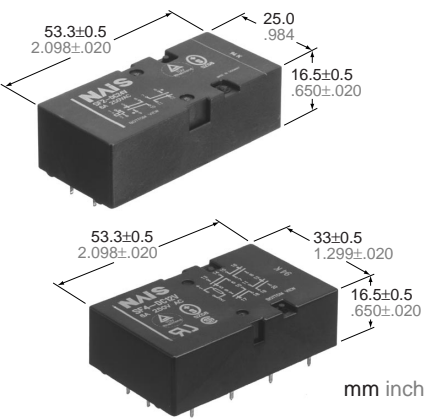


NAIS

POLARISED, MONOSTABLE  
SAFETY RELAY

SF-RELAYS



UL File No.: E43149  
CSA File No.: LR26550

- **Forced operation contacts (2 Form A 2 Form B)**  
N.O. side 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 min. 0.5mm contact gap.
- **Independent operation contacts (4 Form A 4 Form B)**  
Each 4 pair of contacts is free from main armature and keeps independence each other. So, even if a N.O. contact in a pair welding, the other N.O. contacts in 3 other pairs properly operate. That enables to plan a circuit to detect welding or to go back to the beginning condition.
- **Separated chamber structure (2 Form A 2 Form B, 4 Form A 4 Form B)**  
N.O. side and N.C. side contacts are put in each own space surrounded with a card and a body-separator. That prevents short circuit between contacts, which is caused by their springs welding or damaged.

SPECIFICATIONS

Contact			
Arrangement		2 Form A 2 Form B	4 Form A 4 Form B
Initial contact resistance, max. (By voltage drop 6 V DC 1 A)		30 mΩ	
Contact material		Gold-clad silver	
Rating (resistive)	Nominal switching capacity	6 A 250 V AC, 6 A 30 V DC	
	Max. switching power	180 W, 1,500 VA	
	Max. switching voltage	30 V DC, 250 V AC	
	Max. carrying current	6 A DC, AC	
UL/CSA rating		6 A 250 V AC	
Expected life (min. operations)	Mechanical (at 180 cpm)	10 <sup>7</sup>	
	Electrical (at 20 cpm)	3×10 <sup>4</sup> *1	10 <sup>5</sup>

Coil (at 25°C 77°F)	
Nominal operating power	500 mW

**Remarks**  
\*1 More than 10<sup>5</sup> operations when applying the nominal switching capacity to one side of contact pairs of each Form A contact and Form B contact  
\*2 Measurement at same location as "Initial breakdown voltage" section  
\*3 Detection current: 10mA  
\*4 Excluding contact bounce time  
\*5 Half-wave pulse of sine wave: 11ms; detection time: 10μs  
\*6 Half-wave pulse of sine wave: 6ms  
\*7 Detection time: 10μs  
\*8 Refer to 5. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT (Page 49)

Characteristics (at 25°C 77°F, 50% Relative humidity)			
		2 Form A 2 Form B	4 Form A 4 Form B
Max. operating speed		180 cpm (at nominal voltage)	
Initial insulation resistance*2		Min. 1,000 MΩ at 500 V DC	
Initial break-down voltage*3	Between contact sets	2,500 Vrms	
	Between open contacts	2,500 Vrms	
	Between contact and coil	2,500 Vrms	
Operate time*4 (at nominal voltage)		Approx. 17 ms	Approx. 18 ms
Release time (without diode)*4 (at nominal voltage)		Approx. 7 ms	Approx. 6 ms
Temperature rise (at nominal voltage)		Max. 45°C with nominal coil voltage and at 6 A switching current	
Shock resistance	Functional*5	Min. 294 m/s <sup>2</sup> {30 G}	
	Destructive*6	Min. 980 m/s <sup>2</sup> {100 G}	
Vibration resistance	Functional*7	117.6 m/s <sup>2</sup> {12 G}, 10 to 55 Hz at double amplitude of 2 mm	
	Destructive	117.6 m/s <sup>2</sup> {12 G}, 10 to 55 Hz at double amplitude of 2 mm	
Conditions for operation, transport and storage*8 (Not freezing and condensing at low temperature)		Ambient temp.	-40°C to +70°C -40°F to +158°F
		Humidity	5 to 85% R.H.
Unit weight		38 g 1.34 oz	47 g 1.66 oz

ORDERING INFORMATION

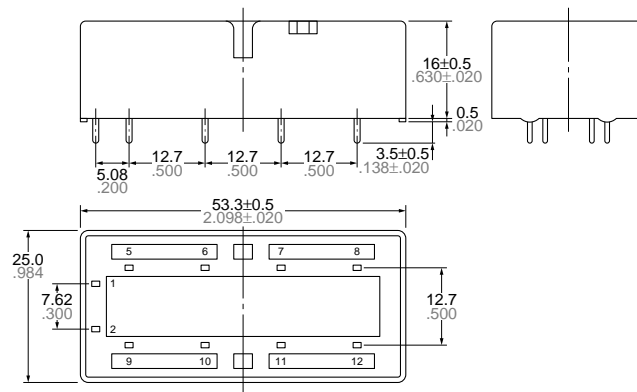


# TYPES AND COIL DATA at 20°C 68°F

Contact arrangement	Part No.	Nominal voltage, V DC	Pick-up voltage, VDC (max.)	Drop-out voltage, V DC (min.)	Coil resistance $\Omega$ ( $\pm 10\%$ )	Nominal operating current, mA ( $\pm 10\%$ )	Nominal operating power, mW	Max. allowable voltage, V DC
2 Form A 2 Form B	SF2-DC5V	5	4.0	0.5	50	100	500	6
	SF2-DC12V	12	9.6	1.2	288	41.7	500	14.4
	SF2-DC24V	24	19.2	2.4	1.152	20.8	500	28.8
	SF2-DC48V	48	38.4	4.8	4.608	10.4	500	57.6
	SF2-DC60V	60	48	6.0	7.200	8.3	500	72
4 Form A 4 Form B	SF4-DC5V	5	4.0	0.5	50	100	500	6
	SF4-DC12V	12	9.6	1.2	288	41.7	500	14.4
	SF4-DC24V	24	19.2	2.4	1.152	20.8	500	28.8
	SF4-DC48V	48	38.4	4.8	4.608	10.4	500	57.6
	SF4-DC60V	60	48	6.0	7.200	8.3	500	72

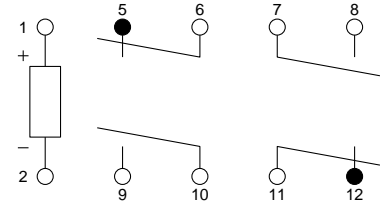
## DIMENSIONS

### 1) 2 Form A 2 Form B

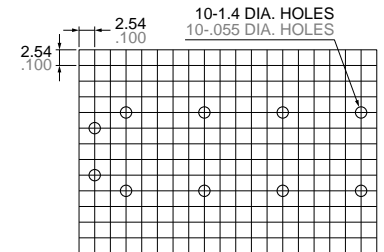


General tolerance:  $\pm 0.3 \pm .012$

### Schematic (Copper-side view)

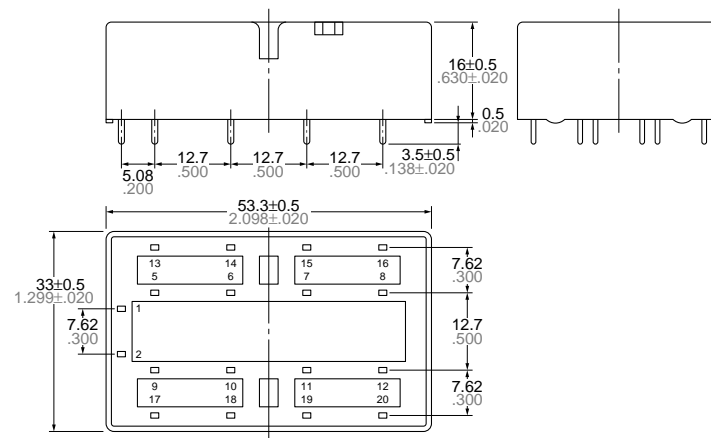


### PC board pattern (Bottom view)



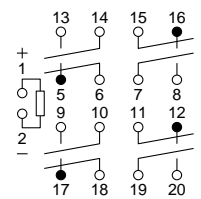
Tolerance:  $\pm 0.1 \pm .004$

### 2) 4 Form A 4 Form B

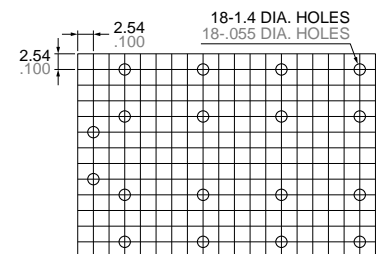


General tolerance:  $\pm 0.3 \pm .012$

### Schematic (Copper-side view)



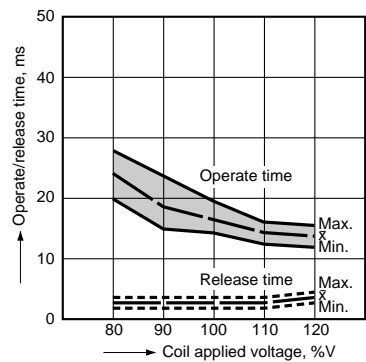
### PC board pattern (Bottom view)



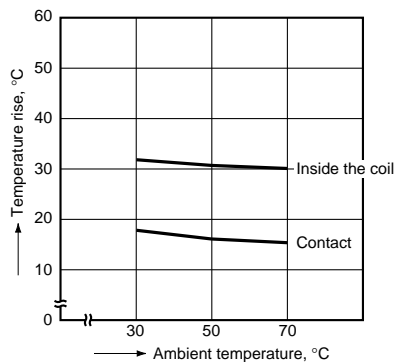
Tolerance:  $\pm 0.1 \pm .004$

REFERENCE DATA

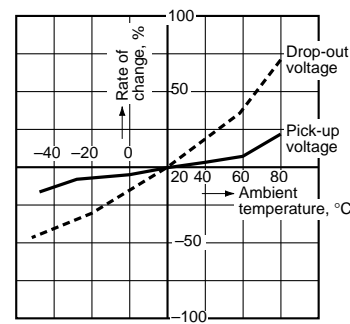
1. Operate/release time



2. Coil temperature rise  
Coil applied voltage: 120%V  
Contact switching current: 6A



3. Ambient temperature characteristics



NOTE

The operating life is calculated at the conditions specified in the JIS C 5442-1986 standard testing conditions (temperature between 15°C and 30°C and relative humidity between 25% and 85%). The operating life will differ depending on the drive circuit, load type, switching frequency, switching phase, ambient temperature, and other factors. Therefore, be sure to confirm those of

your product. Be especially careful regarding loads of the types listed below.

- When the switching phase is synchronous with the AC load switching, locking or welding may occur due to contact point shifting.
- When high frequency load switching, an arc load is generated across the contact points from their high frequency opening and closing. The resulting arc

energy then cause the nitrogen and oxygen in the air to form a molecular bond and HNO<sub>3</sub> is generated. This resulting gas can be corrosive to metallic materials.

Effective countermeasures for this are:

1. Incorporating an arc elimination circuit.
2. Decreasing the switching frequency.
3. Lowering the ambient humidity.