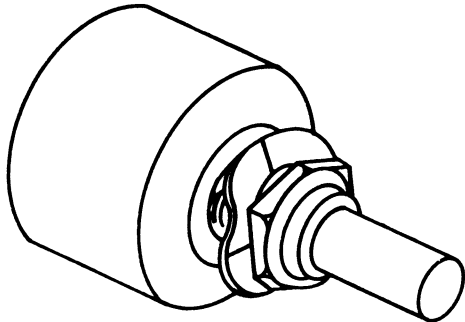


BRITISH STANDARDS INSTITUTION 2 PARK STREET, LONDON W1A 2BS	BS 9133 N004 TO 010 ISSUE 1, JANUARY 1975
ELECTRONIC COMPONENTS OF ASSESSED QUALITY: DETAIL SPECIFICATIONS	
 For individual details see table 1 and appendices A and B	SINGLE TURN LOW POWER ROTARY POTENTIOMETERS
	FULL ASSESSMENT
	WIREWOUND
	CONSTRUCTION: SPINDLE: INSULATED FROM RESISTANCE ELEMENT SEALING: SPINDLE AND PANEL SEALED OR CONTAINER, SPINDLE AND PANEL SEALED

For ordering information see clause 5

1. RATINGS AND CHARACTERISTICS

Resistance laws	Linear (law A)) Non-linear (law B)) See table 2 Reverse non-linear (law C))
Resistance range	The range of values available in each law and in each style will be given in the qualified products list (BS 9002).
Resistance values	The preferred values are 1.0, 2.2 and 4.7 in each decade. Other values should not be used in new designs.
Selection tolerances	$\pm 10\%$, $\pm 5\%$
Rated dissipation at 70 °C	See table 1
Environmental classification	See table 1
Limiting element voltage	See table 1
Isolation voltage	See table 1
Bump severity	390 m/s^2 : 4000 bumps
Vibration severity	10 Hz to 500 Hz; 0.75 mm or 98 m/s^2 , whichever is the less severe
Low air pressure severity	8.5 kPa (85 mbar)
Limits of resistance change (after 1000 h endurance)	2 %
Starting torque	7.5 mN m to 90 mN m
Temperature characteristic of resistance (+20 °C to +70 °C)	$\pm 0.75\%$ (t.c. $\pm 150 \text{ p.p.m./}^\circ\text{C}$)

TABLE 1. SELECTION CHART OF STYLES AND DETAIL SPECIFICATIONS

Type of sealing	Rated dissipation W at 70 °C		Limiting element voltage V d.c. or a.c. r.m.s.	Isolation voltage V a.c. peak		Environ- mental classif- ication	Outline drawing (see appendix A)	Style	
	Resist- ance law A	Resistance laws B and C		Normal air pressure	Low air pressure			Detail specification number BS 9133 N...	Mounting variant (see note and appendix B)
Spindle and panel sealed	0.5	0.25	250	360	240	40/070/21	A/1	004	B.1 series B.2 series
	0.75	0.375	315	450	300	40/070/21	A/2	005	B.1 series B.2 series
	1.0	0.5	400	570	380	40/070/21	A/3	006	B.1 series B.2 series
	2.5	1.25	500	710	470	40/070/21	A/4	007	B.1 series B.2 series
	3.0	1.5	630	900	600	40/070/21	A/5	008	B.1 series B.2 series
Container, spindle and panel sealed	0.5	0.25	250	360	240	40/070/56	A/6	009	B.1 series B.2 series
	2.5	1.25	500	710	470	40/070/56	A/7	010	B.1 series

NOTE. The dimensions and identifying codes of mounting variants are given with associated drawings in appendix B. They are grouped according to whether the mounting variants are metric originals (B.1 series) or inch originals (B.2 series). Dimensions for mounting accessories are also in appendix B.

**Amendment Slip No.1, published 30 September 1976
to BS 9133 N004 to N010 : 1975**

Detail specification for wirewound single turn low
power rotary potentiometers of assessed quality.

Full assessment

Revised text

Clause 1. Ratings and characteristics. Under the heading 'Resistance values' delete the existing text and substitute the following:

'The preferred values are 1.0, 2.2 and 4.7 in each decade, and are selected from BS 2488. Other values should not be used in any new equipment designs.'

Clause 3. Related documents. In correct numerical sequence insert the following:

'BS 2488 'Schedule of preferred numbers for the resistance of resistors and the capacitance of capacitors'.
BS 3401 'Beryllium copper crinkle washers.'

Clause 6.1 Limiting slider current. In the penultimate line delete '500 mA' and substitute '50 mA'.

Clause 8. Inspection requirements

Subgroup A2. In the column 3 entry for 'Resistance', immediately after '0.01 %', insert 'of R_{ac} '.

Subgroup C3 (i). In the column 3 entry for 'Resistance a to b ', immediately after '0.02 %', insert 'of R_{ac} '.

Subgroup C3 (iii). In the column 3 entry for 'Starting torque' under the heading 'Final measurements', delete ' $< 7.5 \leq 90 \text{ mN m}$ ' and substitute ' $\geq 7.5 \text{ mN m} \leq 90 \text{ mN m}$ '.

Subgroup D1. In the column 3 entry for 'Starting torque' delete ' $> 7.5 \text{ mN m} \leq 90 \text{ mN m}$ ' and substitute ' $\geq 7.5 \text{ mN m} \leq 90 \text{ mN m}$ '.

Subgroup D3. In the column 3 entry delete '+20/-70' and substitute '+20/+70'.

Subgroup D6. In the column 3 entry for 'Resistance a to b ', immediately after '0.02 %', insert 'of R_{ac} '.

In the column 3 entry for 'Starting torque' delete ' $> 7.5 \text{ mN m} \leq 90 \text{ mN m}$ ' and substitute ' $\geq 7.5 \text{ mN m} \leq 90 \text{ mN m}$ '.

Appendix A. Outline drawings and dimensions. The last two drawings in this appendix have been numbered A/6. Delete the second 'A/6' and substitute 'A/7'.

Appendix B

Clause B.3 Crinkle washer. Delete this clause entirely.

Variant B.1/2. For dimensions D and E , under the heading 'Tolerance' delete ' ± 0.05 ' and substitute ' ± 0.5 '.

Variant B.2/1. Delete from the table the dimensions J , K and L and the related data.

Under the heading 'Additional information' insert the following:

'Crinkle washer dimensions are specified in BS 3401.'

Variant B.2/2. Delete from the table the dimensions J , K and L and the related data.

Under the heading 'Additional information' insert the following:

'Crinkle washer dimensions are specified in BS 3401.'

Variant B.2/3. Delete from the table the dimensions J , K and L and the related data.

Under the heading 'Additional information' insert the following:

'Crinkle washer dimensions are specified in BS 3401.'

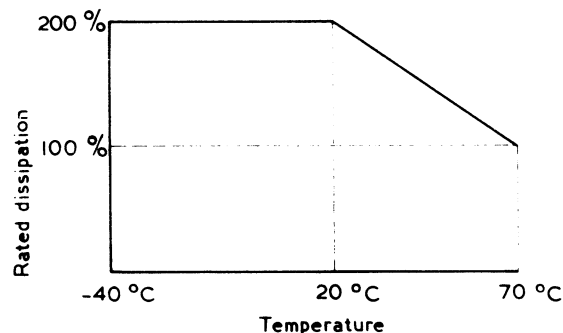
For dimension C , under the heading 'Tolerance' delete ' ± 0.20 ' and substitute ' ± 0.12 '.

For dimension D , under the heading 'Tolerance' delete ' ± 0.12 ' and substitute ' ± 0.20 '.

TABLE 2. LIMITS OF RESISTANCE LAW

Resistance law	% Angle of effective rotation	Output ratio $\% \frac{V_{ab}}{V_{ac}}$
A	33.3 $\pm$ 0.25 50.0 $\pm$ 0.25 66.6 $\pm$ 0.25	33.3 $\pm$ 2.5 50.0 $\pm$ 2.5 66.6 $\pm$ 2.5
B	25 $\pm$ 0.25 50 $\pm$ 0.25	12.5 $\pm$ 5 29.5 $\pm$ 5
C	25 $\pm$ 0.25 50 $\pm$ 0.25	38.5 $\pm$ 5 70.5 $\pm$ 5

1.1 Derating



2. MARKING

The marking of the potentiometer and package shall be in accordance with 1.1.6 of BS 9130.

3. RELATED DOCUMENTS

- BS 84 'Parallel screw threads of Whitworth form'.
- BS 903 'Methods of testing vulcanized rubber', Part A26 'Determination of hardness'.
- BS 2011 'Methods for the environmental testing of electronic components and electronic equipment'.
- BS 2045 'Preferred numbers'.
- BS 3222 'Low compression set butadiene/acrylonitrile vulcanized rubber compounds'.
- BS 4463 'Crinkle washers for general engineering purposes (metric sizes)'.
- BS 5054 'Dimensions of spindle ends for manually operated electronic components'.
- BS 6001 'Sampling procedures and tables for inspection by attributes'.
- BS 9000 'General requirements for electronic components of assessed quality'.
- BS 9002 'Qualified products list for electronic components of assessed quality (including list of approved firms)'.
- BS 9130 'Potentiometers of assessed quality : generic data and methods of test'.
- BS 9133 'Rules for the preparation of detail specifications for single turn low power rotary potentiometers'.

4. TERMINOLOGY

No terminology in addition to that given in BS 9130 is required.

5. ORDERING INFORMATION

Orders for potentiometers covered by this specification shall contain the following information (in accordance with the requirements of 1.1.15 of BS 9130).

- (a) Value of rated resistance and tolerance and law.
- (b) Style and number of the relevant detail specification (see table 1).
- (c) Spindle length and any details not already covered by (b) above.

Example: 1 k Ω , $\pm$ 5 %, law A, style B.2/2, BS 9133 N004, 50.80 mm, screwed knob.

6. ADDITIONAL INFORMATION

6.1 Limiting slider current. The limiting slider current is given by the formula:

$$I = \sqrt{\frac{\text{rated dissipation}}{\text{rated resistance}}}$$

or 500 mA,
whichever is the lesser.

6.2 Materials and finishes. These detail specifications contain no information regarding the external finishes used on the potentiometers. Where the finish may affect compatibility with mounting surfaces (e.g. avoidance of electrolytic corrosion), equipment designers can obtain this information from the manufacturers listed in BS 9002 as having qualification approval to the appropriate detail specification.

7. CERTIFIED TEST RECORDS

Certified test records shall be prepared in accordance with 1.1.11 of BS 9130 and shall be presented in the style of the layout given in appendix D to that document.

8. INSPECTION REQUIREMENTS

- 8.1 Where drying is called for, procedure 1 of 1.2.4.1 of BS 9130 shall be used.
- 8.2 There shall be a satisfactory balance between high, low and critical resistance values in the sample taken. See appendix A of BS 9130. Sampling tables are given in BS 6001.
- 8.3 Throughout this schedule, the unit of product shall be one potentiometer.
- 8.4 Where a subgroup contains more than one test, the tests shall be carried out in the order given.
- 8.5 Samples submitted to tests marked '(D)' shall not be accepted for release under BS 9000 (see 2.6.5 of BS 9000 : Part 1).
- 8.6 The potentiometers shall be mounted in the normal manner.

Inspection	BS 9130 reference and conditions of test	Performance requirements
<i>GROUP A</i>	To be applied on a sampling basis lot-by-lot. Subgroups A3 and A4 are not applicable	
<i>Subgroup A0</i>	100 % inspection	
Resistance a to c	1.2.4.3.2	Shall be within the selection tolerance
<i>Subgroup A1</i>	Inspection level I, AQL 1.5 %	
Visual inspection	1.2.2	As in BS 9130
<i>Subgroup A2</i>	Inspection level S-2, AQL 4.0 %	
Resistance a to b	1.2.4.3.3)	ΔR : 0.01 % or 0.2 Ω whichever is the greater As in BS 9130 0 $\leq 100 \Omega$ As in BS 9130
b to c	1.2.4.3.4)	
Continuity	1.2.4.2	
Rotational noise	1.2.4.13 Method B	
Voltage proof	1.2.4.10	
<i>Subgroup A5</i>		
CTR information	1.1.11 Attributes information for subgroup A2 without reference to the individual tests	

Inspection	BS 9130 reference and conditions of test	Performance requirements
<i>GROUP B</i>	To be applied on a sampling basis lot-by-lot Subgroups B3 to B7 are not applicable	
<i>Subgroup B1</i>	<i>Inspection level S-2, AQL 4.0 %</i>	
Dimensions (gauging)	1.2.3.1	As in appendices A and B of this publication
Total mechanical rotation	1.2.3.3	As in appendix A of this publication
<i>Subgroup B2 (D)</i>	<i>Inspection level S-2, AQL 4.0 %</i>	
Robustness of terminations	1.2.6.1 Tensile Bending	
<i>Measurements</i> Visual examination Resistance a to c		As in BS 9130 $\Delta R: \leq 1.0 \%$
Solderability	1.2.6.3.2 Method 2	As in BS 9130
Mechanical endurance (potentiometers)	1.2.7.1 No load 2500 cycles at 10 to 17 cycles per minute	
<i>Final measurements</i> Visual examination Resistance a to c Rotational noise: method B Starting torque		As in BS 9130 $\Delta R: \leq 2 \%$ $\leq 500 \Omega$ $\geq 7.5 \text{ mN m} \leq 90 \text{ mN m}$
Sealing	See appendix C of this publication	As in appendix C of this publication
<i>Subgroup B8</i>		
CTR information	1.1.11 Attributes information for subgroup B1 without reference to the individual tests	