

JIS

JAPANESE INDUSTRIAL STANDARD

**Carbon potentiometers
for general use**

 **JIS C 6443—1995**

Translated and Published

by

Japanese Standards Association

Printed in Japan

**In the event of any doubt arising,
the original Standard in Japanese is to be final authority**

Errata for JIS (English edition) are printed in *Standardization Journal*, published monthly by the Japanese Standards Association.

Errata will be provided upon request, please contact:

Business Department,
Japanese Standards Association
4-1-24, Akasaka, Minato-ku,
Tokyo, JAPAN 107
TEL. 03-3583-8002
FAX. 03-3583-0462

Errata are also provided to subscribers of JIS (English edition) in *Monthly Information*.



JAPANESE INDUSTRIAL STANDARD

J I S

Carbon potentiometers for general use

C 6443-1995

1. Scope This Japanese Industrial Standard specifies carbon potentiometers for general use mainly in electronic equipment (hereafter referred to as "resistors").

Remarks 1. These resistors mean the ones provided with bearings for shafts (control spindle) which are classified into two kinds i.e. metallic and insulator ones.

2. The following standards are cited in this Standard:

JIS C 0010 Environmental testing Part 1: General and guidance

JIS C 5260 General rules of variable resistors for electronic equipment

JIS C 5261 Test methods of potentiometers for use in electronic equipment

JIS K 6911 Testing methods for thermosetting plastics

3. The International Standard corresponding to this Standard is given below.

IEC 393-5 (1992) Potentiometers for use in electronic equipment
Part 5: Sectional specification:
Single-turn rotary low-power wirewound and non-wirewound potentiometers

2. Definitions For the purposes of this Standard, in addition to the definitions given in JIS C 5260 and JIS C 5261, the following definition apply:

rated dissipation The maximum electric power able to be loaded to a resistor continuously over its full range (between terminations 1 and 3) at an ambient temperature not exceeding 50°C.

3. Type designation

3.1 Structure of type designation The type designation shall be structured by arranging the symbols as follows:

Symbol denot- ing kind	Symbol denot- ing nominal outer diameter	Symbol denot- ing type	Symbol denot- ing spindle	Symbol denot- ing resist- ance law	Symbol denot- ing nominal total resist- ance	Symbol denot- ing addi- tional switch
3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	3.2.7

Example 1:	RV	12	GP	20K	B10 k Ω ×2	
Example 2:	RV	16	NP	15S	B	10 k Ω
Example 3:	RV	16	D	30	B500 Ω	A5 k Ω
Example 4:	RV	24	N	25FZ	A	500 k Ω
	Size					RSE

Remarks 1. Symbol denoting additional switch shall be attached only for the resistor with switch.

2. Combination of symbol denoting kind and symbol denoting nominal outer diameter is called Size.

3.2 Symbols

3.2.1 Kind The symbol denoting kind shall be two English capital letters of RV showing carbon potentiometer.

3.2.2 Nominal outer diameter The symbol denoting nominal outer diameter shall be as given in Table 1 (refer to Attached Figs. 1 to 6).

Table 1. Symbol denoting nominal outer diameter
Unit: mm

Symbol	Outer diameter
12	12 $\pm$ 1
16	16 $\pm$ 1.2
24	24 $\pm$ 1.5

3.2.3 Type The symbol denoting type shall be as given in Table 2.

Table 2. Symbol denoting type

Symbol	Type	Attached Figure	Applicable size
N	Single acting lug termination type	1	RV12, RV16, RV24
NP	Single acting printed termination type	2	
D	Concentric double lug termination type	3	RV16
DP	Concentric double printed termination type	4	
G	Single spindle 2-gang lug termination type	5	RV12, RV16, RV24
GP	Single spindle 2-gang printed termination type	6	RV12, RV16

Remarks: The intermediate termination, if any, shall be denoted by attaching "T" after the symbol of Table 2. The position, resistance and residual resistance thereof (minimum resistance between the intermediate termination and termination 2) shall be agreed between the parties concerned.

3.2.4 Spindle The symbol denoting spindle shall consist of a combination of the symbol denoting length and that denoting shape. The length means the distance from the reference plane to the tip of spindle, and shall comply with Table 3 for metallic spindle and with Table 4 for insulator spindle. The symbols denoting spindle of type D and type DP, however, mean the symbol denoting the length from the reference plane to the tip of inner spindle only (exclusive of the symbol denoting the length and the shape of outer spindle as well as shape of inner spindle) and 2 classes of 25 and 30 are available (refer to Attached Fig. 3 and Attached Fig. 4).

Table 3. Symbol denoting metallic spindle

Length symbol	Length mm	Shape symbol (refer to Attached Fig. 7)				Applicable size
		F	R	S	K	
10	10±1	—	○	○	—	RV12, RV16
15	15±1	○	○	○	○	RV12, RV16, RV24
20	20±1	○	○	○	○	
25	25±1	○	○	○	○	
30	30±1	○	○	—	○	RV16, RV24
35	35±1	○	○	—	○	RV24
40	40±1	○	○	—	○	

Remarks: ○ shows application.

Table 4. Symbol denoting insulator spindle

Length symbol	Length mm	Shape symbol (refer to Attached Fig. 7)	Applicable size
		FZ	
15	15 ± 1	○	Type symbol N and NP of RV16 and RV24
20	20 ± 1	○	
25	25 ± 1	○	

Remarks: ○ shows application.

3.2.5 Resistance law (resistance change characteristics) The resistance law shall be classified in accordance with the behavior of output voltage between terminations 1 and 2 or 2 and 3 expressed in the ratio to the applied voltage, as shown in Fig. 1-1 and Fig. 1-2 when a voltage (not more than rated voltage) is applied between terminations 1 and 3 (refer to Attached Figs. 1 to 6) and the spindle is turned clockwise or counter-clockwise. The characteristics are classified into four and symbolized as follows:

- Symbol A: Resistors which show exponential variation like A of Fig. 1-1
- Symbol B: Resistors which show rectilinear variation like B of Fig. 1-1
- Symbol C: Resistors which show exponential variation like C of Fig. 1-2
- Symbol D: Resistors which show exponential variation like D of Fig. 1-1

Fig. 1-1

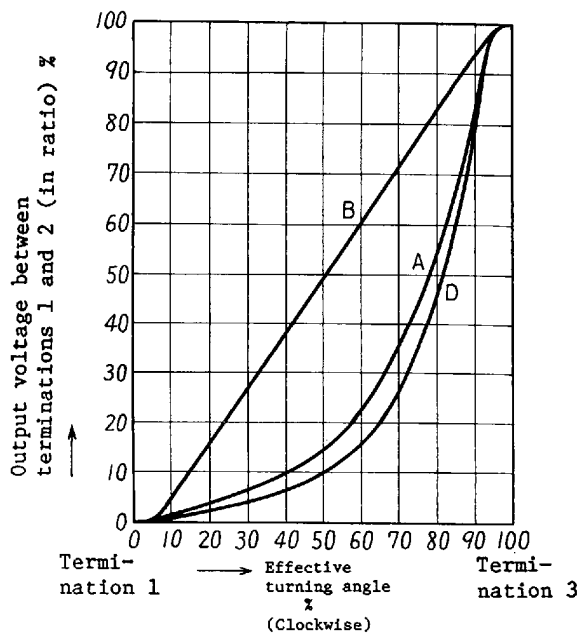
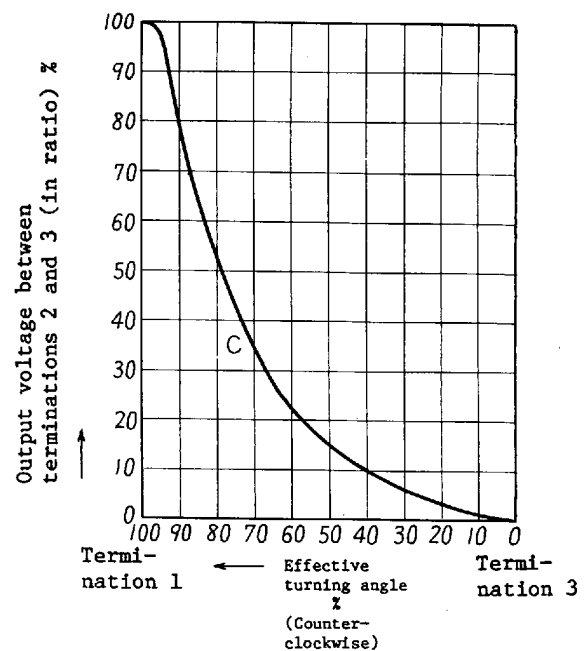


Fig. 1-2



Remarks: In resistors of types G and GP, (ganged) in which combination of resistance law and nominal total resistance is the same, when the deviation between two resistor elements in the resistance law is especially specified, such designation shall be denoted by affixing the symbols of 1G, 2G, 3G or 4G (refer to No. 4 specified in Table 14), in succession to the resistance law.

Example: RV16 GP 20K A 1G 50 $k\Omega \times 2$

3.2.6 Nominal total resistance The symbol denoting nominal total resistance shall be expressed in the unit of ohm (Ω), kilohm ($k\Omega$) or megohm ($M\Omega$), and shall comply with Table 5.

Table 5. Symbol denoting nominal total resistance

Symbol for resistance law	Symbol (nominal total resistance)
B	500 Ω ⁽¹⁾ , 1 $k\Omega$, (2 $k\Omega$), 5 $k\Omega$, 10 $k\Omega$, (20 $k\Omega$), 50 $k\Omega$, 100 $k\Omega$, (200 $k\Omega$), 500 $k\Omega$ ⁽²⁾ , 1 $M\Omega$ ⁽²⁾ , 2 $M\Omega$ ⁽²⁾
D, A, C	5 $k\Omega$, 10 $k\Omega$, (20 $k\Omega$), 50 $k\Omega$, 100 $k\Omega$, (200 $k\Omega$), 500 $k\Omega$ ⁽²⁾ , 1 $M\Omega$ ⁽²⁾

Notes ⁽¹⁾ Applicable to RV24, only.

⁽²⁾ Not applicable to RV12.

Remarks 1. Values given in parentheses should not be used as far as possible.

2. In resistors of symbols D, DP, G and GP, the resistance law and nominal total resistance shall be denoted from the resistor located near the spindle, as shown in Example 3 and Example 4 given in 3.1.

3.2.7 Additional switch The symbol denoting additional switch shall be as follows:

- (1) Structure of symbol of switch The structure of symbol of switch shall be in the following arrangement:

Symbol denoting operation system (2)(a)	Symbol denoting number of circuit contacts (2)(b)	Symbol denoting switch rating (2)(c)
---	--	--

Example: R S E

- (2) Symbol

- (a) Operation system The symbol denoting operation system shall be as given in Table 6.

Table 6. Symbol denoting operation system of switch

Symbol	Operation system
R	Rotary type
P	Push type
U	Pull-push type

- (b) Number of circuit contacts The symbol denoting number of circuit contacts shall be as given in Table 7.

Table 7. Symbol denoting number of circuit contacts of switch

Symbol	Number of circuit contacts
S	Single pole single throw
D	Double pole single throw
M	Single pole double throw

- (c) Rating of switch The symbol denoting the rating of switch shall be as given in Table 8.

Table 8. Symbol denoting rating of switch

Symbol	Rated voltage V	Rated current A	Test method (refer to No. 19 of Table 14)
E	110 (a.c.)	1	Method 1
F		3	
H		5	
1	120 (a.c.)	1	Method 2
3		3	
5		5	
G	16 (d.c.)	1	Method 3
T		3	
K	30 (d.c.)	3	

Remarks: In the case of a.c., the rated voltage and rated current shall be the effective value of commercial frequency.

- (3) Kind of switch The kind of switch shall be as given in Table 9.

Table 9. Symbol denoting kind of switch

Symbol	Operation system	Number of circuit contacts	Rated voltage V	Rated current A	Size of applicable resistor	Test method (refer to No. 19 of Table 14)
RSE	Rotary type	Single pole single throw	110 (a.c.)	1	RV16, RV24	Method 1
RSF				3		
RSH				5	RV24	
RS1			120 (a.c.)	1	RV16, RV24	Method 2
RS3				3		
RS5				5	RV24	
RDE	Rotary type	Double pole single throw	110 (a.c.)	1	RV16, RV24	Method 1
RDF				3	RV24	
RD3			120 (a.c.)	3	RV24	Method 2
RME	Rotary type	Single pole double throw	110 (a.c.)	1	RV24	
RMF				3		
RM1			120 (a.c.)	1	RV24	Method 2
RM3				3		
USF	Pull-push type	Single pole single throw	110 (a.c.)	3	RV24	Method 1
USH				5		
US3			120 (a.c.)	3	RV24	Method 2
UDF	Pull-push type	Double pole single throw	110 (a.c.)	3	RV24	Method 1
UD3			120 (a.c.)	3	RV24	Method 2
UD5				5		
RSG	Rotary type	Single pole single throw	16 (d.c.)	1	RV16	Method 3
RST				3		
RSK			30 (d.c.)	3	RV16	Method 3
RMT	Rotary type	Single pole double throw	16 (d.c.)	3	RV16	Method 3
RMK			30 (d.c.)			
PST	Push type	Single pole single throw	16 (d.c.)	3	RV16	Method 3
PMT		Single pole double throw	16 (d.c.)			

Remarks: In the case of a.c., the rated voltage and rated current shall be the effective value of commercial frequency.

4. Ratings

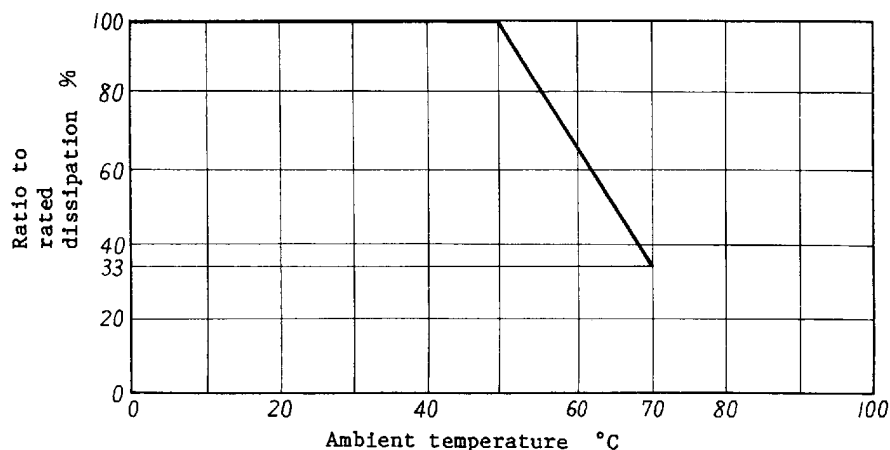
4.1 Rated dissipation The rated dissipation shall be as given in Table 10.

The power actually loaded when the ambient temperature is over 50°C up to and including 70°C, shall be understood as the maximum power, obtained by multiplying the ratio to rated dissipation determined from the derating curve given in Fig. 2, into the rated dissipation.

Table 10. Rated dissipation

Symbol for resistance law	Size					
	RV12		RV16		RV24	
	Rated dissipation W	Max. working voltage V	Rated dissipation W	Max. working voltage V	Rated dissipation W	Max. working voltage V
B	0.05	50	0.1	200	0.5	500
A, C and D			0.05	150	0.25	250

Fig. 2. Derating curve of rated dissipation



4.2 Rated voltage The rated voltage shall be the voltage of d.c. or a.c. (commercial frequency, effective value) corresponding to the rated dissipation, and be obtained from the following formula. When the obtained rated voltage exceeds the maximum working voltage given in Table 10, however, the maximum working voltage of Table 10 shall be the rated voltage.

$$E = \sqrt{P \cdot R}$$

where, E : rated voltage (V)

P : rated dissipation (W)

R : nominal total resistance (Ω)

10
C 6443-1995

5. Appearance, construction and dimensions

5.1 Appearance There shall be no abnormality, when the appearance is visually checked.

5.2 Construction and dimensions The construction and dimensions shall comply with Attached Figs. 1 to 6. The shape and construction in detail are arbitrary as far as they satisfy the performance specified in this Standard. In the resistors whose test method is specified as Method 2 in the test method of Table 9, the opening in the switch enclosure shall be not more than 32 mm² in total.

5.3 Spindle The spindle shall be metallic spindle and insulator spindle (inclusive of spliced spindle with metal), and the shape and dimensions shall comply with Attached Fig. 7.

5.4 Termination The terminations 1 and 3 shall be connected to both ends of the resistor, and termination 2 to the sliding contact piece, each termination shall be insulated from spindle and metal cover.

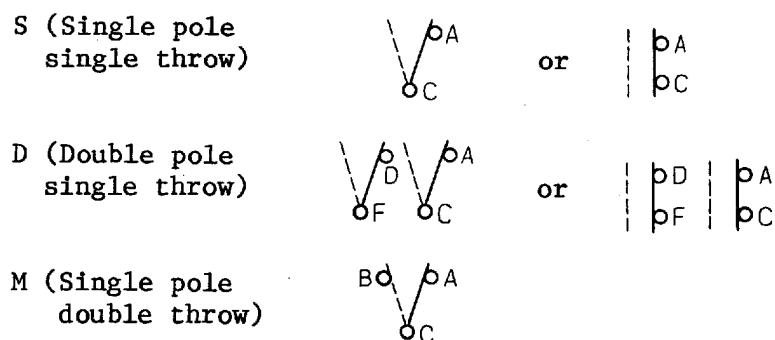
All the terminations shall be so treated that it is soldered easily.

5.5 Switch

5.5.1 Switch termination The switch terminations shall be insulated from all of resistor terminations, spindles and metal cover.

The connection and termination marks of a switch shall comply with Fig. 3.

Fig. 3. Connection diagram of switch terminations



Remarks: Such connection as for closes the contact(s) when the spindle is turned clockwise the operation system of rotary type, or when the spindle is pulled for the operation system of pull-push type, is indicated by full line, and that opens the contact in such operation is indicated by broken line.

5.5.2 Clearance The clearance (inclusive of creepage distance) of the switch with a rated voltage 110 V or 120 V shall comply with Table 11.

Table 11. Clearance of switch

Unit: mm

Measuring parts of clearance (inclusive of creepage distance)	Dimensions (minimum)
Between terminations of switch	3
Between outer termination of switch and dead metallic part liable to be earthed	2.5
Between live parts of different polarity	2.5 (1.5)
Between live parts and dead metallic parts liable to be earthed	2 (1.5)

Remarks: The numerical values given in parentheses show the dimensions of fixed parts where entering of dust and adhesion of metallic powder are not anticipated.

5.5.3 Operation mechanism The operation mechanism shall be of the following three kinds:

- (1) Rotary type The rotary type switch shall be so constructed that it is operated at the beginning part of clockwise rotation of the spindle, single throw one closes the circuit in this operation and the operation angle shall be within 60° .
- (2) Pull-push type The pull-push type switch shall be so constructed that the switch is closed when the spindle is pulled at an arbitrary rotational position of spindle, that the switch is opened and the spindle returns to the original position when the spindle is pushed from the above state (pulled), and that the length of movement (stroke) is 4.5 ± 1 mm.
- (3) Push type The push type switch shall be so constructed that the switch is closed (or opened) when the spindle is pushed at an arbitrary rotational position of spindle, the spindle returns to the original position when the pushing force is removed, the switch is opened (or closed) when the spindle is pushed again from the above state, the switch is operated alternately in such a way and the spindle returns to the original position, and that the length of movement (stroke) is 4.5 ± 1.5 mm.

5.6 Total angle of rotation The total angle of rotation shall be $300 \pm 5^\circ$. Provided that, as for the resistor with pull-push type and push type switch, it shall be $300^{+10^\circ}_{-5}$.

5.7 Rotating torque and operating force of switch The rotating torque and operating force of switch shall comply with Table 12.