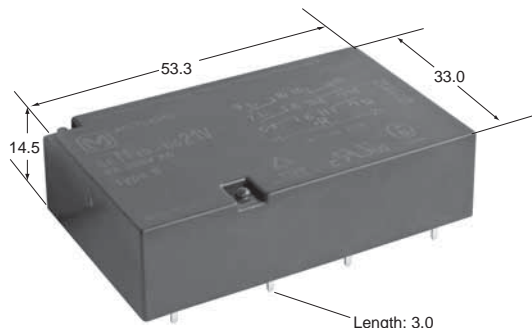


Panasonic

Low profile safety relay
with forcibly guided
double contacts

SFN4D RELAY



Tolerance ± 0.3 mm
Weight approx. 42 g

FEATURES

- Relay complies with IEC 61810-3, Type B
- Polarized magnet system with snap action function
- Extremely small total power loss
 - Nominal coil power consumption of 390mW
 - Double contacts with low contact resistance, e.g. $[(6A)^2 \times 2.5m\Omega] \times 4NO = 360mW$
- Relay height, 14.5mm
- Reinforced insulation according to EN 50178
 - between coil-contacts and contacts-contacts
 - rated voltage of the circuits 230 / 400V or 277 / 480Vrms
 - rated impulse voltage of 6kV \rightarrow clearance ≥ 5.5 mm
 - pollution degree 2 \rightarrow creepage distance ≥ 5.5 mm

SPECIFICATIONS

Contact

Contact configuration (a = normally open / NO, b = normally closed / NC)	4a2b
Contact material	AgSnO ₂ , with Au flash
Contact resistance (initial at 6V DC, 1A)	$\leq 30m\Omega$
Typical contact resistance	2.5m Ω
Max. switching capacity	6A/8A ^{*1} 250V AC
Max. switching voltage	500V AC / DC
Min. switching voltage / min. switching current	Reference 10V / 10mA
Pick-up / drop-out / bounce time (approx. values at U _{nominal})	23 / 6 ^{*2} / 2ms
Mechanical life	10 ⁷ ops

Coil

Operate / release and holding at 20°C (% of U _{nominal}) ^{*3}	75% / 25% min. 48%
Pick-up/nominal power consumption	219-236 / 390-420mW

Characteristics

Max. switching frequency (without load)	5Hz
Permissible ambient temperature at nominal power consumption ^{*3}	-25°C to 92°C
Upper temperature limit	105°C
Test voltage: open contact / contact-contact / contact-coil	2500 / 4000 / 5000V _{rms}
Insulation resistance at 500V DC (initial)	10 ⁹ Ω
Shock resistance (11ms) NO/NC ^{*4}	20 / 15G
Vibration resistance 10 – 200 Hz (10 – 55 Hz, amplitude 2 mm) ^{*4}	10G
Degree of protection	RT III ^{*5}
Unit weight	42g

Important: Relay characteristics may be influenced by:

- strong external magnetic fields
- magnetic conductive materials near the relay
- narrow top-to-top mounting (printed surface to printed surface)

*1 See "ELECTRICAL LIFE (Reference Data)" on page 2.

*2 Without diode

*3 See also "REFERENCE DATA" on page 3.

*4 Contact interruption <10 μ s

*5 According to EN 61810-1: 2004, table 2

ORDERING INFORMATION

Ex. SFN4D — DC12 V

Coil voltage (DC)
5, 9, 12, 16, 18, 21 24, 36, 48, 60

Notes: 1) Standard packing; Tube: 10 pcs. Case 100 pcs.
2) Other coil voltage available upon request

COIL DATA (at 20°C)

Part number	Coil nominal voltage V DC	Operate voltage* ¹ V DC	Release voltage* ¹ V DC	Coil resistance Ω (±10%, 20°C)
SFN4D-DC5V	5	3.75	1.25	64.1
SFN4D-DC9V	9	6.75	2.25	207.7
SFN4D-DC12V	12	9.00	3.00	369.2
SFN4D-DC16V	16	12.00	4.00	656.4
SFN4D-DC18V	18	13.5	4.50	830.8
SFN4D-DC21V	21	15.75	5.25	1130.8
SFN4D-DC24V	24	18.00	6.00	1476.9
SFN4D-DC36V	36	27.00	9.00	3085.7
SFN4D-DC48V	48	36.00	12.00	5485.7
SFN4D-DC60V	60	45.00	15.00	8571.4

*¹ Operate and release voltage at different temperatures, see "REFERENCE DATA" on page 3, coil voltage characteristics.

SWITCHING CAPABILITY

- Making / breaking capacities according to EN 60947-5-1: 2000, table 4 / 5; AC15: 6A 230V AC / DC13: 6A 24V DC
- Endurance / overload test according to UL 508 16 edition, sections 42 / 43; 6A 250V AC / 6A 24V DC; B300 / R300; File E120782

ELECTRICAL LIFE (Reference Data)*

Voltage	Current (A)	Load type	Frequency	Duty cycle	No. of contacts	No. of ops.
230V AC	8	AC 1	0.25Hz	25%	4	85,000
230V AC	6	AC 1	0.25Hz	25%	4	200,000
230V AC	2.5	AC 1	0.25Hz	25%	4	1,500,000
230V AC	60 / 6	AC 15	0.20Hz	20%	3	40,000
24V DC	6	DC 1	0.25Hz	25%	4	2,000,000
250V DC	0.27	DC 13	0.10Hz	10%	4	1,000,000

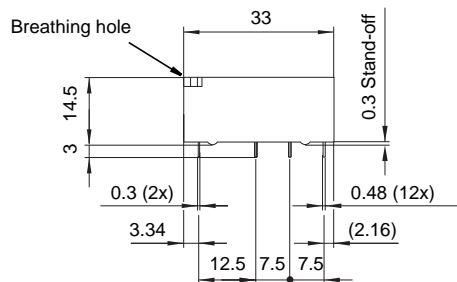
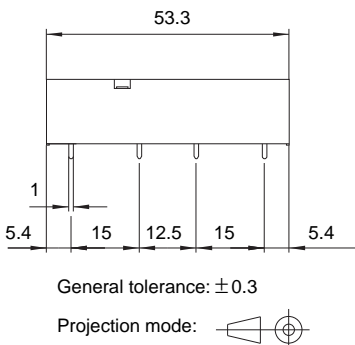
*Test conditions: Room temperature, breathing hole closed, dielectric strength according to EN61810-1:2004.

DIMENSIONS

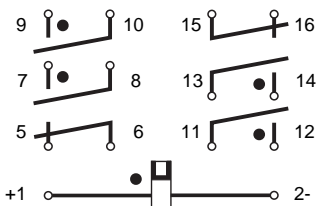
Download [CAD Data](#) from our Web site.

Outer dimensions

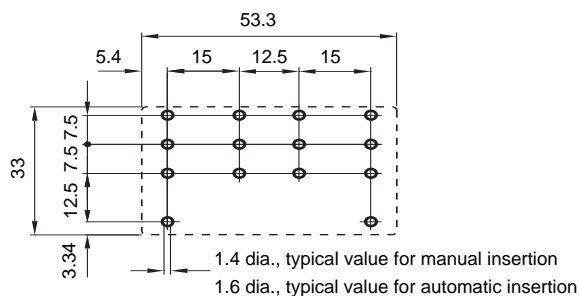
[CAD Data](#)



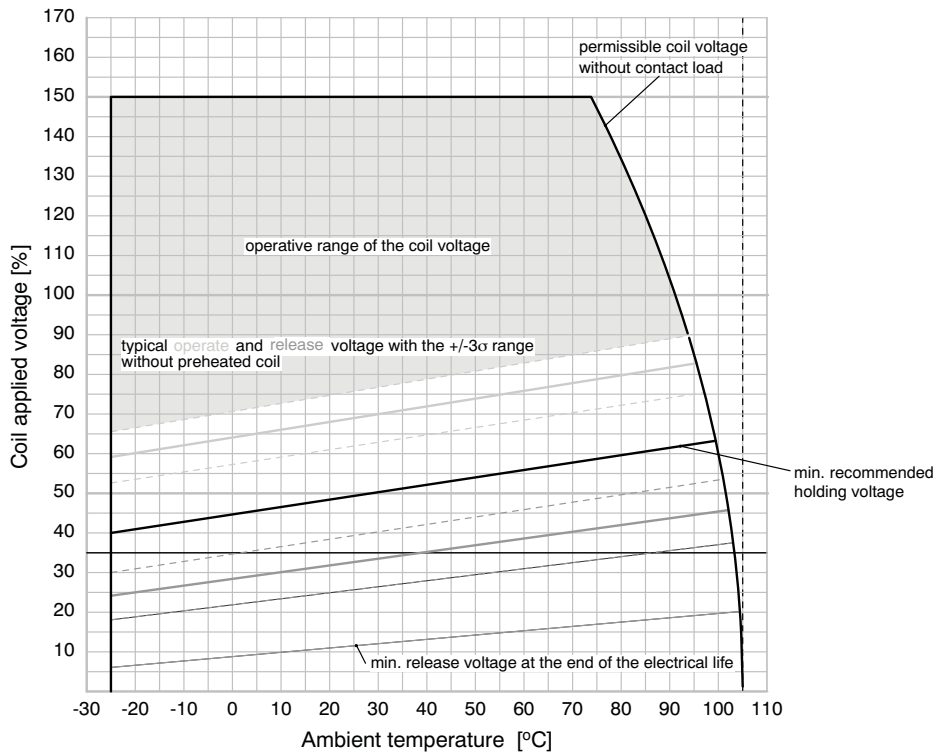
Schematic (Bottom view)



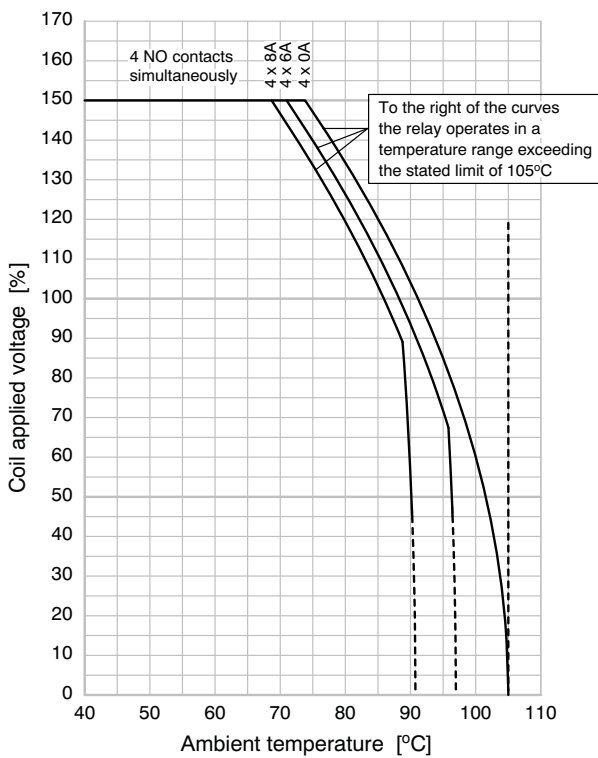
PC board pattern (Bottom view)



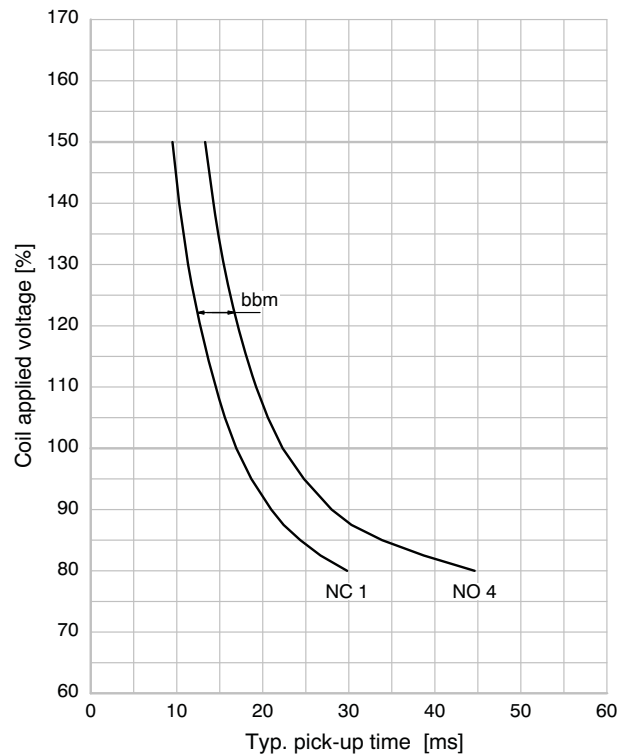
Coil voltage characteristics



Thermic operating range

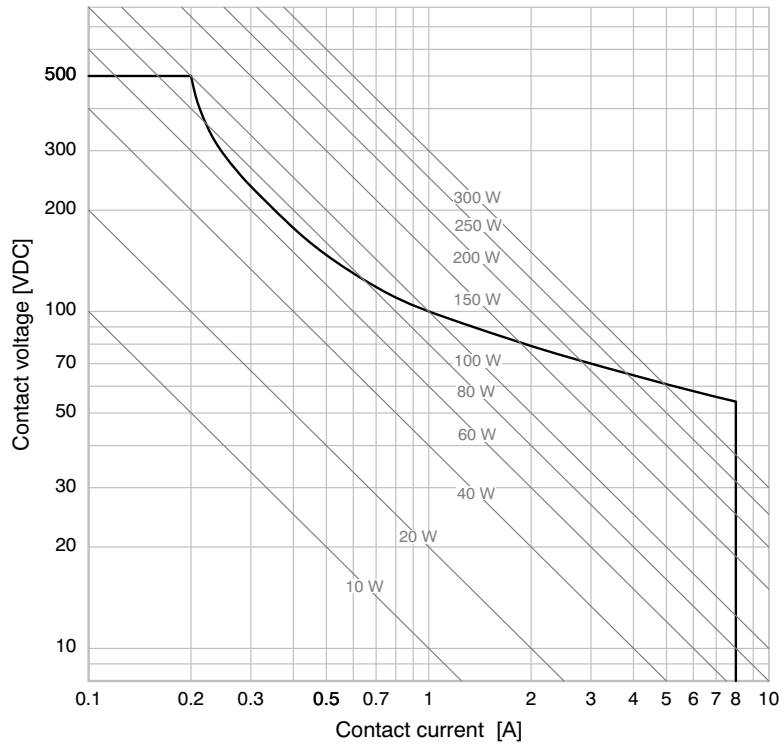


Switching time in relation to coil excitement at 20°C

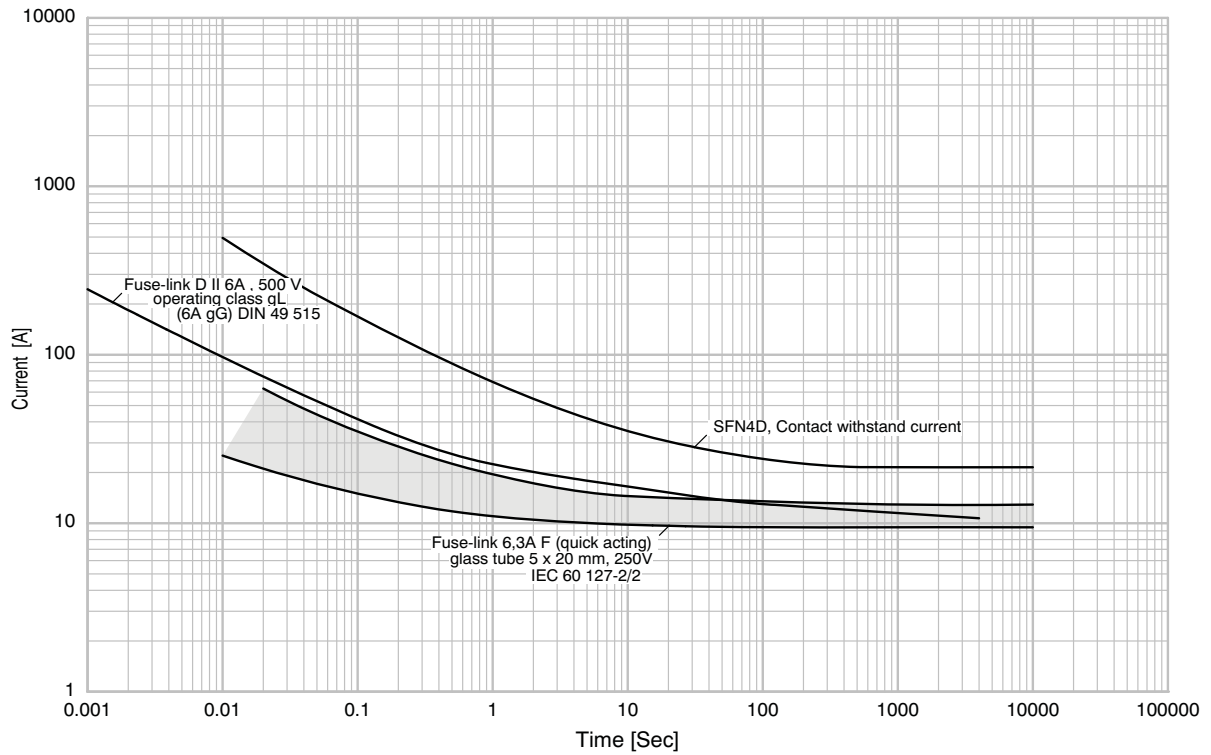


REFERENCE DATA, continued

Load limit curve



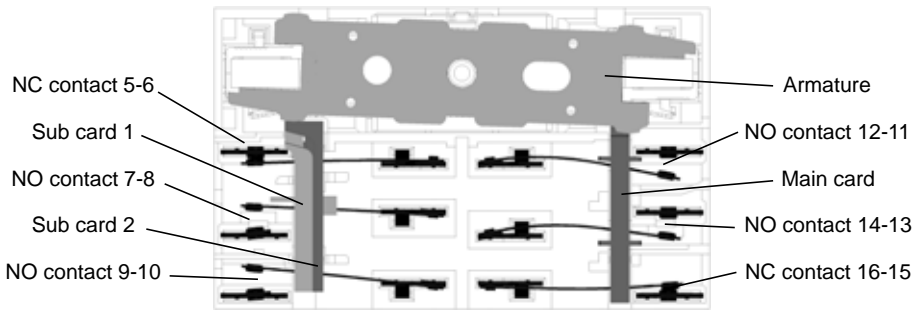
Time / current characteristic



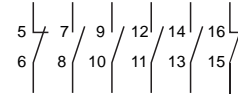
SFN4D

APPLICATION NOTES

The SFN4D Safety Relay



Remark:
Only NC 5-6 monitors
all NO contacts!



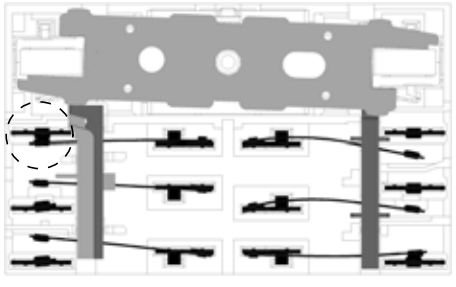
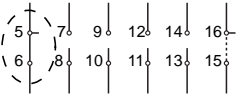
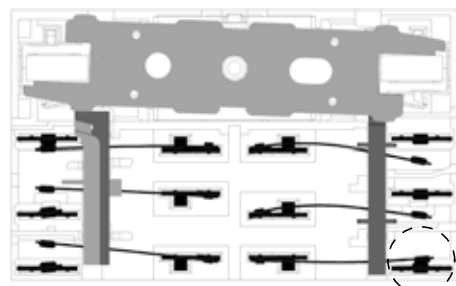
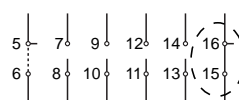
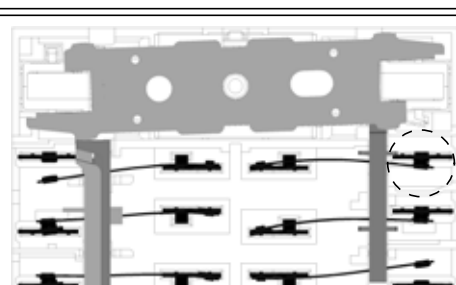
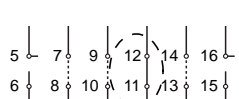
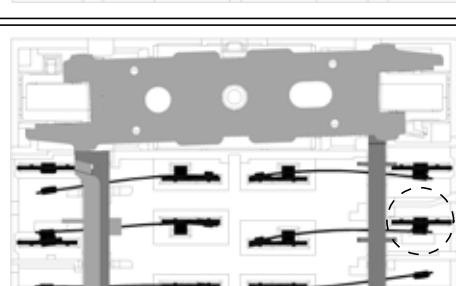
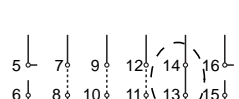
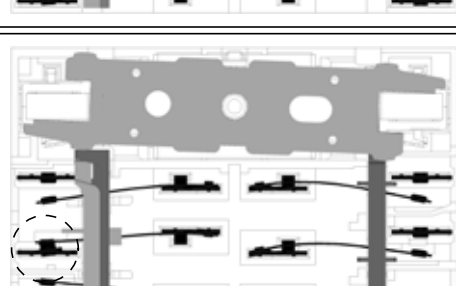
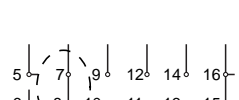
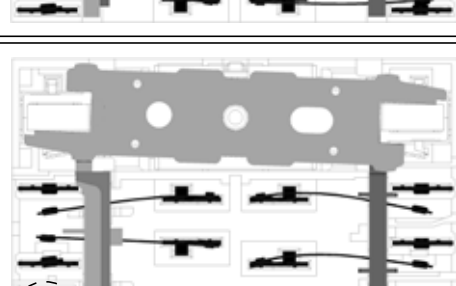
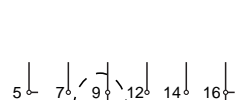
Legend for interpreting contact conditions

Contact	NC (Normally Closed)				NO (Normally Open)			
	Closed	Fully open	Open	Open or closed	Closed	Fully open	Open	Open or closed
Symbol								
Contact gap	0	Maximum (~1.5mm)	>0.5mm (forcibly guided)	Not defined	0	Maximum (~1.5mm)	>0.5mm (forcibly guided)	Not defined

The SFN4D under normal operating conditions

Condition	Illustration of Relay State	Condition of Contacts
<ul style="list-style-type: none"> - Coil deenergized. - Armature in deenergized position. - NC contacts closed. - NO contacts have a contact gap of approx. 1.5mm. 		
<ul style="list-style-type: none"> - Coil energized. - Armature in energized position. - NO contacts closed. - NC contacts have a contact gap of approx. 1.5mm. 		

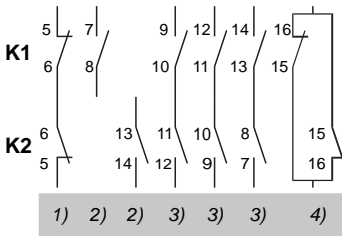
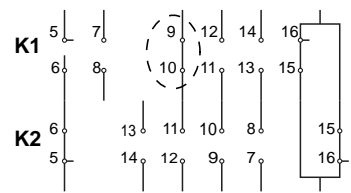
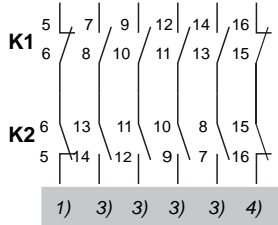
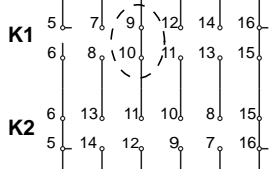
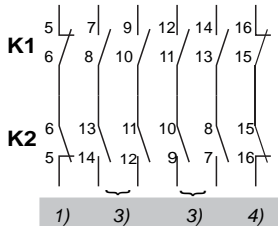
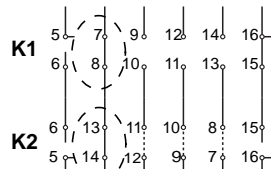
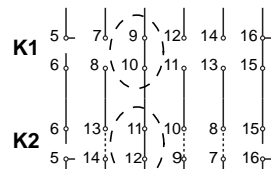
The SFN4D safety relay with welded contacts

Condition	Illustration of Relay State	Condition of Contacts
<ul style="list-style-type: none"> - NC 5-6 welded. - Coil energized. - Armature nearly in deenergized position. 		 <ul style="list-style-type: none"> - All NO contacts are forcibly guided. - The NO contact gaps are min. 0.5mm. - For NC 16-15, the contact condition is not defined.
<ul style="list-style-type: none"> - NC 16-15 welded. - Coil energized. - Armature nearly in deenergized position. 		 <ul style="list-style-type: none"> - All NO contacts are forcibly guided. - The NO contact gaps are min. 0.5mm. - For NC 5-6, the contact condition is not defined.
<ul style="list-style-type: none"> - NO 12-11 welded. - Coil deenergized. - Armature nearly in energized position. 		 <ul style="list-style-type: none"> - All (both) NC contacts are forcibly guided. - The NC contact gaps are min. 0.5mm. - For all NO contacts, the contact condition is not defined.
<ul style="list-style-type: none"> - NO 14-13 welded. - Coil deenergized. - Armature in nearly energized position. 		 <ul style="list-style-type: none"> - All (both) NC contacts are forcibly guided. - The NC contact gaps are min. 0.5mm. - For all NO contacts, the contact condition is not defined.
<ul style="list-style-type: none"> - NO 7-8 welded. - Coil deenergized. - Armature in deenergized position. 		 <ul style="list-style-type: none"> - NC 16-15 is closed!! - All non-welded NO contacts show their max. contact gap. - NC 5-6 forcibly guided to the welded contact by sub card 1. The contact gap is min. 0.5mm.
<ul style="list-style-type: none"> - NO 9-10 welded. - Coil deenergized. - Armature in deenergized position. 		 <ul style="list-style-type: none"> - NC 16-15 is closed!! - All non-welded NO contacts show their max. contact gap. - NC 5-6 forcibly guided to the welded contact by sub card 2. The contact gap is min. 0.5mm.

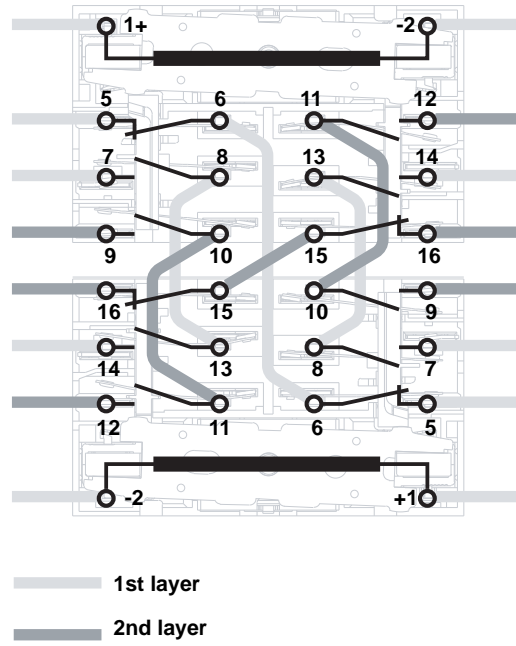
SFN4D

Failure modes, application examples

1) Feedback loop, 2) Self-holding circuit, 3) Safety circuit, 4) Auxiliary contacts

<p>1. Self-holding circuit, three safety circuits</p> 	<p>One contact welded, e.g. NO 9-10 of K1.</p>	<p>Condition of contacts at deenergized coil</p> 
<p>2.1. Four safety circuits</p>  <p>(see wiring example, p. 8)</p>	<p>One contact welded, e.g. NO 9-10 of K1.</p>	<p>Condition of contacts at deenergized coil</p> 
<p>2.2. Two safety circuits</p>  <p>(see wiring example, p. 8)</p>	<p>Both contacts of one path are welded, e.g. NO 7-8 and NO 14-13.</p> <p>A safety circuit needs two paths in this failure mode. The contacts 9-10, 12-11, and 14-13 of K1 interrupt the load.</p>	<p>Condition of contacts at deenergized coil</p> 
<p>Both contacts of one path are welded, e.g. NO 9-10 and NO 12-11.</p> <p>A safety circuit needs two paths in this failure mode. The contacts 7-8, 12-11, and 14-13 of K1 interrupt the load.</p>	<p>Condition of contacts at deenergized coil</p> 	

Wiring for application examples 2.1 and 2.2



For Cautions for Use, see [Relay Technical Information](#).