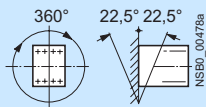



# 3RH, 3TH Contactor Relays

## 3RH1 contactor relays, 4- and 8-pole

### Technical specifications

Contactor	Type Size	<b>3RH1</b> <b>S00</b>
<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	 Special version required
	DC operation	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) according 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) according to:

- ZH 1/457
- EN 60947-5-1, Appendix L
- SUVA

#### Note:

3RFF19 11-.NF.solid-state compatible auxiliary switch blocks have no positively-driven contacts.

### Contact reliability

Contact reliability at 17 V, 1 mA according to EN 60947-5-4

#### 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 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.

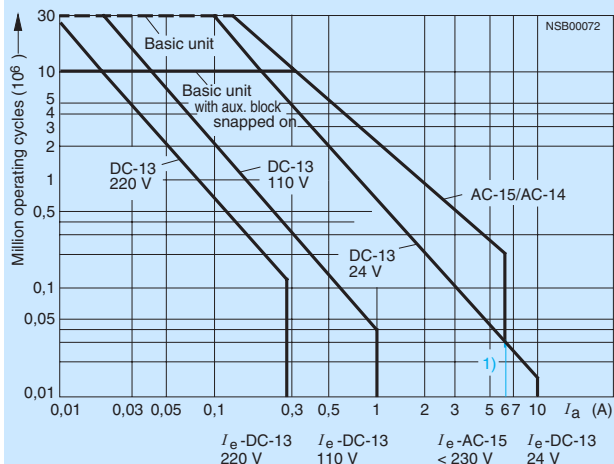
If magnetic circuits other than the contactor coil systems or solenoid valves are present, e.g. magnetic brakes, protective measures for the load circuits are necessary.

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.

Frequency of contact faults  $< 10^{-8}$ , i.e.  $< 1$  fault per 100 million operating cycles



#### Diagram legend:

$I_a$  = Breaking current

$I_e$  = Rated operational current

<sup>1)</sup> Snap-on auxiliary switch blocks:  $I_e$ /DC-13 max. 6 A.

# 3RH, 3TH Contactor Relays

## 3RH1 contactor relays, 4- and 8-pole

Contactor	Type		3RH11, 3RH12 S00	3RH14 S00
<b>CSA and UL rated data</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	5 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>Safe isolation</b> between the coil and the contacts in the basic unit according to EN 60947-1, Appendix N	V		400	
<b>Permissible ambient temperature</b>	During operation	°C	-25 ... +60	
	During storage	°C	-55 ... +80	
<b>Degree of protection</b> according to EN 60947-1, Appendix C			IP20, coil assembly IP40	
<b>Touch protection</b> according 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</b>				
<b>Screw terminals</b>		<b>Auxiliary conductor and coil terminals</b>		
(1 or 2 conductors can be connected)		• 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 conductors, 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>Cage Clamp terminals</b>		<b>Auxiliary conductor and coil terminals</b>		
(1 or 2 conductors can be connected)		• 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 conductors, 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.

Maximum outer diameter of the conductor insulation: 3.6 mm.

# 3RH, 3TH Contactor Relays

## 3RH1 contactor relays, 4- and 8-pole

Contactor	Type Size	3RH1. S00	
<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			
<u>Closing</u>			
• 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
<u>Opening</u>			
• 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>			
<u>Closing</u>			
• 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
<u>Opening</u>			
• 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
<u>Arcing time</u>			
Dependence of the switching frequency $z'$ on the operational current $I'$ and operational voltage $U'$ $z' = z \cdot I_e/I' \cdot (U_e/U')^{1.5} \cdot 1/h$			

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

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

1) Snap-on auxiliary switch blocks: 6 A.