

Technical Information



Style EJ – Vitreous Enamelled ‘J’ size resistor

Style CJ – Edgewound corrutape Vitreous Enamelled ‘J’ size resistor (low ohmic values)

Style SJ – Silicone coated ‘J’ size resistor

Style BJ – Open Wire-Wound ‘J’ size resistor, wound with oxidized wire

Introduction

The extensive range of LPC Power Resistors are available from 20 to 500 watts. They are RoHS Compliant and can be supplied un-mounted or with a variety of mounting styles and methods of termination. Details of which are shown on the following pages.

Ordering Procedure

Unless otherwise specified resistors will be supplied ready for a mechanical connection.

Fixed Resistors—Specify: Type, Ohmic Value, Mounting, Tolerance. E.g. HEJ33-200R ±5%

Adjustable Resistors—Add ‘ADJ’ E.g. HEJ33-ADJ-200R ±10%

Tapped Resistors—Add ‘Tx’ where ‘x’ is no of tapping bands. E.g. HEJ33-T2-200R ±10%

Ferrule Ended Resistors—Add ‘F’ dead or ‘FW’ for live E.g. FEJ33-200R ±10% or FWEJ33-200R ±10%

General Notes

Ohmic Values

The range of ohmic values available are shown below. You may select any ohmic value between the max and min values. Other values and tolerances are available on request.

Low Inductance Windings

Ayrton Perry and bifilar windings are available for resistors which are required to have substantially lower inductance.

Thermal cut-outs

Cut-outs can be fitted to certain resistors which will operate a contact to disconnect the resistor to prevent overload damage.

Electrical Data Power Rating—Continuous Duty

The two power ratings given to each type of resistor in the table are based on temperature rises of 300°C and 380°C respectively and relate to single resistors mounted in free air.

‘Adjusticon’ Resistors (ADJ)

Many of our resistors can be supplied with an ‘Adjusticon’ adjustable tapping band which can be moved along the former. On the Wire-Wound resistors as shown, the wire winding is exposed in a strip along one side for contact with the adjustable band so that the resistance value can be varied as required. The Corrutape resistors have the enamel removed from the edge of the tape along a similar line to the Wire-Wound resistors and the adjustable band fitted.

Tapped Resistors

Extra tappings with terminal bands protected by the vitreous coating are available in the majority of sizes. The maximum number of tappings depends upon the size of the resistor and ohmic value.

Maximum Operating Voltages

As a general rule voltage should be limited to a maximum of 1KV per 25mm of winding. However, if the resistor is mounted on a non-insulated material 2KV should be regarded as the absolute maximum.

Low Wattage & Oval Section Resistors

LPC also manufacture ranges of low wattage and oval section resistors. For details please contact our technical staff or see our website.

Types

1. Vitreous Enamelled Resistors

The ceramic formers are non-hygroscopic, will withstand severe thermal shock and have a thermal coefficient of expansion which matches the component parts of the resistor.

Resistance wires and tapes are Nickel-Chromium alloy and the winding is uniform throughout the length of the tube to prevent 'hot spots' on load.

Windings and terminal bands are joined together by spot welding to ensure a permanent and positive bond.

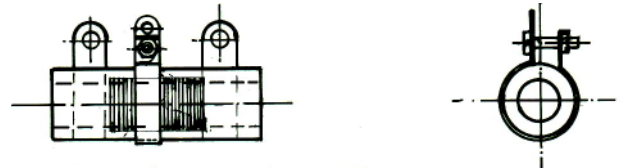
The firing takes place in automatic kilns and the conditions are finely controlled to prevent internal stresses which could otherwise cause crazing and the change of ohmic value with age.

Most of the vitreous enamelled resistors can be supplied with fixed tappings or 'Adjusticon' adjustable tapping bands.

1.1 Style EJ Wire-Wound Resistors (Lug Ended)

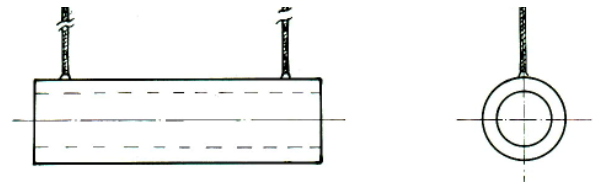
The ceramic former is wound with resistance wire, embedded in vitreous enamel and fired. This results in a high reliability resistor with withstands adverse conditions, because the winding is totally embedded.

Substantial tinned lug connections are suitable for soldering or for screw and nut terminations.



1.2 Style WEJ Wire-Wound Resistors (Wire Ended)

As above but with flexible wire leads instead of lug connections. These enable connections to be made directly to terminals.



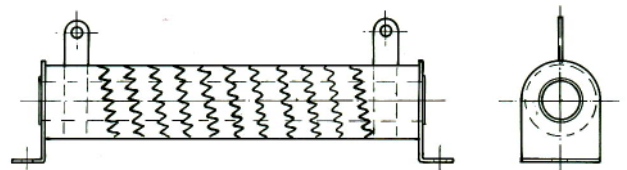
2. Style CJ - Corrugated Edgewound Resistors

For the low ohmic value, high current resistor, tape is used in place of wire.

The tape is corrugated and wound on edge to produce a spaced winding which is then vitreous enameled and fired.

Corrugate resistors can be made with fixed or adjustable tapping bands.

Connections are tinned lug type (CJ) or Wire Ended with flexible wire leads fixed to end bands (WEJ).



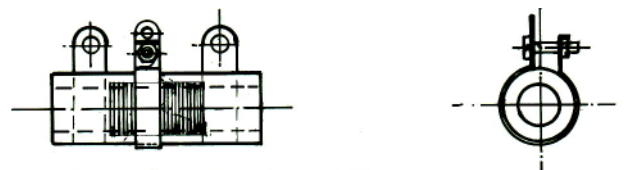
3. Style SJ - Silicone Cement Coated Wire Wound Resistors

These resistors are similar to the standard vitreous enameled resistors but the finish coating is matt silicone cement and applies mainly to the resistors using finer wires.

The cement is cured at a lower temperature than the enamel and provides a tough, moisture proof coating and complete protection to the winding.

The operating surface temperature is the same as the enamel but the process enables resistors of higher ohmic values to be obtained.

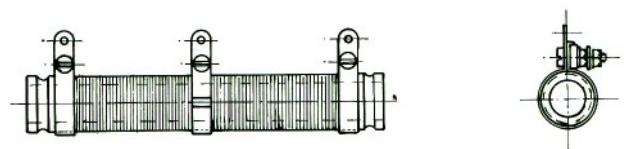
Fixed tappings or 'Adjusticon' adjustable tapping bands can be fitted to the SJ resistors.



4. Style BJ - Open Wire-Wound Resistors

These resistors are wound with oxidized nickel copper wire which has a negligible temperature coefficient. The winding is close wound in order to secure the maximum heat dissipation and the oxide film coating provides complete insulation between turns. The end and tapping bands are of nickel plated gilded metal provided with screw and nut terminals with provision for soldering connection. Resistors with extra tapping bands or without a tapping band can be supplied (J30 does not have a tapping band).

The resistance values are the highest which can be obtained with a particular gauge of wire when the resistor has one tapping band. Intermediate values can be obtained by use of the tapping band on a resistor of the next higher value, although when reasonable quantities of fixed resistor are required the end bands can be brought close together to give any intermediate value with a close winding.



Ohmic Values

Former Size		J30	J31	J32	J33	J34	J35	J36	J37	J38	J39	J40	J41	J42
Rating—Watts		20W	30W	40W	60W	90W	130W	180W	90W	45W	60W	220W	320W	380W
Type	Range	Ohmic Value												
EJ	Min	1R0	2R2	4R7	4R7	10R0	10R0	22R0	10R0	4R7	6R8	22R0	33R0	47R0
Fixed	Max	2K5	6K0	10K0	10K0	40K0	45K0	60K0	40K0	15K0	20K0	60K0	70K0	80K0
EJ	Min	-	2R2	4R7	4R7	10R0	10R0	22R0	10R0	4R7	6R8	22R0	33R0	47R0
Adjustable	Max	-	1K0	3K3	3K3	6K8	7K5	10K0	4K7	2K2	3K3	15K0	15K0	15K0
CJ	Min	-	0R022	0R15	0R22	0R33	0R68	1R0	0R47	0R22	0R33	1R0	1R5	1R5
Fixed	Max	-	1R5	3R3	3R3	6R8	6R8	15R0	6R8	3R3	4R7	15R0	22R0	33R0
SJ	Min	1R0	2R0	5R0	5R0	10R0	10R0	20R0	8R0	3R0	5R0	25R0	30R0	35R0
Fixed	Max	3K3	10K0	30K0	30K0	50K0	68K0	75K0	47K0	20K0	30K0	100K0	100K0	100K0
BJ	Min	0R5	1R1	3R1	2R8	6R3	7R6	12R0	4R2	1R4	2R7	15R0	22R0	27R0
Fixed	Max	225R0	510R0	1K56	1K25	2K86	3K84	6K0	2K11	720R0	1K35	7K6	11K0	13K0
Factor (BJ)		1.43	1.20	1.17	1.10	1.05	1.09	1.06	1.16	1.33	1.17	1.04	1.03	1.03

Open Wire Wound Resistors (BJ) are normally supplied with a tapping band. When the band is removed the ohmic value is increased by the factor shown against each former.

Standard Resistance Tolerances

Fixed Resistors over 10 ohms \pm 5%

Fixed Resistors, 10 ohms or less \pm 10%

All 'Adjusticon' vitreous enamelled resistors \pm 10%

All Open Wire-wound Resistors \pm 10%

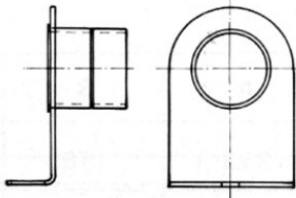
Maximum No of Tappings

The maximum number of extra fixed tappings that can be added are shown in the table below against each former size.

Former Size	J30	J31	J32	J33	J34	J35	J36	J37	J38	J39	J40	J41	J42
Max No. of Tappings	-	1	3	2	4	4	6	3	1	1	7	7	7

Mounting Styles

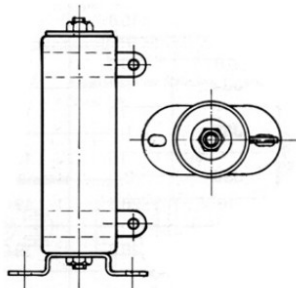
Horizontal Mounting (Prefix H)



Horizontal mounting brackets are fixed firmly glued in position, avoiding the possibility of the resistor rotating about its axis.

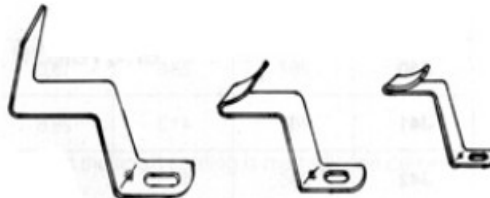
Where space is at a premium, reverse horizontal feet can be supplied.

Vertical Mounting (Prefix V)



As with horizontal feet, tie-rods and nuts firmly secure the mounting foot to the resistor.

Push in Mounting Brackets (Prefix S)



SP9054/1

SP9053/1

SP9052/1

These nickel-plated, phosphor bronze spring clips provide an inexpensive means of mounting EJ, WEJ and similar resistors. However if rotation of the resistor in the clip must be prevented, style HEJ or similar should be used.

Clip No.	Former Sizes for which used
SP 9052/1	J30, J31 and J32
SP 9053/1	J33 and J34
SP 9054/1	J35, J36, J37, J38 and J40

Through-bolts (/TB)

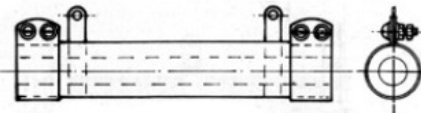
Through bolts can be used to mount resistors directly to a panel 1/4" (6.35mm) or less in thickness. Suitable mica (TB/M) or fibre washers (TB/F) can be supplied for additional insulation. TB30 fitting is suitable for use with J30; TB31 with J31 etc. [Max TB40]

Live Ferrule Ends (Prefix FW)



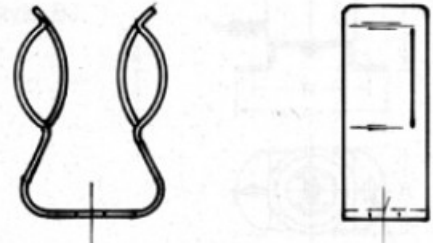
Flexible wire leads, connected to ferrule ends, make this style of resistor suitable for mounting directly into special mounting clips.

Dead Ferrule Ends (Prefix F)



The style of resistor is fitted with standard tinned tags and with ferrules, which makes it suitable for fitting into special mounting clips (see below).

Mounting Clips for Ferrule Ends



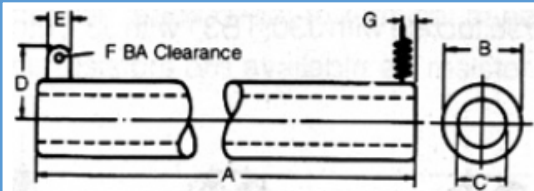
Please Note: When ordering resistors with ferrule ends, they will be supplied without clips, unless specifically requested.

Clip No.	Former Sizes for which used
SP 11436/1	J30, J31 and J32
SP 11436/2	J33 and J34
SP 11436/3	J35, J36, J37, J38 and J40

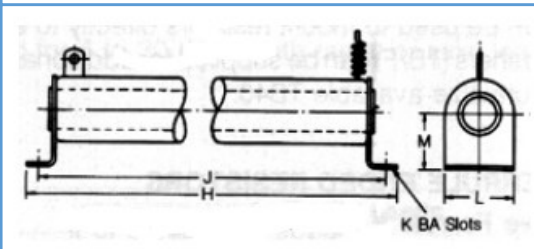
Technical Information

Dimensions

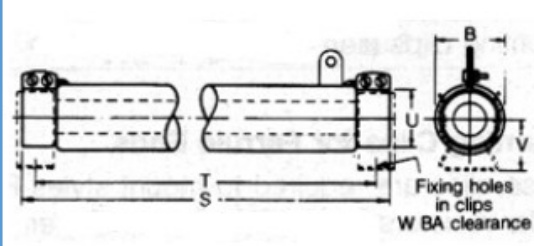
Basic Styles EJ and WEJ



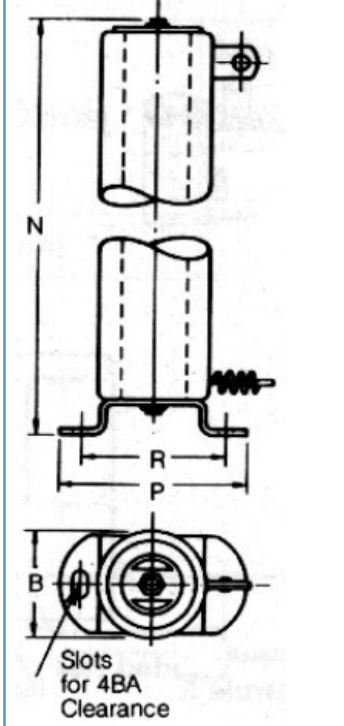
Basic Styles HEJ and HWEJ



Basic Ferrule Ended Styles FEJ and FWEJ



Basic Styles VEJ and VWEJ



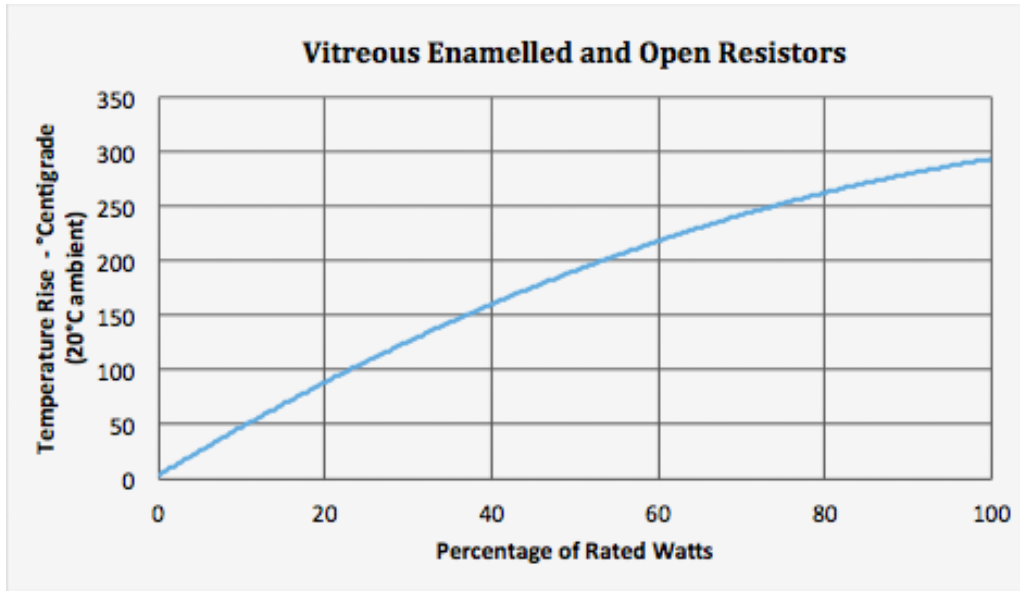
Dimensions

Size	Watts 300°C	A	B	C	D	E	F		G	H	J	K		L	M	N	P	R	S	T	U	V	W		
							BA	mm				BA	mm										BA	mm	
J30	20	33.3	15.8	9.5	21.4	4.8	6	M3	3.9	54.0	44.4	4	M4	20.6	19.0	46.0	38.0	25.4	58.7	47.6	12.6	19	4	M4	
J31	30	50.8	15.8	9.5	21.4	4.8	6	M3	3.9	71.4	62.0	4	M4	20.6	19.0	63.5	38.0	25.4	76	65	12.6	19	4	M4	
J32	40	102.0	15.8	9.5	21.4	4.8	6	M3	3.9	122.0	113.0	4	M4	20.6	19.0	114.0	38.0	25.4	127	116	12.6	19	4	M4	
J33	60	89.0	19.0	12.6	24.6	6.3	4	M4	3.9	113.0	103.0	4	M4	23.8	20.6	102.0	44.4	31.7	121	108	19	22.2	2	M5	
J34	90	165.0	19.0	12.6	24.6	6.3	4	M4	5.5	189.0	179.0	4	M4	23.8	20.6	178.0	44.4	31.7	197	184	19	22.2	2	M5	
J35	130	152.0	28.6	19.0	29.3	9.5	2	M5	5.5	179.0	168.0	2	M5	23.8	27.0	165.0	54.0	41.0	184	171	25.4	31.7	0	M6	
J36	180	216.0	28.6	19.0	29.3	9.5	2	M5	5.5	243.0	232.0	2	M5	33.3	27.0	229.0	54.0	41.0	248	235	25.4	31.7	0	M6	
J37	90	102.0	28.6	19.0	29.3	9.5	2	M5	5.5	128.0	117.0	2	M5	33.3	27.0	114.0	54.0	41.0	133	121	25.4	31.7	0	M6	
J38	45	50.8	28.6	19.0	29.3	6.3	4	M4	5.5	78.0	66.6	2	M5	33.3	27.0	63.5	54.0	41.0	82.5	70	25.4	31.7	0	M6	
J39	60	70.0	28.6	19.0	29.3	6.3	4	M4	5.5	97.0	92.0	2	M5	33.3	27.0	82.5	54.0	41.0	102	89	25.4	31.7	0	M6	
J40	220	267.0	28.6	19.0	29.3	9.5	2	M5	5.5	293.0	282.0	2	M5	33.3	27.0	279.0	54.0	41.0	298	286	25.4	31.7	0	M6	
J41	320	267.0	41.3	28.6	41.0	11.1	0	M6	8.7	303.0	287.0	0	M6	44.4	41.0	-	-	-	-	-	-	-	-	-	-
J42	380	305.0	41.3	28.6	41.0	11.1	0	M6	8.7	341.0	325.0	0	M6	44.4	41.0	-	-	-	-	-	-	-	-	-	-

Duty Ratings

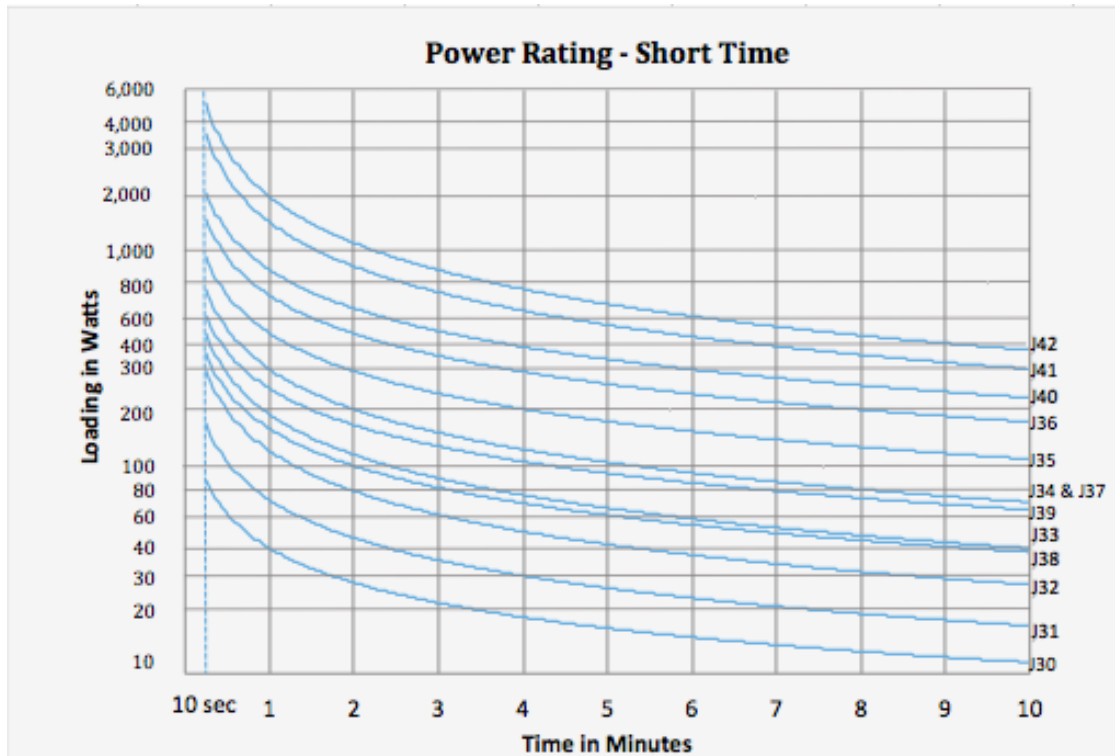
Power Rating—Continuous Duty

Where it is desirable to limit the surface temperature of the resistor, refer to this graph. The ratings given for each type of resistor on the ratings table are those based on a continuous duty in free air and should be regarded as the value for a single resistor mounted vertically. Under these conditions the temperature rise will be 300°C.



Power Rating—Short Time

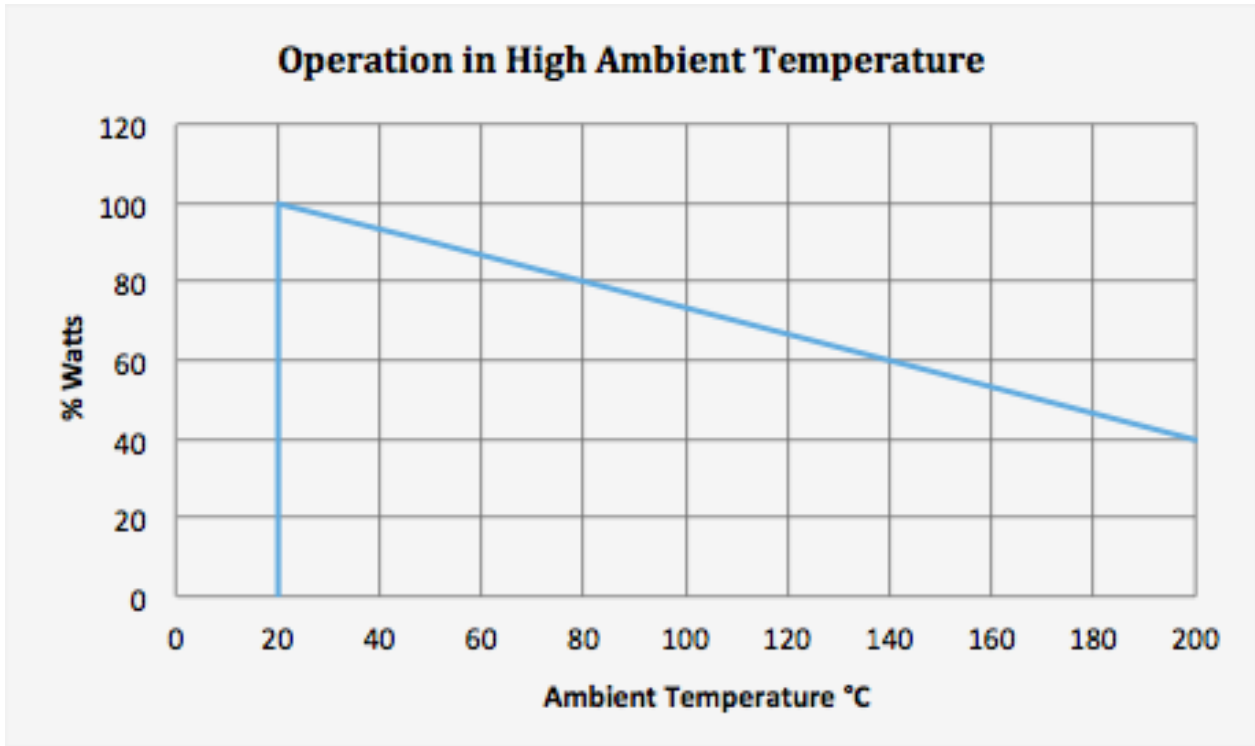
For applications where resistors are only required to be operated intermittently, a higher short time rating may be considered. Where it is desirable to limit the surface temperature of the resistor, refer to this graph. The graph shows loading against time assuming a cooling time of 20 minutes between duty cycles.



Duty Ratings

Operation in High Ambient Temperatures

When the ambient temperature exceeds 20°C the resistor must be derated in accordance with this graph.



Derating for operation in enclosures and group

An enclosure reduces the heat dissipation by natural convection and radiation, whilst the grouping of resistors increases the temperature rise for a given wattage because of heat transfer from one unit to another. Whenever possible the enclosure should be provided with ventilation openings at the top and bottom and in addition to minimise derating, the resistors should be mounted vertically with the distance between the centres at least equal to twice the diameter of the resistor. As this type of application can be almost unlimited in its range, it is not possible to lay down strict derating factors but further advice will be given for projects or applications under consideration.

Uprating resistors for a higher temperature rise

The vitreous enamelled resistors can be operated with a temperature rise of 380°C (i.e. final temperature of 400°C in an ambient temperature of 20°C). The Uprated watts are shown below for each size of former, together with the watts for the normal continuous duty with a temperature rise of 300°C (final temperature of 320°C in an ambient temperature of 20°C):

Size of Former	J30	J31	J32	J33	J34	J35	J36	J37	J38	J39	J40	J41	J42
Watts for 300°C rise	20	30	40	60	90	130	180	90	45	60	220	320	380
Uprated Watts for 380°C rise	30	35	65	75	150	175	230	125	60	75	320	450	500