0-0-0</b> <b>14 25</b>	<b>2-2-0</b> <b>14 34</b>	<b>2-2-2</b> <b>14 35</b>	<b>2-2-2</b> <b>14 36</b>	<b>3-3-2</b> <b>14 44</b>	<b>3-3-2</b> <b>14 45</b>		
<i>All technical specifications not mentioned in the table below are identical to those of the individual 3RT contactors and 3RU overload relays</i>													
<b>Mechanical endurance</b>		Operating cycles	3 million										
<b>Short-circuit protection without overload relay</b>			1)										
Maximum rated current of the fuse													
<b>Main circuit</b>													
Fuse links, gL/gG													
LV HRC 3NA, DIAZED 5SB, NEOZED 5SE													
Single or double infeed													
acc. to IEC 60947-4-1/ EN 60947-4-1			• Type of coordination *1*	A	35	35	63	100	125	125	160	250	250
			• Type of coordination *2*	A	20	20	25	35	63	63	80	125	160
<b>Control circuit</b>													
Fuse links, gL/gG			A	10									
DIAZED 5SB, NEOZED 5SE (short-circuit current $I_k \leq 1$ kA)			A	6 <sup>2)</sup> , if the auxiliary contact of the overload relay is connected in the contactor coil circuit									
Miniature circuit breaker with C characteristic			A	10									
			A	6 <sup>2)</sup> , if the auxiliary contact of the overload relay is connected in the contactor coil circuit									
<b>Size of individual contactors</b>													
• K1 line contactor			Type 3RT	10 15	10 17	10 24	10 26	10 34	10 35	10 36	10 44	10 45	
• K3 delta contactor			Type 3RT	10 15	10 17	10 24	10 26	10 34	10 35	10 36	10 44	10 45	
• K2 star contactor			Type 3RT	10 15	10 15	10 24	10 24	10 26	10 34	10 34	10 35	10 36	
<b>Unassigned auxiliary contacts of the individual contactors</b>			3)										
<b>Current-carrying capacity with reversing time up to 10 s</b>													
• Rated operational current $I_e$			At 400 V	A	12	17	25	40	65	80	86	115	150
			500 V	A	8.7	11.3	20.8	31.2	55.4	69.3	86	112.6	138.6
			690 V	A	6.9	9	20.8	22.5	53.7	69.3	69.3	98.7	138.6
• Rated power for induction motors at 50 Hz and 60 Hz and			At 230 V	kW	3.3	4.7	7.2	12	20.4	25.5	27.8	37	49
			400 V	kW	5.8	8.2	12.5	21	35	44	48	65	85
			500 V	kW	5.3	6.9	13	20.5	38	48	60	80	98
			690 V	kW	5.8	7.5	18	20.4	51	66	67	97	136
			1000 V	kW	--	--	--	--	--	--	--	--	--
• <b>Switching frequency</b> with overload relay				h <sup>-1</sup>	15	15	15	15	15	15	15	15	15
<b>Current-carrying capacity with reversing time up to 15 s</b>													
• Rated operational current $I_e$			At 400 V	A	12	17	25	31	44	57	67	97	106
			500 V	A	8.7	11.3	20.8	31	44	57	67	97	106
			690 V	A	6.9	9	20.8	22.5	44	57	67	97	106
• Rated power for induction motors at 50 Hz and 60 Hz and			At 230 V	kW	3.3	4.7	7.2	9.4	13.8	18.2	21.6	32	35
			400 V	kW	5.8	8.2	12.5	16.3	24	31.6	38	55	60
			500 V	kW	5.3	6.9	13	20.4	30	40	47	69	75
			690 V	kW	5.8	7.5	18	20.4	42	55	65	95	104
			1000 V	kW	--	--	--	--	--	--	--	--	--
• <b>Switching frequency</b> with overload relay				h <sup>-1</sup>	15	15	15	15	15	15	15	15	15
<b>Current-carrying capacity with reversing time up to 20 s</b>													
• Rated operational current $I_e$			At 400 V	A	12	17	25	28	39	51	57	85	92
			500 V	A	8.7	11.3	20.8	28	39	51	57	85	92
			690 V	A	6.9	9	20.8	22.5	39	51	57	85	92
• Rated power for induction motors at 50 Hz and 60 Hz and			At 230 V	kW	3.3	4.7	7.2	8.5	12.2	16.3	18.4	28	30
			400 V	kW	5.8	8.2	12.5	14.7	21.3	28	32	48	52
			500 V	kW	5.3	6.9	13	18.4	26.7	35	40	60	65
			690 V	kW	5.8	7.5	18	20.4	37	49	55	83	90
			1000 V	kW	--	--	--	--	--	--	--	--	--
• <b>Switching frequency</b> with overload relay				h <sup>-1</sup>	15	15	15	15	15	15	15	15	15

1) For short-circuit protection with overload relays see "Protection Equipment --> Overload Relays --> 3RB2 Solid-State Overload Relays".

2) Up to  $I_k < 0.5$  kA;  $\leq 260$  V.

3) For circuit diagrams of the control circuit see page 238.

# 3TD, 3TE Contactor Assemblies

## 3TD6 reversing contactor assemblies, 335 kW

### Overview

The contactor assemblies are suitable for use in any climate and the contactors are mechanically interlocked. They are finger-safe according to EN 50274.

Complete units and components for customer assembly are available. For motor protection, either overload relays for stand-alone installation or thermistor motor protection tripping units must be ordered separately.

#### Complete units

3TD68 contactor assemblies each consist of two mechanically interlocked 3TF68 contactors. Electrical interlocking is wired. The main and control circuits are wired according to the schematics.

An internal circuit diagram, a type designation and an unit labeling plate are provided on a common cover.

### Auxiliary contacts

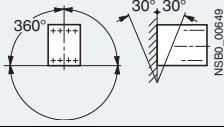
The contactor assemblies each have 2 NO + 2 NC contacts per contactor. 1 NO + 1 NC contacts with momentary-contact operation and 2 NO + 1 NC contacts with continuous operation are unassigned.

### Function

The operating times of the individual contactors are rated in such a way that no overlapping of the contact making and the arcing time between two contactors can occur on reversing, providing they are interlocked via their auxiliary switches and the operating mechanisms.

The operating times of the individual contactors are not affected by the mechanical interlock.

### Technical specifications

Contactors	Type	3TD68	
<b>General data</b>			
<b>Permissible mounting position, installation instructions<sup>1)</sup></b>			
The contactors are designed for operation on a vertical mounting surface.			
			
<b>Ⓢ and Ⓜ ratings</b>			
<b>Rated insulation voltage</b>		V AC	600
<b>Uninterrupted current</b> enclosed		A	550
<b>Maximum horsepower ratings</b> (Ⓢ and Ⓜ approved values)			
• Rated power for induction motors at 60 Hz	At 200 V	hp	200
	230 V	hp	229
	460 V	hp	464
	575 V	hp	582
<b>NEMA/EEMAC ratings</b>			
	NEMA/EEMAC SIZE		6
• Uninterrupted current	- Open	A	600
	- Enclosed	A	540
• Rated power for induction motors with 60 Hz	At 200 V	hp	150
	230 V	hp	200
	460 V	hp	400
	575 V	hp	400
<b>Overload relays</b>	• Type		3RB20 66
	• Setting range	A	160 ... 630

For short-circuit protection with overload relays see "Protection Equipment --> Overload Relays --> 3RB2 Solid-State Overload Relays".

The technical specifications are identical to those of the 3TF68 individual contactors.

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

For the unassigned auxiliary contacts of the individual contactors, see "Circuit Diagrams of the Control Circuits".

1) If the contactors are mounted at a 90° angle (conducting paths horizontally one above the other), the following reductions apply: switching frequency: to 80 % of the standard values.

# 3TD, 3TE Contactor Assemblies

3TE6 contactor assemblies for wye-delta starting, 630 kW

## Overview

The contactor assemblies are suitable for use in any climate. They are finger-safe according to EN 50274.

3TE contactor assemblies are available as complete units and components for customer assembly.

The complete unit combinations are optionally supplied without a main conducting path connection between the line contactor and the delta contactor.

### Motor protection

3TE68 contactor assemblies are supplied without overload protection. Overload relays or thermistor motor protection tripping units must be ordered separately.

The overload relay can be either mounted onto the line contactor or separately fitted. It must be set to 0.58 times the rated motor current.

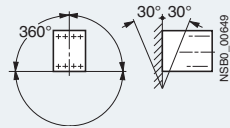
## Function

Wye-delta starting can only be used either if the motor normally operates in a  $\Delta$  connection or starts softly or if the load torque during Y starting is low and does not increase sharply. On the Y step the motors can carry approximately 50 % (class KL 16) or 30 % (class KL 10) of their rated torque; The tightening torque is approximately 1/3 of that during direct on-line starting. The starting current is approximately 2 to 2.7 times the rated motor current.

The changeover from Y to  $\Delta$  must not be effected until the motor has run up to rated speed. Operating mechanisms which require this changeover to be performed earlier are unsuitable for wye-delta starting.

The ratings given in the selection table are only applicable to motors with a starting current ratio of  $I_A \leq 8.4 \times I_N$  and using a 3RP15 74 wye-delta timing relay with a dead interval of approximately 50 ms on reversing.

## Technical specifications

Starter	Type	3TE68	
<b>General data</b>			
<b>Permissible mounting position, installation instructions<sup>1)</sup></b>			
The contactors are designed for operation on a vertical mounting surface.			
			
<b>Mechanical endurance</b>	Operating cycles	3 million	
<b>Type of individual contactors</b>	<ul style="list-style-type: none"> <li>• K1 line contactor</li> <li>• K3 delta contactor</li> <li>• K2 star contactor</li> </ul>	Type	3TF68
		Type	3TF68
		Type	3RT10 75
<b>Unassigned auxiliary contacts of the individual contactors</b>			
2)			
<b>Current-carrying capacity with reversing time up to 10 s</b>			
• Rated operational current $I_e$	Up to 690 V	A	1090
• Rated power for induction motors at 50 Hz	At 230 V	kW	355
	400 V	kW	612
	500 V	kW	800
	690 V	kW	1046
• <b>Switching frequency</b> with overload relay		h <sup>-1</sup>	3
<b>Current-carrying capacity with reversing time up to 15 s</b>			
• Rated operational current $I_e$	Up to 500 V	A	923
	690 V	A	883
• Rated power for induction motors at 50 Hz	At 230 V	kW	295
	400 V	kW	515
	500 V	kW	677
	690 V	kW	885
• <b>Switching frequency</b> with overload relay		h <sup>-1</sup>	2
<b>Current-carrying capacity with reversing time up to 20 s</b>			
• Rated operational current $I_e$	Up to 500 V	A	800
	690 V	A	765
• Rated power for induction motors at 50 Hz	At 230 V	kW	244
	400 V	kW	444
	500 V	kW	590
	690 V	kW	770
• <b>Switching frequency</b> with overload relay		h <sup>-1</sup>	2
<b>Short-circuit protection</b>			
<b>Main circuit</b>			
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"	A	1000
	• Type of coordination "2"	A	500 <sup>3)</sup>
<b>Auxiliary circuit</b>			
• Fuse links gL/gG (weld-free protection at $I_k \geq 1$ kA) DIAZED 5SB, NEOZED 5SE		A	10
• Or miniature circuit breakers with C characteristic ( $I_k < 400$ A)			

1) If the contactors are mounted at a 90° angle (conducting paths horizontally one above the other), the following reductions apply: switching frequency: to 80 % of the standard values.

2) See "Circuit diagrams of the control circuits".

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

# 3TD, 3TE Contactor Assemblies

## 3TE6 contactor assemblies for wye-delta starting, 630 kW

Contactor assembly	Type	3TE68
<b>Short-circuit protection with fuses for motor feeders with short-circuit currents up to 50 kA and 690 V</b>		
<b>Rated motor current</b>	A	277 ... 1090
<b>Overload relays</b>	Type	3RB20 66
<b>Setting range</b> (the overload relays must be set to 0.58 times the rated motor current)	A	160 ... 630
<b>Permissible back-up fuses for starters,</b> comprising contactor assemblies and overload relays. Single or double infeed <sup>1)</sup>		
<ul style="list-style-type: none"> <li>• Fuse links LV HRC Type 3NA, DIAZED Type 5SB, NEOZED Type 5SE                             <ul style="list-style-type: none"> <li>- Type of coordination "1"</li> <li>- Type of coordination "2"</li> </ul> </li> <li>• Fuse links LV HRC type 3ND, aM operational class                             <ul style="list-style-type: none"> <li>- Type of coordination "2"</li> </ul> </li> <li>• Fuse links, Siemens Canada, HRC fuses, Type II</li> <li>• Fuse links UL-listed fuses CLASS L</li> <li>• Fuse links British Standard Fuses BS88                             <ul style="list-style-type: none"> <li>- Type of coordination "1"</li> <li>- Type of coordination "2"</li> </ul> </li> </ul>	A	1000
	A	500
	A	630
	A	1000
	A	1200
	A	1000
	A	500

For short-circuit protection with overload relays see "Protection Equipment --> Overload Relays --> 3RB2 Solid-State Overload Relays".

Use double infeed for higher rated motor currents (see "Circuit diagram").

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

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

### Overview

#### AC and DC operation (size S3)

#### UC operation (AC/DC) (sizes S6 to S12)

IEC 60947, EN 60947 (VDE 0660)

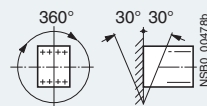

The contactors are suitable for use in any climate. They are finger-safe according to EN 50274.

3RT14 contactors are used for switching resistive loads (AC-1) or as contactors, for example, for variable-speed operating mechanisms that normally only have to carry the current.

The accessories for the 3RT10 contactors can also be used here.

For more detailed descriptions about the sizes S6 to S12, see "3RT10 Contactors, 3-pole, 3 ... 250 kW".

### Technical specifications

Contactor	Type Size	3RT14 46 S3	
<b>General data</b>			
<b>Permissible mounting position</b> The contactors are designed for operation on a vertical mounting surface.	<ul style="list-style-type: none"> <li>AC and DC operation</li> </ul>	 <p>For DC operation and 22.5 °C inclination towards the front, operating range 0.85 ... 1.1 x U<sub>s</sub></p>	
Upright mounting position:	<ul style="list-style-type: none"> <li>AC operation</li> <li>DC operation</li> </ul>	 <p>Special version required. --</p>	
<b>Mechanical endurance</b>	Operating cycles	10 million	
<b>Electrical endurance in operating cycles</b> <b>Utilization category AC-1 at I<sub>e</sub></b>	Operating cycles	0.5 million	
<b>Rated insulation voltage U<sub>i</sub></b> (degree of pollution 3)	V	1000	
<b>Rated impulse withstand voltage U<sub>imp</sub></b>	kV	6	
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N	V	690	
<b>Mirror contacts</b> • A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.	<ul style="list-style-type: none"> <li>Removable auxiliary switch block</li> <li>Permanently fitted auxiliary switch block</li> </ul>	Yes, acc. to EN 60947-4-1, Appendix F Acc. to Swiss regulations (SUVA) on request	
<b>Permissible ambient temperature</b>	<ul style="list-style-type: none"> <li>During operation °C</li> <li>During storage °C</li> </ul>	-25 ... +60 -55 ... +80	
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C		IP20 (terminal compartment IP00), AC coil assembly IP40, DC coil assembly IP30	
<b>Touch protection</b> acc. to EN 50274		Finger-safe	
<b>Shock resistance</b>			
<ul style="list-style-type: none"> <li>Rectangular pulse</li> <li>Sine pulse</li> </ul>	<ul style="list-style-type: none"> <li>AC and DC operation</li> <li>AC and DC operation</li> </ul>	<ul style="list-style-type: none"> <li>g/ms</li> <li>g/ms</li> </ul>	<ul style="list-style-type: none"> <li>6.8/5 and 4/10</li> <li>10.6/5 and 6.2/10</li> </ul>
<b>Conductor cross-sections</b>		1)	
<b>Short-circuit protection for contactors without overload relays</b>			
<b>Main circuit</b> Fuse links, gL/gG operational class, LV HRC, 3NA	<ul style="list-style-type: none"> <li>Type of coordination "1"</li> </ul>	A	250
Fuse links, gR operational class, SITOR 3NE	<ul style="list-style-type: none"> <li>Type of coordination "2"</li> </ul>	A	250
<b>Auxiliary circuit</b>			
<ul style="list-style-type: none"> <li>Fuse links gL/gG (weld-free protection at I<sub>k</sub> ≥ 1 kA) DIAZED 5SB, NEOZED 5SE</li> <li>Or miniature circuit breakers with C characteristic (I<sub>k</sub> &lt; 400 A)</li> </ul>		A	10
		A	10

1) For conductor cross-sections see page 96.

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

Contactor	Type Size	3RT14 46 S3	
<b>Control</b>			
<b>Magnetic coil operating range</b>		AC/DC	0.8 ... 1.1 x $U_s$
<b>Power consumption of the magnetic coils</b> (when coil is cold and $1.0 \times U_s$ )			
<b>Standard version:</b>			
• AC operation, 50 Hz	Closing	VA	270
	P.f.		0.68
• AC operation, 50/60 Hz	Closed	VA	22
	P.f.		0.27
	Closing	VA	298/274
	P.f.		0.7/0.62
• AC operation, 50/60 Hz	Closed	VA	27/20
	P.f.		0.29/0.31
	Closing	VA	270
	P.f.		0.68
• AC operation, 50 Hz	Closed	VA	22
	P.f.		0.27
	Closing	VA	300
	P.f.		0.52
• AC operation, 60 Hz	Closed	VA	21
	P.f.		0.29
	Closing = Closed	W	15
	• DC operation	Closing = Closed	W
<b>Operating times for <math>0.8 \dots 1.1 \times U_s</math><sup>1)</sup></b>			
Total break time = Opening delay + Arcing time			
• AC operation	- Closing delay	ms	17 ... 90
	- Opening delay	ms	10 ... 25
• DC operation	- Closing delay	ms	90 ... 230
	- Opening delay	ms	14 ... 20
• Arcing time		ms	10 ... 15
<b>Operating times for <math>1.0 \times U_s</math><sup>1)</sup></b>			
• AC operation	- Closing delay	ms	18 ... 30
	- Opening delay	ms	11 ... 23
• DC operation	- Closing delay	ms	100 ... 120
	- Opening delay	ms	16 ... 20

1) The OFF-delay of the NO contact and the ON-delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (varistor +2 ms to 5 ms, diode assembly: 2 to 6 times).



# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT14 Contactors for Switching Resistive Loads (AC-1)




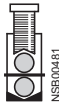
3-pole, 140 ... 690 A

Contactors	Type Size	<b>3RT14 46 S3</b>	
<b>Main circuit</b>			
<b>AC capacity</b>			
<b>Utilization category AC-1, switching resistive loads</b>			
• Rated operational currents $I_e$	At 40 °C up to 690 V	A	140
	At 60 °C up to 690 V	A	130
	At 1000 V	A	60
• Ratings of AC loads P.f. = 0.95 (at 60 °C)	At 230 V	kW	50
	400 V	kW	86
	500 V	kW	107
	690 V	kW	148
	1000 V	kW	98
• Minimum conductor cross-section for loads with $I_e$	At 40 °C	mm <sup>2</sup>	50
	At 60 °C	mm <sup>2</sup>	50
<b>Utilization category AC-2 and AC-3</b>			
With an electrical endurance of 1.3 million operating cycles			
• Rated operational current $I_e$	Up to 690 V	A	44
• Rated power of slipping or squirrel-cage motors at 50 Hz and 60 Hz (at 60 °C)	At 230 V	kW	12.7
	400 V	kW	22
	500 V	kW	29.9
	690 V	kW	38.2
<b>Power loss per conducting path</b>	At $I_e$ /AC-1	W	12.5
<b>Load rating with DC</b>			
<b>Utilization category DC-1, switching resistive loads (<math>L/R \leq 1</math> ms)</b>			
• Rated operational currents $I_e$ (at 60 °C)			
- 1 conducting path	Up to 24 V	A	130
	60 V	A	80
	110 V	A	12
	220 V	A	2.5
	440 V	A	0.8
	600 V	A	0.48
- 2 conducting paths in series	Up to 24 V	A	130
	60 V	A	130
	110 V	A	130
	220 V	A	13
	440 V	A	2.4
	600 V	A	1.3
- 3 conducting paths in series	Up to 24 V	A	130
	60 V	A	130
	110 V	A	130
	220 V	A	130
	440 V	A	6
	600 V	A	3.4
<b>Utilization category DC-3/DC-5</b>			
<b>Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>			
• Rated operational currents $I_e$ (at 60 °C)			
- 1 conducting path	Up to 24 V	A	6
	60 V	A	3
	110 V	A	1.25
	220 V	A	0.35
	440 V	A	0.15
	600 V	A	0.1
- 2 conducting paths in series	Up to 24 V	A	130
	60 V	A	130
	110 V	A	130
	220 V	A	1.75
	440 V	A	0.42
	600 V	A	0.27
- 3 conducting paths in series	Up to 24 V	A	130
	60 V	A	130
	110 V	A	130
	220 V	A	4
	440 V	A	0.8
	600 V	A	0.45
<b>Switching frequency</b>			
<b>Switching frequency <math>z</math> in operating cycles/hour</b>			
• Contactors without overload relays	No-load switching frequency AC	1/h	5000
	No-load switching frequency DC	1/h	1000
• Rated operation	Acc. to AC-1 (AC/DC)	1/h	650
	Acc. to AC-3 (AC/DC)	1/h	1000
Dependence of the switching frequency $z'$ on the operational current $I'$ and operational voltage $U'$ : $z' = z \cdot (I_e/I') \cdot (400 V/U')^{1.5} \cdot 1/h$ .			

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

Contactors	Type Size	3RT14 46 S3	
<b>Conductor cross-sections</b>			
(1 or 2 conductors can be connected) <b>Front clamping point connected</b> 	<b>Main conductors:</b> <u>With box terminal</u>		 <b>Screw terminals</b>
	<ul style="list-style-type: none"> <li>• Finely stranded with end sleeve</li> <li>• Finely stranded without end sleeve</li> <li>• Solid</li> <li>• Stranded</li> <li>• Ribbon cable conductors (number x width x thickness)</li> <li>• AWG cables, solid or stranded</li> </ul>	<ul style="list-style-type: none"> <li>mm<sup>2</sup> 2.5 ... 50</li> <li>mm<sup>2</sup> 4 ... 50</li> <li>mm<sup>2</sup> 2.5 ... 16</li> <li>mm<sup>2</sup> 4 ... 70</li> <li>mm 6 x 9 x 0.8</li> <li>AWG 10 ... 2/0</li> </ul>	
<b>Rear clamping point connected</b> 	<ul style="list-style-type: none"> <li>• Finely stranded with end sleeve</li> <li>• Finely stranded without end sleeve</li> <li>• Solid</li> <li>• Stranded</li> <li>• Ribbon cable conductors (number x width x thickness)</li> <li>• AWG cables, solid or stranded</li> </ul>	<ul style="list-style-type: none"> <li>mm<sup>2</sup> 2.5 ... 50</li> <li>mm<sup>2</sup> 10 ... 50</li> <li>mm<sup>2</sup> 2.5 ... 16</li> <li>mm<sup>2</sup> 10 ... 70</li> <li>mm 6 x 9 x 0.8</li> <li>AWG 10 ... 2/0</li> </ul>	
<b>Both clamping points connected</b> 	<ul style="list-style-type: none"> <li>• Finely stranded with end sleeve</li> <li>• Finely stranded without end sleeve</li> <li>• Solid</li> <li>• Stranded</li> <li>• Ribbon cable conductors (number x width x thickness)</li> <li>• AWG cables, solid or stranded</li> <li>• Terminal screws - Tightening torque</li> </ul>	<ul style="list-style-type: none"> <li>mm<sup>2</sup> max. 2 x 35</li> <li>mm<sup>2</sup> max. 2 x 35</li> <li>mm<sup>2</sup> max. 2 x 16</li> <li>mm<sup>2</sup> max. 2 x 50</li> <li>mm 2 x (6 x 9 x 0.8)</li> <li>AWG 2 x (10 ... 1/0)</li> <li>Nm 4 ... 6 (36 ... 53 lb.in)</li> </ul>	
<b>Connection for drilled copper bars</b>	Max. width <sup>1)</sup>	mm	10
	<b>Main conductors:</b> <u>Without box terminal with cable lugs<sup>2)</sup></u>		
	<ul style="list-style-type: none"> <li>• Finely stranded with cable lug</li> <li>• Stranded with cable lug</li> <li>• AWG cables, solid or stranded</li> </ul>	<ul style="list-style-type: none"> <li>mm<sup>2</sup> 10 ... 50<sup>3)</sup></li> <li>mm<sup>2</sup> 10 ... 70<sup>3)</sup></li> <li>AWG 7 ... 1/0</li> </ul>	
	<b>Auxiliary conductors:</b>		
	<ul style="list-style-type: none"> <li>• Solid</li> <li>• Finely stranded with end sleeve</li> <li>• AWG cables, solid or stranded</li> <li>• Terminal screws - Tightening torque</li> </ul>	<ul style="list-style-type: none"> <li>mm<sup>2</sup> 2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5)</li> <li>mm<sup>2</sup> 2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5)</li> <li>AWG 2 x (20 ... 16) 2 x (18 ... 14) 1 x 12</li> <li>M3</li> <li>Nm 0.8 ... 1.2 (7 ... 10.3 lb.in)</li> </ul>	acc. to IEC 60947; max. 2 x (0.75 ... 4)

1) If bars larger than 12 x 10 mm are connected, a 3RT19 46-4EA1 terminal cover is needed to comply with the phase clearance.

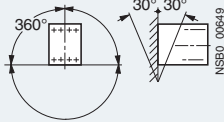
2) When connecting rails which are larger than 25 mm<sup>2</sup>, the 3RT19 46-4EA1 terminal cover must be used to keep the phase clearance.

3) Only with crimped cable lugs according to DIN 46234. Cable lug max. 20 mm wide.

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

Contactors	Type Size	3RT14 56 S6	3RT14 66 S10	3RT14 76 S12	
<b>General data</b>					
<b>Permissible mounting position</b> The contactors are designed for operation on a vertical mounting surface.					
<b>Mechanical endurance</b>	Operating cycles	10 million			
<b>Electrical endurance</b> Utilization category AC-1 at $I_e$	Operating cycles	0.5 million			
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	1000			
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	kV	8			
<b>Protective separation</b> between the coil and the auxiliary contacts and main contacts acc. to EN 60947-1, Appendix N	V	690			
<b>Mirror contacts</b> 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			
<b>Permissible ambient temperature</b>	<ul style="list-style-type: none"> <li>• During operation</li> <li>• During storage</li> </ul>	°C	-25 ... +60/+55 with AS-Interface		
		°C	-55 ... +80		
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C		IP00/open, coil assembly IP20			
<b>Touch protection</b> acc. to EN 50274		Finger-safe with cover			
<b>Shock resistance</b>	<ul style="list-style-type: none"> <li>• Rectangular pulse</li> <li>• Sine pulse</li> </ul>	g/ms g/ms	8.5/5 and 4.2/10 13.4/5 and 6.5/10		
<b>Conductor cross-sections</b>		1)			
<b>Electromagnetic compatibility (EMC)</b>		2)			
<b>Short-circuit protection</b>					
<b>Main circuit</b>					
Fuse links gL/gG	• Type of coordination "1":	A	355	500	800
LV HRC 3NA					
Fuse links gR, SITOR 3NE	• Type of coordination "2":	A	350	500	710
<b>Auxiliary circuit</b>					
• Fuse links gL/gG (weld-free protection at $I_k \geq 1$ kA) DIAZED 5SB, NEOZED 5SE		A	10		
• Or miniature circuit breakers with C characteristic (short-circuit current $I_k < 400$ A)					

1) For conductor cross-sections see pages 100, 101.

2) For electromagnetic compatibility (EMC) see page 12.

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

Contactors	Type Size		3RT14 56 S6	3RT14 66 S10	3RT14 76 S12	
<b>Control</b>						
<b>Operating range of the solenoid</b>	AC/DC (UC)		0.8 x $U_{s \min}$ ... 1.1 x $U_{s \max}$			
<b>Power consumption of the solenoid</b> (when coil is cool and rated range $U_{s \min}$ ... $U_{s \max}$ )						
• Conventional operating mechanism						
- AC operation	Closing at $U_{s \min}$	VA/p.f.	250/0.9	490/0.9	700/0.9	
	Closing at $U_{s \max}$	VA/p.f.	300/0.9	590/0.9	830/0.9	
	Closed at $U_{s \min}$	VA/p.f.	4.8/0.8	5.6/0.9	7.6/0.9	
	Closed at $U_{s \max}$	VA/p.f.	5.8/0.8	6.7/0.9	9.2/0.9	
- DC operation	Closing at $U_{s \min}$	W	300	540	770	
	Closing at $U_{s \max}$	W	360	650	920	
	Closed at $U_{s \min}$	W	4.3	6.1	8.5	
	Closed at $U_{s \max}$	W	5.2	7.4	10	
• Solid-state operating mechanism						
- AC operation	Closing at $U_{s \min}$	VA/p.f.	190/0.8	400/0.8	560/0.8	
	Closing at $U_{s \max}$	VA/p.f.	28/0.8	530/0.8	750/0.8	
	Closed at $U_{s \min}$	VA/p.f.	3.5/0.5	4/0.5	5.4/0.8	
	Closed at $U_{s \max}$	VA/p.f.	4/0.4	5/0.4	7/0.8	
- DC operation	Closing at $U_{s \min}$	W	250	440	600	
	Closing at $U_{s \max}$	W	320	580	800	
	Closed at $U_{s \min}$	W	2.3	3.2	4	
	Closed at $U_{s \max}$	W	2.8	3.8	5	
<b>PLC control input</b> (EN 61131-2/type 2)			24 V DC/≤ 30 mA power consumption, (operating range 17 ... 30 V DC)			
<b>Operating times</b> (Total break time = Opening delay + Arcing time)						
• Conventional operating mechanism						
- With 0.8 x $U_{s \min}$ ... 1.1 x $U_{s \max}$	Closing delay	ms	20 ... 95	30 ... 95	45 ... 100	
	Opening delay	ms	40 ... 60	40 ... 80	60 ... 100	
- For $U_{s \min}$ ... $U_{s \max}$	Closing delay	ms	25 ... 50	35 ... 50	50 ... 70	
	Opening delay	ms	40 ... 60	50 ... 80	70 ... 100	
• Solid-state operating mechanism, actuated via A1/A2						
- With 0.8 x $U_{s \min}$ ... 1.1 x $U_{s \max}$	Closing delay	ms	95 ... 135	105 ... 145	120 ... 150	
	Opening delay	ms	80 ... 90	80 ... 200	80 ... 100	
- For $U_{s \min}$ ... $U_{s \max}$	Closing delay	ms	100 ... 120	110 ... 130	125 ... 150	
	Opening delay	ms	80 ... 90	80 ... 100	80 ... 100	
• Solid-state operating mechanism, actuated via PLC input						
- With 0.8 x $U_{s \min}$ ... 1.1 x $U_{s \max}$	Closing delay	ms	35 ... 75	45 ... 80	60 ... 90	
	Opening delay	ms	80 ... 90	80 ... 100	80 ... 100	
- For $U_{s \min}$ ... $U_{s \max}$	Closing delay	ms	40 ... 60	50 ... 65	65 ... 80	
	Opening delay	ms	80 ... 90	80 ... 100	80 ... 100	
• Arcing time						
		ms	10 ... 15	10 ... 15	10 ... 15	
<b>Main circuits</b>						
<b>AC capacity</b>						
<b>Utilization category AC-1, switching resistive loads</b>						
• Rated operational currents $I_e$	At 40 °C up to 690 V A		275	400	690	
	At 60 °C up to 690 V A		250	380	650 <sup>1)</sup>	
	At 1000 V A		100	150	250	
• Rated power for AC loads <sup>2)</sup> P.f. = 0.95 (at 60 °C)	At 230 V kW		95	145	245	
	400 V kW		165	250	430	
	500 V kW		205	315	535	
	690 V kW		285	430	740	
	1000 V kW		165	247	410	
• Minimum conductor cross-section for loads with $I_e$	At 40 °C mm <sup>2</sup>		2 x 70	240	2 x 240	
	At 60 °C mm <sup>2</sup>		120	240	2 x 240	
<b>Power loss per conducting path</b>			At $I_e$ /AC-1 W	20	27	55
<b>Utilization category AC-2 and AC-3 for an electrical endurance of 1.3 million operating cycles</b>						
• Rated operational current $I_e$	Up to 690 V A		97	138	170	
	At 230 V kW		30	37	55	
	400 V kW		55	75	90	
	500 V kW		55	90	110	
	690 V kW		90	132	160	

1) 600 A for 3RT14 76-N contactor.

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

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

Contactors	Type Size	3RT14 56 S6	3RT14 66 S10	3RT14 76 S12
<b>Main circuit</b>				
<i>Load rating with DC</i>				
<b>Utilization category DC-1, switching resistive loads (<math>L/R \leq 1</math> ms)</b>				
• Rated operational currents $I_e$ (at 60 °C)				
- 1 conducting path	Up to 24 V A	250	380	500
	60 V A	250	380	500
	110 V A	18	33	33
	220 V A	3.4	3.8	3.8
	440 V A	0.8	0.9	0.9
	600 V A	0.5	0.6	0.6
- 2 conducting paths in series	Up to 24 V A	250	380	500
	60 V A	250	380	500
	110 V A	250	380	500
	220 V A	20	380	500
	440 V A	3.2	4	4
	600 V A	1.6	2	2
- 3 conducting paths in series	Up to 24 V A	250	380	500
	60 V A	250	380	500
	110 V A	250	380	500
	220 V A	250	380	500
	440 V A	11.5	11	11
	600 V A	4	5.2	5.2
<b>Utilization category DC-3/DC-5</b>				
<b>Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>				
• Rated operational currents $I_e$ (at 60 °C)				
- 1 conducting path	Up to 24 V A	250	380	500
	60 V A	7.5	11	11
	110 V A	2.5	3	3
	220 V A	0.6	0.6	0.6
	440 V A	0.17	0.18	0.18
	600 V A	0.12	0.125	0.125
- 2 conducting paths in series	Up to 24 V A	250	380	500
	60 V A	250	380	500
	110 V A	250	380	500
	220 V A	2.5	2.5	2.5
	440 V A	0.65	0.65	0.65
	600 V A	0.37	0.37	0.37
- 3 conducting paths in series	Up to 24 V A	250	380	500
	60 V A	250	380	500
	110 V A	250	380	500
	220 V A	250	380	500
	440 V A	1.4	1.4	1.4
	600 V A	0.75	0.75	0.75

### Switching frequency

**Switching frequency  $z$**  in operating cycles/hour

• Contactors without overload relays	No-load switching frequency	h <sup>-1</sup>	2000
	AC-1	h <sup>-1</sup>	600
	AC-3	h <sup>-1</sup>	1000

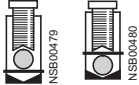

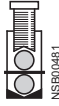
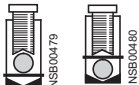


Dependence of the switching frequency  $z'$  on the operational current  $I'$  and operational voltage  $U'$ :

$$z' = z \cdot (I_e/I') \cdot (400 V/U')^{1.5} \cdot 1/h$$

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

Contactor	Type Size	3RT14 56 S6	
<b>Conductor cross-sections</b>			
<b>Front or rear clamping point connected</b> 	<b>Main conductors:</b> With 3RT19 55-4G box terminal		 <b>Screw terminals</b>
	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> <li>AWG cables, solid or stranded</li> </ul>	mm <sup>2</sup> 16 ... 70 mm <sup>2</sup> 16 ... 70 mm <sup>2</sup> 16 ... 70 mm 3 x 9 x 0.8 ... 6 x 15.5 x 0.8 AWG 6 ... 2/0	
<b>Both clamping points connected</b> 	<ul style="list-style-type: none"> <li>Finely stranded with end sleeves, max.</li> <li>Finely stranded without end sleeve</li> <li>Stranded (max.)</li> <li>Ribbon cable conductors (number x width x thickness), max.</li> <li>AWG cables, solid or stranded, max.</li> </ul>	mm <sup>2</sup> 1 x 50, 1 x 70 mm <sup>2</sup> 1 x 50, 1 x 70 mm <sup>2</sup> 2 x 70 mm 2 x (6 x 15.5 x 0.8) AWG 2 x 1/0	
<b>Front or rear clamping point connected</b> 	<b>Main conductor</b> With 3RT19 56-4G box terminal		 <b>Screw terminals</b>
	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> <li>AWG cables, solid or stranded</li> </ul>	mm <sup>2</sup> 16 ... 120 mm <sup>2</sup> 16 ... 120 mm <sup>2</sup> 16 ... 120 mm 3 x 9 x 0.8 ... 10 x 15.5 x 0.8 AWG 6 ... 250 kcmil	
<b>Both clamping points connected</b> 	<ul style="list-style-type: none"> <li>Finely stranded with end sleeves, max.</li> <li>Finely stranded without end sleeve</li> <li>Stranded (max.)</li> <li>Ribbon cable conductors (number x width x thickness), max.</li> <li>AWG cables, solid or stranded, max.</li> <li>Terminal screws               <ul style="list-style-type: none"> <li>Tightening torque</li> </ul> </li> </ul>	mm <sup>2</sup> 1 x 95, 1 x 120 mm <sup>2</sup> 1 x 95, 1 x 120 mm <sup>2</sup> 2 x 120 mm 2 x (10 x 15.5 x 0.8) AWG 2 x 3/0 Nm M10 (hexagon socket, A/F4) 10 ... 12 (90 ... 110 lb.in)	
<b>Main conductors:</b> Without box terminal/busbar connection <sup>1)</sup>		<ul style="list-style-type: none"> <li>Finely stranded with cable lug</li> <li>Stranded with cable lug</li> <li>AWG cables, solid or stranded</li> <li>Connecting bar (max. width)</li> <li>Terminal screw               <ul style="list-style-type: none"> <li>Tightening torque</li> </ul> </li> </ul>	16 ... 95 25 ... 120 4 ... 250 kcmil 17 M8 x 25 (A/F 13) Nm 10 ... 14 (90 ... 110) lb.in
<b>Auxiliary conductors:</b>		<ul style="list-style-type: none"> <li>Conductor cross-section               <ul style="list-style-type: none"> <li>Solid</li> <li>Finely stranded with end sleeve</li> <li>Solid or stranded AWG (2 x)</li> </ul> </li> <li>Terminal screw               <ul style="list-style-type: none"> <li>Tightening torque</li> </ul> </li> </ul>	2 x (0.5 ... 1.5) <sup>2)</sup> ; 2 x (0.75 ... 2.5) <sup>2)</sup> acc. to IEC 60947; max. 2 x (0.75 ... 4) 2 x (0.5 ... 1.5) <sup>2)</sup> ; 2 x (0.75 ... 2.5) <sup>2)</sup> 2 x (18 ... 14) M3 (PZ 2) Nm 0.8 ... 1.2 (7 ... 10.3) lb.in



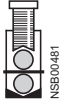
1) When connecting cable lugs according to DIN 46235, use the 3RT19 56-4EA1 terminal cover for conductor cross-sections from 95 mm<sup>2</sup> to ensure phase spacing.

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.

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

Contactors	Type Size	3RT14 66 S10	3RT14 76 S12
<b>Conductor cross-sections</b>			
(1 or 2 conductors can be connected)	<b>Main conductors:</b> With 3RT19 66-4G box terminal	⊕ <b>Screw terminals</b>	
<b>Front clamping point connected</b> 	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>AWG cables, solid or stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> </ul>	<ul style="list-style-type: none"> <li>mm<sup>2</sup> 70 ... 240</li> <li>mm<sup>2</sup> 70 ... 240</li> <li>mm<sup>2</sup> 95 ... 300</li> <li>AWG 3/0 ... 600 kcmil</li> <li>mm Min. 6 x 9 x 0,8, max. 20 x 24 x 0,5</li> </ul>	
<b>Rear clamping point connected</b> 	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>AWG cables, solid or stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> </ul>	<ul style="list-style-type: none"> <li>mm<sup>2</sup> 120 ... 185</li> <li>mm<sup>2</sup> 120 ... 185</li> <li>mm<sup>2</sup> 120 ... 240</li> <li>AWG 250 ... 500 kcmil</li> <li>mm Min. 6 x 9 x 0,8, max. 20 x 24 x 0,5</li> </ul>	
<b>Both clamping points connected</b> 	<ul style="list-style-type: none"> <li>Finely stranded with end sleeve</li> <li>Finely stranded without end sleeve</li> <li>Stranded</li> <li>AWG cables, solid or stranded</li> <li>Ribbon cable conductors (number x width x thickness)</li> <li>Terminal screws</li> <li>- Tightening torque</li> </ul>	<ul style="list-style-type: none"> <li>mm<sup>2</sup> Min. 2 x 50, max. 2 x 185</li> <li>mm<sup>2</sup> Min. 2 x 50, max. 2 x 185</li> <li>mm<sup>2</sup> Min. 2 x 70, max. 2 x 240</li> <li>AWG Min. 2 x 2/0, max. 2 x 500 kcmil</li> <li>mm Max. 2 x (20 x 24 x 0,5)</li> <li>Nm M12 (hexagon socket, A/F 5)</li> <li>20 ... 22 (180 ... 195 lb.in)</li> </ul>	
	<b>Main conductors:</b> Without box terminal/busbar connection <sup>1)</sup>		
	<ul style="list-style-type: none"> <li>Finely stranded with cable lug</li> <li>Stranded with cable lug</li> <li>AWG cables, solid or stranded</li> <li>Connecting bar (max. width)</li> <li>Terminal screws</li> <li>- Tightening torque</li> </ul>	<ul style="list-style-type: none"> <li>mm<sup>2</sup> 50 ... 240</li> <li>mm<sup>2</sup> 70 ... 240</li> <li>AWG 2/0 ... 500 kcmil</li> <li>mm 25</li> <li>Nm M10 x 30 (A/F 17)</li> <li>14 ... 24 (124 ... 210 lb.in)</li> </ul>	
	<b>Auxiliary conductors:</b>		
	<ul style="list-style-type: none"> <li>Solid</li> <li>Finely stranded with end sleeve</li> <li>AWG cables, solid or stranded</li> <li>Terminal screws</li> <li>- Tightening torque</li> </ul>	<ul style="list-style-type: none"> <li>mm<sup>2</sup> 2 x (0,5 ... 1,5)<sup>2)</sup>, 2 x (0,75 ... 2,5)<sup>2)</sup> acc. to IEC 60947, max. 2 x (0,75 ... 4)</li> <li>mm<sup>2</sup> 2 x (0,5 ... 1,5)<sup>2)</sup>; 2 x (0,75 ... 2,5)<sup>2)</sup></li> <li>AWG 2 x (18 ... 14)</li> <li>Nm M3 (PZ 3)</li> <li>0,8 ... 1,2 (7 ... 10,3 lb.in)</li> </ul>	

1) When connecting cable lugs to DIN 46234, the 3RT19 66-4EA1 terminal cover must be used for conductor cross-sections of 240 mm<sup>2</sup> and more as well as DIN 46235 for conductor cross-sections of 185 mm<sup>2</sup> 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.

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT13 Contactors for Switching Resistive Loads (AC-1)

4-pole, 4 NO, 18 ... 140 A

### Overview

#### AC and DC operation

EN 60947-4-1 (VDE 0660 Part 102).

The contactors are suitable for use in any climate. They are finger-safe according to EN 50274.

The accessories for the 3-pole SIRIUS contactors can also be used for the 4-pole versions.

### Function

- Switching resistive loads
- Isolating systems with ungrounded or poorly grounded neutral conductors
- System transfers when alternative AC power supplies are used
- As contactors, e. g. for variable-speed operating mechanisms which only have to carry current and not switch
- The contactors are also suitable for switching mixed loads in distribution systems (e. g. for supplying heaters, lamps, motors, PC power supply units) with p.f. > 0.8 according to IEC 60947-4-1 test conditions for utilization category AC-1.

### Integration

#### Mountable auxiliary contacts

##### Size S00

4 auxiliary contacts (according to EN 50005)

##### Size S0

Maximum 2 auxiliary contacts (either laterally mounted or snapped onto the top).

##### Size S2 to S3

Max. 4 auxiliary contacts (either laterally mounted or snapped onto the top)

#### Contactor assembly with mechanical interlock

The 4-pole 3RT13 contactors with 4 NO contacts as the main contacts are suitable for making contactor assemblies with a mechanical interlock, e. g. for system transfers.

##### Size S00

Contactor assemblies can be constructed from two 3RT13 1. contactors in conjunction with mechanical interlocks and two connecting clips (Order No.: 3RA19 12-2H, pack with 10 interlock elements and 20 clips for 10 assemblies).

##### Size S0

When constructing 4-pole contactor assemblies from two 3RT13 2. contactors, the fourth pole of the left contactor must always be moved to the left side. The contactor assembly can then be made easily with the aid of the 3RA19 24-1A mechanical interlock fitted onto the front and the 3RA19 22-2C mechanical connectors. The laterally mountable 3RA19 24-2B mechanical interlock can be used if the contactor assembly is mounted on a base plate.

##### Sizes S2 and S3

Contactor assemblies can be constructed from two 3RT13 3. or two 3RT13 4. contactors in conjunction with the laterally mountable 3RA19 24-2B mechanical interlock and the 3RA19 .2-2G mechanical connectors. The mechanical interlock for fitting onto the front cannot be used for size S2 and S3 contactors.



# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT13 Contactors for Switching Resistive Loads (AC-1)

4-pole, 4 NO, 18 ... 140 A

### Technical specifications

Contactors	Type Size		3RT13 16 S00	3RT13 17 S0	3RT13 25 S0	3RT13 26	3RT13 36 S2	3RT13 44 S3	3RT13 46 S3	
<b>General data</b>										
<b>Permissible mounting position<sup>1)</sup></b>										
<b>Mechanical endurance</b>		Operating cycles	30 million	10 million						
<b>Electrical endurance at <math>I_e/AC-1</math></b>		Operating cycles	Approx. 0.5 million							
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)		V	690							
<b>Permissible ambient temperature</b>		°C	-25 ... +60							
		°C	-55 ... +80							
<b>Degree of protection</b> Acc. to EN 60947-1, Appendix C	Device Connection range		IP20				IP20 IP00			
<b>Touch protection</b> acc. to EN 50274			Finger-safe							
<b>Short-circuit protection of contactors without overload relays</b>										
<b>Main circuit</b>										
Fuse links, gL/gG operational class LV HRC, 3NA, DIAZED, 5SB, NEO- ZED, 5SE acc. to IEC 60947-4-1/ EN 60947-4-1		• Type of coordination *1*) • Type of coordination *2*)  • Weld-free	A A A	35 20 10	63 25/35 16		160 63 50	250 125 63	250 160 100	
<b>Control</b>										
<b>Magnetic coil operating range</b>	AC at 50 Hz AC at 60 Hz  DC at 50 °C DC at 60 °C AC/DC		0.8 ... 1.1 x $U_s$ 0.85 ... 1.1 x $U_s$  0.8 ... 1.1 x $U_s$ 0.85 ... 1.1 x $U_s$						0.8 ... 1.1 x $U_s$	
<b>Power consumption of the magnetic coils</b> (when coil is cold and 1.0 x $U_s$ )										
• AC operation, 50 Hz	- Closing - P.f.	VA VA		61 0.82			145 0.79	270 0.68		
	- Closed - P.f.	VA VA		7.8 0.24			12.5 0.36	22 0.27		
• AC operation, 50/60 Hz	- Closing - P.f.	VA VA	26.5/24.3 0.79/0.75	64/63 0.82/0.74			170/155 0.76/0.72	298/274 0.72/0.62		
	- Closed - P.f.	VA VA	4.4/3.4 0.27/0.27	8.4/6.8 0.24/0.28			15/11.8 0.35/0.38	27/20 0.29/0.31		
• DC operation	- Closing = Closed	W W	3.3	5.6			13.3	15		
<b>Operating times for 0.8 ... 1.1 x <math>U_s</math><sup>2)</sup></b> Total break time = Opening delay + Arcing time										
• DC operation	- Closing delay - Opening delay	ms ms	25 ... 100 7 ... 10	30 ... 90 13 ... 40			50 ... 110 15 ... 30	110 ... 200 14 ... 20		
• AC operation	- Closing delay - Opening delay	ms ms	8 ... 35 4 ... 30	6 ... 30 13 ... 25			4 ... 35 10 ... 30	20 ... 50 10 ... 25		
• Arcing time		ms	10 ... 15	10 ... 15			10 ... 15	10 ... 15		
<b>Main circuit</b>										
<b>AC capacity</b>										
<b>Utilization category AC-1, switching resistive loads</b>										
• Rated operational currents $I_e$	At 40 °C, up to 690 V At 60 °C, up to 690 V	A A	18 16	22 20	35 30	40 35	60 55	110 100	140 120	
• Rated power for AC loads P.f. = 0.95 (at 40 °C)	At 230 V 400 V	kW kW	7 12	8.5 14.5	12.5 22	15 26	23 39	42 72	53 92	
• Minimum conductor cross-section for loads with $I_e$	At 40 °C At 60 °C	mm <sup>2</sup> mm <sup>2</sup>	2.5 2.5	2.5 2.5	10 10	10 10	16 16	50 50	50 50	
<b>Utilization category AC-2 and AC-3</b>										
• Rated operational currents $I_e$	At 60 °C, up to 400 V	A	9	12	17	25	26	--	--	
• Rated power of slipring or squirrel-cage motors at 50 Hz and 60 Hz	At 230 V 400 V	kW kW	3 4	3 5.5	4 7.5	5.5 11	5.5 11	-- --	-- --	

1) In accordance with the corresponding 3-pole 3RT1 contactors.

2) With size S00, DC operation: Operating times at 0.85 ... 1.1 x  $U_s$ .

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT13 Contactors for Switching Resistive Loads (AC-1)

4-pole, 4 NO, 18 ... 140 A

Contactors	Type Size		3RT13 16 S00	3RT13 17	3RT13 25 S0	3RT13 26
<b>Main circuit</b>						
<i>Load rating with DC</i>						
<b>Utilization category DC-1, switching resistive loads (<math>L/R \leq 1</math> ms)</b>						
• Rated operational currents $I_g$ (at 40 °C)						
- 1 conducting path		Up to 24 V A	18	22	35	
		60 V A	18	22	20	
		110 V A	2.1	2.1	4.5	
		220 V A	0.8	0.8	1	
		440 V A	0.6	0.6	0.4	
- 2 conducting paths in series		Up to 24 V A	18	22	35	
		60 V A	18	22	35	
		110 V A	12	12	35	
		220 V A	1.6	1.6	5	
		440 V A	0.8	0.8	1	
- 3 conducting paths in series		Up to 24 V A	18	22	35	
		60 V A	18	22	35	
		110 V A	18	22	35	
		220 V A	18	22	35	
		440 V A	1.3	1.3	2.9	
- 4 conducting paths in series		Up to 24 V A	18	22	35	
		60 V A	18	22	35	
		110 V A	18	22	35	
		220 V A	18	22	35	
		440 V A	1.3	1.3	2.9	
<b>Utilization category DC-3/DC-5</b>						
<b>Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>						
• Rated operational currents $I_g$ (at 40 °C)						
- 1 conducting path		Up to 24 V A	18	20	20	
		60 V A	0.5	0.5	5	
		110 V A	0.15	0.15	2.5	
		220 V A	--	--	1	
		440 V A	--	--	0.09	
- 2 conducting paths in series		Up to 24 V A	18	20	35	
		60 V A	5	5	35	
		110 V A	0.35	0.35	15	
		220 V A	--	--	3	
		440 V A	--	--	0.27	
- 3 conducting paths in series		Up to 24 V A	18	20	35	
		60 V A	18	20	35	
		110 V A	18	20	35	
		220 V A	1.5	1.5	10	
		440 V A	0.2	0.2	0.6	
- 4 conducting paths in series		Up to 24 V A	18	20	35	
		60 V A	18	20	35	
		110 V A	18	20	35	
		220 V A	1.5	1.5	35	
		440 V A	0.2	0.2	0.6	
<b>Maximum breaking current AC</b>						
e. g for isolation of load distributions						
• 50/60 Hz		400 V A	72	96	200	

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT13 Contactors for Switching Resistive Loads (AC-1)

4-pole, 4 NO, 18 ... 140 A

Contactors	Type Size	3RT13 36 S2	3RT13 44 S3	3RT13 46 S3
<b>Main circuit</b>				
<i>Load rating with DC</i>				
<b>Utilization category DC-1, switching resistive loads (<math>L/R \leq 1</math> ms)</b>				
• Rated operational currents $I_e$ (at 40 °C)				
- 1 conducting path	Up to 24 V A	50	70	80
	60 V A	23	23	60
	110 V A	4.5	4.5	9
	220 V A	1	1	2
	440 V A	0.4	0.4	0.6
- 2 conducting paths in series	Up to 24 V A	50	70	80
	60 V A	45	70	80
	110 V A	45	70	80
	220 V A	5	5	10
	440 V A	1	1	1.8
- 3 conducting paths in series	Up to 24 V A	50	70	80
	60 V A	45	70	80
	110 V A	45	70	80
	220 V A	45	70	80
	440 V A	2.9	2.9	4.5
- 4 conducting paths in series	Up to 24 V A	50	70	80
	60 V A	45	70	80
	110 V A	45	70	80
	220 V A	45	70	80
	440 V A	2.9	2.9	4.5
<b>Utilization category DC-3/DC-5</b>				
<b>Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>				
• Rated operational currents $I_e$ (at 40 °C)				
- 1 conducting path	Up to 24 V A	20	20	20
	60 V A	6	6	6.5
	110 V A	2.5	2.5	2.5
	220 V A	1	1	1
	440 V A	0.1	0.15	0.15
- 2 conducting paths in series	Up to 24 V A	45	70	80
	60 V A	45	70	80
	110 V A	25	70	80
	220 V A	5	7	7
	440 V A	0.27	0.42	0.42
- 3 conducting paths in series	Up to 24 V A	45	70	80
	60 V A	45	70	80
	110 V A	45	70	80
	220 V A	25	35	35
	440 V A	0.6	0.8	0.8
- 4 conducting paths in series	Up to 24 V A	45	70	80
	60 V A	45	70	80
	110 V A	45	70	80
	220 V A	45	70	80
	440 V A	0.6	0.8	0.8
<b>Maximum breaking current AC</b>				
e. g for isolation of load distributions				
• 50/60 Hz	400 V A	400	520	760

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3TK1 Contactors for Switching Resistive Loads (AC-1)

4-pole, 4 NO, 200 ... 1000 A

### Overview

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

The contactors also comply with the requirements of NFC 63-110 and NFC 20-040.

The contactors are suitable for use in any climate. 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.

Magnetic coils for 3TK10 to 3TK13 contactors: as withdrawable coils.

### Surge suppression

#### Control circuit

Magnetic coils for 3TK1 contactors: can be retrofitted with RC elements.

### Function

- Isolating systems with ungrounded or poorly grounded neutral conductors
- Switching resistive loads
- System transfers when alternative AC power supplies are used
- The contactors are also suitable for switching mixed loads in distribution systems (e. g for supplying heaters, lamps, motors, PC networks) with p.f. > 0.8 according to IEC 60947-4-1 test conditions for utilization category AC-1

### Technical specifications

Contactors	Type	3TK1	
<b>Rated data of the auxiliary contacts</b>		Acc. to IEC 60947-5-1 (VDE 0660 Part 200)	
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	690	
<b>Continuous thermal current <math>I_{th}</math> = Rated operational current <math>I_e/AC-12</math></b>	A	10	
<b>AC load</b> <b>Rated operational current <math>I_e/AC-15/AC-14</math></b> • For rated operational voltage $U_e$			
	24 V A	6	
	110 V A	6	
	125 V A	6	
	220 V A	6	
	230 V A	6	
	380 V A	4	
	400 V A	4	
	500 V A	1	
	660 V A	1	
	690 V A	1	
<b>DC load</b> <b>Rated operational current <math>I_e/DC-12</math></b> • For rated operational voltage $U_e$			
	24 V A	--	
	60 V A	--	
	110 V A	--	
	125 V A	--	
	220 V A	--	
	440 V A	--	
	600 V A	--	
<b>Rated operational current <math>I_e/DC-13</math></b> • For rated operational voltage $U_e$			
	24 V A	6	
	60 V A	6	
	110 V A	1.8	
	125 V A	--	
	220 V A	0.6	
	440 V A	--	
	600 V A	--	
<b>Ⓢ and Ⓣ ratings of the auxiliary contacts</b>			
Rated voltage	V AC, max.	600	
Switching capacity		A 600, P 600	

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3TK1 Contactors for Switching Resistive Loads (AC-1)

4-pole, 4 NO, 200 ... 1000 A


Contactors	Type		3TK10	3TK11	3TK12	3TK13	3TK14	3TK15	3TK17
<b>General data</b>									
<b>Permissible mounting position</b> Vertical mounting position also permitted.									
<b>Mechanical endurance</b>	Operating cycles	Mill.	10				5		
<b>Electrical endurance</b> for $I_e$ /AC-1 at 55 °C	Operating cycles	Mill.	0.8	0.8	0.8	0.4	0.65	0.5	0.4
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)		V	1000						
<b>Ambient temperature</b>	• During operation	°C	-25 ... +55						
	• During storage	°C	-50 ... +70						
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C			IP00						
<b>Touch protection</b> acc. to EN 50274			Finger-safe with cover						
<b>Shock resistance</b>	Sine pulse	g/ms	10/15						
<b>Short-circuit protection</b>									
<b>Main circuit</b> 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":	A	250		355		800	1000	
	• Type of coordination "2":	A	250		315		630	850	
<b>Auxiliary circuit</b> (short-circuit current $I_s \geq 1$ kA) fuse links, gL/gG, DIAZED 5SB, NEOZED 5SE		A	10						
<b>Control</b>									
<b>Magnetic coil operating range</b>			0.85 ... 1.1 x $U_s$						
<b>Power consumption of the magnetic coils</b> (when coil is cold and 1.0 x $U_s$ )									
• 50 Hz	- Closing	VA	820		1100		3500		
	- P.f.		0.4		0.35		0.26		
	- Closed	VA	44		52		125		
	- P.f.		0.34		0.35		0.4		
• 60 Hz	- Closing	VA	990		1200		4000		
	- P.f.		0.35		0.31		0.22		
	- Closed	VA	52		65		140		
	- P.f.		0.35		0.34		0.43		
<b>Operating times at 1.0 x <math>U_s</math></b>									
• Arcing time	- Closing delay	ms	20 ... 40				30 ... 60		
	- Opening delay	ms	7 ... 15				10 ... 20		
		ms	10				10		
<b>Main circuit</b>									
<b>AC capacity</b>									
<b>Utilization category AC-1, switching resistive loads</b>									
• Rated operational currents $I_e$	At 40° C up to 690 V	A	200	250	300	350	550	800	1000
	At 50° C up to 690 V	A	180	230	270	310	470	650	850
• Rated power for AC loads, p.f. = 0.95 (at 40°C)	At 230 V	kW	76	95	114	132	208	303	378
	400 V	kW	132	165	197	230	362	527	658
	500 V	kW	165	206	247	288	452	658	828
	690 V	kW	227	284	341	397	624	908	1135
• Minimum conductor cross-sections for loads with $I_e$	At 40° C	mm <sup>2</sup>	95	150	185	240	185	240	300
<b>Utilization category AC-2 and AC-3</b>									
• Rated operational currents $I_e$	Up to 400 V	A	120	145	210	210	400	550	700
• Rated power of squirrel-cage or slipping motors at 50 Hz and 60 Hz	At 230 V	kW	30	45	75	75	110	160	220
	400 V	kW	55	75	110	110	200	280	370
• Short-time current at 40° C in cold state up to 10 s		A	900	1200	1600	1600	5300	5300	6400
<b>Switching frequency<sup>1)</sup></b>									
<b>Switching frequency <math>z</math> in operating cycles/hour</b>									
• Contactors without overload relays	- No-load switching frequency	1/h	3600						
	- AC-1	1/h	300						
	- AC-3	1/h	300						

1) Dependence of the switching frequency  $z'$  on the operational current  $I'$  and operational voltage  $U'$ :  $z' = z \cdot (I_e/I') \cdot (400 V/U')^{1.5} \cdot 1/h$ .

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3TK1 Contactors for Switching Resistive Loads (AC-1)

4-pole, 4 NO, 200 ... 1000 A

Contactor	Type		3TK10	3TK11	3TK12	3TK13	3TK14	3TK15	3TK17
<b>Conductor cross-sections</b>									
<b>Main conductors:</b>			 <b>Screw terminals</b>						
• Stranded with cable lug		mm <sup>2</sup>	2 x 70	2 x 120	2 x 120		2 x 300		
• Solid or stranded	AWG	MCM	2 x 00	2 x 250	2 x 250		2 x 600		
• Connecting bar (max. width)		mm	30	30	33		55		
• Terminal screw			M6	M10	M10		M10		
- Tightening torque		Nm	5	16	16		16		
		lb.in	42	135	135		135		
<b>Auxiliary conductors:</b>									
• Solid		mm <sup>2</sup>	2 x (0.5 ... 2.5)						
• Finely stranded with end sleeve		mm <sup>2</sup>	2 x (0.5 ... 2.5)						
• Solid or stranded	AWG	MCM	20 ... 14						
- Tightening torque		Nm	1.2 (10 lb.in)						

### Overview

#### AC and DC operation

IEC 60947 (VDE 0660).

The contactors are suitable for use in any climate. The contactors with screw terminals are finger-safe according to EN 50274.

The contactors are available in versions with screw terminals, 6.3 mm plug-in terminals and solder pin connections for soldering in printed circuit boards.

### Design

#### Auxiliary contacts

##### Contact reliability

To switch voltages  $\leq 110$  V and currents  $\leq 100$  mA the 3TH2 contactor relays should be used as they guarantee a high level of contact reliability.

These auxiliary contacts are suitable for solid-state circuits with currents  $\geq 1$  mA at a voltage of 17 V and higher.

#### Short-circuit protection of the contactors

For short-circuit protection of the contactors without overload relays see "Technical specifications".

#### Version

The 3TK2 contactors with 4 main contacts are available with screw terminals, 6.3 mm x 0.8 mm flat connectors and solder pin connectors.

The 3TK2 contactors with 6.3 mm x 0.8 mm flat connectors are coded can be used in the plug-in base with solder pin connections for printed circuit boards.

### Technical specifications

#### 3TK20

#### Endurance of the main contacts

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

The rated operational current  $I_e$  complies with utilization category AC-4 (breaking six times the rated operational current) and is intended for a contact endurance of at least 200 000 operating cycles. If a shorter endurance is sufficient, the rated operational current  $I_e/AC-4$  can be increased.

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

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

Characters in the equation:

$X$  = Contact endurance for mixed operation in operating cycles

$A$  = Contact endurance for normal operation ( $I_a = I_e$ ) in operating cycles

$B$  = Contact endurance for inching ( $I_a =$  multiple of  $I_e$ ) in operating cycles

$C$  = Inching operations as a percentage of total switching operations

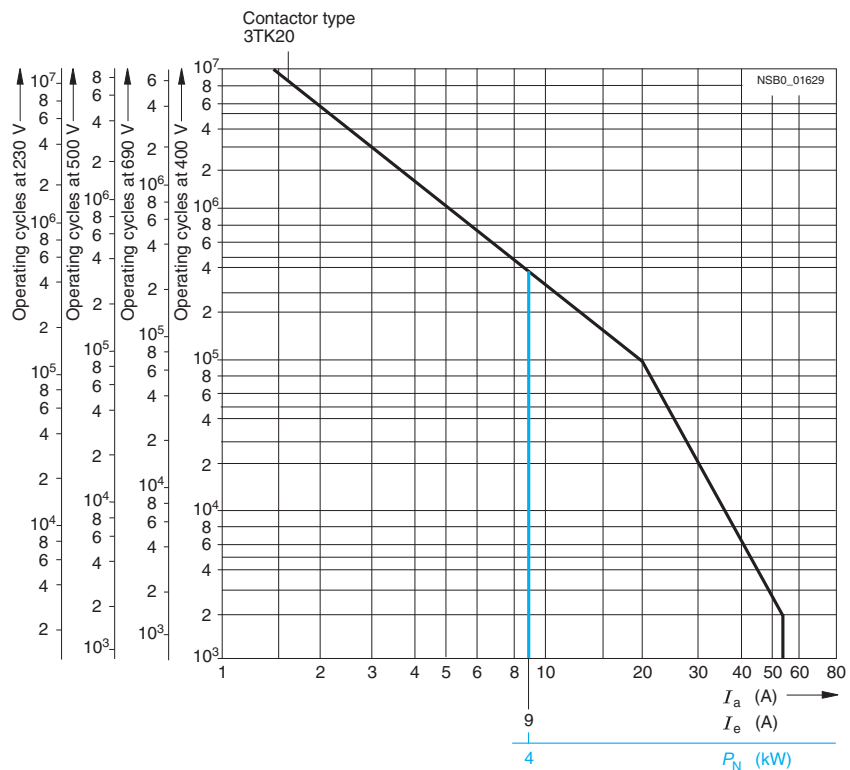


Diagram legend:

$P_N$  = Rated power for squirrel-cage motors at 400 V

$I_a$  = Breaking current

$I_e$  = Rated operational current

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3TK20 Contactors

4-pole, 4 kW

Contactors			
Type	<b>3TK20</b>		
<b>General data</b>			
<b>Permissible mounting position</b>	AC and DC operation	Any	
<b>Mechanical endurance</b>	<ul style="list-style-type: none"> <li>• AC operation</li> <li>• DC operation</li> <li>• Auxiliary switch block</li> </ul>	Operating cycles	10 million 30 million 10 million
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)			
• Screw terminals	V		690
• Flat connector 6.3 mm x 0.8 mm	V		500
• Solder pin connections	V		500
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (degree of pollution 3)			
• Screw terminals	kV		8
• Flat connector 6.3 mm x 0.8 mm	kV		6
• Solder pin connections	kV		6
<b>Protective separation</b> between coil and main contacts (acc. to EN 61140)	V		Up to 300
<b>Permissible ambient temperature<sup>1)</sup></b>	<ul style="list-style-type: none"> <li>• During operation</li> <li>• During storage</li> </ul>	°C	-25 ... +55 -55 ... +80
<b>Degree of protection</b> acc. to EN 60947-1 Appendix C			IP00 open IP20 for screw terminals IP40 coil assembly
<b>Touch protection</b>	Finger-safe for screw terminals		
<b>Shock resistance</b>			
• Rectangular pulse	<ul style="list-style-type: none"> <li>- AC operation</li> <li>- DC operation</li> </ul>	g/ms	8.3/5 and 5.2/10 11.3/5 and 9.2/10
• Sine pulse	<ul style="list-style-type: none"> <li>- AC operation</li> <li>- DC operation</li> </ul>	g/ms	13/5 and 8/10 17.4/5 and 12.9/10
<b>Conductor cross-sections</b>	2)		
<b>Short-circuit protection for contactors without overload relays</b>			
<b>Main circuit<sup>3)</sup></b>			
• Fuse links gL/gG LV HRC 3NA, DIAZED 5SB, NEOZED 5SE acc. to IEC 60947-4-1 (VDE 0660, Part 102)	<ul style="list-style-type: none"> <li>- Type of coordination "1"</li> <li>- Type of coordination "2"<sup>4)</sup></li> <li>- Weld-free</li> </ul>	A	25 10 10
• Miniature circuit breaker with C characteristic		A	10
<b>Auxiliary circuit</b>			
Short-circuit current $I_k \geq 1$ kA			
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE		A	6

1) Applies to 50/60 Hz coil:  
At 50 Hz,  $1.1 \times U_s$ , side-by-side mounting and 100 % ON period the max. ambient temperature is +40 °C.

2) See page 114.

3) According to excerpt from IEC 60947-4-1 (VDE 0660 Part 102)  
Type of coordination "1"  
Destruction of the contactor and the overload relay is permissible. The contactor and/or overload relay can be replaced if necessary.  
Type of coordination "2":  
The overload relay must not suffer any damage. Contact welding on the contactor is permissible, however, if the contacts can be easily separated.

4) A short-circuit current of  $I_q \leq 6$  kA applies to type of coordination "2".



Contactors			
Type	<b>3TK20</b>		
<b>Control</b>			
<b>Magnetic coil operating range<sup>1)</sup></b>			
0.8 ... 1.1 x $U_s$			
<b>Power consumption of the magnetic coils</b> (when coil is cold and 1.0 x $U_s$ )			
<b>Standard version:</b>			
• AC operation, 50 Hz	Closing	VA	15
	P.f.		0.41
	Closed	VA	6.8
	P.f.		0.42
• AC operation, 60 Hz	Closing	VA	14.4
	P.f.		0.36
	Closed	VA	6.1
	P.f.		0.46
• AC operation, 50/60 Hz <sup>1)</sup>	Closing	VA	16.5/13.2
	P.f.		0.43/0.38
	Closed	VA	8.0/5.4
	P.f.		0.48/0.42
<b>For USA and Canada:</b>			
• AC operation, 50 Hz	Closing	VA	14.6
	P.f.		0.38
	Closed	VA	6.5
	P.f.		0.40
• AC operation, 60 Hz	Closing	VA	14.4
	P.f.		0.30
	Closed	VA	6.0
	P.f.		0.44
• DC operation	Closing = Closed	W	3
<b>Permissible residual current of the electronic circuit<sup>2)</sup></b> (for 0 signal)			
	• AC operation	mA	$\leq 3 \times (230 \text{ V}/U_s)$
	• DC operation	mA	$\leq 1 \times (230 \text{ V}/U_s)$
<b>Operating times at 0.8 ... 1.1 x <math>U_s</math><sup>3)</sup></b>			
Total break time = Opening delay + Arcing time			
Values apply with coil in cold state and at operating temperature for operating range			
• AC operation	Closing delay	ms	5 ... 19
	Opening delay	ms	2 ... 22
- Dead interval			To use the 3TK20 AC-operated contactor in reversing duty an additional dead interval of 50 ms is required along with an NC contact interlock.
• DC operation	Closing delay	ms	16 ... 65
	Opening delay	ms	2 ... 5
• Arcing time		ms	10 ... 15
<b>Operating times at 1.0 x <math>U_s</math><sup>3)</sup></b>			
• AC operation	Closing delay	ms	5 ... 18
	Opening delay	ms	3 ... 21
- Dead interval			To use the 3TK20 AC-operated contactor in reversing duty an additional dead interval of 50 ms is required along with an NC contact interlock.
• DC operation	Closing delay	ms	19 ... 31
	Opening delay	ms	3 ... 4
• Arcing time		ms	10 ... 15

- 1) Applies to 50/60 Hz coil:  
At 50 Hz, 1.1 x  $U_s$ , side-by-side mounting and 100 % ON period the max. ambient temperature is +40 °C.
- 2) The 3TX4 490-1J additional load module is recommended for higher residual currents (see Catalog LV 1).
- 3) The OFF-delay of the NO contacts and ON-delay of the NC contacts increase if the contactor coils are protected against voltage peaks (noise suppression diode 6 to 10 times, diode assemblies 2 to 6 times, varistor +2 to 5 ms).

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3TK20 Contactors

4-pole, 4 kW

Contactor	Type	3TK20 ...0...	3TK20 ...3..., 3TK20 ...6..., 3TK20 ...7...
Size 00			
<b>Main circuit</b>			
<b>AC capacity</b>			
<b>Utilization category AC-1, switching resistive loads</b>			
• Rated operational current $I_e$ (at 40 °C)	Up to 400/380 V A 690/660 V A	18 18	18 --
• Rated operational current $I_e$ (at 55 °C)	400/380 V A 690/660 V A	16 16	16 --
• Rated power of AC loads P.f. = 1	At 230/220 V kW 400/380 V kW 500 V kW 690/660 V kW	6.0 10 13 17	6.0 10 13 --
• Minimum conductor cross-section for loads with $I_e$	mm <sup>2</sup>	2.5	2.5
<b>Utilization category AC-2 and AC-3</b>			
• Rated operational current $I_e$	Up to 220 V A 230 V A 380 V A 400 V A 500 V A 660 V A 690 V A	9.0 9.0 9.0 8.4 6.5 5.2 5.2	9.0 9.0 9.0 8.4 6.5 -- --
• Rated power for motors with slipring or squirrel-cage rotors at 50 Hz and 60 Hz and	At 110 V kW 115 V kW 120 V kW 127 V kW 200 V kW 220 V kW 230 V kW 240 V kW 380 V kW 400 V kW 415 V kW 440 V kW 460 V kW 500 V kW 575 V kW 660 V kW 690 V kW	1.2 1.2 1.3 1.4 2.2 2.4 2.5 2.6 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0	1.2 1.2 1.3 1.4 2.2 2.4 2.5 2.6 4.0 4.0 4.0 4.0 4.0 4.0 -- -- --
<b>Utilization category AC-4</b>			
(contact endurance approx. 200000 operating cycles at $I_a = 6 \times I_e$ )			
• Rated operational current $I_e$	Up to 400 V A 690 V A	2.6 1.8	2.6 --
• Rated power for motors with squirrel-cage rotor at 50 and 60 Hz and	At 110 V kW 115 V kW 120 V kW	0.32 0.33 0.35	0.32 0.33 0.35
• Max. permissible rated operational current $I_e/AC-4 \cong I_e/AC-3$ up to 500 V, for reduced contact endurance and reduced switching frequency	127 V kW 200 V kW 220 V kW 230 V kW 240 V kW 380 V kW 400 V kW 415 V kW 440 V kW 460 V kW 500 V kW 575 V kW 660 V kW 690 V kW	0.37 0.58 0.64 0.67 0.70 1.10 1.15 1.20 1.27 1.33 1.45 1.30 1.10 1.15	0.37 0.58 0.64 0.67 0.70 1.10 1.15 1.20 1.27 1.33 1.45 -- -- --

Contactors	Type	3TK20 ...0...	3TK20 ...3..., 3TK20 ...6..., 3TK20 ...7...
Size 00			
<b>Main circuit</b>			
<b>AC capacity</b>			
<b>Utilization category AC-5a, switching gas discharge lamps</b>			
Per main current path at 230/220 V			
• Rated power per lamp	Rated operational current per lamp (A)		
- Uncorrected			
L 18 W	0.37	Units	43
L 36 W	0.43	Units	37
L 58 W	0.67	Units	23
- DUO switching			
L 18 W	0.11	Units	144
L 36 W	0.21	Units	76
L 58 W	0.32	Units	50
<b>Switching gas discharge lamps with correction, solid-state ballast</b>			
Per main current path at 230/220 V			
• Rated power per lamp	Capacitance (µF)	Rated operational current per lamp (A)	
- Parallel correction			
L 18 W	4.5	0.11	Units 22
L 36 W	4.5	0.21	Units 22
L 58 W	7	0.31	Units 14
- With solid-state ballast (single lamp)			
L 18 W	6.8	0.10	Units 63
L 36 W	6.8	0.18	Units 35
L 58 W	10	0.27	Units 23
- With solid-state ballast (two lamps)			
L 18 W	10	0.18	Units 35
L 36 W	10	0.35	Units 18
L 58 W	22	0.52	Units 12
<b>Utilization category AC-5b, switching incandescent lamps</b>		kW	1.6
Per main current path at 230/220 V			
<b>Utilization category AC-6a, switching AC transformers</b>			
• Rated operational current $I_e$			
- For inrush current n = 20	At 400 V	A	5.1
- For inrush current n = 30	At 400 V	A	3.3
• Rated power $P$			
- For inrush current n = 20	Up to 230/220 V	kVA	2.0
	400/380 V	kVA	3.5
	500 V	kVA	4.6
	690/660 V	kVA	6.0
- For inrush current n = 30	Up to 230/220 V	kVA	1.3
	400/380 V	kVA	2.3
	500 V	kVA	3.1
	690/660 V	kVA	4.0
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n,30} \times (30/x)$			
<b>Utilization category AC-6b, switching low-inductance (low-loss, metallized dielectric) AC capacitors</b>		No switching capacity	
<b>Utilization category AC-7a, switching low inductive loads in household appliances</b>			
• Rated operational current $I_e$ (at 55 °C)	At 400/380 V	A	16
	690/660 V	A	16
• Rated power at 50 and 60 Hz	At 230/220 V	kW	6
	400/380 V	kW	10
• Minimum conductor cross-section for loads with $I_e$		mm <sup>2</sup>	2.5
<b>Utilization category AC-7b, switching motor loads in household appliances</b>			
• Rated operational current $I_e$	Up to 220 V	A	9.0
	230 V	A	9.0
	380 V	A	9.0
	400 V	A	8.4
• Rated power of motors at 50 and 60 Hz and	At 110 V	kW	1.2
	220 V	kW	2.4
	230 V	kW	2.5
	240 V	kW	2.6
	380 V	kW	4.0
	400 V	kW	4.0

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3TK20 Contactors

4-pole, 4 kW

Contactors	Type	3TK20 ...0...	3TK20 ...3..., 3TK20 ...6..., 3TK20 ...7...
Size 00			
<b>Main circuit</b>			
<i>Load rating with DC</i>			
<b>Utilization category DC-1, switching resistive loads</b> (contact endurance $0.1 \times 10^6$ operating cycles; $L/R \leq 1$ ms)			
• Rated operational current $I_{\theta}$ (at 55 °C)			
- 1 conducting path	Up to 24 V A 60 V A 110 V A 220/240 V A	16 6 2 1	16 6 2 1
- 2 conducting paths in series	Up to 24 V A 60 V A 110 V A 220/240 V A	16 16 6 2	16 16 6 2
- 3 conducting paths in series	Up to 24 V A 60 V A 110 V A 220/240 V A	16 16 16 6	16 16 16 6
<b>Utilization category DC-3 and DC-5, shunt-wound and series-wound motors</b> ( $L/R \leq 15$ ms)			
• Rated operational current $I_{\theta}$ (at 55 °C)			
- 1 conducting path	Up to 24 V A 60 V A 110 V A 220/240 V A	6 3 0.5 0.1	6 3 0.5 0.1
- 2 conducting paths in series	Up to 24 V A 60 V A 110 V A 220/240 V A	10 5 2 0.5	10 5 2 0.5
- 3 conducting paths in series	Up to 24 V A 60 V A 110 V A 220/240 V A	16 16 16 2	16 16 16 2
<b>Thermal load capacity</b>	10 s current	A	70
<b>Power loss per conducting path</b>	At $I_{\theta}/AC-3$	W	0.3
<i>Switching frequency</i>			
<b>Switching frequency z</b> in operating cycles/hour			
• Contactors without overload relays	No-load switching frequency	h <sup>-1</sup>	10000
Dependence of the switching frequency z' on the operational current I' and operational voltage U': $z' = z \cdot (I_{\theta}/I') \cdot (400 V/U')^{1.5} \cdot 1/h$	AC-1	h <sup>-1</sup>	1000
	AC-2	h <sup>-1</sup>	500
	AC-3	h <sup>-1</sup>	1000
• Contactors with overload relays (mean value)		h <sup>-1</sup>	15
<b>Conductor cross-sections</b>			
<b>Main and auxiliary conductors</b>			
• Solid		mm <sup>2</sup>	2 x (0.5 ... 2.5), 1 x 4 2 x (20 ... 14) AWG, 1 x 12 AWG
• Finely stranded with end sleeve		mm <sup>2</sup>	2 x (0.5 ... 1.5), 1 x 2.5
• Pin-end connector (DIN 46231)		mm <sup>2</sup>	1 x 1 ... 2.5
• Terminal screw			M3
• Prescribed tightening torque for terminal screws		Nm lb.in	0.8 ... 1.3 7 ... 11
<b>Flat connectors</b>			
• When using a plug-in sleeve	6.3 ... 1	mm <sup>2</sup>	0.5 ... 1
• Finely stranded	6.3 ... 2.5	mm <sup>2</sup>	1 ... 2.5
<b>Solder pin connections</b> (only for printed circuit boards)			

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3TK20 Contactors

4-pole, 4 kW

Contactors	Type	3TK20 ...-0...	3TK20 ...-3..., 3TK20 ...-6..., 3TK20 ...-7...
Size 00			
<b>Ⓢ and Ⓣ rated data of the 3TK20 contactors</b>			
<b>Rated insulation voltage <math>U_i</math></b>	V AC	600	300
<b>Uninterrupted current</b>	• Open and enclosed A	16	16 (10 for solder pin connection)
<b>Maximum horsepower ratings</b> (Ⓢ and Ⓣ approved values)			
• Rated power for induction motors at 60 Hz			
- 1-phase	At 115 V hp	0.5	--
	200 V hp	1	1
	230 V hp	1.5	1
	460/575 V hp	--	--
- 3-phase	At 115 V hp	--	--
	200 V hp	3	3 (1 for 3TK20 ...-6)
	230 V hp	3	3 (1 for 3TK20 ...-6)
	460/575 V hp	5	--
<b>Overload relay</b>	Type/Setting range	3UA7/EB 8 ... 10 A	

Contactors	Type	3TK20
Size 00		
<b>Rated data of the auxiliary contacts acc. to IEC 60947-5-1 (VDE 0660 Part 200)</b>		
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	690
<b>Continuous thermal current <math>I_{th}</math> = Rated operational current <math>I_e/AC-12</math></b>	A	10
<b>AC load</b> <b>Rated operational current <math>I_e/AC-15/AC-14</math></b>		
• For rated operational voltage $U_e$		
	24 V A	4
	110 V A	4
	125 V A	4
	220 V A	4
	230 V A	4
	380 V A	3
	400 V A	3
	500 V A	2
	660 V A	1
	690 V A	1
<b>DC load</b> <b>Rated operational current <math>I_e/DC-12</math></b>		
• For rated operational voltage $U_e$		
	24 V A	4
	48 V A	2.2
	110 V A	1.1
	125 V A	1.1
	220 V A	0.5
	440 V A	--
	600 V A	--
<b>Rated operational current <math>I_e/DC-13</math></b>		
• For rated operational voltage $U_e$		
	24 V A	2.1
	48 V A	1.1
	110 V A	0.52
	125 V A	0.52
	220 V A	0.27
	440 V A	--
	600 V A	--
<b>Ⓢ, Ⓣ and Ⓜ rated data of the auxiliary contacts</b>		
<b>Rated voltage, max.</b>	V AC	600
Auxiliary switch blocks, max.	V AC	300
<b>Switching capacity</b>		A 600, Q 300
Uninterrupted current at 240 V AC	A	10

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT15 Contactors

4-pole, 2 NO + 2 NC, 4 ... 18.5 kW

### Overview

#### AC and DC operation

EN 60947-4-1 (VDE 0660 Part 102).

The contactors are suitable for use in any climate. They are finger-safe according to EN 50274.

The accessories for the 3-pole SIRIUS contactors can also be used for the 4-pole versions.

### Function

- Changing the polarity of hoisting gear motors
- Switching two separate loads

#### Note:

Single device for pole reversal; not suitable for reversing duty. 3RT15 contactors are not suitable for switching a load between two current sources.

### Integration

#### Mountable auxiliary contacts

##### Size S00

4 auxiliary contacts (auxiliary switch blocks according to EN 50005)

##### Size S0

Maximum 2 auxiliary contacts (either laterally mounted or snapped onto the top auxiliary switch blocks according to EN 50012 and EN 50005).

##### Size S2

Maximum 4 auxiliary contacts (either laterally mounted or snapped onto the top auxiliary switch blocks to EN 50012 and EN 50005).

### Technical specifications

Contactors	Type Size	3RT15 16 S00	3RT15 17 S00	3RT15 26 S0	3RT15 35 S2
<b>General data</b>					
<b>Permissible mounting position<sup>1)</sup></b>					
<b>Mechanical endurance</b>		Opera- ting cycles	30 million	10 million	
<b>Electrical endurance at <math>I_e/AC-1</math></b>		Opera- ting cycles	Approx. 0.5 million		
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)		V	690		
<b>Permissible ambient temperature</b>		• During operation • During storage	°C -25 ... +60 °C -55 ... +80		
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C			IP20	IP20 (IP00 terminal compartment)	
<b>Touch protection</b> acc. to EN 50274			Finger-safe		
<b>Short-circuit protection of contactors without overload relays</b>					
<b>Main circuit</b>					
Fuse links, gL/gG	• Type of coordination "1"	A	35	63	160
LV HRC 3NA, DIAZED 5SB, NEOZED 5SE	• Type of coordination "2"	A	20	35	80
Acc. to IEC 60947-4-1/ EN 60947-4-1	• Weld-free	A	10	16	50
<b>Control</b>					
<b>Magnetic coil operating range</b>		AC at 50 Hz AC at 60 Hz DC at 50 °C DC at 60 °C AC/DC	0.8 ... 1.1 x $U_s$ 0.85 ... 1.1 x $U_s$ 0.8 ... 1.1 x $U_s$ 0.85 ... 1.1 x $U_s$		0.8 ... 1.1 x $U_s$
<b>Power consumption of the magnetic coils</b> (when coil is cold and 1.0 x $U_s$ )					
• AC operation, 50 Hz	- Closing	VA		61	145
	- P.f.	VA		0.82	0.79
• AC operation, 50/60 Hz	- Closing	VA	26.5/24.3	64/63	170/155
	- P.f.	VA	0.79/0.75	0.82/0.74	0.76/0.72
• DC operation	- Closing	VA	4.4/3.4	8.4/6.8	15/11.8
	- P.f.	VA	0.27/0.27	0.24/0.28	0.35/0.38
	- Closing = Closed	W	3.3	5.6	13.3
<b>Operating times for 0.8 ... 1.1 x <math>U_s</math><sup>2)</sup></b> Total break time = Opening delay + Arcing time					
AC/DC operation					
• DC operation	- Closing delay	ms	25 ... 100	30 ... 90	50 ... 110
	- Opening delay	ms	7 ... 10	13 ... 40	15 ... 30
• AC operation	- Closing delay	ms	8 ... 35	6 ... 30	4 ... 35
	- Opening delay	ms	4 ... 30	13 ... 25	10 ... 30
• Arcing time		ms	10 ... 15		

1) In accordance with the corresponding 3-pole 3RT1 contactors.

2) With size S00, DC operation: operating times at 0.85 ... 1.1 x  $U_s$ .

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT15 Contactors

4-pole, 2 NO + 2 NC, 4 ... 18.5 kW

Contactors	Type Size	3RT15 16 S00	3RT15 17 S00	3RT15 26 S0	3RT15 35 S2
<b>Main circuit</b>					
<b>AC capacity</b>					
<b>Utilization category AC-1, switching resistive loads</b>					
• Rated operational currents $I_e$	At 40 °C up to 690 V A	18	22	40	60
	At 60 °C up to 690 V A	16	20	35	55
• Rated power for AC loads P.f. = 0.95 (at 60 °C)	At 230 V kW	6.5	7.5	15	20
	400 V kW	11	13	26	36
• Minimum conductor cross-section for loads with $I_e$	At 40 °C mm <sup>2</sup>	2.5	2.5	10	16
<b>Utilization category AC-2 and AC-3</b>					
• Rated operational currents $I_e$ (at 60 °C)	Up to 400 V A	9	12	25 <sup>1)</sup>	40
	At 230 V kW	3	3	5.5	9.5
• Rated power of slipping or squirrel-cage motors at 50 and 60 Hz	400 V kW	4	5.5	11	18.5
<b>Load rating with DC</b>					
<b>Utilization category DC-1, switching resistive load (<math>L/R \leq 1</math> ms)</b>					
• Rated operational currents $I_e$ (at 60 °C)					
- 1 conducting path	Up to 24 V A	16	20	35	50
	60 V A	16	20	20	23
	110 V A	2.1	2.1	4.5	4.5
	220 V A	0.8	0.8	1	1
	440 V A	0.6	0.6	0.4	0.4
- 2 conducting paths in series	Up to 24 V A	16	20	35	50
	60 V A	16	20	35	45
	110 V A	12	12	35	45
	220 V A	1.6	1.6	5	5
	440 V A	0.8	0.8	1	1
<b>Utilization category DC-3/DC-5<sup>2)</sup>, shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>					
• Rated operational currents $I_e$ (at 60 °C)					
- 1 conducting path	Up to 24 V A	16	20	20	35
	60 V A	0.5	0.5	5	6
	110 V A	0.15	0.15	2.5	2.5
	220 V A	0.75	0.75	1	1
	440 V A	--	--	0.09	0.1
- 2 conducting paths in series	Up to 24 V A	16	20	35	50
	60 V A	5	5	35	45
	110 V A	0.35	0.35	15	25
	220 V A	--	--	3	5
	440 V A	--	--	0.27	0.27

1) For AC operation: 25 A  
DC operation: 20 A.

2) For  $U_s > 24$  V the rated operational currents  $I_e$  for the NC contact conducting paths are 50 % of the values for the NO contact conducting paths.

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT16 Capacitor Contactors

12.5 ... 50 kvar

### Overview

#### AC operation

IEC 60947, EN 60947 (VDE 0660)

The contactors are suitable for use in any climate. They are finger-safe according to EN 50274.

The 3RT16 capacitor contactors are special version of the size S00 to S3 SIRIUS contactors. The capacitors are precharged by means of the mounted leading NO contacts and resistors; only then do the main contacts close.

This prevents disturbances in the network and welding of the contactors.

Only discharged capacitors are permitted to be switched on with capacitor contactors.

The auxiliary switch block which is snapped onto the capacitor contactor contains the three leading NO contacts and in the case of S00 one standard NC contact and in the case of S0 and S3 one standard NO contact, which is unassigned. Size S00 also contains another unassigned NO contact in the basic unit.

In addition, a 2-pole auxiliary switch block can be mounted laterally on the 3RT16 47 capacitor contactors (2 NO, 2 NC or 1 NO + 1 NC versions); Type 3RH19 21-1EA. ... The fitting of auxiliary switches for 3RT16 17 and 3RT16 27 is not expandable.

For the capacitor switching capacity of the basic 3RT10 contactor version, see "Technical specifications".

### Technical specifications

All technical specifications not mentioned in the table below are identical to those of the 3RT10 17 contactors for size S00, to those of the 3RT10 26 contactors for size S0 and to those of the 3RT10 45 contactors for size S3.

Contactor	Type Size		3RT16 17-.A..3 S00	3RT16 27-.A..1 S0	3RT16 47-.A..1 S3
<b>Capacitor rating at rated power</b> (utilization category AC-6b)		230 V, 50/60 Hz kvar	3 ... 7.5	3.5 ... 15	3.5 ... 30
		<b>400 V, 50/60 Hz kvar</b>	<b>5 ... 12.5</b>	<b>6 ... 25</b>	<b>5 ... 50</b>
		525 V, 50/60 Hz kvar	7.5 ... 15	7.8 ... 30	7.5 ... 60
		690 V, 50/60 Hz kvar	10 ... 21	10 ... 42	10 ... 84
<b>Auxiliary contacts mounted</b> (unassigned)			1 NO + 1 NC	1 NO contact	
<b>Auxiliary contacts mountable</b> (lateral), not for sizes S00 and S0			--		2 NC + 2 NO or 1 NO + 1 NC
<b>Magnetic coil operating range</b>			0.8 ... 1.1 x U <sub>s</sub>		
<b>Max. switching frequency</b>		h <sup>-1</sup>	180	100	
<b>Electrical endurance</b>		Operating cycles	> 250000	> 150000	> 100000
<b>Ambient temperature</b>		°C	60		
<b>Standards</b>			IEC 60947/EN 60947 (VDE 0660)		
<b>Short-circuit protection</b>			1.6 ... 2.2 x I <sub>e</sub>		
<b>Conductor cross-sections (1 or 2 conductors connectable)</b>					
<b>Main conductor</b>			<b>Screw terminals</b>		
• Solid	mm <sup>2</sup>	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5) Acc. to IEC 60947; Max. 2 x (1 ... 4)	2 x (1 ... 2.5); 2 x (2.5 ... 6) Acc. to IEC 60947; Max. 1 x 10 <sup>1)</sup>	--	
• Finely stranded with end sleeve	mm <sup>2</sup>	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5)	2 x (1 ... 2.5); 2 x (2.5 ... 6) <sup>1)</sup>	--	
• AWG cables					
- Solid	AWG	2 x (20 ... 16)	2 x (16 ... 12)	--	
- Solid or stranded	AWG	2 x (18 ... 14)	2 x (14 ... 10)	--	
- Stranded	AWG	1 x 12	1 x 8	--	
• Terminal screws		M3	M4 (Pozidriv size 2)	--	
- Tightening torque	Nm	0.8 ... 1.2	2 ... 2.5	--	
	lb.in	7 ... 10.3	18 ... 22	--	





1) 3RV19 25-5AB feeder terminal for 16 mm<sup>2</sup>.



# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3RT16 Capacitor Contactors

12.5 ... 50 kvar

Contactors	Type Size	3RT16 17-.A..3 S00	3RT16 27-.A..1 S0	3RT16 47-.A..1 S3
<b>Conductor cross-sections (1 or 2 conductors connectable)</b>				
		 <b>Screw terminals</b>		
<b>Front clamping point connected</b> 	<b>Main conductors:</b> With box terminal			
	<ul style="list-style-type: none"> <li>• Finely stranded with end sleeve mm<sup>2</sup> --</li> <li>• Finely stranded without end sleeve mm<sup>2</sup> --</li> <li>• Solid mm<sup>2</sup> --</li> <li>• Stranded mm<sup>2</sup> --</li> <li>• Ribbon cable conductors (number x width x thickness) mm --</li> <li>• AWG cables, solid or stranded AWG --</li> </ul>	2.5 ... 35 4 ... 50 2.5 ... 16 4 ... 70 6 x 9 x 0.8 10 ... 2/0		
<b>Rear clamping point connected</b> 	<ul style="list-style-type: none"> <li>• Finely stranded with end sleeve mm<sup>2</sup> --</li> <li>• Finely stranded without end sleeve mm<sup>2</sup> --</li> <li>• Solid mm<sup>2</sup> --</li> <li>• Stranded mm<sup>2</sup> --</li> <li>• Ribbon cable conductors (number x width x thickness) mm --</li> <li>• AWG cables, solid or stranded AWG --</li> </ul>	2.5 ... 50 10 ... 50 2.5 ... 16 10 ... 70 6 x 9 x 0.8 10 ... 2/0		
	<ul style="list-style-type: none"> <li>• Finely stranded with end sleeve mm<sup>2</sup> --</li> <li>• Finely stranded without end sleeve mm<sup>2</sup> --</li> <li>• Solid mm<sup>2</sup> --</li> <li>• Stranded mm<sup>2</sup> --</li> <li>• Ribbon cable conductors (number x width x thickness) mm --</li> <li>• AWG cables, solid or stranded AWG --</li> </ul>	Max. 2 x 35 Max. 2 x 35 Max. 2 x 16 Max. 2 x 50 2 x (6 x 9 x 0.8) 2 x (10 ... 1/0)		
<b>Both clamping points connected</b> 	<ul style="list-style-type: none"> <li>• Terminal screw - Tightening torque Nm --</li> <li>lb.in --</li> </ul>	M6 (hex. socket, A/F 4) 4 ... 6 36 ... 53		
Connection for drilled copper bars <sup>1)</sup> Max. width mm		10		
Without box terminal with cable lugs <sup>2)</sup> (1 or 2 conductors can be connected)	<ul style="list-style-type: none"> <li>• Finely stranded with cable lug mm<sup>2</sup> --</li> <li>• Stranded with cable lug mm<sup>2</sup> --</li> <li>• AWG cables, solid or stranded AWG --</li> </ul>	10 ... 50 <sup>3)</sup> 10 ... 70 <sup>3)</sup> 7 ... 1/0		
<b>Auxiliary conductors:</b>				
	<ul style="list-style-type: none"> <li>• Solid mm<sup>2</sup></li> </ul>	2 x (0.5 ... 1.5) <sup>4)</sup> ; 2 x (0.75 ... 2.5) <sup>4)</sup> acc. to IEC 60947; max. 2 x (1 ... 4)	2 x (0.5 ... 1.5) <sup>4)</sup> ; 2 x (0.75 ... 2.5) <sup>4)</sup> acc. to IEC 60947; max. 2 x (0.75 ... 4)	
	<ul style="list-style-type: none"> <li>• Finely stranded with end sleeve mm<sup>2</sup></li> </ul>	2 x (0.5 ... 1.5) <sup>4)</sup> ; 2 x (0.75 ... 2.5) <sup>4)</sup>		
	<ul style="list-style-type: none"> <li>• AWG cables, solid or stranded AWG</li> </ul>	2 x (20 ... 16) <sup>4)</sup> ; 2 x (18 ... 14) <sup>4)</sup> ; 1 x 12		
	<ul style="list-style-type: none"> <li>• Terminal screw - Tightening torque Nm</li> <li>lb.in</li> </ul>	M3 0.8 ... 1.2 7 ... 10.3		

- 1) If bars larger than 12 x 10 mm are connected, a 3RT19 46-4EA1 terminal cover is needed to comply with the phase clearance.
- 2) When connecting conductors which are larger than 25 mm<sup>2</sup>, the 3RT19 46-4EA1 terminal cover must be used to keep the phase clearance.
- 3) Only with crimped cable lugs according to DIN 46234. Cable lug max. 20 mm wide.
- 4) 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.

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## Contactors with Extended Operating Range $0.7 \dots 1.25 \times U_s$ , for Railway Applications

### 3RH11 contactor relays

#### Overview

##### DC operation

IEC 60947-4-1, EN 60947-4-1 (VDE 0660, Part 102), for requirements according to IEC 60077-1 and IEC 60077-2.

The contactor relays are finger-safe according to EN 50274. The size S00 contactor relays have Cage Clamp connections for all terminals.

##### Ambient temperature

The permissible ambient temperature for operation of the contactor relays (across the full magnetic coil operating range) is  $-40\text{ °C}$  to  $+70\text{ °C}$ .

Uninterrupted duty at temperatures  $> +60\text{ °C}$  reduces the mechanical endurance, the current-carrying capacity of the conducting paths and the switching frequency.

#### Function

##### Control and auxiliary circuits

The magnetic coils of the contactor relays have an extended operating range from  $0.7$  to  $1.25 \times U_s$  and are fitted as standard with varistors to provide protection against overvoltage. The opening delay is consequently 2 to 5 ms longer than for standard contactors.

##### 3RH11 ..-0LA0

The DC solenoid systems of the contactor relays are modified (to holding excitation) by means of a series resistor.

The size S00 contactor relays are supplied prewired with a plug-on module containing the series resistor. The varistor is integrated. A 4-pole auxiliary switch block (according to EN 50005) can be fitted additionally.

##### Mounting

At ambient temperatures up to  $70\text{ °C}$ , the size S00 contactor relays are allowed to be mounted side by side.

##### 3RH11 22-2K.40

These contactor relays have an extended operating range from  $0.7$  to  $1.25 \times U_s$ ; the coils are fitted with varistors as standard. An additional series resistor is not required. Please note:

- Size S00: it is not possible to mount an auxiliary switch block.

At ambient temperatures  $> 60\text{ °C} \leq 70\text{ °C}$ , a clearance of 10 mm is required when they are mounted side by side.

#### Technical specifications

Contactors	Type	3RH11 .	
<b>Magnetic coil operating range</b>	AC/DC	$0.7 \dots 1.25 \times U_s$	
<b>Power consumption of the magnetic coils</b>			
• Contactors with series resistor	- Closing	W	11
	- Closed	W	4
• Contactors without series resistor	- Closing	W	2.3
	- Closed	W	2.3
<b>Upright mounting position</b>		3RH11 22-2K.40: please ask 3RH11 22-2K.40-0LA0 standard version	

All specifications and technical specifications not mentioned here are identical to those of the standard contactors.

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## Contactors with Extended Operating Range $0.7 \dots 1.25 \times U_s$ , for Railway Applications

3TH4 contactor relays

### Overview

#### 3TH4 contactor relays

EN 60947-4-1.

For requirements according to IEC 60077-1 and IEC 60077-2.

The contactors 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.

### Function

#### Control and auxiliary circuits

The magnetic coils of the contactors have an extended coil operating range from  $0.7$  to  $1.25 \times U_s$  and are fitted as standard with varistors to provide protection against overvoltage. The opening delay is consequently 2 ms to 5 ms longer than for standard contactors.

All specifications and technical specifications not mentioned here are identical to those of the standard 3TH4 contactor relays.

#### Ambient temperature

The permissible ambient temperature for operation of the contactors (across the full operating range of the magnetic coil) is  $-50$  to  $+70$  °C. Uninterrupted duty at temperatures  $< -25$  °C and  $> +55$  °C reduces the mechanical endurance, the current-carrying capacity of the conducting paths and the switching frequency.

#### Mounting

At ambient temperatures  $> 55$  °C, a distance of 10 mm must be observed if contactor relays and size 1 and 2 contactors are mounted side by side. There is no need to reduce the technical specifications.

### Technical specifications

Contactors	Type	3TH42	
<b>Magnetic coil operating range</b>		$0.7 \dots 1.25 \times U_s$	
<b>Power consumption of the magnetic coils</b> (for cold coil)			
	$0.7 \times U_s$ W	2.6	
	$1.0 \times U_s$ W	5.2	
	$1.25 \times U_s$ W	8.2	
(For cold coil: Closing = Closed)			
<b>Permissible ambient temperature</b>	• During operation	°C	$-50 \dots +70$ <sup>1)</sup>
	• During storage	°C	$-55 \dots +80$
<b>Permissible residual current of the electronics</b> (with 0 signal)			
	DC operation		$\leq 10 \text{ mA} \times (24 \text{ V}/U_s)$
<b>Operating times</b>			
(Total break time = OFF-delay + Arcing time)			
• Closing			
- $0.7 \times U_s$	ON-delay (NO)	ms	70 ... 200
	OFF-delay (NC)	ms	28 ... 33
- $1 \times U_s$	ON-delay (NO)	ms	45 ... 80
	OFF-delay (NC)	ms	30 ... 34
- $1.25 \times U_s$	ON-delay (NO)	ms	40 ... 60
	OFF-delay (NC)	ms	31 ... 35
• Opening			
- $0.7 \dots 1.25 \times U_s$	OFF-delay (NO)	ms	20 ... 30
	ON-delay (NC)	ms	22 ... 32
• Arcing time			
		ms	10

1) Side-by-side mounting with 10 mm distance.

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## Contactors with Extended Operating Range $0.7 \dots 1.25 \times U_s$ , for Railway Applications

### 3RT10 motor contactors, 5.5 ... 45 kW

#### Overview

##### DC operation

IEC 60947-4-1, EN 60947-4-1 (VDE 0660, Part 102), for requirements according to IEC 60077-1 and IEC 60077-2.

The contactors are finger-safe according to EN 50274 (exception: series resistors S0 to S3). The contactors are available with both Cage Clamp and screw connection. The size S00 contactors have Cage Clamp terminals for all connections. The auxiliary conductor and coil terminals of sizes S0 to S3 are all Cage Clamp terminals.

##### Ambient temperature

The permissible ambient temperature for operation of the contactors (across the full magnetic coil operating range) is  $-40 \text{ }^\circ\text{C}$  to  $+70 \text{ }^\circ\text{C}$ .

Uninterrupted duty at temperatures  $> +60 \text{ }^\circ\text{C}$  reduces the mechanical endurance, the current-carrying capacity of the conducting paths and the switching frequency.

##### Dimensions

Attaching resistors increases the width of contactor sizes S0 to S3 (see "Dimensional Drawings").

#### Function

##### Control and auxiliary circuits

The magnetic coils of the contactors have an extended operating range from  $0.7$  to  $1.25 \times U_s$  and are fitted as standard with varistors to provide protection against overvoltage. The opening delay is consequently 2 to 5 ms longer than for standard contactors.

##### 3RT10 ..-0LA0

The DC solenoid systems of the contactors are modified (to holding excitation) by means of a series resistor.

The size S00 contactors are supplied prewired with a plug-on module containing the series resistor. The varistor is integrated. A 4-pole auxiliary switch block (according to EN 50005) can be fitted additionally.

The size S0 to S3 contactors are equipped on the front with an auxiliary switch block with 2 NO + 2 NC contacts. The separate series resistor, which is attached laterally next to the contactor on the 35 mm standard mounting rail, is fitted with connecting cables for mounting onto contactors. A circuit diagram showing the terminals is stuck onto each contactor. One NC of the auxiliary contacts is required for the series resistor function. The selection and ordering data shows the number of additional, unsigned auxiliary contacts. It is only possible to extend the number of auxiliary contacts with size S00.

##### Mounting

At ambient temperatures up to  $70 \text{ }^\circ\text{C}$ , the size S00 contactors and contactor relays are allowed to be mounted side by side. The resistor module of the size S0 to S3 contactors must be mounted to the left of the contactor owing to the prefabricated connecting cables.

##### 3RT10 17-2K.4., 3RT10 2.-3K.40

These contactors have an extended operating range from  $0.7$  to  $1.25 \times U_s$ ; the coils are fitted with varistors as standard. An additional series resistor is not required. Please note:

- Size S00: it is not possible to mount an auxiliary switch block.
- Size S0: up to two single-pole auxiliary switch blocks can be mounted.

At ambient temperatures  $> 60 \text{ }^\circ\text{C} \leq 70 \text{ }^\circ\text{C}$ , a clearance of 10 mm is required when they are mounted side by side.

##### 3RT10 contactors with contactor control unit, extended operating range

##### Control and auxiliary circuits

The magnetic coils of the contactors have an extended operating range from  $0.7$  to  $1.25 \times U_s$  and are fitted as standard with varistors to provide protection against overvoltage. The opening delay is consequently 2 ms to 5 ms longer than for standard contactors.

##### 3RT10 ...-X.40-0LA2

The contactors are energized via upstream control electronics which ensure the coil operating range of  $0.7$  to  $1.25 \times U_s$  at an ambient temperature of  $70 \text{ }^\circ\text{C}$ . They are supplied as complete units with a built-on contactor control unit. A varistor is integrated for damping opening surges in the coil.

The possibility of mounting auxiliary switches is the same as that for equivalent standard contactors.

##### Mounting

At ambient temperatures up to  $70 \text{ }^\circ\text{C}$ , sizes S0 to S3 of these contactor versions are allowed to be mounted side by side.

##### Ambient temperature

The permissible ambient temperature for operation of the contactors (across the full operating range of the magnetic coil) is  $-40 \text{ }^\circ\text{C}$  to  $+70 \text{ }^\circ\text{C}$ .

Uninterrupted duty at temperatures  $> +60 \text{ }^\circ\text{C}$  reduces the mechanical endurance, the current-carrying capacity of the conducting paths and the switching frequency.

##### Dimensions

Because of the built-on contactor control unit, the height of the size S0 to S3 contactors increases by up to 34 mm (see "Dimensional Drawings").

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## Contactors with Extended Operating Range $0.7 \dots 1.25 \times U_s$ , for Railway Applications

3RT10 motor contactors, 5.5 ... 45 kW

### Technical specifications

Contactors	Type		3RT10 17	3RT10 2.	3RT10 3.	3RT10 4.
<b>Magnetic coil operating range</b>	AC/DC		$0.7 \dots 1.25 \times U_s$			
<b>Power consumption of the magnetic coils</b>			For cold coil and $1.0 \times U_s$			
• Contactors with series resistor	- Closing	W	11	23	46	78
	- Closed	W	4	7	14	23
• Contactors without series resistor	- Closing	W	2.3	4.2	--	--
	- Closed	W	2.3	4.2	--	--
<b>Upright mounting position</b>			Standard version	3RT10 2.-3K, 40: Special version required 3RT10 2.- 3K, 44-0LA0: Special version required	--	--

All specifications and technical specifications not mentioned here are identical to those of the standard contactors.

Contactors			3RT10 2.	3RT10 3.	3RT10 4.
<b>3RT10 contactors with contactor control unit</b>					
<b>Magnetic coil operating range</b>			$0.7 \dots 1.25 \times U_s$		
<b>Power consumption</b>			For cold coil and $1.0 \times U_s$		
• Closing		W	6	15	19
	• Closed	W	5.4	11	12
<b>Upright mounting position</b>			Special version required --		

All specifications and technical specifications not mentioned here are identical to those of the standard contactors.

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## Contactors with Extended Operating Range $0.7 \dots 1.25 \times U_s$ , for Railway Applications

### 3TB5 motor contactors, 55 ... 200 kW

#### Overview

EN 60947-4-1.

For requirements according to IEC 60077-1 and IEC 60077-2.

The contactors 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.

#### Function

##### Control and auxiliary circuits

The magnetic coils of the contactors have an extended coil operating range from  $0.7$  to  $1.25 \times U_s$  and are fitted as standard with varistors to provide protection against overvoltage. The opening delay is consequently 2 ms to 5 ms longer than for standard contactors.

The DC solenoid systems of the 3TB contactors must be modified (to holding excitation) by means of a series resistor.

This series resistor is supplied separately packed with the contactors. With types 3TB50, the series resistor must be attached onto the right-hand side of the auxiliary switch block by means of the enclosed mounting parts and sets of links provided.

With types 3TB52/54/56, the series resistor must be attached separately next to the contactors. One NC of the auxiliary contacts is required for the series resistor function. The selection and or-

dering data show the number of additional, unassigned auxiliary contacts. It is not possible to extend the number of auxiliary contacts.

With the 3TB52 and larger contactors, the series resistor must be connected using an additional K2 reversing contactor (3RT13 17-1F.40). This contactor is automatically included in the scope of supply in the same packaging as the contactor.

All specifications and technical specifications not mentioned here are identical to those of the standard 3TB contactors.

##### Ambient temperature

The permissible ambient temperature for operation of the contactors (across the full operating range of the magnetic coil) is  $-50$  to  $+70$  °C. Uninterrupted duty at temperatures  $< -25$  °C and  $> +55$  °C reduces the mechanical endurance, the current-carrying capacity of the conducting paths and the switching frequency.

##### Mounting

At ambient temperatures  $> 55$  °C, a distance of 10 mm must be observed if contactor relays and size 1 and 2 contactors are mounted side by side. There is no need to reduce the technical specifications.

##### Dimensions

Attaching resistors and varistors increases the width of the contactors (see "Dimensional Drawings").

#### Technical specifications

Contactors	Type	3TB50	3TB52	3TB54	3TB56
<b>Magnetic coil operating range</b>		$0.8 \dots 1.1 \times U_s$			
<b>Power consumption of the magnetic coils</b>		For cold coil and $1.0 \times U_s$			
• Closing	W	38	40	190	295
• Closed	W	20	21	43	59

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## Contactors with Extended Operating Range $0.7 \dots 1.25 \times U_s$ , for Railway Applications

### 3TC contactors for switching DC voltage, 2-pole

#### Overview

EN 60947-4-1.

For requirements according to IEC 60077-1 and IEC 60077-2.

The contactors are finger-safe according to EN 50274 (exception: series resistor). Terminal covers may have to be fitted onto the connecting bars, depending on the configuration with other devices.

#### Function

##### Control and auxiliary circuits

The magnetic coils of the contactors have an extended coil operating range from  $0.7$  to  $1.25 \times U_s$  and are fitted as standard with varistors to provide protection against overvoltage. The opening delay is consequently 2 ms to 5 ms longer than for standard contactors.

The DC solenoid systems of the 3TC contactors must be modified (to holding excitation) by means of a series resistor.

This series resistor is supplied separately packed with the contactors. With types 3TC48, the series resistor must be attached onto the right-hand side of the auxiliary switch block by means of the enclosed mounting parts and sets of links provided, while in the case of the 3TC44 it must be mounted and wired between the contactor poles. With types 3TC52/56, the series resistor must be attached separately next to the contactors. One NC of the auxiliary contacts is required for the series resistor function.

The selection and ordering data show the number of additional, unassigned auxiliary contacts. It is not possible to extend the number of auxiliary contacts.

With the 3TC52 and larger contactors, the series resistor must be connected using an additional K2 reversing contactor (3RT13 17-1F.40). This contactor is automatically included in the scope of supply in the same packaging as the contactor.

All specifications and technical specifications not mentioned here are identical to those of the standard 3TC contactors.

##### Ambient temperature

The permissible ambient temperature for operation of the contactors (across the full operating range of the magnetic coil) is  $-50$  to  $+70$  °C. Uninterrupted duty at temperatures  $< -25$  °C and  $> +55$  °C reduces the mechanical endurance, the current-carrying capacity of the conducting paths and the switching frequency.

##### Mounting

At ambient temperatures  $> 55$  °C, a distance of 10 mm must be observed if contactor relays and size 1 and 2 contactors are mounted side by side. There is no need to reduce the technical specifications.

##### Dimensions

Attaching resistors and varistors increases the width of the contactors (see "Dimensional Drawings").

#### Technical specifications

Contactors	Type	3TC44	3TC48	3TC52	3TC56
<b>Magnetic coil operating range</b>		$0.7 \dots 1.25 \times U_s$			
<b>Power consumption of the magnetic coils</b>		For cold coil and $1.0 \times U_s$			
• Closing	W	48	26	40	295
• Closed	W	13	14	21	59

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3TC Contactors for Switching DC Voltage

1- and 2-pole, 32 ... 400 A

### Overview

#### 3TC4 and 3TC5

EN 60947-4-1 (VDE 0660 Part 102).

The contactors 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.

The DC motor ratings given in the tables are applicable to the DC-3 and DC-5 utilization categories with two-pole switching of the load or with the two conducting paths of the contactor connected in series.

One contactor conducting path can switch full power up to 220 V. The ratings for higher voltages are available on request.

#### 3TC7

EN 60947-4-1 (VDE 0660 Part 102).

The contactors are suitable for use in any climate. They are suitable for switching and controlling DC motors as well as all other DC loads. The electromagnetic excitation is designed for a particularly wide coil operating range.

It is between 0.7 or 0.8 to  $1.2 \times U_s$ .

3TC74 contactors can be used at up to 750 V/400 A and 50 Hz in AC-1 operation.

### Technical specifications

Contactors	Type		3TC4 and 3TC7	3TC5
<b>Rated data of the auxiliary contacts</b>				
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)		V	690	
<b>Continuous thermal current <math>I_{th}</math> = Rated operational current <math>I_e/AC-12</math></b>			10	10
<b>AC load</b> <b>Rated operational current <math>I_e/AC-15/AC-14</math></b> • For rated operational voltage $U_e$				
	24 V	A	10	10
	110 V	A	10	10
	125 V	A	10	10
	220 V	A	6	6
	230 V	A	5.6	5.6
	380 V	A	4	4
	400 V	A	3.6	3.6
	500 V	A	2.5	2.5
	660 V	A	2.5	2.5
	690 V	A	--	--
<b>DC load</b> <b>Rated operational current <math>I_e/DC-12</math></b> • For rated operational voltage $U_e$				
	24 V	A	10	10
	60 V	A	10	10
	110 V	A	3.2	8
	125 V	A	2.5	6
	220 V	A	0.9	2
	440 V	A	0.33	0.6
	600 V	A	0.22	0.4
<b>Rated operational current <math>I_e/DC-13</math></b> • For rated operational voltage $U_e$				
	24 V	A	10	10
	60 V	A	5	5
	110 V	A	1.14	2.4
	125 V	A	0.98	2.1
	220 V	A	0.48	1.1
	440 V	A	0.13	0.32
	600 V	A	0.07	0.21

Contactors	Type		3TC44 ... 3TC56
<b>Ⓢ and Ⓣ ratings of the auxiliary contacts</b>			
Rated voltage		V AC, max.	600
Switching capacity			A 600, P 600



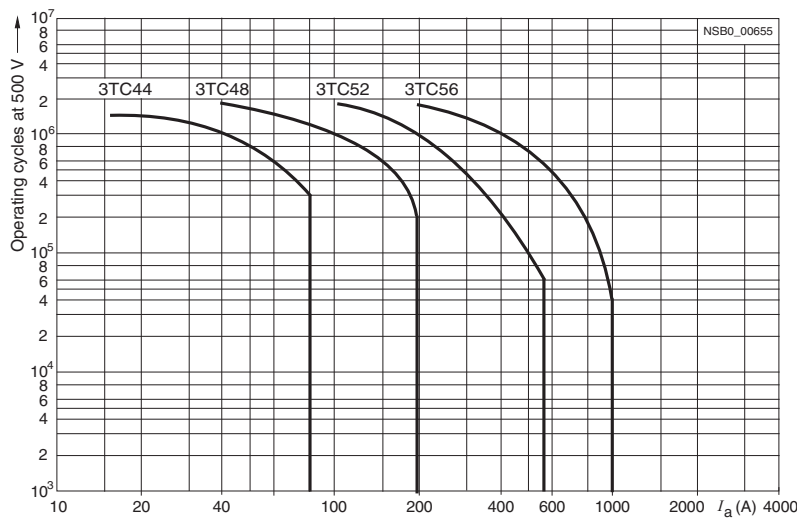
# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3TC Contactors for Switching DC Voltage

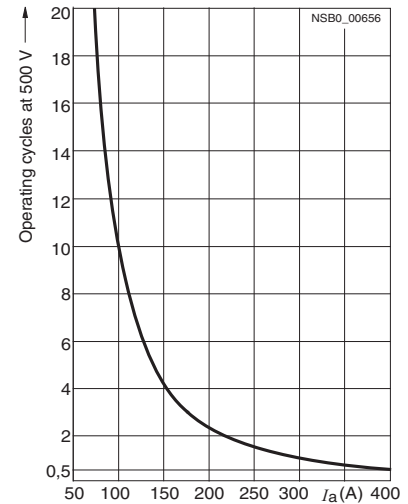
1- and 2-pole, 32 ... 400 A

Contactors Type **3TC44 ... 3TC78**

### Endurance of the main contacts



3TC44 to 3TC56 contactors



3TC74 and 3TC78 contactors

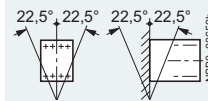
Diagram legend:  
 $I_a$  = Breaking current

Contactors	Type Size	3TC44 2	3TC48 4	3TC52 8	3TC56 12
------------	-----------	------------	------------	------------	-------------

### General data

#### Permissible mounting position

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



<b>Mechanical endurance</b>	Operating cycles	10 million			
<b>Electrical endurance</b>	Operating cycles	1)			
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	800		1000	
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N	V	Up to 300		Up to 660	
<b>Mirror contacts<sup>2)</sup></b> 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			
<b>Permissible ambient temperature</b>	<ul style="list-style-type: none"> <li>• During operation °C</li> <li>• During storage °C</li> </ul>	-25 ... +55		-50 ... +80	
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C		IP00/open, for AC operation, coil assembly IP40			
<b>Shock resistance</b>	Rectangular pulse	g/ms	7.5/5 and 3.4/10	10/5 and 5/10	12/5 and 5.5/10 12/5 and 5.6/10

### Short-circuit protection

#### Main circuit

Fuse links gL/gG	Type of coordination "1"	A	50	160	250	400
LV HRC 3NA, DIAZED 5SB, NEOZED 5SE	Type of coordination "2"	A	35	63	80	250

#### Auxiliary circuit

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

• Fuse links, gL/gG DIAZED 5SB, NEOZED 5SE	A	16				
• Miniature circuit breaker with C characteristic	A	10				


For the rated data of the auxiliary contacts see page 126.

- 1) See the endurance diagram above.
- 2) For 3TC44, one NC contact each must be connected in series for the right and left auxiliary switch block respectively.

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3TC Contactors for Switching DC Voltage

1- and 2-pole, 32 ... 400 A

Contactors	Type Size		3TC44 2	3TC48 4	3TC52 8	3TC56 12
<b>Control</b>						
<b>Magnetic coil operating range</b>			0.8 ... 1.1 x $U_s$			
<b>Power consumption of the magnetic coils</b> (for cold coil and 1.0 x $U_s$ )						
• DC operation	- Closing = Closed	W	10	19	30	86
• AC operation, 50 Hz coil	- Closing	VA/p.f.	68/0.86	300/0.5	640/0.48	1780/0.3
	- Closed	VA/p.f.	10/0.29	26/0.24	46/0.23	121/0.22
• AC operation, 60 Hz coil	- Closing	VA/p.f.	95/0.79	365/0.45	730/0.38	2140/0.3
	- Closed	VA/p.f.	12/0.3	35/0.26	56/0.24	140/0.29
• AC operation, 50/60 Hz coil	- Closing at 50 Hz/60 Hz	VA/p.f.	79/73/0.83/0.78	--	--	--
	- Closed at 50 Hz/60 Hz	VA/p.f.	11/9/0.28/0.27	--	--	--
<b>Operating times</b> (at 0.8 ... 1.1 x $U_s$ ) Total break time = opening delay + Arcing time			(The values apply up to and including 20 % undervoltage, 10 % overvoltage, as well as when the coil is cold and warm)			
• DC operation	- Closing delay	ms	35 ... 190	90 ... 380	120 ... 400	110 ... 400
	- Opening delay <sup>1)</sup>	ms	10 ... 25	17 ... 28	22 ... 35	40 ... 110
• AC operation	- Closing delay	ms	10 ... 40	20 ... 50	20 ... 50	20 ... 50
	- Opening delay <sup>1)</sup>	ms	5 ... 25	5 ... 30	10 ... 30	10 ... 30
• Arcing time	- DC-1	ms	20			
	- DC-3/DC-5	ms	30			
<b>Main circuit</b>						
<b>Load rating with DC</b>						
<b>Utilization category DC-1, switching resistive loads (<math>L/R \leq 1</math> ms)</b>						
• Rated operational currents $I_e$ (at 55 °C)	Up to $U_e$ 750 V	A	32	75	220	400
• Minimum conductor cross-section		mm <sup>2</sup>	6	25	95	240
• Rated power at $U_e$	At 220 V	kW	7	16.5	48	88
	440 V	kW	14	33	97	176
	600 V	kW	19.2	45	132	240
	750 V	kW	24	56	165	300
<b>Utilization category DC-3 and DC-5 Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>						
• Rated operational currents $I_e$ (at 55 °C)	Up to 220 V	A	32	75	220	400
	440 V	A	29	75	220	400
	600 V	A	21	75	220	400
	750 V	A	7.5	75	170	400
• Rated power at $U_e$	At 110 V	kW	2.5	6.5	20	35
	220 V	kW	5	13	41	70
	440 V	kW	9	27	82	140
	600 V	kW	9	38	110	200
	750 V	kW	4	45	110	250
<b>Switching frequency</b>						
<b>Switching frequency z</b> in operating cycles/hour						
AC/DC operation	• With resistive load DC-1	h <sup>-1</sup>	1500	1000		
	• For inductive load DC-3/DC-5	h <sup>-1</sup>	750	600		
<b>Conductor cross-sections (1 or 2 conductors connectable)</b>						
<b>Main conductors:</b>			 <b>Screw terminals</b>			
• Solid		mm <sup>2</sup>	2 x (2.5 ... 10)	2 x (6 ... 16)	--	--
• Finely stranded with end sleeve		mm <sup>2</sup>	2 x (1.5 ... 4)	--	--	--
• Stranded with cable lug		mm <sup>2</sup>	2 x 16	2 x 35	2 x 120	2 x 150
• Pin-end connector to DIN 46231		mm <sup>2</sup>	2 x (1 ... 6)	--	--	--
• Busbars		mm	--	15 x 2.5	25 x 4	2 x (25 x 3)
• Terminal screw			M5	M6	M10	M10
<b>Auxiliary conductors:</b>						
• Solid		mm <sup>2</sup>	2 x (1 ... 2.5)			
• Finely stranded with end sleeve		mm <sup>2</sup>	2 x (0.75 ... 1.5)			

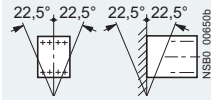

For the rated data of the auxiliary contacts see page 126.

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

# 3RT, 3RH, 3TB, 3TC, 3TH, 3TK Contactors for Special Applications

## 3TC Contactors for Switching DC Voltage

1- and 2-pole, 32 ... 400 A

Contactors	Type	3TC74 1-pole contactors	3TC78 2-pole contactors
<b>General data</b>			
<b>Permissible mounting position</b> The contactors are designed for operation on a vertical mounting surface.			
<b>Mechanical endurance</b>	Operating cycles	30 million	
<b>Electrical endurance</b>	Operating cycles	1)	
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	1500	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	kV	8	
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N	V	630	
<b>Permissible ambient temperature</b>	°C	-25 ... +55	
<b>Degree of protection</b> acc. to EN 60947-1 Appendix C		IP00/open	
<b>Short-circuit protection</b>			
<b>Main circuit</b>			
Fuse links, gL/gG	• Type of coordination "1":	A	630
LV HRC 3NA	• Type of coordination "2":	A	500
<b>Auxiliary circuit</b> (short-circuit current $I_k \geq 1$ kA)			
• Fuse links, gL/gG operational class DIAZED Type 5SB, NEOZED Type 5SE		A	16
• Miniature circuit breaker with C characteristic		A	10
<b>Control</b>			
<b>Magnetic coil operating range</b>			
• DC operation	24 V > 24 V	0.8 ... 1.2 x $U_s$ 0.7 ... 1.2 x $U_s$	
• AC operation	24 V > 24 V	0.7 ... 1.15 x $U_s$ 0.7 ... 1.14 x $U_s$	
<b>Power consumption of the magnetic coils</b> (when coil is cold and 1.0 x $U_s$ )			
• DC operation	Closing = Closed	W	46
• AC operation, 50 Hz	Closing, Closed	VA	80/0.95
<b>Operating times</b> (Total break time = Opening delay + Arcing time)			(The values apply up to and including 15 % undervoltage, 10 % overvoltage, as well as when the coil is cold and warm)
• AC and DC operation	- Closing delay	ms	60 ... 100
	- Opening delay	ms	20 ... 35
• Arcing time at 0.06 ... 4 x $I_e$		ms	40 ... 70
<b>Main circuit</b>			
<b>Load rating with DC</b>			
<b>Utilization category DC-1, switching resistive loads (<math>L/R \leq 1</math> ms)</b>			
• Rated operational current $I_{\theta}/DC-1$ (at 55 °C)	A	500	500
• Minimum conductor cross-section	mm <sup>2</sup>	2 x 150	2 x 150
• Rated power at	220 V kW	110	110
	440 V kW	220	220
	600 V kW	300	300
	750 V kW	375	375
	1200 V kW	--	600
	1500 V kW	--	750
• Critical currents, without arc extinction	440 V A	≤ 7	--
	600 V A	≤ 13	--
	750 V A	≤ 15	--
	≤ 800 V A	--	≤ 7
	1200 V A	--	≤ 13
	1500 V A	--	≤ 15
<b>Utilization categories DC-3 and DC-5, switching DC motors</b>		2)	
<b>Permissible rated current for regenerative braking</b> At 110 ... 600 V		A	400
<b>Switching frequency</b>			
<b>Switching frequency <math>z</math></b> in operating cycles/hour			
• AC/DC operation	- With resistive load DC-1	h <sup>-1</sup>	750
	- For inductive load, DC-3/DC-5	h <sup>-1</sup>	500
			1000
			500
<b>Conductor cross-section</b>			
<b>Main conductors:</b>		 <b>Screw terminals</b>	
• Stranded with cable lug	mm <sup>2</sup>	2 x ... 150	
• Busbars	mm	2 x (30 x 4)	
<b>Auxiliary conductors:</b>			
• Solid	mm <sup>2</sup>	1 ... 2.5	
• Finely stranded with end sleeve	mm <sup>2</sup>	0.75 ... 1.5	

For the rated data of the auxiliary contacts see page 126.

1) For endurance see page 127.

2) See selection table in Catalog LV 1.

# 3RH, 3TH Contactor Relays

## 3RH1 contactor relays, 4- and 8-pole

### Overview

The SIRIUS generation of controls is a complete, modular system family, logically designed right down to the last detail, from the basic units to the accessories.

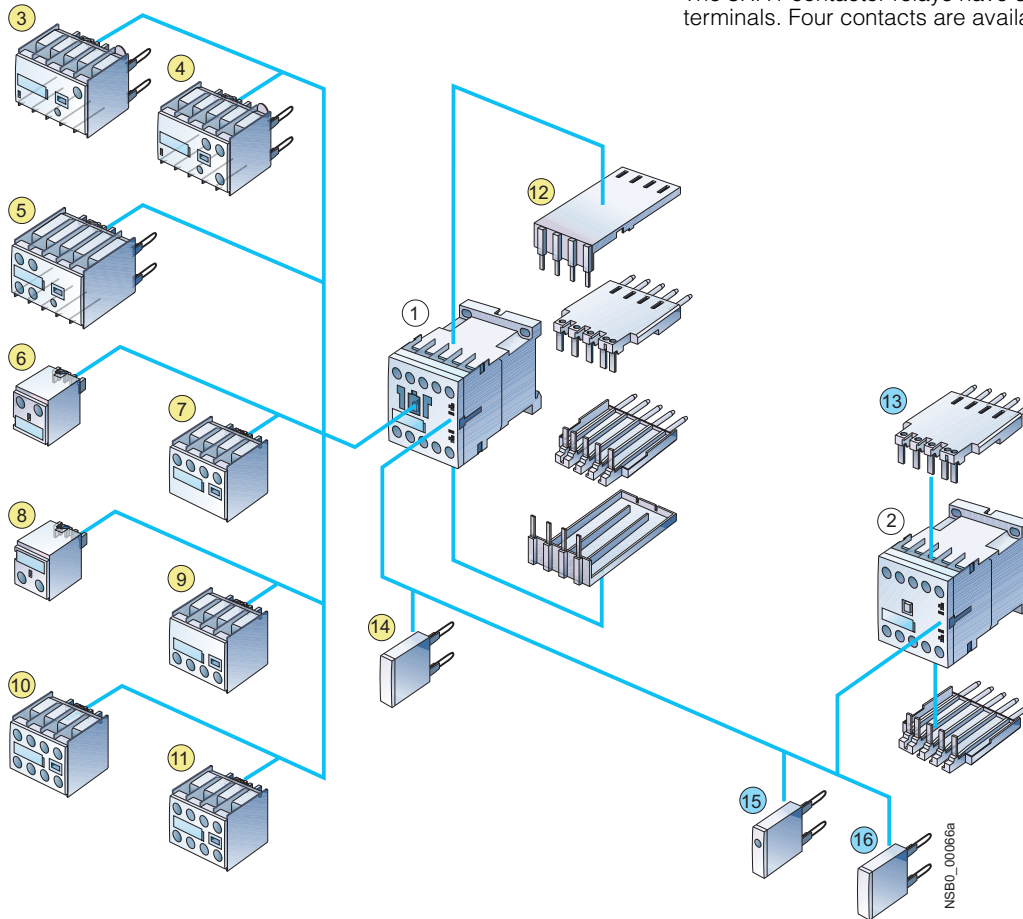
#### Contactor relays and coupling relays Size S00 with accessories

#### AC and DC operation

IEC 60947, EN 60947 (VDE 0660)

The 3RH1 contactor relays are suitable for use in any climate. They are finger-safe according to EN 50274.

The 3RH1 contactor relays have screw or Cage Clamp terminals. Four contacts are available in the basic unit.



- ① Contactor relay
- ② Coupling relay for auxiliary circuits
- ③ Solid-state timing relay block, with ON-delay
- ④ Solid-state timing relay block, with OFF-delay
- ⑤ Auxiliary switch block, with solid-state time-delay (versions: ON or OFF-delay)
- ⑥ 1-pole auxiliary switch block, cable entry from above
- ⑦ 2-pole auxiliary switch block, cable entry from above
- ⑧ 1-pole auxiliary switch block, cable entry from below
- ⑨ 2-pole auxiliary switch block, cable entry from below
- ⑩ 4-pole auxiliary switch block (terminal designations according to EN 50011 or EN 50005)
- ⑪ 2-pole auxiliary switch block, standard version or solid-state time-delay version (terminal designations according to EN 50005)
- ⑫ Solder pin adapter for contactor relays with 4-pole auxiliary switch block
- ⑬ Solder pin adapter for contactor relays and coupling relays
- ⑭ Additional load module for increasing the permissible residual current
- ⑮ Surge suppressor with LED
- ⑯ Surge suppressor without LED

## 3RH1 contactor relays, 4- and 8-pole

### Function

#### Contact reliability

High contact stability at low voltages and currents, suitable for solid-state circuits with currents  $\geq 1$  mA at a voltage of 17 V.

#### Surge suppression

RC elements, varistors, diodes or diode assemblies (combination of a diode and a Zener diode) can be plugged onto all contactor relays from the front for damping opening surges in the coil. The plug-in direction is determined by a coding device.

#### Note:

*The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are damped against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).*

### Integration

#### Auxiliary switch blocks

The 3RH1 contactor relays can be expanded by up to four contacts by the addition of snap-on auxiliary switch blocks.

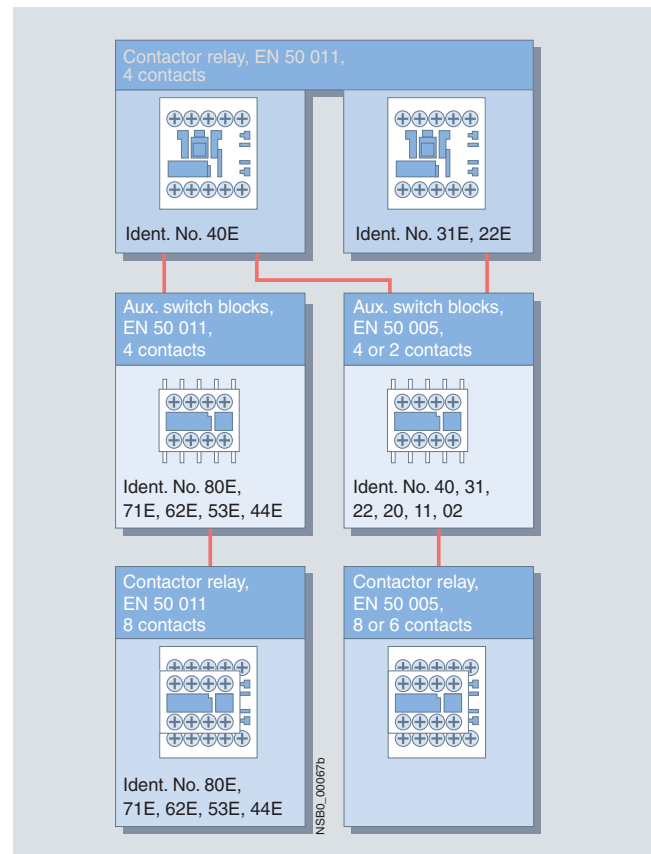
The auxiliary switch block can easily be snapped onto the front of the contactors. The auxiliary switch block has a centrally positioned release lever for disassembly.

The contactor relays with 4 contacts according to EN 50011, with the identification number 40E, can be extended with 80E to 44E auxiliary switch blocks to obtain contactor relays with 8 contacts according to EN 50011. The identification numbers 80E to 44E on the auxiliary switch blocks apply to the complete contactors. These auxiliary switch blocks (3RH19 11-1GA ..) cannot be combined with contactor relays with identification numbers 31E and 22E; they are coded.

All contactor relays with 4 contacts according to EN 50011, identification numbers 40E to 22E, can be extended with auxiliary switch blocks 40 to 02 to obtain contactor relays with 6 or 8 contacts in accordance with EN 50005. The identification numbers on the auxiliary switch blocks apply only to the attached auxiliary switch blocks.

In addition, fully mounted 3RH12 8-pole contactor relays are available; the mounted 4-pole auxiliary switch block in the 2nd tier is not removable.

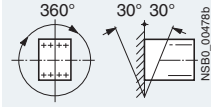

The terminal designations comply with EN 50011. These versions are built in accordance with special Swiss regulations (SUVA) and are distinguished externally by a red labeling plate.



# 3RH, 3TH Contactor Relays

## 3RH1 contactor relays, 4- and 8-pole

### Technical specifications

Contactor	Type Size	3RH1 S00
<b>Permissible mounting position</b>		
The contactors are designed for operation on a vertical mounting surface.	• AC and DC operation	
Upright mounting position (only for 3RH11/3RH12/3RH14)	• AC operation	
	• DC operation	Special version required Standard version (for coupling relays and contactor relays with extended operating range 3RH11 22-2K. 40, please ask)

### Positively-driven operation of contacts in contactor relays

#### 3RH1:

**Yes**, in the basic unit and the auxiliary switch block as well as between the basic unit and the snap-on auxiliary switch block (removable) acc. to:

- ZH 1/457
- EN 60947-5-1, Appendix L

#### 3RH12:

**Yes**, in the basic unit and the auxiliary switch block as well as between the basic unit and the snap-on auxiliary switch block (fixed) acc. to:

- ZH 1/457
- EN 60947-5-1, Appendix L
- SUVA

#### Note:

3RH19 11-.NF. solid-state compatible auxiliary switch blocks have no positively-driven contacts.

Explanations:

There is positively-driven operation if it is ensured that the NC and NO contacts cannot be closed at the same time.

#### ZH1/457

Safety rules for control units on power-operated presses in the metal-working industry.

#### EN 60947-5-1, Appendix L

Low-voltage controlgear, control equipment, and switching elements. Special requirements for positively-driven contacts

#### SUVA

Accident prevention regulations of the "Schweizer Unfallverhütungsanstalt" (Swiss Institute for Accident Insurance)

### Contact reliability

Contact reliability at 17 V, 1 mA acc. to EN 60947-5-4

Frequency of contact faults  $< 10^{-8}$ , i. e.  $< 1$  fault per 100 million operating cycles

### Contact endurance for AC-15/AC-14 and DC-13 utilization categories

The contact endurance is mainly dependent 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. If magnetic circuits other than the contactor coil systems or solenoid valves are present, e.g. magnetic brakes, protective measures for the load circuits are necessary.

RC elements and freewheel diodes would be suitable as protective measures.

The characteristic curves apply to:

- 3RH11, 3RH12 contactor relays
- 3RH14 latched contactor relays
- 3RH19 11 auxiliary switch blocks.

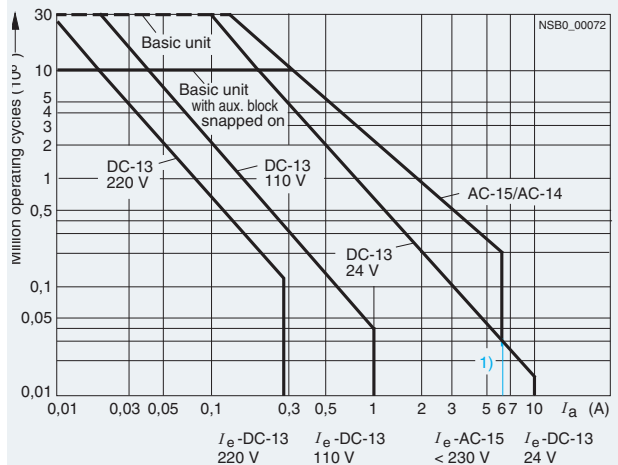


Diagram legend:

$I_a$  = Breaking current

$I_e$  = Rated operational current

1) Snap-on auxiliary switch blocks:  $I_e$ /DC-13 max. 6 A.

# 3RH, 3TH Contactor Relays

## 3RH1 contactor relays, 4- and 8-pole

Contactors	Type Size	3RH11, 3RH12 S00	3RH14 S00
<b>Ⓢ and Ⓛ ratings</b>			
<b>Basic units and auxiliary switch blocks</b>			
• Rated control supply voltage	V AC	Max. 600	
• Rated voltage	V AC	600	
• Switching capacity		A 600, Q 600	
• Uninterrupted current at 240 V AC	A	10	
<b>General data</b>			
<b>Mechanical endurance</b>	• Basic units	Operating cycles	30 million
	• Basic unit with snap-on auxiliary switch block	Operating cycles	10 million
	• Solid-state compatible auxiliary switch block	Operating cycles	5 million
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	690	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	kV	6	
<b>Protective separation</b> between the coil and the contacts in the basic unit acc. to EN 60947-1, Appendix N	V	400	
<b>Permissible ambient temperature</b>	• During operation • During storage	°C	-25 ... +60 -55 ... +80
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C			IP20, coil assembly IP40
<b>Touch protection</b> acc. to EN 50274			Finger-safe
<b>Shock resistance</b>			
• Rectangular pulse	AC/DC operation	g/ms	10/5 and 5/10
• Sine pulse	AC/DC operation	g/ms	15/5 and 8/10
<b>Conductor cross-sections (1 or 2 conductors connectable)</b>			
<b>Auxiliary conductor and coil terminals</b>		<b>⊕ Screw terminals</b>	
• Solid	mm <sup>2</sup>	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (1 ... 4)	
• Finely stranded with end sleeve	mm <sup>2</sup>	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5)	
• AWG cables, solid or stranded	AWG	2 x (20 ... 16) 2 x (18 ... 14) 1 x 12	
• Terminal screws		M3	
- Tightening torque	Nm	0.8 ... 1.2 (7 ... 10.3 lb.in)	
<b>Auxiliary conductor and coil terminals</b>		<b>⊖ Cage Clamp terminals</b>	
• Solid	mm <sup>2</sup>	2 x (0.25 ... 2.5)	
• Finely stranded with end sleeve	mm <sup>2</sup>	2 x (0.25 ... 1.5)	
• Finely stranded without end sleeve	mm <sup>2</sup>	2 x (0.25 ... 2.5)	
• AWG cables, solid or stranded	AWG	2 x (24 ... 14)	
<b>Short-circuit protection</b>			
(weld-free protection at $I_k \geq 1$ kA)			
• Fuse links, gL/gG operational class			
- DIAZED, Type 5SB	A	10	
- NEOZED, Type 5SE	A	10	
• Or miniature circuit breakers with C characteristic (short-circuit current $I_k < 400$ A)	A	6	

For corresponding 8WA2 803/8WA2 804 opening tool, see Catalog LV 1.

An "insulation stop" must be used for conductor cross-sections  $\leq 1$  mm<sup>2</sup>, see Catalog LV 1.

### Note:

Maximum external diameter of the conductor insulation: 3.6 mm.

# 3RH, 3TH Contactor Relays

## 3RH1 contactor relays, 4- and 8-pole

Contactors	Type Size	<b>3RH1. S00</b>	
<b>Control</b>			
<b>Magnetic coil operating range</b>			
• AC operation		At 50 Hz At 60 Hz	0.8 ... 1.1 x $U_s$ 0.85 ... 1.1 x $U_s$
• DC operation		At +50 °C At +60 °C	0.8 ... 1.1 x $U_s$ 0.85 ... 1.1 x $U_s$
<b>Power consumption of the magnetic coils</b> (when coil is cold and 1.0 x $U_s$ )			
• AC operation, 50 Hz	- Closing - Closed	VA/p.f. VA/p.f.	27/0.8 4.6/0.27
• AC operation, 60 Hz	- Closing - Closed	VA/p.f. VA/p.f.	24/0.75 3.5/0.27
• DC operation	- Closing = Closed	W	3.2
<b>Permissible residual current of the electronics</b> (with 0 signal)			
	• For AC operation <sup>1)</sup> • For DC operation		< 3 mA x (230 V/ $U_s$ ) < 10 mA x (24 V/ $U_s$ )
<b>Operating times<sup>2)</sup></b> (Total break time = OFF-delay + Arcing time)			
<u>AC operation</u> Values apply with coil in cold state and at operating temperature for operating range			
• Closing			
- ON-delay of NO contact	0.8 ... 1.1 x $U_s$ 1.0 x $U_s$ 3RH14 minimum operating time	ms ms ms	8 ... 35 10 ... 25 ≥ 35
- OFF-delay of NC contact	0.8 ... 1.1 x $U_s$ 1.0 x $U_s$	ms ms	6 ... 20 7 ... 20
• Opening			
- OFF-delay of NO contact	0.8 ... 1.1 x $U_s$ 1.0 x $U_s$ 3RH14 minimum operating time	ms ms ms	4 ... 30 5 ... 30 ≥ 30
- ON-delay of NC contact	0.8 ... 1.1 x $U_s$ 1.0 x $U_s$	ms ms	5 ... 30 7 ... 20
<u>DC operation</u>			
• Closing			
- ON-delay of NO contact	0.8 ... 1.1 x $U_s$ 1.0 x $U_s$ 3RH14 minimum operating time	ms ms ms	25 ... 100 30 ... 50 ≥ 100
- OFF-delay of NC contact	0.8 ... 1.1 x $U_s$ 1.0 x $U_s$	ms ms	20 ... 90 25 ... 45
• Opening			
- OFF-delay of NO contact	0.8 ... 1.1 x $U_s$ 1.0 x $U_s$ 3RH14 minimum operating time	ms ms ms	7 ... 10 7 ... 9 ≥ 30
- ON-delay of NC contact	0.8 ... 1.1 x $U_s$ 1.0 x $U_s$	ms ms	13 ... 16 13 ... 15
• Arcing time		ms	10 ... 15
Dependence of the switching frequency $z'$ on the operational current $I'$ and operational voltage $U'$ : $z' = z \cdot (I_e/I') \cdot (400 \text{ V}/U')^{1.5} \cdot 1/\text{hy}$			

1) The 3RT19 16-1GA00 additional load module is recommended for higher residual currents, see Catalog LV 1.

2) The OFF-delay of the NO contact and the ON-delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).



# 3RH, 3TH Contactor Relays

## 3RH1 contactor relays, 4- and 8-pole

Contactors	Type Size	3RH1. S00	
<b>Load side</b>			
<b>Rated operational currents <math>I_e</math></b>			
AC-12		A	10
AC-15/AC-14	Up to 230 V	A	6
For rated operational voltage $U_s$	400 V	A	3
	500 V	A	2
	690 V	A	1
DC-12			
For rated operational voltage $U_s$			
• 1 conducting path	24 V	A	10
	60 V	A	6
	110 V	A	3
	220 V	A	1
	440 V	A	0.3
	600 V	A	0.15
• 2 conducting paths in series	24 V	A	10
	60 V	A	10
	110 V	A	4
	220 V	A	2
	440 V	A	1.3
	600 V	A	0.65
• 3 conducting paths in series	24 V	A	10
	60 V	A	10
	110 V	A	10
	220 V	A	3.6
	440 V	A	2.5
	600 V	A	1.8
DC-13			
For rated operational voltage $U_s$			
• 1 conducting path	24 V	A	10 <sup>1)</sup>
	60 V	A	2
	110 V	A	1
	220 V	A	0.3
	440 V	A	0.14
	600 V	A	0.1
• 2 conducting paths in series	24 V	A	10
	60 V	A	3.5
	110 V	A	1.3
	220 V	A	0.9
	440 V	A	0.2
	600 V	A	0.1
• 3 conducting paths in series	24 V	A	10
	60 V	A	4.7
	110 V	A	3
	220 V	A	1.2
	440 V	A	0.5
	600 V	A	0.26
<b>Switching frequency <math>z</math></b>			
• In operating cycles/h during normal duty for utilization category	AC-12/DC-12	h <sup>-1</sup>	1000
	AC-15/AC-14	h <sup>-1</sup>	1000
	DC-13	h <sup>-1</sup>	1000
• No-load switching frequency		h <sup>-1</sup>	10000
Dependence of the switching frequency $z'$ on the operational current $I'$ and operational voltage $U'$ : $z' = z \cdot (I_e/I') \cdot (400 \text{ V}/U')^{1.5} \cdot 1/\text{h}$			

1) Snap-on auxiliary switch blocks: 6 A.

# 3RH, 3TH Contactor Relays

## 3RH14 latched contactor relays, 4-pole

### Overview

#### *AC and DC operation*

IEC 60947, EN 60947 (VDE 0660).

The terminal designations comply with EN 50011.

The contactor coil and the coil of the release solenoid are both designed for uninterrupted duty.

The number of auxiliary contacts can be extended by means of auxiliary switch blocks (up to 4 poles).

RC elements, varistors diodes or diode assemblies can be fitted to both coils from the front for damping opening surges in the coil.

The contactor relay can also be switched on and released manually ([for minimum actuating times, see page 134](#)).

### Overview

#### AC and DC operation

IEC 60947 and EN 60947 (VDE 0660).

The 3TH42/3TH43 contactor relays are suitable for use in any climate. They are finger-safe according to EN 50274.

#### Terminal designations according to EN 50011

In terms of their terminal designations, identification numbers and identification letters, the 3TH42/3TH43 contactor relays conform to the standard EN 50011 for "Specific contactor relays".

### Function

#### Contact reliability

High contact stability at low voltages and currents thanks to the use of moving double-break contacts, suitable for solid-state circuits with currents  $\geq 1$  mA for voltages at 17 V.

#### Make-before-break contacting

The 3TH42/3TH43 contactor relays are available in versions with make-before-break contacting (make-before-break between 1 NO and 1 NC).

The make-before-break time is approximately 1 ms. This is not sufficient to cause another contactor to close. If the make-before-break conducting paths are connected in series, a fleeting contact element is created; the wiping time is approximately 1 ms.

#### Surge suppression

The 3TH42/3TH43 contactors can be equipped with RC elements, varistors, diodes or diode assemblies (combination of a diode and a Zener diode) for damping opening surges. The surge suppressors can be mounted directly on the coil (see "Accessories").

#### Note:

The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are damped against voltage peaks (noise suppression diode 6 to 10 times; diode assembly 2 to 6 times, varistor +2 to 5 ms).

### Technical specifications

Contactors	Type	3TH42/3TH43
<b>Permissible mounting position</b>		
The contactors are designed for operation on a vertical mounting surface.	• AC operation	
	• DC operation	
Upright mounting position	• AC and DC operation	<p>Special version required</p>

### Positively-driven operation in contactor relays with 8 and 10 contacts

#### 3TH42/3TH43:

Yes, the contactor relays comply with the conditions for positively-driven operation acc. to:

- ZH 1/457
- EN 60947-5-1, Appendix L
- SUVA

#### Explanations:

There is positively-driven operation if it is ensured that the NC and NO contacts cannot be closed at the same time.

#### ZH1/457

Safety rules for control units on power-operated presses in the metal-working industry.

#### EN 60947-5-1, Appendix L

Low-voltage controlgear, control equipment, and switching elements. Special requirements for positively-driven contacts

#### SUVA

Accident prevention regulations of the "Schweizer Unfallverhütungsanstalt" (Swiss Institute for Accident Insurance)

# 3RH, 3TH Contactor Relays

## 3TH4 contactor relays, 8- and 10-pole

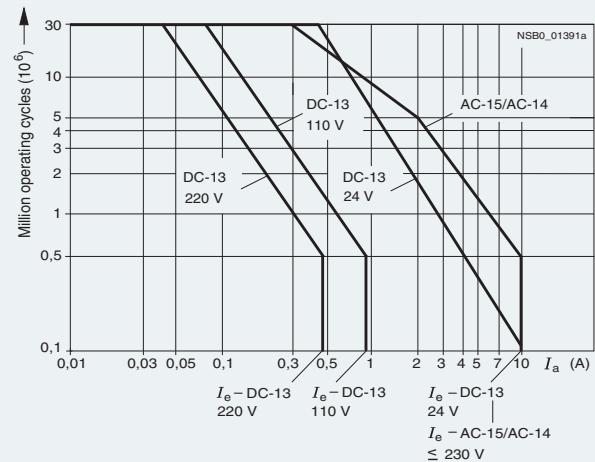
Contactors

Type

3TH42/3TH43

### Contact endurance for AC-15/AC-14 and DC-13 utilization categories

The contact endurance is mainly dependent 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. If magnetic circuits other than the contactor coil systems or solenoid valves are present, e.g. magnetic brakes, protective measures for the load circuits are necessary. RC elements and freewheel diodes would be suitable as protective measures.



### Ⓢ and Ⓜ ratings

#### Basic units

Rated control supply voltage  $U_s$

Max. 600 V AC, 230 V DC (acc. to UL 240 V DC)

Rated voltage

600 V AC, 600 V DC

Switching capacity

A 600, P 600

#### General data

Mechanical endurance

Basic units

Operating cycles

30 million

Rated insulation voltage  $U_i$  (degree of pollution 3)

V

690

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

Up to 500

Permissible ambient temperature

- During operation
- During storage

°C

-25 ... +55

°C

-55 ... +80

Degree of protection acc. to EN 60947-1, Appendix C

IP20

#### Shock resistance

- Rectangular pulse

- AC operation

g/ms

7.7/5 and 4.4/10

- DC operation

g/ms

9.3/5 and 5.4/10

- Sine pulse

- AC operation

g/ms

12/5 and 6.8/10

- DC operation

g/ms

14.7/5 and 8.5/10

### Conductor cross-sections

- Solid
- Finely stranded with end sleeve
- Terminal screw

mm<sup>2</sup>

mm<sup>2</sup>

### ⊕ Screw terminals

2 x (0.5 ... 1)<sup>1)</sup>; 2 x (1 ... 2.5)<sup>1)</sup>; 1 x 4

2 x (0.75 ... 2.5)

M3.5

### Short-circuit protection

(weld-free protection at  $I_k \geq 1$  kA)

- Fuse links, gL/gG operational class
  - LV HRC Type 3NA
  - DIAZED Type 5SB
  - NEOZED Type 5SE, quick
- Miniature circuit breaker
  - C Characteristic
  - B Characteristic

A

A

A

A

A

16

16

20

16

16

1) 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.

Contactors	Type	3TH42/3TH43	
<b>Control</b>			
<b>Magnetic coil operating range</b>			
AC operation			0.8 ... 1.1 x $U_s$ <sup>1)</sup>
DC operation (except 24 V)			0.8 ... 1.1 x $U_s$
• At 24 V DC			0.8 ... 1.2 x $U_s$
<b>Power consumption of the magnetic coils</b> (when coil is cold and 1.0 x $U_s$ )			
AC operation, 50 Hz, standard version			
• Closing	VA/p.f.	68/0.82	
• Closed	VA/p.f.	10/0.29	
AC operation, 50/60 Hz, standard version			
• Closing, 50 Hz	VA/p.f.	77/0.81	
• Closed, 50 Hz	VA/p.f.	11/0.28	
• Closing, 60 Hz	VA/p.f.	71/0.75	
• Closed, 60 Hz	VA/p.f.	9/0.27	
AC operation, 50 Hz, USA/Canada			
• Closing	VA/p.f.	68/0.82	
• Closed	VA/p.f.	10/0.29	
AC operation, 60 Hz, USA/Canada			
• Closing	VA/p.f.	75/0.76	
• Closed	VA/p.f.	9.4/0.29 ... 0.3	
AC operation, 50 Hz, standard version			
• Closing	VA/p.f.	80/0.8	
• Closed	VA/p.f.	10.7/0.29	
AC operation, 60 Hz, standard version			
• Closing	VA/p.f.	75 ... 90/0.73	
• Closed	VA/p.f.	8.5 ... 10.7/0.29 ... 0.3	
DC operation up to 250 V	Closing = Closed	W	6.2
<b>Permissible residual current of the electronics</b> (with 0 signal)			
For AC operation			≤ 8 mA x (220 V/ $U_s$ )
For DC operation			≤ 1.25 mA x (220 V/ $U_s$ )
<b>Operating times<sup>2)</sup></b>			
Total break time = OFF-delay + arcing time (the values apply up to and including 20 % undervoltage, 10 % overvoltage, and with the coil in the cold state and at operating temperature)			
<u>AC operation</u>			
Closing			
• ON-delay NO	ms	8 ... 35	
• OFF-delay NC	ms	6 ... 20	
Opening			
• OFF-delay NO	ms	4 ... 18	
• ON-delay NC	ms	5 ... 30	
Arcing time	ms	10	
<u>DC operation</u>			
Closing			
• ON-delay NO	ms	20 ... 170	
• OFF-delay NC	ms	18 ... 110	
Opening			
• OFF-delay NO	ms	10 ... 25	
• ON-delay NC	ms	15 ... 30	
Arcing time	ms	10	
<b>Operating times<sup>2)</sup> at 1.0 x <math>U_s</math></b>			
<u>AC operation</u>			
Closing			
• ON-delay NO	ms	10 ... 25	
• OFF-delay NC	ms	7 ... 20	
Opening			
• OFF-delay NO	ms	5 ... 18	
• ON-delay NC	ms	7 ... 20	
<u>DC operation</u>			
Closing			
• ON-delay NO	ms	30 ... 70	
• OFF-delay NC	ms	28 ... 65	
Opening			
• OFF-delay NO	ms	10 ... 20	
• ON-delay NC	ms	15 ... 25	

1) Coils for USA, Canada and Japan: 0.85 ... 1.1  $U_s$  at 60 Hz.

2) The OFF-delay of the NO contact and the ON-delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (noise suppression diode 6 to 9 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).

# 3RH, 3TH Contactor Relays

## 3TH4 contactor relays, 8- and 10-pole

Contactors	Type	3TH42/3TH43	
<b>Load side</b>			
<b>Rated operational currents <math>I_e</math></b>			
AC-12	A		16
AC-15/AC-14 for rated operational voltage $U_e$			
	230 V	A	10
	400 V	A	6
	500 V	A	4
	690 V	A	2
DC-12, for rated operational voltage $U_e$			
• 1 conducting path	Up to 48 V	A	10
	110 V	A	2.1
	220 V	A	0.8
	440 V	A	0.6
	600 V	A	0.6
• 2 conducting paths in series	Up to 48 V	A	10
	110 V	A	10
	220 V	A	1.6
	440 V	A	0.8
	600 V	A	0.7
• 3 conducting paths in series	Up to 48 V	A	10
	110 V	A	10
	220 V	A	10
	440 V	A	1.3
	600 V	A	1
DC-13, for rated operational voltage $U_e$			
• 1 conducting path	24 V	A	10
	48 V	A	5
	110 V	A	1
	220 V	A	0.45
	440 V	A	0.25
	600 V	A	0.2
• 2 conducting paths in series	24 V	A	10
	48 V	A	10
	110 V	A	2.5
	220 V	A	0.75
	440 V	A	0.5
	600 V	A	0.4
• 3 conducting paths in series	24 V	A	10
	48 V	A	10
	110 V	A	10
	220 V	A	2
	440 V	A	0.9
	600 V	A	0.8
<b>Rated power of induction motors</b>			
Acc. to utilization category AC-2 and AC-3, 50 Hz			
	230/220 V	kW	2.4
	400/380 V	kW	4
	500 V	kW	4
	690/660 V	kW	4
<b>Switching frequency <math>z^1</math></b>			
Operating cycles per hour during normal duty for utilization category			
	AC-12/DC-12	h <sup>-1</sup>	1000
	AC-2	h <sup>-1</sup>	500
	AC-3	h <sup>-1</sup>	1000
	AC-15/AC-14	h <sup>-1</sup>	3600
	DC-13	h <sup>-1</sup>	3600
	No-load switching frequency	h <sup>-1</sup>	10000

1) Dependence of the switching frequency  $z'$  on the operational current  $I'$  and operational voltage  $U'$ :  $z' = z \cdot (I_e/I') \cdot (400 \text{ V}/U')^{1.5} \cdot 1/\text{h}$ .

### Overview

#### AC and DC operation

IEC 60947 (VDE 0660).

The terminal designations comply with EN 50011.

#### 3TH2 contactor relays

The 3TH2 contactor relays are suitable for use in any climate. The contactor relays with screw terminals are finger-safe according to EN 50274.

#### 3TH27 latched contactor relays

The contactor coil and the coil of the release solenoid are both designed for uninterrupted duty.

RC elements, varistors diodes or diode assemblies can be fitted to both coils from the front for damping opening surges in the coil.

The contactor relay can also be switched on and released manually.

### Design

#### 3TH2 contactor relays

##### Version

The 3TH20 contactors with 4 auxiliary contacts are available with SIGUT screw terminals, 6.3 mm x 0.8 mm flat connectors and solder pin connections.

The contactors with 6.3 mm x 0.8 mm flat connectors can be used in the plug-in base with solder pin connections for printed circuit boards. The contactor relays are coded and the plug-in base is codable in order to ensure non-interchangeability.

The 3TH22 contactor relays with 8 integrated contacts are available with screw terminals. The terminal designations are according to EN 50011.

##### Contact reliability

High contact stability at low voltages and currents, suitable for solid-state circuits with currents  $\geq 1$  mA at a voltage of 17 V and higher.

##### Auxiliary switch blocks

The contactor relays with 4 contacts with screw terminals relays can be expanded by up to four contacts by the addition of snap-on auxiliary switch blocks.

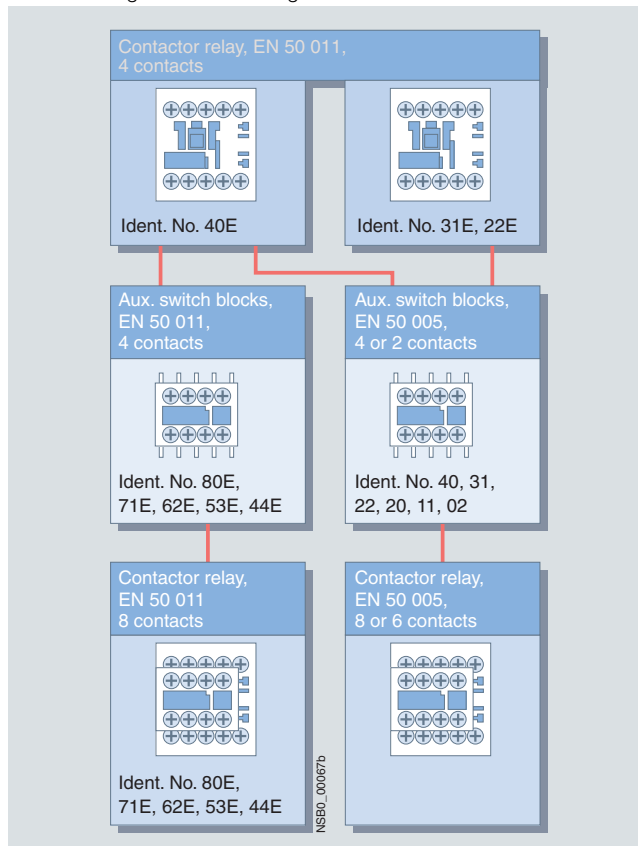
A cover (with unit labeling plate) must be removed from the front of the contactor for this purpose. The auxiliary switch block is then easy to mount. The auxiliary switch blocks can be removed again by unlocking them with a laterally arranged slide.

The contactor relays with screw terminals with 4 contacts according to EN 50011, with the identification number 40E, can be extended with 80E, 71E, 62E, 53E or 44E auxiliary switch blocks to obtain contactor relays with 8 contacts according to EN 50011. The identification numbers 80E, 71E, 62E, 53E or 44E on the coded auxiliary switch blocks apply to the complete contactors (see graphic on the right). These auxiliary switch blocks cannot be combined with contactor relays with identification number 31E and 33E.

All contactor relays with screw terminals with 4 contacts according to EN 50011, identification number 40E, 31E or 22E, can be extended with auxiliary switch blocks with identification number 40, 31, 22, 20, 11 or 02 to obtain contactor relays with 6 or 8 contacts according to EN 50005. The identification numbers on the auxiliary switch blocks apply only to the attached auxiliary switch blocks (see the graphic on the right).

#### 3TH20 ...0 contactor relays

Terminal designations according to EN 50011 and EN 50005



#### Surge suppression

RC elements, varistors, diodes or diode assemblies (combination of a diode and a Zener diode for short break times) can be plugged onto all contactors and auxiliary switch blocks with screw terminals from the front in order to damp opening surges in the coil. The unit labeling plate must be removed for this purpose.

It can be snapped onto the attached surge suppressor.

#### Residual current

The 3TX4 490-1J additional load module (see "Accessories") can be used by programmable logic controllers to increase the permissible residual current and to limit the residual voltage of semiconductor outputs.

This module ensures the safe opening of 3TH2/3TF2 contactors with direct control through 230 V AC semiconductor outputs. It is accommodated in the same enclosure as the 3TX4 490-3. surge suppressors and can be plugged into the contactor.

# 3RH, 3TH Contactor Relays

## 3TH2 contactor relays, 4- and 8-pole

### Technical specifications

Contactor relays Type **3TH2**

#### Contact endurance for AC-15/AC-14 and DC-13 utilization categories

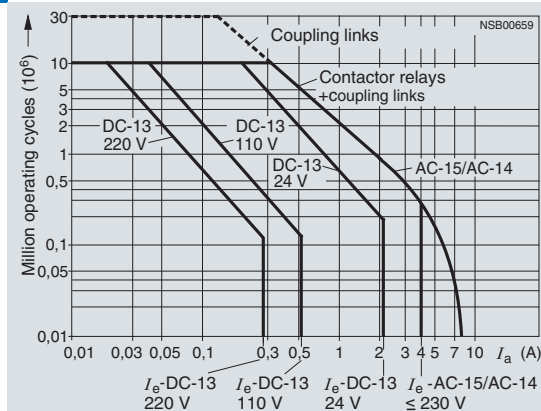
The contact endurance is mainly dependent on the breaking current. It is assumed that the operating mechanisms are switched randomly, i. e. not synchronized with the phase angle of the supply system.

If magnetic circuits other than the contactor coil systems or solenoid valves are present, e.g. magnetic brakes, protective measures for the load circuits are necessary. RC elements and freewheel diodes would be suitable as protective measures.

Diagram legend:

$I_e$  = Rated operational current

$I_a$  = Breaking current



Type	Contactor relays		Auxiliary switch block
	3TH20 ..-....	3TH22 ..-....	3TX4 ...-..
<b>General data</b>			
<b>Permissible mounting position</b>	AC and DC operation		Any
<b>Mechanical endurance</b>	<ul style="list-style-type: none"> <li>• AC operation</li> <li>• DC operation</li> </ul>		Operating cycles 10 million 30 million
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)			
• Screw terminals	V	690	500
• Flat connector 6.3 mm x 0.8 mm	V	500	--
• Solder pin connections	V	500	--
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (degree of pollution 3)			
• Screw terminals	kV	8	6
• Flat connector 6.3 mm x 0.8 mm	kV	6	--
• Solder pin connections	kV	6	--
<b>Protective separation</b> between coil and contacts (acc. to EN 61140)	V	Up to 300	
<b>Positively-driven operation of contacts in contactor relays</b>			
<b>3TH20:</b> <b>Yes</b> , in the basic unit and the auxiliary switch block as well as between the basic unit and the snap-on auxiliary switch block (removable) acc. to: • ZH 1/457 • EN 60947-5-1, Appendix L	Explanations: There is positively-driven operation if it is ensured that the NC and NO contacts cannot be closed at the same time.  <b>ZH1/457</b> Safety rules for control units on power-operated presses in the metal-working industry.  <b>EN 60947-5-1, Appendix L</b> Low-voltage controlgear, control equipment, and switching elements. Special requirements for positively-driven contacts  <b>SUVA</b> Accident prevention regulations of the "Schweizer Unfallverhütungsanstalt" (Swiss Institute for Accident Insurance)		
<b>3TH22:</b> <b>Yes</b> , in the basic unit and the auxiliary switch block as well as between the basic unit and the snap-on auxiliary switch block (fixed) acc. to: • ZH 1/457 • EN 60947-5-1, Appendix L • SUVA			
<b>Permissible ambient temperature</b> <sup>1)</sup>	<ul style="list-style-type: none"> <li>• During operation</li> <li>• During storage</li> </ul>	°C	-25 ... +55 -55 ... +80
<b>Degree of protection</b> acc. to EN 60947-1 Appendix C	IP00 open IP20 for screw terminals IP40 coil assembly		
<b>Touch protection</b> acc. to EN 50274	Finger-safe for screw terminals		
<b>Shock resistance</b>			
• Rectangular pulse	- AC operation - DC operation	g/ms g/ms	7/5 and 4/10 10/5 and 6/10
• Sine pulse	- AC operation - DC operation	g/ms g/ms	9/5 and 6/10 13/5 and 8/10
<b>Conductor cross-sections</b> 2)			

1) Applies to 50/60 Hz coil  
Operating range at 60 Hz:  $0.85 \dots 1.1 \times U_s$ ;  
at 50 Hz,  $1.1 \times U_s$ , side-by-side mounting and 100 % ON period the max. ambient temperature is +40 °C.

2) For conductor cross-sections see page 144.






Contactor relays	Type	3TH2	
<b>Short-circuit protection</b>			
LV HRC 3NA, DIAZED 5SB, NEOZED 5SE Weld-free protection at $I_k \geq 1 \text{ kA}$	A	6	
<b>Control</b>			
<b>Magnetic coil operating range<sup>1)</sup></b>		0.8 ... 1.1 x $U_s$	
<b>Power consumption of the magnetic coils</b> (when coil is cold and $1.0 \times U_s$ )			
• AC operation, 50 Hz	Closing P.f. Closed P.f.	VA	15 0.41 6.8 0.42
• AC operation, 60 Hz	Closing P.f. Closed P.f.	VA	14.4 0.36 6.1 0.46
• AC operation, 50/60 Hz <sup>1)</sup>	Closing P.f. Closed P.f.	VA	16.5/13.2 0.43/0.38 8.0/5.4 0.48/0.42
• DC operation	Closing = Closed	W	3
<b>Permissible residual current of the electronics</b> (with 0 signal)			
	AC operation	mA	$\leq 3 \times (220 \text{ V}/U_s)$
	DC operation	mA	$\leq 1 \times (220 \text{ V}/U_s)$
<b>Operating times at 0.8 ... 1.1 x <math>U_s</math><sup>2)</sup></b> Total break time = Opening delay + Arcing time Values apply with coil in cold state and at operating temperature for operating range			
• AC operation			
- Closing	ON-delay NO OFF-delay NC	ms	5 ... 20 4 ... 12
- Opening	OFF-delay NO ON-delay NC	ms	3 ... 24 3 ... 20
• DC operation			
- Closing	ON-delay NO OFF-delay NC	ms	16 ... 140 13 ... 40
- Opening	OFF-delay NO ON-delay NC	ms	3 ... 6 4 ... 10
• Arcing time		ms	10
<b>Operating times at 1.0 x <math>U_s</math><sup>2)</sup></b>			
• AC operation			
- Closing	ON-delay NO OFF-delay NC	ms	6 ... 17 5 ... 12
- Opening	OFF-delay NO ON-delay NC	ms	3 ... 24 5 ... 20
• DC operation			
- Closing	ON-delay NO OFF-delay NC	ms	18 ... 42 15 ... 26
- Opening	OFF-delay NO ON-delay NC	ms	3 ... 5 4 ... 10
<b>Main circuit</b>			
<b>AC capacity</b>			
<b>Utilization category AC-12</b> Rated operational current $I_e$ (at 60 °C)	A	10	
<b>Utilization category AC-15 and AC-14</b> Rated operational current $I_e$ for rated operational voltage $U_e$			
	230/220 V	A	4
	400/380 V	A	3
	500 V	A	2
	690/660 V	A	1

- 1) Applies to 50/60 Hz coil  
Operating range at 60 Hz: 0.85 ... 1.1 x  $U_s$ ;  
at 50 Hz, 1.1 x  $U_s$ , side-by-side mounting and 100 % ON period the max. ambient temperature is +40 °C.
- 2) The OFF-delay of the NO contact and the ON-delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).

# 3RH, 3TH Contactor Relays

## 3TH2 contactor relays, 4- and 8-pole

Contactor relays	Type	3TH2	
<b>Main circuit</b>			
<i>Load rating with DC</i>			
<b>Utilization category DC-12</b> Rated operational current $I_e$ for rated operational voltage $U_e$	A		10
• 1 conducting path <sup>1)</sup>	Up to 24 V A	4	
	60 V A	2	
	110 V A	1.1	
	240/220 V A	0.5	
• 2 conducting paths in series	Up to 24 V A	10	
	60 V A	10	
	110 V A	4	
	240/220 V A	2	
• 3 conducting paths in series	Up to 24 V A	10	
	60 V A	10	
	110 V A	6	
	240/220 V A	2.5	
<b>Utilization category DC-13</b> Rated operational current $I_e$ for rated operational voltage $U_e$			
• 1 conducting path	Up to 24 V A	2.1	
	60 V A	0.9	
	110 V A	0.52	
	240/220 V A	0.27	
• 2 conducting paths in series	Up to 24 V A	10	
	60 V A	3.5	
	110 V A	1.3	
	240/220 V A	0.9	
• 3 conducting paths in series	Up to 24 V A	10	
	60 V A	4.7	
	110 V A	3	
	240/220 V A	1.2	
<i>Induction motors</i>			
<b>Rated power of induction motors</b>			
Acc. to utilization category	110 V	kW	0.2
AC-2 and AC-3	230/220 V	kW	0.55
	400/380 V	kW	1.1
	500 V	kW	1.5
	690/660 V	kW	1.5
<i>Switching frequency</i>			
<b>Switching frequency z</b> in operating cycles/hour			
Rated operation for utilization category			
	AC-12/DC-12	h <sup>-1</sup>	1000
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-2	h <sup>-1</sup>	500
	AC-3	h <sup>-1</sup>	1000
	AC-15/AC-14	h <sup>-1</sup>	1200
	DC-13	h <sup>-1</sup>	1200
No-load switching frequency		h <sup>-1</sup>	10000
<b>Conductor cross-sections</b>			
<b>Main and auxiliary conductors</b>		 <b>Screw terminals</b>	
• Solid	mm <sup>2</sup>	2 x (0.5 ... 2.5)	
• Finely stranded with end sleeve	mm <sup>2</sup>	2 x (0.5 ... 1.5)	
• Terminal screw		M3	
		 <b>Flat connectors</b>	
• Finely stranded		0.5 ... 1	
When using a plug-in sleeve	- 6.3 ... 1	mm <sup>2</sup>	
	- 6.3 ... 2.5	mm <sup>2</sup>	1 ... 2.5
		 <b>Solder pin connections</b> (only for printed circuit boards)	

1) Contact endurance 0.1 x 10<sup>6</sup> operating cycles.

### Application

#### DC operation

IEC 60947 and EN 60947 (VDE 0660).

The 3RH11 coupling relays for switching auxiliary circuits are tailored to the special requirements of working with electronic controls.

The 3RH11 coupling relays cannot be extended with auxiliary switch blocks.







### Function

No auxiliary switch blocks can be snapped onto 3RH11 coupling relays.

Coupling relays have a low power consumption, an extended magnetic coil operating range and an integrated surge suppressor for damping opening surges (exceptions: 3RH11 ...-HB40 and 3RH11 ...-MB40-0KT0).

### Technical specifications

All technical specifications not mentioned in the table below are identical to those of the 3RH11 contactor relays (see page 132).  
The size S00 coupling relays (3RH11) cannot be extended with auxiliary switch blocks.

Contactor type	3RH11 ...-HB40	3RH11 ...-JB40	3RH11 ...-KB40
Size	S00	S00	S00
<b>Magnetic coil operating range</b>	0.7 ... 1.25 x $U_s$		
<b>Power consumption of the magnetic coil</b> (for cold coil) Closing = Closed			
At $U_s = 17\text{ V}$	W	1.2	
At $U_s = 24\text{ V}$	W	2.3	
At $U_s = 30\text{ V}$	W	3.6	
<b>Permissible residual current</b> Of the electronics for 0 signal	< 10 mA x (24 V/ $U_s$ )		
<b>Overvoltage configuration of the magnetic coil</b>	No overvoltage damping 	With diode 	With varistor 
<b>Operating times</b>			
• <b>Closing</b> at 17 V			
- ON-delay NO	ms	40 ... 120	
- OFF-delay NC	ms	30 ... 70	
• At 24 V			
- ON-delay NO	ms	30 ... 60	
- OFF-delay NC	ms	20 ... 40	
• At 30 V			
- ON-delay NO	ms	20 ... 50	
- OFF-delay NC	ms	15 ... 30	
• <b>Closing</b> at 17 ... 30 V			
- OFF-delay NO	ms	7 ... 17	40 ... 60
- ON-delay NC	ms	22 ... 30	60 ... 70
7 ... 17			22 ... 30
<b>Upright mounting position</b>	Request required		
<b>Contactor type</b>	<b>3RH11 ...-MB40-0KT0</b>	<b>3RH11 ...-VB40</b>	<b>3RH11 ...-WB40</b>
Size	S00	S00	S00
<b>Magnetic coil operating range</b>	0.85 ... 1.85 x $U_s$		
<b>Power consumption of the magnetic coil</b> (for cold coil) Closing = Closed at $U_s = 24\text{ V}$	W	1.4	
<b>Permissible residual current</b> Of the electronics for 0 signal	< 8 mA x (24 V/ $U_s$ )		
<b>Overvoltage configuration of the magnetic coil</b>	Diode, varistor or RC element, attachable 	Built-in diode 	Built-in varistor 
<b>Operating times of the coupling relays</b>			
• <b>Closing</b> at 20.5 V			
- OFF-delay	ms	110 ... 20	
- ON-delay	ms	120 ... 30	
• At 24 V			
- ON-delay NO	ms	25 ... 90	
- OFF-delay NC	ms	15 ... 80	
• At 44 V			
- OFF-delay	ms	50 ... 10	
- ON-delay	ms	60 ... 15	
• <b>Closing</b> at 17 ... 30 V			
- OFF-delay NO	ms	5 ... 20	20 ... 80
- ON-delay NC	ms	10 ... 30	30 ... 90
5 ... 20			10 ... 30
<b>Upright mounting position</b>	Request required		

# 3RT Coupling Relays

**3RT10 coupling relays (interface),  
3-pole, 3 ... 11 kW**

## Application

### DC operation

IEC 60947, EN 60947 (VDE 0660).

The 3RT10 coupling relays for switching motors are tailored to the special requirements of working with electronic controls.

The 3RT10 1. coupling relays cannot be extended with auxiliary switch blocks.

Two single-pole auxiliary switch blocks can be fitted to the 3RT10 2. coupling relays.

## Function





Coupling relays have a low power consumption, an extended operating range of the magnetic coil and an integrated surge suppressor for damping opening surges (exceptions: 3RT10 1.-1HB4. and 3RT10 1.-.MB4.-OKT0).

## Technical specifications

*All technical specifications not mentioned in the table below are identical to those of the 3RT10 contactors for switching motors (see page 20).*

*The 3RT10 1. coupling relays cannot be extended with auxiliary switch blocks.*




*Two single-pole auxiliary switch blocks can be fitted to the 3RT10 2. coupling relays (see "Accessories").*

Contactor	Type Size		3RT10 1.-.HB4. S00	3RT10 1.-.JB4. S00	3RT10 1.-.KB4. S00	3RT10 2.-.KB4. S0
<b>General data</b>						
<b>Mechanical endurance</b>		Operating cycles	30 million			10 million
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N		V	400			
<b>Control</b>						
<b>Magnetic coil operating range</b>			0.7 ... 1.25 x $U_s$			
<b>Power consumption of the magnetic coil</b> (for cold coil) Closing = Closed		At $U_s$	17 V W	24 V W	30 V W	2.1 4.2 6.6
<b>Permissible residual current</b> Of the electronics (for 0 signal)			< 10 mA x (24 V/ $U_s$ )			< 6 mA x (24 V/ $U_s$ )
<b>Overvoltage configuration of the magnetic coil</b>			No overvoltage damping 	With diode 	With varistor 	With varistor 
<b>Operating times of the coupling relays</b>						
• Closing						
- At 17 V	ON-delay NO	ms	40 ... 120			93 ... 270
	OFF-delay NC	ms	30 ... 70			83 ... 250
- At 24 V	ON-delay NO	ms	30 ... 60			64 ... 87
	OFF-delay NC	ms	20 ... 40			55 ... 78
- At 30 V	ON-delay NO	ms	20 ... 50			53 ... 64
	OFF-delay NC	ms	15 ... 30			45 ... 56
• Opening at 17... 30 V						
	OFF-delay NO	ms	7 ... 17	40 ... 60	7 ... 17	18 ... 19
	ON-delay NC	ms	22 ... 30	60 ... 70	22 ... 30	24 ... 25

# 3RT Coupling Relays

3RT10 coupling relays (interface),  
3-pole, 3 ... 11 kW

All technical specifications not mentioned in the table below are identical to those of the 3RT10 contactors for switching motors (see page 20).  
The 3RT10 1. coupling relays cannot be extended with auxiliary switch blocks.  
Power consumption of the coils 1.4 W at 24 V.

Contactors	Type Size		3RT10 1.-1MB4.-0KT0 S00	3RT10 1.-1VB4. S00	3RT10 1.-1WB4. S00
<b>General data</b>					
<b>Mechanical endurance</b>		Operating cycles	30 million		
<b>Protective separation</b> between the coil and the main contacts acc. to EN 60947-1, Appendix N		V	400		
<b>Control</b>					
<b>Power consumption of the magnetic coil</b> (for cold coil) Closing = Closed		At $U_s$ 24 V W	1.4		
<b>Permissible residual current, upright mounting position</b>			On request		
<b>Overvoltage configuration of the magnetic coil</b>			No overvoltage damping 	With diode 	With varistor  U
<b>Operating times of the coupling relays</b>					
• Closing					
- At 20.5 V	ON-delay NO	ms	40 ... 130		
	OFF-delay NC	ms	40 ... 125		
- At 24 V	ON-delay NO	ms	40 ... 100		
	OFF-delay NC	ms	30 ... 90		
- At 44 V	ON-delay NO	ms	20 ... 30		
	OFF-delay NC	ms	15 ... 25		
• Opening					
	OFF-delay NO	ms	9 ... 12	45 ... 65	10 ... 15
	ON-delay NC	ms	12 ... 16	52 ... 72	15 ... 20

# 3TX7, 3RS18 Coupling Relays

## 3TX7 Coupling Relays, Narrow Design

### Relay couplers

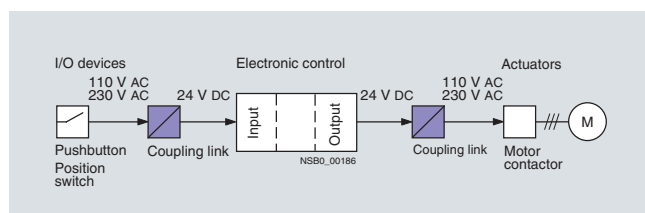
#### Design

##### Installation instructions

Snap-on mounting is possible on horizontal and vertical standard mounting rails. In the case of vertical standard mounting rails and closely mounted units, the maximum permissible ambient temperature  $T_U = 40\text{ °C}$ . Any service position is possible.

If the coupling elements are operated continuously 24 hours per day (100 % ON period) at the maximum permissible rated control supply voltage and the maximum permissible ambient temperature, it is recommended that no similar equipment or other units that generate heat are placed directly adjoining the coupling elements because this can reduce the endurance of the couplers.

A distance  $> 10\text{ mm}$  to the right and left of the coupling link reduces the risk of a premature failure under these operating conditions.



#### Function

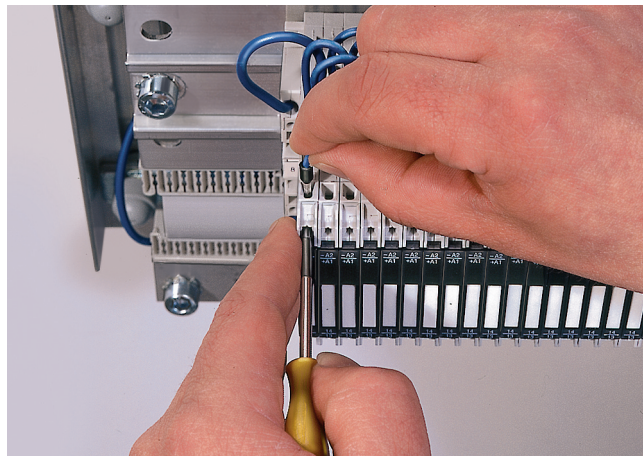
##### Surge suppression

The coupling links have been tested with  $1 \times 10^5$  operating cycles at AC-15 operation with the values specified in the Technical specifications.

If inductive loads are connected in parallel, the endurance of the relay couplers can be increased.

##### Note:

*If capacitive loads without series resistors are switched, which limit temporary peak currents, microscopic welding of the relay contacts may result.*



Connecting a cable to the spring-type terminals

#### Technical specifications

Type	3TX7 002/3TX7 003	
<b>General data</b>		
Rated insulation voltage $U_i$ (degree of pollution 3)	V	300
Protective separation for relay couplers <sup>1)</sup> Between the coil and the contacts acc. to EN 60947-1, Appendix N	V	Up to 300 AC
Degree of protection	<ul style="list-style-type: none"> <li>• Connections for relay couplers</li> <li>• Enclosure</li> </ul>	IP20 IP30
Short-circuit protection acc. to IEC 60947-5-1 (weld-free protection at $I_k \geq 1\text{ kA}$ ) Fuse links, gL/gG operational class	A	4
Permissible ambient temperature	<ul style="list-style-type: none"> <li>• During operation</li> <li>• During storage</li> </ul>	°C -25 ... +60 °C -40 ... +80
<b>Conductor cross-sections</b>		
<ul style="list-style-type: none"> <li>• Solid</li> <li>• Finely stranded with or without end sleeve</li> <li>• Terminal screw</li> </ul> Corresponding opening tool For 3TX7 003:	mm <sup>2</sup> mm <sup>2</sup>	<b>Screw terminals</b>  1 x (0.25 ... 4) 1 x (0.5 ... 2.5) M3 Screwdriver, 3.5 mm x 0.5 mm (8WA2 804)
<ul style="list-style-type: none"> <li>• Solid or finely stranded</li> <li>• Finely stranded with end sleeve</li> </ul> Corresponding opening tool	mm <sup>2</sup> mm <sup>2</sup>	<b>Spring-type terminals</b>  1 x (0.08 ... 2.5) 1 x (0.25 ... 1.5) Screwdriver, 3.5 mm x 0.5 mm (8WA2 803)

1) For 3TX7 00.-1FB02, no protective separation according to EN 61140.

# 3TX7, 3RS18 Coupling Relays

## 3TX7 Coupling Relays, Narrow Design

Relay couplers

Type	3TX7 002-/3TX7 003-	1AB02	1AB00	1BB00	1FB02	1CB00	2AB00	2AE00	1BF00 2BF02	2AF00	2AF05	
<b>Control side</b>												
<b>Operating range</b>		0.8 ... 1.25 x $U_s$						0.8 ... 1.1 x $U_s$				
<b>Power consumption at <math>U_s</math></b>	W	0.75	0.75	0.75	1.2	1.2	0.75	0.75	1.2	1.2	1.2	
<b>Release voltage</b>	%	≥ 10										
<b>Max. permissible cable length</b> (min. cross-section: 0.75 mm <sup>2</sup> )	AC DC	m m	300 2000	300	300	300	300	300	15	7	7	350
<b>Permissible residual current</b> of the electronics (with 0 signal)		mA	2	2	2	2	4	2	0.4	0.35	0.35	4
<b>Operating times at <math>U_s</math></b>												
<b>Function display</b>			LED yellow									

Type	3TX7 002/3TX7 003										
<b>Load side</b>											
<b>Rated currents<sup>1)</sup></b>											
Continuous thermal current $I_{th}$		A	6								
Rated operational currents $I_e$											
Acc. to utilization categories (EN 60947) (3TX7 002-1CB00: AC-15, $I_e = 2$ A)											
• AC-15	- At 24 V	A	3								
	- At 110 V	A	3								
	- At 230 V	A	3								
• DC-13	- At 24 V	A	1								
	- At 110 V	A	0.2								
	- At 230 V	A	0.1								
<b>Switching current</b>											
With resistive load to VDE 0435 (relay standard) and EN 60947											
• AC-12	- At 24 V	A	6								
	- At 110 V	A	6								
	- At 230 V	A	6								
• DC-12	- At 24 V	A	6								
	- At 110 V	A	0.2								
	- At 230 V	A	0.2								
<b>Switching voltage</b>	AC/DC	V	24 ... 250								
• Min. contact load for 3TX7 00.-...02		mA	1 V, 0.1 AC/DC								
<b>Mechanical endurance</b>		Operating cycles	20 x 10 <sup>6</sup>								
<b>Electrical endurance at <math>I_e</math></b>		Operating cycles	1x10 <sup>5</sup>								
<b>Switching frequency</b>		Operating cycles 1/h	5000								
<b>Contact material for 3TX7 00.-...02</b>	Ag/Ni 0.15 hard gold-plated										
<b>Power limit hard gold-plating for 3TX7 00.-...02</b>											
• Voltage		V	30								
• Current		mA	20								

1) Capacitive loads can result in micro-weldings on the contacts.



Note:

If inductive loads are connected in parallel, the endurance of the relay couplers can be increased.

# 3TX7, 3RS18 Coupling Relays

## 3TX7 Coupling Relays, Narrow Design

### Relay couplers

Type		3TX7 004/3TX7 005		
<b>General data</b>				
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	300		
<b>Protective separation for relay couplers</b> Between the coil and the contacts acc. to EN 60947-1, Appendix N	V	Up to 300 AC		
<b>Degree of protection</b>			IP20	IP30
			<ul style="list-style-type: none"> <li>• Terminals</li> <li>• Enclosure</li> </ul>	
<b>Short-circuit protection</b> acc. to IEC 60947-5-1 (weld-free protection at $I_k \geq 1$ kA) Fuse links, gL/gG operational class	A	4		
<b>Permissible ambient temperature</b>			°C	-25 ... +60
			°C	-40 ... +80
<b>Conductor cross-sections</b>				
For 3TX7 004:				
			 <b>Screw terminals</b>	
• Solid	mm <sup>2</sup>	1 x (0.25 ... 4)		
• Finely stranded without end sleeve	mm <sup>2</sup>	1 x (0.5 ... 2.5)		
• Finely stranded with end sleeve	mm <sup>2</sup>	1 x (0.5 ... 2.5)		
• Terminal screws		M3		
For 3TX7 005:				
			 <b>Spring-type terminals</b>	
• Solid or finely stranded	mm <sup>2</sup>	1 x (0.08 ... 2.5)		
• Finely stranded with end sleeve	mm <sup>2</sup>	1 x (0.25 ... 1.5)		
<b>Control side</b>				
<b>Operating range</b>			0.7 ... 1.25 x $U_s$	0.8 ... 1.1 x $U_s$
		<ul style="list-style-type: none"> <li>• At <math>U_s = 24</math> V AC/DC</li> <li>• At <math>U_s = 110</math> V and 230 V AC/DC</li> </ul>		
<b>Power consumption at <math>U_s</math></b>			0.5 W; 3TX7 00...05: 1 W at 230 V DC/6 VA at 230 V AC	
<b>Permissible residual current</b> of the electronics (for 0 signal)				
• Width 6.2 mm	mA	2		
• $U_s = 24$ V	mA	0.5		
• $U_s > 24$ V	mA	2.5		
• From 12.5 mm width	mA	5 ( $U_s = 230$ V AC)		
Exceptions: 3TX7 00.-1BF05	mA	0.5 ( $U_s = 230$ V DC)		
<b>Operating times at <math>U_s</math></b>				
			ms	< 8
			ms	< 15
			<ul style="list-style-type: none"> <li>• ON-delay</li> <li>• OFF-delay</li> </ul>	
<b>Function display</b>			LED yellow	
<b>Type</b>				
	<b>3TX7 004/3TX7 005</b>		<b>-1.F00</b> <b>-2ME02</b> <b>-2MF02</b>	<b>-1.B..</b> <b>-2MB02</b>
				<b>-1BF05</b>
<b>Max. permissible cable length</b> (min. conductor cross-section: 0.75 mm <sup>2</sup> )				
	AC	m	40	400
	DC	m	2000	2000
				350
				2000



# 3TX7, 3RS18 Coupling Relays

## 3TX7 Coupling Relays, Narrow Design

Relay couplers

Type			3TX7 00.-1B/-1C/-1G/-1H/-1L	3TX7 00.-.M
<b>Load side</b>				
<b>Rated operational currents <math>I_e</math><sup>1)</sup></b>				
• Continuous thermal current $I_{th}$		A	6	
• Rated operational current $I_e$ acc. to utilization categories (EN 60947)				
- AC-15	At 24 V	A	3	2
	At 110 V	A	3	2
	At 230 V	A	3	2
- DC-13	At 24 V	A	1	
	At 110 V	A	0.2	
	At 230 V	A	0.1	
<b>Switching current</b> with resistive load to VDE 0435 (relay standard) and VDE 0660				
- AC-12	At 24 V	A	6	
	At 110 V	A	6	
	At 230 V	A	6	
- DC-12	At 24 V	A	6	
	At 110 V	A	0.3	
	At 230 V	A	0.2	
<b>Power limit for hard gold-plating</b>	• Voltage	V	30	
	• Current	mA	20	
<b>Switching voltage</b>	AC/DC	V	17 ... 250	
<b>Min. switching voltage</b> (reliability 1 ppm) <sup>2)</sup>				
• Standard contact			17 V DC/5 mA	
• Hard gold-plated contacts			5 V DC/1 mA	
<b>Endurance</b>	• Mechanical	Operating cycles	20 x 10 <sup>6</sup>	
	• Electrical (at $I_e$ )	Operating cycles	1 x 10 <sup>6</sup>	0.5 x 10 <sup>6</sup>
<b>Switching frequency</b>		Operating cycles 1/h	5000	

1) Capacitive loads can result in micro-weldings on the contacts.

2) 1 ppm = 1st fault in one million operating cycles.

Note:

*If inductive loads are connected in parallel, the endurance of the relay couplers can be increased.*

# 3TX7, 3RS18 Coupling Relays

## 3TX7 Coupling Relays, Narrow Design


### Relay couplers with plug-in design

#### Design

Coupling links are used to connect signals to and from a PLC. The plug-in relays enable the relay to be replaced at the end of its service life without detaching the wiring.

For easy linking of the signals, each terminal can be jumpered using an external connecting comb.

#### Technical specifications

Type	3TX7 01.-1		
<b>General data</b>			
<b>Rated insulation voltage</b> $U_i$ (degree of pollution 2)	V	300	
<b>Protective separation</b> Between the coil and the contacts acc. to EN 60947-1, Appendix N	V	Up to 300 AC	
<b>Degree of protection</b>	<ul style="list-style-type: none"> <li>Enclosure</li> <li>Relays</li> </ul>	IP20 IP40	
<b>Short-circuit protection</b> acc. to IEC 60947-5-1 (weld-free protection at $I_k \geq 1$ kA) Fuse links, gL/gG operational class	A	4	
<b>Permissible ambient temperature</b>	<ul style="list-style-type: none"> <li>During operation</li> <li>During storage</li> </ul>	°C	-25 ... +55 -40 ... +80
<b>Conductor cross-sections</b>			
<ul style="list-style-type: none"> <li>Solid</li> <li>Finely stranded with or without end sleeve</li> <li>Terminal screw</li> </ul>	mm <sup>2</sup> mm <sup>2</sup>	 <b>Screw terminals</b> 1 x (0.5 ... 2.5) 1 x (0.5 ... 1.5) M2.5 Screwdriver with blade width 3.0 mm x 0.5 mm	
Permissible opening tool			

Type	3TX7 01.-1.H	3TX7 01.-1.B	3TX7 01.-1.E	3TX7 01.-1.F		
<b>Control side</b>						
<b>Operating range</b>	0.9 ... 1.1 $U_s$	0.7 ... 1.25 $U_s$	0.8 ... 1.1 $U_s$	0.8 ... 1.1 $U_s$		
<b>Power consumption at <math>U_s</math> (24 V/115 V/230 V)</b>	W < 0.5/0.5/1					
<b>Release voltage</b>	% 10 of $U_s$					
<b>Max. permissible cable length</b> (min. conductor cross-section: 0.75 mm <sup>2</sup> )						
<ul style="list-style-type: none"> <li>AC</li> <li>DC</li> </ul>	m	100 2000	70 800	40 800		
<b>Permissible residual current</b> of the electronics (for 0 signal)	mA	1	2	0.3		
<b>Operating times at <math>U_s</math></b>	<ul style="list-style-type: none"> <li>ON-delay</li> <li>OFF-delay</li> </ul>	ms ms	< 6 < 6	< 7 < 7	< 8 < 20	< 8 < 20
<b>Function display</b>	LED yellow					
<b>Protection circuit</b>	<ul style="list-style-type: none"> <li>DC</li> <li>AC</li> </ul>	Freewheel diode + Reverse polarity protection Rectifier bridge				

Type	3TX7 01.-1			
<b>Load side</b>				
<b>Rated currents<sup>1)</sup></b>				
<ul style="list-style-type: none"> <li>Continuous thermal current <math>I_{th}</math></li> <li>Rated operational currents <math>I_e</math> <ul style="list-style-type: none"> <li>AC-15               <ul style="list-style-type: none"> <li>At 24 V</li> <li>At 110 V</li> <li>At 230 V</li> </ul> </li> <li>DC-13               <ul style="list-style-type: none"> <li>At 24 V</li> <li>At 110 V</li> <li>At 230 V</li> </ul> </li> </ul> </li> </ul>	A	A	A	
		5	3 3 3	1 0.2 0.1
<b>Switching voltage</b>	AC/DC	V	24 ... 250	
<b>Min. contact load</b> (reliability 1 ppm) <sup>2)</sup>				
<ul style="list-style-type: none"> <li>Standard contact</li> <li>Hard gold-plated contacts</li> </ul>	17 V DC/5 mA 5 V DC/1 mA			
<b>Mechanical endurance</b>	Operating cycles	20 × 10 <sup>6</sup>		
<b>Electrical endurance at <math>I_e</math></b> acc. to AC-15	Operating cycles	100000		
<b>Switching frequency</b>	Operating cycles 1/h	5000		

Note: If inductive loads are connected in parallel, the endurance of the relay couplers can be increased.

- Capacitive loads can result in micro-weldings on the contacts.
- 1 ppm = 1st fault in one million operating cycles.

# 3TX7, 3RS18 Coupling Relays

## 3TX7 Coupling Relays, Narrow Design

Semiconductor couplers

### Overview

#### AC and DC operation

EN 60664-1, EN 60947 and EN 50005; optocouplers:  
EN 60747-5, IEC 61131-2 (programmable controllers).

In the coupling links in double-decker design, the connections are arranged on two levels; the units are extremely compact. Connection method: screw or spring-type terminals. For test purposes, versions are available with manual 0 automatic switches.

The input and output coupling links differ with regard to the positioning of the terminals and the LEDs. For equipment identification purposes, each coupling link has a blank labeling plate.

In accordance with the technical specifications of electronic systems, the coupling links have a lower power consumption.

### Design

#### Installation instructions

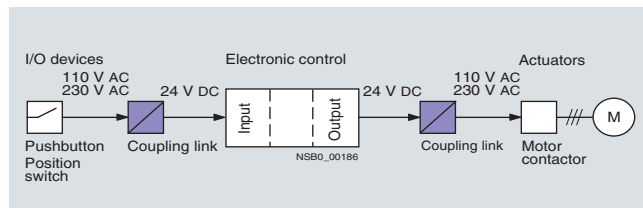
Snap-on mounting is possible on horizontal and vertical standard mounting rails. In the case of vertical standard mounting rails and closely mounted units, the maximum permissible ambient temperature  $T_U = 40\text{ }^\circ\text{C}$ . Any service position is possible.

If the coupling elements are operated continuously 24 hours per day (100 % ON period) at the maximum permissible rated control supply voltage and the maximum permissible ambient temperature, it is recommended that no similar equipment or other units that generate heat are placed directly adjoining the coupling elements because this can reduce the endurance of the couplers.

A distance  $> 10\text{ mm}$  to the right and left of the coupling link reduces the risk of a premature failure under these operating conditions.

Optocouplers switch using semiconductors. These are not subject to wear; welding is not possible.

The 6.2 mm wide optocouplers have an opening in the right-hand side of the casing. They can, like relay couplers, be mounted side-by-side without gaps.



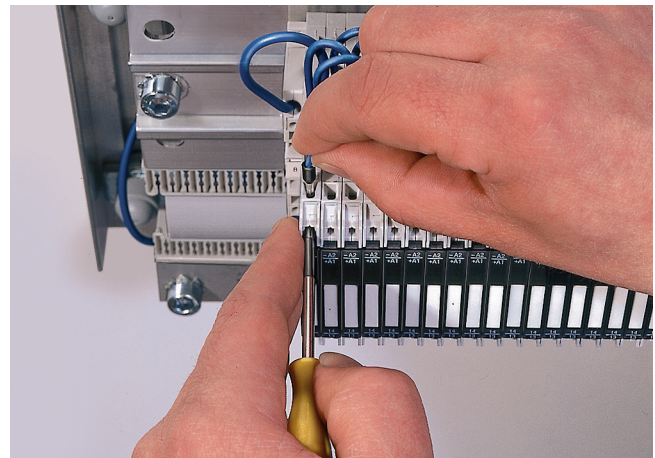
### Function

#### Surge suppression

In the case of optocouplers, the contact element is a semiconductor. These are not subject to wear; so welding is not possible.

#### Note:

*With semiconductors, the switching current is not dependent on the inductance of the load, i. e. the switching current for a DC-13 load is the same as that for an inductive DC-12 load. This means that coupling links with a semiconductor output are particularly suitable for inductive loads such as solenoid valves. It is not relevant to specify the number of operating cycles because this does not affect the endurance of the semiconductor provided it is not overheated.*



Connecting a cable to the spring-type terminals

# 3TX7, 3RS18 Coupling Relays

## 3TX7 Coupling Relays, Narrow Design

### Semiconductor couplers

#### Technical specifications

Type	3TX7 002-1 . F.5		
<b>General data</b>			
Derating diagram for 3TX7 002-3AB01 load current depending on the ambient temperature $T_U$			
	<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	300
	<b>Optoelectronic coupling element for protective separation</b> Acc. to EN 60947-1, Appendix N	V	Up to 300
<b>Permissible ambient temperature</b>	°C	-25 ... +60	
• During operation	°C	-40 ... +80	
• During storage			
<b>Conductor cross-sections</b>			<b>Screw terminals</b>
• Solid	mm <sup>2</sup>	1 x (0.25 ... 4)	
• Finely stranded with or without end sleeve	mm <sup>2</sup>	1 x (0.5 ... 2.5)	
• Terminal screws		M3	

Type	3TX7002-	3AB00	3AB01	4AB00	4AG00
<b>Control side</b>					
<b>Operating range</b>	V	17 ... 30 DC	11 ... 30 DC	17 ... 30 AC/DC	88 ... 264 AC
<b>Control side power consumption</b>					
	At 17 V DC	mA	< 18	< 5	--
	At 24 V DC	mA	< 20	< 7	--
	At 30 V DC	mA	< 22	< 8.5	--
	At 17 V AC/DC	mA	--	< 10	--
	At 24 V AC/DC	mA	--	< 14	--
	At 30 V AC/DC	mA	--	< 18	--
	At 88 V AC	mA	--	--	< 9
	At 230 V AC	mA	--	--	< 24
	At 264 V AC	mA	--	--	< 28
<b>Release voltage</b>	V	> 5	> 8	> 5	> 40
<b>Operating times</b>					
• ON-delay	At 17 V DC	ms	< 10	< 0.1	1
	At 24 V DC	ms	< 10	< 0.1	1
	At 30 V DC	ms	< 10	< 0.1	1
	At 17 V AC/DC	ms	--	--	< 1
	At 24 V AC/DC	ms	--	--	< 1
	At 30 V AC/DC	ms	--	--	< 1
	At 88 V AC	ms	--	--	--
	At 230 V AC	ms	--	--	< 18
	At 264 V AC	ms	--	--	< 20
		ms	--	--	< 22
• OFF-delay	At 17 V DC	ms	< 10	< 0.1	< 18
	At 24 V DC	ms	< 10	< 0.1	< 25
	At 30 V DC	ms	< 10	< 0.1	< 30
	At 17 V AC/DC	ms	--	--	< 18
	At 24 V AC/DC	ms	--	--	< 25
	At 30 V AC/DC	ms	--	--	< 30
	At 88 V AC	ms	--	--	--
	At 230 V AC	ms	--	--	< 10
	At 264 V AC	ms	--	--	< 20
		ms	--	--	< 25
<b>Function display</b>		LED yellow	LED yellow	LED yellow	LED yellow
<b>Max. permissible cable length</b> (min. cond. cross-section: 0.75 mm <sup>2</sup> )	AC	m	--	--	1000
	DC	m	2000	2000	140
					--
<b>Load side</b>					
<b>Switching current</b>	A	1.8	1.5 (see derating diagram)	0.1	0.1
<b>Short-time loading capacity</b>					
	A	20	4	1	1
	ms	20	200	20	20
<b>Contacts</b>					
		1 NO, Triac	1 NO, transistor	1 NO, transistor	1 NO, transistor
<b>Switching voltage<sup>1)</sup></b> (operating range)	• Effective AC 50/60 Hz • DC	V	48 ... 264	--	--
			--	≤ 60	≤ 30
<b>Minimum load current</b>		mA	60	--	--
<b>Voltage drop conducting</b>		V	≤ 1.5	≤ 1.1	≤ 1.7
<b>Permissible residual current</b> of the electronics (with 0 signal)		mA	< 5	< 0.1	< 0.1
<b>Switching frequency at <math>I_e</math></b>		Hz	1	1	5

1) Observe minimum switching voltage for 3TX7 002-3AB00.

# 3TX7, 3RS18 Coupling Relays

## 3TX7 Coupling Relays, Narrow Design

Semiconductor couplers

Type	3TX7 002	
<b>General data</b>		
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	300
<b>Protective separation</b> acc. to EN 60947-1, Appendix N for optocouplers	V	Up to 300
<b>Permissible ambient temperature</b>		
• During operation	°C	-25 ... +60
• During storage	°C	-40 ... +80
<b>Conductor cross-sections</b>		
For 3TX7 004		
• Solid	mm <sup>2</sup>	1 x (0.25 ... 4)
• Finely stranded without end sleeve	mm <sup>2</sup>	1 x (0.5 ... 2.5)
• Finely stranded with end sleeve	mm <sup>2</sup>	1 x (0.5 ... 2.5)
• Terminal screws		M3
Permissible opening tool		Screwdriver, 3.5 mm x 0.5 mm (8WA2 804)
For 3TX7 005		
• Solid or finely stranded	mm <sup>2</sup>	1 x (0.08 ... 2.5)
• Finely stranded with end sleeve	mm <sup>2</sup>	1 x (0.25 ... 1.5)
Permissible opening tool		Screwdriver, 3.5 mm x 0.5 mm (8WA2 803)

Type	3TX7 004-/3TX7 005-	3AB04	3AC.4	3AC03	3PB54	4PG24
<b>Control side</b>						
<b>Operating range</b>	V	11 ... 30 DC				110 ... 230 AC/DC
<b>Power consumption</b>						
	• At 24 V DC	W	≤ 0.5	≤ 0.5	≤ 0.25	≤ 0.2
	• At 230 V AC	W	--	--	--	--
<b>Release voltage</b>	V	6	5	6	9	20
<b>Permissible residual current of the electronics</b> (for 0 signal)	mA	2.3	2.6	1.5	1.5	0.4
<b>Operating times</b>						
	• ON-delay	ms	2.5	0.3	10	0.3
	• OFF-delay	ms	8	4	10	0.3
<b>Function display</b>		LED yellow				
<b>Max. permissible cable length</b> (min. conductor cross-section: 0.75 mm <sup>2</sup> )	m	1700	2000	2000	2000	40
<b>Load side</b>						
<b>Switching voltage</b>	V	10 ... 48 DC	10 ... 30 DC	24 ... 250 AC	10 ... 30 DC	10 ... 30 DC
<b>Switching current</b>	A	0.5	5	2	1.5	0.1
<b>Short-time loading capacity</b>						
	A	1.5	Short-circuit resistant <sup>1)</sup>	100	Short-circuit resistant <sup>2)</sup>	0.2
	ms	20	--	20	--	3
<b>Contacts</b>		1 NO, transistor		1 NO, Triac	1 NO, transistor	
<b>Minimum load current</b>	mA	--	500 <sup>3)</sup>	50	--	--
<b>Voltage drop conducting</b>	V	≤ 1	≤ 0.5	≤ 1.6	≤ 0.5	≤ 1.5
<b>Leakage current of the electronics</b> for 0 signal	mA	< 0.1	< 0.1	< 6	< 0.1	< 0.1
<b>Switching frequency</b> for resistive load	Hz	50	50	1	500	25

1) In the event of a short-circuit or overload, the semiconductor output switches off. In order to operate the device again, it must be temporarily disconnected from the power supply.

2) In the event of a short-circuit or overload, the current is limited by the semiconductor output.

3) If the current falls below the minimum load current, the built-in semiconductor detects an open circuit in the load circuit. The control must be temporarily switched off for resetting.

# 3TX7, 3RS18 Coupling Relays

## 3TX7 Coupling Relays, Narrow Design

### Semiconductor couplers

Type	3TX7 004-/3TX7 005-		3PB74	3PG74
<b>Control side</b>				
<b>Operating range</b>		V	11 ... 30 DC	88 ... 253 AC/DC
<b>Power consumption</b>	<ul style="list-style-type: none"> <li>• At 24 V DC</li> <li>• At 110 V DC</li> <li>• At 230 V AC</li> </ul>	W	0.2	--
		W	--	0.2
		W	--	≤ 1.5
<b>Release voltage</b>		V	6	25
<b>Permissible residual current of the electronics</b> (for 0 signal)		mA	1.2	1
<b>Operating times</b>	<ul style="list-style-type: none"> <li>• ON-delay</li> <li>• OFF-delay</li> </ul>	ms	0.2	1.5
		ms	1.0	75
<b>Function display</b>			LED yellow	
<b>Max. permissible cable length</b> (min. conductor cross-section: 0.75 mm <sup>2</sup> )		m	2000	40
<b>Load side</b>				
<b>Switching voltage max.</b>	<ul style="list-style-type: none"> <li>• Min.</li> <li>• Max.</li> </ul>	V	11 DC	
		V	30 DC	
<b>Switching current</b>		A	3	
<b>Short-time loading capacity</b>		A	Short-circuit resistant <sup>1)</sup>	
		ms	--	
<b>Contacts</b>			1 NO, transistor	
<b>Minimum load current</b>		mA	--	
<b>Voltage drop conducting</b>		V	≤ 0.5	
<b>Leakage current of the electronics</b> for 0 signal		mA	0.1	
<b>Switching frequency</b> for resistive load		1/s	10	

1) In the event of a short-circuit or overload, the current is limited by the semiconductor output.

# 3TX7, 3RS18 Coupling Relays

## 3RS18 Coupling Relays with Industrial Housing

Relay couplers



### Overview

The new 3RS18 coupling relays are couplers in the well-proven standard 22.5 mm timing relay enclosure. The series comprises relays with 1, 2 and 3 changeover contacts with screw and spring-type connections for combined voltages and wide voltage ranges.

### Application

Typical applications are found wherever solid-state compatible contacts are required and equipment with a wide voltage range is implemented.

### Technical specifications

Type	3RS1800		
<b>General data</b>			
<b>Rated insulation voltage <math>U_i</math></b> , degree of pollution 3	V		500
<b>Protective separation</b> acc. to EN 60947-1, Appendix N between the coil and the contacts and between the individual contacts.	V		300
<b>Degree of protection acc. to EN 60529</b>			
<ul style="list-style-type: none"> <li>• Enclosure</li> <li>• Cover</li> </ul>			IP20 IP40
<b>Permissible ambient temperature</b>			
<ul style="list-style-type: none"> <li>• During operation</li> <li>• During storage</li> </ul>	°C		-25 ... +60 -40 ... +80
<b>Permissible</b>			Any
<b>Shock resistance</b> Half-sine acc. to IEC 60028-2-27	g/ms		15/11
<b>Vibration resistance</b> Acc. to IEC 60068-2-6	g/ms		10 ... 55/0.35
<b>Electromagnetic compatibility (EMC)</b> Tests acc. to basic specification			IEC 61000-6-2/IEC 61000-6-4
<b>Conductor cross-sections</b>			
			 <b>Screw terminals</b>
<ul style="list-style-type: none"> <li>• Solid</li> <li>• Finely stranded with end sleeve</li> <li>• AWG cables, solid or stranded</li> </ul>	mm <sup>2</sup>		1 x (0.5 ... 4); 2 x (0.5 ... 2.5)
	mm <sup>2</sup>		2 x (0.5 ... 2.5)
	mm <sup>2</sup>		2 x (20 ... 14)
<ul style="list-style-type: none"> <li>• Terminal screw</li> </ul>			M3.5
<ul style="list-style-type: none"> <li>• Tightening torque</li> </ul>	Nm		0.8 ... 1.2
Corresponding opening tool			Standard screwdriver, size 2 or Pozidriv 2
			 <b>Spring-type terminals</b>
<ul style="list-style-type: none"> <li>• Solid</li> <li>• Finely stranded without end sleeve</li> <li>• Finely stranded with end sleeve</li> <li>• AWG cables, solid or stranded</li> </ul>	mm <sup>2</sup>		2 x (0.25 ... 1.5)
	mm <sup>2</sup>		2 x (0.25 ... 1.5)
	mm <sup>2</sup>		2 x (0.25 ... 1)
	AWG		2 x (24 ... 16)
Corresponding opening tool			Screwdriver with 3 mm blade or 8WA2 807 opening tool
<b>Control side</b>			
<b>Operating range</b>			0.85 ... 1.1 x $U_s$
<b>Rated power</b>			
<ul style="list-style-type: none"> <li>• Max. DC</li> <li>• Max. AC</li> </ul>	W		1
	VA		8
<b>Mains buffering</b>			
<ul style="list-style-type: none"> <li>• Depends on version</li> </ul>	ms		5 ... 100
<b>Max. permissible cable length</b>			
330 pF/m AC			
Min. cross-section: 0.75 mm <sup>2</sup> DC			
<ul style="list-style-type: none"> <li>• 1 CO - AC</li> <li>  - DC</li> <li>• 2 CO - AC</li> <li>  - DC</li> <li>• 3 CO - AC</li> <li>  - DC</li> </ul>	m		100 2000 200 1500 200 1500
<b>Permissible residual current</b> Of the electronics (for 0 signal)	mA		2
<b>Temporarily flowing capacitor charging currents</b> On energizing supply voltage	mA		450 for $\leq 500 \mu s^1$
<b>Function display</b>			LED yellow

1) Note the short-circuit limitation for control with the semiconductor version!

# 3TX7, 3RS18 Coupling Relays

## 3RS18 Coupling Relays with Industrial Housing

### Relay couplers

Type			3RS18 ..-....0	3RS18 ..-....1
<b>Load side</b>				
<b>Continuous thermal current</b> $I_{th}$	A		6	
<b>Rated operational currents</b> $I_e$				
• AC-15	- At 24 V - At 110 V - At 230 V - At 400 V	A A A A	3 3 3 3	
• DC-13	- At 24 V - At 110 V - At 230 V	A A A	1 0.2 0.1	
<b>Switching current</b> for resistive load				
• AC-12	- At 24 V - At 115 V - At 230 V - At 400 V	A A A A	5 5 5 5	
• DC-12	- At 24 V - At 115 V - At 230 V	A A A	5 0.2 0.2	
<b>Switching voltage</b>				
	• Max. AC • Max. DC	V V	400 250	
<b>Contact material</b>			AgSnO <sub>2</sub>	AgNi 0.15 hard gold-plated
<b>Min. contact load</b>				
• Standard contact			17 V DC/5 mA at 1 ppm fault	--
• Hard gold-plated contacts			--	5 V DC/1 mA at 1 ppm fault
<b>Endurance</b>				
• Mechanical		Operating cycles	20 x 10 <sup>6</sup>	
• Electrical (at $I_e$ )		Operating cycles	1 x 10 <sup>6</sup>	
<b>Operating times</b>				
• Max. ON-delay at $U_s$		ms	8 (for 3RS18 00-..W0. < 30)	
• Max. OFF-delay at $U_s$		ms	30 (for 3RS18 00-..W0. < 150)	
<b>Switching frequency</b>			Operating cycles 1/h	5000
<b>Short-circuit protection</b>			A	4
Weld-free protection with gL/gG operational class at $I_k \geq 1$ kA				



### Overview

The LZX complete units and accessory parts previously available are no longer listed in this catalog. They can still be supplied however in limited quantities. In their place you will now find the new LZS types. LZS complete units are fully compatible with their predecessors, the LZX complete units. The LZX plug-in relays have not been changed and are used accordingly in both the LZS and the LZX series.

Due to differences in geometry the LED modules, plug-in bases, retaining brackets and labels can be combined and/or used in only the respective series, LZS or LZX.

List for converting from LZX to LZS plug-in relay couplers:

Complete units	
Previous Order No.	New Order No.
LZX:PT3A5L24	LZS:PT3A5L24
LZX:PT3A5R24	LZS:PT3A5R24
LZX:PT3A5S15	LZS:PT3A5S15
LZX:PT3A5T30	LZS:PT3A5T30
LZX:PT5A5L24	LZS:PT5A5L24
LZX:PT5A5R24	LZS:PT5A5R24
LZX:PT5A5S15	LZS:PT5A5S15
LZX:PT5A5T30	LZS:PT5A5T30
LZX:PT5B5L24	LZS:PT5B5L24
LZX:PT5B5R24	LZS:PT5B5R24
LZX:PT5B5S15	LZS:PT5B5S15
LZX:PT5B5T30	LZS:PT5B5T30
LZX:RT3A4L24	LZS:RT3A4L24
LZX:RT3A4R24	LZS:RT3A4R24
LZX:RT3A4S15	LZS:RT3A4S15
LZX:RT3A4T30	LZS:RT3A4T30
LZX:RT3B4L24	LZS:RT3B4L24
LZX:RT3B4R24	LZS:RT3B4R24
LZX:RT3B4S15	LZS:RT3B4S15
LZX:RT3B4T30	LZS:RT3B4T30
LZX:RT4A4L24	LZS:RT4A4L24
LZX:RT4A4R24	LZS:RT4A4R24
LZX:RT4A4S15	LZS:RT4A4S15
LZX:RT4A4T30	LZS:RT4A4T30
LZX:RT4B4L24	LZS:RT4B4L24
LZX:RT4B4R24	LZS:RT4B4R24
LZX:RT4B4S15	LZS:RT4B4S15
LZX:RT4B4T30	LZS:RT4B4T30

Prices for the new LZS series are lower than for the previous LZX series.

#### Note:

In addition the LZS series offers not only service-proven screw connections but also versions with plug-in terminals.

The following conversion list will help you to change over from the LZX types previously sold to the new LZS types. Please contact your regional adviser if you have any questions.

List for converting from LZX to LZS accessories for individual modules:

Accessories for individual modules	
Previous Order No.	New Order No.
LZX:MT28800	LZS:MT28800
LZX:MT78750	LZS:MT78750
LZX:PT16016	LZS:PT17024 <sup>1)</sup> LZS:PT17021 <sup>2)</sup>
LZX:PT16040	LZS:PT17040
LZX:PT78702	LZS:PT78720
LZX:PT78703	LZS:PT78730
LZX:PT78704	LZS:PT78740
LZX:PT78802	LZS:PT78722
LZX:PT78804	LZS:PT78742
LZX:RPMG0024	LZS:PTMG0024
LZX:RPMG0524	LZS:PTMG0524
LZX:RPMG0730	LZS:PTMG0730
LZX:RPML0024	LZS:PTML0024
LZX:RPML0524	LZS:PTML0524
LZX:RPML0730	LZS:PTML0730
LZX:RPMT00A0	LZS:PTMT00A0
LZX:RPMU0548	LZS:PTMU0524
LZX:RPMU0730	LZS:PTMU0730
LZX:RT16016	LZS:RT17016
LZX:RT78625	LZS:RT78725
LZX:RT78626	LZS:RT78726
LZX:RY16040	LZS:RT17040

- 1) LZS:PT17024 for PT standard base: Without logical isolation, screw terminals.
- 2) LZS:PT1721 for PT base with logical isolation, screw terminals and plug-in terminals.

# Coupling Relays with LZS, LZX Plug-in Relays

## Plug-in relay couplers

### Design

Plug-in relay coupling links can be ordered complete or as single modules.

#### Mounting

The relays are plugged into the base and this is snapped onto a TH 35 standard mounting rail according to EN 60715.

A retaining bracket can be ordered for the MT series that additionally fixes the relay into a plug-in base (under conditions of increased mechanical stress). For the RT and PT series, a combined fixing and ejection bracket is available which can be used to remove the relay where access is difficult, for example, when relays are mounted side-by-side.

They can be mounted as required.

### Function

In accordance with the technical specifications of electronic systems, the coupling links have a lower power consumption. In the versions equipped with LEDs, these indicate the switching state. The LZS:PT/MT plug-in relay couplers have a test button. This can be used to force the plug-in relay coupler into the tripped state and to lock it. This is indicated by a raised petrol-colored lever.

#### Surge suppression

The 24 V DC relays LZX:RT and LZX: PT with LEDs can be supplied with, all others without integral surge suppression (free-wheel diode connected in parallel with A1/A2). The positive supply voltage must be connected to coil terminal A1.

#### Logical disconnection

The terminals for the contacts and the terminals for the coil are arranged on separate levels, e. g. above for contacts and below for coil. Logical isolation is not necessarily protective separation.

#### Protective separation

For protective separation, transfer of the voltage of one circuit to another circuit is prevented to a suitable degree of safety (requirements and tests are described in EN 60947-1 in Appendix N).

#### Control with solid-state output

In the case of solid-state outputs (e. g. BERO) with overload and short-circuit protection, you must make allowance during configuration for the temporarily flowing capacitor charging currents!

This is possible, for example, by using a suitable LZS plug-in relay coupler.

### Technical specifications

Relay type		LZX:RT print relay, 8-pole, (12.7 mm) 1 CO/2 CO				LZX:PT industrial relay, 8-, 11- and 14-pole, (22.5 mm) 2 CO/3 CO/4 CO			
<b>General data</b>									
Rated control supply voltage $U_s^{(1)}$	V	24 DC	24 AC	115 AC	230 AC	24 DC	24 AC	115 AC	230 AC
Rated insulation voltage $U_i$	V	250				250			
Degree of pollution		3				3			
Overvoltage category		III				III			
Acc. to EN 60947-1, Appendix N									
Protective separation		Up to 250 V (with plug-in base LZS:RT78726)				No			
Between the coil and the contacts		No (for complete units with standard socket)							
Acc. to EN 60947-1, Appendix N									
Degree of protection of relay/base		IP67/IP20				IP50/IP20			
Permissible ambient temperature									
• During operation	°C	-40 ... +70				-40 ... +70			
• During storage	°C	-40 ... +80				-40 ... +80			
Conductor cross-sections									
• Solid									
- LZS:RT.A..../LZS:RT.B....	mm <sup>2</sup>	2 x 2.5				2 x 2.5			
- LZS:RT.D....	mm <sup>2</sup>	2 x 0.75 ... 1.5				2 x 0.75 ... 1.5			
• Finely stranded with or without end sleeve									
- LZS:PT.A..../LZS:PT.B....	mm <sup>2</sup>	2 x 1.5				2 x 1.5			
- LZS:PT.D....	mm <sup>2</sup>	2 x 0.75 ... 1.5/1.0				2 x 0.75 ... 1.5/1.0			
• Permissible opening tool		Screwdriver for slotted screws, 3.0 ... 3.5 mm x 0.5 mm							
<b>Control side</b>									
Operating range									
At 20 °C	V	16.8 ... 52	18 ... 52	86.3 ... 127	172 ... 264	18 ... 40.8	19.2 ... 39.6	92 ... 190	184 ... 380
Power consumption at $U_s$		0.4 W	0.75 VA	0.75 VA	0.75 VA	0.75 W	1 VA	1 VA	1 VA
Release voltage	V	2.4	7.2	34.5	69	3.6	7.2	34.5	69
Permissible residual current	mA	1.5	4.2	0.8	0.4	2.8	8.8	1.9	1.0
Protection circuit		Freewheel diode for complete unit	No			Freewheel diode in LED module	No		
Max. permissible cable length at $U_s^{(2)}$ (min. cross-section: 0.75 mm <sup>2</sup> )	m	> 2000	30 (with LED), 20 (without LED)			> 2000	500	200	50
<b>Load side</b>									
Switching voltage									
AC/DC	V	24 ... 250				24 ... 250			
Rated currents <sup>(3)</sup>									
• Continuous thermal current $I_{th}$	A	16/8 (1 CO/2 CO)				12/10/6 (2 CO/3 CO/4 CO)			
• Rated operational current $I_e$ AC-15 acc. to utilization categories (EN 60947)	A	6/3				5/5/4			
• Rated operational current $I_e$ DC-13 acc. to utilization categories (EN 60947)	A	2 at 24 V 0.27 at 230 V				5 at 24 V 0.5 at 230 V			
Short-circuit protection	A	10				6			
$I_k \geq 1$ kA acc. to IEC 60947-5-1									
Fuse links gL/gG operational class DIAZED									
Shock resistance	g/ms	10/11				9/11			
Half-sine acc. to IEC 60028-2-27									
Vibration resistance									
Floating sine acc. to IEC 60068-2-6; 30 ... 150 Hz									
• Opening the normally-closed contacts along the critical axis	g	5				Approx. 7			
• Closing the normally-open contacts	g	> 20				> 20			
Min. contact load (reliability: 1 ppm)		Standard 17 V, 10 mA; hard gold-plated 17 V/0.1 mA				Standard 17 V, 10 mA; hard gold-plated 20 mV/1 mA			
Mechanical endurance	Operating cycles	30 x 10 <sup>6</sup>		10 x 10 <sup>6</sup>		10 x 10 <sup>6</sup>			
Electrical endurance (resistive load at 250 V AC)	Operating cycles	1 x 10 <sup>5</sup>				1 x 10 <sup>5</sup>			
Switching frequency (operating cycles)									
• Without load	1/min 1/h	1200 72000				600 36000			
• With load	1/min 1/h	6 360				6 360			
Make-time	ms	7				15			
Break-time	ms	3				10			
Bounce time	ms	2				5			
Contact material		AgNi 90/10							

1) AC voltages, 50 Hz; for 60 Hz operation, the lower response value must be increased by 10 %; the power loss will reduce slightly.

2) The max. cable length depends on the conductor capacity and the cable installation. It can be increased by means of parallel load on A1/A2.

3) Capacitive loads can result in micro-weldings on the contacts.

# Coupling Relays with LZS, LZX Plug-in Relays

## Plug-in relay couplers

Relay type	MT industrial relay, 11-pole (35.5 mm) 3 CO				
<b>AC and DC operation</b>					
Rated control supply voltage $U_s^{1)}$	V	24 DC	24 AC	115 AC	230 AC
Rated insulation voltage $U_i$ Degree of pollution	V	250 3			
Overvoltage category Acc. to EN 60664-1		III			
Protective separation Between the coil and the contacts Acc. to EN 60947-1, Appendix N		No			
Degree of protection of relay/base		IP50/IP20			
Permissible ambient temperature					
• During operation	°C	-40 ... +60	-45 ... +50	-45 ... +50	-45 ... +50
• During storage	°C	-45 ... +80	-45 ... +80	-45 ... +80	-45 ... +80
<b>Conductor cross-sections</b>					
• Screw terminals					
- Solid	mm <sup>2</sup>	2 x 2.5			
- Finely stranded with or without end sleeve	mm <sup>2</sup>	2 x 1.5			
- Permissible opening tool		Screwdriver size 1 or Pozidriv 1			
<b>Control side</b>					
Operating range					
• At 20 °C	V	18 ... 38	19.2 ... 38	92 ... 137	184 ... 264
Power consumption at $U_s$		1.2 W	2.3 VA	2.3 VA	2.3 VA
Release voltage	V	2.4	9.6	46	92
Permissible residual current	mA	4.5	29.2	6.2	3.0
Protection circuit		No			
Max. permissible cable length at $U_s^{2)}$ (min. cross-section: 0.75 mm <sup>2</sup> )	m	> 2000	On request	On request	80
<b>Load side</b>					
Switching voltage					
• AC/DC	V	24 ... 250			
<b>Rated currents<sup>3)</sup></b>					
• Continuous thermal current $I_{th}$	A	10			
• Rated operational current $I_{e}/DC-13$ acc. to utilization categories (EN 60947)	A	2 at 24 V 0.27 at 230 V			
• Rated operational current $I_{e}/AC-15$ acc. to utilization categories (EN 60947)	A	5 at 24 V and 230 V			
Short-circuit protection $I_k \geq 1$ kA acc. to IEC 60947-5-1 Fuse links gL/gG operational class DIAZED	A	10			
Shock resistance Half-sine acc. to IEC 60028-2-27	g/ms	13/11			
<b>Vibration resistance</b>					
Floating sine acc. to IEC 60068-2-6 30 ... 150 Hz					
• Opening the normally-closed contacts along the critical axis	g	2			
• Closing the normally-open contacts	g	> 20			
Min. contact load (reliability: 1 ppm)		12 V DC/10 mA			
Mechanical endurance	Operating cycles	20 x 10 <sup>6</sup>			
Electrical endurance (resistive load at 250 V AC)	Operating cycles	4 x 10 <sup>5</sup>			
<b>Switching frequency (operating cycles)</b>					
• Without load	1/min 1/h	100 6000			
• With load	1/min 1/h	20 1200			
Make-time	typ./ms	12			
Break-time	typ./ms	5			
Bounce time	typ./ms	4			
Contact material		AgNi 90/10			

1) AC voltages, 50 Hz; for 60 Hz operation, the lower response value must be increased by 10 %; the power loss will reduce slightly.

2) The max. cable length depends on the conductor capacity and the cable installation. It can be increased by means of parallel load on A1/A2.

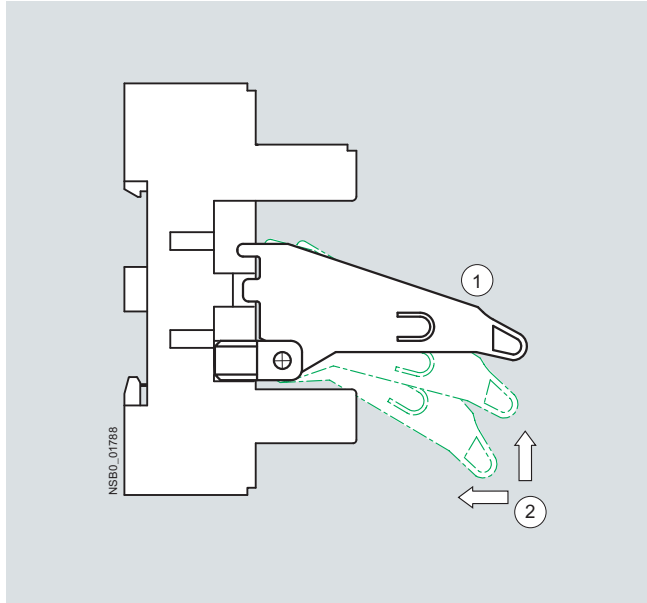
3) Capacitive loads can result in micro-weldings on the contacts.

**More information**

*Notes on configuration*

PT series

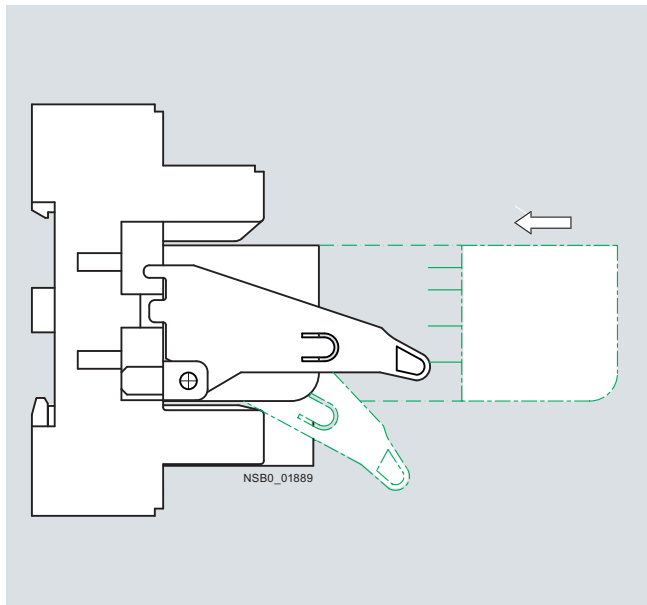
Mounting the LZS:PT17024 fixing/ejection bracket on the LZS:PT787.0 standard plug-in base with screw terminals



Legend:

- ① Locking position
- ② Mounting direction

Mounting the coupling relays with plug-in relay

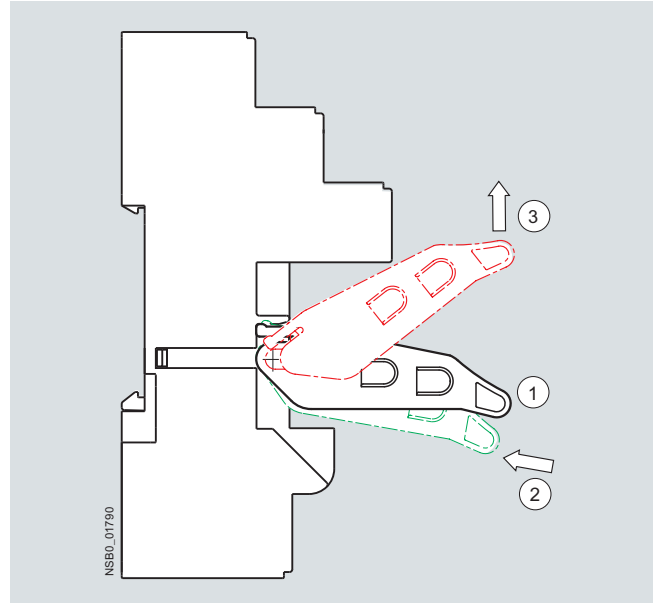


Important:

The LZS:PT17021 and LZS:PT17024 ejection brackets of the coupling relays with plug-in relay are not status displays!

RT series

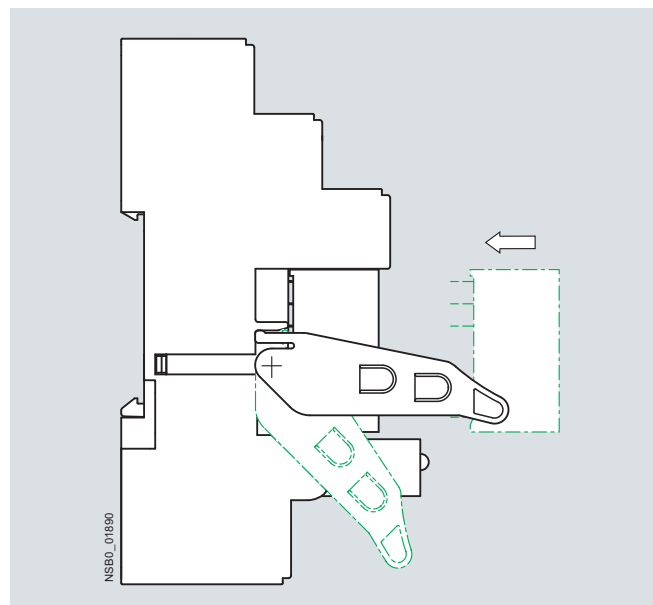
Mounting the LZS:RT17016 fixing/ejection bracket on the LZS:RT7872. plug-in base



Legend:

- ① Locking position
- ② Mounting direction
- ③ Demounting direction

Mounting the coupling relays with plug-in relay



Important:

The LZS:RT17016 ejection brackets of the coupling relays with plug-in relay are not status displays!

# 3TG10 Power Relays/Miniature Contactors

4-pole, 4 kW

## Overview

### *Version*

The 3TG10 power relays/miniature contactors with 4 main contacts are available with 6.3 mm × 0.8 mm screw terminals or flat connectors. The versions with screw terminals are climate-proof and finger-safe according to EN 61140.

The 3TG10 power relays/miniature contactors are small. The overall width is 36 mm.

### Technical specifications

Type		3TG10	
<b>General data</b>			
<b>Endurance</b>			
• Mechanical	Operating cycles		3 million
• Electrical			
- AC-1 at $I_e$	Operating cycles		0.1 million
- AC-3 at $I_e$	Operating cycles		0.4 million
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)		V	400
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>		kV	4
<b>Protective separation</b> Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	Up to 300
<b>Permissible ambient temperature</b>			
	• During operation <sup>1)</sup>	°C	-25 ... + 55
	• During storage	°C	-50 ... + 80
<b>Degree of protection</b> acc. to IEC 60947-1 and EN 60529 (VDE 0470 Part 1)			IP00, drive system IP20
<b>Power consumption of the magnetic coils</b> (when coil is cold and $1.0 \times U_s$ )			
	• AC operation 45 ... 450 Hz	VA	4.4
	• P.f.		0.9 (hum-free)
	• DC operation	W	4
<b>Magnetic coil operating range</b>			$0.85 \dots 1.1 \times U_s$
<b>Operating times</b> (Total break time = OFF-delay + Arcing time)			
• ON-delay			
- Closing NO	DC operation	ms	11 ... 50
	AC operation	ms	10 ... 50
- Opening NC	DC operation	ms	21 ... 39
	AC operation	ms	20 ... 30
• OFF-delay			
- Closing NC	DC operation	ms	5 ... 45
	AC operation	ms	5 ... 45
- Opening NO	DC operation	ms	19 ... 35
	AC operation	ms	20 ... 30
• Arcing time			
		ms	10 ... 15
<b>Shock resistance</b>			
• Rectangular pulse	AC operation and DC operation	g/ms	5.1/5 and 3.5/10
• Sine pulse	AC operation and DC operation	g/ms	7.9/5 and 5.2/10
<b>Switching frequency <math>z</math></b> in operating cycles/hour rated operation			
	Acc. to AC-1	1/h	1000
	Acc. to AC-2	1/h	500
	Acc. to AC-3	1/h	1000
	No-load switching frequency	1/h	10000
<b>Short-circuit protection</b>			
<b>Fuse links</b>			
gL/gG operational class LV HRC 3NA, DIAZED 5SB, NEOZED 5SE acc. to IEC 60947-4-1 (VDE 0660 Part 102)			
	• Type of coordination "1"	A	25
	• Type of coordination "2"	A	10
Miniature circuit breakers	C Characteristic	A	10
<b>AC capacity</b>			
<b>Utilization category AC-1, switching resistive loads</b>			
<b>Rated operational current <math>I_e</math></b> up to 400 V at 55 °C <sup>1)</sup>		A	20 for screw terminals, 16 for flat connector
<b>Rated power <math>U_e</math></b> for AC loads with p.f. = 1, 230/220 V			
• For screw terminals		kW	7.5 (13 at 400 V)
• For flat connector		kW	6 (10 at 400 V)
Minimum conductor cross-section for load with $I_e$		mm <sup>2</sup>	2.5
<b>Utilization category AC-2 and AC-3</b>			
<b>Operational current for AC-3 at 400 V rated value</b>		A	8.4
Rated power for slipring or squirrel-cage motors with 50 Hz and 60 Hz and at 400 V		W	4000
<b>Utilization category AC-5a</b> (permissible nominal impedance: $\geq 0.5 \Omega$ )			
<b>Switching gas discharge lamps</b>			
Per main current path at 230 V, 50 Hz			
Rated power/rated operational current per lamp			
• Uncorrected	18 W	0.37 A	43
	36 W	0.43 A	37
	58 W	0.67 A	24
• DUO switching	18 W	2 x 0.11 A	2 x 81
	36 W	2 x 0.21 A	2 x 42
	58 W	2 x 0.32 A	2 x 28

1) If the three main current paths carry a load of 20 A, the following applies if  $I > 10$  A for the fourth conducting path: permissible ambient temperature 40 °C.

# 3TG10 Power Relays/Miniature Contactors

4-pole, 4 kW

Type	3TG10				
<b>AC capacity</b>					
<b>Switching gas discharge lamps with correction, solid-state ballast</b>					
Per main current path 230 V, 50 Hz					
Rated power per lamp/capacitance/rated operational current per lamp					
• Shunt compensation	L18 W	4.5 µF	0.11 A	Units	15
	L36 W	4.5 µF	0.21 A	Units	15
	L58 W	7 µF	0.32 A	Units	10
• With solid-state ballast (single lamp)	L18 W	6.8 µF	0.10 A	Units	39
	L36 W	6.8 µF	0.18 A	Units	39
	L58 W	10 µF	0.27 A	Units	26
• With solid-state ballast (two lamps)	L18 W	10 µF	0.18 A	Units	2 x 26
	L36 W	10 µF	0.35 A	Units	2 x 26
	L58 W	22 µF	0.52 A	Units	2 x 12
<b>Utilization category AC-5b, switching incandescent lamps</b>					
Per main current path at 230 V, 50 Hz					
kW					
1.6					
<b>Load rating with DC</b>					
<b>Utilization category DC-1, switching resistive load (<math>L/R \leq 15</math> ms)</b>					
• Rated operational currents $I_e$					
- 1 conducting path	Up to 24 V	A	16		
	60 V	A	6		
	110 V	A	2		
	220/240 V	A	0.8		
- 2 conducting paths in series	Up to 24 V	A	16		
	60 V	A	16		
	110 V	A	6		
	220/240 V	A	1.6		
- 3 conducting paths in series	Up to 24 V	A	18		
	60 V	A	18		
	110 V	A	16		
	220 / 240 V	A	6		
- 4 conducting paths in series	Up to 24 V	A	20		
	60 V	A	20		
	110 V	A	20		
	220 / 240 V	A	20		
<b>Utilization category DC-3 and DC-5</b>					
<b>Shunt-wound and series-wound motors (<math>L/R \leq 15</math> ms)</b>					
• Rated operational currents $I_e$					
- 1 conducting path	Up to 24 V	A	10		
	60 V	A	0.5		
	110 V	A	0.15		
	220/240 V	A	0		
- 2 conducting paths in series	Up to 24 V	A	16		
	60 V	A	5		
	110 V	A	0.35		
	220/240 V	A	0		
- 3 conducting paths in series	Up to 24 V	A	16		
	60 V	A	16		
	110 V	A	10		
	220/240 V	A	1.75		
- 4 conducting paths in series	Up to 24 V	A	18		
	60 V	A	16		
	110 V	A	10		
	220/240 V	A	2		
<b>Conductor cross-sections</b>					
<b>Screw terminals</b>					
• Finely stranded with end sleeve (DIN 46228 Form A/D/C)	mm <sup>2</sup>		M3		
• Solid	mm <sup>2</sup>		2 x (0.75 ... 2.5) 2 x (1 ... 2.5), 1 x 4		
<b>Flat connectors</b>					
• Finely stranded 6.3 mm plug-in sleeve acc. to DIN 46245/46247	mm <sup>2</sup>		0.5 ... 1		
- 6.3 ... 1	mm <sup>2</sup>		1 ... 2.5		
- 6.3 ... 2.5	mm <sup>2</sup>				
<b>Ⓢ and Ⓣ ratings (screw terminals)</b>					
<b>Rated insulation voltage</b>		AC V	600		
<b>Uninterrupted current</b>		• Open and enclosed A	20		
<b>Maximum horsepower ratings</b> (Ⓢ and Ⓣ approved values), rated power for induction motors with 60 Hz			1-phase/3-phase		
	At 115 V	hp	0.5/ --		
	200 V	hp	1/ 3		
	230 V	hp	1.5/ 3		
	460 V	hp	0/ 5		
	575 V	hp	0/ 5		
	600 V	hp	0/ 5		

For short-circuit protection for overload see "Protection Equipment --> Overload Relays".



# Accessories and Spare Parts

## For 3RT, 3RH Contactors and Contactor Relays

Accessories for 3RT, 3RH contactors and contactor relays

### Overview

#### Snap-on auxiliary switch blocks

The auxiliary switch blocks and the maximum number of blocks that can be mounted are described in the sections "Motor Contactors" and "Contactor Relays".

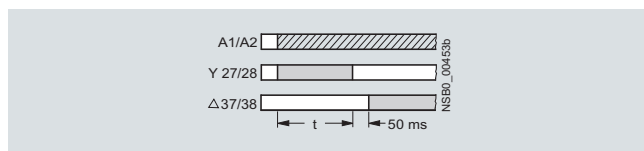
#### Solid-state time-delay auxiliary switch block

The timer module, which is available in the "ON-DELAY" and "OFF-DELAY" versions, allows time-delayed functions up to 100 s (3 distinct delay ranges).

It contains a relay with one NO contact and one NC contact; depending on the version, the relay is switched either after an ON-delay or after an OFF-delay.

The timer module with "WYE-DELTA FUNCTION" is equipped with one delayed and one instantaneous NO contact, with a dead time of 50 ms between the two. The delay time of the NO contact can be adjusted between 1.5 s and 30 s.

#### Wye-delta function:



The contactor on which the solid-state, time-delay auxiliary switch block is mounted operates without a delay.

#### Size S00

The solid-state, time-delay auxiliary switch block is fitted onto the front side of the contactor. The timer module is supplied with power directly by plug-in contacts through the coil terminals of the contactor, in parallel with A1/A2. The timing function is activated by closing the contactor on which the auxiliary switch block is mounted. The OFF-delay version operates without an auxiliary voltage; minimum ON period: 200 ms.

A varistor is integrated in the timer module in order to damp opening surges in the contactor coil.

The solid-state, time-delay auxiliary switch block cannot be mounted on size S00 coupling relays.

#### Sizes S0 to S12

The solid-state, time-delay auxiliary switch block is fitted onto the front side of the contactor.

The timer module is supplied with power through two terminals (A1/A2); the time delay of the auxiliary switch block can be activated either by a parallel link to any contactor coil or by any power source.

The OFF-delay version operates without an auxiliary voltage; minimum ON period: 200 ms.

A single-pole auxiliary switch block can be snapped onto the front of the contactor in addition to the timer module.

The timer module has no integrated components for overvoltage damping.

#### Solid-state timing relay block with semiconductor output

The timer module in the "ON-DELAY" and "OFF-DELAY with auxiliary voltage" versions allows time-delayed functions up to 100 s (3 distinct delay ranges). Contactors fitted with a timing relay block close or open after a delay according to the set time.

The ON-delay variant of the timing relay is connected in series with the contactor coil; terminal A1 of this coil must not be connected.

With the OFF-delay variant of the timing relay, the contactor coil is contacted directly through the relay; terminals A1 and A2 of the contactor coil must not be connected.

The timing relays are suitable for both AC and DC operation.

#### Size S00

The version for size S00 contactors is fitted onto the front of the contactor (with the supply voltage switched off) and then slid into its latched position; at the same time, the timing relay is connected by means of plug-in contacts to coil terminals A1 and A2 of the contactor. Any contactor coil terminals which are not required are sealed off by means of covers on the enclosure of the timing relay block, to prevent them from being connected inadvertently.

A varistor is integrated in the timer module in order to damp opening surges in the contactor coil.

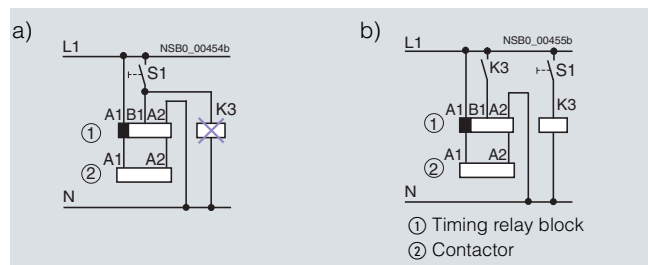
The solid-state, timing relay block cannot be mounted on size S00 coupling relays.

#### Sizes S0 to S3

The timing relay block for size S0 to S3 contactors is plugged into coil terminals A1 and A2 on top of each contactor; the timing relay is connected both electrically and mechanically by means of pins.

A varistor is integrated in the timer module in order to damp opening surges in the contactor coil.

#### Configuring note:



The activation of loads parallel to the start input is not permissible when using AC control voltage (see (a) in the circuit diagram).

The 3RT19 16-2D.../3RT19 26-2D... OFF-delay time relay blocks have a zero potential start input B1. This means that if there is a parallel load on terminal B1, activation can be simultaneous with AC voltage. In this case, the additional load (e. g. contactor K3) must be wired according to (b).

#### OFF-delay device for size S00 to S3 contactors

##### AC and DC operation

IEC 60947, EN 60947.

For screw and snap-on mounting onto 35 mm standard mounting rail. The OFF-delay devices have screw terminals.

The OFF-delay device prevents a contactor from dropping out unintentionally when there is a short-time voltage dip or voltage failure. It supplies a downstream, DC-operated contactor with the necessary energy during a voltage dip, ensuring that the contactor does not trip. The 3RT19 16 OFF-delay devices are specifically designed for operation with the 3RT contactors and 3RH contactor relays of the SIRIUS series.

The OFF-delay device operates without external voltage on a capacitive basis, and can be energized with either AC or DC (24 V version only for DC operation). Voltage matching, which is only necessary with AC operation, is performed using a rectifier bridge.

A contactor opens after a delay when the capacitors of the magnetic coil, built into the OFF-delay device, are switched in parallel. In the event of voltage failures, the capacitors are discharged via the magnetic coil and thereby delay the opening of the contactor.

# Accessories and Spare Parts For 3RT, 3RH Contactors and Contactor Relays

## Accessories for 3RT, 3RH contactors and contactor relays

If the command devices are upstream of the OFF-delay device in the circuit, the OFF-delay takes effect with every opening operation. If the opening operation is downstream of the OFF-delay device, an OFF-delay only applies in the event of failure of the mains voltage.

### Operation

In the case of the versions for rated control supply voltages of 110 V and 230 V, either AC voltage or DC voltage can be applied on the line side, whereas the variant for 24 V is designed for DC operation only.

A DC-operated contactor is connected to the output in accordance with the input voltage that is applied.

The mean value of the OFF-delay is approximately 1.5 times the specified minimum time.

### Surge suppressors

- Without LED (also for Cage Clamp terminals) size S00, S0, S2, S3, S6 to S12
- With LED (also for Cage Clamp terminals) size S00

All 3RT1 contactors and 3RH1 contactor relays can be retrofitted with RC elements or varistors for damping opening surges in the coil. Diodes or diode assemblies (comprising noise suppression diodes and Zener diodes for rapid switch-off) can be used.

The surge suppressors are plugged onto the front of size S00 contactors. Space is provided for them next to a snap-on auxiliary switch block.

With all size S0 to S3 contactors, varistors, RC elements and diode assemblies can be plugged on directly at the coil terminals, either on the top or underneath.

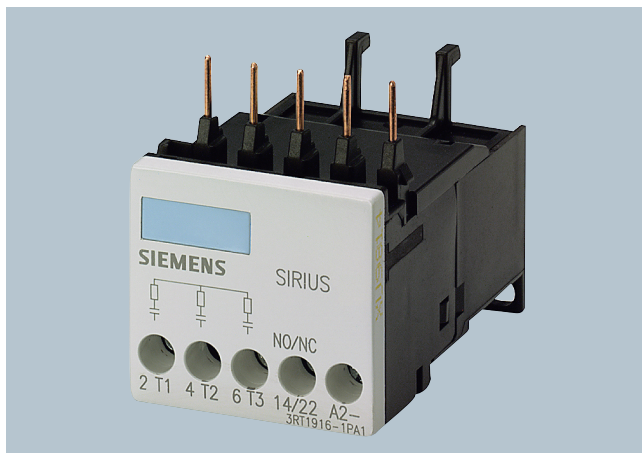
The plug-in direction of the diodes and diode assemblies is determined by a coding device.

Coupling relays are supplied either without overvoltage damping or with a varistor or diode connected as standard, according to the version.

### Note:

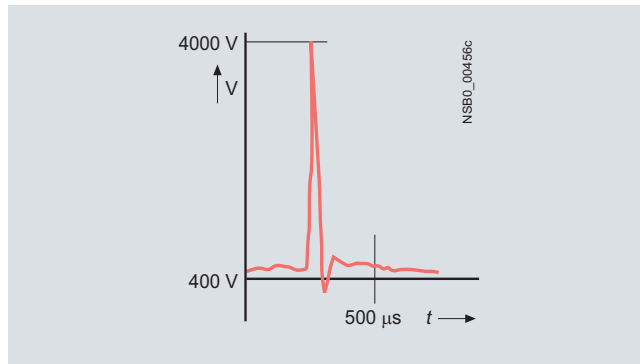
*The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are damped against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).*

### Electromagnetic interference suppression module, 3-phase for size S00 contactors



A so-called counter-e.m.f. (electromotive force) is produced when motors or various inductive loads are turned off. Voltage peaks of up to 4000 V may occur as a result, with a frequency spectrum from 1 kHz to 10 MHz and a rate of voltage variation from 0.1 to 20 V/ns.

Capacitive input to various analog and digital signals makes it necessary to suppress interference in the load circuit.



### Reducing contact arcing

The connection between the main current path and the EMC interference suppression module enables contact arcing, which is responsible for contact erosion and the majority of clicking noises, to be reduced; this in turn is conducive to an electromagnetically compatible design.

### Higher operational reliability

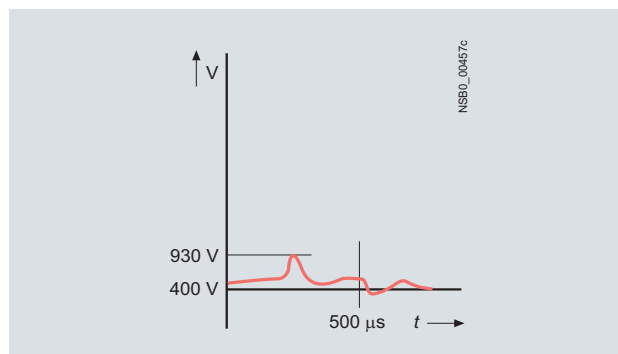
Since the EMC interference suppression module achieves a significant reduction in radio-frequency components and the voltage level in three phases, the contact endurance is also improved considerably. This makes an important contribution towards enhancing the reliability and availability of the system as a whole.

### Dispensing with fine graduations

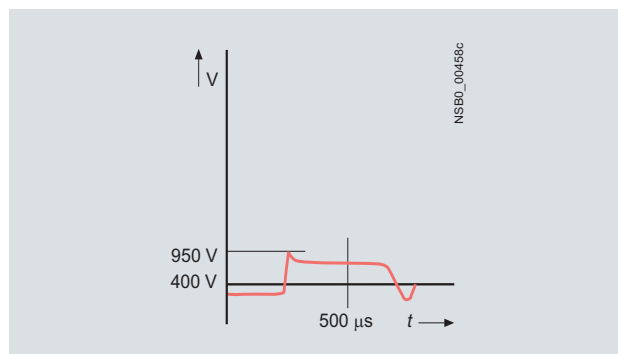
There is no need for fine graduations within each performance class, as smaller motors inherently have a higher inductance, so that one solution for all fixed-speed operating mechanisms up to 5.5 kW is adequate.

Two electrical versions are available:

- The advantages of the RC circuit lie mainly in the reduction in the rate of rise and in its RF damping ability. The selected values ensure effective interference suppression over a wide range.



- The varistor circuit can absorb a high energy level and can also be used for frequencies ranging from 10 to 400 Hz (closed-loop controlled operating mechanisms). There is no limiting below the knee-point voltage, however.



# Accessories and Spare Parts

## For 3RT, 3RH Contactors and Contactor Relays

### Accessories for 3RT, 3RH contactors and contactor relays

#### Additional load module

Size S00 for plugging onto the front of the contactors with and without auxiliary switch block

#### Coupling links for mounting on contactors of sizes S0 to S3

##### DC operation

IEC 60947 and EN 60947.

The coupling link is suitable for use in any climate. It is finger-safe according to EN 50274. The terminal designations comply with EN 50005.

System-compatible operation with 24 DC V, operating range 17 to 30 V.

Low power consumption in conformity with the technical specifications of the solid-state systems. An LED indicates the switching state.

##### Surge suppression

The 3RH19 24-1GP11 coupling link has an integrated surge suppressor (varistor) for the contactor coil being switched.

##### Mounting

The 3RH19 24-1GP11 coupling link is mounted directly on the contactor coil.

#### Solder pin adapters

The solder pin adapters for the size S00 contactors are available in two versions:

- Solder pin adapter for contactors with one integrated auxiliary contact
- Solder pin adapter for contactors with mounted 4-pole auxiliary switch block

#### Screw adapters

Plug-on adapters improve the accessibility of the screw fixing for size S0 contactors. As a result it is possible to position the screwdriver vertically even when using insulated screwdrivers or power screwdrivers.

Optionally the adapters can be rotated through 90° before mounting.

#### Sealable covers for sizes S00 to S12

When contactors and contactor relays are used in safety-oriented applications, it must be ensured that it is impossible to operate the contactors manually.

For SIRIUS contactors there are sealable covers available for this purpose as accessories; these prevent accidental manual operation. These are transparent molded-plastic caps with a bracket that enables the contactor to be sealed.

## Technical specifications

### Technical specifications according to EN 61812-1 (VDE 0435 Part 2021)

Contactors	Type	<b>3RT19 26-3A</b> <b>Mechanical latching block for the 3RT1 . 2. and 3RT1 . 3. contactors</b>	
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	690	
<b>Mechanical endurance</b> (operating cycles)	<ul style="list-style-type: none"> <li>• With 3RT1 . 2</li> <li>• With 3RT1 . 3</li> </ul>	3 million 50 000	
<b>Permissible ambient temperature</b>			
• During operation	°C	-25 ... +60	
• During storage	°C	-50 ... +80	
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C		IP20	
<b>Operating range of the magnetic coil</b> At AC 50/60 Hz and DC		0.85 ... 1.1 x $U_s$	
<b>Power consumption of the magnetic coils of the unlocking magnet</b> (for cold coil and 1.0 x $U_s$ ) AC and DC operation	W	Approx. 4	
<b>Command duration for de-energizing</b>			
• AC operation	ms	18 ... 31	
• DC operation	ms	18 ... 26	
<b>Conductor cross-sections</b>			
• Solid	mm <sup>2</sup> AWG	2 x (0.5 ... 2.5); 1 x 4 2 x 14; 1 x 12	
• Finely stranded with end sleeve	mm <sup>2</sup> AWG	2 x (0.5 ... 2.5); 1 x 2.5 2 x 14; 1 x 12	
<b>Tightening torque of the terminal screws</b>	Nm lb.in	0.8 ... 1.1 7 ... 9.5	

# Accessories and Spare Parts

## For 3RT, 3RH Contactors and Contactor Relays




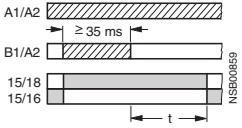
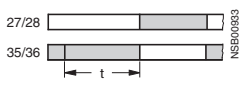
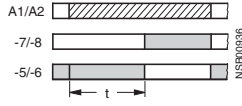
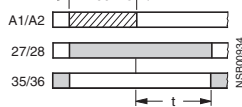
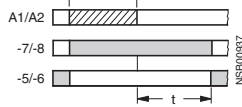
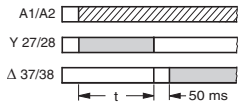
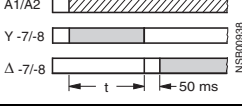
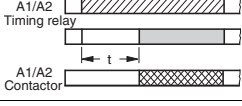
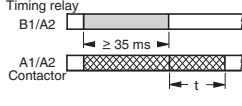
### Accessories for 3RT, 3RH contactors and contactor relays

Contactor	Type		3RT19 .6-2C	3RT19 .6-2D	3RT19 .6-2L	3RT19 .6-2E	3RT19 .6-2F	3RT19 .6-2G
			Solid-state time-delay blocks with semi-conductor output			Solid-state time-delay auxiliary switch blocks		
<b>Rated insulation voltage</b> $U_i$ Degree of pollution 3 Overvoltage category III acc. to EN 60664-1		V AC	250		300			250
<b>Operating range of excitation</b>			0.8 ... 1.1 x $U_s$ , 0.95 ... 1.05 times rated frequency		0.85 ... 1.1 x $U_s$ , 0.95 ... 1.05 times rated frequency			
<b>Rated power</b>		W	1					2
• Power consumption at 230 V AC, 50 Hz		VA	1		4			
<b>Rated operational currents</b> $I_e$								
• AC-140, DC-13		A	0.3 for 3RT19 16					--
		A	0.3 for 3RT19 26					--
• AC-15, 230 V, 50 Hz		A	--		3			
• DC-13, 24 V		A	--		1			
• DC-13, 110 V		A	--		0.2			
• DC-13, 230 V		A	--		0.1			
<b>DIAZED protection</b> gL/gG operational class		A	--		4			
<b>Switching frequency</b> for load								
• With $I_e$ 230 V AC		h <sup>-1</sup>	2500					
• With 3RT10 16 contactor, 230 V AC		h <sup>-1</sup>	2500		5000			
<b>Recovery time</b>		ms	50		150			
<b>Minimum ON period</b>		ms	35		35 (OFF-delay with auxiliary voltage)		200 (with OFF-delay)	
<b>Residual current</b>	Max.	mA	5		--			
<b>Voltage drop</b> With conducting output	Max.	VA	3.5		--			
<b>Short-time loading capacity</b>	Up to 10 ms	A	10		--			
<b>Setting accuracy</b> With reference to upper limit of scale	Typ.	%	±15					
<b>Repeat accuracy</b>	Max.	%	±1					
<b>Mechanical endurance</b>		Operat- ing cycles	100 x 10 <sup>6</sup>		10 x 10 <sup>6</sup>			
<b>Permissible ambient temperature</b>								
• During operation		°C	-25 ... +60					
• During storage		°C	-40 ... +80					
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C								
• Cover			IP40					
• Terminals			IP20					
<b>Conductor connections</b>								
• Solid		mm <sup>2</sup>	2 x (0.5 ... 1.5), 2 x (0.75 ... 4)					
• Finely stranded with end sleeve		mm <sup>2</sup>	2 x (0.5 ... 2.5)					
• AWG cables, solid or stranded		AWG	2 x (18 ... 14)					
• Terminal screws			M3					
• Tightening torque		Nm	0.8 ... 1.2					
<b>Permissible mounting position</b>			Any					
<b>Shock resistance</b> Half-sine acc. to IEC 60068-2-27		g/ms	15/11					
<b>Vibration resistance</b> Acc. to IEC 60068-2-6		Hz/mm	10 ... 55/0.35					
<b>EMC tests</b>	Basic specification		IEC 61000-6-4		IEC 61000-6-2; IEC 61000-6-4	IEC 61000-6-4		
<b>Overvoltage protection</b>			Varistor integrated in timing relay			--		

# Accessories and Spare Parts

## For 3RT, 3RH Contactors and Contactor Relays

### Accessories for 3RT, 3RH contactors and contactor relays

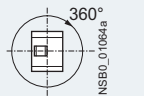
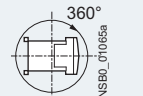
Function table 3RT19 16, 3RT19 26	Function chart	3RT19 16 timing relays						3RT19 26 timing relays				
Function	 Timing relay energized  Contact closed  Contact open	3RT19 16-2C	3RT19 16-2D	3RP19 16-2E	3RT19 16-2F	3RT19 16-2G	3RT19 16-2L	3RT19 26-2C	3RT19 26-2D	3RT19 26-2E	3RT19 16-2F	3RT19 26-2G
<b>1 CO contact</b>												
OFF-delay With auxiliary voltage							✓					
<b>1 NO contact + 1 NC contact</b>												
ON-delay (varistor integrated)				✓								
With ON-delay									✓			
OFF-delay Without auxiliary voltage (varistor integrated)					✓							
OFF-delay without auxiliary voltage										✓		
<b>2 NO contacts</b>												
Wye-delta function (varistor integrated) 1 NO delayed, 1 NO instantaneous, dead time 50 ms						✓						
Wye-delta function 1 NO delayed, 1 NO instantaneous, dead time 50 ms												✓
<b>1 NO contact (semiconductor)</b>												
ON-delay Two-wire version (varistor integrated)		✓						✓				
OFF-delay With auxiliary voltage (varistor integrated)			✓						✓			

✓ Function is possible.

# Accessories and Spare Parts

## For 3RT, 3RH Contactors and Contactor Relays

### Accessories for 3RT, 3RH contactors and contactor relays

Versions		3RT19 16-2BE01 OFF-delay devices	3RT19 16-2BK01	3RT19 16-2BL01
Connectable contactor sizes Caution! Only contactors and contactor relays with DC operation can be connected.		S00 ...S3 --	S00/S0 S00/S0	S00/S0 S00/S0
• DC supply • AC supply	Type	3RT10 ...-1BB4., 3RH1. ...-1BB40	3RT10 1.-1BF4, 3RT10 2.-1BF4, 3RH1. ...-1BF40	3RT10 1.-1BM4./1BP4., 3RT10 2.-1BM4./1BP4., 3RH1. ...-1BM40/1BP40
<b>Permissible mounting position</b>				
<b>Rated control supply voltage <math>U_s</math></b> Operating range	V	24 (DC) 0.9 ... 1.1 $U_s$	110 (UC)	220/230 (UC)
Rated frequency/ies with AC supply	$f$	Hz $\pm 5\%$	50/ 60	50/ 60
<b>Ambient temperature</b> permissible:				
• During operation				
- Side-by-side mounting without distance	$T_u$	°C	-25 ... +50	
- Side-by-side mounting with 5 mm distance	$T_u$	°C	-25 ... +60	
• During storage	$T_u$	°C	-40 ... +80	
<b>OFF-delay<sup>1)</sup></b> (minimum times at $U_{sp} = 0.9 \times U_s$ , $T_{sp} = 20$ °C)			Note: In practice the mean value is 1.5 times the minimum time.	
• S00	$t_{off} >$	ms	250	600
• S0	$t_{off} >$	ms	150	400
• S2 (only for DC supply)	$t_{off} >$	ms	90	--
• S3 (only for DC supply)	$t_{off} >$	ms	70	--
<b>Installed capacity C</b> 3RT19 16-2B.01	$\mu F$		2000	68
Capacitor voltage	V		35	180
<b>ON-delay</b> (maximum at $U_{sp} = 0.9 \times U_s$ , $T_{sp} = 20$ °C)			Note: The total ON-delay = Contactor make-time + $t_{on}$	
• S00	$t_{on} <$	ms	10	200
• S0	$t_{on} <$	ms	10	80
<b>Mechanical endurance</b>	Operating cycles		30 million	
<b>Endurance, electrical approx.</b>	Operating cycles		> 1 million	
<b>Switching frequency z</b> max. (at $T_u = 60$ °C)	$h^{-1}$		300	
<b>Power loss <math>P_V</math></b> max. approx.	W		0.4	0.5
<b>Surge suppression</b>			with varistor, integrated	
<b>Conductor cross-sections</b> $U_{sp}$ = Coil voltage $T_{sp}$ = Coil temperature			2)	

1) Doubling the delay time can be achieved by doubling the capacitance. Commercially available capacitors can be used, which can be connected to terminals C+ and Z-.

2) See 3RT10 1 contactors, page 23.

# Accessories and Spare Parts

## For 3RT, 3RH Contactors and Contactor Relays

### Accessories for 3RT, 3RH contactors and contactor relays

Contactors	Type	3RT19 26-2P. Pneumatic delay block <sup>1)</sup>	
<b>General data</b>			
<b>Mechanical endurance</b>	Operating cycles	5 million	
<b>Electrical endurance at <math>I_e</math></b>	Operating cycles	1 million	
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	690	
<b>Permissible ambient temperature</b>			
• During operation	°C	-25 ... +60	
• During storage	°C	-50 ... +80	
<b>Rated operational currents <math>I_e</math></b> Acc. to utilization categories EN 60947			
• AC-12	A	10	
• AC-15/AC-14 at $U_e$	Up to 230/220 V A	6	
	400/380 V A	4	
	500 V A	2.5	
	690/660 V A	1.5	
• DC-13 at $U_e$	24 V A	4	
	48 V A	2	
	110 V A	0.7	
	220 V A	0.3	
	440 V A	0.15	
<b>Conductor cross-sections</b>			
• Solid, stranded:	mm <sup>2</sup>	2 x 0.5 ... 2.5 <sup>2)</sup> or 2 x 2.5 ... 4 <sup>2)</sup>	
• Finely stranded with end sleeve	mm <sup>2</sup>	2 x 0.5 ... 2.5	
• AWG cables	AWG	2 x 22 ... 12	
• Tightening torque of the terminal screws	Nm	0.8 ... 1.1	
<b>Time delay</b>			
• Accuracy		±10 %	
<b>Ⓢ and Ⓢ rated data</b>			
• Rated voltage	V AC	600	
• Switching capacity		A 600, Q 600	
1) For size S0. In addition to the pneumatic delay block, no other auxiliary contacts are permitted.		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.	

Versions	3RT1900-4RE01 plugs S00, S0		3RT1916-4RD01 adapters S00	3RT1926-4RD01 adapters S0
Connection modules for contactors with screw terminals				
<b>General data</b>				
<b>Mechanical endurance</b>	Operating cycles	10 million		
<b>Electrical endurance at <math>I_e</math></b>	Operating cycles	1 million		
<b>Rated operational voltage <math>U_e</math></b>	V	440		
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	690		
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (degree of pollution 3)	kV	6		
<b>Protective separation acc. to EN 60947-1</b> (degree of pollution 3)	V	400		
<b>Rated operational current <math>I_e</math></b> AC-3 at 400 V	A	25	20	25
<b>Rated frequency <math>f</math></b> For AC operation	Hz	50/60		
<b>Permissible ambient temperature</b>				
• During operation	°C	-25 ... +60		
• During storage	°C	-50 ... +80		
<b>Degree of protection acc. to EN 60529</b>		IP20		
<b>Conductor cross-sections</b> Screw terminals				
• Solid	mm <sup>2</sup>	1x (0.5 ... 6)		
• Finely stranded without/with end sleeve	mm <sup>2</sup>	1x (0.5 ... 6)		
• Stranded	mm <sup>2</sup>	1x (0.5 ... 6)		
• AWG cables, solid or stranded	AWG	1x (20 ... 10)		
• Tightening torque	Nm	0.6 ... 0.8		
• Corresponding opening tool		Short-slot screwdriver PZ2		

# Accessories and Spare Parts

## For 3RT, 3RH Contactors and Contactor Relays

### Accessories for 3RT, 3RH contactors and contactor relays

Versions		3RT1900-4RE01 plugs S00, S0	3RT1916-4RD01 adapters S00	3RT1926-4RD01 adapters S0
Connection modules for contactors with screw terminals				
<b>Ⓢ and Ⓛ rated data</b>				
• Rated operational voltage $U_e$	V	480		
• Rated insulation voltage $U_i$	V	600		
• Uninterrupted current, at 40 °C	A	16/25	16	25
• Short-circuit protection <sup>1)</sup>				
	• At 600 V	kA	5	
	• CLASS RK5 fuse	A	100	60
	• Circuit breakers with overload protection acc. to UL 489	A	100	60
				100
				100
<b>Combination motor controllers type E Acc. to UL 508</b>				
	• At 480 V	Type	3RV102	
		A	22	--
		kA	65	--
	• At 600 V	Type	3RV102	
		A	22	--
		kA	10	--

1) For more information about short-circuit values, e. g. for protection against short-circuit currents, see the UL guide (Order No.: A5E02118883) or UL reports (<http://www.siemens.com/lowvoltage/ul-europe>) for the individual devices.

Contactor	Type	3RH19 24, 3TX7 090 Coupling links for mounting on contactors acc. to IEC 60947/EN 60947	
<b>General data</b>			
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)	V	300	
<b>Protective separation</b> between the coil and the contacts acc. to EN 60947-1, Appendix N	V AC	Up to 300	
<b>Degree of protection</b> acc. to EN 60947-1, Appendix C			
• Terminals		IP20	
• Enclosure		IP40	
<b>Permissible ambient temperature</b>			
• During operation	°C	-25 ... +60	
• During storage	°C	-40 ... +80	
<b>Conductor cross-section</b>			
• Solid	mm <sup>2</sup>	2 x (0.5 ... 2.5)	
• Finely stranded with end sleeve	mm <sup>2</sup>	2 x (0.5 ... 1.5)	
Terminal screws		M3	
<b>Short-circuit protection</b> (weld-free protection at $I_k \geq 1$ kA) Fuse links, gL/gG operational class LV HRC 3NA, DIAZED 5SB, NEOZED 5SE	A	6	
<b>Control side</b>			
<b>Rated control supply voltage <math>U_s</math></b>	V DC	24	
<b>Operating range</b>	V DC	17 ... 30	
<b>Power consumption at <math>U_s</math></b>	W	0.5	
<b>Nominal current input</b>	mA	20	
<b>Release voltage</b>	V	$\geq 4$	
<b>Function display</b>		LED yellow	
<b>Protection circuit</b>		Varistor	



# Accessories and Spare Parts

## For 3RT, 3RH Contactors and Contactor Relays

### Accessories for 3RT, 3RH contactors and contactor relays



Contactors	Type	<b>3RH19 24, 3TX7 090</b> Coupling links for mounting on contactors acc. to IEC 60947/EN 60947	
<b>Load side</b>			
<b>Mechanical endurance</b>	In million operating cycles		20
<b>Electrical endurance at <math>I_e</math></b>	In million operating cycles		0.1
<b>Switching frequency</b>	Operating cycles	$h^{-1}$	5000
<b>Make-time</b>		ms	Approx. 7
<b>Break-time</b>		ms	Approx. 4
<b>Bounce time</b>		ms	Approx. 2
<b>Contact material</b>			AgSnO
<b>Switching voltage</b>		V AC/DC	24 ... 250
<b>Permissible residual current</b> of the electronics (for 0 signal)		mA	2.5
<b>Rated operational currents<sup>1)</sup></b>			
Continuous thermal current $I_{th}$		A	6
<b>Rated operational currents <math>I_e</math></b> Acc. to utilization categories EN 60947			
• AC-15	- At 24 V	A	3
	- At 110 V	A	3
	- At 230 V	A	3
• DC-13	- At 24 V	A	1
	- At 110 V	A	0.2
	- At 230 V	A	0.1
<b>Switching current</b> with resistive load to EN 60255 (relay standard) and EN 60947			
• AC-12	- At 24 V	A	6
	- At 110 V	A	6
	- At 230 V	A	6
• DC-12	- At 24 V	A	6
	- At 110 V	A	0.3
	- At 230 V	A	0.2 <sup>1)</sup>

1) Capacitive loads can result in micro-weldings on the contacts.

# Accessories and Spare Parts For 3T Contactors and Contactor Relays



Accessories for  
3TB, 3TC, 3TF, 3TG, 3TK contactors

## Technical specifications

For 3TF2 contactors		<b>Auxiliary switch block</b>
Type		<b>3TX4 4...-..</b>
<b>General data</b>		
<b>Permissible mounting position</b>	AC and DC operation	Any
<b>Mechanical endurance</b>		10 million
• AC operation	Operating cycles	10 million
• DC operation	Operating cycles	30 million
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)		 <b>For screw terminals</b>
	V	500
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (degree of pollution 3)		 <b>For screw terminals</b>
	kV	6
<b>Protective separation</b> between the coil and the contacts acc. to EN 60947-1, Appendix N	V	Up to 300
<b>Positively-driven operation</b>		
• 3TF2 basic unit or complete unit		ZH1/457, SUVA
• 3TF20 basic unit with 3TX4 4 auxiliary switch block	- Upper level - Lower level - Different levels	ZH1/457, SUVA ZH1/457, SUVA SUVA
<b>Permissible ambient temperature<sup>1)</sup></b>		
• During operation	°C	-25 ... +55
• During storage	°C	-55 ... +80
<b>Degree of protection</b> acc. to EN 60947-1 Appendix C		IP20 for screw terminals
<b>Touch protection</b> acc. to EN 50274		Finger-safe for screw terminals
<b>Shock resistance</b>		
• Rectangular pulse	- AC operation - DC operation	<i>g/ms</i> <i>g/ms</i>
		7/5 and 4/10 10/5 and 6/10
• Sine pulse	- AC operation - DC operation	<i>g/ms</i> <i>g/ms</i>
		9/5 and 6/10 13/5 and 8/10
<b>Short-circuit protection</b>		
<b>Short-circuit protection</b>		
Fuse links gL/gG LV HRC 3NA, DIAZED 5SB, NEOZED 5SE	A	6
Weld-free protection at $I_k \geq 1$ kA		

1) Applies to 50/60 Hz coil:  
Operating range at 60 Hz:  $0.85 \dots 1.1 \times U_s$ ;  
at 50 Hz,  $1.1 \times U_s$ , side-by-side mounting and 100 % ON period the max.  
ambient temperature is +40 °C.

### Technical specifications

For 3TH2 contactor relays		<b>Auxiliary switch block</b>
Type		<b>3TX4 4...-</b>
<b>General data</b>		
<b>Permissible mounting position</b>	AC and DC operation	Any
<b>Mechanical endurance</b>		
• AC operation	Operating cycles	10 million
• DC operation	Operating cycles	30 million
<b>Rated insulation voltage <math>U_i</math></b> (degree of pollution 3)		 <b>For screw terminals</b>
	V	500
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (degree of pollution 3)		 <b>For screw terminals</b>
	kV	6
<b>Protective separation</b> between the coil and the contacts acc. to EN 60947-1, Appendix N	V	Up to 300
<b>Positively-driven operation</b>		
• 3TH2 basic unit or complete unit		ZH1/457, SUVA
• 3TH20 basic unit with 3TX4 4 auxiliary switch block	- Upper level - Lower level - Different levels	ZH1/457, SUVA ZH1/457, SUVA SUVA
<b>Permissible ambient temperature<sup>1)</sup></b>		
• During operation	°C	-25 ... +55
• During storage	°C	-55 ... +80
<b>Degree of protection</b> acc. to EN 60947-1 Appendix C		IP20 for screw terminals
<b>Touch protection</b> acc. to EN 50274		Finger-safe for screw terminals
<b>Shock resistance</b>		
• Rectangular pulse	- AC operation - DC operation	<i>g/ms</i> <i>g/ms</i>
		7/5 and 4/10 10/5 and 6/10
• Sine pulse	- AC operation - DC operation	<i>g/ms</i> <i>g/ms</i>
		9/5 and 6/10 13/5 and 8/10
<b>Short-circuit protection</b>		
<b>Short-circuit protection</b>		
Fuse links gL/gG LV HRC 3NA, DIAZED 5SB, NEOZED 5SE	A	6
Weld-free protection at $I_k \geq 1$ kA		

1) Applies to 50/60 Hz coil  
Operating range at 60 Hz:  $0.85 \dots 1.1 \times U_N$ ;  
at 50 Hz,  $1.1 \times U_N$ , side-by-side mounting and 100 % ON period the max.  
ambient temperature is +40 °C.

### Overview

#### Dimensional drawings

3RA13 .....	200 ... 202
3RA14 .....	203, 204
3RA19 .....	199, 200
3RH11 .....	188, 191
3RH14 .....	191
3RH19 .....	196, 197
3RS18 .....	216
3RT10 .....	179 ... 184, 188 ... 190
3RT12 .....	185
3RT13 .....	185
3RT14 .....	181, 183, 184
3RT15 .....	186
3RT16 .....	187
3RT19 .....	193 ... 196, 198, 204
3TB5 .....	207, 212
3TC4 .....	210, 212
3TC5 .....	210
3TC7 .....	211
3TD68 .....	207
3TE68 .....	207
3TF2 .....	213
3TF6 .....	205
3TG10 .....	204
3TH2 .....	215, 216
3TH4 .....	192
3TK1 .....	208, 209
3TK2 .....	214
3TX2 .....	211
3TX4 .....	192, 213 ... 215
3TX7 .....	192, 206, 217
LZS/LZX .....	218 ... 220

#### Schematics

3RA13 .....	237
3RA14 .....	238
3RH11 .....	226, 231, 232, 235, 236
3RH14 .....	232, 235
3RH19 .....	222 ... 224, 227 ... 230
3RS18 .....	249
3RT10 .....	221, 226 ... 228, 231
3RT12 .....	221
3RT13 .....	221, 228
3RT14 .....	221, 227
3RT15 .....	221, 228
3RT16 .....	225, 230
3RT19 .....	222 ... 225, 229, 230
3TB5 .....	240, 243
3TC4 .....	242, 244
3TC5 .....	242, 244
3TC7 .....	242, 244
3TD68 .....	240
3TE68 .....	241
3TF2 .....	245
3TF6 .....	239, 243
3TG10 .....	239, 243
3TH2 .....	246
3TH4 .....	233, 234
3TK1 .....	241, 244
3TK2 .....	245
3TX4 .....	245, 246
3TX7 .....	239, 247 ... 249
3TY6 .....	240
3TY7 .....	239
LZS/LZX .....	250, 251

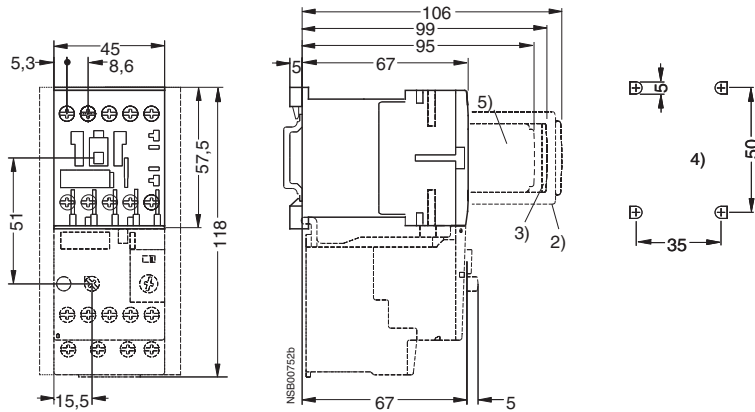
## Dimensional drawings

### 3RT10 contactors, 3-pole

#### 3RT10 1 contactors, size S00

Screw terminals  
with surge suppressor, auxiliary switch block and mounted overload relay

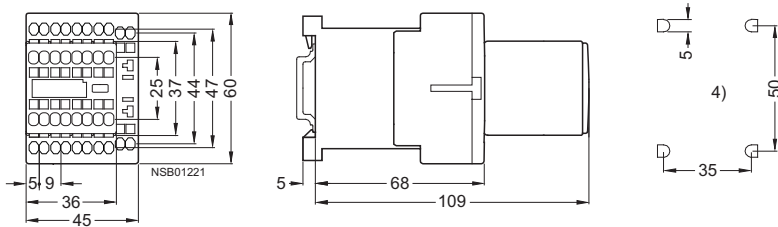
Lateral distance to grounded components = 6 mm



- 2) Auxiliary switch block (also solid-state compatible version 3RH19 11- . NF . .)
- 3) Surge suppressor (also 3RT19 16-1GA00 additional load module)
- 4) Drilling pattern
- 5) Auxiliary switch block 1-pole

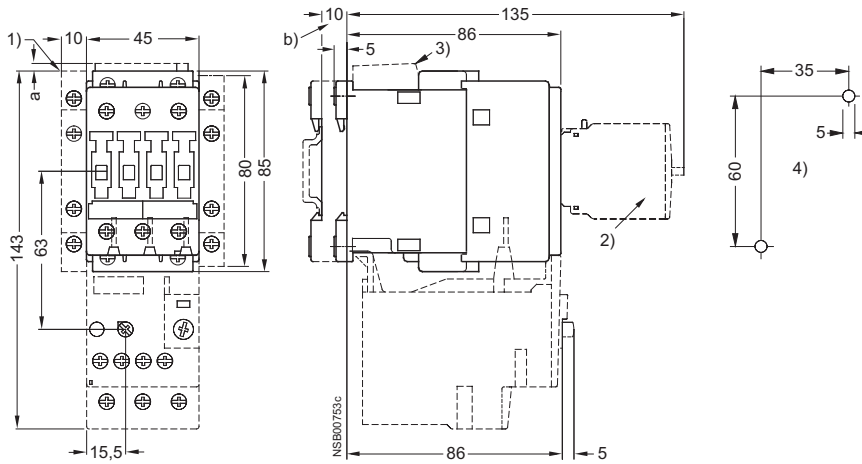
#### 3RT10 1 contactors, size S00

Cage Clamp terminals with auxiliary switch block



#### 3RT10 2 contactors, 3RT10 2 coupling relays, size S0

Screw terminals  
with surge suppressor, auxiliary switch blocks and mounted overload relay



- For size S0:
- a = 3 mm at < 240 V
  - a = 7 mm at > 240 V
  - b = DC 10 mm deeper than AC
  - 1) Auxiliary switch block, laterally mountable
  - 2) Auxiliary switch block, mountable on the front, 1-, 2- and 4-pole (also solid-state compatible version 3RH19 21- . FE22)
  - 3) Surge suppressor
  - 4) Drilling pattern

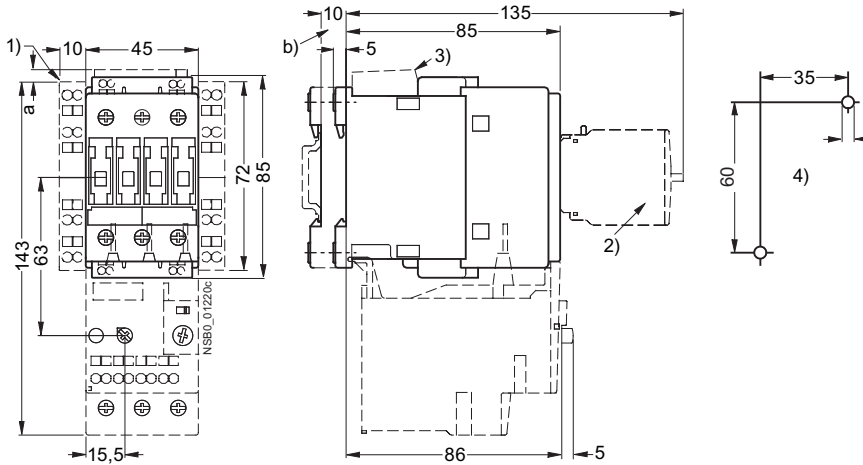
# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### 3RT10 contactors, 3-pole

#### 3RT10 2 contactors, 3RT10 2 coupling relays, size S0

Cage Clamp terminals  
with surge suppressor, auxiliary switch blocks and mounted overload relay

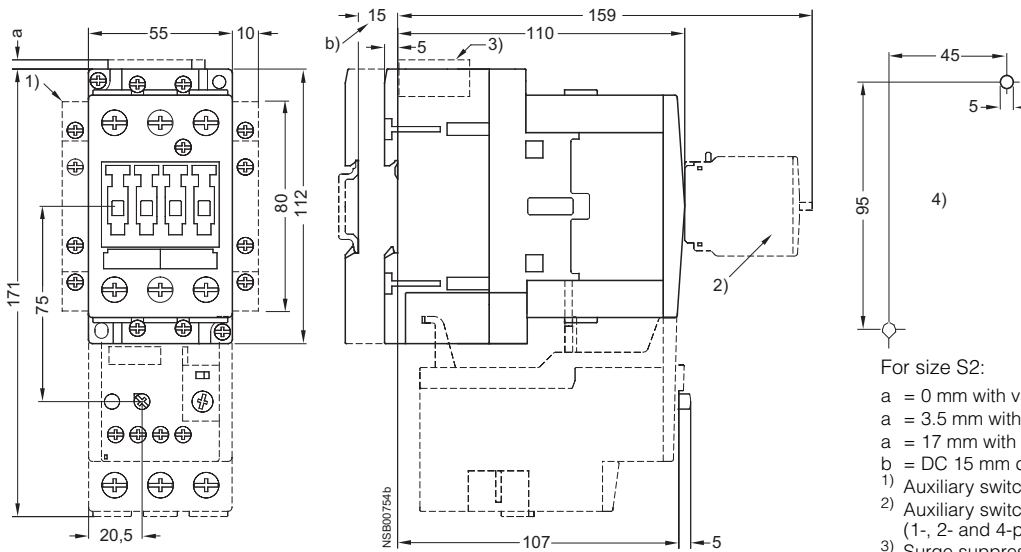


For size S0:

- a = 0 mm with varistor < 240 V, diode assembly
- a = 3.5 mm with varistor > 240 V
- a = 17 mm with RC element
- b = DC 10 mm deeper than AC
- 1) Auxiliary switch block, laterally mountable
- 2) Auxiliary switch block, mountable on the front, (1-, 2- and 4-pole)
- 3) Surge suppressor
- 4) Drilling pattern

#### 3RT10 3 contactors, size S2

Screw terminals  
with surge suppressor, auxiliary switch blocks and mounted overload relay



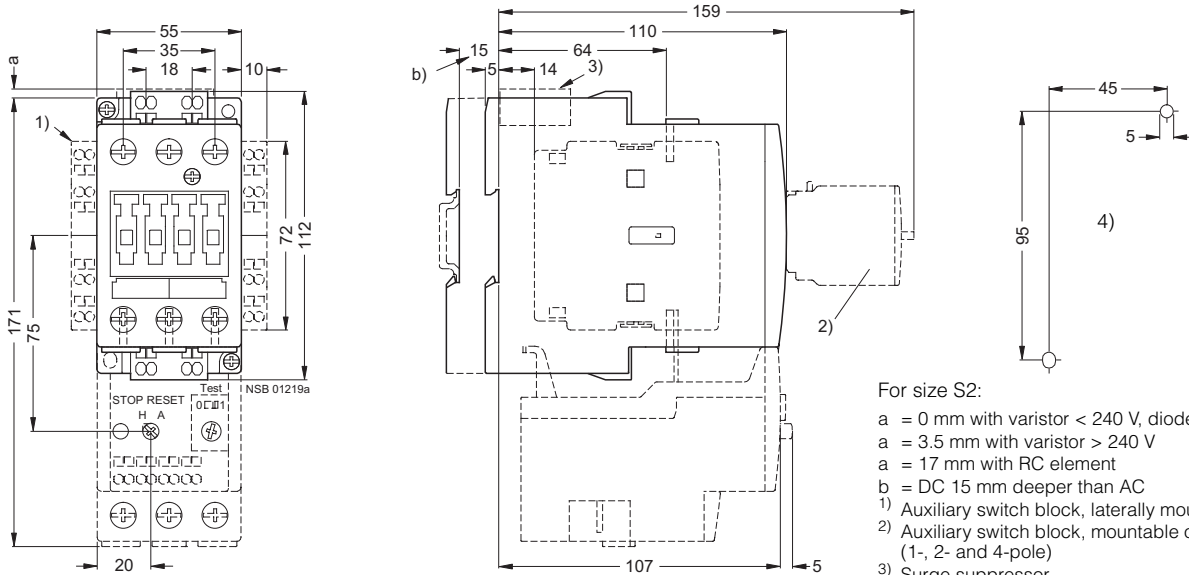
For size S2:

- a = 0 mm with varistor < 240 V, diode assembly
- a = 3.5 mm with varistor > 240 V
- a = 17 mm with RC element
- b = DC 15 mm deeper than AC
- 1) Auxiliary switch block, laterally mountable
- 2) Auxiliary switch block, mountable on the front, (1-, 2- and 4-pole)
- 3) Surge suppressor
- 4) Drilling pattern

## 3RT10 and 3RT14 contactors, 3-pole

### 3RT10 3 contactors, size S2

Cage Clamp terminals  
with surge suppressor, auxiliary switch blocks and mounted overload relay

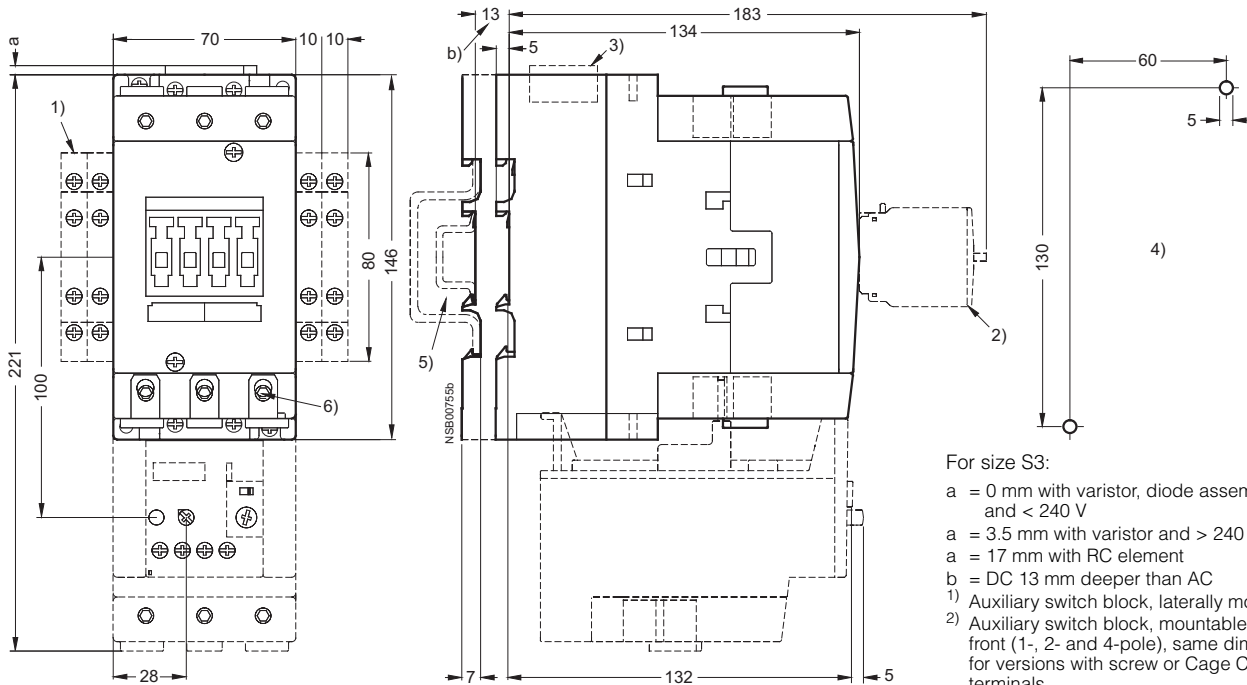


For size S2:

- a = 0 mm with varistor < 240 V, diode assembly
- a = 3.5 mm with varistor > 240 V
- a = 17 mm with RC element
- b = DC 15 mm deeper than AC
- 1) Auxiliary switch block, laterally mountable
- 2) Auxiliary switch block, mountable on the front, (1-, 2- and 4-pole)
- 3) Surge suppressor
- 4) Drilling pattern

### 3RT10 4, 3RT14 46 contactors, size S3

Screw terminals  
with surge suppressor, auxiliary switch blocks and mounted overload relay



For size S3:

- a = 0 mm with varistor, diode assembly and < 240 V
- a = 3.5 mm with varistor and > 240 V
- a = 17 mm with RC element
- b = DC 13 mm deeper than AC
- 1) Auxiliary switch block, laterally mountable
- 2) Auxiliary switch block, mountable on the front (1-, 2- and 4-pole), same dimensions for versions with screw or Cage Clamp terminals
- 3) Surge suppressor
- 4) Drilling pattern
- 5) For mounting onto TH 35 standard mounting rail according to EN 60715 (15 mm deep) or TH 75 standard mounting rail according to EN 60715
- 6) Allen screw 4 mm

Lateral distance to grounded components = 6 mm

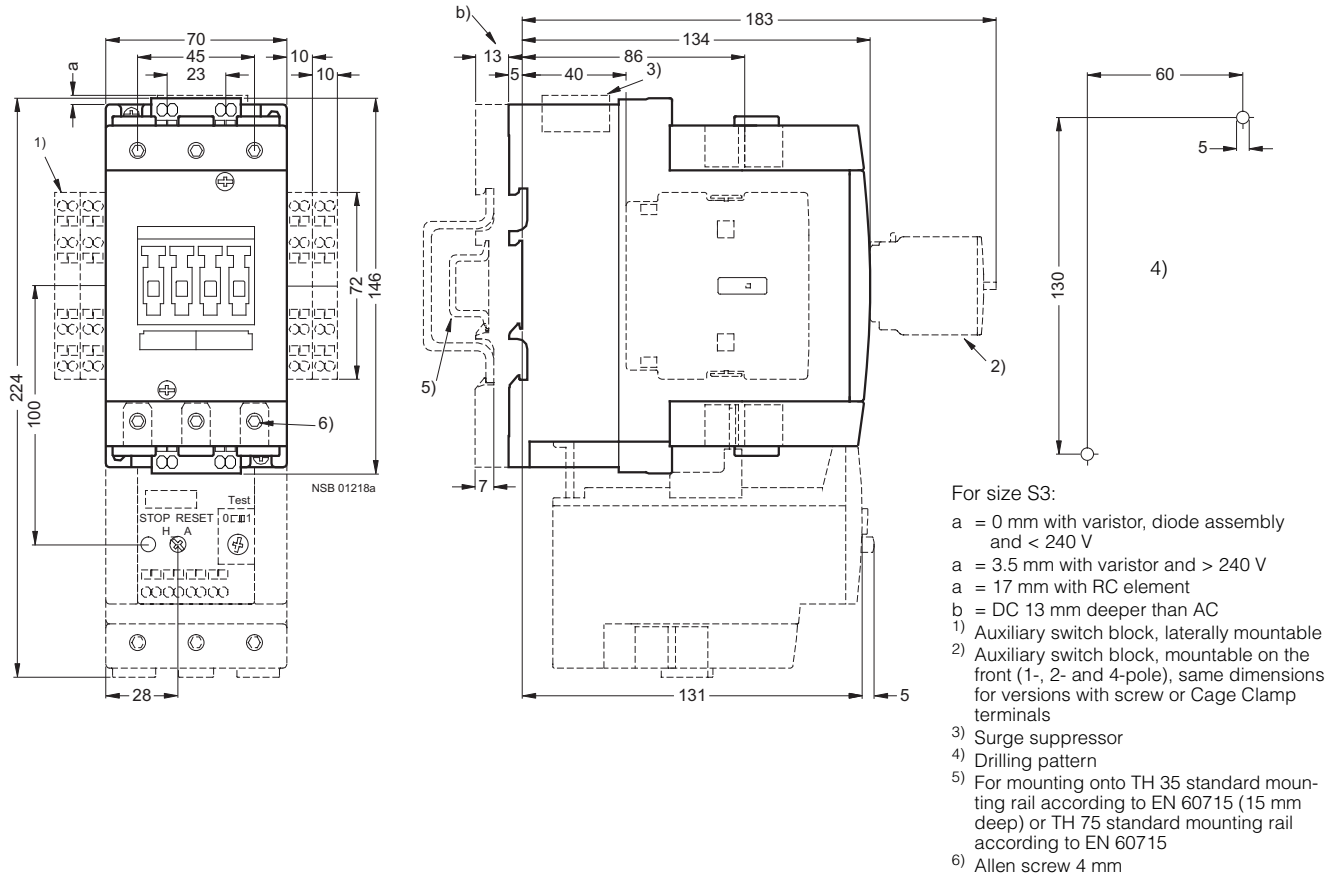
# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### 3RT10 contactors, 3-pole

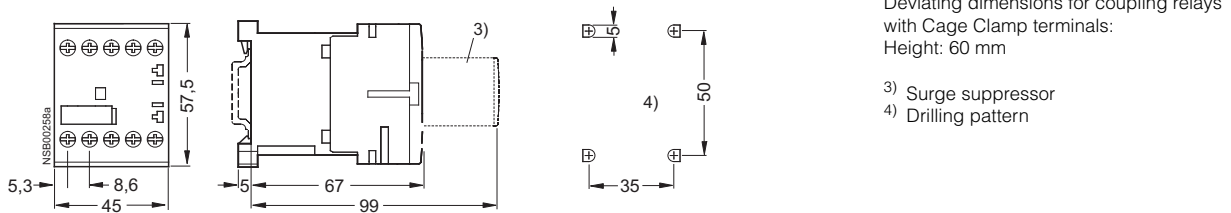
#### 3RT10 4 contactors, size S3

Cage Clamp terminals  
with surge suppressor, auxiliary switch blocks and mounted overload relay



#### 3RT10 coupling relays, size S00

with surge suppressor





## 3RT10 and 3RT14 contactors, 3-pole

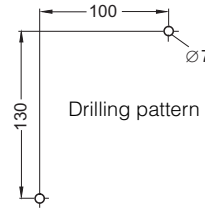
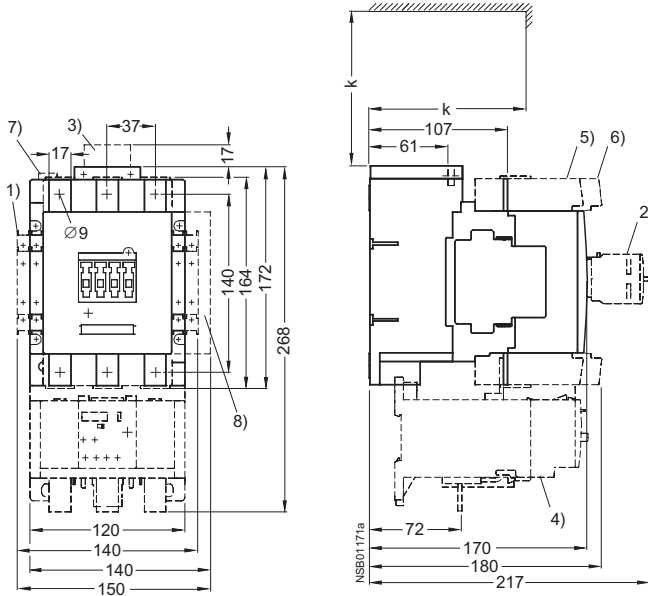
### 3RT10 5, 3RT14 5 contactors, size S6

with lateral and front mounted auxiliary switch block  
 mounted overload relay and box terminals,  
 lateral solid-state module with remaining lifetime indicator

Distance from grounded parts

Lateral: 10 mm

Front: 20 mm



Drilling pattern

For size S6:

k = 120 mm (minimum clearance for removing the withdrawable coil)

- 1) 2nd auxiliary switch block, lateral
- 2) Auxiliary switch block, mountable on the front
- 3) RC element
- 4) 3RB20 overload relay, mounted
- 5) 3RT19 55-4G box terminal block (Allen screw 4 mm)
- 6) 3RT19 56-4G box terminal block (Allen screw 4 mm)
- 7) PLC connection 24 V DC and changeover switch (for 3RT1...-N)
- 8) Solid-state module with remaining lifetime indicator (auxiliary switch block not mountable on right-hand side)

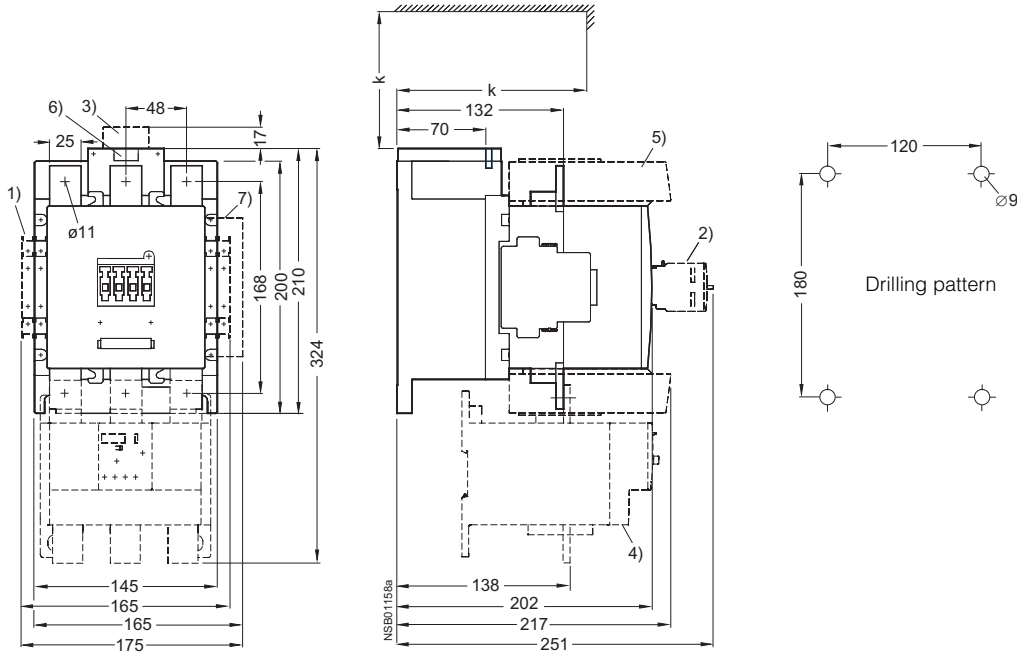
# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### 3RT10 and 3RT14 contactors, 3-pole

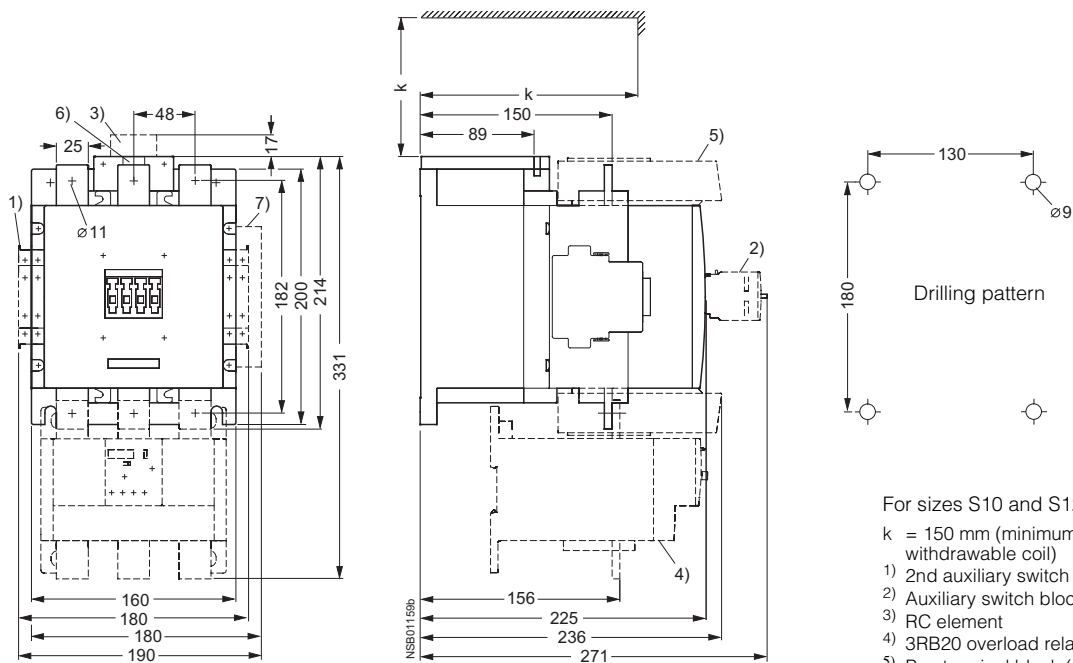
#### 3RT10 6, 3RT14 6 contactors, size S10

with lateral and front mounted auxiliary switch block  
mounted overload relay and box terminals,  
lateral solid-state module with remaining lifetime indicator



#### 3RT10 7, 3RT14 7 contactors, size S12

with lateral and front mounted auxiliary switch block  
mounted overload relay and box terminals,  
lateral solid-state module with remaining lifetime indicator



For sizes S10 and S12:  
Distance from grounded parts  
Lateral: 10 mm  
Front: 20 mm

For sizes S10 and S12:

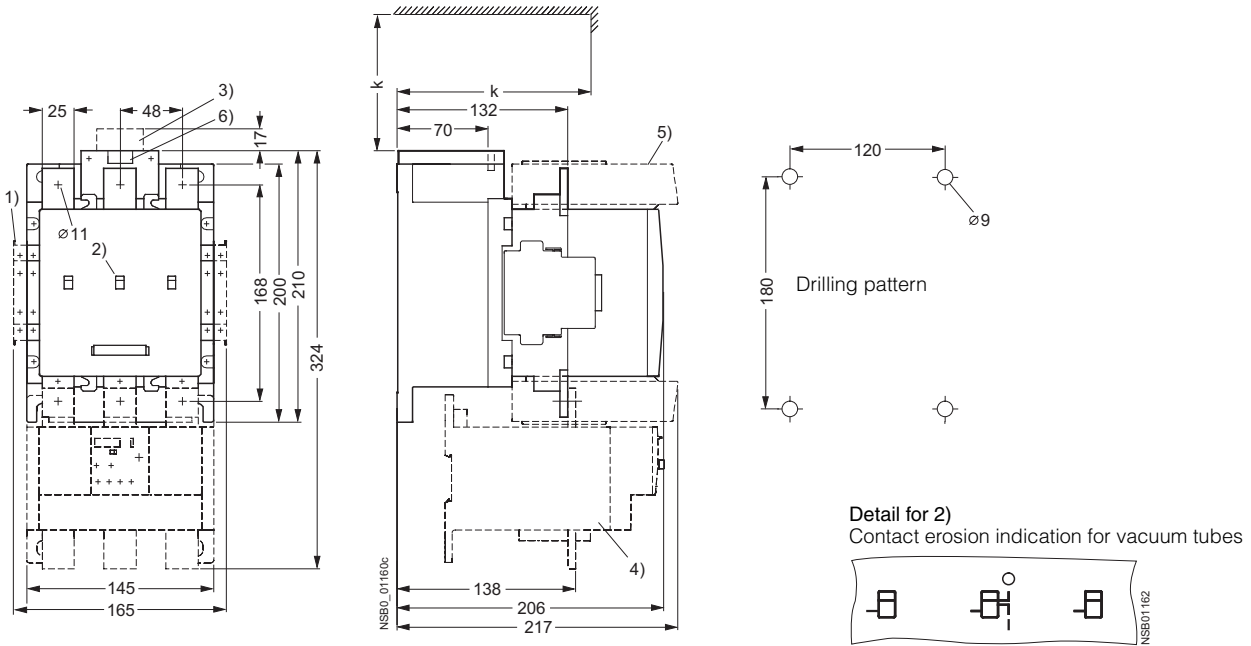
k = 150 mm (minimum clearance for removing the withdrawable coil)

- 1) 2nd auxiliary switch block, lateral
- 2) Auxiliary switch block, mountable on the front
- 3) RC element
- 4) 3RB20 overload relay, mounted
- 5) Box terminal block (Allen screw 6 mm)
- 6) PLC connection 24 V DC and changeover switch (for 3RT1...-N)
- 7) Solid-state module with remaining lifetime indicator (auxiliary switch block not mountable on right-hand side)

## 3RT12 vacuum contactors, 3-pole

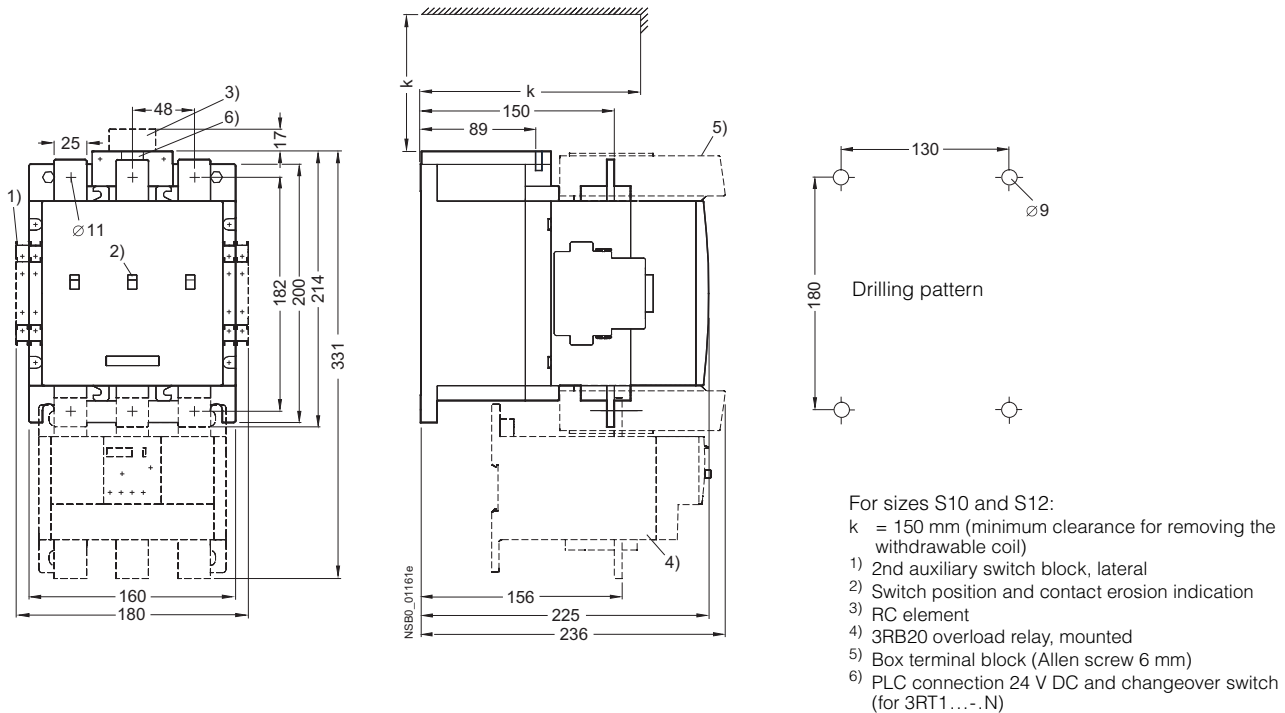
### 3RT12 6 vacuum contactors, size S10

with lateral auxiliary switch block,  
mounted overload relay and box terminals



### 3RT12 7 vacuum contactors, size S12

with lateral auxiliary switch block,  
mounted overload relay and box terminals



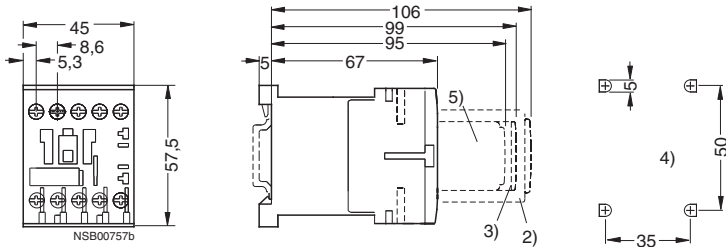
# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### 3RT13 and 3RT15 contactors, 4-pole

#### 3RT13 1 and 3RT15 1 contactors, size S00,

Screw terminals  
with surge suppressor and auxiliary switch block



Lateral distance to grounded components = 6 mm

For size S00:

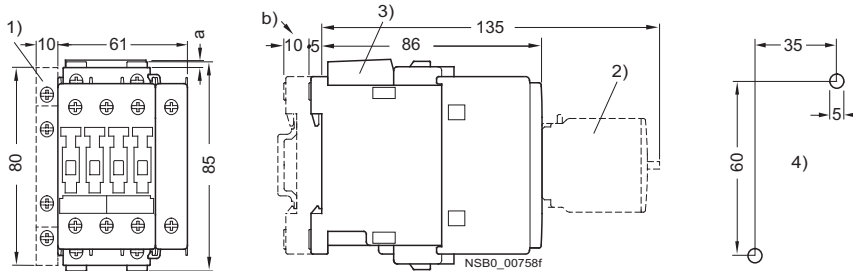
Deviating dimensions for contactors with Cage Clamp terminals:

Height: 60 mm  
Mounting depth with auxiliary switch block: 110 mm

- 2) Auxiliary switch block (also solid-state compatible version 3RH19 11-.N...)
- 3) Surge suppressor (also 3RT19 16-1GA00 additional load module)
- 4) Drilling pattern
- 5) Auxiliary switch block 1-pole

#### 3RT13 2 and 3RT15 2 contactors, size S0

with surge suppressor and auxiliary switch block



For size S0:

a = 3 mm at < 250 V and mounting of surge suppressor

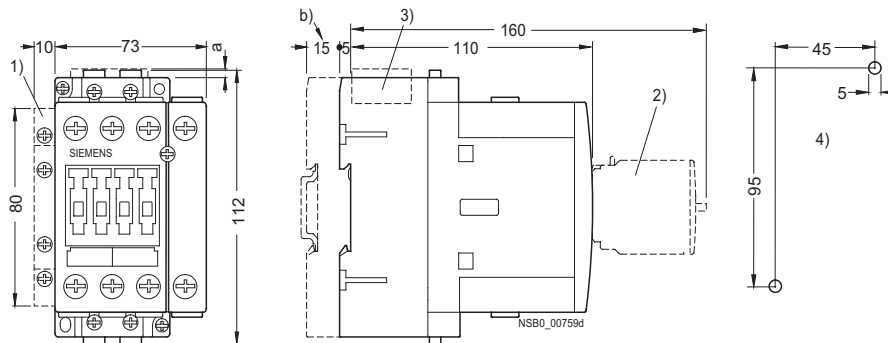
a = 7 mm at > 250 V and mounting of surge suppressor

b = DC 10 mm deeper than AC

- 1) Auxiliary switch block, laterally mountable (left)
- 2) Auxiliary switch block, mountable on the front
- 3) Surge suppressor
- 4) Drilling pattern

#### 3RT13 3 and 3RT15 3 contactors, size S2

with surge suppressor and auxiliary switch block



For sizes S2 and S3:

a = 0 mm with varistor < 240 V

a = 3.5 mm with varistor > 240 V

a = 17 mm with RC element and diode assembly

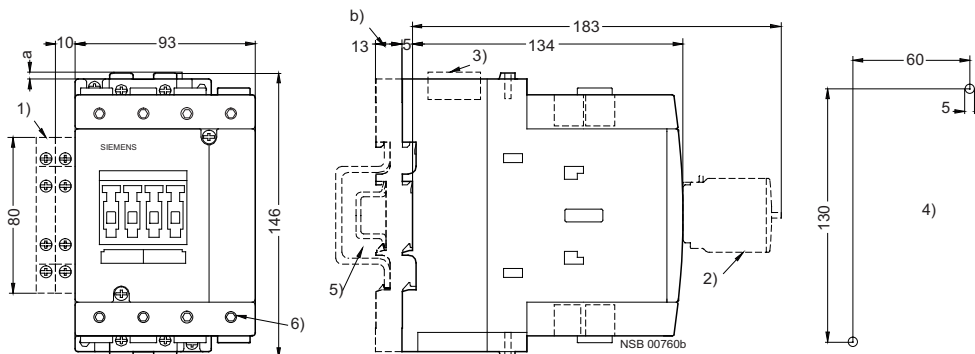
b = S2: DC 15 mm deeper than AC

S3: DC 13 mm deeper than AC

- 1) Auxiliary switch block, laterally mountable (right or left)
- 2) Auxiliary switch block, mountable on the front, (1-, 2- and 4-pole, also 3RH19 21-1FE22 solid-state compatible version)
- 3) Surge suppressor
- 4) Drilling pattern
- 5) For mounting onto TH 35 standard mounting rail according to EN 60715 (15 mm deep) or for size S3 also to TH 75 standard mounting rail according to EN 60715
- 6) Allen screw 4 mm

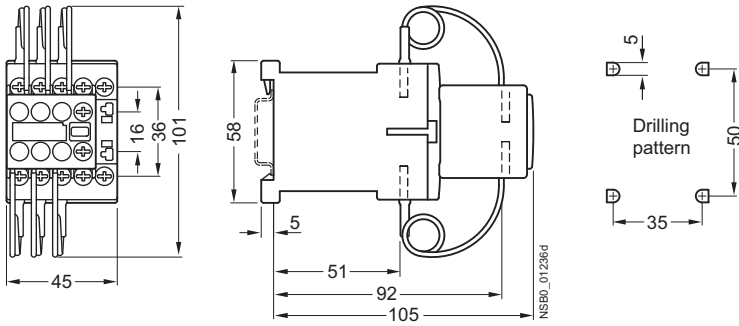
#### 3RT13 4 contactors, size S3

with surge suppressor and auxiliary switch block

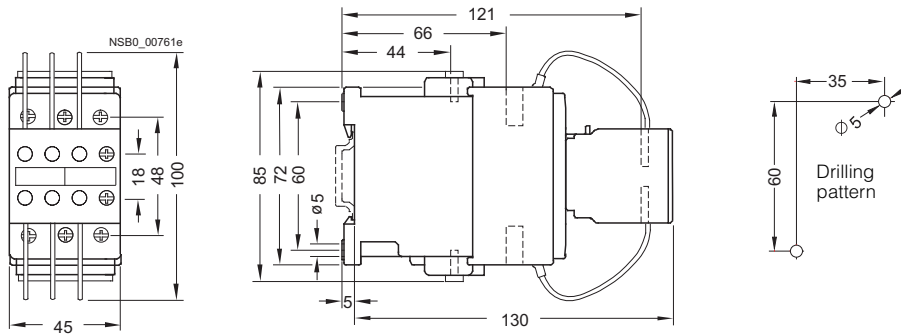


## 3RT16 capacitor contactors

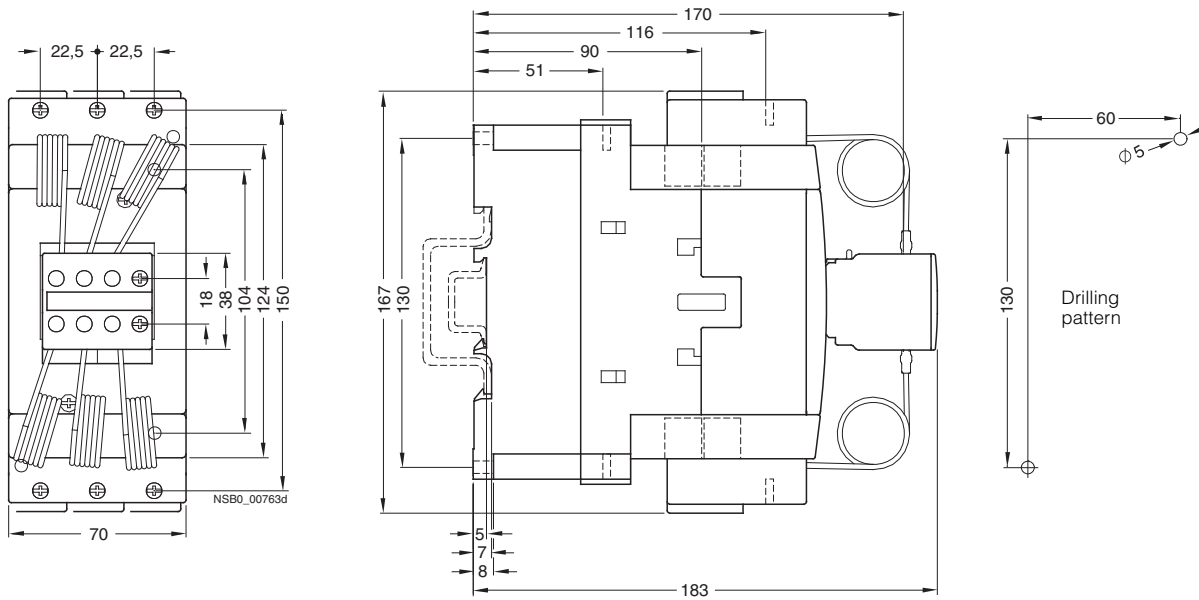
### 3RT16 17 capacitor contactors, size S00



### 3RT16 27 capacitor contactors, size S0



### 3RT16 47 capacitor contactors, size S3

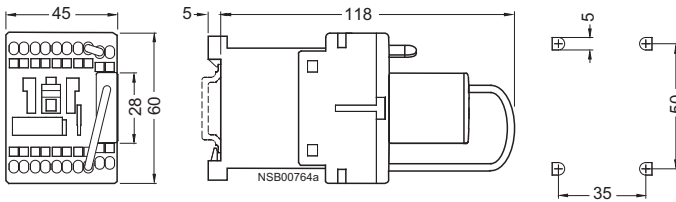


# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### Contactor with extended operating range $0.7$ to $1.25 \times U_s$

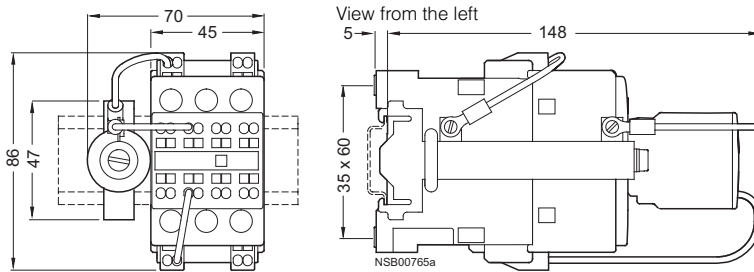
#### Size S00



Without series resistor:  
 3RH11 22-2KB40  
 -2KF40  
 3RT10 17-2KB41  
 -2KF41  
 -2KB42  
 -2KF42

For dimensions see page 179 (size S00)

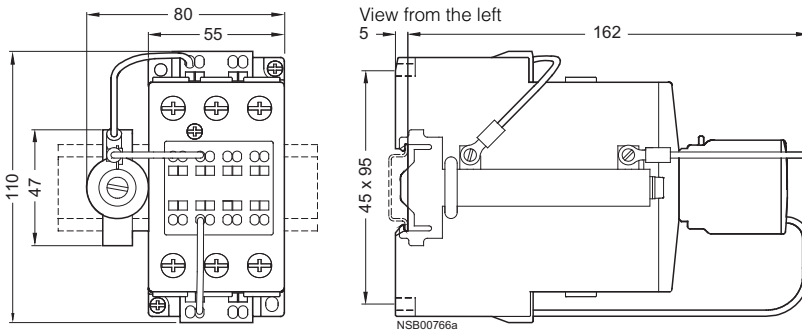
#### Size S0<sup>1)</sup>



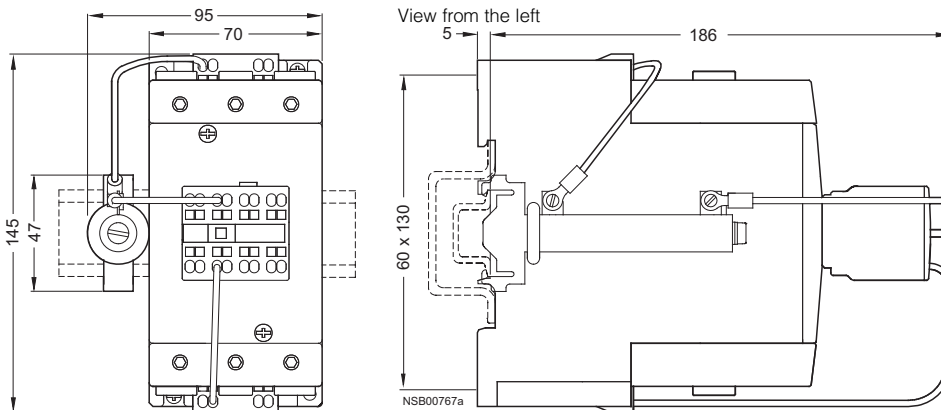
Without series resistor:  
 3RT10 25-3KB40  
 -3KF40  
 3RT10 26-3KB40  
 -3KF40

For dimensions see page 180 (size S0)

#### Size S2<sup>1)</sup>



#### Size S3<sup>1)</sup>

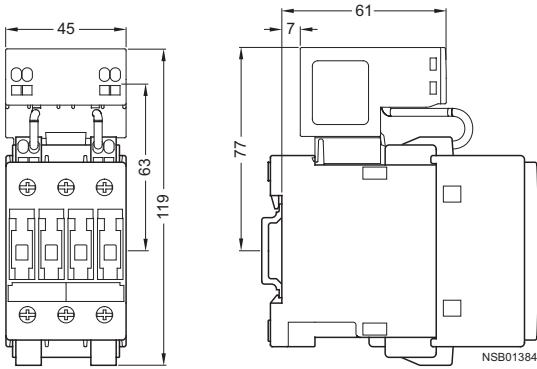


1) Sizes S0 to S3: Contactor series resistor must be connected by customer.  
 The series resistor is equipped with the necessary connecting cables.

*Contactors with extended operating range 0.7 to 1.25 x U<sub>s</sub>*

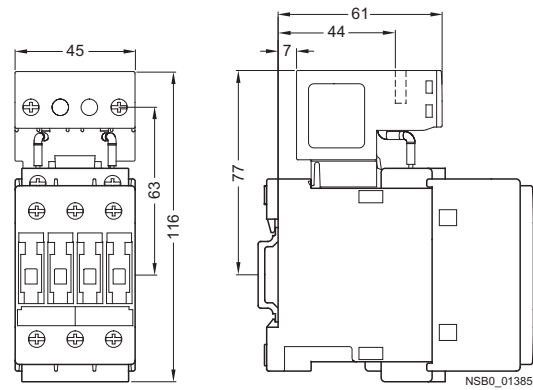
**3RT10 2 . -3X . 40-0LA2 contactors, size S0**

Cage Clamp terminals



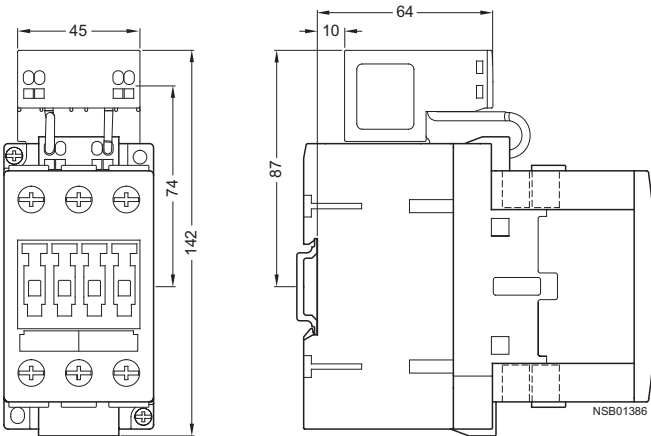
**3RT10 2 . -1X . 40-0LA2 contactors, size S0**

Screw terminals



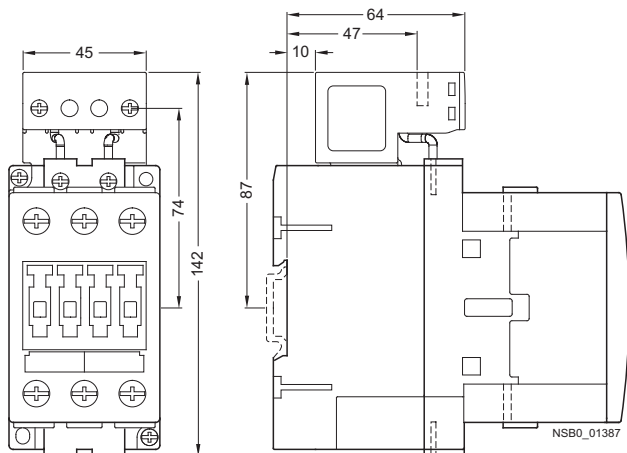
**3RT10 3 .-3X.40-0LA2 contactors, size S2**

Cage Clamp terminals



**3RT10 3 .-1X.40-0LA2 contactors, size S2**

Screw terminals



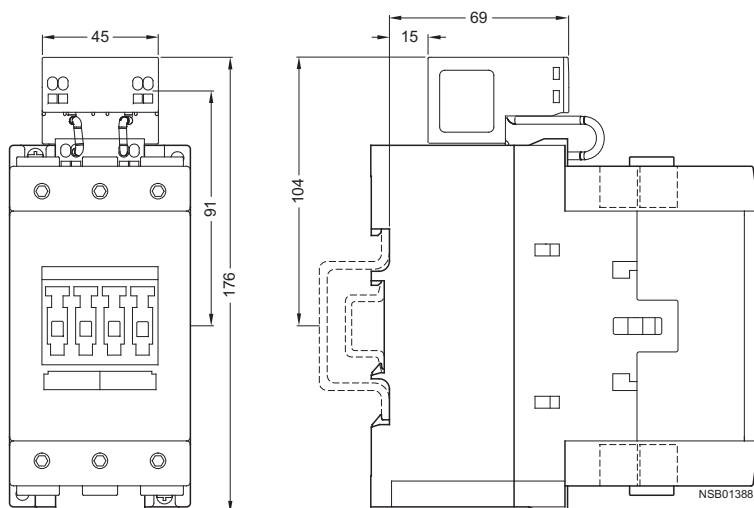
All dimensions not mentioned are identical to those of the contactors with DC operation (see page 180 to page 182).

## Project planning aids

*Contactors with extended operating range 0.7 to 1.25 x U<sub>s</sub>*

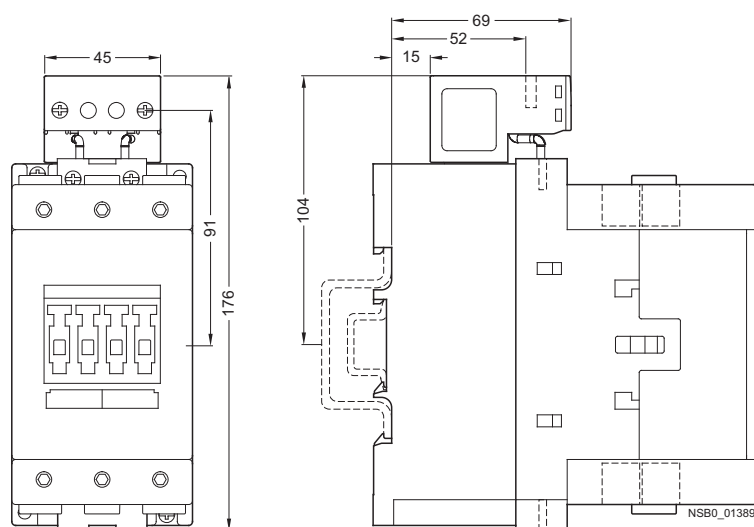
### **3RT10 4.-3X.40-0LA2 contactors, size S3**

Cage Clamp terminals



### **3RT10 4.-1X.40-0LA2 contactors, size S3**

Screw terminals



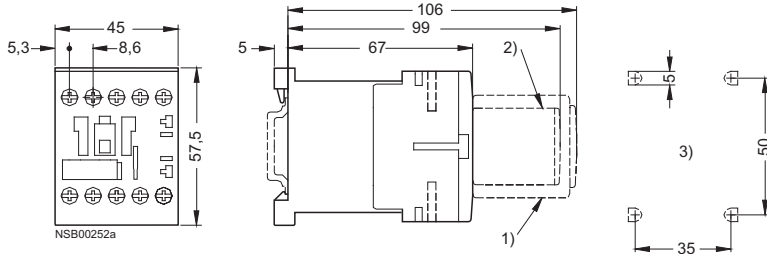
All dimensions not mentioned are identical to those of the contactors with DC operation (see page 180 to 182).



## 3RH11 and 3RH14 contactor relays

### 3RH11 contactor relays, size S00

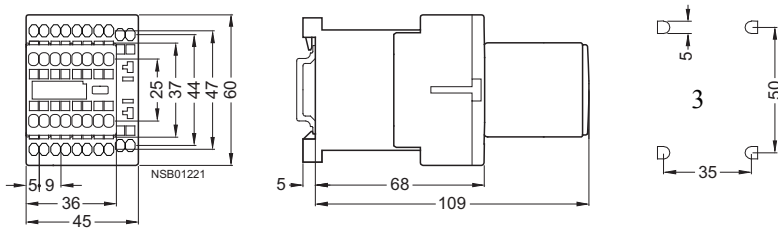
with screw terminals,  
with surge suppressor and auxiliary switch block



Lateral distance to grounded components = 6 mm

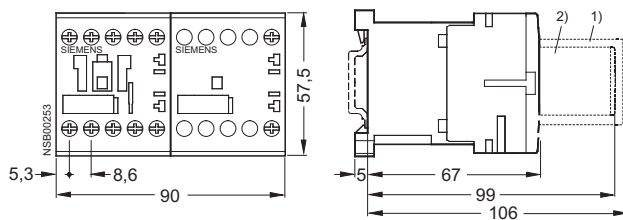
- 1) Auxiliary switch block
- 2) Surge suppressor
- 3) Drilling pattern

with Cage Clamp terminals,  
with auxiliary switch block



### 3RH14 latched contactor relays, size S00

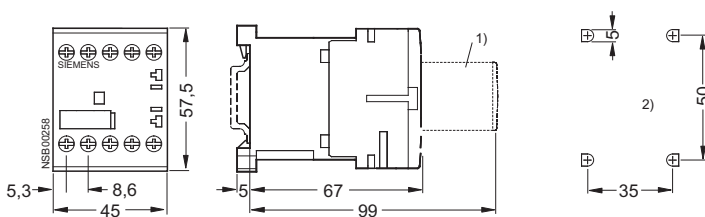
with surge suppressor and auxiliary switch block



## 3RH11 coupling relays

### 3RH11 coupling relays, size S00

with screw terminals,  
with surge suppressor



- 1) Surge suppressor
- 2) Drilling pattern

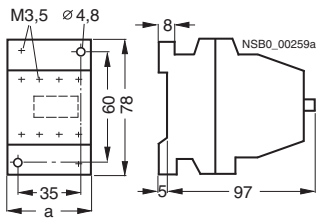
Deviating dimensions for coupling relays  
with Cage Clamp terminals:  
Height: 60 mm

# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

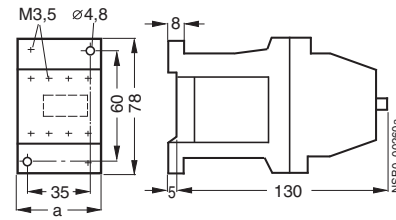
### 3TH42/3TH43

AC operation



Contactor a type	
3TH42	45
3TH43	55

DC operation

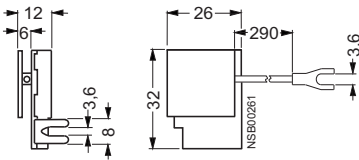


Contactor a type	
3TH42	45
3TH43	55

### Accessories for 3TH42/3TH43 contactor relays

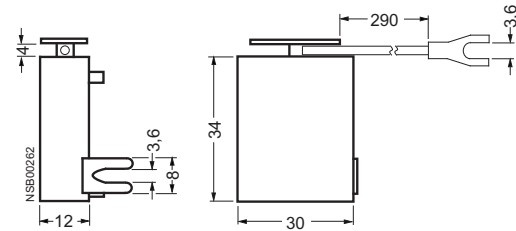
**3TX7 402-3 varistors,**  
**3TX7 402-3A noise suppression diode,**  
**3TX7 402-3D diode assemblies**

(for DC operation) for 3TH42/3TH43 contactor relays for mounting onto the coil terminals



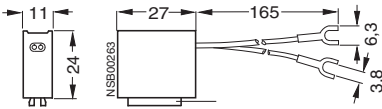
### 3TX7 402-3 RC elements

for 3TH42/3TH43 contactor relays for mounting onto the coil terminals



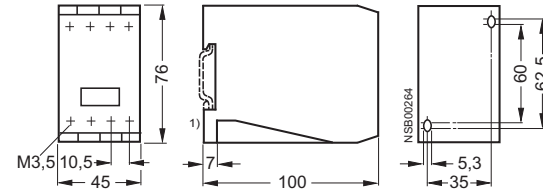
### 3TX4 180-0A ON-delay devices

for 3TH42/3TH43 contactor relays



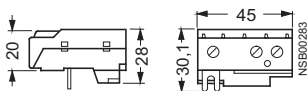
### 3TX4 701 OFF-delay devices

for 3TH42/3TH43 contactor relays



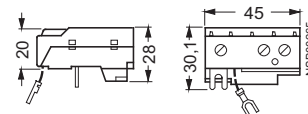
### 3TX4 090-0C coupling link

for mounting onto the contactor coil of 3TH42/3TH43 contactor relays, without surge suppression



### 3TX4 090-0D coupling link

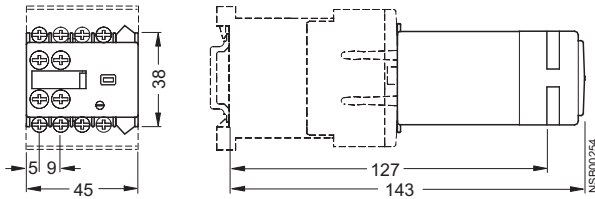
for mounting onto the contactor coil of 3TH42/3TH43 contactor relays with surge suppression



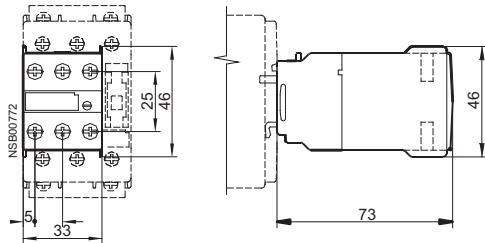
1) For 35 mm standard mounting rail.

## Accessories for 3RT1 contactors

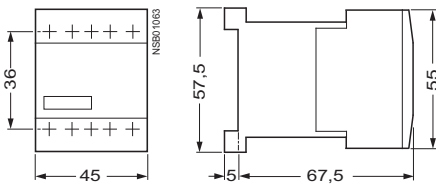
**3RT19 16-2E . . . , 3RT19 16-2F . . . , 3RT19 16-2G . . .**  
solid-state time-delay auxiliary switch blocks  
for contactors, size S00



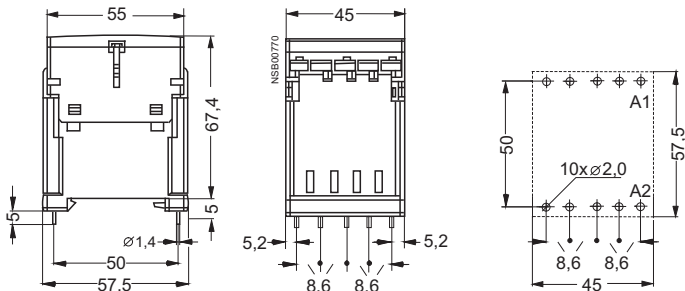
**3RT19 26-2E . . . , 3RT19 26-2F . . . , 3RT19 26-2G . . .**  
solid-state time-delay auxiliary switch blocks  
for contactors, sizes S0 to S3



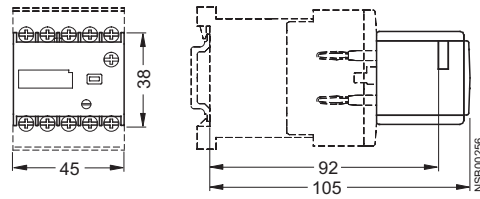
**3RT19 16-2B.01**  
OFF-delay devices  
for contactors, sizes S00 to S3



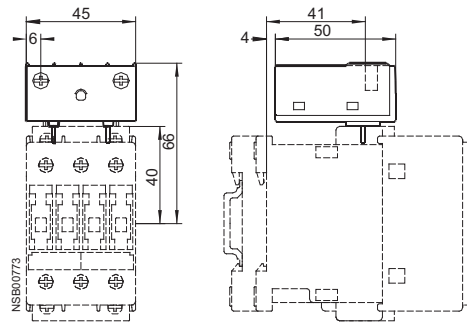
**3RT19 16-4KA1**  
solder pin adapters  
Size S00  
Mounted onto 3RT10 1. contactors with 1 auxiliary contact  
in the basic unit



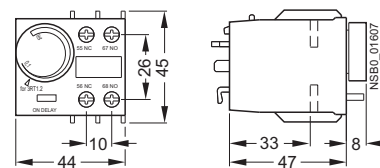
**3RT19 16-2 . . . .**  
solid-state time-delay blocks, with ON-delay  
Size S00  
for mounting onto the front of contactors  
(the dimensions are also valid for time-delay blocks with an  
OFF-delay)



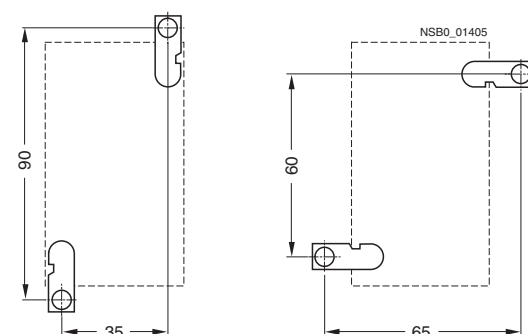
**3RT19 26-2 . . . .**  
solid-state time-delay blocks, with ON-delay  
Sizes S0 to S3  
for mounting onto the top of the contactors  
(the dimensions are also valid for time-delay blocks with an  
OFF-delay and for 3RH19 24-1GP11 coupling links)



**3RT19 26-2P.1**  
pneumatic delay block  
for contactors, size S0  
for mounting onto the front of 3RT1. 2 contactors



**3RT19 26-4P**  
screw adapters  
for contactors of size S0



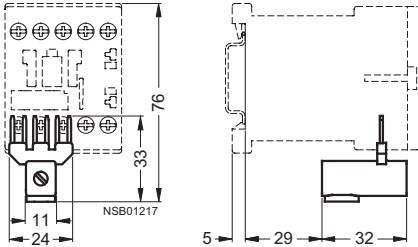
# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### Accessories for 3RT1 contactors

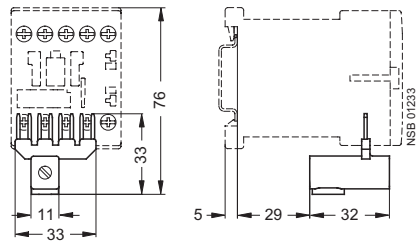
**3RT19 16-4BB31**  
parallel connector  
**Size S00**

3-pole, with terminal



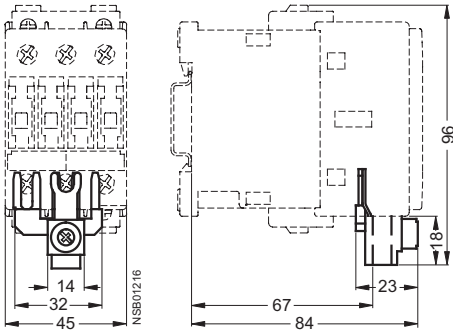
**3RT19 16-4BB41**  
parallel connector  
**Size S00**

4-pole, with terminal



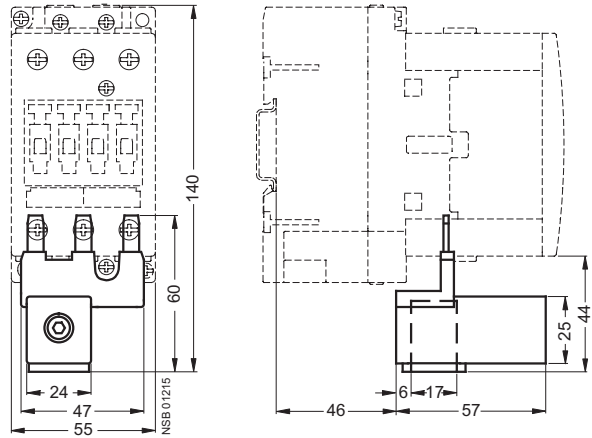
**3RT19 26-4BB31**  
parallel connector  
**Size S0**

3-pole, with terminal



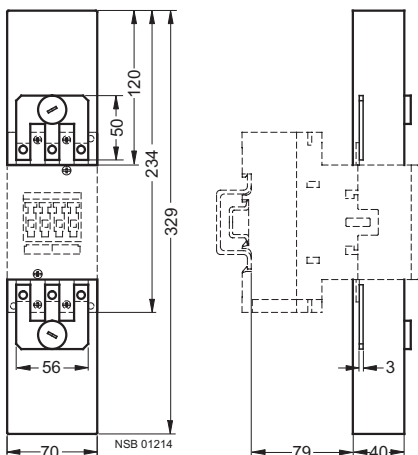
**3RT19 36-4BB31**  
parallel connector  
**Size S2**

3-pole, with terminal

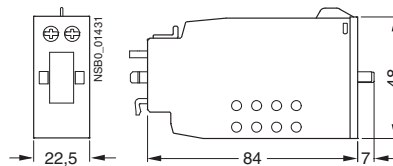


**3RT19 46-4BB31**  
parallel connector  
**Size S3**

3-pole, with through hole and cover for touch protection



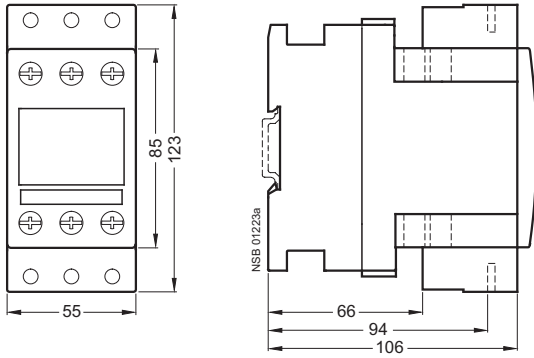
**3RT19 26-3A.**  
mechanical latching block



## Accessories for 3RT1 contactors

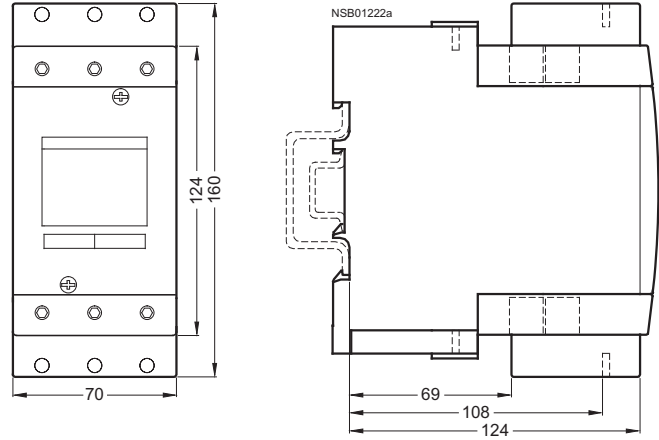
### 3RT19 36-4EA2

terminal cover for box terminals  
for size S2



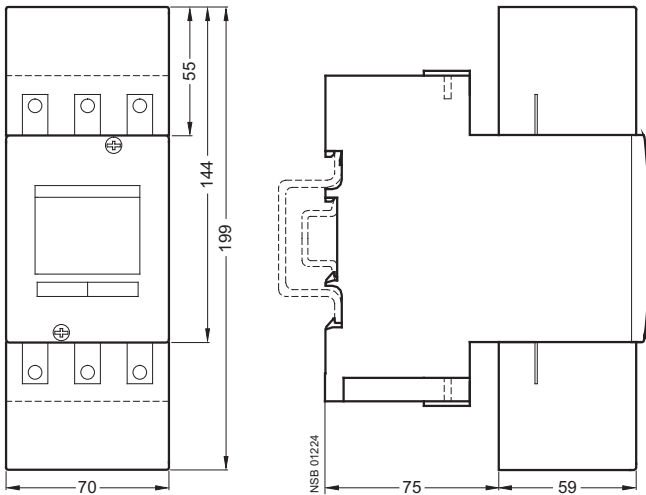
### 3RT19 46-4EA2

terminal cover for box terminals  
for size S3



### 3RT19 46-4EA1

terminal cover for cable lug and busbar connection  
for size S3



## Project planning aids

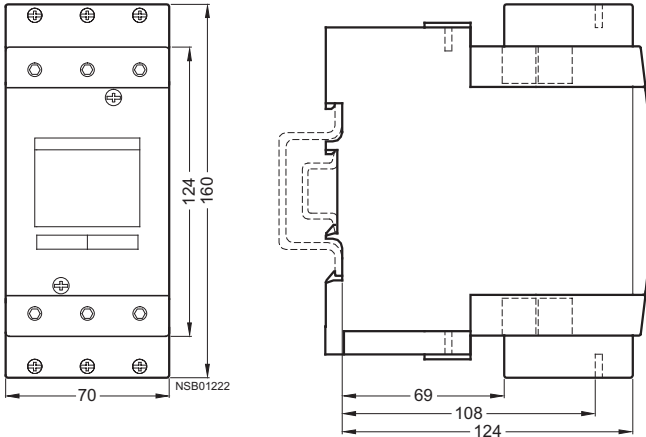
### Accessories for 3RT1 contactors

#### 3RT19 46-4F

auxiliary terminals, 3-pole

#### Size S3

Mounted on contactor



#### 3RH19 11-1AA... 3RH19 11-1LA...

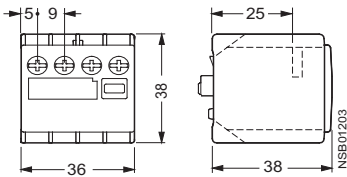
auxiliary switch blocks

#### for size S00

Screw terminals

2-pole

Cable entry from above



#### 3RH19 11-1BA... 3RH19 11-1MA...

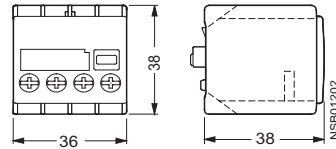
auxiliary switch blocks

#### for size S00

Screw terminals

2-pole

Cable entry from below



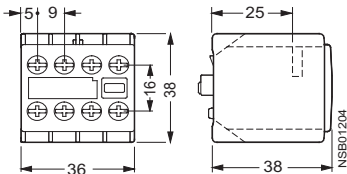
#### 3RH19 11-1F... 3RH19 11-1H...

auxiliary switch blocks according to EN 50012 and EN 50005

#### for size S00

Screw terminals

1- to 4-pole

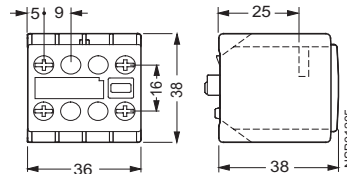


#### 3RH19 11-.NF...

solid-state compatible auxiliary switch blocks according to EN 50005

#### for size S00

Screw terminals <sup>1)</sup>



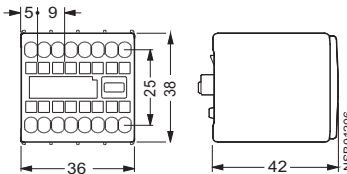
#### 3RH19 11-2F... 3RH19 11-2H...

auxiliary switch blocks according to EN 50005 and EN 50012

#### for size S00

Cage Clamp terminals

1- to 4-pole

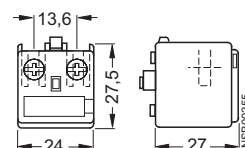


#### 3RH19 11-1AA... 3RH19 11-1BA...

auxiliary switch blocks, 1-pole

#### for size S00

Cable entry from one side

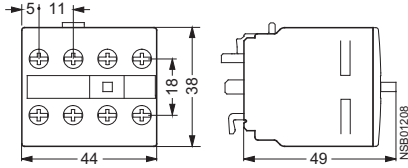


1) Deviating dimension for auxiliary switch block with Cage Clamp terminals: mounting depth 42 mm.

## Accessories for 3RT1 contactors

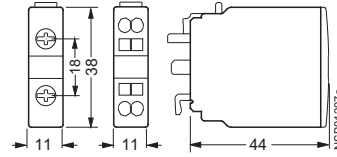
**3RH19 21- HA ... 3RH19 21- F ...**  
 auxiliary switch blocks according to EN 50005 and EN 50012  
**for sizes S0 to S12**

Screw and Cage Clamp terminals  
 4-pole



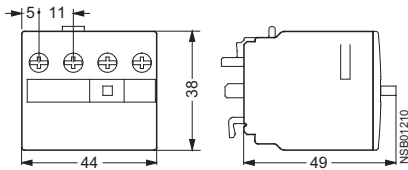
**3RH19 21- C ...**  
 auxiliary switch block according to EN 50005 and EN 50012  
**for sizes S0 to S12**

Screw and Cage Clamp terminals  
 1-pole



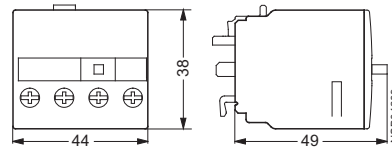
**3RH19 21-1LA ...**  
 auxiliary switch block according to EN 50005  
**for sizes S0 to S12**

Screw terminals  
 2-pole  
 Cable entry from above



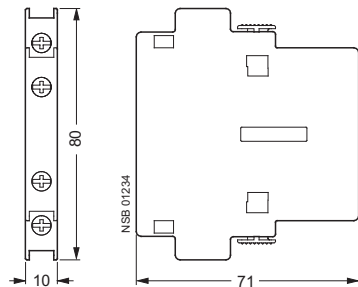
**3RH19 21-1MA ...**  
 auxiliary switch block according to EN 50005  
**for sizes S0 to S12**

Screw terminals  
 2-pole  
 Cable entry from below



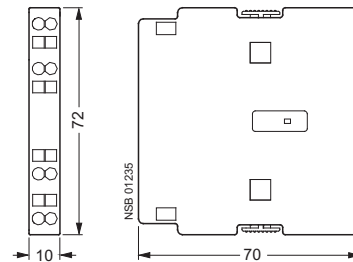
**3RH19 21-1D ... 3RH19 21-1J ... 3RH19 21-1E ... 3RH19 21-1K ...**  
 auxiliary switch blocks, for lateral mounting  
**for sizes S0 to S12**

Screw terminals  
 2-pole

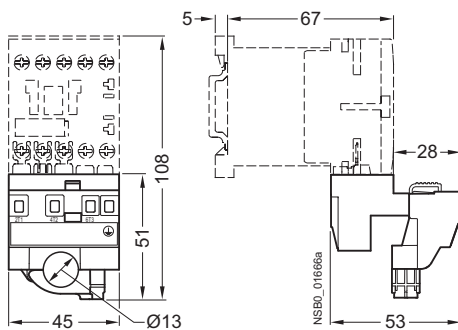


**3RH19 21-2D ... 3RH19 21-2J ... 3RH19 21-2E ... 3RH19 21-2K ...**  
 auxiliary switch blocks, for lateral mounting  
**for sizes S0 to S12**

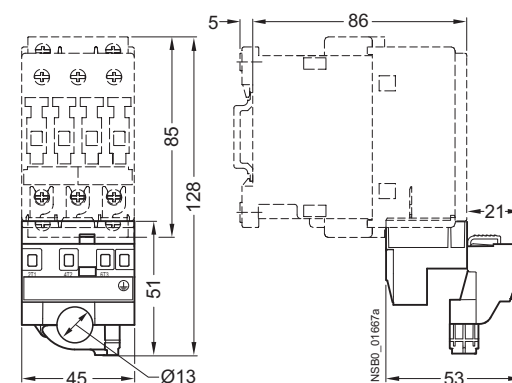
Cage Clamp terminals  
 2-pole



**3RT19 00-4RE01 and 3RT19 16-4RD01**  
 connection modules for contactors with screw terminals  
**size S00**



**3RT19 00-4RE01 and 3RT19 26-4RD01**  
 connection modules for contactors with screw terminals  
**size S0**



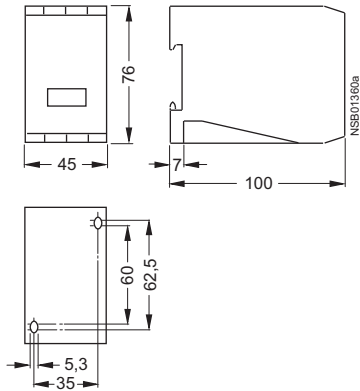
## Project planning aids

### Accessories for 3RT1 contactors

#### 3RT19 66-1PV3

main current path surge suppression module  
for 3RT12 vacuum contactors, sizes S10 and S12

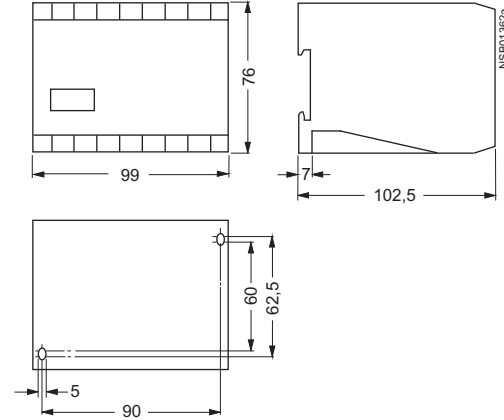
Connected to outgoing side of contactor (2-T1/4-T2/6-T3)  
using approx. 350 mm long, molded cable



#### 3RT19 66-1PV4

main current path surge suppression module  
for 3RT12 vacuum contactors, sizes S10 and S12

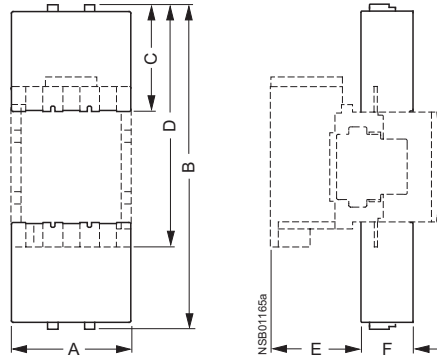
Connected to outgoing side of contactor (2-T1/4-T2/6-T3)  
using approx. 350 mm long, molded cable



#### 3RT19 .6-4EA1

terminal covers for busbar connections  
Sizes S6 to S12

for mounting onto the contactor enclosure

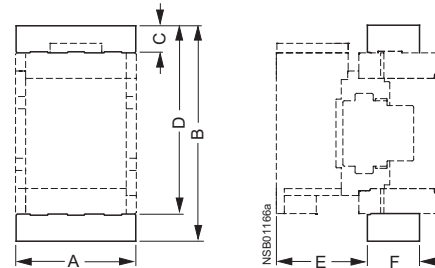


	A	B	C	D	E	F
<b>S6</b>	119	324	107	241	91	52
<b>S10</b>	145	385	128	289	106	66
<b>S12</b>	145	399	128	303	124	66

#### 3RT19 .6-4EA2

terminal covers for box terminals  
Sizes S6 to S12

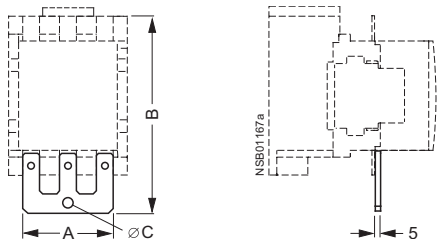
for mounting onto box terminals



	A	B	C	D	E	F
<b>S6</b>	119	215	27	190	91	52
<b>S10</b>	145	265	30	235	106	66
<b>S12</b>	145	279	30	249	124	66

#### 3RT19 .6-4BA31

links for paralleling  
sizes S6 to S12

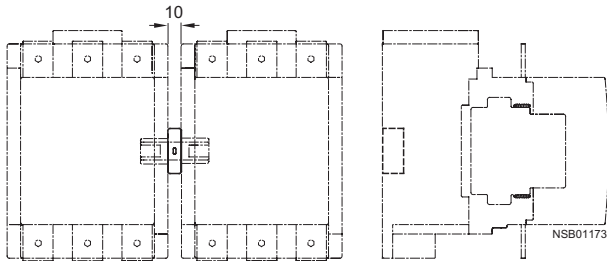


	A	B	ØC
<b>S6</b>	91	199	10.5
<b>S10</b>	121	244	12.5
<b>S12</b>	121	258	12.5

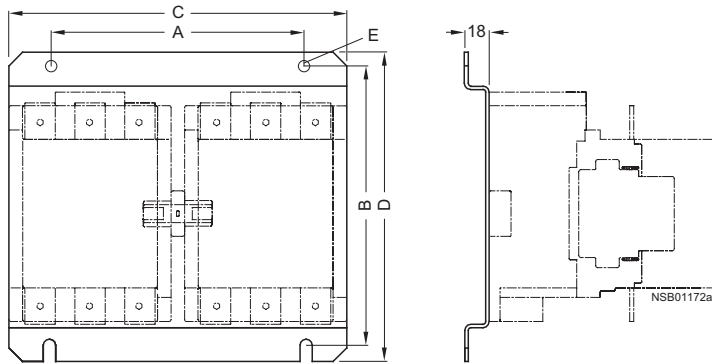


## Accessories for 3RA1 contactor assemblies

**3RA19 54-2A**  
mechanical interlocks  
Sizes S6 to S12

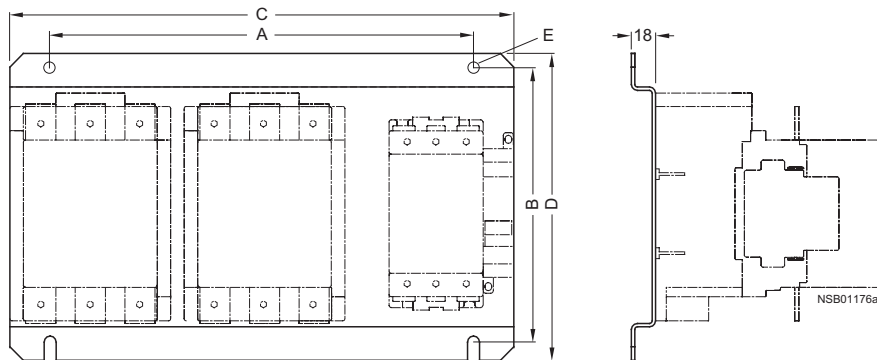


## 3RA19 .2-2A base plates for reversing contactor assemblies



	A	B	C	D	E
<b>S6</b>	190	205	250	229	9
<b>S10</b>	240	249	300	275	11
<b>S12</b>	280	249	330	275	11

## 3RA19 .2-2E, 3RA19 .2-2F base plates for contactor assemblies for wye-delta starting



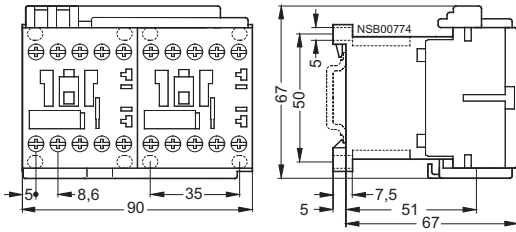
	A	B	C	D	E
<b>S6-S6-S3</b>	316	205	376	229	9
<b>S6-S6-S6</b>	343	205	403	229	9
<b>S10-S10-S6</b>	393	250	453	275	11
<b>S10-S10-S10</b>	423	250	483	275	11
<b>S12-S12-S10</b>	450	250	510	275	11
<b>S12-S12-S12</b>	465	250	525	275	11

# Switching Devices – Contactors and Contactor Assemblies

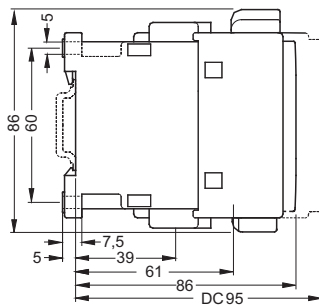
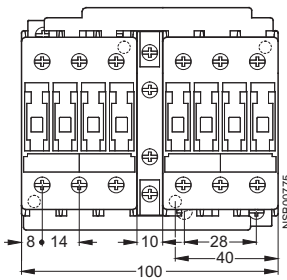
## Project planning aids

### 3RA13 reversing contactor assemblies

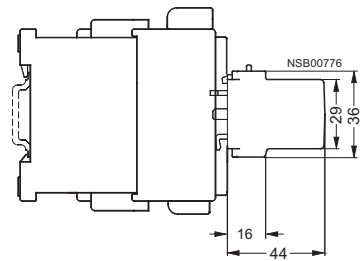
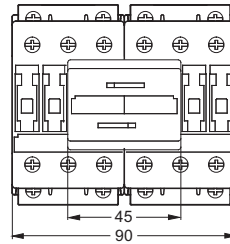
#### Size S00



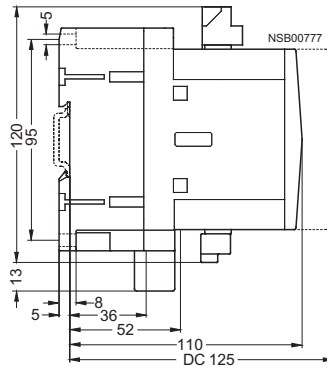
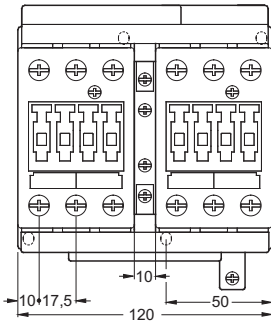
#### Size S0 with 3RA19 24-2B mechanical interlocking Lateral



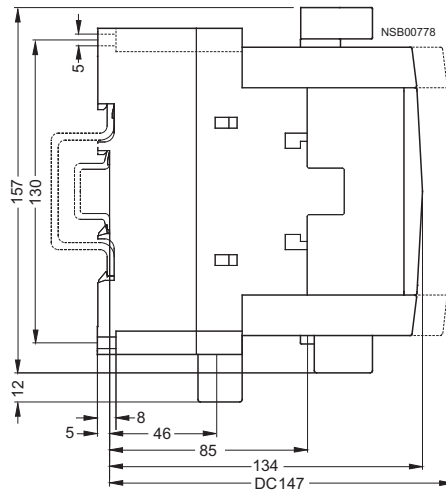
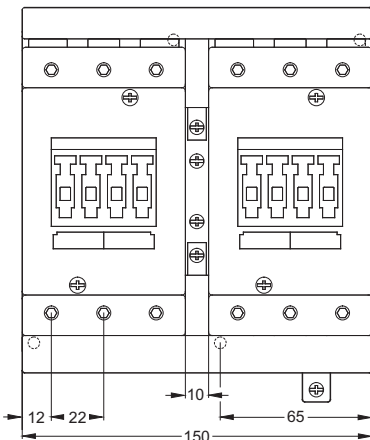
#### with 3RA19 24-1A mechanical interlocking On front



#### Size S2

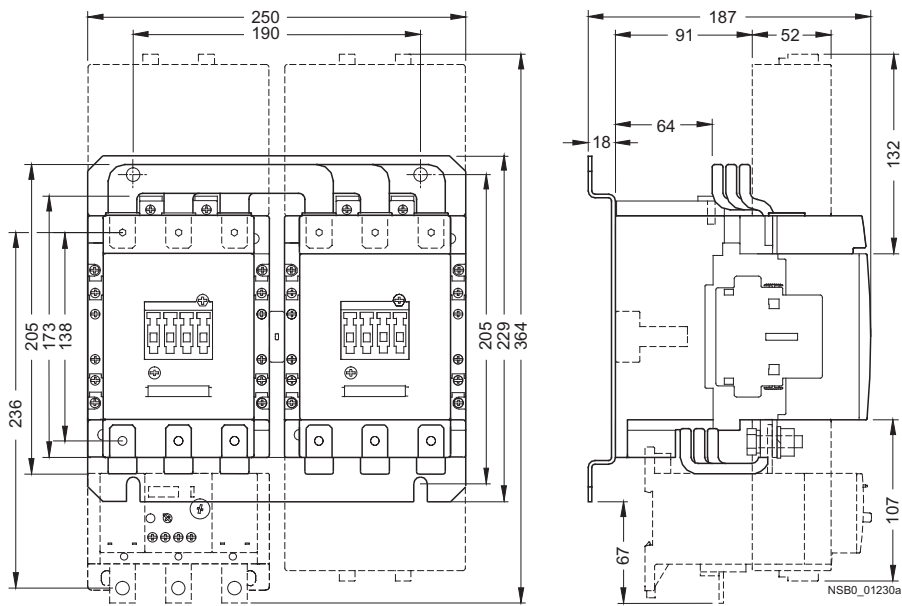


#### Size S3

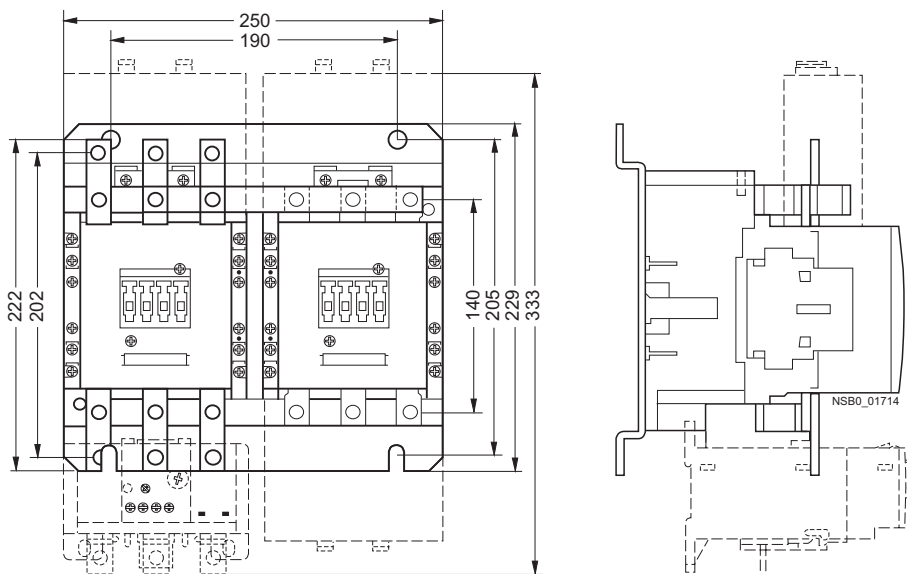


## 3RA13 reversing contactor assemblies

### Size S6 with 3RA19 53-2A wiring module



### Size S6 with 3RA19 53-2M wiring module

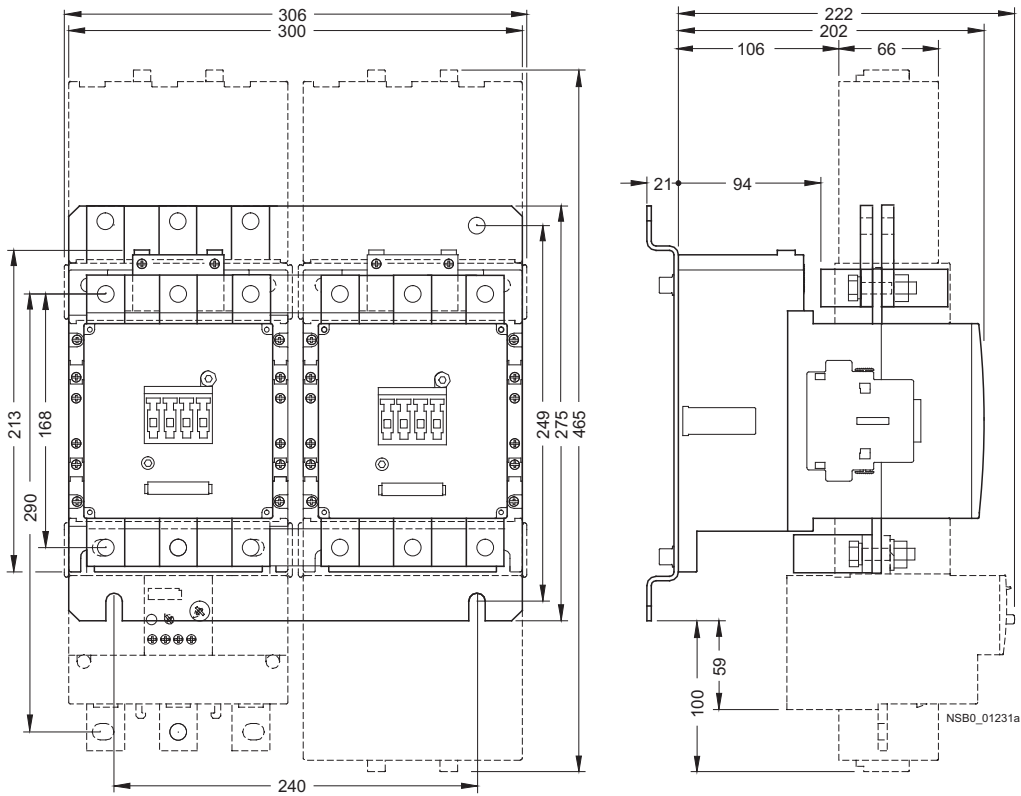


# Switching Devices – Contactors and Contactor Assemblies

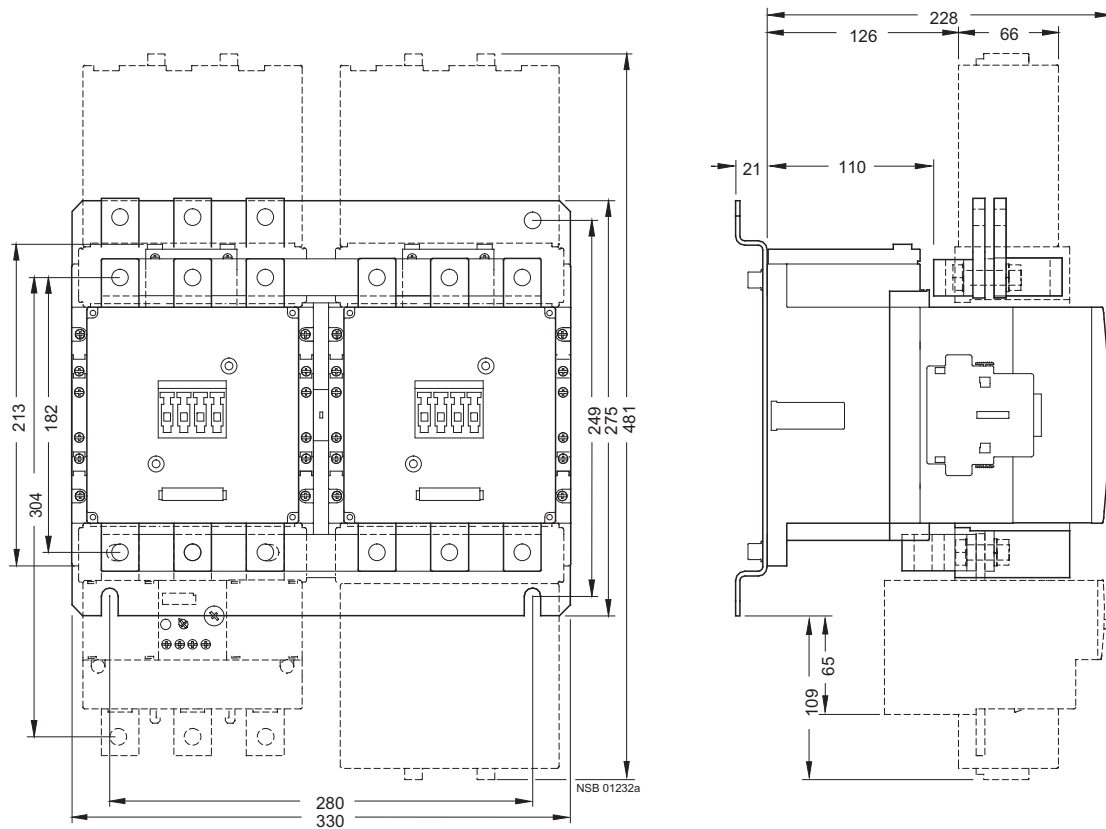
## Project planning aids

### 3RA13 reversing contactor assemblies

#### Size S10

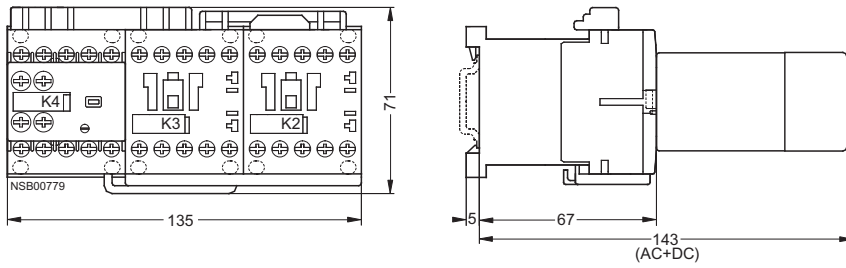


#### Size S12

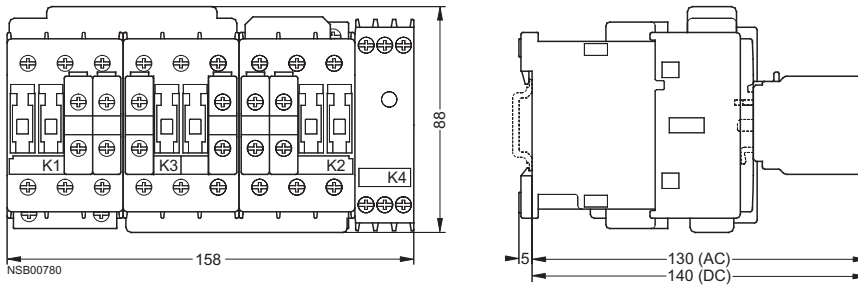


## 3RA14 contactor assemblies for wye-delta starting

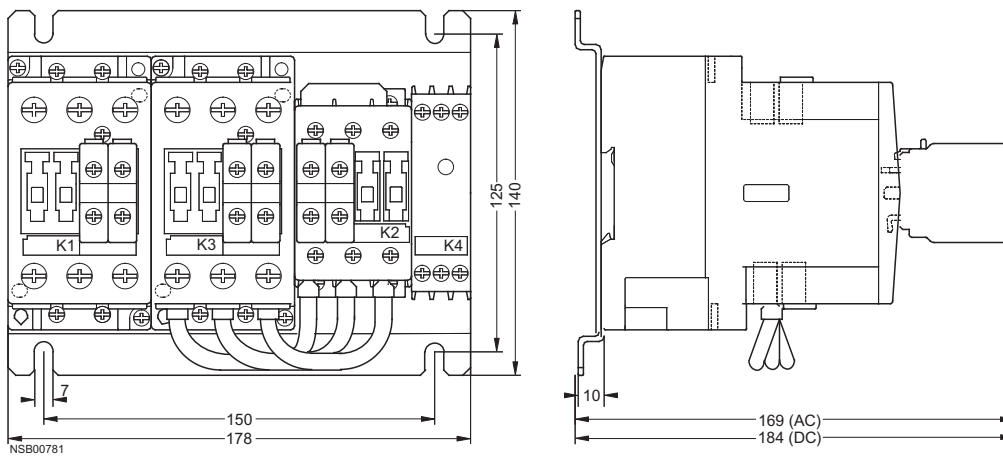
### Sizes S00 – S00 – S00



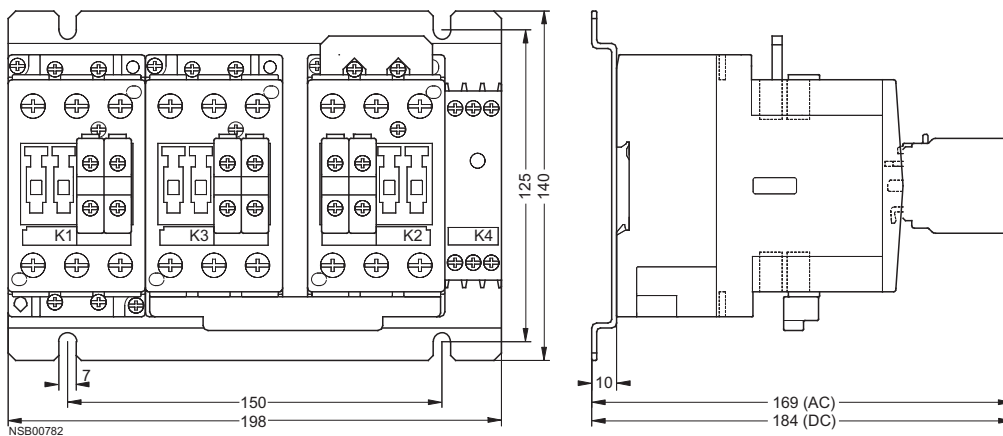
### Sizes S0 – S0 – S0



### Sizes S2 – S2 – S0



### Sizes S2 – S2 – S2

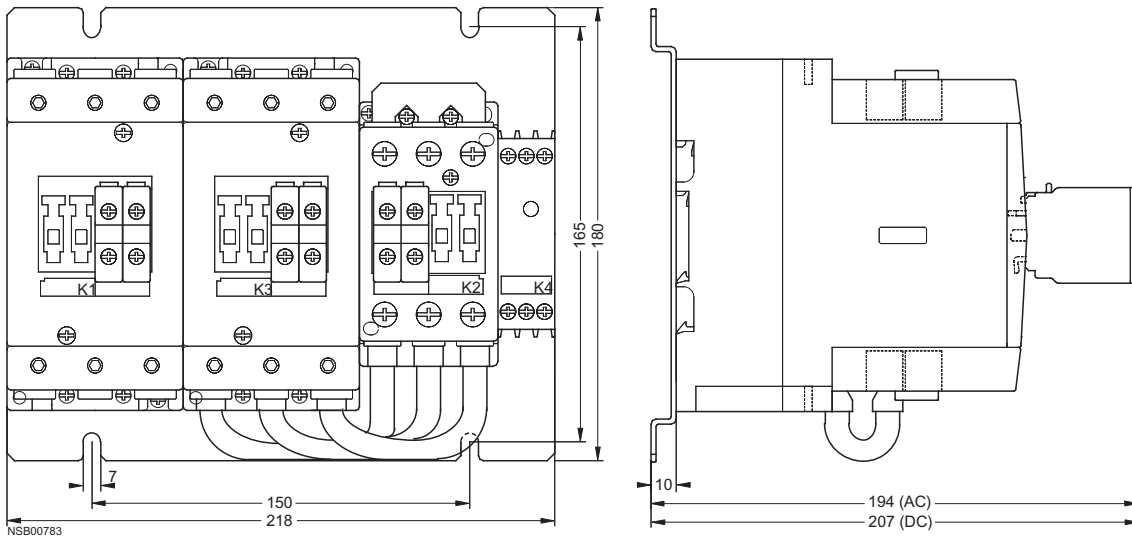


# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

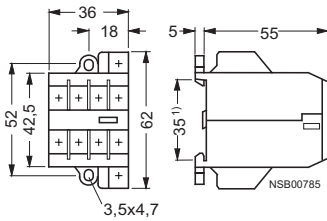
### 3RA14 contactor assemblies for wye-delta starting

Sizes S3 – S3 – S2

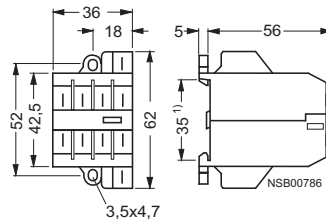


### 3TG10 miniature contactors

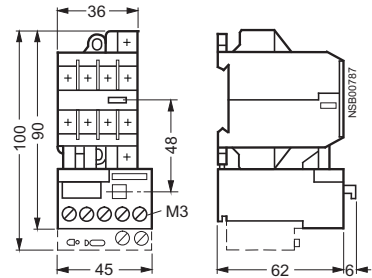
**3TG10 ..-0..contactors**  
with screw terminals



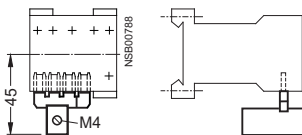
**3TG10 ..-1..contactors**  
with tab connectors



**3TG10 contactors**  
with 3UA7 overload relays



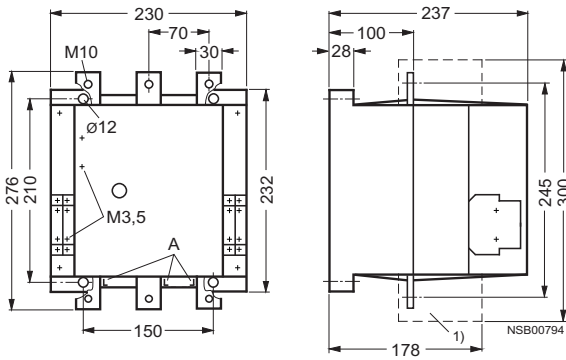
**3RT19 16-4BB41** links for paralleling, 4-pole, with terminal  
for **3TG10** contactors



The links for paralleling can be reduced by one pole.  
1) Can be snapped onto 35 mm standard mounting rail.

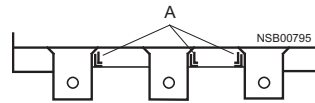
## 3TF68 and 3TF69 vacuum contactors, 3-pole

### 3TF68 vacuum contactors

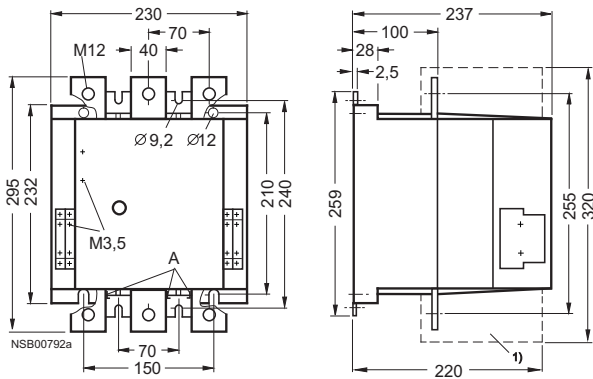


Detail

A = Contact erosion indication for vacuum interrupter contacts

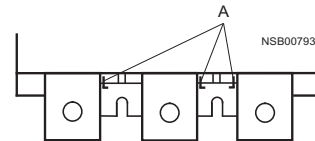


### 3TF69 vacuum contactors



Detail

A = Contact erosion indication for vacuum interrupter contacts



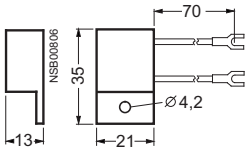
1) With box terminals for laminated copper bars (accessories).

# Switching Devices – Contactors and Contactor Assemblies

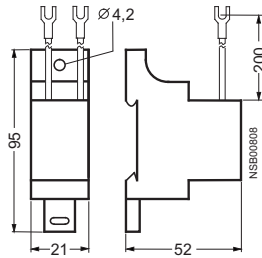
## Project planning aids

### Accessories for 3T contactors

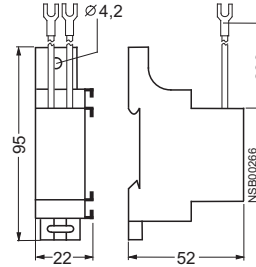
#### 3TX7 462-3. varistors



#### 3TX7 462-3., 3TX7 522-3., 3TX7 572-3. RC elements and varistors

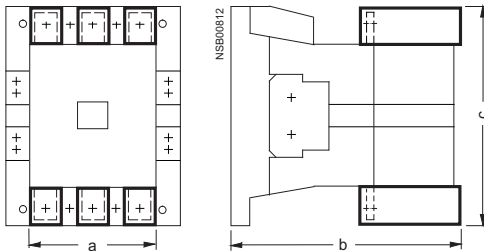


#### 3TX7 090-0D coupling link for laterally snapping onto contactors



#### 3TX7 box terminals for laminated copper bars

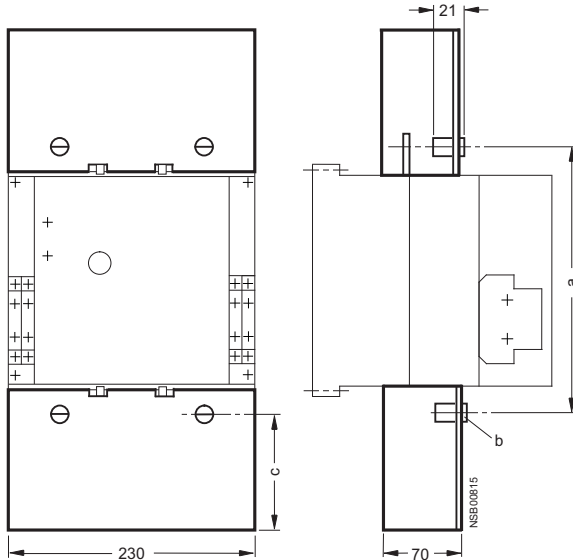
Box terminals with cover, mounted to contactor



For contactor type	Box terminals	a	b	c
3TF68	3TX7 570-1.	182	178	300
3TF69	3TX7 690-1F	200	219	320

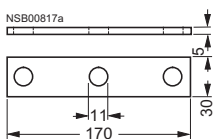
#### 3TX7 686-0A and 3TX7 696-0A terminal covers For 3TF68 and 3TF69 contactors, size 14,

for screwing onto free screw end of the two outer conducting paths



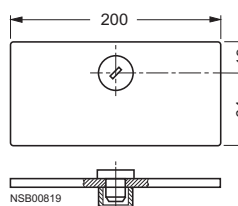
For contactor type	Terminal covers	a	b	c
3TF68	3TX7 686-0A	245	M10	104
3TF69	3TX7 696-0A	255	M12	99

#### 3TX7 680-0D link for paralleling for 3TF68 contactors



#### 3TX7 680-0E cover plate

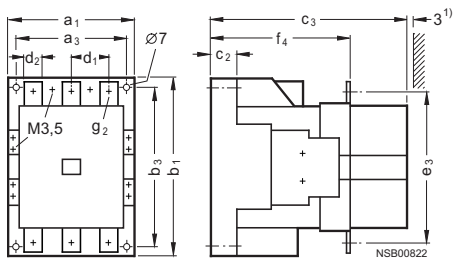
for 3TX7 680-0D link for paralleling for 3TF68 contactor





## 3TB5 contactors

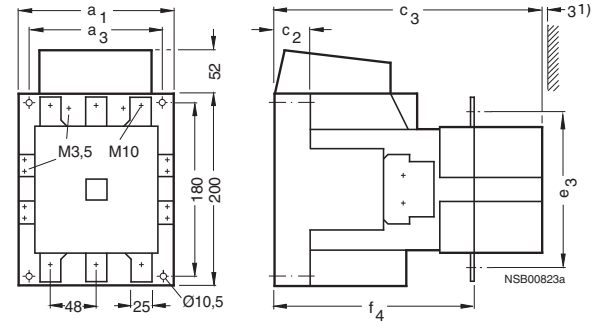
### 3TB50 and 3TB52 contactors Sizes 6 and 8



Type	a <sub>1</sub>	a <sub>3</sub>	b <sub>1</sub>	b <sub>3</sub>	c <sub>2</sub>	c <sub>3</sub>	d <sub>1</sub>	d <sub>2</sub>	e <sub>3</sub>	f <sub>4</sub>	g <sub>2</sub>
3TB50	120	100	150	130	23	198	37	15	133	137.5	M6
3TB52	135	110	180	160	28	217	42	20	154	147	M8

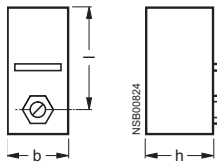
1) Minimum clearance from insulated components 3 mm.  
Minimum clearance from grounded components 10 mm.

### 3TB54 and 3TB56 contactors Sizes 10 and 12



Type	a <sub>1</sub>	a <sub>3</sub>	c <sub>2</sub>	c <sub>3</sub>	e <sub>3</sub>	f <sub>4</sub>
3TB54	145	120	30.5	264	168	188
3TB56	160	130	39	282	178	200

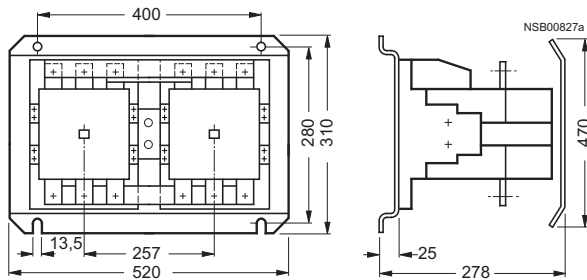
## 3TX6 .. 6-3B terminal covers



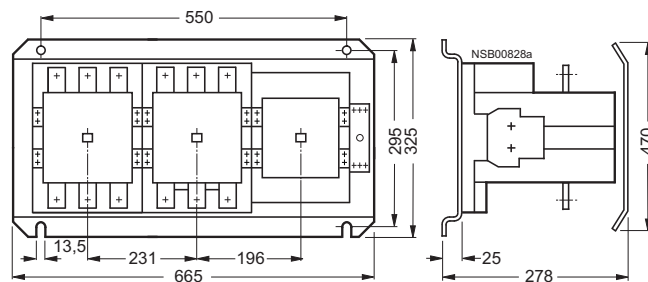
For contactors				
Size	Type	b	h	l
6	3TB50	27	33	58
8	3TB52	34	44	75
10 to 12	3TB54 to 3TB56	38	56	95

## 3TD68, 3TE68 contactor assemblies

### 3TD68 contactor assemblies



### 3TE68 contactor assemblies



# Switching Devices – Contactors and Contactor Assemblies

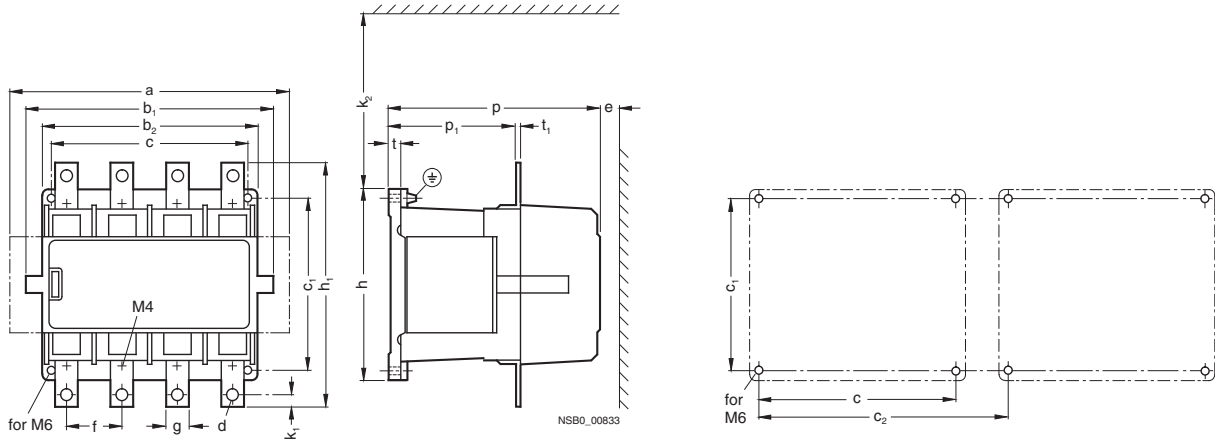
## Project planning aids

### 3TK10 to 3TK17 contactors

#### 3TK10 to 3TK17 contactors

The scope of supply includes screws and rubber buffers.

⊕ M10 grounding screw for 3TK14 to 3TK17



Contactors Type	a	b <sub>1</sub>	b <sub>2</sub>	c	c <sub>1</sub>	c <sub>2</sub> <sup>1)</sup>	c <sub>2</sub> <sup>2)</sup>	d <sup>3)</sup>	e min.	f	g	h	h <sub>1</sub>	k <sub>1</sub>	k <sub>2</sub> <sup>4)</sup>	p	p <sub>1</sub>	t	t <sub>1</sub>
3TK10	186	165	136	120	140	166	187	6.6	40	41	15	156	156	7.5	134	154.5	102.3	10	4
3TK11	186	165	136	120	140	168	187	11	40	42	20	156	172	10	134	154.5	102.3	10	4
3TK12	225	201	176	160	140	202	226	11	15	45	20	156	198	10	134	172	106.7	10	5
3TK13	225	201	176	160	140	202	226	11	15	45	20	156	198	10	134	172	106.7	10	5
3TK14	266	244	244	220	200	271	293	11	40	67	25	223	272	12.5	--	225.5	139.5	23 <sup>5)</sup>	6
3TK15	266	244	244	220	200	271	293	11	40	67	25	223	273	12.5	--	225.5	139.5	23 <sup>5)</sup>	6
3TK17	266	244	244	220	200	271	293	11	40	67	40	223	273	12.5	--	225.5	139.5	23 <sup>5)</sup>	6

1) Distance when 2 contactors, each with one auxiliary switch block opposite, are mounted.

2) Distance when 2 contactors, each with two auxiliary switch blocks opposite, are mounted.

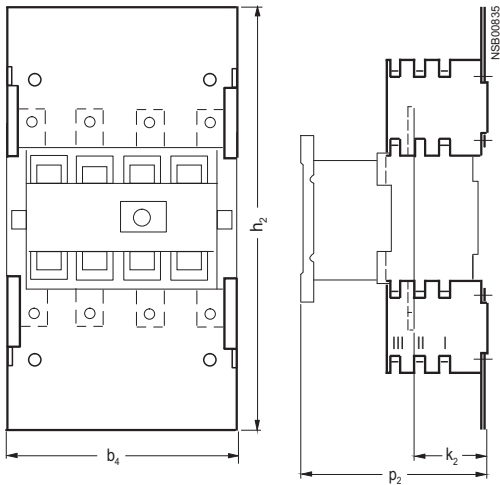
3) Nuts, bolts, screws and washers are supplied.

4) Minimum clearance for removing the withdrawable coil.

5) Damping elements are supplied.

## Accessories for 3TK1 contactors

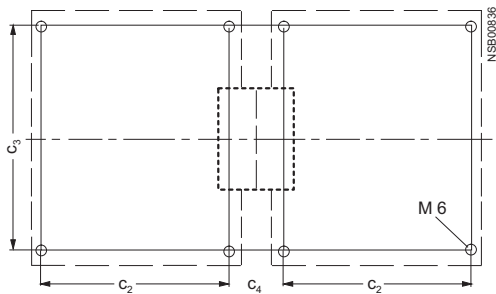
### 3TK19 4. terminal covers



Contactors Type	Terminal covers	$h_2$	$p_2$ for			$k_2$ for			$b_4$
			I	II	III	I	II	III	
3TK10, 3TK11	3TK19 40-0A	372	153	178	203	47	72	97	168
3TK12, 3TK13	3TK19 42-0A	399	158	183	208	47	72	97	202
3TK14, 3TK15	3TK19 44-0A	464	193	218	243	47	72	97	268
3TK17	3TK19 46-0A	464	193	218	243	47	72	97	268

### 3TK19 20 and 3TK19 22 locking devices

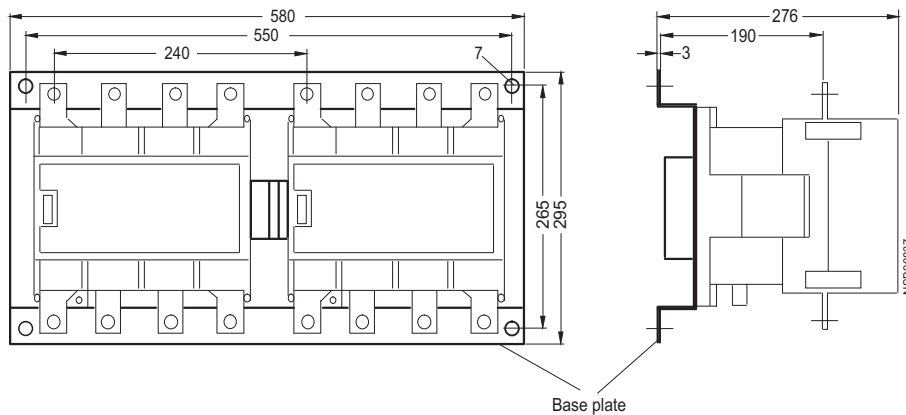
for mechanical locking of two identical 3TK10 to 3TK13 contactors, mounted side by side on the mounting plate



Contactors Type	Locking devices	$c_2$	$c_3$	$c_4$
3TK12, 3TK13	3TK19 22-0A	160	140	63.5

### 3TK19 24 locking device

for mechanical locking of two identical 3TK14, 3TK15 or 3TK17 contactors, mounted side by side on the mounting plate

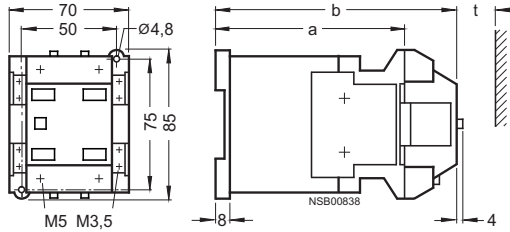


# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### 3TC4 and TC5 contactors

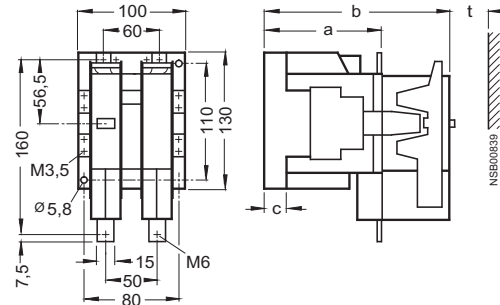
#### 3TC44 contactors Size 2, AC and DC operation



t = minimum clearance from insulated components: 15 mm (600 V and 750 V)  
from grounded components: 30 mm (600 V and 750 V)

	a	b
DC operation	109	141
AC operation	68	100

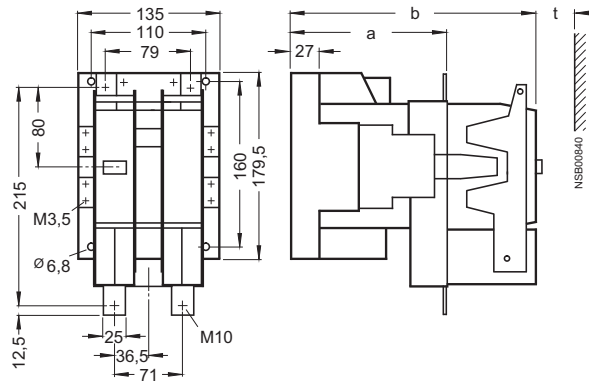
#### 3TC48 contactors Size 4, AC and DC operation



t = minimum clearance from insulated components: 15 mm (600 V),  
20 mm (750 V)  
from grounded components: 35 mm (600 V),  
55 mm (750 V)

	a	b	c
DC operation	112	180	21,5
AC operation	86	154	23,5

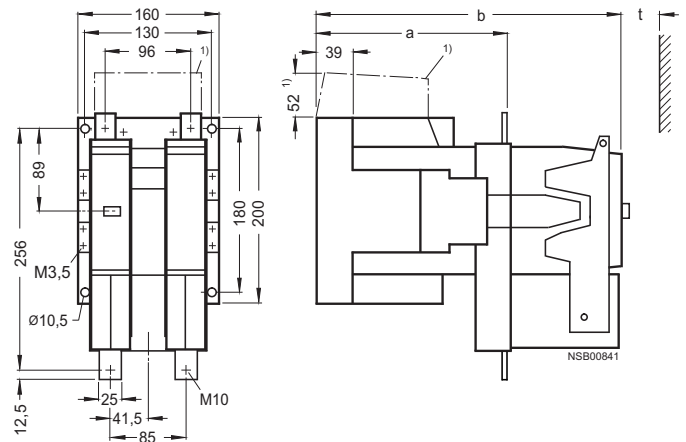
#### 3TC52 contactors Size 8, AC and DC operation



t = minimum clearance from insulated components: 20 mm (600 V and 750 V)  
from grounded components: 70 mm (600 V and 750 V)

	a	b
DC operation	147	232
AC operation	115	200

#### 3TC56 contactors Size 12, AC and DC operation



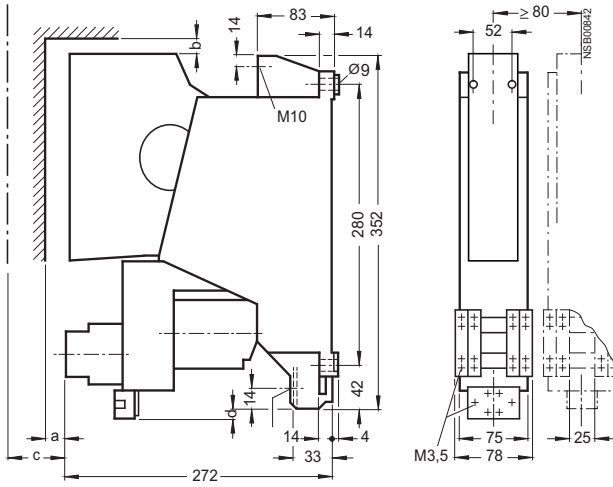
t = minimum clearance from insulated components: 25 mm (600 V and 750 V)  
from grounded components: 80 mm (600 V),  
100 mm (750 V)

	a	b
DC operation	200	310
AC operation	141	251

1) DC operation only.

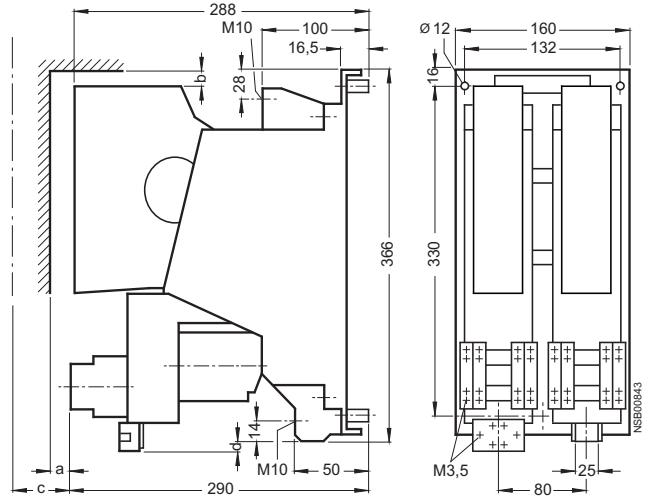
## 3TC7 contactors

### 3TC74 contactors Size 12, DC and AC operation



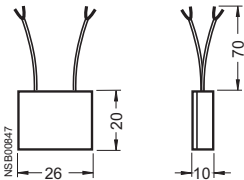
Dimensions	Minimum clearance from insulated components	Minimum clearance from grounded components
a	≥ 20	≥ 50
b	≥ 10	≥ 25
c	≥ 180 (clearance for removing arc chute)	

### 3TC78 contactors Size 12, DC and AC operation



Dimensions	Minimum clearance from insulated components	Minimum clearance from grounded components
a	≥ 20	≥ 50
b	≥ 10	≥ 25
c	≥ 180 (clearance for removing arc chute)	
d	Coil terminal 3TC78 14-0E: 8 mm 3TC78 14-1C: 16 mm	

### 3TX2 746-2. varistors for 3TC74 and 3TC78 contactors

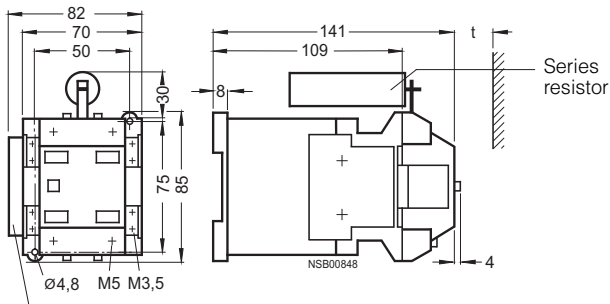


# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### Contactors with extended operating range 0.7 to 1.25 x $U_s$

#### 3TC44 17-0L contactors, size 2, DC operation

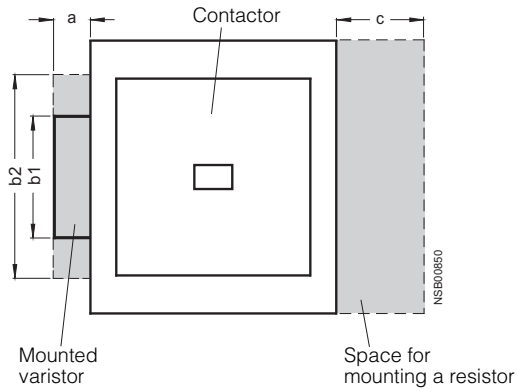


Varistor

$t$  = minimum clearance from insulated components: 15 mm (600 V and 750 V)  
from grounded components: 30 mm (600 V and 750 V)

Additional space requirements for mounting resistors and varistors

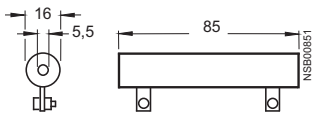
#### For 3TB50 to 3TB56, 3TC48 to 3TC56 contactors



Mounted varistor

Space for mounting a resistor

Separately mounted series resistor



For contactors	Additional space requirements			
	for series resistor $c$	for varistor $a$	$b_1$	$b_2$ *)
3TB50	30	13	70	110
3TB52, 3TB54, 3TB56	--	15	82	120
3TC48	30	13	70	110
3TC52, 3TC56	--	15	82	120

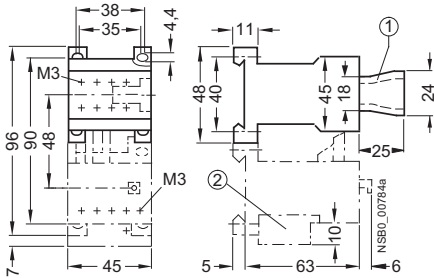
\*) Terminal compartment.

For contactors	Number of series resistors
3TB52, 3TC52	1
3TB54, 3TB56	2
3TC56	2

## 3TF2 contactors for switching motors, width 45 mm, size S00

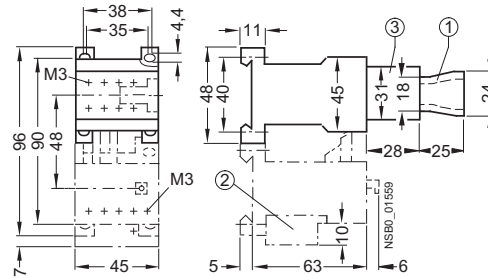
**3TF20, 3TF28,**  
with 1 auxiliary contact,  
with screw terminals,  
AC and DC operation,  
without or with overload relay  
(3UA7),

- ① TX4 490 surge suppressor
- ② Additional module (on overload relay)

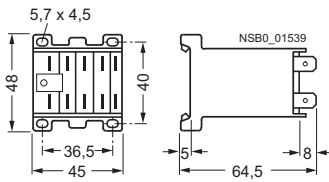


**3TF20, 3TF22, 3TF28, 3TF29**  
with 2 to 5 auxiliary contacts,  
with screw terminals,  
AC and DC operation,  
without or with overload relay

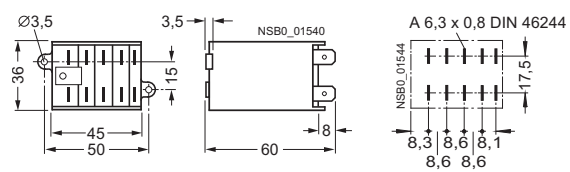
- ① TX4 490 surge suppressor
- ② Additional module (on overload relay)
- ③ Auxiliary switch block



**3TF20**  
with flat connectors 6.3 mm x 0.8 mm,  
for snap-on and screw fixing,  
AC and DC operation

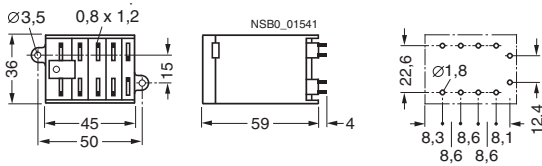


**3TF20**  
with flat connectors 6.3 mm x 0.8 mm,  
for screw fixing (diagonal),  
AC and DC operation



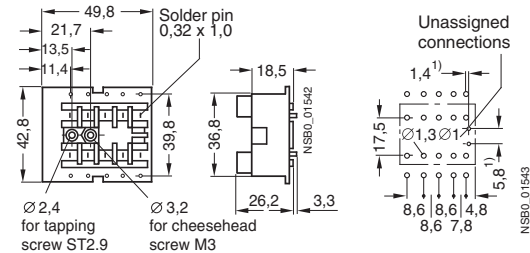
Grid size for flat connectors

**3TF20**  
with solder pin connections for printed circuit boards  
for screw fixing (diagonal),  
AC and DC operation



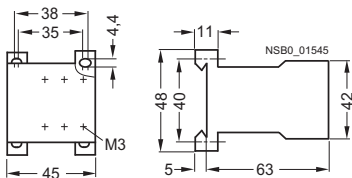
Hole pattern for solder pin connections

**3TX4 491-2A plug-in base**  
with solder pin connections for printed circuit boards



Hole pattern for plug-in base

## 3TX4 490 OFF-delay device



1) Holes required only for integrated overvoltage damping in the plug-in base.

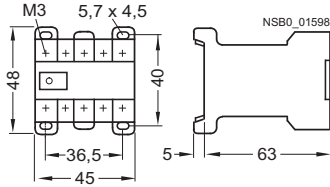
# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### 3TK20 contactors, width 45 mm, size S00

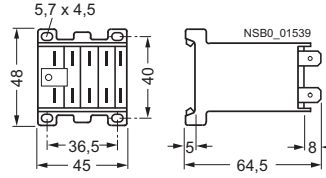
#### 3TK20

with screw terminals,  
for snap-on and screw fixing,  
AC and DC operation



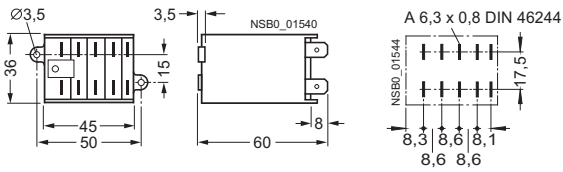
#### 3TK20

with flat connectors 6.3 mm x 0.8 mm,  
for snap-on and screw fixing,  
AC and DC operation



#### 3TK20

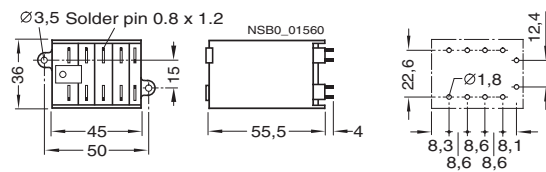
with flat connectors 6.3 mm x 0.8 mm,  
for screw fixing (diagonal),  
AC and DC operation



Grid size  
for flat connectors

#### 3TK20

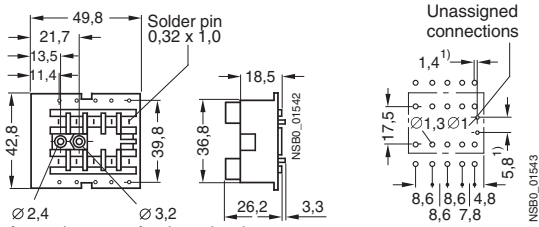
with solder pin connections for printed circuit boards,  
for screw fixing (diagonal),  
AC and DC operation



Hole pattern  
for solder pin  
connections

#### 3TX4 491-2A plug-in base

with solder pin connections for printed circuit boards



Hole pattern  
for plug-in base

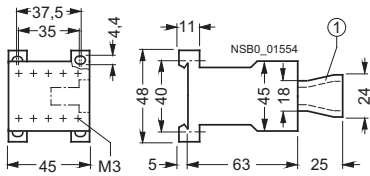
1) Holes required only for integrated overvoltage damping in the plug-in base.



### 3TH2 contactor relays, width 45 mm, size S00

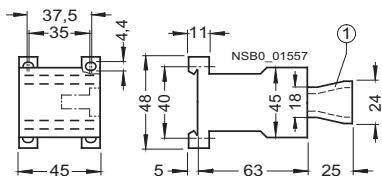
**3TH20 with 4 contacts**  
with screw terminals,  
AC and DC operation

① ② TX4 490  
surge suppressor

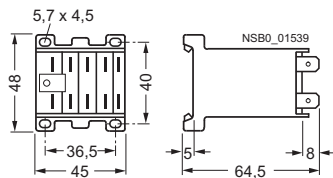


**3TH20 with 4 contacts**  
AC and DC operation

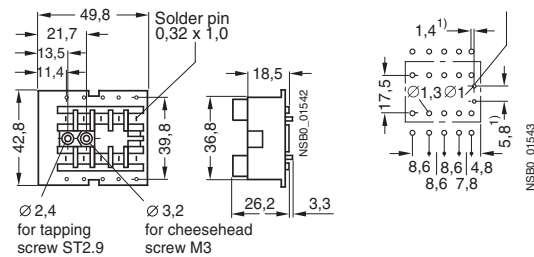
① ② TX4 490  
surge suppressor



**3TH20**  
with flat connectors 6.3 mm x 0.8 mm,  
for snap-on and screw fixing,  
AC and DC operation



**3TX4 491-2A plug-in base**  
with solder pin connections for printed circuit boards

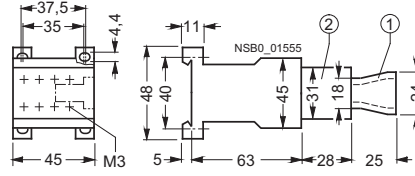


Hole pattern for  
plug-in base

1) Holes required only for integrated overvoltage damping in the plug-in base.

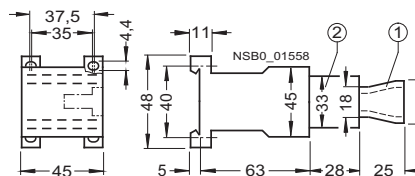
**3TH20 with 6 and 8 contacts,**  
**3TH22 with 8 contacts**  
with screw terminals,  
AC and DC operation

① ② TX4 490  
surge suppressor  
② auxiliary switch block

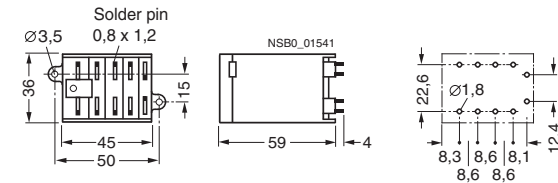


**3TH20 with 6 and 8 contacts,**  
**3TH22 with 8 contacts**  
AC and DC operation

① ② TX4 490  
surge suppressor  
② auxiliary switch block

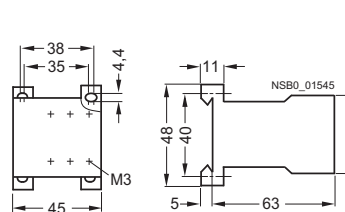


**3TH20**  
with solder pin connections for printed circuit boards  
for screw fixing (diagonal),  
AC and DC operation



Hole pattern  
for solder pin  
connections

**3TX4 490 OFF-delay device**



# Switching Devices – Contactors and Contactor Assemblies

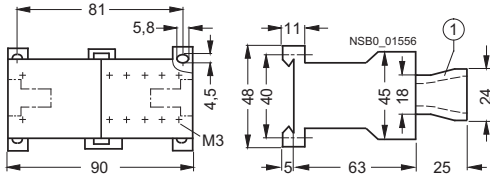
## Project planning aids

### 3TH27 latched contactor relays, width 90 mm, size S00

#### 3TH27 with 4 contacts

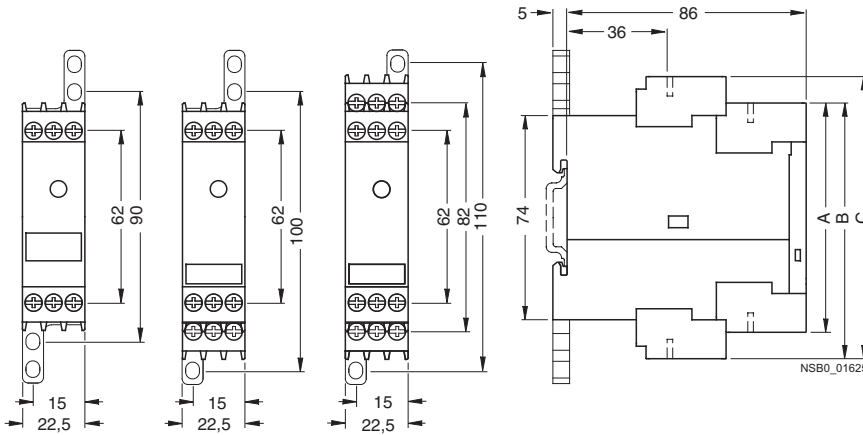
with screw terminals,  
for screw and snap-on mounting,  
AC and DC operation

① ⓈTX4 490  
surge suppressor



### Coupling relays in industrial enclosure

#### 3RS18

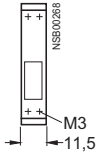


	A	B	C
	3RS18 00-.A	3RS18 00-.B	3RS18 00-.H
<b>Removable terminals</b>			
Spring-type terminals	84	94	103
Screw terminals	83	92	102

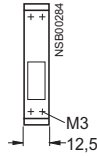
### Coupling relays with narrow design

**3TX7 002, 3TX7 003 coupling links in terminal block design**

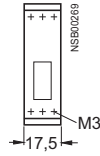
**3TX7 00 .-1AB . . . ,  
3TX7 00 .-2A . . . ,  
3TX7 002-3AB01**



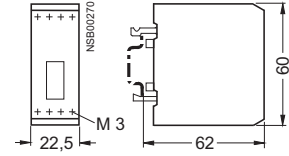
**3TX7 002-3AB00,  
3TX7 002-4A . . .**



**3TX7 00 .-1BB00,  
3TX7 00 .-1BF00,  
3TX7 002-2BF02**

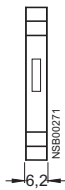


**3TX7 00 .-1CB00,  
3TX7 002-1FB02**

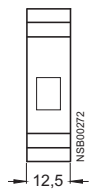


**3TX7 004, 3TX7 005 coupling links in double-decker design**

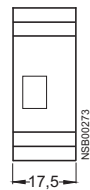
**3TX7 00 .-1MB00,  
3TX7 00 .-1MF00,  
3TX7 00 .-1L . 0 . . ,  
3TX7 00 .-2M . . .  
relay coupling links**



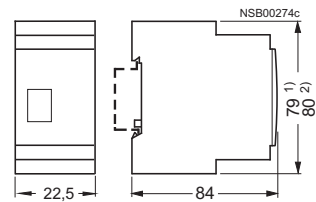
**3TX7 00 .-1BB00,  
3TX7 00 .-1BB10,  
3TX7 00 .-1CB00,  
3TX7 00 .-1BF05  
relay coupling links**



**3TX7 00 .-1HB00  
relay coupling links**



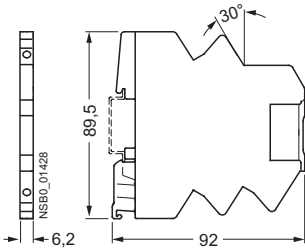
**3TX7 00 .-1GB00  
relay coupling links**



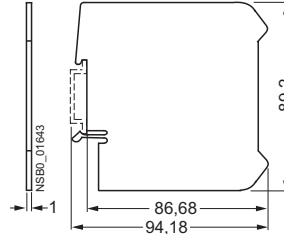
**3TX7 00 .-3AB04,  
3TX7 00 .-4AB04,  
3TX7 00 .-3PB . . ,  
3TX7 00 .-3PG74,  
3TX7 00 .-3RB43  
semiconductor coupling links**

**3TX7 00 .-3AC04,  
3TX7 00 .-3AC14,  
3TX7 00 .-3AC03  
semiconductor coupling links**

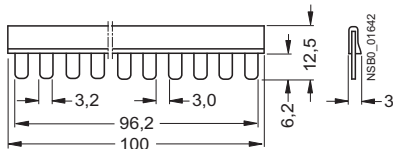
**3TX7 014, 3TX7 015  
relay couplers with plug-in design**



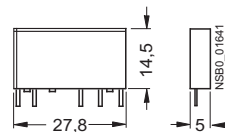
**3TX7 014-7CE00  
galvanic isolation plate**



**3TX7 014-7AA00  
connecting comb, 16-pole**



**3TX7 014-7B.0.  
individual relay module**



- 1) Dimensions for 3TX7 004 coupling links (screw terminals).
- 2) Dimensions for 3TX7 005 coupling links (spring-type terminals).

# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

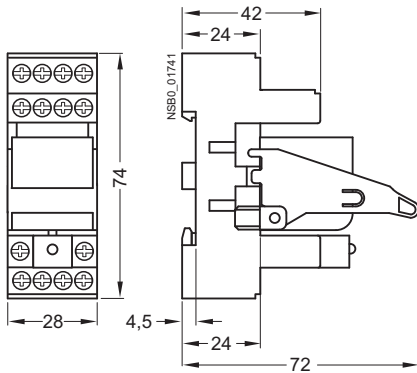
### LZS:PT relay couplers

Complete units, 11- and 14-pole, PT series

**LZS:PT3A5**

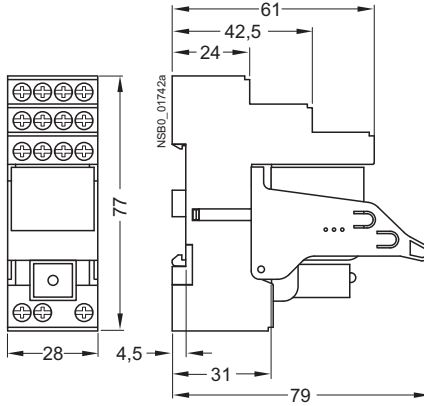
**LZS:PT5A5**

Standard plug-in base with screw terminals



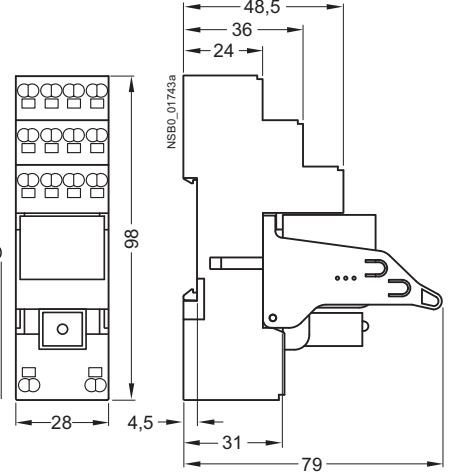
**LZS:PT5B5**

Plug-in base with logical isolation and screw terminals



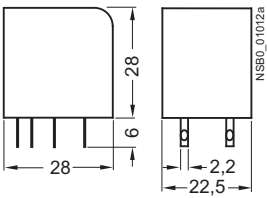
**LZS:PT5D5**

Plug-in base with logical isolation and plug-in terminals

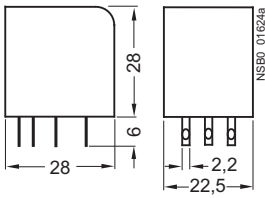


LZX industrial relays, 8-, 11-, and 14-pole, PT series

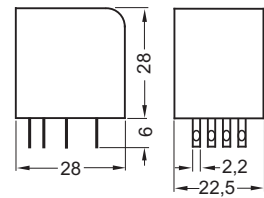
**LZX:PT270, 8-pole**  
2 CO



**LZX:PT370, 11-pole**  
3 CO



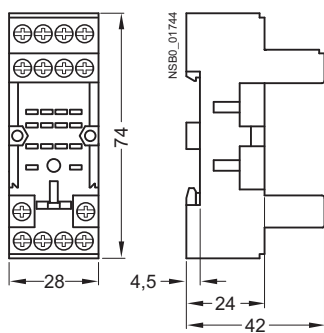
**LZX:PT520, LZX:PT570, LZX:PT580, 14-pole**  
4 CO



Plug-in bases for PT series

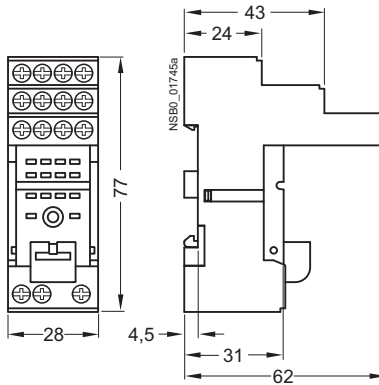
**LZS:PT78740**

with screw terminals



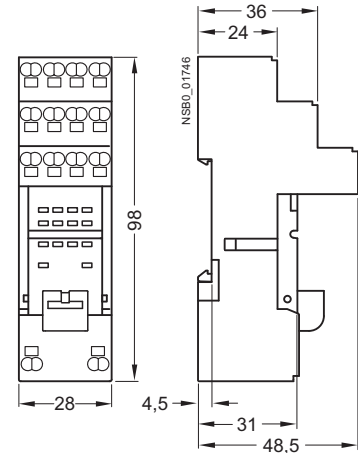
**LZS:PT78742**

with logical isolation and screw terminals



**LZS:PT7874P**

with logical isolation and plug-in terminals



## LZS:RT relay couplers

Complete units, 8-pole, 5 mm pinning, RT series

**LZS:RT3A4;**

**LZS:RT4A4**

Standard plug-in base with screw terminals

**LZS:RT3B4;**

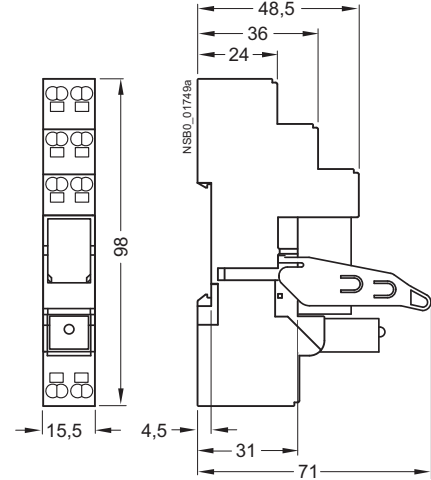
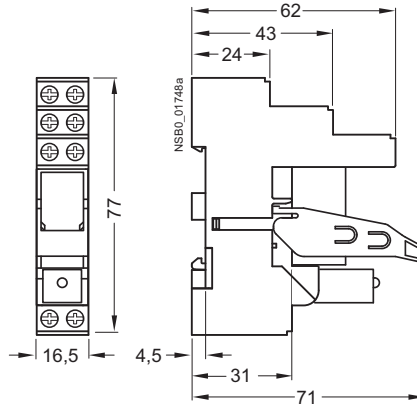
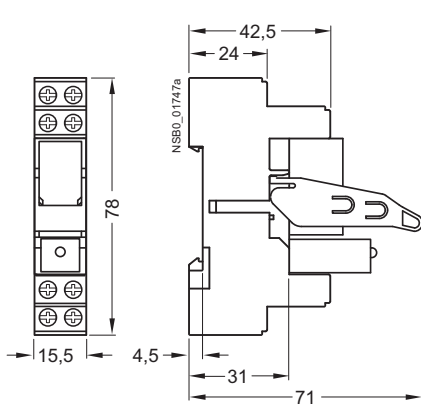
**LZS:RT4B4**

Plug-in base with logical isolation and screw terminals

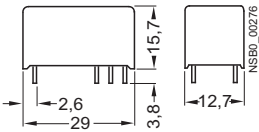
**LZS:RT3D4;**

**LZS:RT4D4**

Plug-in base with logical isolation and plug-in terminals



## LZX:RT3; LZX:RT4 print relays



## Plug-in bases for RT series

**LZS:RT78725**

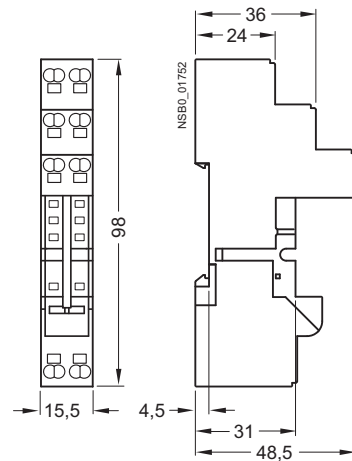
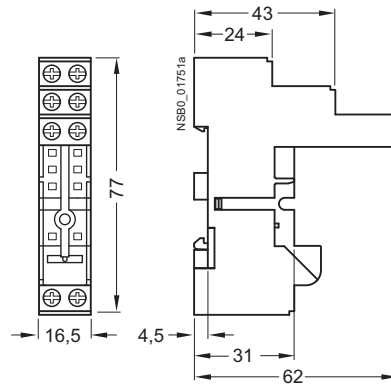
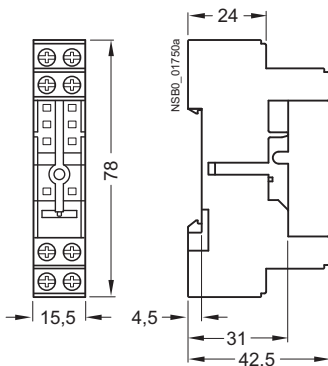
with screw terminals

**LZS:RT78726**

with logical isolation and screw terminals

**LZS:RT7872P**

with logical isolation and plug-in terminals

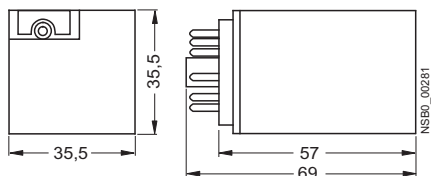


## Project planning aids

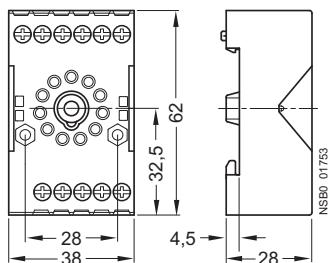
### LZX:MT relay couplers

Industrial relays, 11-pole, MT series

LZX:MT32



LZS:MT78750 plug-in bases  
for industrial relays



## Schematics

Internal circuit diagrams for 3RT1 contactors and accessories (valid for screw and Cage Clamp terminals)

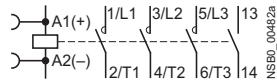
### Size S00

#### Terminal designations according to EN 50012

3RT10 1 contactors

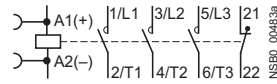
##### 1 NO

Ident. No.: 10E



##### 1 NC

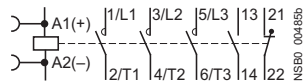
01



3RT10 1 contactors (with 1 NO) with front-mounted 3RH19 11-.HA... auxiliary switch blocks

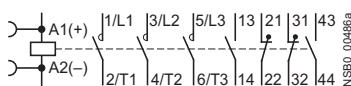
##### 1 NO + 1 NC

Ident. No.: 11E



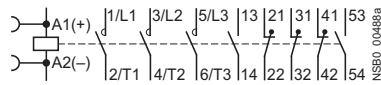
##### 2 NO + 2 NC

22E



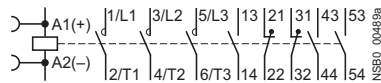
##### 2 NO + 3 NC

Ident. No.: 23E



##### 3 NO + 2 NC

32E

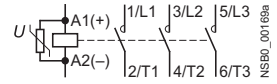


### Size S0 to S3

#### Terminal designations according to EN 50012

3RT10...X.40-0LA2 contactors

Varistor built-in

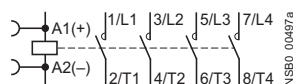


#### Contactors with 4 main contacts, size S00

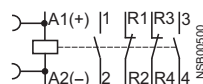
#### Terminal designations according to EN 50005

3RT13 and 3RT15 contactors

##### 4 NO



##### 2 NO + 2 NC



(3RH19 11 auxiliary switch blocks acc. to EN 50005 can be snapped on)

Surge suppressors for sizes S00 to S3 (coded plug-in direction; exception: for 3RT19 16-1T...diode assembly designation with +/-)

Diode

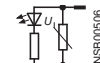
Diode assembly

Varistor

RC element

Diode with LED

Varistor with LED



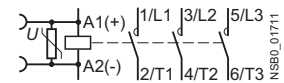
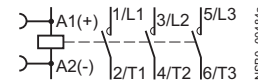
1) Not for 3RT12 vacuum contactors.

### Size S0 to S12

#### Terminal designations according to EN 50012

3RT10 2, 3RT10 3 contactors

3RT10 5 to 3RT10 7, 3RT12, 3RT14 contactors

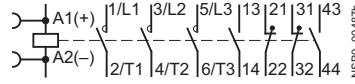


3RT10 2 and 3RT10 3, 3RT14 contactors

with front-mounted 4-pole 3RH19 21-.HA22 auxiliary switch block

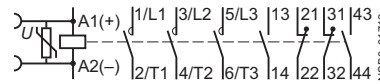
##### 2 NO + 2 NC

Ident. No.: 22E



Contactors 3RT1. 5, 3RT1. 6, 3RT1. 7 (sizes S6, S10, S12) with front-mounted 4-pole 3RH19 21-.HA22 auxiliary switch block or with lateral 2-pole 3RH19 21-1DA11 auxiliary switch blocks

##### 2 NO + 2 NC



4-pole 3RH19 21-.HA...XA... auxiliary switch blocks, for snapping onto the front<sup>1)</sup>

##### 3 NO + 1 NC

Ident. No.: 31

3RH19 21-.HA... 3RH19 21-.HA...

##### 2 NO + 2 NC

22

3RH19 21-.HA... 3RH19 21-.HA...

##### 2 NO + 2 NC

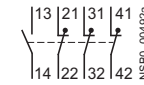
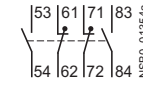
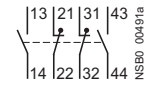
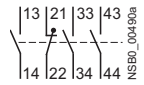
22

3RH19 21-.XA... 3RH19 21-.XA...

##### 1 NO + 3 NC

13

3RH19 21-.HA... 3RH19 21-.HA...



First laterally mountable 3RH19 21-.DA11, 3RH19 21-2DE11 auxiliary switch block (solid-state compatible)

##### 1 NO + 1 NC

Left



##### 1 NO + 1 NC

Right



Second laterally mountable 3RH19 21-.JA11, 3RH19 21-2JE11 auxiliary switch block (solid-state compatible) (only for sizes S3 to S12)

##### 1 NO + 1 NC

Left



##### 1 NO + 1 NC

Right

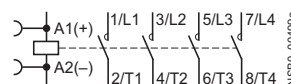


#### Contactors with 4 main contacts, sizes S0 to S3

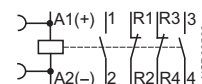
#### Terminal designations according to EN 50005

3RT13 and 3RT15 contactors

##### 4 NO



##### 2 NO + 2 NC



(3RH19 21 auxiliary switch blocks acc. to EN 50005 can be snapped on)

# Switching Devices – Contactors and Contactor Assemblies

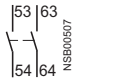
## Project planning aids

Internal circuit diagrams for 3RT1 contactors and accessories (valid for screw and Cage Clamp terminals)

### Accessories for size S00 contactors and contactor relays Terminal designations according to EN 50005

3RH19 11-.F... auxiliary switch blocks and 3RH19 11-.NF... solid-state compatible auxiliary switch blocks  
(solid-state compatible auxiliary switch blocks)

**2 NO**  
Ident. No.: 20



**1 NO + 1 NC**  
11



**2 NC**  
02

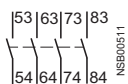


**1 NO + 1 NC**  
11 U

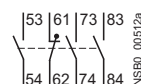


with make-before-break

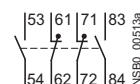
**4 NO**  
Ident. No.: 40



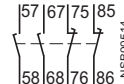
**3 NO + 1 NC**  
31



**2 NO + 2 NC**  
22

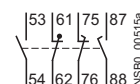


**2 NO + 2 NC**  
22 U



with make-before-break

**2 NO + 2 NC**  
11/11 U



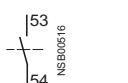
1 NO + 1 NC standard  
1 NO + 1 NC with  
make-before-break

Internal wiring

3RH19 11-1AA.. and 3RH19 11-1BA..  
auxiliary switch blocks,  
for snapping onto the front,  
cable entry from above or below

3RH19 11-1LA.. and 3RH19 11-1MA..  
auxiliary switch blocks,  
for snapping onto the front,  
cable entry from above or below

**1 NO**



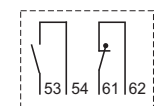
**1 NC**



**2 NO**



**1 NO + 1 NC**

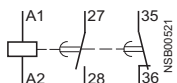


Example of  
1 NO + 1 NC, cable  
entry from below

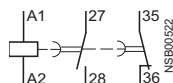
### Accessories for size S00 contactors and contactor relays Terminal designations according to DIN 46199 Part 5

3RT19 16-2E.../2F.../2G... solid-state, time-delay auxiliary switch blocks

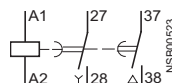
**1 NO + 1 NC**  
With ON-delay



**1 NO + 1 NC**  
OFF-delay



**2 NO**  
Wye-delta function

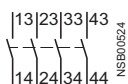


(Integrated varistors not shown)

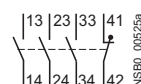
### Accessories for size S0 to S12 contactors Terminal designations according to EN 50005

3RH19 21-.F... auxiliary switch blocks, 4-pole,  
for snapping onto the front<sup>1)</sup>

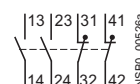
**4 NO**  
Ident. No.: 40



**3 NO + 1 NC**  
31



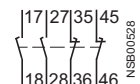
**2 NO + 2 NC**  
22



**4 NC**  
04



**2 NO + 2 NC**  
22 U

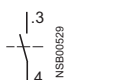


with make-before-break

3RH19 21-.CA... auxiliary switch blocks, 1-pole,  
for snapping onto the front<sup>1)</sup>

3RH19 21-1CD... auxiliary switch blocks, 1-pole  
with make-before-break, for snapping onto the front<sup>1)</sup>

**1 NO**



**1 NC**



**1 NO**



**1 NC**



(Terminal designations according to EN 50005 or EN 50012)

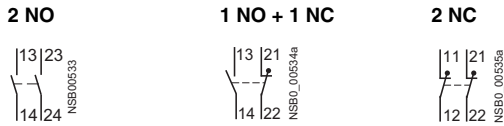
1) Not for 3RT12 vacuum contactors.



*Internal circuit diagrams for 3RT1 contactors and accessories (valid for screw and Cage Clamp terminals)*

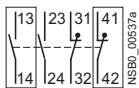
**Accessories for size S0 to S12 contactors**  
**Terminal designations according to EN 50005**

3RH19 21-1LA... and 3RH19 21-1MA... auxiliary switch block, 2-pole, for snapping onto the front <sup>1)</sup> cable entry from above or below

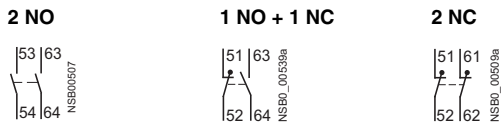


3RH19 21-.FE22 solid-state compatible auxiliary switch block, 4-pole, for snapping onto the front <sup>1)</sup>

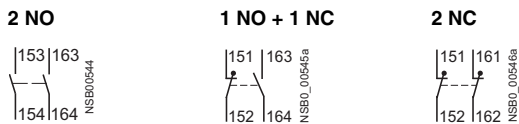
**2 NO + 2 NC**  
 Ident. No.: 22



3RH19 21-.EA... first laterally mountable auxiliary switch blocks (left)

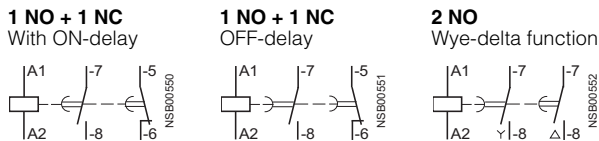


3RH19 21-.KA... second laterally mountable auxiliary switch blocks (left) (only for sizes S3 to S12)



**Accessories for size S0 to S12 contactors**  
**Terminal designations according to DIN 46199 Part 5**

3RT19 26-2E.../2F.../2G... solid-state, time-delay auxiliary switch blocks



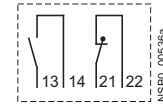
**Accessories for contactors size S0**  
**Terminal designations, pneumatic delay block**

With ON-delay      OFF-delay  
 3RT19 26-2PA.1      3RT19 26-2PR.1



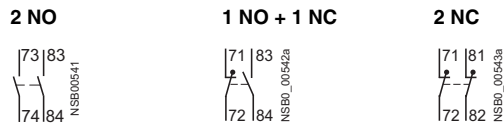
1) Not for 3RT12 vacuum contactors.

Internal wiring

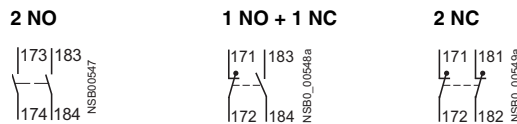


Example of 1 NO + 1 NC, cable entry from below

3RH19 21-.EA... first laterally mountable auxiliary switch blocks (right)

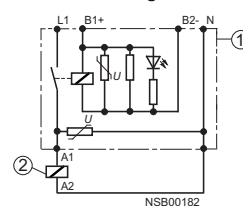


3RH19 21-.KA... second laterally mountable auxiliary switch blocks (right)



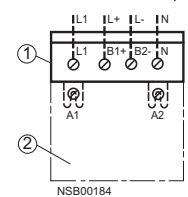
3RT19 24-1GP11 coupling link with surge suppression

Connection diagram



① Coupling link  
 ② Contactor

Connection example



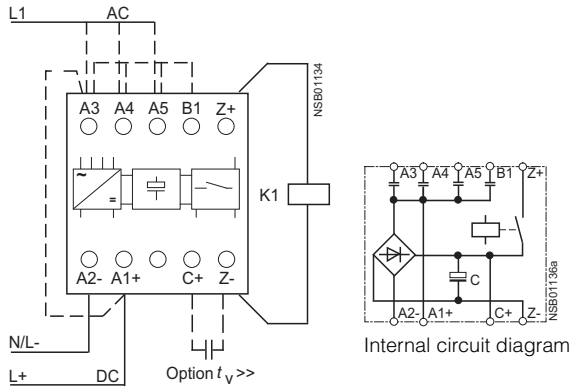
① Coupling link  
 ② Contactor

# Switching Devices – Contactors and Contactor Assemblies

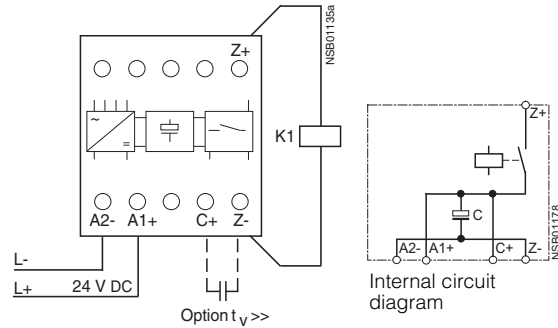
## Project planning aids

### Schematics for accessories for sizes S00 to S3

3RT19 16-2BK01, 110 V UC  
3RT19 16-2BL01, 230 V UC OFF-delay devices



3RT19 16-2BE01, 24 V DC OFF-delay devices



3RT19 16-2BK01, 110 V UC

110 V UC	A1	A3	A4	A5	B1	A2	Z+	Z-	$t_v$ (ms) >
S00 DC	L+					L-			130
50 Hz	L1					N	3RT1. 1.-.BF4. 3RH1. ...-BF4.		130
60 Hz	L1					N			130
S0 DC	L+					L-			100
50 Hz	L1					N	3RT1. 2.-.BF4.		100
60 Hz	L1					N			100

3RT19 16-2BE01, 24 V DC

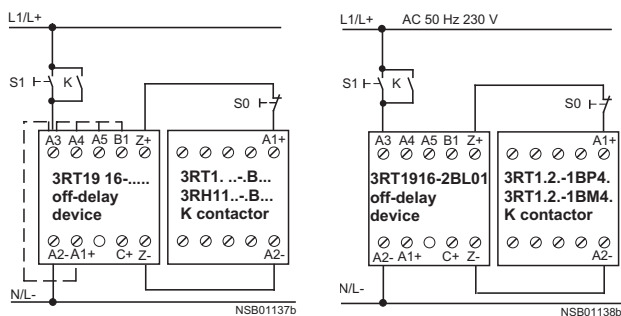
24 V DC	A1	A2	Z+	Z-	$t_v$ (ms) >
S00	L+	L-	3RT1. 1.-.BB4. 3RH1. ...-BB4.		250
S0	L+	L-	3RT1. 2.-.BB4.		150
S2	L+	L-	3RT1. 3.-.BB4.		90
S3	L+	L-	3RT1. 4.-.BB4.		70

3RT19 16-2BL01, 230 V UC

230 V UC	A1	A3	A4	A5	B1	A2	Z+	Z-	$t_v$ (ms) >
S00 DC	L+					L-			600
50 Hz	L1					N	3RT1. 1.-.BM4. 3RT1. 1.-.BP4. 3RH1. ...-BM4.		600
60 Hz	L1					N	3RH1. ...-BP4.		600
S0 DC	L+					L-			400
50 Hz	L1					N	3RT1. 2.-.BM4. 3RT1. 2.-.BP4.		400
60 Hz	L1					N			400

### Operation after OFF-delay

(Contactor only switches off with delay in case of voltage failure)

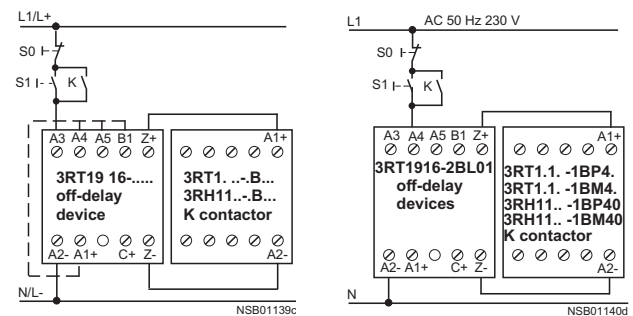


Schematic circuit diagram

Typical circuit diagram:  
Contactor size S0,  
DC operation, at AC 50 Hz 230 V

### Operation before OFF-delay

(Contactor always switches off with delay)



Schematic circuit diagram

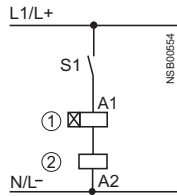
Typical circuit diagram:  
Contactor size S00,  
DC operation, at AC 50 Hz 230 V

## Circuit diagrams for accessories for sizes S00 to S3

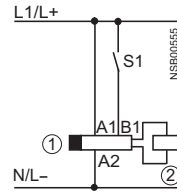
### Accessories for size S00 to S3 contactors and contactor relays

Solid-state time-delay blocks  
(note planning aids on Page 167!)

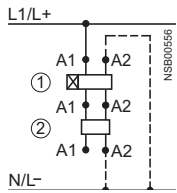
3RT19 16-2C...  
With ON-delay  
Size S00



3RT19 16-2D...  
OFF-delay (with auxiliary voltage)  
Size S00

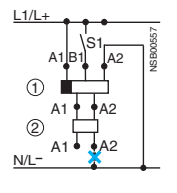


3RT19 26-2C...  
With ON-delay  
Sizes S0 to S3

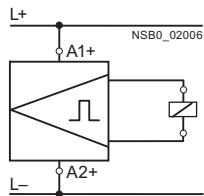


A2 can be connected to N(L-) using either the contactor or the timing relay.  
--- optionally connect

3RT19 26-2D...  
OFF-delay (with auxiliary voltage)  
Sizes S0 to S3



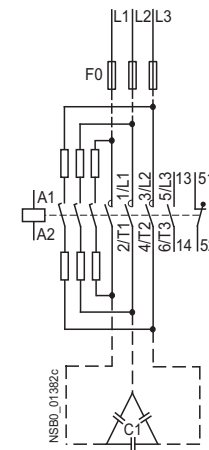
A2 must only be connected to N(L-) from the timing relay.  
✗ Do not connect  
① Timing relay block  
② Contactor



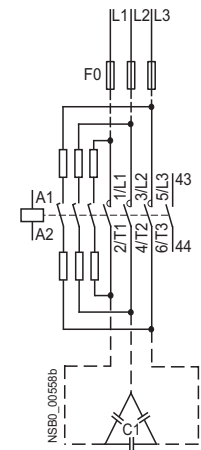
Circuit diagram for railway-type contactors with solid-state coil excitation

### 3RT16 capacitor contactors

Size S00



Sizes S0 and S3



# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

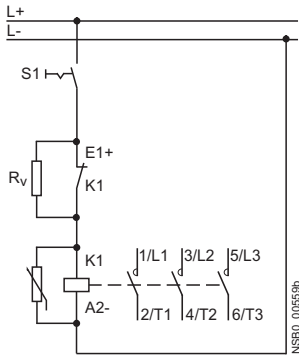
### Internal circuit diagrams for accessories of size S00 to S3

#### Contactors with extended operating range 0.7 to 1.25 × $U_s$

##### Size S00

##### Terminal designations according to EN 50012

3RT10 17-2K.42-0LA0 contactors

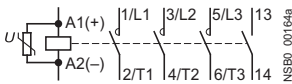


Series resistor  $R_v$  plugged on, NC contact prewired.

3RT10 17-2K.41/2K.42 contactor  
Varistor integrated  
Size S00

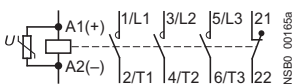
##### 1 NO

Ident. No.: 10E



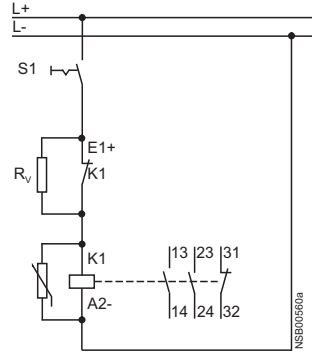
##### 1 NC

01E



##### Terminal designations according to EN 50011

3RH11 22-2K.40-0LA0 contactor relays

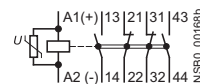


2 NO + 1 NC unassigned  
Series resistor  $R_v$  plugged on,  
NC contact prewired.

3RH11 22-2K.40 contactor relay  
Varistor integrated  
Size S00

##### 2 NO + 2 NC

22E



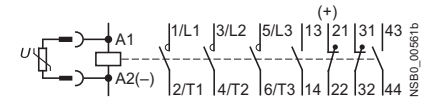
##### Size S00 to S3

##### Terminal designations according to EN 50012

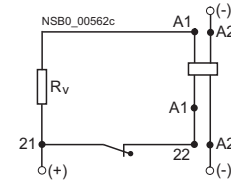
3RT10 2.-, 3RT10 3.-,  
3RT10 4.-3K.44-0LA0 contactors  
with front-mounted 4-pole 3RH19 21-1HA22  
auxiliary switch block

##### 2 NO + 2 NC

Ident. No.: 22



##### Circuit diagram of the series resistor wiring

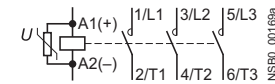


The series resistor is supplied separately packed.  
The 21/22 NC contact is necessary to wire the  
series resistor.

3RT10 25-3K.40 contactor

Varistor integrated

Size S0



(Two single-pole auxiliary switch blocks can be  
snapped on)

*Position of the terminals for 3RT1 contactors and accessories (valid for screw and Cage Clamp terminals)*

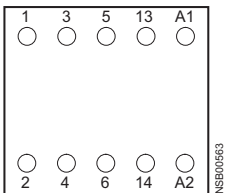
**Size S00**

**Terminal designations according to EN 50012**

3RT10 1 contactors, 3RT10 1 coupling relays  
3RT10 17-2K.4. contactors with extended operating range

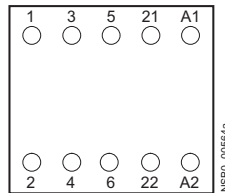
**1 NO**

Ident. No.: 10E



**1 NC**

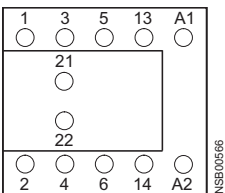
01



3RT10 1 contactors (with 1 NO contact)  
with front-mounted 3RH19 11-.H... auxiliary switch blocks

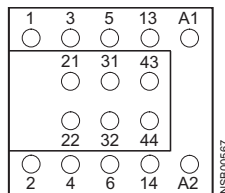
**1 NO + 1 NC**

Ident. No.: 11E



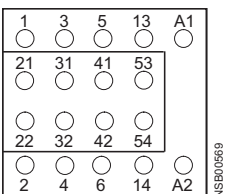
**2 NO + 2 NC**

22E



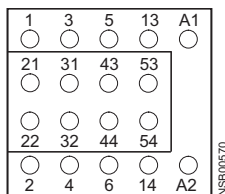
**2 NO + 3 NC**

Ident. No.: 23E



**3 NO + 2 NC**

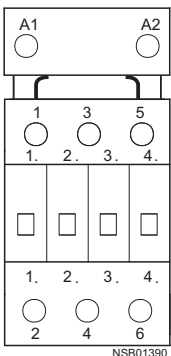
32E



**Size S0 to S3**

**Terminal designations according to EN 50012**

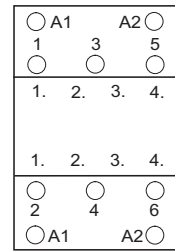
3RT10 . . . X . 40-0LA2 contactors  
with solid-state control unit



**Size S0 to S12**

**Terminal designations according to EN 50012**

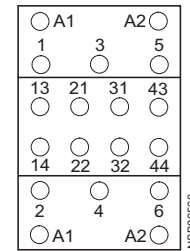
3RT10 2, 3RT 10 3,  
3RT10 4, 3RT14 46 contactors,  
3RT10 2 coupling relays  
3RT10 25-3K.40 contactors with  
extended operating range



3RT10 2, 3RT10 3, 3RT10 4  
contactors  
with front-mounted  
4-pole 3RH19 21-.HA22  
auxiliary switch block

**2 NO + 2 NC**

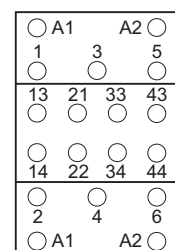
Ident. No.: 22 E



3RT10 2, 3RT10 3, 3RT10 4  
contactors  
with front-mountable  
4-pole 3RH19 21-.HA31  
auxiliary switch block

**3 NO + 2 NC**

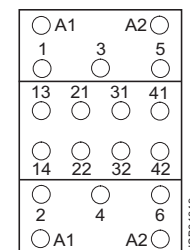
Ident. No.: 31 E



3RT10 2, 3RT10 3, 3RT10 4  
contactors  
with front-mountable  
4-pole 3RH19 21-.HA13  
auxiliary switch block

**1 NO + 3 NC**

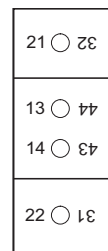
13 E



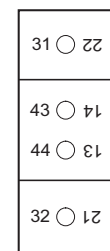
First laterally mountable  
3RH19 21-.DA11<sup>1)</sup>  
auxiliary switch block  
can be mounted on the left or  
right

**1 NO + 1 NC**

Left



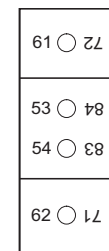
Right



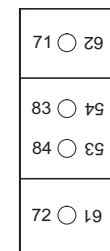
Second laterally mountable  
3RH19 21-.JA11<sup>1)</sup>  
auxiliary switch block  
can be mounted on the left or  
right  
(only for sizes S3 to S12)

**1 NO + 1 NC**

Left



Right



1) Note location identifier. Can only be used if no 4-pole auxiliary switch block is snapped onto the front.

# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

Position of the terminals for 3RT1 contactors and accessories (valid for screw and Cage Clamp terminals)

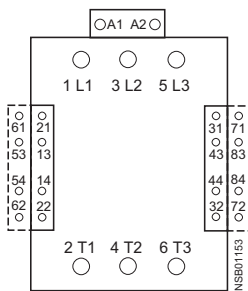
### Sizes S6 to S12

3RT1 .5, 3RT1 .6, 3RT1 .7 contactors

- With conventional operating mechanism (3RT1...-A...)

With laterally mountable auxiliary switch blocks  
3RH19 21-1DA11  
(for 2 NO + 2 NC, included in the contactors)  
3RH19 21-1JA11  
(can be extended to 4 NO + 4 NC)

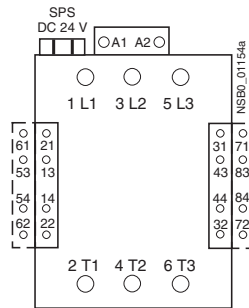
**2 NO + 2 NC or 4 NO + 4 NC**



- With solid-state operating mechanism (3RT1...-N...)

With laterally mountable auxiliary switch blocks  
3RH19 21-1DA11  
(for 2 NO + 2 NC, included in the contactors)  
3RH19 21-1JA11  
(can be extended to 4 NO + 4 NC)

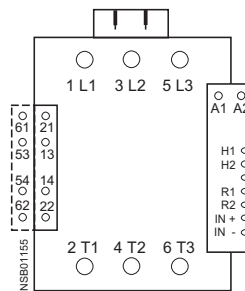
**2 NO + 2 NC or 4 NO + 4 NC**



- With solid-state operating mechanism (3RT1...-P...)

With laterally mountable auxiliary switch blocks  
3RH19 21-1DA11  
(for 1 NO + 1 NC, included in the contactors)  
3RH19 21-1JA11  
(can be extended to 2 NO + 2 NC)

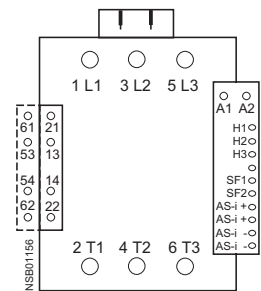
**1 NO + 1 NC or 2 NO + 2 NC**



- With solid-state operating mechanism (3RT1...-Q...)

With laterally mountable auxiliary switch blocks  
3RH19 21-1DA11  
(for 1 NO + 1 NC, included in the contactors)  
3RH19 21-1JA11  
(can be extended to 2 NO + 2 NC)

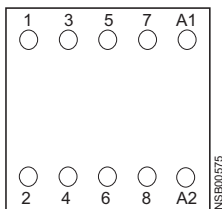
**1 NO + 1 NC or 2 NO + 2 NC**



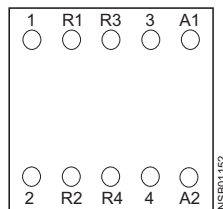
### Contactors with 4 main contacts, size S00 Terminal designations according to EN 50005

3RT13 and 3RT15 contactors

**4 NO**



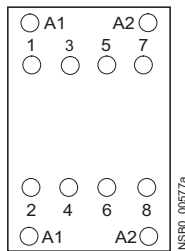
**2 NO + 2 NC**



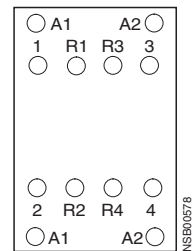
### Contactors with 4 main contacts, sizes S0 to S3 Terminal designations according to EN 50005

3RT13 and 3RT15 contactors

**4 NO**



**2 NO + 2 NC**

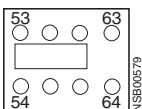


### Accessories for size S00 contactors and contactor relays Terminal designations according to EN 50005

3RH19 11-.F... auxiliary switch blocks and 3RH19 11-.NF... solid-state compatible auxiliary switch blocks for snapping onto the front

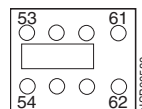
**2 NO**

Ident. No.: 20



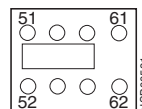
**1 NO + 1 NC**

11



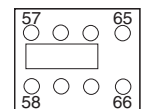
**2 NC**

02



**1 NO + 1 NC**

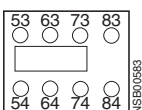
11 U



with make-before-break

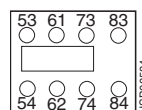
**4 NO**

Ident. No.: 40



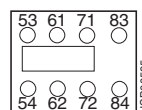
**3 NO + 1 NC**

31



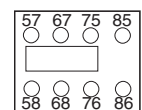
**2 NO + 2 NC**

22



**2 NO + 2 NC**

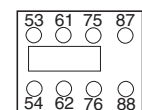
22 U



with make-before-break

**2 NO + 2 NC**

11/11 U



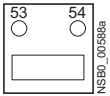
1 NO + 1 NC ON-delay  
1 NO + 1 NC with make-before-break

*Position of the terminals for 3RT1 contactors and accessories (valid for screw and Cage Clamp terminals)*

**Accessories for size S00 contactors and contactor relays**  
**Terminal designations according to EN 50005**

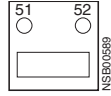
3RH19 11-1AA...  
 auxiliary switch blocks for snapping onto the front  
 Cable entry from above

**1 NO**



3RH19 11-1LA20

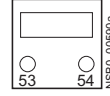
**1 NC**



3RH19 11-1LA11

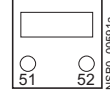
3RH19 11-1BA...  
 auxiliary switch blocks for snapping onto the front  
 Cable entry from below

**1 NO**



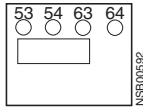
3RH19 11-1MA20

**1 NC**

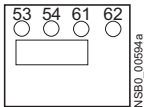


3RH19 11-1MA11

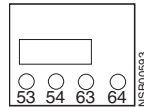
**2 NO**



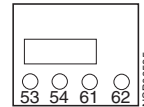
**1 NO + 1 NC**



**2 NO**



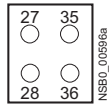
**1 NO + 1 NC**



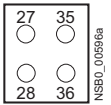
**Terminal designations according to DIN 46199 Part 5**

3RT19 16-2E.../2F.../2G... solid-state, time-delay auxiliary switch blocks

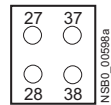
**1 NO + 1 NC**  
 With ON-delay



**1 NO + 1 NC**  
 OFF-delay



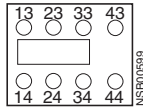
**2 NO**  
 Wye-delta function



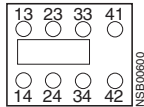
**Accessories for size S0 to S12 contactors**  
**Terminal designations according to EN 50005**

3RH19 21-.F... auxiliary switch blocks, 4-pole,  
 for snapping onto the front

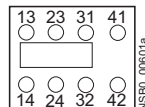
**4 NO**  
 Ident. No.: 40



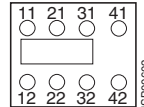
**3 NO + 1 NC**  
 31



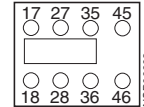
**2 NO + 2 NC**  
 22



**4 NC**  
 04



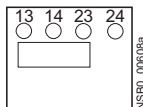
**2 NO + 2 NC**  
 22 U



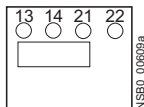
with make-before-break

3RH19 21-1LA... auxiliary switch blocks, 2-pole  
 for snapping onto the front, cable entry from the top

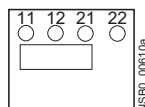
**2 NO**



**1 NO + 1 NC**

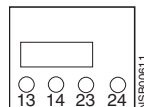


**2 NC**

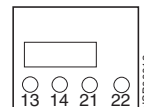


3RH19 21-1MA... auxiliary switch blocks, 2-pole,  
 for snapping onto the front, cable entry from the bottom

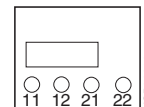
**2 NO**



**1 NO + 1 NC**

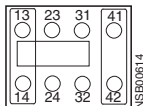


**2 NC**



3RH19 21-.FE22 solid-state compatible auxiliary switch block, 4-pole,  
 for snapping onto the front

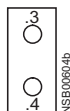
**2 NO + 2 NC**  
 Ident. No.: 22



**Terminal designations according to EN 50005 or EN 50012**

3RH19 21-.CA... auxiliary switch blocks, 1-pole,  
 for snapping onto the front

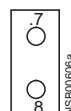
**1 NO**



**1 NC**



**1 NO**



with extended contacting

**1 NC**



with extended contacting

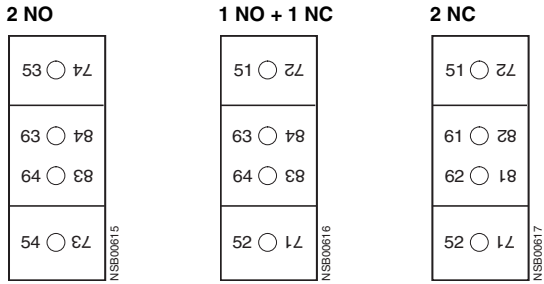
# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

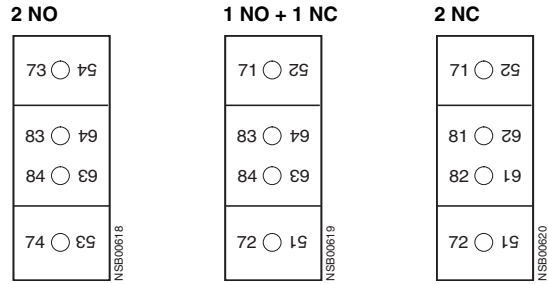
### Position of the terminals for 3RT1 contactors and accessories

#### Accessories for size S0 to S12 contactors Terminal designations according to EN 50005

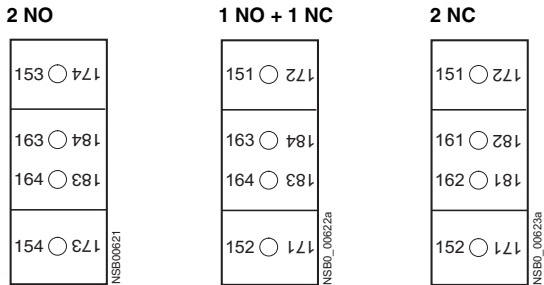
First laterally mountable 3RH19 21-.EA.. auxiliary switch blocks (left)



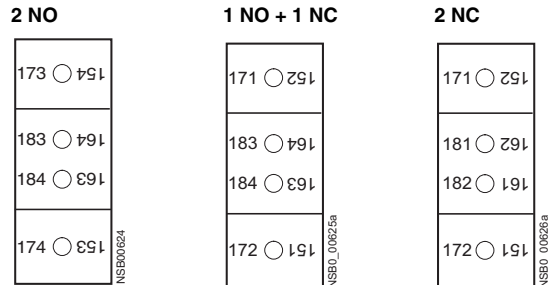
First laterally mountable 3RH19 21-.EA.. auxiliary switch blocks (right)



Second laterally mountable 3RH19 21-.KA.. auxiliary switch blocks (left)  
(only for sizes S3 to S12; can only be used if no auxiliary switches are snapped onto the front)

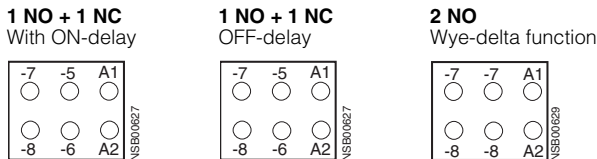


Second laterally mountable 3RH19 21-.KA.. auxiliary switch blocks (right)  
(only for sizes S3 to S12; can only be used if no auxiliary switches are snapped onto the front)



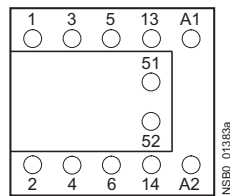
#### Accessories for size S0 to S12 contactors Terminal designations according to DIN 46199 Part 5

3RT19 26-2E.../2F.../2G... solid-state, time-delay auxiliary switch blocks



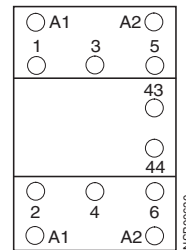
#### 3RT16 capacitor contactors

Size S00  
with 4-pole auxiliary switch block mounted on the front



The auxiliary switch block contains 3 leading contacts (not shown), and one unassigned NO contact and one unassigned NC contact.

Size S0 and S3  
with 4-pole auxiliary switch block mounted on the front



The auxiliary switch block contains 3 leading contacts (not shown) and one unassigned NO contact.

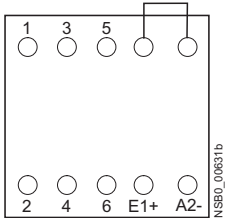


## Position of the terminals for 3RT1 contactors and accessories

### Contactors with extended operating range 0.7 to 1.25 × U<sub>s</sub> Size S00

#### Terminal designations according to EN 50012

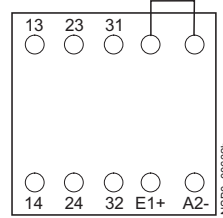
3RT10 17-2K.42-0LA0 contactors



Series resistor  $R_V$  plugged on, NC contact prewired.  
3RH19 11-2. . . . auxiliary switch blocks according to EN 50005 can be snapped on.

#### Terminal designations according to EN 50011

3RH11 22-2K.40-0LA0 contactor relays



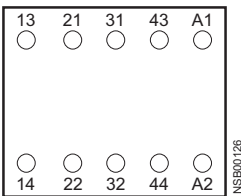
Series resistor  $R_V$  plugged on, NC contact prewired.  
3RH19 11-2. . . . auxiliary switch blocks according to EN 50005 can be snapped on.

### Contactor relays with extended tolerance 0.7 to 1.25 × U<sub>s</sub> Size S00

3RH11 22-2K.40 contactor relays

#### 2 NO + 2 NC

Ident. No.: 22 E



It is not possible to mount an auxiliary switch block.

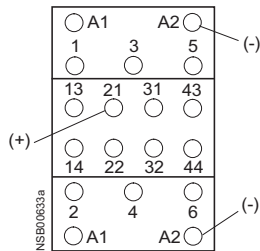
### Contactors with extended operating range 0.7 to 1.25 × U<sub>s</sub> Size S0 to S3

#### Terminal designations according to EN 50012

3RT10 2.-, 3RT10 3.-, 3RT10 4.-3K.44-0LA0 contactors  
with front 4-pole 3RH19 21-2HA22 auxiliary switch block

#### 2 NO + 2 NC

Ident. No.: 22 E



For circuit diagram of the series resistor wiring, see page 226.

*Note:*  
For position of terminals for the 3RT10 17-2K.4. and 3RT10 25-3K.40 contactors see page 227.

# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

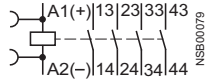
### Connection diagrams for 3RH1 contactor relays, size S00

#### Terminal designations according to EN 50011<sup>1)</sup>

3RH11 contactor relays

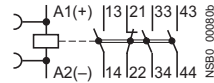
##### 4 NO

Ident. No.: 40E



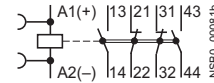
##### 3 NO + 1 NC

31 E



##### 2 NO + 2 NC

22E



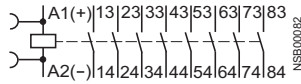
3RH11 40 contactor relays

with 3RH19 11-1GA..,

3RH12 44, 3RH12 62 auxiliary switch blocks snapped onto the front

##### 8 NO

Ident. No.: 80E



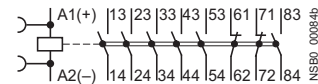
##### 7 NO + 1 NC

71E



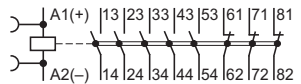
##### 6 NO + 2 NC

62E



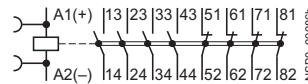
##### 5 NO + 3 NC

Ident. No.: 53E



##### 4 NO + 4 NC

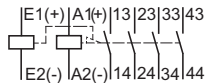
44E



3RH14 latched contactor relays

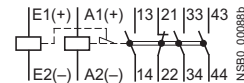
##### 4 NO

Ident. No.: 40E



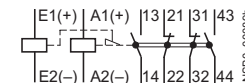
##### 3 NO + 1 NC

31E



##### 2 NO + 2 NC

22E



Surge suppressor (plug-in direction coded)

Diode



Diode assembly



Varistor



RC element



Diode with LED



Varistor with LED



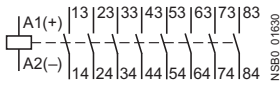
1) Positively-driven operation is assured likewise for auxiliary switch blocks according to EN 50005 in conjunction with 3RH11 contactor relays (basic units).

## Connection diagrams for 3TH42 contactor relays with 8 contacts

### Terminal designations according to EN 50011

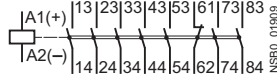
#### 8 NO

Ident. No.: 80E



#### 7 NO + 1 NC

71E



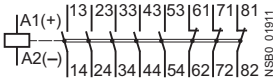
#### 6 NO + 2 NC

62E



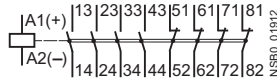
#### 5 NO + 3 NC

Ident. No.: 53E



#### 4 NO + 4 NC

44E



#### 3 NO + 3 NC and 1 NO + 1 NC make-before-break

44E, U

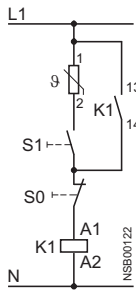


## Circuit diagrams for 3TH42 contactor relays with 8 contacts

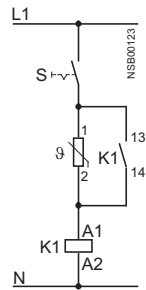
3TX4 180-0A NTC thermistor module

Switching examples

Momentary-contact operation



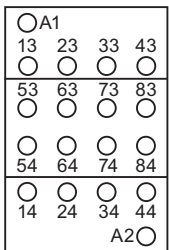
Maintained-contact operation



## Position of the terminals for 3TH42 contactor relays with 8 contacts

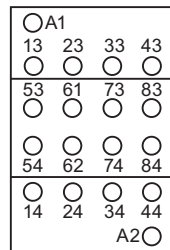
#### 8 NO

Ident. No.: 80E



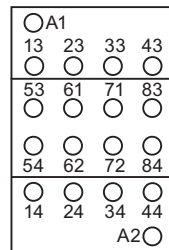
#### 7 NO + 1 NC

71E



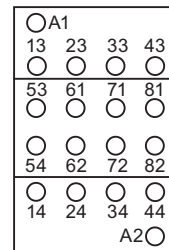
#### 6 NO + 2 NC

62E



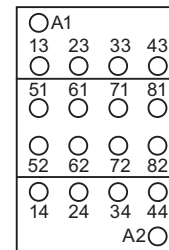
#### 5 NO + 3 NC

53E



#### 4 NO + 4 NC

44E



# Switching Devices – Contactors and Contactor Assemblies

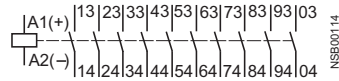
## Project planning aids

### Connection diagrams for 3TH43 contactor relays with 10 contacts

#### Terminal designations according to EN 50011

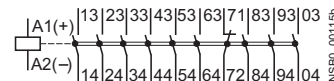
##### 10 NO

Ident. No.: 100E



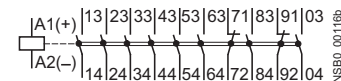
##### 9 NO + 1 NC

91E



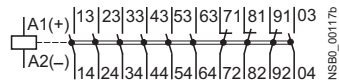
##### 8 NO + 2 NC

82E



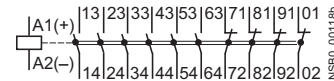
##### 7 NO + 3 NC

Ident. No.: 73E



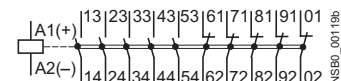
##### 6 NO + 4 NC

64E



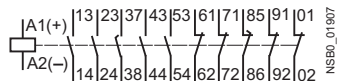
##### 5 NO + 5 NC

55E



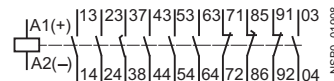
##### 4 NO + 4 NC, 1 NO + 1 NC make-before-break

Ident. No.: 44E/11U



##### 6 NO + 2 NC, 1 NO + 1 NC make-before-break

63E/11U

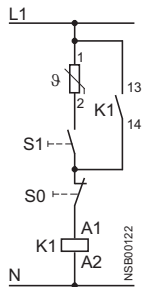


### Circuit diagrams for 3TH43 contactor relays with 10 contacts

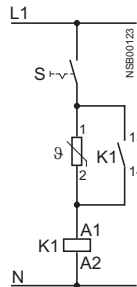
3TX4 180-0A NTC thermistor module

Switching examples

Momentary-contact operation



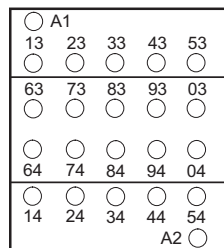
Maintained-contact operation



### Position of the terminals for 3TH43 contactor relays with 10 contacts

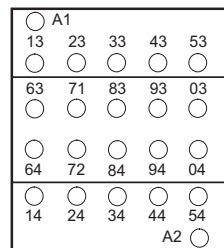
##### 10 NO

Ident. No.: 100E



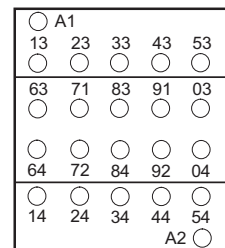
##### 9 NO + 1 NC

91E



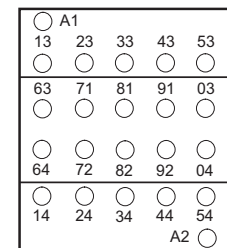
##### 8 NO + 2 NC

82E



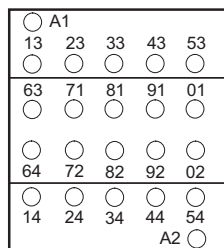
##### 7 NO + 3 NC

73E



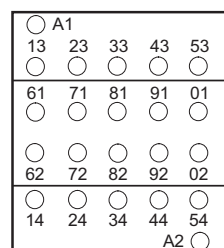
##### 6 NO + 4 NC

Ident. No.: 64E



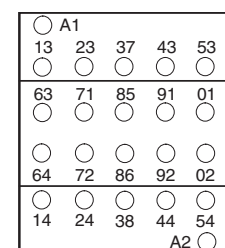
##### 5 NO + 5 NC

55E



##### 5 NO + 5 NC

55E, U



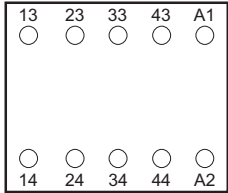
## Position of the terminals for 3RH1 contactor relays, size S00

### Terminal designations according to EN 50011

3RH11 contactor relays

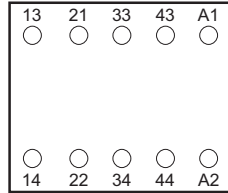
#### 4 NO

Ident. No.: 40E



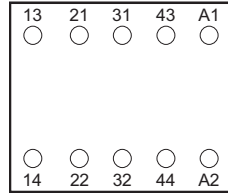
#### 3 NO + 1 NC

31E



#### 2 NO + 2 NC

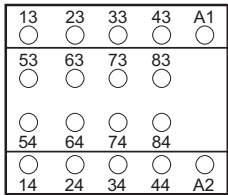
22E



3RH11 40 contactor relays  
with 3RH19 11-1GA... 3RH12 44, 3RH12 62  
auxiliary switch blocks snapped onto the front

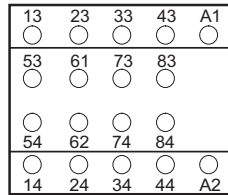
#### 8 NO

Ident. No.: 80E



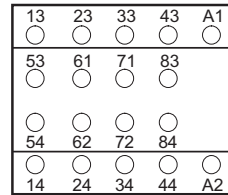
#### 7 NO + 1 NC

71E



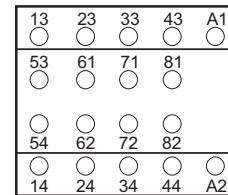
#### 6 NO + 2 NC

62E



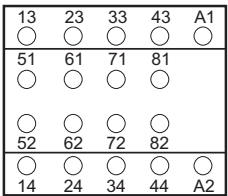
#### 5 NO + 3 NC

53E



#### 4 NO + 4 NC

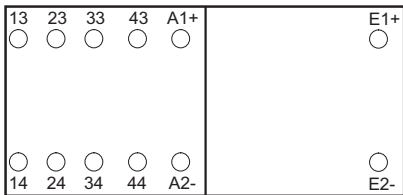
Ident. No.: 44E



3RH14 latched contactor relays

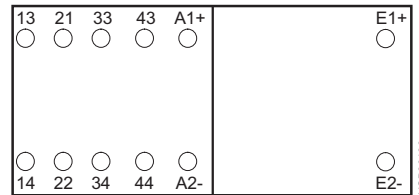
#### 4 NO

Ident. No.: 40E



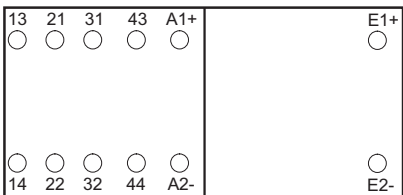
#### 3 NO + 1 NC

31E



#### 2 NO + 2 NC

Ident. No.: 22E



# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### Connection diagrams for 3RH11 coupling relays for switching auxiliary circuits

DC operation

L+ is to be connected to coil terminal A1.

#### 3RH11 coupling relays for auxiliary circuits, size S00

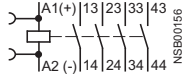
##### Terminal designations according to EN 50011

(it is not possible to snap on an auxiliary switch block)

Surge suppressor can be mounted

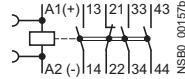
#### 4 NO

Ident. No.: 40E



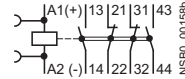
#### 3 NO + 1 NC

31E



#### 2 NO + 2 NC

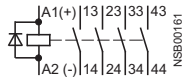
22E



Diode integrated

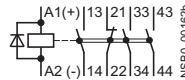
#### 4 NO

Ident. No.: 40E



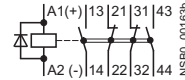
#### 3 NO + 1 NC

31E



#### 2 NO + 2 NC

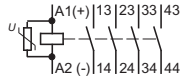
22E



Varistor integrated

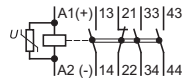
#### 4 NO

Ident. No.: 40E



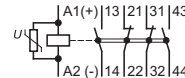
#### 3 NO + 1 NC

31E



#### 2 NO + 2 NC

22E



#### Surge suppressors for size S00 coupling relays

See 3RH11 contactor relays, page 232.

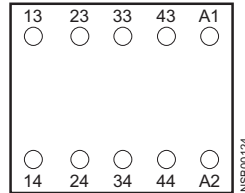
### Position of the terminals for 3RH11 coupling relays for switching auxiliary circuits

Size S00

3RH11 coupling relays

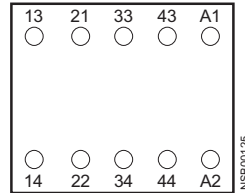
#### 4 NO

Ident. No.: 40E



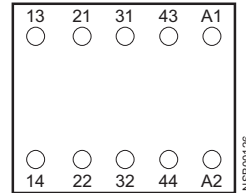
#### 3 NO + 1 NC

31E



#### 2 NO + 2 NC

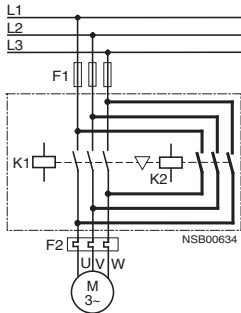
22E



## Circuit diagrams for 3RA13 reversing contactor assemblies

### Size S00

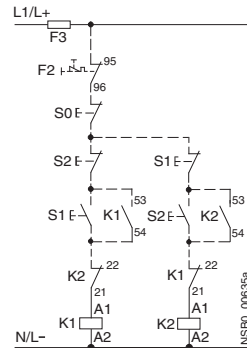
#### Main circuit



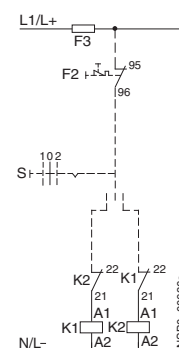
#### Control circuit

(The terminal designations for the contactors comply with EN 50012)

#### For momentary-contact operation



#### For maintained-contact operation

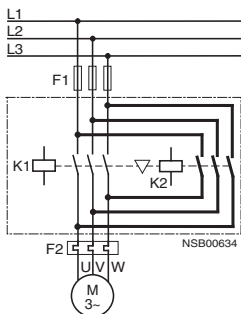


The 3RA19 13-2A assembly kit contains, among other things, wiring connectors for connecting the main circuit.

The 3RA19 13-2A assembly kit contains, among other things, the electrical interlock.

### Sizes S0 to S3

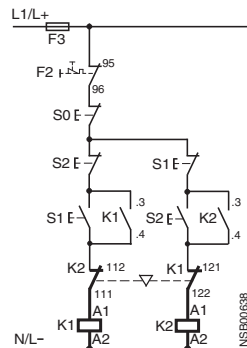
#### Main circuit



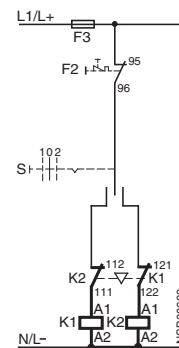
#### Control circuit

(The terminal designations for the contactors comply with EN 50005)

#### For momentary-contact operation



#### For maintained-contact operation



The 3RA19 .3-2A assembly kits contain, among other things, the wiring modules on the top and bottom for connecting the main current paths.

The 3RA19 24-2B mechanical interlock contains one NC contact for each contactor for the NC contact interlock.

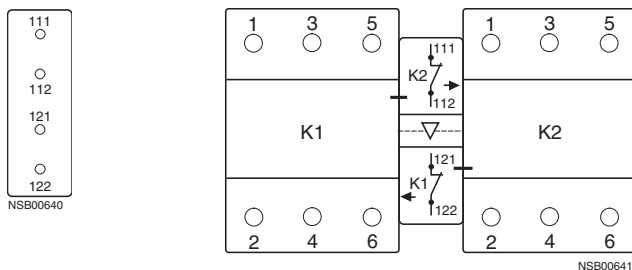
## Position of the terminals for 3RA13 reversing contactor assemblies

### Size S0 to S3

#### Terminal designations according to EN 50005

3RA19 24-2B mechanical interlock (laterally mountable), integrated in reversing contactor assemblies (reversing starters), contains one NC contact for the electrical interlock for each contactor

#### 2 NC



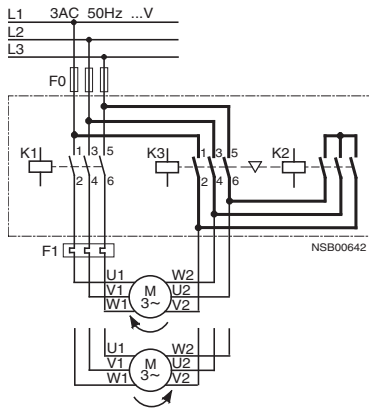
- S0 Button "OFF"
- S1 Button "Clockwise ON"
- S2 Button "Counterclockwise ON"
- S Button "CW-OFF-CCW"
- K1 Clockwise contactor
- K2 Counterclockwise contactor
- F1 Fuses for main circuit
- F3 Fuses for control circuit
- F2 Overload relays

# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

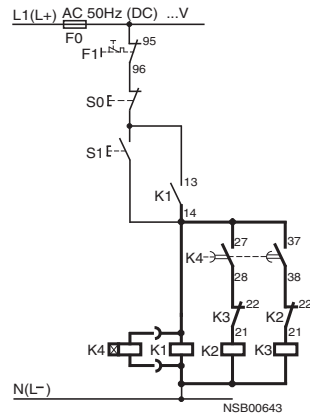
### Circuit diagrams for 3RA14 wye-delta starting contactor assemblies

#### Size S00 + S0 Main circuit

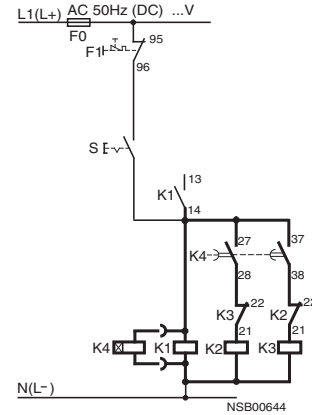


#### Control circuits with 3RT19 16-2G... solid state time-delay auxiliary switch block, snapped onto the front (example circuits)

##### For momentary-contact operation



##### For maintained-contact operation

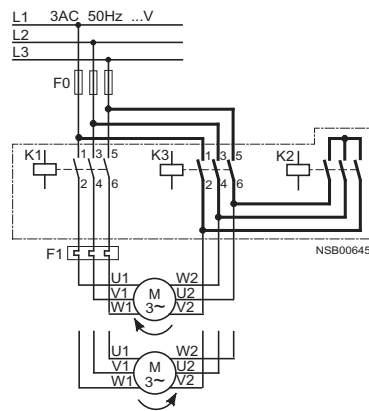


The contact element 27/28 for the solid-state time-delay auxiliary switch block with wye-delta function is only closed on the wye stage; the contact element is open in the delta stage as well as in the de-energized state.

#### Sizes S2 to S12<sup>1)</sup>

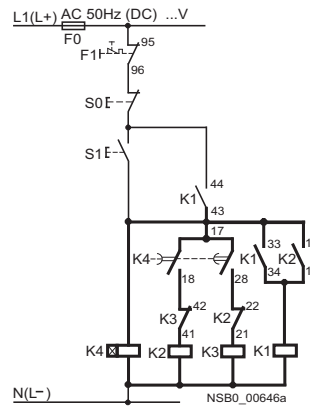
##### Main circuit

Joint supply line of  
line contactor and delta contactor

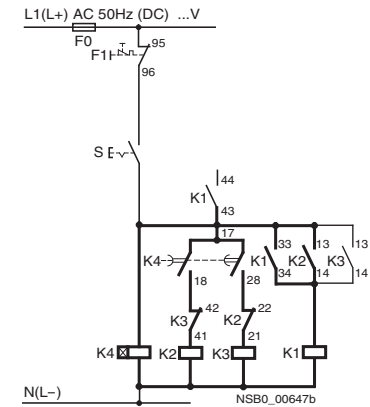


#### Control circuits with 3RP15 7. timing relay, laterally mounted (example circuits)

##### For momentary-contact operation



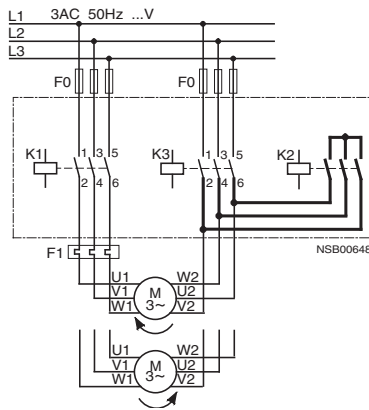
##### For maintained-contact operation



The contact element 17/18 is only closed in the wye stage; the contact element is open in the delta stage as well as in the de-energized state.

S1 (S) is connected to clamping point K1/33.

#### Alternative for separate supply line of line contactor and delta contactor



- S0 Button "OFF"
- S1 Button "ON"
- S Maintained-contact switch
- K1 Line contactor
- K2 Star contactor
- K3 Delta contactor
- K4 Solid-state, time-delay auxiliary switch block or timing relay
- F0 Fuses
- F1 Overload relays

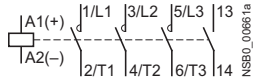
1) Only 3RA19 53-2B assembly kit.



## Internal circuit diagrams for 3TG10 miniature contactors

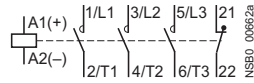
3TG10 10 contactors

**1 NO**  
Ident. No.: 10E



3TG10 01 contactors

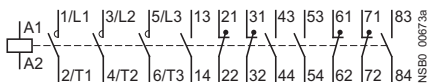
**1 NC**  
01E



## Internal circuit diagrams for 3TF68 and 3TF69 vacuum contactors, 3-pole

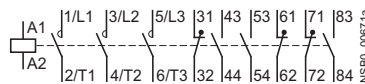
3TF68 44 and 3TF69 44 contactors

**4 NO + 4 NC**  
AC operation  
Maximum number of auxiliary contacts that can be fitted



3TF68 33 and 3TF69 33 contactors

**3 NO + 3 NC**  
DC operation  
Maximum number of auxiliary contacts that can be fitted



3TY7 681-1G

auxiliary switch blocks  
for coil reconnection,  
3TF68 and 3TF69,  
DC economy circuit



3TY7 561-1AA00

auxiliary switch blocks  
1st auxiliary switch block  
left or right

Mounted on left Mounted on right



3TY7 561-1KA00

auxiliary switch blocks  
2nd auxiliary switch block  
left or right

Mounted on left Mounted on right



3TY7 561-1EA00

auxiliary switch blocks  
with overlapping contacting

Mounted on left Mounted on right



3TY7 561-1. auxiliary switch blocks

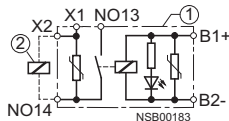
Solid-state compatible auxiliary switch  
block

Mounted on left Mounted on right



3TX7 090-0D

coupling links for control by PLC  
with surge suppression

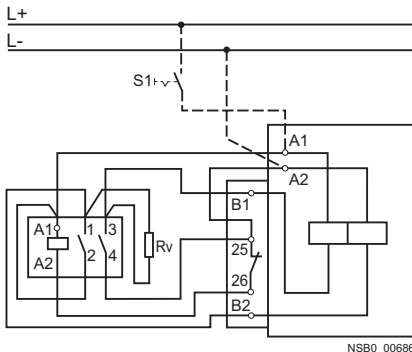


- ① Coupling link
- ② Contactor

## Circuit diagrams for 3TF68 and 3TF69 vacuum contactors, 3-pole

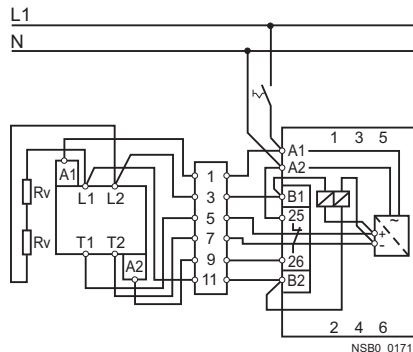
**DC economy circuit · Maintained-contact operation**

3TF68 33-.D.4 and 3TF69 33-.D.4 contactors



**For AC control supply voltage subject to strong interference**

3TF68 33-.Q.7 and 3TF69 33-.Q.7 contactors



# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

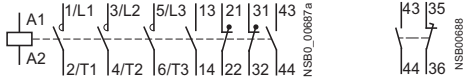
### Internal circuit diagrams for 3TB50 to 3TB56 contactors, 3-pole

Sizes 6 to 12  
3TB50 to 3TB56

DC operation  
Auxiliary contacts: **2 NO + 2 NC**

Auxiliary switch block  
3TY6 501-1E, 3TY6 561-1E

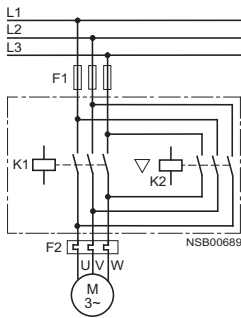
With overlapping  
contacting



### Circuit diagrams for 3TD68 reversing contactor assemblies

#### Main circuit

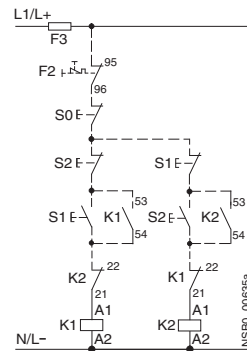
In the main circuit the connections are made between contactors K1 and K2.



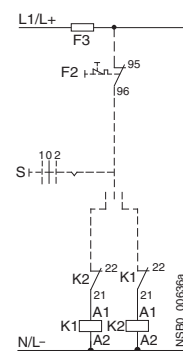
#### Control circuits

The control circuit cables indicated by broken lines are not wired in the factory.

#### Momentary-contact operation



#### Maintained-contact operation



#### Terminal designations of the unassigned auxiliary contacts

Contactor assembly	With electrical interlock				Without electrical interlock			
	Contactor K1 NO contact	Contactor K2 NC contact	Contactor K1 NO contact	Contactor K2 NC contact	Contactor K1 NO contact	Contactor K2 NO contact	Contactor K1 NC contact	Contactor K2 NC contact
3TD68	13 – 14	21 – 22	13 – 14	31 – 32	13 – 14	21 – 22	13 – 14	21 – 22
	43 – 44	61 – 62	43 – 44	61 – 62	43 – 44	31 – 32	43 – 44	31 – 32
	53 – 54	71 – 72	53 – 54	71 – 72	53 – 54	61 – 62	53 – 54	61 – 62
	83 – 84		83 – 84		83 – 84	71 – 72	83 – 84	71 – 72

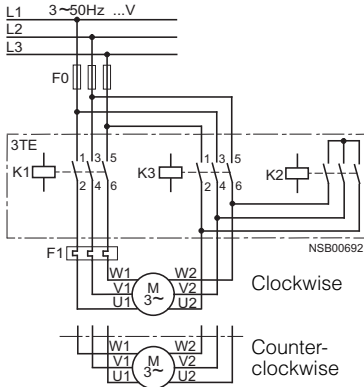
S0 Button "OFF"  
S1 Button "Clockwise ON"  
S2 Button "Counterclockwise ON"  
S Button "CW-OFF-CCW"  
K1 Clockwise contactor  
K2 Counterclockwise contactor  
F1 Fuses for main circuit  
F3 Fuses for control circuit  
F2 Overload relays

## Circuit diagrams for 3TE68 wye-delta starting contactor assemblies

### Main circuit

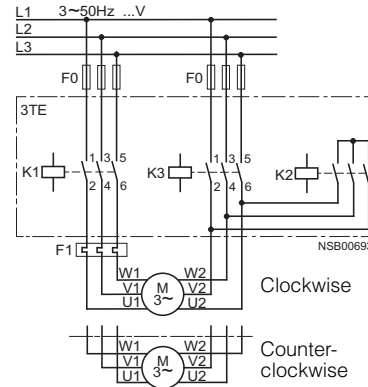
Single infeed

Without main conducting path connection between line and delta contactors



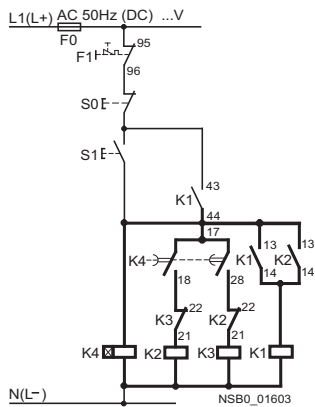
Double infeed

Without main conducting path connection between line and delta contactors

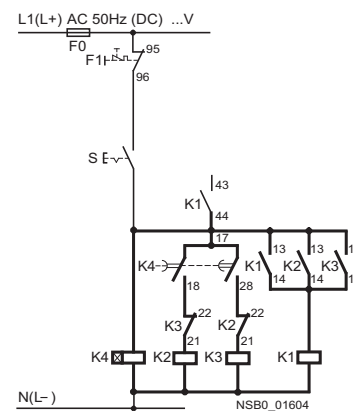


### Control circuit with 3RP1 574 timing relay

For momentary-contact operation



For maintained-contact operation

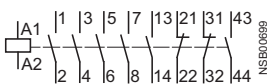


The contact element 17/18 is only closed in the wye stage; the contact element is open in the delta stage as well as in the de-energized state.

- S0 Button "OFF"
- S1 Button "ON"
- S Maintained-contact switch
- K1 Line contactor
- K2 Star contactor
- K3 Delta contactor
- K4 Timing relay
- F0 Fuses
- F1 Overload relays

## Internal circuit diagrams for 3TK1 contactors, 4-pole (4 NO) for switching resistive loads (AC-1)

3TK1 contactors



3TK1 910-3B  
auxiliary switch block  
Mounted on left



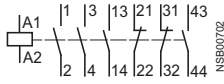
Mounted on right



# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### Internal circuit diagram for 3TC44 to 3TC56 contactors for switching DC voltage

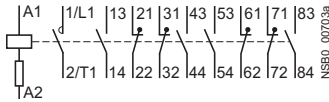


### Internal circuit diagrams for 3TC74, 3TC78 contactors for switching DC voltage

DC operation

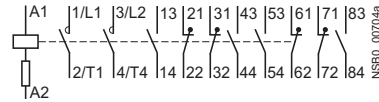
3TC74 contactors

Auxiliary contacts **4 NO + 4 NC**



3TC78 contactors

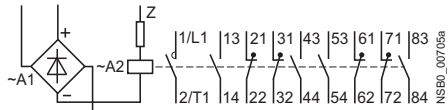
Auxiliary contacts **4 NO + 4 NC**



AC operation

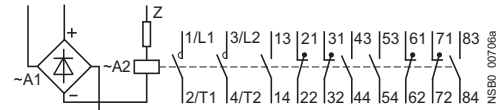
Auxiliary contacts **4 NO + 4 NC**

Must be operated in the DC circuit



Auxiliary contacts **4 NO + 4 NC**

Must be operated in the DC circuit

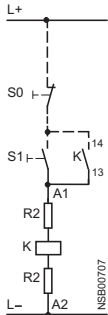


### Circuit diagrams for 3TC74, 3TC78 contactors for switching DC voltage

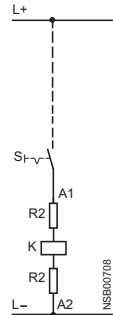
3TC74 contactors

Momentary-contact operation

DC operation

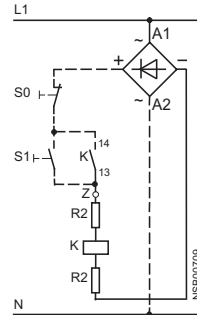


Maintained-contact operation



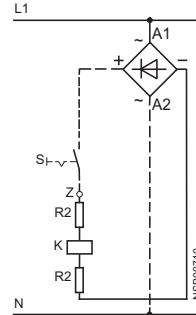
Momentary-contact operation

AC operation (must be operated in the DC circuit)



Maintained-contact operation

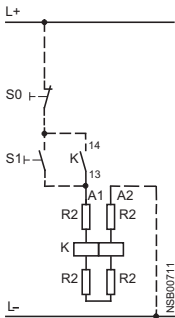
AC operation (must be operated in the DC circuit)



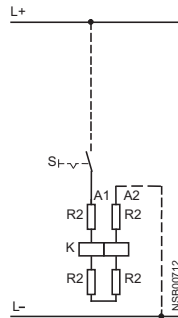
3TC78 contactors

Momentary-contact operation

DC operation

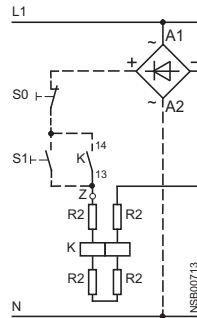


Maintained-contact operation



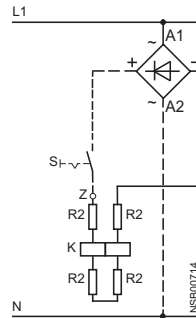
Momentary-contact operation

AC operation (must be operated in the DC circuit)



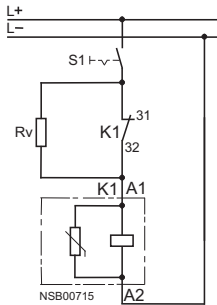
Maintained-contact operation

AC operation (must be operated in the DC circuit)

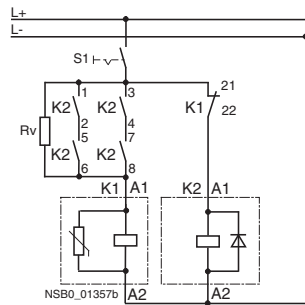


## Circuit diagrams for 3T contactors with extended operating range $0.7$ to $1.25 \times U_s$

Circuit with series resistor  $R_v$  (size 2 or larger) without reversing contactor



Circuit with series resistor  $R_v$  and reversing contactor  $K_2$  (for  $K_1$  contactors size 8 or larger)



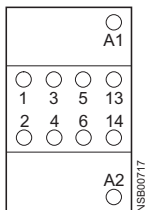
$R_v$ :  
Two resistors are connected in series for 3TB54, 3TB56 and 3TC56 contactors.

$K_2$ :  
For 3TB52 to 3TB56 and 3TC52 to 3TC56:  
3RT13 17-1F.40

## Position of the terminals for 3TG10 miniature contactors

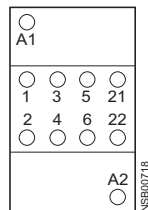
3TG10 10 contactors

**1 NO**



3TG10 01 contactors

**1 NC**

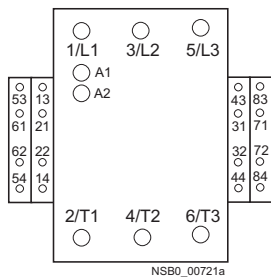


## Position of the terminals for 3TF68 and 3TF69 vacuum contactors, 3-pole

AC operation

3TF68 and 3TF69 contactors

**4 NO + 4 NC**

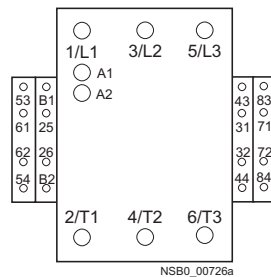


DC operation

3TF68 and 3TF69 contactors

**3 NO + 3 NC**

Maximum number of auxiliary contacts that can be fitted

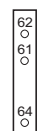


3TY7 561-1 . solid-state compatible auxiliary switch blocks for lateral mounting

Left mounted



Right mounted



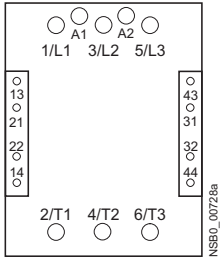
# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### Position of the terminals for 3TB50 to 3TB56 contactors, 3-pole

Size 6 to 12  
3TB50 to 3TB56 contactors

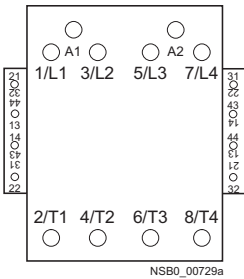
**2 NO + 2 NC**



### Position of the terminals for 3TK1 contactors for switching resistive loads (AC-1)

3TK10 to 3TK17 contactors

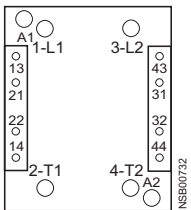
**2 NO + 2 NC**



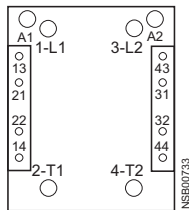
### Position of the terminals for 3TC contactors for switching DC voltage

AC and DC operation

Size 2  
3TC44 contactors

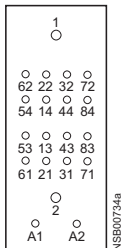


Sizes 4, 8 and 12  
3TC48 to 3TC56 contactors



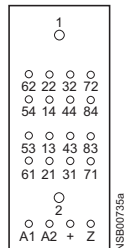
DC operation

3TC74 contactors



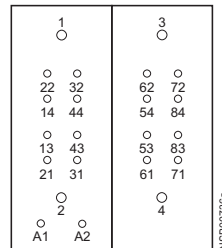
AC operation

3TC74 contactors



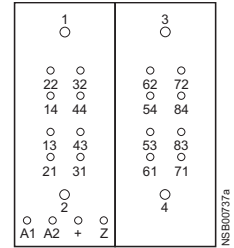
DC operation

3TC78 contactors



AC operation

3TC78 contactors

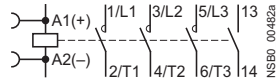


## Internal circuit diagrams for 3TF2 and 3TK2 contactors

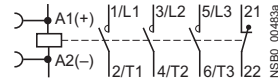
### Terminal designations according to EN 50012

3TF20 ...-0 and 3TF28 ...-0 contactors with AC and DC operation

**1 NO**  
Ident. No.: 10E

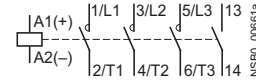


**1 NC**  
01E

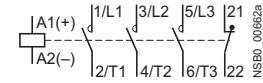


3TF20 ...-3, 3TF20 ...-6 and 3TF20 ...-7 contactors with AC and DC operation

**1 NO**  
Ident. No.: 10E

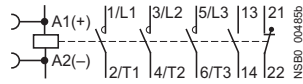


**1 NC**  
01E

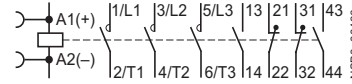


3TF20 10 contactors with 3TX4 4 ...-1 auxiliary switch block, 3TF22 and 3TF29 contactors with AC and DC operation

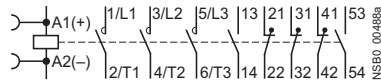
**1 NO + 1 NC**  
Ident. No. 11E



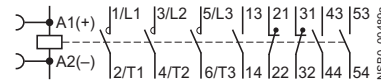
**2 NO + 2 NC**  
22E



**2 NO + 3 NC**  
Ident. No.: 23E



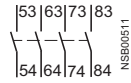
**3 NO + 2 NC**  
32E



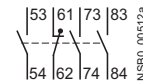
### Terminal designations according to EN 50005

3TX4 4 ...-2 auxiliary switch block

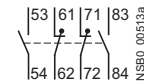
**4 NO**  
Ident. No.: 40



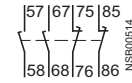
**3 NO + 1 NC**  
31



**2 NO + 2 NC**  
22



**2 NO + 2 NC**  
22U



with make-before-break

**2 NO**  
Ident. No.: 20



**1 NO + 1 NC**  
11



**2 NC**  
02



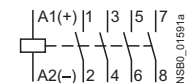
**1 NO + 1 NC**  
11U



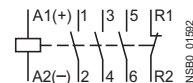
with make-before-break

3TK20 contactors

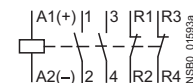
**4 NO**



**3 NO + 1 NC**



**2 NO + 2 NC**



### Surge suppressors

Diode



Diode assembly



Varistor



RC element



Diode with LED



Varistor with LED



# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### Internal circuit diagrams for 3TH2 contactor relays and 3TH27 latched contactor relays

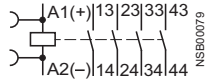
#### Size S00

#### Terminal designations according to EN 50011

3TH20 ...0 contactor relays,  
AC and DC operation,  
with screw terminals

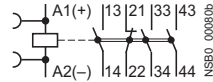
#### 4 NO

Ident. No.: 40E



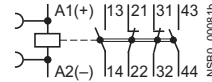
#### 3 NO + 1 NC

31E



#### 2 NO + 2 NC

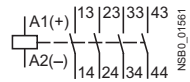
22E



3TH20 ...-3, 3TH20 ...-6, 3TH20 ...-7 contactor relays,  
AC and DC operation,  
with flat connectors 6.3 mm x 0.8 mm and solder pin connections

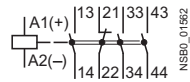
#### 4 NO

Ident. No.: 40E



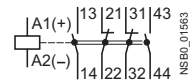
#### 3 NO + 1 NC

31E



#### 2 NO + 2 NC

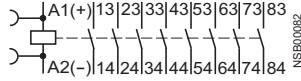
22E



3TH20 40 contactor relays with 3TX4 4 ...0 auxiliary switch block and  
3TH22 contactor relay

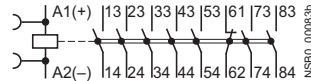
#### 8 NO

Ident. No.: 80E



#### 7 NO + 1 NC

71E



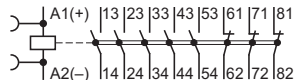
#### 6 NO + 2 NC

62E



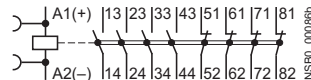
#### 5 NO + 3 NC

Ident. No.: 53E



#### 4 NO + 4 NC

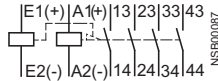
44E



3TH27 latched contactor relays,  
AC and DC operation

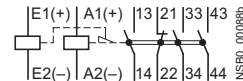
#### 4 NO

Ident. No.: 40E



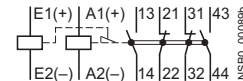
#### 3 NO + 1 NC

31E



#### 2 NO + 2 NC

22E



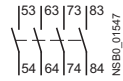
#### Terminal designations according to EN 50005

3TX4 4 ...-2 auxiliary switch block

Positively-driven operation is assured likewise for auxiliary switch blocks according to EN 50005 in conjunction with 3TH20 contactor relays (basic units).

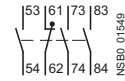
#### 4 NO

Ident. No.: 40



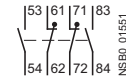
#### 3 NO + 1 NC

31



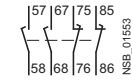
#### 2 NO + 2 NC

22



#### 2 NO + 2 NC

22U



with make-before-break

#### 2 NO

Ident. No.: 20



#### 1 NO + 1 NC

11



#### 2 NC

02



#### 1 NO + 1 NC

11U



with make-before-break

Surge suppressors

Diode



Diode assembly



Varistor



RC element



Diode with LED



Varistor with LED

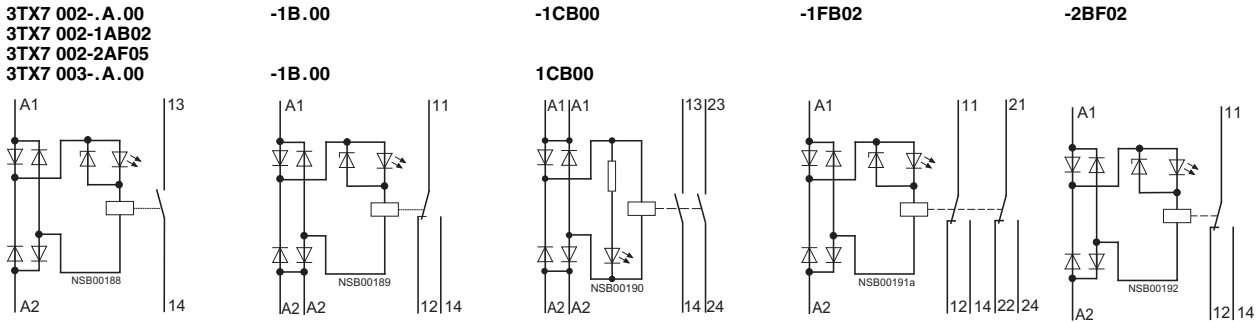




## Relay couplers – connection diagrams for 3TX7 002/3TX7 003

Terminal designations according to EN 50005

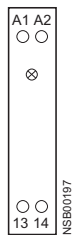
3TX7 002-.A.00  
3TX7 002-1AB02  
3TX7 002-2AF05  
3TX7 003-.A.00



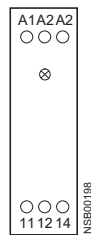
## Relay couplers – position of the terminals

Output coupling links

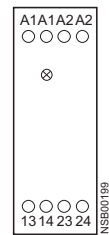
3TX7 002-1AB0.  
3TX7 003-1AB00



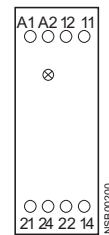
-1B.00  
-1B.00



-1CB00  
-1CB00



-1FB02

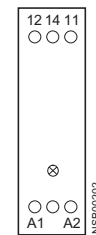


Input coupling links

3TX7 002-2A.0.  
3TX7 003-2A.0.



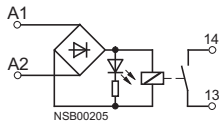
-2BF02



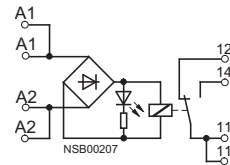
## Relay couplers – connection diagrams for 3TX7 004/3TX7 005

Output coupling links

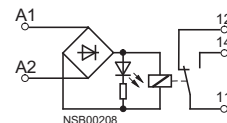
3TX7 00.-1M.00



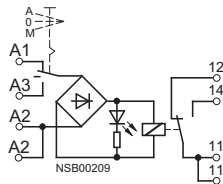
3TX7 00.-1BB00  
3TX7 00.-1BF05



3TX7 00.-1L.0.



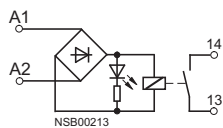
3TX7 00.-1BB10



A = Automatic  
0 = Neutral position  
M = Manual

Input coupling links

3TX7 00.-2M.02



# Switching Devices – Contactors and Contactor Assemblies

## Project planning aids

### Relay couplers – position of the terminals

#### Output coupling links

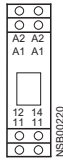
**3TX7 004**  
**-1M.00**



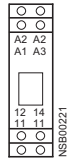
**-1L.0.**



**-1B.0.**



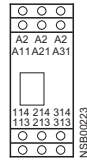
**-1BB10**



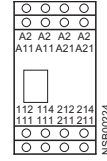
**-1CB00**



**-1HB00**



**-1GB00**



#### Input coupling links

**3TX7 004-2M...**



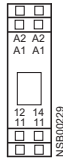
**3TX7 005**  
**-1M.00**



**-1L.0.**



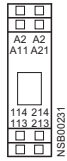
**-1BB00**



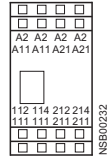
**-1BB10**



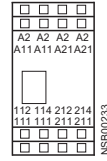
**-1CB00**



**-1HB00**



**-1GB00**



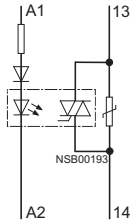
**3TX7 005-2M...**



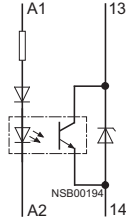
### Semiconductor couplers – connection diagrams

#### Terminal designations according to EN 50005

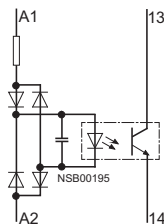
**3TX7 002-3AB00**



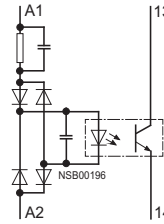
**-3AB01**



**-4AB00**



**-4AG00**



### Semiconductor couplers – position of the terminals

#### Output coupling links

**3TX7 002-3AB0.**



#### Input coupling links

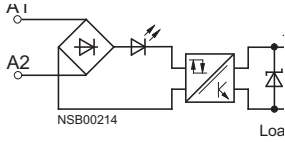
**3TX7 002-4A.0.**



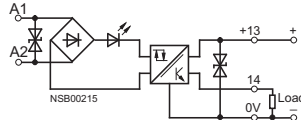
## Semiconductor couplers – connection diagrams

### Output coupling links

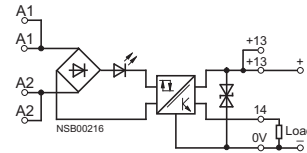
**3TX7 00.-3AB04**  
**3TX7 00.-3PB41**



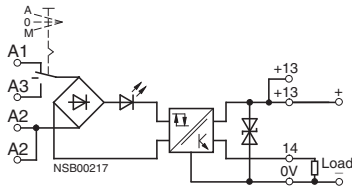
**3TX7 00.-3PB54**  
**3TX7 00.-3PG74**  
**3TX7 00.-3PB74**



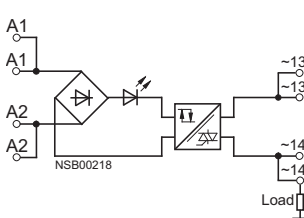
**3TX7 00.-3AC04**



**3TX7 00.-3AC14**

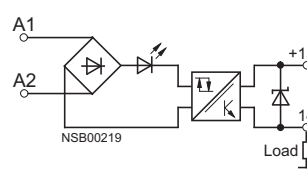


**3TX7 00.-3AC03**



### Input coupling links

**3TX7 00.-4AB04**



A = Automatic  
0 = Neutral position  
M = Manual

## Semiconductor couplers – position of the terminals

### Output coupling links

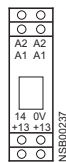
**3TX7 004**  
**-3AB04,**  
**-3PB41**



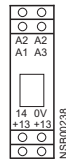
**-3PB54,**  
**-3PB74,**  
**-3PG74**



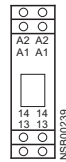
**-3AC04**



**-3AC14**

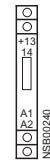


**-3AC03**



### Input coupling links

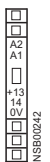
**3TX7 004-4AB04**



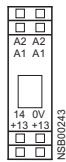
**3TX7 005**  
**-3AB04,**  
**-3PB41**



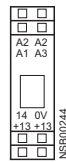
**-3PB54,**  
**-3PB74,**  
**-3PG74**



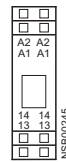
**-3AC04**



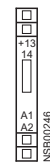
**-3AC14**



**-3AC03**



**3TX7 005-4AB04**

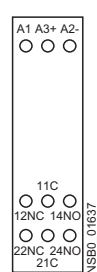


## 3RS18 coupling relays with industrial housing – position of the terminals

**3RS18 00**  
**-.AP00**  
**-.AQ00**



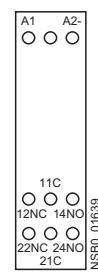
**3RS18 00**  
**-.BP00**  
**-.BQ00**



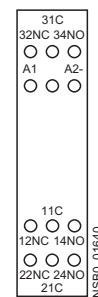
**3RS18 00**  
**-.HP0.**  
**-.HQ0.**



**3RS18 00**  
**-.BW00**



**3RS18 00**  
**-.HW0.**

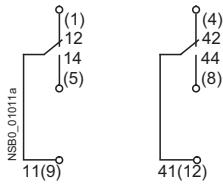


# Switching Devices – Contactors and Contactor Assemblies

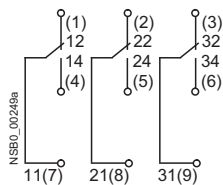
## Project planning aids

### LZX plug-in relays – relay couplers

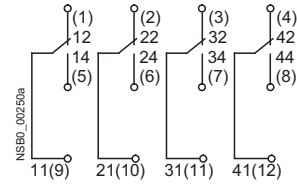
**LZX:PT270**  
2-pole



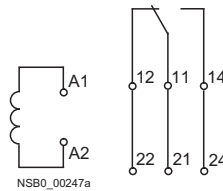
**LZX:PT370**  
3-pole



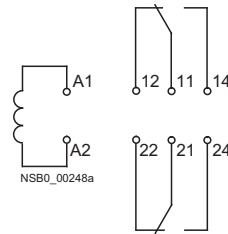
**LZX:PT520, LZX:PT570, LZX:PT580**  
4-pole



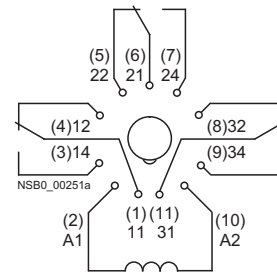
**LZX:RT3**  
1-pole



**LZX:RT4**  
2-pole



**LZX:MT32**  
3-pole



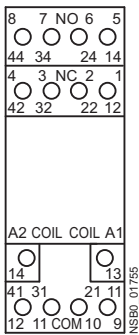
Values in brackets: socket designations.  
Without brackets: contact/coil designations.

### Position of the connection terminals

#### Standard plug-in bases for PT series

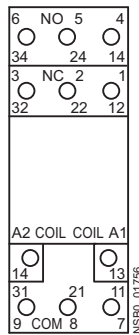
**LZS:PT78720**

for 2 CO contacts, with screw terminals



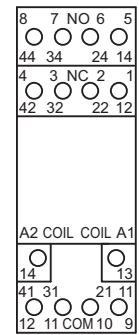
**LZS:PT78730**

for 3 CO contacts, with screw terminals



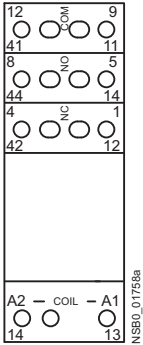
**LZS:PT78740**

for 4 CO contacts, with screw terminals



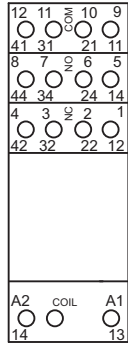
## Plug-in bases with logical isolation for PT series

**LZS:PT78722**  
for 2 CO contacts,  
with screw terminals



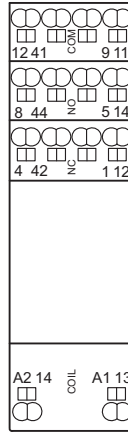
NSBD\_01758a

**LZS:PT78742**  
for 4 CO contacts,  
with screw terminals



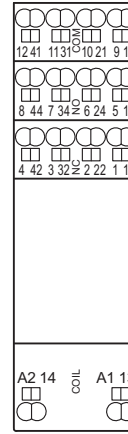
NSBD\_01759

**LZS:PT7872P**  
for 2 CO contacts,  
with spring-type terminals



NSBD\_01760

**LZS:PT7874P**  
for 4 CO contacts,  
with spring-type terminals



NSBD\_01761a

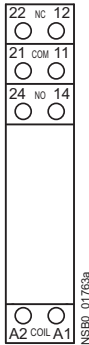
## Plug-in bases for RT series

**LZS:RT78725**  
with screw terminals



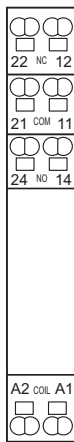
NSBD\_01762a

**LZS:RT78726**  
with logical isolation and  
screw terminals



NSBD\_01763a

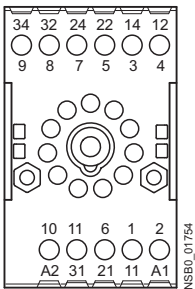
**LZS:RT7872P**  
with logical isolation and spring-type  
terminals



NSBD\_01764a

## Plug-in bases for MT series

**LZS:MT78750**  
for industrial relays



NSBD\_01754

# Switching Devices – Contactors and Contactor Assemblies

Project planning aids



## Service & Support

Download catalogs and information material:  
[www.siemens.com/industrial-controls/catalogs](http://www.siemens.com/industrial-controls/catalogs)

Newsletter - always up to date:  
[www.siemens.com/industrial-controls/newsletter](http://www.siemens.com/industrial-controls/newsletter)

E-Business in the Industry Mall:  
[www.siemens.com/industrial-controls/mall](http://www.siemens.com/industrial-controls/mall)

Online-Support:  
[www.siemens.com/industrial-controls/support](http://www.siemens.com/industrial-controls/support)

Contact for all technical information:  
**Technical Assistance**  
Tel.: +49 (911) 895-5900  
E-Mail: [technical-assistance@siemens.com](mailto:technical-assistance@siemens.com)  
[www.siemens.com/industrial-controls/technical-assistance](http://www.siemens.com/industrial-controls/technical-assistance)