PCN.PG05.02.22.2023 02.22.2023

Product Change Notice: SF, SF-D, SF-N, and SF-Y Series Relays Materials Color Change

About This Notice:

We would like to inform you that we will change the materials color of the SF, SF-D, SF-N, and SF-Y Series Relays due to the ddiscontinuation of the case molding materials of the current color.

Effective Date:

SF-Y: Production from 01/01/2024 onwards.
SF: Production from 11/01/2023 onwards.
SF-D: Production from 11/01/2023 onwards.
SF-N: Production from 12/20/2022 onwards.

Change Details:

Series	Changes	
	Current	Change
SF-Y（All Types)	**PBT (Black)**	**PBT (Natural)**
SF (3a1b)	**PBT (Blue)**	**PBT (Natural)**
SF-D (2a2b/4a4b)	**PBT (Blue)**	**PBT (Natural)**
SF-N (All Types)	**PBT (Blue)**	**PBT (Natural)**

Affected Parts:

SFY2-**V
SFY4-**V

Panasonic Industrial Devices Sales Company of America
Two Riverfront Plaza, 7th Floor, Newark, NJ 07102

	SF2D-**V SF4D-**V SFN4D-*DC**V
Datasheet(s):	See Attached.
Notes:	There are no changes to the order part number, price, or other specifications of the relay due to this materials change.

Panasonic PCN.PG05.02.22.2023 SF, SF-D, SF-N, and SF-Y Series Relays Materials Color Change

Affected Series	Affected Part Numbers	Comments
SF-Y Series Relays	SFY2-DC5V	Color Change
SF-Y Series Relays	SFY2-DC12V	Color Change
SF-Y Series Relays	SFY2-DC16V	Color Change
SF-Y Series Relays	SFY2-DC18V	Color Change
SF-Y Series Relays	SFY2-DC21V	Color Change
SF-Y Series Relays	SFY2-DC24V	Color Change
SF-Y Series Relays	SFY3-DC5V	Color Change
SF-Y Series Relays	SFY3-DC12V	Color Change
SF-Y Series Relays	SFY3-DC16V	Color Change
SF-Y Series Relays	SFY3-DC18V	Color Change
SF-Y Series Relays	SFY3-DC21V	Color Change
SF-Y Series Relays	SFY3-DC24V	Color Change
SF-Y Series Relays	SFY4-DC5V	Color Change
SF-Y Series Relays	SFY4-DC12V	Color Change
SF-Y Series Relays	SFY4-DC16V	Color Change
SF-Y Series Relays	SFY4-DC18V	Color Change
SF-Y Series Relays	SFY4-DC21V	Color Change
SF-Y Series Relays	SFY4-DC24V	Color Change
SF-Y Series Relays	SFY5-DC5V	Color Change
SF-Y Series Relays	SFY5-DC12V	Color Change
SF-Y Series Relays	SFY5-DC16V	Color Change
SF-Y Series Relays	SFY5-DC18V	Color Change
SF-Y Series Relays	SFY5-DC21V	Color Change
SF-Y Series Relays	SFY5-DC24V	Color Change
SF-N Series Relays	SFN4D-DC5V	Color Change; Europe
SF-N Series Relays	SFN4D-DC9V	Color Change; Europe
SF-N Series Relays	SFN4D-DC12V	Color Change; Europe
SF-N Series Relays	SFN4D-DC16V	Color Change; Europe
SF-N Series Relays	SFN4D-DC18V	Color Change; Europe
SF-N Series Relays	SFN4D-DC21V	Color Change; Europe
SF-N Series Relays	SFN4D-DC24V	Color Change; Europe
SF-N Series Relays	SFN4D-DC36V	Color Change; Europe
SF-N Series Relays	SFN4D-DC48V	Color Change; Europe
SF-N Series Relays	SFN4D-DC60V	Color Change; Europe
SF Series Relays Double Contact Type	SF2D-DC5V	Color Change
SF Series Relays Double Contact Type	SF2D-DC12V	Color Change
SF Series Relays Double Contact Type	SF2D-DC24V	Color Change
SF Series Relays Double Contact Type	SF2D-DC48V	Color Change
SF Series Relays Double Contact Type	SF2D-DC60V	Color Change
SF Series Relays Double Contact Type	SF4D-DC5V	Color Change
SF Series Relays Double Contact Type	SF4D-DC12V	Color Change
SF Series Relays Double Contact Type	SF4D-DC24V	Color Change
SF Series Relays Double Contact Type	SF4D-DC48V	Color Change
SF Series Relays Double Contact Type	SF4D-DC60V	Color Change
SF Series Relays	SF3-DC5V	Color Change
SF Series Relays	SF3-DC12V	Color Change
SF Series Relays	SF3-DC24V	Color Change
SF Series Relays	SF3-DC48V	Color Change
SF Series Relays	SF3-DC60V	Color Change

Flat type safety relays (double contact)

SF RELAYS
Double contact type

2 Form A 2 Form B

4 Form A 4 Form B

RoHS compliant

FEATURES

1. High contact reliability
High contact reliability is achieved through the use of a double contact.

2. Forced operation contacts
N.O. and N.C. side contacts are connected through a card so that one interacts with the other in movement. In case of a contact welding, the other keeps a min. 0.5mm .020inch contact gap.

3. Independent operation contacts (4 Form A 4 Form B)
There are 4 points of forced operation contacts.
Each pair of contacts is free from the main armature and is independent from each other. So if a N.O. pair of contacts are welded, the other 3 N.O. contacts are not effected (operate properly) That enables to plan a circuit to detect welding or go back to the beginning condition.

4. Separated chamber structure
N.O. and N.C. side contacts are put in each own space surrounded with a card and a body-separater. That prevents short circuit between contacts, which is caused by their springs welding or damaged.

5. High breakdown voltage
High breakdown voltage 2,500 Vrms between contacts and coil.

6. High sensitivity
Realizes thin shape and high sensitivity (500 mW nominal operating power) by utilizing high-efficiency polarized magnetic circuit with 4-gap balanced armature.

7. Complies with safety standards
Standard products are UL, CSA, TÜV and SEV certified. Conform to European standards. TÜV certified. Complies with SUVA European standard.

TYPICAL APPLICATIONS

1. Industrial equipment such as presses and machine tools
2. Elevators and other kinds of hoisting mechanisms, conveyor equipment.

ORDERING INFORMATION

SF ☐ D - ☐

Contact arrangement
2: 2 Form A 2 Form B
4: 4 Form A 4 Form B

Nominal coil voltage
DC 5, 12, 24, 48, 60V

Note: Certified by UL, CSA, TÜV and SEV

TYPES

Contact arrangement	Nominal coil voltage	Part No.
2 Form A 2 Form B	5V DC	SF2D-DC5V
	12V DC	SF2D-DC12V
	24V DC	SF2D-DC24V
	48V DC	SF2D-DC48V
	60V DC	SF2D-DC60V
4 Form A 4 Form B	5V DC	SF4D-DC5V
	12V DC	SF4D-DC12V
	24V DC	SF4D-DC24V
	48V DC	SF4D-DC48V
	60V DC	SF4D-DC60V

Standard packing: Carton: 20 pcs.; Case: 200 pcs.

RATING

1. Coil data

Contact arrangement	Nominal coil voltage	Pick-up voltage (at 20°C 68°F)	Drop-out voltage (at 20°C 68°F)	Nominal coil current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power (at 20°C 68°F)	Max. applied voltage (at 20°C 68°F)
2 Form A 2 Form B	5V DC	75%V or less of nominal voltage (Initial)	10%V or more of nominal voltage (Initial)	100mA	50Ω	500mW	120%V of nominal voltage
	12V DC			41.7mA	288Ω		
	24V DC			20.8mA	1,152Ω		
	48V DC			10.4mA	4,608Ω		
	60V DC			8.3mA	7,200Ω		
4 Form A 4 Form B	5V DC	75%V or less of nominal voltage (Initial)	15%V or more of nominal voltage (Initial)	100mA	50Ω	500mW	
	12V DC			41.7mA	288Ω		
	24V DC			20.8mA	1,152Ω		
	48V DC			10.4mA	4,608Ω		
	60V DC			8.3mA	7,200Ω		

2. Specifications

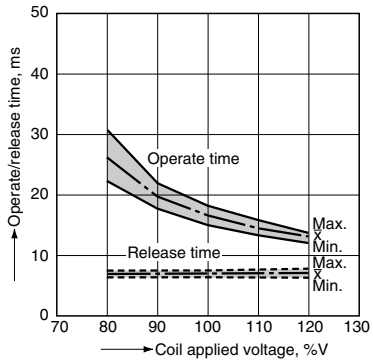
Characteristics	Item		Specifications	
Contact	Arrangement		2 Form A 2 Form B	4 Form A 4 Form B
	Contact resistance (Initial)		Max. 30 mΩ (By voltage drop 6 V DC 1A)	
	Contact material		Au-flashed $AgSnO_2$ type	
Rating	Nominal switching capacity (resistive load)		6A 250V AC, 6A 30V DC	
	Max. switching power (resistive load)		1,500VA 180W	
	Max. switching voltage		440V AC, 30V DC	
	Max. switching current		6A	
	Nominal operating power		500mW	
	Min. switching capacity (Reference value)*1		100mA 5V DC	
Electrical characteristics	Insulation resistance (Initial)		Min. 1,000MΩ (at 500V DC) Measurement at same location as “Breakdown voltage” section.	
	Breakdown voltage (Initial)	Between open contacts	1,300 Vrms for 1min. (Detection current: 10mA)	
		Between contact sets	2,500 Vrms for 1min. (Detection current: 10mA)	
		Between contact and coil	2,500 Vrms for 1min. (Detection current: 10mA)	
	Temperature rise (coil) (at 20° 68°F)		Max. 45°C 113°F (By resistive method, nominal voltage applied to the coil; contact carrying current: 6A)	
	Operate time		Max. 30ms (Nominal voltage applied to the coil, excluding contact bounce time.)	
	Release time		Max. 15ms (Nominal voltage applied to the coil, excluding contact bounce time.) (without diode)	
Mechanical characteristics	Shock resistance	Functional	Min. 294 m/s² (Half-wave pulse of sine wave: 11 ms; detection time: 10μs)	
		Destructive	Min. 980 m/s² (Half-wave pulse of sine wave: 6 ms)	
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 2 mm (Detection time: 10μs)	
		Destructive	10 to 55 Hz at double amplitude of 2 mm	
Expected life	Mechanical		Min. 10^7 (at 180 times/min.)	
	Electrical		Min. 10^5 (at 20 times/min.)	
Conditions	Conditions for operation, transport and storage*2		Ambient temperature: –40°C to +70°C –40°F to +158°F Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)	
	Max. Operating speed		180 times/min.	
Unit weight			Approx. 38g 1.34oz	Approx. 47g 1.66oz

Notes: *1. This value can change due to the switching frequency, environmental conditions and desired reliability level, therefore it is recommended to check this with the actual load.
*2. The upper limit of the ambient temperature is the maximum temperature that can satisfy the coil temperature rise value. Refer to Usage, transport and storage conditions in NOTES.

REFERENCE DATA

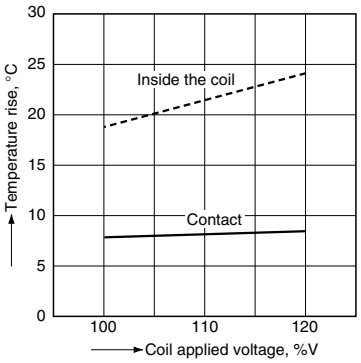
1. Operate/release time (without diode)

Tested sample: SF2D-DC24V (2 Form A 2 Form B)
Quantity: n = 20



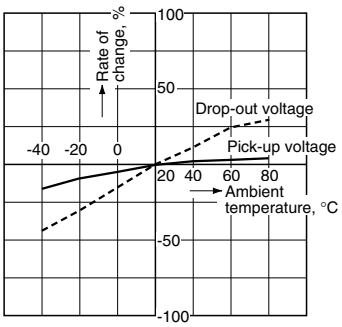
2. Temperature rise

Tested sample: SF4D-DC24V (4 Form A 4 Form B)
Quantity: n = 6
Coil applied voltage: 100%V, 120%V
Contact carry current: 6A



3. Ambient temperature characteristics

Tested sample: SF4D-DC24V (4 Form A 4 Form B)
Quantity: n = 6



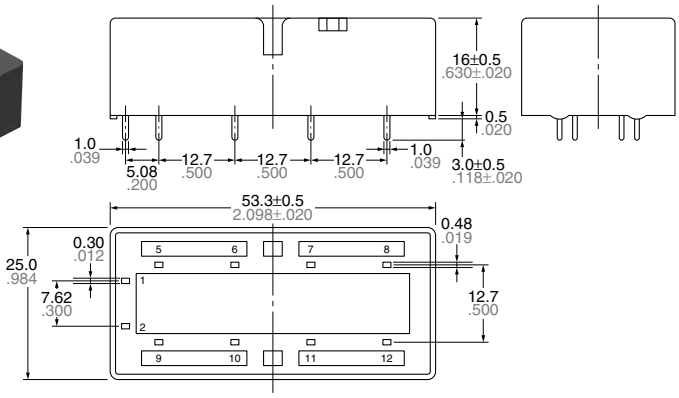
DIMENSIONS (mm inch)

The CAD data of the products with a CAD Data mark can be downloaded from: http://industrial.panasonic.com/ac/e/

1. 2 Form A 2 Form B

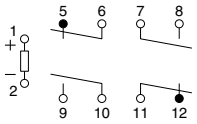
CAD Data

External dimensions

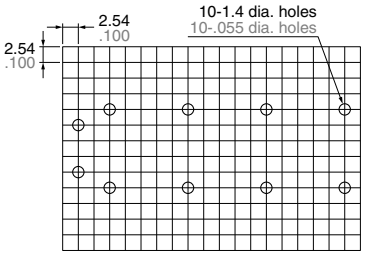


General tolerance: ±0.3 ±.012

Schematic (Bottom view)



PC board pattern (Bottom view)

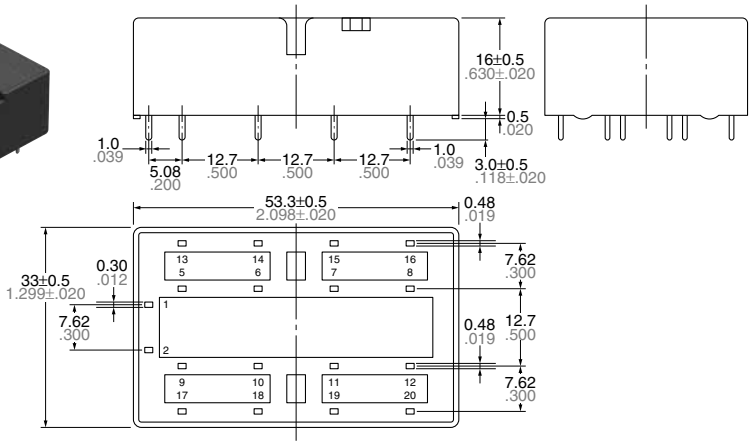


Tolerance: ±0.1 ±.004

2. 4 Form A 4 Form B

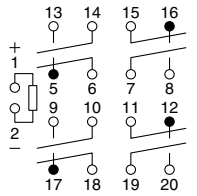
CAD Data

External dimensions

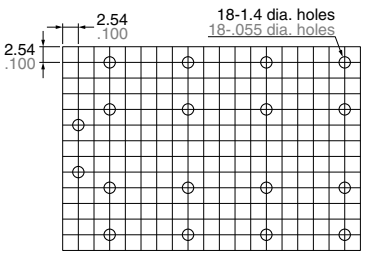


General tolerance: ±0.3 ±.012

Schematic (Bottom view)



PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

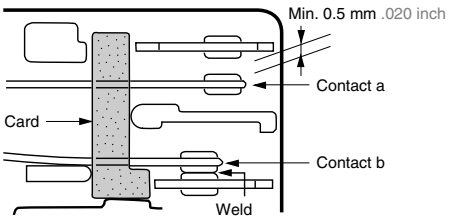
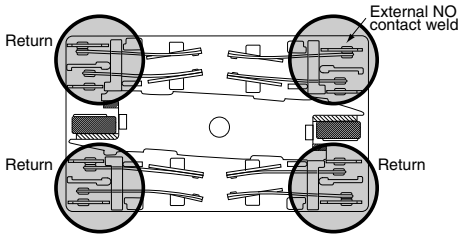
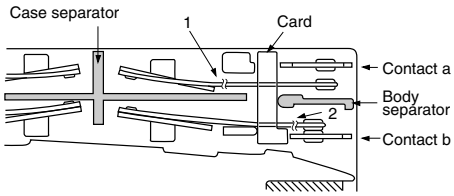
SAFETY STANDARDS

UL/C-UL (Recognized)		TÜV (Certified)		SEV	
File No.	Contact rating	File No.	Rating	File No.	Contact rating
E120782*	6A 250V AC 6A 24V DC	968 EZ 116.03/10 (SF2D) 968 EZ 116.02/09 (SF4D)	3A 24V DC 6A 250V AC	12.0520	6A 24V DC 6A 250V AC

* CSA standard: Certified by C-UL

SAFETY STRUCTURE OF SF RELAYS

This SF relay design ensures that subsequent operations shut down and can automatically return to a safe state when the SF relay suffers overloading and other circuit abnormalities (unforeseen externally caused circuit or device breakdowns, end of life incidents, and noise, surge, and environmental influences) owing to contact welding, spring fusion or, in the worst-case scenario, relay breakdown (coil rupture, faulty operation, faulty return, and fatigue and breakage of the operating spring and return spring), and even in the event of end of life.

	Structure	Operation
1. Forced operation method (2 Form A 2 Form B, 4 Form A 4 Form B types)	 The two contacts “a” and “b” are coupled with the same card. The operation of each contact is regulated by the movement of the other contact.	Even when one contact is welded closed, the other maintains a gap of greater than 0.5 mm .020 inch. In the diagram on the left, the lower contact “b” have welded but the upper contact “a” maintain at a gap of greater than 0.5 mm .020 inch. Subsequent contact movement is suspended and the weld can be detected
2. Independent operation method (4 Form A 4 Form B type)	 None of four contacts are held in position by the armature. Even though one of the external N.O. contacts has welded, the other three contacts have returned owing to the de-energizing of the coil.	Enables design of safety circuits that allow weld detection and return at an early stage. As shown at the top right of the diagram on the left, if the external N.O. contact welds, a 0.5 mm .020 inch gap is maintained. Each of the other contacts returns to N.O. because the coil is no longer energized.
3. Separate chamber method (2 Form A 2 Form B, 4 Form A 4 Form B types)	 In independent chambers, the contacts “a” and “b” are kept apart by a body/case separator or by the card itself.	Prevents shorting and fusing of springs and spring failure owing to short-circuit current. As shown on the diagram on the left, even if the operating springs numbered 1 and 2 there is no shorting between “a” and “b” contacts.
4. 2 Form A 2 Form B contact 4 Form A 4 Form B contact	Structure with independent COM contact of 2 Form A 2 Form B and 4 Form A 4 Form B contacts.	Independent COM enables differing pole circuit configurations. This makes it possible to design various kinds of control circuits and safety circuits.

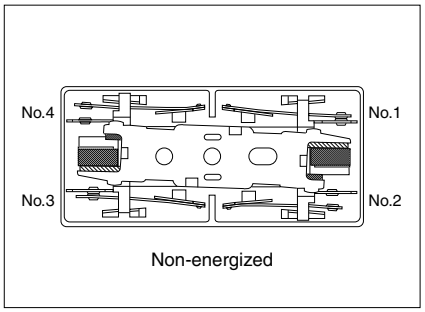
THE OPERATION OF SF RELAYS (when contacts are welded)

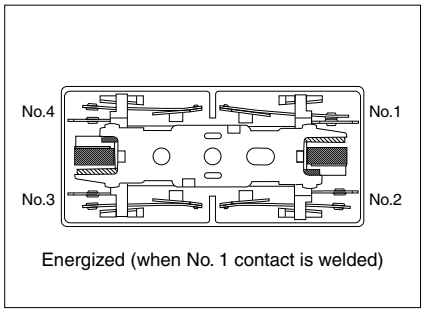
SF relays work to maintain a normal operating state even when the contact welding occur by overloading or short-circuit currents. It is easy to make weld detection circuits and safety circuits in the design to ensure safety even if contacts weld.

1) 2 Form A 2 Form B type

Form “b” Contact Weld

If the form “b” contact (No. 1 and 3) welds, the armature becomes non-operational, the contact gaps at the three form “a” contacts are maintained at greater than 0.5 mm .020 inch. Reliable isolation is thus ensured.

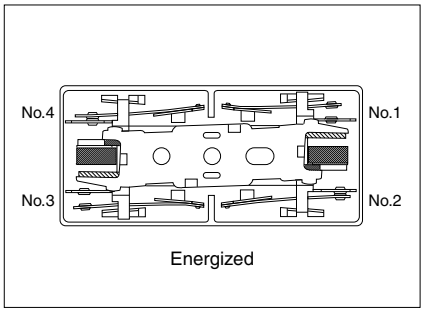


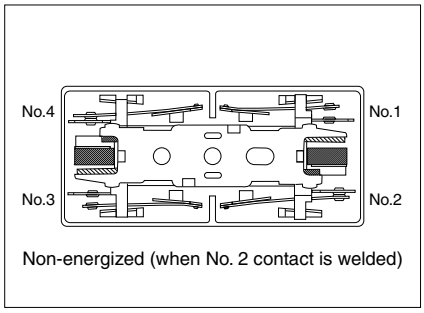


Example: If the No. 1 contact welds
Each of the three form “a” contacts (No. 2 and 4) maintain a gap of greater than 0.5 mm .020 inch.

Form “a” Contact Weld

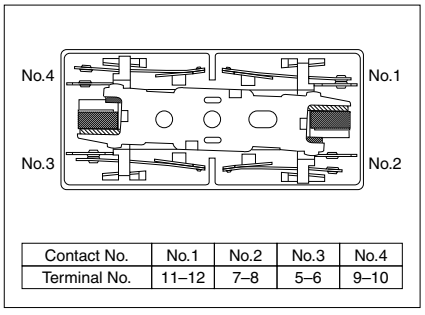
When the form “a” contacts (No. 2 or 4) weld, the armature remains in a non-returned state and the contact gap at the two form “b” contact is maintained at greater than 0.5 mm .020 inch. Reliable isolation is thus ensured.





Example: If the No. 2 contact welds.
The two form “b” contact (No. 1 or 3) maintains a gap of greater than 0.5 mm .020 inch.

Contact Operation Table



Contact No.	No.1	No.2	No.3	No.4
Terminal No.	11–12	7–8	5–6	9–10

The table below shows the state of the other contacts when the current through the welded form “a” contact is 0 V and the rated voltage is applied through the form “b” contact.

		State of other contacts			
		1	2	3	4
Welded terminal No.	1		>0.5		>0.5
	2	>0.5		>0.5	
	3		>0.5		>0.5
	4	>0.5		>0.5	

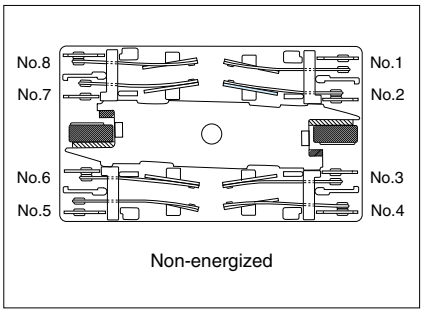
>0.5: contact gap is kept at min. 0.5 mm .020 inch
Empty cells: either closed or open

* Contact gaps are shown at the initial state.
If the contacts change state owing to loading/breaking it is necessary to check the actual loading.

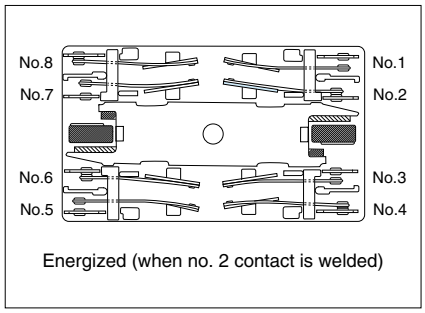
2) 4 Form A 4 Form B type

Internal Contacts Weld

When internal contacts (No. 2, No. 3, No. 6 or No. 7) are welded, the armature becomes non-operational and the four form “a” contact gaps are maintained at 0.5 mm .020inch or greater. Reliable cut-off is thus ensured.



Non-energized

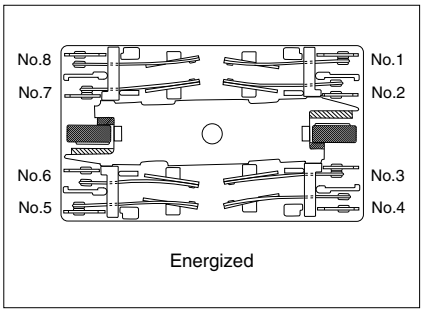


Energized (when no. 2 contact is welded)

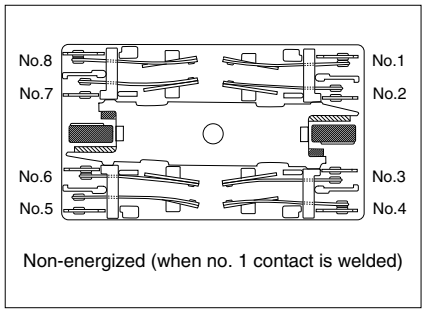
Example: If the No. 2 contact welds.
Each of the four form “a” contacts (No. 1, 3, 5, and 7) maintains a gap of greater than 0.5 mm .020 inch.

External Contacts Weld

When external contacts (No. 1, No. 4, No. 5 or No. 8) are welded, gaps of 0.5 mm .020inch and greater are maintained between adjacent contacts and other contacts operate normally by the coil being non-energized.



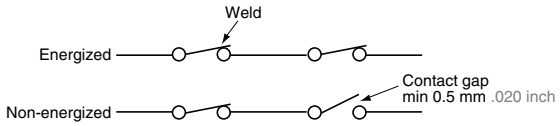
Energized



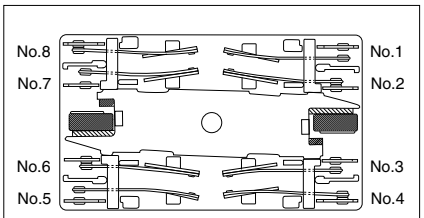
Non-energized (when no. 1 contact is welded)

Example 1: If the No. 1 contact welds.
The adjacent No. 2 contact maintains a gap of greater than 0.5 mm .020 inch. The other contacts, because the coil is not energized, return to their normal return state; each of form “a” contacts (No. 3, 5, and 7) maintains a contact gap of greater than 0.5 mm .020 inch; each of the form “b” contacts (No. 4, 6, and 8) return to a closed state.

Example 2:
If external connections are made in series.
Even if one of the contacts welds, the other contacts operate independently and the contact gaps are maintained at greater than 0.5 mm .020 inch.



Contact Operation Table



Contact No.	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8
Terminal No.	20–19	12–11	8–7	16–15	13–14	5–6	9–10	17–18

The table below shows the state of the other contacts when the current through the welded form “a” contact is 0 V and the rated voltage is applied through the form “b” contact.

Contact No. \ State of other contacts		1	2	3	4	5	6	7	8
Welded terminal No.	1		>0.5	>0.5	≠	>0.5	≠	>0.5	≠
	2	>0.5		>0.5		>0.5		>0.5	
	3		>0.5		>0.5		>0.5		>0.5
	4	≠	>0.5	>0.5		≠	>0.5	≠	>0.5
	5	>0.5	≠	>0.5	≠		>0.5	>0.5	≠
	6	>0.5		>0.5		>0.5		>0.5	
	7		>0.5		>0.5		>0.5		>0.5
	8	>0.5	>0.5	≠	>0.5	≠	>0.5	>0.5	

>0.5: contact gap is kept at min. 0.5 mm .020 inch
≠: contact closed
Empty cells: either closed or open

* Contact gaps are shown at the initial state.
If the contacts change state owing to loading/breaking it is necessary to check the actual loading.

NOTES

1. For cautions for use, please read “General Application Guidelines”.

Flat type safety relays

SF RELAYS

RoHS compliant

FEATURES

1. Forced operation contacts
N.O. and N.C. side contacts are connected through a card so that one interacts with the other in movement. In case of a contact welding, the other keeps a min. 0.5mm .020inch contact gap.

2. Separated chamber structure
N.O. and N.C. side contacts are put in each own space surrounded with a card and a body-separater. That prevents short circuit between contacts, which is caused by their springs welding or damaged.

3. Contact arrangement of 3 Form A 1 Form B
Enables various forms of control circuit.

4. High breakdown voltage
High breakdown voltage 2,500 Vrms (between contact sets/ between contact and coil)

5. High sensitivity
Realizes thin shape and high sensitivity (500mW nominal operating power) by utilizing high-efficiency polarized magnetic circuit with 4-gap balanced armature.

6. Complies with safety standards
Standard products are UL, CSA, TÜV and SEV certified. Conform to European standards. TÜV certified. Complies with SUVA European standard.

TYPICAL APPLICATIONS

1. Industrial equipment such as presses and machine tools
2. Elevators and other kinds of hoisting mechanisms, conveyor equipment.

ORDERING INFORMATION

SF **3** - ☐

Contact arrangement
3: 3 Form A 1 Form B

Nominal coil voltage
DC 5, 12, 24, 48, 60V

TYPES

Contact arrangement	Nominal coil voltage	Part No.
3 Form A 1 Form B	5V DC	SF3-DC5V
	12V DC	SF3-DC12V
	24V DC	SF3-DC24V
	48V DC	SF3-DC48V
	60V DC	SF3-DC60V

Standard packing: Carton: 20 pcs.; Case: 200 pcs.

RATING

1. Coil data

Contact arrangement	Nominal coil voltage	Pick-up voltage (at 20°C 68°F)	Drop-out voltage (at 20°C 68°F)	Nominal coil current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power (at 20°C 68°F)	Max. applied voltage (at 20°C 68°F)
3 Form A 1 Form B	5V DC	80%V or less of nominal voltage (Initial)	10%V or more of nominal voltage (Initial)	100mA	50Ω	500mW	120%V of nominal voltage
	12V DC			41.7mA	288Ω		
	24V DC			20.8mA	1,152Ω		
	48V DC			10.4mA	4,608Ω		
	60V DC			8.3mA	7,200Ω		

2. Specifications

Characteristics	Item		Specifications
Contact	Arrangement		3 Form A 1 Form B
	Contact resistance (Initial)		Max. 30 mΩ (By voltage drop 6 V DC 1A)
	Contact material		Au-flashed $AgSnO_2$ type
Rating	Nominal switching capacity (resistive load)		6A 250V AC, 6A 30V DC
	Max. switching power (resistive load)		1,500VA 180W
	Max. switching voltage		250V AC, 30V DC
	Max. switching current		6A
	Nominal operating power		500mW
	Min. switching capacity (Reference value)*1		100mA 5V DC
Electrical characteristics	Insulation resistance (Initial)		Min. 1,000MΩ (at 500V DC) Measurement at same location as “Breakdown voltage” section.
	Breakdown voltage (Initial)	Between open contacts	2,500 Vrms for 1min. (Detection current: 10mA)
		Between contact sets	2,500 Vrms for 1min. (Detection current: 10mA)
		Between contact and coil	2,500 Vrms for 1min. (Detection current: 10mA)
	Temperature rise (coil)		Max. 45°C 113°F (By resistive method, nominal voltage applied to the coil; contact carrying current: 6A)
	Surge breakdown voltage (between contact and coil)		—
	Operate time		Max. 30ms (Nominal voltage applied to the coil, excluding contact bounce time.)
	Release time		Max. 15ms (Nominal voltage applied to the coil, excluding contact bounce time.) (without diode)
Mechanical characteristics	Shock resistance	Functional	Min. 294 m/s² (Half-wave pulse of sine wave: 11 ms; detection time: 10μs)
		Destructive	Min. 980 m/s² (Half-wave pulse of sine wave: 6 ms)
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 2 mm (Detection time: 10μs)
		Destructive	10 to 55 Hz at double amplitude of 2 mm
Expected life	Mechanical		Min. 10^7: (at 180 times/min.)
	Electrical		Min. 3×10^4 (at 20 times/min.)*2
Conditions	Conditions for operation, transport and storage*3		Ambient temperature: –40°C to +70°C –40°F to +158°F Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)
	Max. Operating speed		180 times/min.
Unit weight			38g 1.34oz

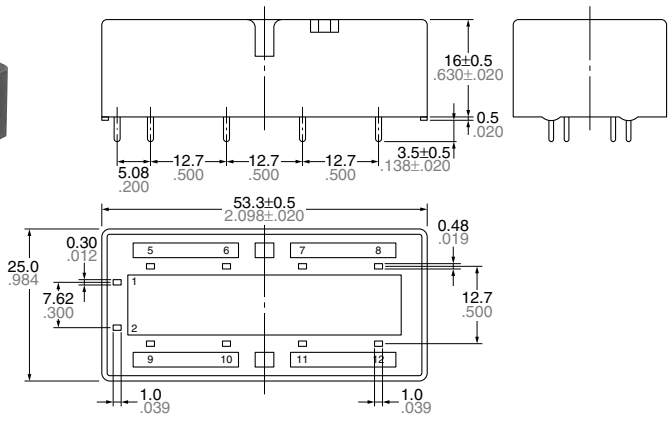
Notes: *1. This value can change due to the switching frequency, environmental conditions and desired reliability level, therefore it is recommended to check this with the actual load.
*2. More than 10^5 operations when applying the nominal switching capacity to one side of contact pairs of each Form A contact and Form B contact
*3. The upper limit of the ambient temperature is the maximum temperature that can satisfy the coil temperature rise value. Refer to Usage, transport and storage conditions in NOTES.

DIMENSIONS (mm inch)

The CAD data of the products with a **CAD Data** mark can be downloaded from: http://industrial.panasonic.com/ac/e/

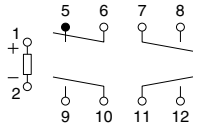
CAD Data

External dimensions

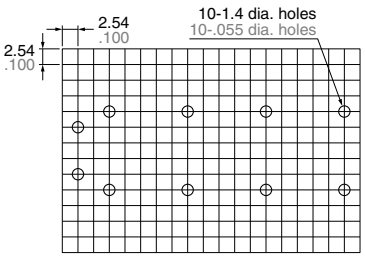


General tolerance: ±0.3 ±.012

Schematic (Bottom view)



PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

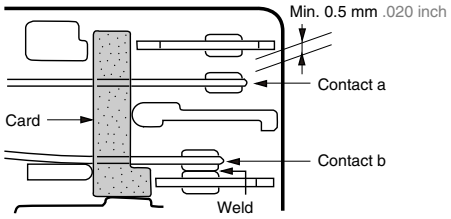
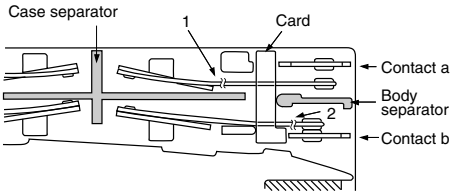
SAFETY STANDARDS

UL/C-UL (Recognized)		TÜV (Certified)		SEV	
File No.	Contact rating	File No.	Rating	File No.	Contact rating
E120782	6A 250V AC	968/EZ 312.01/09	6A 250V AC	12.0193	6A 250V AC

* CSA standard: certified by C-UL

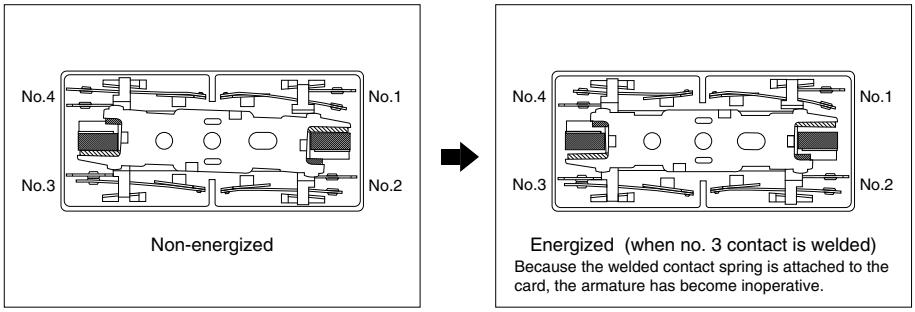
SAFETY STRUCTURE OF SF RELAYS

This SF relay design ensures that subsequent operations shut down and can automatically return to a safe state when the SF relay suffers overloading and other circuit abnormalities (unforeseen externally caused circuit or device breakdowns, end of life incidents, and noise, surge, and environmental influences) owing to contact welding, spring fusion or, in the worst-case scenario, relay breakdown (coil rupture, faulty operation, faulty return, and fatigue and breakage of the operating spring and return spring), and even in the event of end of life.

	Structure	Operation
1. Forced operation method (3 Form A 1 Form B types)	 The two contacts “a” and “b” are coupled with the same card. The operation of each contact is regulated by the movement of the other contact.	Even when one contact is welded closed, the other maintains a gap of greater than 0.5 mm .020 inch. In the diagram on the left, the lower contact “b” have welded but the upper contact “a” maintain at a gap of greater than 0.5 mm .020 inch. Subsequent contact movement is suspended and the weld can be detected
2. Separate chamber method (3 Form A 1 Form B types)	 In independent chambers, the contacts “a” and “b” are kept apart by a body/ case separator or by the card itself.	Prevents shorting and fusing of springs and spring failure owing to short-circuit current. As shown on the diagram on the left, even if the operating springs numbered 1 and 2 there is no shorting between “a” and “b” contacts.
3. 3 Form A 1 Form B contact	Structure with independent COM contact of (3 Form A 1 Form B), contacts.	Independent COM enables differing pole circuit configurations. This makes it possible to design various kinds of control circuits and safety circuits.

Form “b” Contact Weld

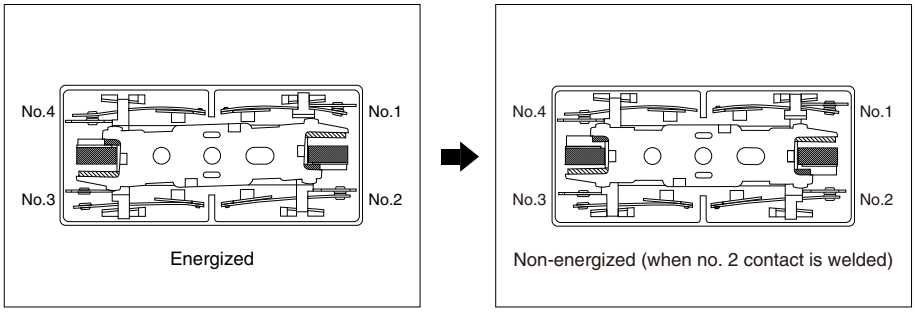
If the form “b” contact (No. 3) welds, the armature becomes non-operational, the contact gaps at the three form “a” contacts are maintained at greater than 0.5 mm .020 inch. Reliable isolation is thus ensured.



If the No. 3 contact welds.
Each of the three form “a” contacts (No. 1, 2, and 4) maintain a gap of greater than 0.5 mm .020 inch.

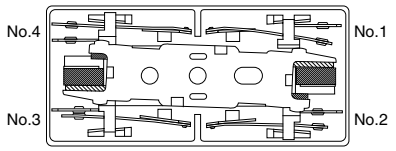
Form “a” Contact Weld

When the form “a” contacts (No. 1, 2, or 4) weld, the armature remains in a non-returned state and the contact gap at the single form “b” contact is maintained at greater than 0.5 mm .020 inch. Reliable isolation is thus ensured.



If the No. 2 contact welds.
The single form “b” contact (No. 3) maintains a gap of greater than 0.5 mm .020 inch.

Contact Operation Table



Contact No.	No.1	No.2	No.3	No.4
Terminal No.	11–12	7–8	5–6	9–10

The table below shows the state of the other contacts when the current through the welded form “a” contact is 0 V and the rated voltage is applied through the form “b” contact.

Welded terminal No.	State of other contacts 1	2	3	4
1			>0.5	
2			>0.5	
3	>0.5	>0.5		>0.5
4			>0.5	

>0.5: contact gap is kept at min. 0.5 mm .020 inch
Empty cells: either closed or open

* Contact gaps are shown at the initial state.
If the contacts change state owing to loading/breaking it is necessary to check the actual loading.

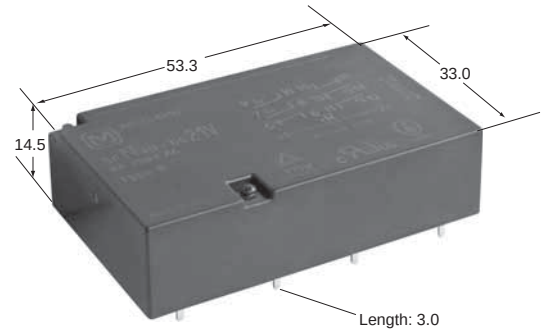
NOTES

1. For cautions for use, please read “General Application Guidelines”.

Panasonic
ideas for life

Low profile safety relay with forcibly guided double contacts

SFN4D RELAY



Tolerance ±0.3 mm
Weight approx. 42 g

FEATURES

- **Relay complies with EN 50205, 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 × 2.5mΩ] × 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 → clearance ≥ 5.5 mm
  - pollution degree 2 → creepage distance ≥ 5.5mm

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) Typical contact resistance	≤30mΩ 2.5mΩ
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	10^7ops

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)	$10^9\Omega$
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)*1” on page 2.
*2 Without diode
*3 See also “REFERENCE DATA” on page 3.
*4 Contact interruption <10μs
*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)*1

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*2

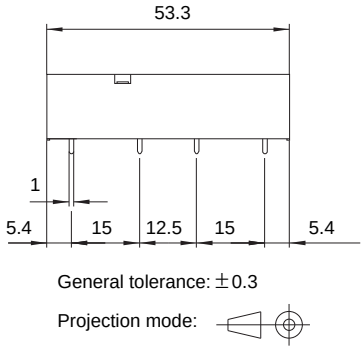
*1 Test conditions: Room temperature, breathing hole closed, dielectric strength according to EN61810-1:2004.
*2 Has to be confirmed

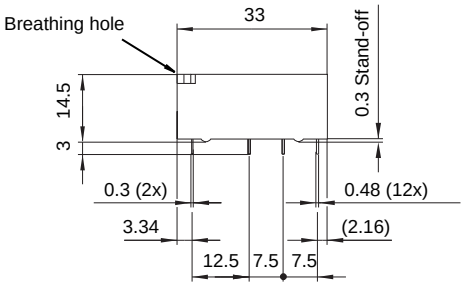
DIMENSIONS

Download CAD Data from our Web site.

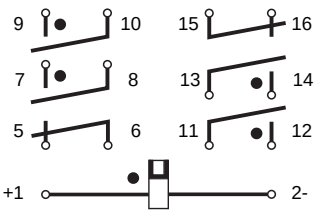
Outer dimensions

CAD Data

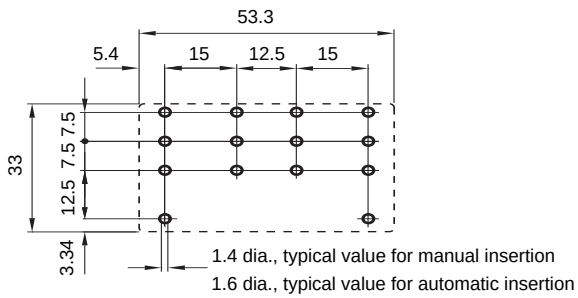




Schematic (Bottom view)

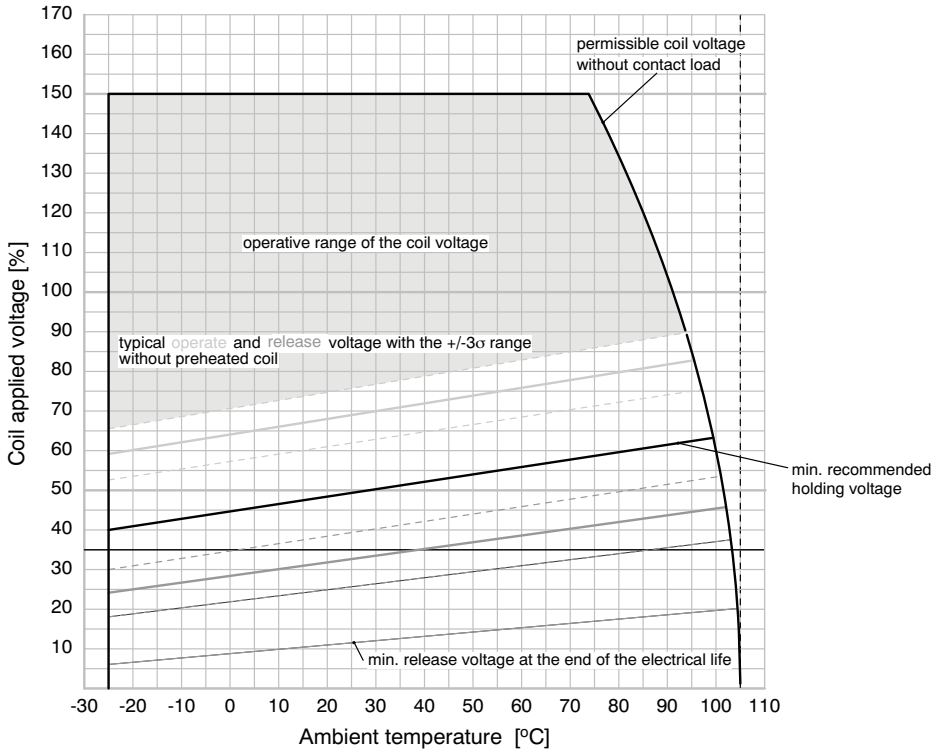


PC board pattern (Bottom view)

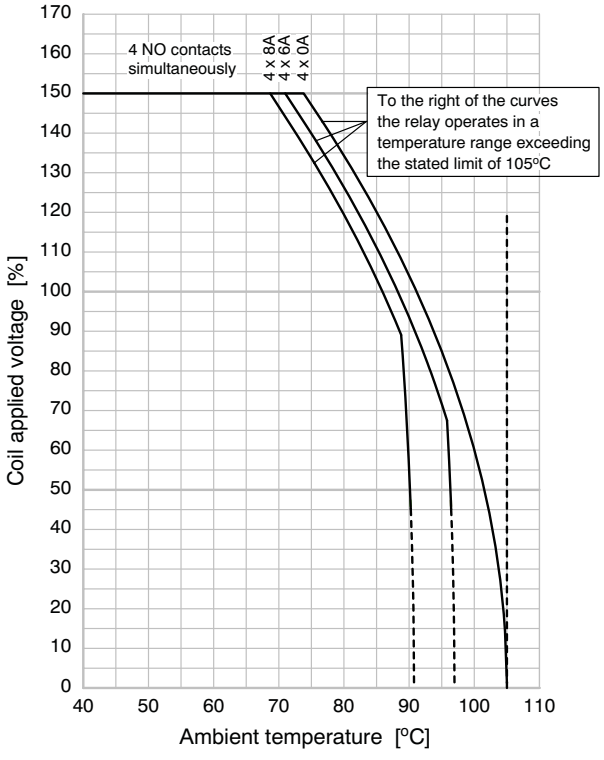


REFERENCE DATA

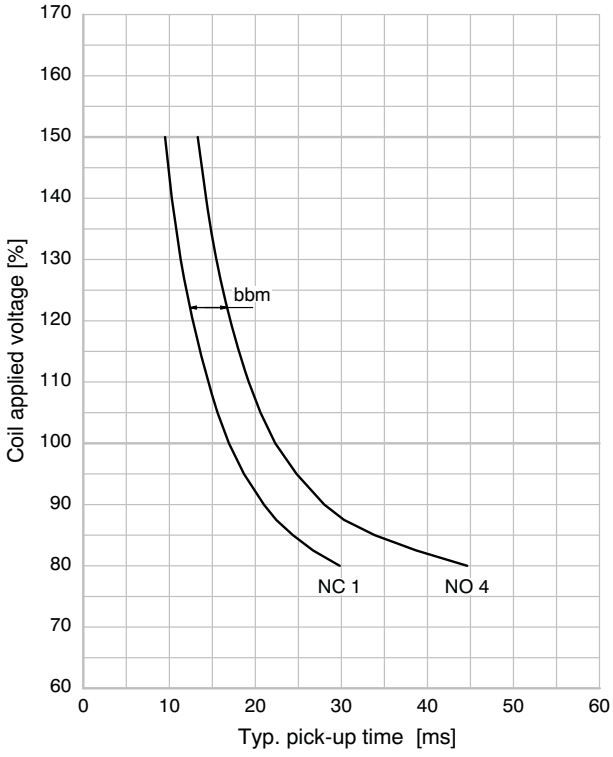
Coil voltage characteristics



Thermic operating range

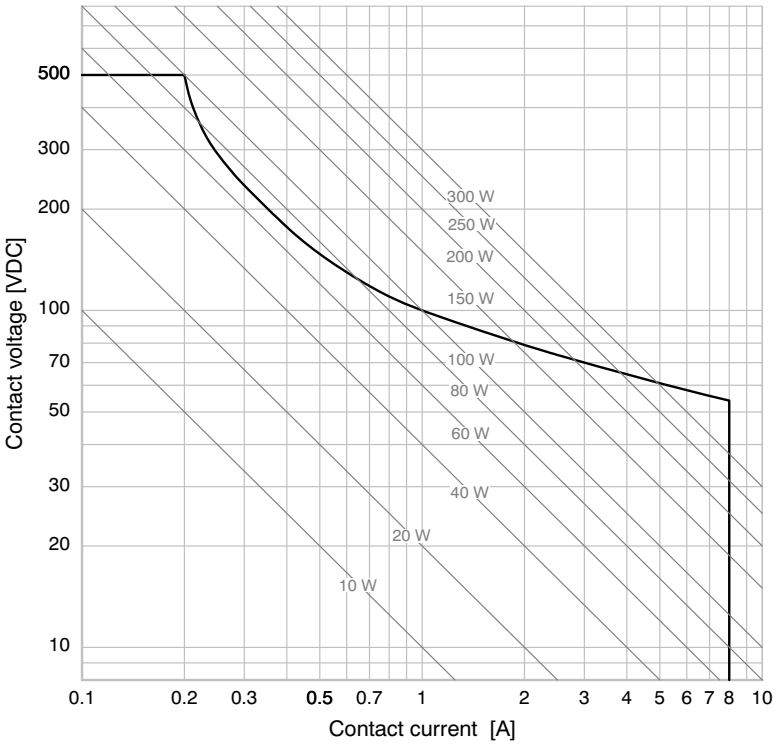


Switching time in relation to coil excitement at 20°C

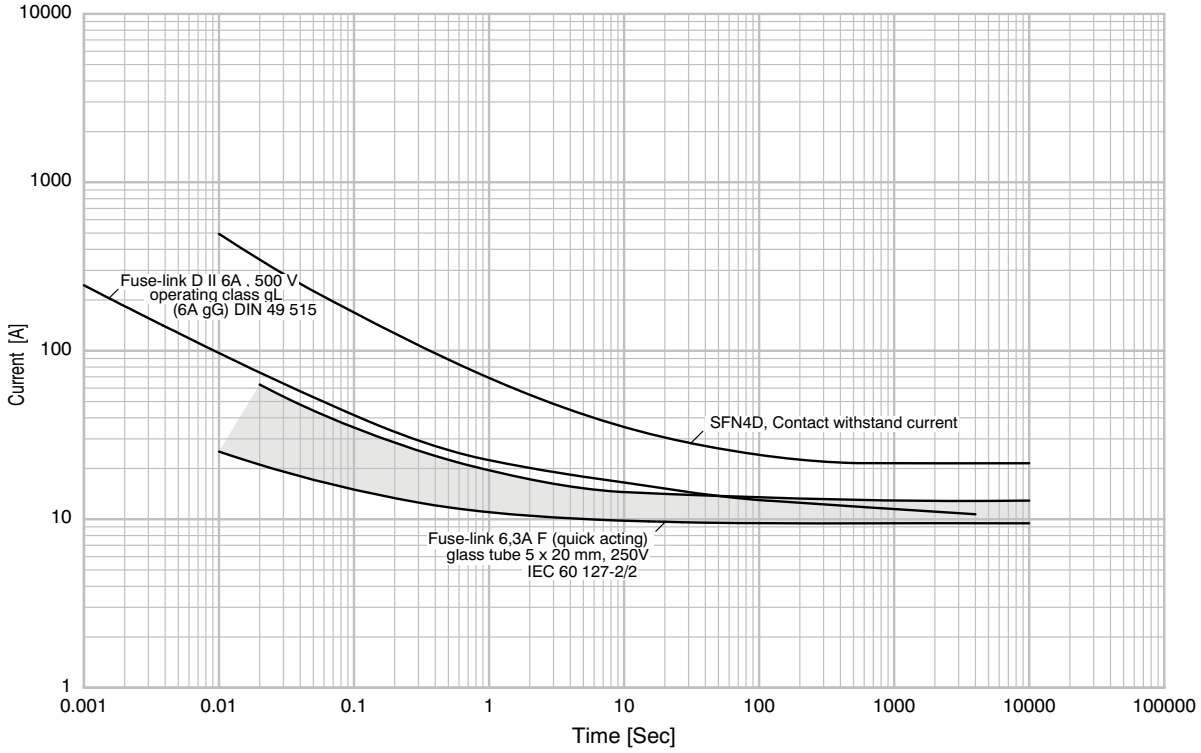


REFERENCE DATA, continued

Load limit curve

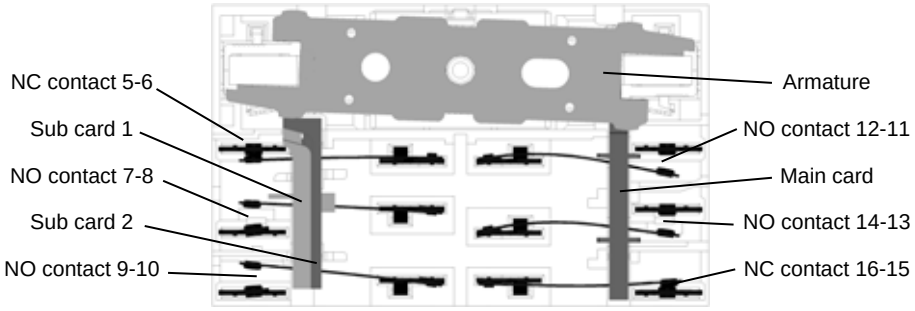


Time / current characteristic

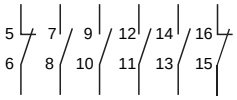


APPLICATION NOTES

The SFN4D Safety Relay



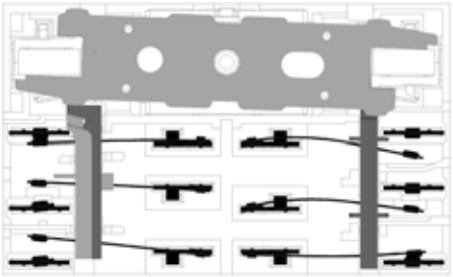
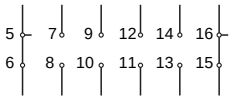
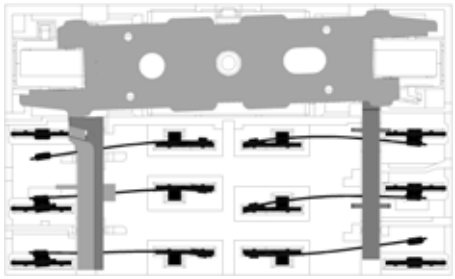
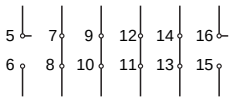
Remark:
Only NC 5-6 monitors all NO contacts!



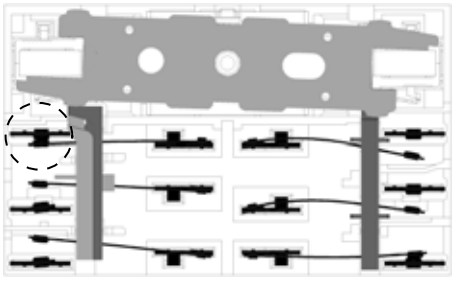
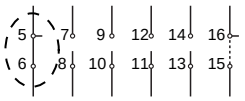
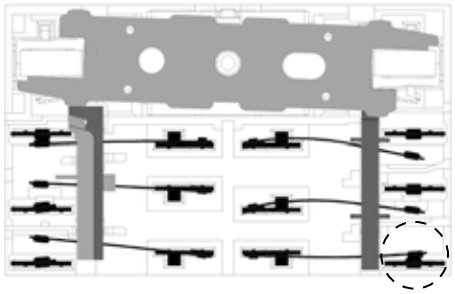
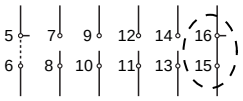
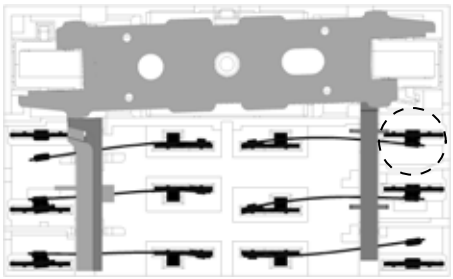
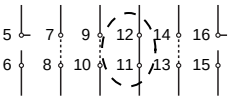
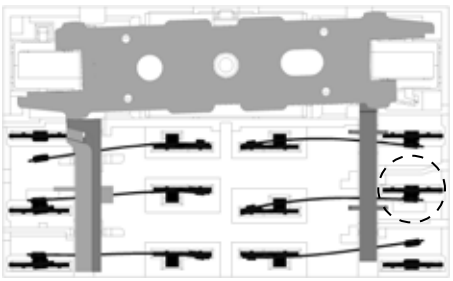
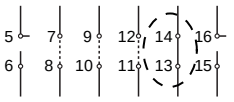
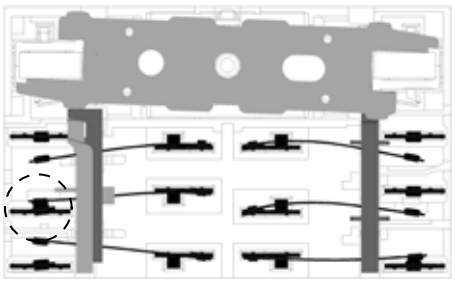
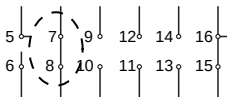
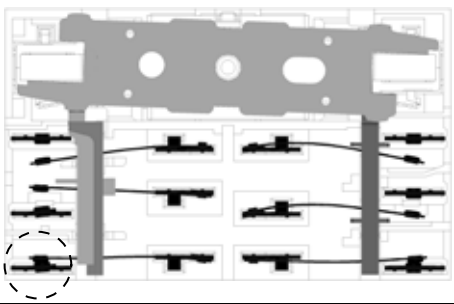
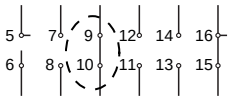
Legend for interpreting contact conditions

Contact	NC (Normally Closed)				NO (Normally Open)			
Condition	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

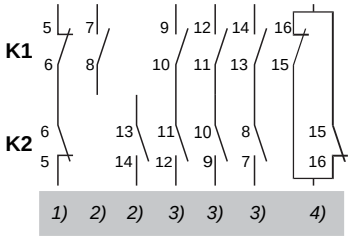
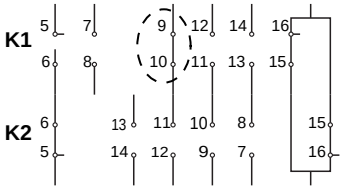
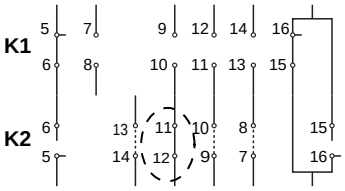
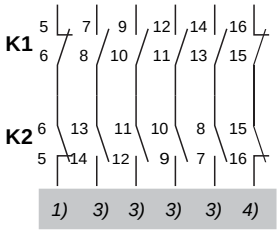
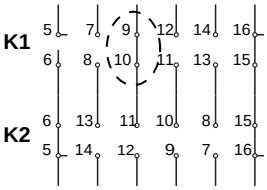
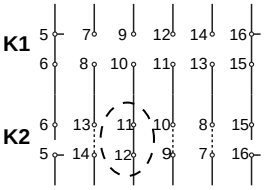
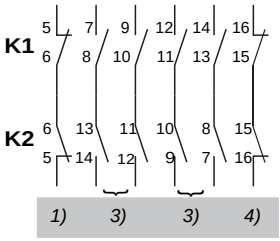
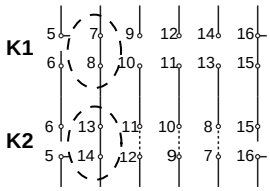
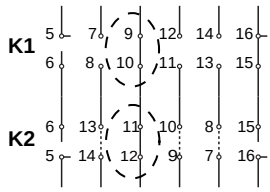
Condition	Illustration of Relay State	Condition of Contacts
- Coil deenergized. - Armature in deenergized position. - NC contacts closed. - NO contacts have a contact gap of approx. 1.5mm.		
- Coil energized. - Armature in energized position. - NO contacts closed. - NC contacts have a contact gap of approx. 1.5mm.		

The SFN4D safety relay with welded contacts

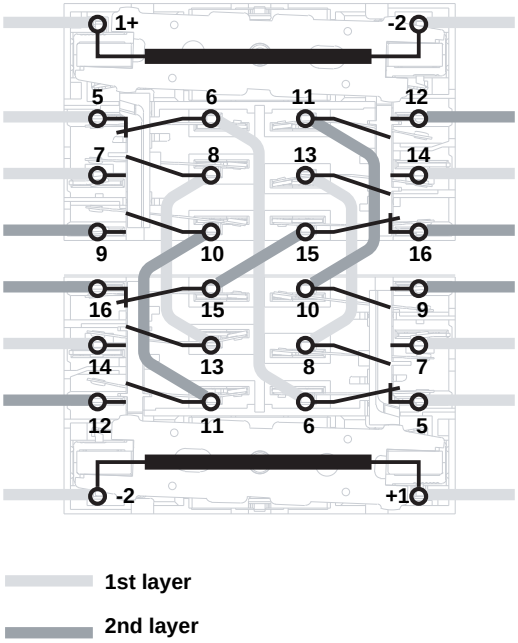
Condition	Illustration of Relay State	Condition of Contacts
- NC 5-6 welded. - Coil energized. - Armature nearly in deenergized position.		 - All NO contacts are forcibly guided. - The NO contact gaps are min. 0.5mm. - For NC 16-15, the contact condition is not defined.
- NC 16-15 welded. - Coil energized. - Armature nearly in deenergized position.		 - All NO contacts are forcibly guided. - The NO contact gaps are min. 0.5mm. - For NC 5-6, the contact condition is not defined.
- NO 12-11 welded. - Coil deenergized. - Armature nearly in energized position.		 - 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.
- NO 14-13 welded. - Coil deenergized. - Armature in nearly energized position.		 - 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.
- NO 7-8 welded. - Coil deenergized. - Armature in deenergized position.		 - **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.
- NO 9-10 welded. - Coil deenergized. - Armature in deenergized position.		 - **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.

Failure modes, application examples

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

1. Self-holding circuit, three safety circuits 	One contact welded, e.g. NO 9-10 of K1.	Condition of contacts at deenergized coil 
	One contact welded, e.g. NO 12-11 of K2.	Condition of contacts at deenergized coil 
2.1. Four safety circuits  (see wiring example, p. 8)	One contact welded, e.g. NO 9-10 of K1.	Condition of contacts at deenergized coil 
	One contact welded, e.g. NO 12-11 of K2.	Condition of contacts at deenergized coil 
2.2. Two safety circuits  (see wiring example, p. 8)	Both contacts of one path are welded, e.g. NO 7-8 and NO 14-13. A safety circuit needs two paths in this failure mode. The contacts 9-10, 12-11, and 14-13 of K1 interrupt the load.	Condition of contacts at deenergized coil 
	Both contacts of one path are welded, e.g. NO 9-10 and NO 12-11. A safety circuit needs two paths in this failure mode. The contacts 7-8, 12-11, and 14-13 of K1 interrupt the load.	Condition of contacts at deenergized coil 

Wiring for application examples 2.1 and 2.2



For Cautions for Use, see Relay Technical Information.

Compact Relay Family with Forcibly Guided Contacts

SF-Y RELAYS

4-pole
(2 Form A 2 Form B, 3 Form A 1 Form B)

6-pole
(4 Form A 2 Form B, 5 Form A 1 Form B)

RoHS compliant

FEATURES

1. Forcibly guided contact structure
Relay complies with EN 50205, Type A
Equipped with forcibly guided contact structure that enables detection of contact welding and construction of safety circuit.

2. Small size

3. Different contact configurations:

Type	L × W × H (mm inch)
2 Form A 2 Form B, 3 Form A 1 Form B	31.0 × 28.6 × 14.5 1.220 × 1.126 × .571
4 Form A 2 Form B, 5 Form A 1 Form B	39.0 × 28.6 × 14.5 1.535 × 1.126 × .571

4. Low profile: 14.5 mm .571 inch

5. Insulation according to EN 60664-1:
Overvoltage category III, Pollution degree 2, 250V AC

• Reinforced insulation:
Clearance and creepage 5.5 mm .217 inch
(between all contacts and between contact NO4 and coil)

• Basic insulation:
Clearance 3 mm .118 inch and creepage 4 mm .157 inch
(between all contacts and between contact NC3 and coil)

TYPICAL APPLICATIONS

1. Emergency stop switches
2. Machine safety engineering
3. Safety control units
4. Automation technology
5. Elevators
6. Escalators
7. Overcurrent protection with monitor contact

ORDERING INFORMATION

SFY □ - □

Contact arrangement
2: 2 Form A 2 Form B
3: 3 Form A 1 Form B
4: 4 Form A 2 Form B
5: 5 Form A 1 Form B

Nominal coil voltage
DC 5, 12, 16, 18, 21, 24V

Notes: Please consult us about other coil voltages.
Gold-clad contact type available on request.

TYPES

Contact arrangement		Nominal coil voltage	Part No.
4-pole	2 Form A 2 Form B	5 V DC	SFY2-DC5V
		12 V DC	SFY2-DC12V
		16 V DC	SFY2-DC16V
		18 V DC	SFY2-DC18V
		21 V DC	SFY2-DC21V
		24 V DC	SFY2-DC24V
	3 Form A 1 Form B	5 V DC	SFY3-DC5V
		12 V DC	SFY3-DC12V
		16 V DC	SFY3-DC16V
		18 V DC	SFY3-DC18V
		21 V DC	SFY3-DC21V
		24 V DC	SFY3-DC24V
6-pole	4 Form A 2 Form B	5 V DC	SFY4-DC5V
		12 V DC	SFY4-DC12V
		16 V DC	SFY4-DC16V
		18 V DC	SFY4-DC18V
		21 V DC	SFY4-DC21V
		24 V DC	SFY4-DC24V
	5 Form A 1 Form B	5 V DC	SFY5-DC5V
		12 V DC	SFY5-DC12V
		16 V DC	SFY5-DC16V
		18 V DC	SFY5-DC18V
		21 V DC	SFY5-DC21V
		24 V DC	SFY5-DC24V

Standard packing: Tube 20 pcs.

RATING

1. Coil data

Contact arrangement		Nominal coil voltage	Pick-up voltage (at 20°C 68°F)	Drop-out voltage (at 20°C 68°F)	Nominal operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power (at 20°C 68°F)	Max. applied voltage (at 20°C 68°F)
4-pole	2 Form A 2 Form B	5V DC	75%V or less of nominal voltage (Initial)	15%V or more of nominal voltage (Initial)	134mA	38Ω	670mW	120%V of nominal voltage
		12V DC			56mA	215Ω		
		16V DC			42mA	380Ω		
		18V DC			37mA	483Ω		
		21V DC			32mA	666Ω		
		24V DC			28mA	864Ω		
	3 Form A 1 Form B	5V DC			134mA	38Ω		
		12V DC			56mA	215Ω		
		16V DC			42mA	380Ω		
		18V DC			37mA	483Ω		
		21V DC			32mA	666Ω		
		24V DC			28mA	864Ω		
6-pole	4 Form A 2 Form B	5V DC			134mA	38Ω		
		12V DC			56mA	215Ω		
		16V DC			42mA	380Ω		
		18V DC			37mA	483Ω		
		21V DC			32mA	666Ω		
		24V DC			28mA	864Ω		
	5 Form A 1 Form B	5V DC			134mA	38Ω		
		12V DC			56mA	215Ω		
		16V DC			42mA	380Ω		
		18V DC			37mA	483Ω		
		21V DC			32mA	666Ω		
		24V DC			28mA	864Ω		

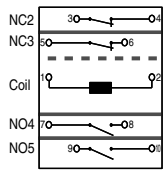
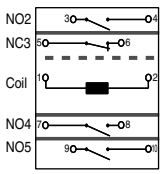
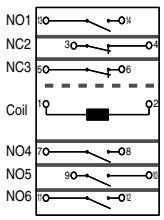
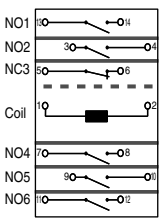
2. Specifications

Characteristics	Item		Specifications	
			4-pole	6-pole
Contact	Contact arrangement		2 Form A 2 Form B, 3 Form A 1 Form B	4 Form A 2 Form B, 5 Form A 1 Form B
	Forcibly guided contacts		All contacts: Type A, EN 50205	
	Contact resistance (Initial)		Max. 100 mΩ (By voltage drop 6 V DC 1A)	
	Contact material		Au-flashed AgNi alloy type	
Rating	Nominal switching capacity (resistive load)		6A 250V AC, 6A 30V DC	
	Max. switching power (resistive load)		1,500VA, 180W	
	Max. switching voltage		250V AC, 30V DC	
	Max. switching current		6 A	
	Min. switching capacity (Reference value)*1		10mA 10V DC	
Electrical characteristics	Insulation resistance (Initial)		Min. 1,000MΩ (at 500V DC) Measurement at same location as “Breakdown voltage” section.	
	Breakdown voltage (Initial)	Between open contacts	1,500 Vrms for 1 min. (Detection current: 10mA)	
		Between contact sets	4,000 Vrms for 1 min. (Detection current: 10mA)	
		Between contact and coil	NC3: 2,500 Vrms for 1min; NO4: 4,000 Vrms for 1min (Detection current: 10mA)	
	Coil holding voltage*4		Min. 60%V (Initial, at 20°C 68°F)	
	Operate time (at 20°C 68°F)		Max. 20ms (Nominal coil voltage applied to the coil, excluding contact bounce time)	
	Release time (at 20°C 68°F)		Max. 10ms (Nominal coil voltage applied to the coil, excluding contact bounce time) (without diode)	
Mechanical characteristics	Shock resistance	Functional	Min. 200 m/s² {Min. 20G} (Half-wave pulse of sine wave: 11 ms; detection time: 10μs)	
		Destructive	Min. 1,000 m/s² (Half-wave pulse of sine wave: 6 ms)	
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 1.5 mm .059 inch (Detection time: 10μs)	
		Destructive	10 to 55 Hz at double amplitude of 1.5 mm .059 inch	
Expected life	Mechanical		Min. 10^7 (at 180 times/min.)	
	Electrical		250 V AC 6 A resistive load: Min. 10^5 (at 20 times/min.)	
Degree of protection			RT III*3	
Conditions	Conditions for operation, transport and storage*2		Ambient temperature: –40°C to +70°C –40°F to +158°F Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)	
	Max. Operating speed		20 times/min. (at nominal voltage)	
Unit weight			Approx. 19 g .67 oz	Approx. 23 g .81 oz

Notes: *1. This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.
*2. The upper limit of the ambient temperature is the maximum temperature that can satisfy the coil temperature rise value. Refer to Usage, transport and storage conditions in NOTES.
*3. According to EN 61810-1:2010, table 2. Characteristic is sealed construction with terminals, case and base sealed shut with sealing resin. Construction is designed to prevent seeping of flux when soldering and cleaning fluid when cleaning. Harmful substances on the contacts are removed by gas purging before sealing with.
*4. Coil holding voltage is the coil voltage after 100 ms from the applied nominal voltage.

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)

Insulation

2 Form A 2 Form B	3 Form A 1 Form B	4 Form A 2 Form B	5 Form A 1 Form B
			

= Reinforced insulation: overvoltage category III, pollution degree 2, 250V AC
(Clearance and creepage distance is 5.5 mm .217 inch or more between all contacts. Also, there is 5.5 mm .217 inch or more clearance and creepage distance even between contact NO4 and coil.)

= Basic insulation: overvoltage category III, pollution degree 3, 250V AC
(The clearance is 3 mm .118 inch or more between all contacts and the creepage distance is 4 mm .157 inch or more. Even between contact NC3 and coil, the clearance is 3 mm .118 inch or more and the creepage distance is 4 mm .157 inch or more.)

Other contact gaps when contacts are welded

The table below shows the state of the other contacts.
In case of form “NO” contact weld the coil applied voltage is 0 V.
In case of form “NC” contact weld the coil applied voltage is nominal.

<2 Form A 2 Form B>

		State of other contacts			
		3-4 (NC)	5-6 (NC)	7-8 (NO)	9-10 (NO)
Welded terminal No.	3-4 (NC)			>0.5	>0.5
	5-6 (NC)			>0.5	>0.5
	7-8 (NO)	>0.5	>0.5		
	9-10 (NO)	>0.5	>0.5		

<3 Form A 1 Form B>

		State of other contacts			
		3-4 (NC)	5-6 (NO)	7-8 (NO)	9-10 (NO)
Welded terminal No.	3-4 (NC)		>0.5	>0.5	>0.5
	5-6 (NO)	>0.5			
	7-8 (NO)	>0.5			
	9-10 (NO)	>0.5			

<4 Form A 2 Form B>

		State of other contacts					
		3-4 (NC)	5-6 (NC)	7-8 (NO)	9-10 (NO)	11-12 (NO)	13-14 (NO)
Welded terminal No.	3-4 (NC)			>0.5	>0.5	>0.5	>0.5
	5-6 (NC)			>0.5	>0.5	>0.5	>0.5
	7-8 (NO)	>0.5	>0.5				
	9-10 (NO)	>0.5	>0.5				
	11-12 (NO)	>0.5	>0.5				
	13-14 (NO)	>0.5	>0.5				

<5 Form A 1 Form B>

		State of other contacts					
		3-4 (NC)	5-6 (NO)	7-8 (NO)	9-10 (NO)	11-12 (NO)	13-14 (NO)
Welded terminal No.	3-4 (NC)		>0.5	>0.5	>0.5	>0.5	>0.5
	5-6 (NO)	>0.5					
	7-8 (NO)	>0.5					
	9-10 (NO)	>0.5					
	11-12 (NO)	>0.5					
	13-14 (NO)	>0.5					

>0.5: contact gap is kept at min. 0.5 mm .020 inch
Empty cells: either ON or OFF
Note: Contact gaps are shown at the initial state.
If the contact transfer is caused by load switching, it is necessary to check the actual loading.

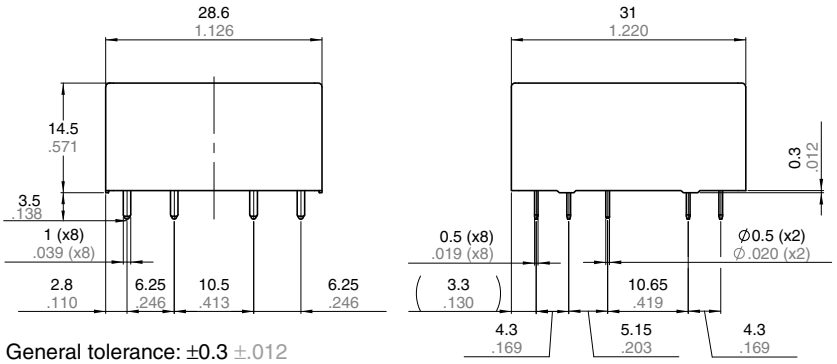
DIMENSIONS (mm inch)

The CAD data of the products with a **CAD Data** mark can be downloaded from: http://industrial.panasonic.com/ac/e/

1. 4-pole (2 Form A 2 Form B, 3 Form A 1 Form B)

CAD Data

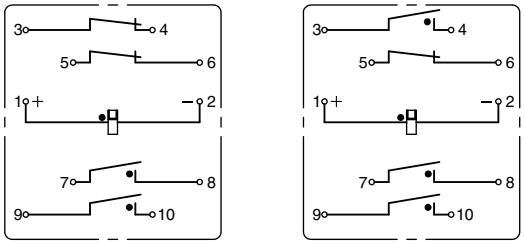
External dimensions



General tolerance: ±0.3 ±.012

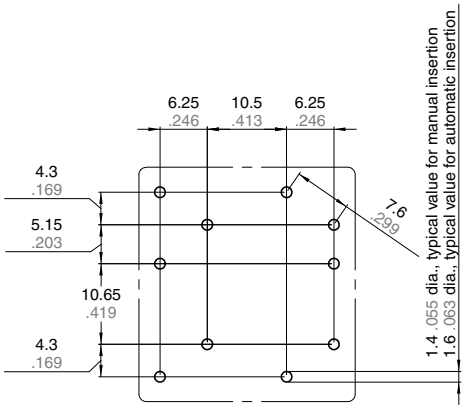
Projection mode:

Schematic (Bottom view)



(2 Form A 2 Form B) (3 Form A 1 Form B)

PC board pattern (Bottom view)

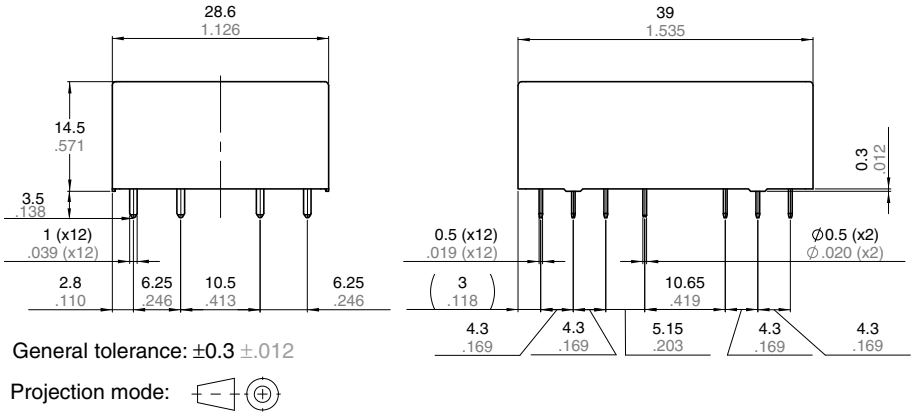


Tolerance: ±0.1 ±.004

2. 6-pole (4 Form A 2 Form B, 5 Form A 1 Form B)

CAD Data

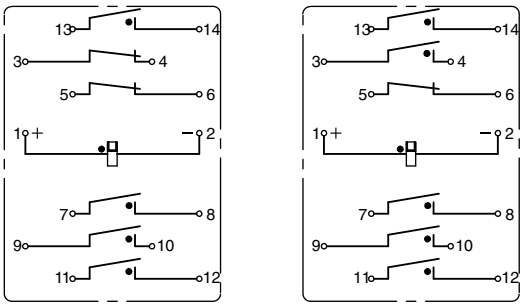
External dimensions



General tolerance: ±0.3 ±.012

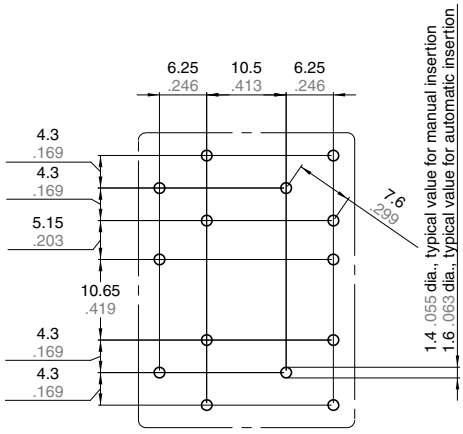
Projection mode:

Schematic (Bottom view)



(4 Form A 2 Form B) (5 Form A 1 Form B)

PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

SAFETY STANDARDS

Certification authority	File No.	Rating
UL/C-UL	E120782	6A 250V AC, general use, 100Kops 6A 30V DC, general use, 100Kops, B300, R300 (pilot duty)
TÜV	Cert. no: 968/EZ 535. 00/12	6A 230V AC (cosϕ=1.0) 70°C 158°F, 6A 24V DC resistive

NOTES

1. For cautions for use, please read "General Application Guidelines".

2. Coil operating power

Pure DC current should be applied to the coil. The wave form should be rectangular. If it includes ripple, the ripple factor should be less than 5%. However, check it with the actual circuit since the characteristics may be slightly different.

3. Coil connection

When connecting coils, refer to the wiring diagram to prevent mis-operation or malfunction.

4. Soldering

When using automatic soldering, the following conditions are recommended

1) Preheating: 120°C 248°F, within 120 sec (PC board solder surface)

2) Soldering: 260°C±5°C 500°F±41°F, within 6 sec