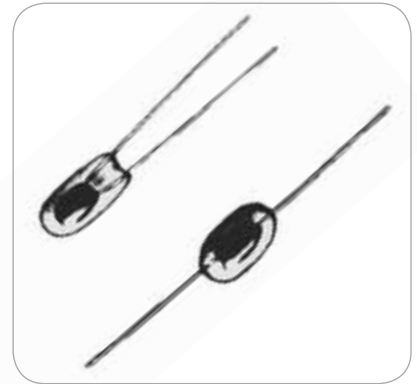


T H E R M O M E T R I C S  
A C O M M I T M E N T T O E X C E L L E N C E

# NTC Type BR Series

## Glass Encapsulated Bead Thermistors



### Features

#### Type BR11/14/16/25

Small glass encapsulated bead thermistors on fine diameter alloy lead-wires.

- Suitable for most low cost temperature measurement, control or compensation applications
- Very fast thermal response times
- Rugged glass encapsulation provides hermetic seal and better strain relief than small glass coated bead thermistors
- Long term stability is better than small glass coated bead thermistors
- Suitable for self-heated applications such as liquid level sensing or gas flow measurement
- Recommended for all applications where the customer will perform further assembly operations
- Normal operating/storage temperatures range from
- -112°F (-80°C) to: 221°F (105°C) for Material system E0, 392°F (200°C) for Material systems A1 through A4, 572°F (300°C) for Material systems A5 through D17
- Unaffected by severe environmental exposures, including nuclear radiation
- Intermittent operation to 1112°F (600°C) is permissible, however, stability will be degraded

#### Type B32/42/55

Large glass encapsulated bead thermistors on fine diameter platinum alloy lead-wires.

- Suitable for most low cost temperature measurement, control or compensation applications
- Fast thermal response times
- Rugged glass encapsulation provides hermetic seal and better strain relief than large glass coated bead thermistors
- Long term stability is better than large glass coated bead thermistors
- Suitable for self-heated applications such as liquid level sensing or gas flow measurement
- Recommended for all applications where the customer will perform further assembly operations
- Normal operating/storage temperatures range from
- -112°F (-80°C) to: 221°F (105°C) for Material system E0, 392°F (200°C) for Material systems A1 through A4, 572°F (300°C) for Material systems A5 through D17
- Unaffected by severe environmental exposures, including nuclear radiation
- Intermittent operation to 1112°F (600°C) is permissible, however, stability will be degraded



# Amphenol

## Advanced Sensors

# Type BR Series Specifications

## Type BR11/14/16/23

### Thermal and Electrical Properties

The following lists the thermal and electrical properties for all small ruggedized thermistors. All definitions and test methods per MIL-PRF-23648.

### Body Dimensions

#### BR11

- Nominal diameter: 0.011 in (0.28 mm)
- Maximum diameter: 0.012 in (0.30 mm)
- Maximum length: 0.0242 in (0.610 mm)

#### BR14

- Nominal diameter: 0.014 in (0.36 mm)
- Maximum diameter: 0.016 in (0.41 mm)
- Maximum length: 0.032 in (0.81 mm)

#### BR16

- Nominal diameter: 0.016 in (0.41 mm)
- Maximum diameter: 0.017 in (0.43 mm)
- Maximum length: 0.034 in (0.86 mm)

#### BR23

- Nominal diameter: 0.023 in (0.58 mm)
- Maximum diameter: 0.025 in (0.63 mm)
- Maximum length: 0.056 in (1.46 mm)

### Lead-Wires

#### BR11

- Nominal diameter: 0.0007 in (0.02 mm)
- Maximum lead length: 0.312 in (7.9 mm)
- Lead material: platinum alloy
- Available cuts: "K" adjacent or "P" opposite

#### BR14

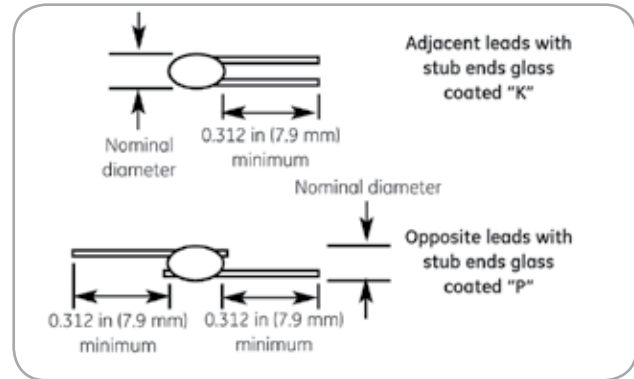
- Nominal diameter: 0.0011 in (0.03 mm)
- Maximum lead length: 0.312 in (7.9 mm)
- Lead material: platinum alloy
- Available cuts: "K" adjacent or "P" opposite

#### BR16

- Nominal diameter: 0.0011 in (0.03 mm)
- Maximum lead length: 0.312 in (7.9 mm)
- Lead material: platinum alloy
- Available cuts: "K" adjacent or "P" opposite

#### BR23

- Nominal diameter: 0.002 in (0.05 mm)
- Maximum lead length: 0.312 in (8 mm)
- Lead material: platinum alloy
- Available cuts: "K" adjacent or "P" opposite



Type BR Series dimensions

### Material System (Table A)

Code Letter	R vs T Curve	25/125 Ratio	Nominal Resistance Range at 77°F (25°C)			
			BR11	BR14	BR16	BR23
E	0	5.0	-	-	-	-
A	1	11.8	1 to 1.5 kΩ	300 to 680 Ω	300 to 680 Ω	300 to 680 Ω
A	2	12.5	1.5 to 3.6 kΩ	680 to 1.6 kΩ	680 to 1.6 kΩ	680 to 1.6 kΩ
A	3	14	3.6 to 7.5 kΩ	1.6 to 3.6 kΩ	1.6 to 3.6 kΩ	1.6 to 3.6 kΩ
A	4	16.9	7.5 to 15 kΩ	3.6 to 6.8 kΩ	3.6 to 6.8 kΩ	3.6 to 6.8 kΩ
A	5	19.8	15 to 51 kΩ	6.8 to 27 kΩ	6.8 to 27 kΩ	6.8 to 27 kΩ
A	6	22.1	-	-	-	-
A	7	22.7	51 to 150 kΩ	27 to 75 kΩ	27 to 75 kΩ	27 to 75 kΩ
B	8	29.4	150 to 270 kΩ	75 to 130 kΩ	75 to 130 kΩ	75 to 130 kΩ
B	9	30.8	270 to 470 kΩ	130 to 240 kΩ	130 to 240 kΩ	130 to 240 kΩ
B	10	32.3	470 to 750 kΩ	240 to 360 kΩ	240 to 360 kΩ	240 to 360 kΩ
B	11	35.7	750 to 1.6 MΩ	360 to 820 kΩ	360 to 820 kΩ	360 to 820 kΩ
B	12	38.1	1.6 to 2.7 MΩ	820 to 1.3 MΩ	820 to 1.3 MΩ	820 to 1.3 MΩ
B	13	45	2.7 to 6.8 MΩ	1.3 to 3.36 MΩ	1.3 to 3.36 MΩ	1.3 to 3.36 MΩ
B	14	48.1	6.8 to 10 MΩ	3.3 to 6.86 MΩ	3.3 to 6.86 MΩ	3.3 to 6.86 MΩ
B	15	56.5	-	6.8 to 10 MΩ	6.8 to 10 MΩ	6.8 to 10 MΩ
D	16	75.6	-	-	-	-
D	17	81	-	-	-	-

### Thermal Time Constant

#### BR11

- Still air at 77°F (25°C): 0.8 second
- Plunge into water: 12 msec

#### BR14

- Still air at 77°F (25°C): 1 second
- Plunge into water: 14 msec

#### BR16

- Still air at 77°F (25°C): 1.2 second
- Plunge into water: 16 msec

#### BR23

- Still air at 77°F (25°C): 1.7 second
- Plunge into water: 40 msec

# Type BR Series Specifications

## Dissipation Constant

### BR11

- Still air at 77°F (25°C): 0.065 mW/°C
- Still water at 77°F (25°C): 0.33 mW/°C

### BR14

- Still air at 77°F (25°C): 0.10 mW/°C
- Still water at 77°F (25°C): 0.50 mW/°C

### BR16

- Still air at 77°F (25°C): 0.12 mW/°C
- Plunge into water: 0.60 mW/°C

### BR23

- Still air at 77°F (25°C): 0.18 mW/°C
- Plunge into water: 0.9 mW/°C

## Power Rating (In Air)

### BR11

- Maximum Power Rating: 0.007 W
- 100% Maximum Power To: 257°F (125°C)
- Derated to 0% at: 572°F (300°C)

### BR14

- Maximum Power Rating: 0.015 W
- 100% Maximum Power To: 257°F (125°C)
- Derated to 0% at: 572°F (300°C)

### BR16

- Maximum Power Rating: 0.015 W
- 100% Maximum Power To: 257°F (125°C)
- Derated to 0% at: 572°F (300°C)

### BR23

- Maximum Power Rating: 0.020 W
- 100% Maximum Power To: 257°F (125°C)
- Derated to 0% at: 572°F (300°C)

## Options

- Non-standard resistance tolerances
- Non-standard resistance values
- Specify reference temperature(s) if it is not 77°F (25°C)
- Mounting in special housings or enclosures
- Longer continuous leads
- Welded or soldered extension leads\_specify lead material, diameter, length, and insulation, if any.
- Solderable or weldable/solderable leads
- Leads can be pre-tinned or treated for improved soldering
- Calibration\_specify temperature(s)
- Interchangeable pairs or sets, R-vs-T curve matching; specify temperature range(s) and tolerance(s)
- Special aging and conditioning for high reliability applications

## Type BR32/42/55

### Thermal and Electrical Properties

The following lists the thermal and electrical properties for all large ruggedized thermistors. All definitions and test methods per MIL-PRF-23648.

### Body Dimensions

#### BR32

- Nominal diameter: 0.032 in (0.81 mm)
- Maximum diameter: 0.033 in (0.84 mm)
- Maximum length: 0.084 in (2.1 mm)

#### BR42

- Nominal diameter: 0.042 in (1.16 mm)
- Maximum diameter: 0.046 in (1.2 mm)
- Maximum length: 0.095 in (2.4 mm)

#### BR55

- Nominal diameter: 0.055 in (1.41 mm)
- Maximum diameter: 0.060 in (1.5 mm)
- Maximum length: 0.120 in (3 mm)

### Lead-Wires

#### BR32

- Nominal diameter: 0.003 in (0.08 mm)
- Maximum lead length: 0.312 in (7.9 mm)
- Lead material: platinum alloy
- Available cuts: "K" adjacent or "P" opposite

#### BR42

- Nominal diameter: 0.004 in (0.10 mm)
- Maximum lead length: 0.312 in (7.9 mm)
- Lead material: platinum alloy
- Available cuts: "K" adjacent or "P" opposite

#### BR55

- Nominal diameter: 0.004 in (0.10 mm)
- Maximum lead length: 0.312 in (7.9 mm)
- Lead material: platinum alloy
- Available cuts: "K" adjacent or "P" opposite

### Thermal Time Constant

#### BR32

- Still air at 77°F (25°C): 4.5 second
- Plunge into water: 90 msec

#### BR42

- Still air at 77°F (25°C): 5 second
- Plunge into water: 140 msec

#### BR55

- Still air at 77°F (25°C): 7 second
- Plunge into water: 200 msec

## Material System (Table B)

Code Letter	R vs T Curve	25/125 Ratio	Nominal Resistance Range at 77°F (25°C)		
			BR32	BR42	BR55
E	0	5.0	-	30 to 51 Ω	30 to 51 Ω
A	1	11.8	100 to 300 Ω	51 to 150 Ω	51 to 150 Ω
A	2	12.5	300 to 750 Ω	150 to 360 Ω	150 to 360 Ω
A	3	14	750 to 1.5 kΩ	360 to 750 Ω	360 to 750 Ω
A	4	16.9	1.5 to 3.0 kΩ	750 to 1.5 kΩ	750 to 1.5 kΩ
A	5	19.8	3.0 to 6.8 kΩ	1.5 to 3.6 kΩ	1.5 to 3.6 kΩ
A	6	22.1	6.8 to 13 kΩ	3.6 to 6.2 kΩ	3.6 to 6.2 kΩ
A	7	22.7	13 to 18 kΩ	6.2 to 9.1 kΩ	6.2 to 9.1 kΩ
B	8	29.4	18 to 51 kΩ	9.1 to 27 kΩ	9.1 to 27 kΩ
B	9	30.8	51 to 82 kΩ	27 to 43 kΩ	27 to 43 kΩ
B	10	32.3	82 to 150 kΩ	43 to 75 kΩ	43 to 75 kΩ
B	11	35.7	150 to 330 kΩ	75 to 160 kΩ	75 to 160 kΩ
B	12	38.1	330 to 680 kΩ	160 to 360 kΩ	160 to 360 kΩ
B	13	45	680 to 1.5 MΩ	360 to 750 kΩ	360 to 750 kΩ
B	14	48.1	1.5 to 3.0 MΩ	750 to 1.5 MΩ	750 to 1.5 MΩ
B	15	56.5	3.0 to 6.2 MΩ	1.5 to 3.0 MΩ	1.5 to 3.0 MΩ
D	16	75.6	6.2 to 10 MΩ	3.0 to 8.2 MΩ	3.0 to 8.2 MΩ
D	17	81	-	8.2 to 20 MΩ	8.2 to 20 MΩ

### Dissipation Constant

#### BR32

- Still air at 77°F (25°C): 0.285 mW/°C
- Still water at 77°F (25°C): 1.4 mW/°C

#### BR42

- Still air at 77°F (25°C): 0.33 mW/°C
- Still water at 77°F (25°C): 1.65 mW/°C

#### BR55

- Still air at 77°F (25°C): 0.5 mW/°C
- Still water at 77°F (25°C): 2.50 mW/°C

### Power Rating (In Air)

#### BR32

- Maximum Power Rating: 0.035 W
- 100% Maximum Power To: 302°F (150°C)
- Derated to 0% at: 572°F (300°C)

#### BR42

- Maximum Power Rating: 0.042 W
- 100% Maximum Power To: 302°F (150°C)
- Derated to 0% at: 572°F (300°C)

#### BR55

- Maximum Power Rating: 0.050 W
- 100% Maximum Power To: 302°F (150°C)
- Derated to 0% at: 572°F (300°C)

## Options

- Non-standard resistance tolerances
- Non-standard resistance values
- Specify reference temperature(s) if it is not 77°F (25°C)
- Mounting in special housings or enclosures
- Longer continuous leads
- Welded or soldered extension leads; specify lead material, diameter, length, and insulation, if any.
- Solderable or weldable/solderable leads
- Leads can be pre-tinned or treated for improved soldering
- Calibration\_specify temperature(s)
- Interchangeable pairs or sets, R-vs-T curve matching; specify temperature range(s) and tolerance(s)
- Special aging and conditioning for high reliability applications

## Ordering Information

The code number to be ordered may be specified as follows:

Code	Type																								
BR	Ruggedized bead structure																								
	<table> <tr> <th>Code</th><th>Diameter</th></tr> <tr> <td>11</td><td>11 mils</td></tr> <tr> <td>14</td><td>14 mils</td></tr> <tr> <td>16</td><td>16 mils</td></tr> <tr> <td>23</td><td>23 mils</td></tr> <tr> <td>32</td><td>32 mils</td></tr> <tr> <td>42</td><td>42 mils</td></tr> <tr> <td>55</td><td>55 mils</td></tr> </table>	Code	Diameter	11	11 mils	14	14 mils	16	16 mils	23	23 mils	32	32 mils	42	42 mils	55	55 mils								
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11	11 mils																								
14	14 mils																								
16	16 mils																								
23	23 mils																								
32	32 mils																								
42	42 mils																								
55	55 mils																								
	<table> <tr> <th>Code</th><th>Lead Configuration</th></tr> <tr> <td>K</td><td>Adjacent leads with stub ends glass coated</td></tr> <tr> <td>P</td><td>Opposite leads</td></tr> </table>	Code	Lead Configuration	K	Adjacent leads with stub ends glass coated	P	Opposite leads																		
Code	Lead Configuration																								
K	Adjacent leads with stub ends glass coated																								
P	Opposite leads																								
	<table> <tr> <th>Code</th><th>Material System Code</th></tr> <tr> <td>X</td><td>See table A or table B for code number</td></tr> </table>	Code	Material System Code	X	See table A or table B for code number																				
Code	Material System Code																								
X	See table A or table B for code number																								
	<table> <tr> <th>Code</th><th>Power</th></tr> <tr> <td>X</td><td>Zero-power resistance as 77°F (25°C) (see note 2 for code number)</td></tr> </table>	Code	Power	X	Zero-power resistance as 77°F (25°C) (see note 2 for code number)																				
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X	Zero-power resistance as 77°F (25°C) (see note 2 for code number)																								
	<table> <tr> <th>Code</th><th>Tolerance*</th></tr> <tr> <td>F</td><td>1</td></tr> <tr> <td>G</td><td>2</td></tr> <tr> <td>J</td><td>5</td></tr> <tr> <td>K</td><td>10</td></tr> <tr> <td>L</td><td>15</td></tr> <tr> <td>M</td><td>20</td></tr> <tr> <td>N</td><td>25</td></tr> <tr> <td>P</td><td>30</td></tr> <tr> <td>Q</td><td>40</td></tr> <tr> <td>R</td><td>50</td></tr> <tr> <td>S</td><td>Non-standard (consult factory)</td></tr> </table>	Code	Tolerance*	F	1	G	2	J	5	K	10	L	15	M	20	N	25	P	30	Q	40	R	50	S	Non-standard (consult factory)
Code	Tolerance*																								
F	1																								
G	2																								
J	5																								
K	10																								
L	15																								
M	20																								
N	25																								
P	30																								
Q	40																								
R	50																								
S	Non-standard (consult factory)																								
BR -	Typical model number																								

Special tolerances are available upon request. Consult factory for special resistance tolerances, non-standard resistances and/or non-standard temperatures.

\*The zero-power resistance at 77°F (25°C), expressed in Ω, is identified by a three digit code number. The first two digits represent significant figures, and the last digit specifies the number of zeros to follow. Example: 10k Ω = "103". The standard resistance values are from the 24-Value series decade as specified in Military Standard MS90178.

1.0 / 1.1 / 1.2 / 1.3 / 1.5 / 1.6 / 1.8 / 2.0 / 2.2 / 2.4 / 2.7 / 3.0  
3.3 / 3.6 / 3.9 / 4.3 / 4.7 / 5.1 / 5.6 / 6.2 / 6.8 / 7.5 / 8.2 / 9.1

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