

JIS

JAPANESE INDUSTRIAL STANDARD

Motor Driven Timer

JIS C 4551 --1981

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Motor Driven Timer

C 4551-1981

1. Scope

This Japanese Industrial Standard specifies the motor driven timers principally used in industrial control circuits not exceeding 250 V of 50 Hz or 60 Hz frequency a.c. or of d.c., hereinafter referred to as the "timers".

2. Definitions

The meanings of principal terms used in this standard are as follows:

- (1) motor driven timer A timer that operates with an intended time delay by using a small motor as the time limiting element.
- (2) operating time The lapse of time from the instant of the application of the prescribed voltage to the operating circuit to the instant of completion of operation of the time limit contact.
- (3) resetting time While the time limit operation is going on or after it has finished, the duration of time from the instant when the voltage on the operating circuit is removed or the necessary voltage is applied to the resetting circuit to the instant when the timer returns to the condition before starting.

Applicable Standards:

JIS C 0301-Graphical Symbols for Electrical Apparatus

JIS C 0911-Vibration Testing Procedure for Electric Machines and Equipment

JIS C 0912-Shock Testing Procedure for Electric Machines and Equipment

JIS C 7005-Kinds and Dimensions of Bases, Caps and Gauges for Receiving Tubes

- (4) reset The reversion into the condition before starting, while the time limit operation is going on or after it has finished.
- (5) self-reset The automatic reversion actuated by removal of the voltage from the operating circuit.
- (6) electrical reset The reversion done by application of necessary voltage to the resetting circuit.
- (7) manual reset The mechanical reversion done by manual operation.
- (8) resetting timer A timer that performs the specified time limit operation, is resettable at any instant during operation and can perform the next time limit operation only when it is reset once.
- (9) repeating timer A timer that repeats operations at a definite period.
- (10) set error The difference of the mean of the successive five operating times from the time set on the dial.
- (11) dispersion of operating times The irregularity of operating times, when the timer set at a specified time is operated repeatedly under the same conditions.
- (12) rated insulation voltage The voltage that is taken as the basis for designing insulation, and satisfies the insulation distance and withstand voltage.
- (13) rated operational voltage The voltage that, in relation to the rated operational current, determines the specifications for a timer.
- (14) rated thermal current The maximum current that a timer can continuously carry without causing a temperature rise exceeding the value specified in the temperature test, while its switching part is maintained unoperated.
- (15) rated operational current The current used under the specified conditions and the rated operational voltage.

3. Standard Conditions in Service and Power Source

3.1 Standard Conditions in Service Standard conditions in service shall be as follows:

- (1) Ambient Temperature -5 to 40°C, provided that the timer is not frozen.

(2) Relative Humidity 45 to 85 %, provided that the timer is not dewed.

(3) Altitude Not more than 2000 m.

3.2 Standard Power Sources in Service Standard power sources in service shall be as follows:

(1) Standard Power Sources in Service Where a.c. is to be used the standard power source shall be an a.c. source of sinusoidal waveform of the rated frequency, and where d.c. is to be used, it shall be a storage battery. However, where operational characteristics are not affected in actual service, an a.c. source of nearly sinusoidal waveform may be used for a.c., and a d.c. source having a ripple component as little as practicable (d.c. by three-phase full-wave rectification, for example) for d.c., may be used.

(2) Allowable Range of Voltage Variation of Operating Circuits The range shall be 85 to 110 % of the rated voltage.

(3) Frequency of Operating Circuits The frequency shall be 50 Hz or 60 Hz.

4. Classification of Timers The timers are classified as follows:

4.1 Resetting Timer

- (1) Self-reset
- (2) Electrical reset
- (3) Manual reset

4.2 Repeating Timer

5. Ratings

5.1 Rated Insulation voltages The rated insulation voltages shall conform to Table 1.

Table 1

Unit: V

Rated insulation voltage		
60	125	250

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5.2 Rated Operational Voltages of Switching Parts The rated operational voltages of switching parts shall conform to Table 2.

Table 2

Unit: V

A.C.	100	200		
D.C.	24	48	100	200

5.3 Rated Voltages of Operating Circuits The rated voltages of operating circuits shall conform to Table 3.

Table 3

Unit: V

A.C.	24	100 (110)	200 (220)
D.C.	24	48	100

Remark: It is advised that the values in parentheses should not be used.

5.4 Rated Thermal Currents of Switching Parts The rated thermal currents of switching parts shall conform to Table 4.

Table 4

Unit: A

Rated thermal current					
1	2	3	5	7	10

5.5 Rated Operational Currents of Switching Parts The rated operational currents of switching parts shall conform to Table 5.

Table 5

Unit: A

Rated operational current						
0.1	0.2	0.3	(0.4)	0.5	0.7	
1	2	3	(4)	5	7	10

Remark: It is advised that the values in parentheses should not be used.

5.6 Rated Frequencies The rated frequencies of a.c. timers shall conform to Table 6.

Table 6

Unit: Hz

Rated frequency	
50	60

5.7 Time The maximum time scale of resetting timers shall conform to Table 7. However, in the case of those for common use for 50 Hz and 60 Hz rated frequencies, the time shall be related to 60 Hz. The time for repeating timers shall be expressed by the time of one period and its value is not expressly specified.

Table 7

Second	1	3	5	6	10	12	15	30	60	120	180
Minute	2	3	5	6	10	12	15	30	60	120	180
Hour	2	3	6	10	12	24	48	72			

6. Performance

6.1 Operation When the timer is subjected to the test of 8.2.2, all the parts shall operate well.

6.2 Tolerances When the timer is subjected to the tests of 8.2.3 and 8.2.4, the tolerances shall satisfy the values in Table 8.

Table 8

Set error (scale error)	%	± 1	± 2	± 5	± 10
Dispersion of operating time (repeating error)	%	± 0.5	± 1	± 2	± 5

6.3 Maximum Resetting Time When tested in accordance with 8.2.5, the maximum resetting time of a resetting timer shall be not more than 0.5 s.

6.4 Contact Resistance When tested in accordance with 8.2.6, the contact resistance between the terminals of switching part shall be not more than 100 mΩ.

6.5 Temperature Rise When the timer is tested in accordance with 8.2.7, the temperature rise of each part shall not exceed the appropriate value in Tables 9 and 10.

Table 9

Part and material		Limit of temperature rise (thermometer method)
Contact in air	Silver and silver alloy or silver contact	Limited to the temperature up to which adjacent parts are not damaged.
	Other metals	Limited to the level up to which the properties of the metal or adjacent parts are not damaged.
Metal part that perform spring action		Limited to the temperature up to which the elasticity of the material is not lost. For pure copper, the total tem- perature (including ambient tempera- ture) shall be not more than 75°C.
Metal part that is in contact with insulating material		Limited to the temperature up to which the insulating material is not damaged. For example, the temperature rise of the contact part being in contact with a phenol resin moulding shall be 100°C.
Terminal that is connected with external insulated conductor		65°C

Remark: The limit of reference ambient temperature shall be 40°C.

Table 10

Unit: °C

Insulation class		Limit of temperature rise (resistance method)
In air	Coll of Class A insulation	85
	Coll of Class E insulation	100
	Coll of Class B insulation	110

Remark: The limit of reference ambient temperature shall be 40°C.

6.6 Insulation Resistance When tested in accordance with 8.2.8, the insulation resistance shall be not less than 20 MΩ.

6.7 Withstand Voltage When the timer is subjected to the test of 8.2.9, the part under test shall withstand the test voltage.

6.8 Resistance to Cold The resistance to cold shall meet the following:

- (1) Resistance to Cold in Service When subjected to the test of 8.2.10(1) for resistance to cold in service, the timer shall operate normally.
- (2) Resistance to Cold in Storage When subjected to the test of 8.2.10(2) for resistance to cold in storage, the timer shall satisfy the requirements of 6.1, 6.6, 6.7 and 7.1.

6.9 Resistance to Heat The resistance to heat shall meet the following:

- (1) Resistance to Heat in Service When subjected to the test of 8.2.11(1) for resistance to heat in service, the timer shall operate normally.
- (2) Resistance to Heat in Storage When subjected to the test of 8.2.11(2) for resistance to heat in storage, the timer shall satisfy the requirements of 6.1, 6.6, 6.7 and 7.1.

6.10 Resistance to Moisture When subjected to the test of 8.2.12 for resistance to moisture, the timer shall satisfy the requirements of 6.1, 6.6, 6.7 and 7.1.

6.11 Resistance to Vibration The resistance to vibration shall meet the following:

- (1) Durability When subjected to the test of 8.2.13(1) for durability, the timer shall show no mechanical damage in all parts and shall satisfy the requirements of 6.1.
- (2) False Operation When subjected to the test of 8.2.13(2) for false operation, the timer shall show no resonance in all parts and the duration of contact separation shall be not more than 3 ms.

6.12 Resistance to Shock The resistance to shock shall meet the following:

- (1) Durability When subjected to the test of 8.2.14(1) for durability, the timer shall show no mechanical damage in all parts and shall satisfy the requirements of 6.1.
- (2) False Operation When the timer is subjected to the test of 8.2.14(2) for false operation, the duration of contact separation shall be not more than 3 ms.