

JIS

JAPANESE INDUSTRIAL STANDARD

Control Reed Relays

JIS C 4523—1985

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Control Reed Relays

C 4523-1985

1. Scope

This Japanese Industrial Standard specifies reed relays with a rated thermal withstand current 5 A or less for electric circuits of a.c. 250 V or less at a frequency of 50 or 60 Hz or of d.c. 250 V or less in industrial control circuits or mainly in signal transfer circuits of electronic apparatus.

Remark: Above-mentioned reed relay means sealed glass tube relay employing reed contacts not containing mercury.

2. Definitions

For the purposes of this standard, the following definitions apply:

- (1) reed relay An electromagnetic relay of such mechanism that the reed contact of the reed switch closes or opens the circuit when an operating input is applied on or removed from the coil.
- (2) signal transfer This means to transfer or interrupt an electric power by closing or opening the contacts through application or removal of control voltage on or from the operating coil, so that the external circuits connected to the contacts are controlled and the appropriate systems or equipments are put into operation.
- (3) coil A part of relay which supplies an electromagnetic force to put a reed relay in the operated condition, and which mainly consists of winding(s).
- (4) operating input Voltage or current to be applied on the coil.
- (5) rated voltage of coil Basic voltage to be applied on the coil for ordinary use of a reed relay.
- (6) rated current of coil Basic current to be applied on the coil for ordinary use of a reed relay.
- (7) operated condition The condition where all normally closed contacts are in open position or all normally open contacts are stably in closed position.
- (8) reset condition The condition where all normally open contacts are in open position or all normally closed contacts are stably in closed position.
- (9) operation The action of a reed relay to shift from the reset condition to the operated condition.

Applicable Standards, Corresponding International Standard and Reference Standards: See page 28.

- (10) return The action of a reed relay to shift from the operated condition to the reset condition.
- (11) operating voltage The voltage at the instant when a reed relay is activated to operate condition from the reset condition when the operating input is increased.
- (12) return voltage The voltage at the instant when a reed relay is activated to return condition from the operated condition when the operating input is decreased.
- (13) switching part Whole conductive parts of a reed relay connected with the external circuit to be switched by the reed relay. The switching part is composed of internal conductors, terminations or the like.
- (14) normally open contact A contact which is opened at reset condition and closed at operated condition. This is also said as an "a" contact or a make contact.
- (15) normally closed contact A contact which is closed at reset condition and opened at operated condition. This is also said as a "b" contact or a break contact.
- (16) change-over contact A contact assembly in which both normally open contact and normally closed contact are provided, and the conductive part for both movable contacts is common. Generally, in a reed relay, after opening of the contact to be opened the contact to be closed is closed, during the action to operate and to return the relay, therefore the both contacts become open temporarily. This contact assembly is also said as "break before make contact", contact "c", or "transfer contact", but in this standard said as change-over contact simply.
- (17) rated thermal withstand current The current able to be passed continuously through the switching part without switching the contact.
- (18) rated contact current A current not more than the rated thermal withstand current, to make that is used as the reference for determining performance of switching part.
- (19) rated contact voltage The voltage which is used as the reference for determining performance of switching part.
- (20) rated burden The power which is used as the reference for determining switching part (rated contact current x rated contact voltage).
- (21) switching frequency Number of operations per unit time of a reed relay.
- (22) switching frequency at rated burden The maximum switching frequency at which the electrical endurance is satisfied, when a relay is continuously actuated to operate and to return with the rated burden imposed on the switching part.

- (23) no-load switching frequency The maximum switching frequency at which the mechanical endurance is satisfied, when a relay is continuously actuated to operate and to return without any burden imposed on the switching part.
- (24) operating time The time interval from application of the rated operating input on the coil of a reed relay to the instant when the contact comes in operated condition. In the case of reed relay having contacts of plural number, unless otherwise specified, the time interval to the instant when the slowest contact comes in operated condition.
- (25) returning time The time interval from the removal of the rated operating input from the coil of a reed relay, to the instant when the contact resets. In the case of reed relay having contacts of plural number, unless otherwise specified, the time interval to the instant when the slowest contact comes in reset condition.
- (26) bounce time When the rated operating input is abruptly applied or removed on or from the coil, the time interval from the instant when the contact which is closing its circuit first closes the circuit to the instant when perfectly complete the closing, or the time interval from the instant when the contact which is opening its circuit first opens the circuit to the instant when complete the opening.
- (27) chattering Intermittent switching phenomenon between contacts due to shock, vibration applied on a reed relay from outside.

3. Standard Service Conditions

The standard atmospheric conditions during service are as follows:
Provided that, the conditions shall not allow icing or dewing.

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|-------------------------|----------------------|
| (1) Ambient temperature | -5 to 40°C |
| (2) Relative humidity | 45 to 85 % |
| (3) Altitude | Not more than 2000 m |

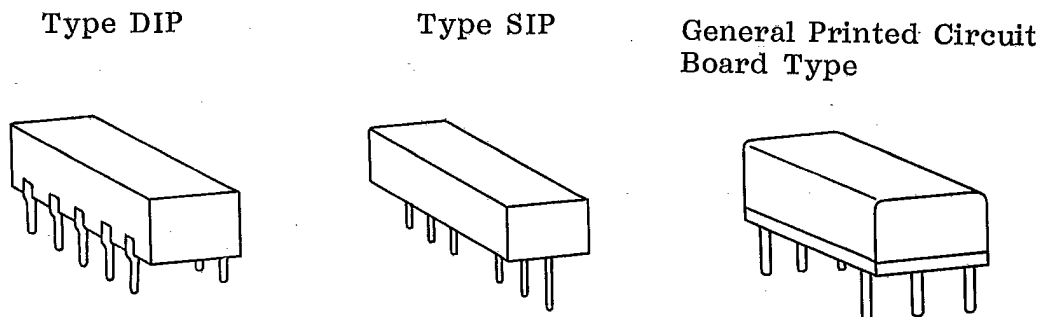
4. Classification

4.1 Classification by Mounting The classification by mounting are as follows:

- (1) Printed Circuit Board Type A type of relay which is mount directly on a printed circuit board as shown in Fig. 1. There are following 3 types according to the construction.
- (a) Type DIP (Dual In Line Package)
- (b) Type SIP (Single In Line Package)

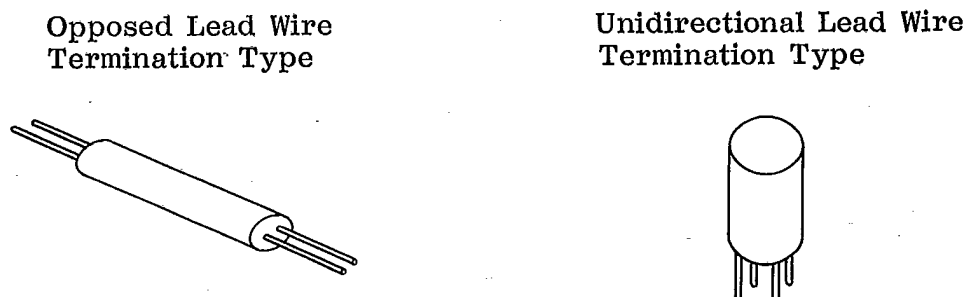
- (c) General Printed Circuit Board Type The type in which lead wire terminations are drawn out from the base of reed relay body downward at the lattice points of 2.54 mm or 2.50 mm pitch.

Fig. 1. Printed Circuit Board Type (Example)



- (2) Tubular Type A type of relay as shown in Fig. 2, i.e. the reed relay body is cylindrical. There are opposed lead wire termination type in which the lead wire terminations are projected on both sides and unidirectional lead wire termination type in which the lead wire terminals are projected on one side.

Fig. 2 (Example)



4.2 Classification by Contact Constitution The classification by contact constitution shall be as shown in Table 1.

Table 1

Type of contact	Number of poles			
	1	2	3	4
Normally open contact	1	2	3	4
Normally closed contact	1	2	-	-
Change-over contact	1	2	-	-

5. Ratings

5.1 Rated Insulation Voltage The rated insulation voltage shall be as shown in Table 2.

Table 2

Classification by a.c. or d.c.	Unit: V			
	Rated insulation voltage			
A.C.	30	60	125	250
D.C.	30	60	125	250

5.2 Rated Contact Voltage The rated contact voltage shall be as shown in Table 3.

Table 3

Classification by a.c. or d.c.	Unit: V							
	Rated contact voltage							
A.C.	6	12	24	48	50	100	110	200
D.C.	6	12	24	30	48	100	200	

5.3 Rated Thermal Withstand Current The rated thermal withstand current shall be as shown in Table 4.

Table 4

Unit: A							
Rated thermal withstand current							
0.1	0.2	0.3	0.5	1.0	2.0	3.0	5.0

5.4 Rated Contact Current The rated contact current shall be as shown in Table 5.

Table 5

Unit: A									
Rated contact current									
0,01	0.02	0.03	0.05	0.1	0.2	0.3	0.5	1.0	2.0

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5.5 Rated Voltage of Coil The rated voltage of coil shall be as shown in Table 6.

Table 6

Unit: V				
Rated voltage (d.c.) of coil				
5	6	12	24	48

6. Performances

6.1 Operating Voltage and Return Voltage When test of 8.3 is carried out the reed relay shall comply with the following items:

- (1) **Operating Voltage** The operating voltage shall be not more than 80 % of the rated voltage.
- (2) **Return Voltage** The return voltage shall be not less than 8 % of the rated voltage.

6.2 Contact Resistance When the test of 8.4 is carried out, the contact resistance shall be not more than 200 mΩ.

6.3 Insulation Resistance When the test of 8.5 is carried out, the insulation resistance shall be not less than 2 MΩ.

6.4 Withstand Voltage When the test of 8.6 is carried out, the reed relay shall withstand the test voltage.

6.5 Temperature Rise When the test of 8.7 is carried out, the temperature rise of the coil shall not exceed the temperature rise limit of Table 7.

Table 7

Unit: °C	
Insulation class	Temperature-rise limit (Resistance method)
Class A	85
Class E	100
Class B	110

6.6 Operating Time When the test of 8.8 (1) is carried out, the operating time shall be not more than 3 ms.

6.7 Returning Time When the test of 8.8 (2) is carried out, the returning time shall be not more than 3 ms.

6.8 Bounce Time When the test of 8.9 is carried out, the bounce time shall be not more than 3 ms.

6.9 Resistance to Vibration The reed relay shall comply with the following items:

- (1) Malfunction by Vibration When the test of 8.10 (1) is carried out, there shall be no harmful influence due to resonance and the chattering of contact shall be not more than 10 μ s.
- (2) Endurance to Vibration When the test of 8.10 (2) is carried out, the reed relay shall show no damage on each part, and shall satisfy the provisions of 6.1 Operating Voltage and Return Voltage, 6.2 Contact Resistance and 6.4 Withstand Voltage.

6.10 Resistance to Shock The reed relay shall comply with the following items:

- (1) Malfunction by Shock When the test of 8.11 (1) is carried out, the chattering of contact shall be not more than 10 μ s.
- (2) Endurance to Shock When the test of 8.11 (2) is carried out, the reed relay shall show no damage on each part, and shall satisfy the provisions of 6.1 Operating Voltage and Return Voltage, 6.2 Contact Resistance and 6.4 Withstand Voltage.

6.11 Robustness of Terminations When the test of 8.12 is carried out, there shall be no abnormality such as breaking and loosening of terminations.

6.12 Resistance to Cold The reed relay shall comply with the following items:

- (1) Resistance to Cold Operation When the test of 8.13 (1) is carried out, the reed relay shall show no damage on each part, and good operation of the contacts. However, the return voltage may be not less than 5 % of the rated voltage of coil.
- (2) Resistance to Cold Storage When the test of 8.13 (2) is carried out, the reed relay shall satisfy the provisions of 6.1 Operating Voltage and Return Voltage, 6.2 Contact Resistance, 6.3 Insulation Resistance, 6.4 Withstand Voltage and 7.1 General Construction.

6.13 Resistance to Heat The reed relay shall comply with the following items:

- (1) Resistance to Hot Operation When the test of 8.13 (3) is carried out, the reed relay shall show no damage on each part, and good operation of the contacts. However, the operating voltage may be not more than 95 % of the rated voltage of coil.
- (2) Resistance to Hot Storage When the test of 8.13 (4) is carried out, the reed relay shall satisfy the provisions of 6.1 Operating Voltage and Return Voltage, 6.2 Contact Resistance, 6.3 Insulation Resistance, 6.4 Withstand Voltage and 7.1 General Construction.

6.14 Resistance to Damp Heat When the test of 8.14 is carried out, the reed relay shall satisfy the provisions of 6.1 Operating Voltage and Return Voltage, 6.2 Contact Resistance, 6.3 Insulation Resistance, 6.4 Withstand Voltage and 7.1 General Construction.

6.15 Endurance The reed relay shall comply with the following items:

- (1) Mechanical Endurance When the test of 8.15 (1) is carried out, the reed relay shall show no trouble on any part such as adhesion of contacts, and satisfy the provisions of 1 and 2 of Table 26 after elapse of the specified number of endurance cycles.
- (2) Electrical Endurance When the test of 8.15 (2) is carried out, the reed relay shall show no trouble on any part such as adhesion of contacts, and satisfy the provision of Table 26.

6.16 Solderability When the test of 8.16 is carried out, 3/4 or more of the circumference of termination surface dipped in solder shall be covered with new solder.

6.17 Resistance to Soldering Heat When the test of 8.17 is carried out, the reed relay shall show no damage on any part, and satisfy the provisions of 6.1 Operating Voltage and Return Voltage, 6.2 Contact Resistance, 6.3 Insulation Resistance and 6.4 Withstand Voltage.

7. Construction

7.1 General Construction The reed relay shall be made of materials of superior quality and shall comply with the following items:

- (1) The reed relay shall have the structural strength, not to cause deformation and remarkable variation in its performance which are detrimental to practical use.
- (2) The parts liable to rust, shall be treated deterrent to rusting by means of plating, coating or the like. However, for the part where no-treatment is unavoidable from the constructional point of view and will not cause trouble on the function, the above requirements need not be fulfilled.
- (3) For the part liable to work loose, locking shall be done.

7.2 Shape and Connection The shape and connection of reed relay shall comply with the following requirements:

- (1) Shape of Type DIP The reed relay of Type DIP shall have the shape shown in Fig. 3 and the dimensions given in Table 8, while its coil and reed switch are fixed with resin and the lead wire terminations are drawn out as shown in the above Figure.