Version:
October 16, 2017

High Power Wirewound Resistor Series

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Production Index

High Power Resistor Series

Adjustable Resistor Application Notes

Application Notes

Adjustable Resistor Application Notes

Determination of End Resistance Value of FVR, DQS, DSRA, DSRB, BSR, BSQ:

1. Resistance Range means you can choose one maximum resistance value (End resistance value) at one of FVR, DQS, DSRA, DSRB, BSR, BSQ VR (Adjustable Resistor) type.
2. After End Resistance Value confirmed, the minimum resistance (start resistance value) will be determined by depending on resistance of wire and wire wound type.

Power Rating of Adjustable Resistor:

The part Number formation of FVR, DQS, DSRA, DSRB, BSR, BSQ:

Product type	-	Rated Wattage	-	Resistance Value (Ω)	-	Resistance Tolerance

- Product type means one of FVR, DQS, DSRA, DSRB, BSR, BSQ.
- Rated Wattage means power rating at End Resistance Value.
- Resistance Value (Ω) means maximum resistance value (End Resistance Value).
- Resistance Tolerance means precision range of End Resistance Value.

1. Power Rating of VR (Variable Resistor) is determined by the maximum resistance value (End Resistance Value).
2. Resistance and Power Rating should be decreased while you are adjusting the screw.

Notes:

- Adjustability is 10% to 90% of full resistance value.
- Wattage is proportional to this adjusted resistance value.

Power Rating:

- Based on 25℃ free air rating. The stated wattage rating applies only when the entire resistance is in the circuit.
- Setting the lug at an intermediate point reduces the wattage rating by approximately the same proportion.
- Example: If the lug is set at half resistance, the wattage is reduced by approximately one-half.

If you need current constant type or special specifications, please feel free to contact us.

Wire Wound Terminology & Glossary

Terminology & Glossary

Wire Wound Terminology & Glossary

Ayrton-Perry Winding

Winding of two wires in parallel but opposite directions to give better cancellation of magnetic fields than is obtained with a single winding.

Wire wound technology has long been known as a leading technology for power device needs. The most critical drawback with this technology is that it is inherently inductive. This is logical given that a wire wound inductor and wire wound resistors are made with essentially the same materials and processes. This fact limits the use of wire wounds for applications with high switching speeds, which require low inductance.

Now the same standard wire wounds can be used for these applications by using a non-inductively wound version. This manufacturing method greatly reduces the inductance of any given resistor size and value combination, however it does not completely eliminate the inductance. A non-inductively wound wire wound has one winding in one direction and one in the other direction; known as Ayrton Perry winding. This non-inductive winding is available in all Token standard wire wound series.

Dynamic Braking Resistors

Dynamic braking resistors are used on VFDs (AC variable frequency drives) to dissipate energy that is produced in the motor as the drive provides braking torque to stop the motor. The resistors are either used alone for decelerating or in conjunction with compressed air brakes for stopping. The excitation voltage of the traction motors generally comes from a static converter powered by the overhead catenary and operates as a DC voltage transformer.

Token's BOX and RNW resistors are used for most dynamic braking applications. These are conveniently provided on L-shaped mounting brackets or in standard enclosures with louvered or screened covers. For heavy duty applications that require even higher wattage, we recommend Token's Oval Edge-Wound DOE, and Power-Wound DST resistor elements.

Neutral Grounding Resistor

A suitably rated industrial resistor that is connected between the neutral of a transformer (or generator) and the system ground. It serves to limit fault currents and prevent damage to the equipment.

Rated Continuous Current

The current expressed in amperes (RMS), that the device can carry continuously under specified service conditions without exceeding the allowable temperature rise.

What is a Ground Fault?

A Ground Fault is an unwanted connection between the system conductors and ground. Ground faults often go unnoticed and can cause problems with plant production processes. They can also shut down power and damage equipment, which disrupts the flow of production leading to hours or even days of lost productivity.

Undetected ground faults pose potential health and safety risks to personnel. Ground faults can lead to safety hazards such as equipment malfunctions, fire and electric shock. Ground faults cause serious damage to equipment and to your processes. This damage can seriously affect your bottom line.

Power Dissipation

This is a measure of the amount of power that a resistor can dissipate without causing it to overheat. Resistors are manufactured in standard power ratings and mostly these are in fractions of 1 Watt with some larger carbon and metal resistors available in 1 Watt to about 5 Watts. Higher power ratings are available. Wire wound units are normally available in power ratings of up to about 50 W. However, industrial wire wound types are made by component manufacturers in much higher power ratings to the specification of the customer.

Industrial Wire wound Variables & Adjustable Resistor - Resistive Controls

Controls that produce a varying voltage using resistance are called either adjustable or variable resistors (potentiometers). Although both types of control may be functionally the same, it is the way they are connected that differentiates between the two types.

A common construction is for the control to have three connections. One connected to a sliding contact called the wiper and the other two to either end of a fixed resistor called the track. The wiper is able to be moved along the track either by use of a linear sliding control or a rotary "wiper" contacts. Both linear and rotary controls have the same basic operation.

High Power Wire wound Industrial Resistors

Industrial resistors are high temperature, high power, wire wound types, and non-inductive, they generally coated with vitreous or glass epoxy enamel for use in resistance banks or DC motor/servo control and dynamic braking applications. The resistance wire is wound around a ceramic or porcelain tube covered with mica to prevent the alloy wires from moving when hot. Industrial resistors are available in a variety of resistance and power ratings. With one main use of high power industrial resistor is in the electrical heating elements of an electric fire which converts the electrical current flowing through it into heat with each element dissipating up to 20000W, (20kW) of energy.

Because the wire is wound into a coil, it acts like an inductor causing them to have inductance as well as resistance and this affects the way the resistor behaves in AC circuits by producing a phase shift at high frequencies especially in the larger size resistors. The length of the actual resistance path in the resistor and the leads contributes inductance in series with the "apparent" DC resistance resulting in an overall impedance path Z. Impedance (Z) is the combined effect of resistance (R) and inductance (X), measured in ohms and for a series AC circuit is given as, **Equation $Z_2 = R_2 + X_2$.**

When used in AC circuits this inductance value changes with frequency (inductive reactance, **XL = $2\pi fL$**) and therefore, the overall value of the resistor changes. Inductive reactance increases with frequency but is zero at DC (zero frequency). Then, resistors must not be designed into AC or amplifier type circuits where the frequency across the resistor changes. However, Token offers special wire wound non-inductive resistors winding Ayrton-Perry Method are also available for alternative choice.

Adjustable Resistors (DQS)

Product Introduction

Low-cost and high-precision power rib-wound adjustable wire wound resistors for high energy dissipation.

Adjustable Ribbon-Wound (DQS) have been a main product line at Token Electronics for years. Adjustable ribwound resistors are particularly useful where high energy is to be dissipated in the lower Ohmic ranges and high power capacity. Precision winding design, provide uniform windings to be applied extremely close to each other resulting in significantly higher resistance values.

In significant savings in space and cost, Adjustable (DQS) Series is ideal replacements for many standard round-wire resistors.

The Power Adjustable (DQS) Resistor is RoHS compliant and lead free. For unusual technical requirements and custom special applications, please contact us. Or link to Token official website "High Power Resistors" to get more information.

Features:

- Resistance Tolerance: K(±10%), J(±5%), H(±3%).
- Power-rib wirewound resistor with adjustable lug supplied.
- Suitable for high energy to be dissipated in the lower ohmic ranges.
- Design as heavy-duty resistors to withstand frequent start-stop cycles.
- Hollow core to permit secure fastening with spring-type clips or thru bolts with washers.
- Durability Flame resistant coating and all-welded construction.
- Terminals suitable for bolt connection or soldering.

Power Rating:

- Based on 25℃ free air rating. The stated wattage rating applies only when the entire resistance is in the circuit.
- Setting the lug at an intermediate point reduces the wattage rating by approximately the same proportion.
- Example: If the lug is set at half resistance, the wattage is reduced by approximately one-half.
- Wattage is proportional to this adjusted resistance value.

Adjustability is 10% to 90% of full resistance value.

Options:

- Adjustable, fixed, or tapped styles are available.
- Special terminals available for non-standard applications.
- Single and double quick connect terminals can be specified.
- Standard lug terminals available with or without terminal hardware.
- Non-inductive Ayrton Perry windings can be specified.
- Special temperature coefficients, tolerances

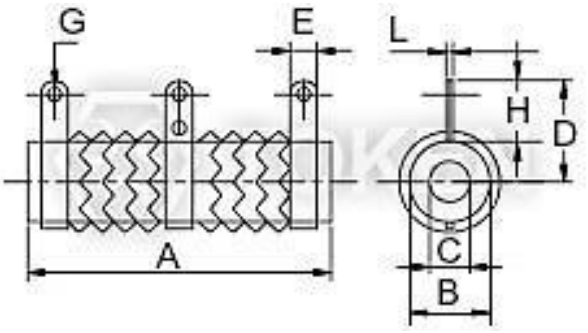
To Calculate Max. Amperes:

- Voltage = (Watts × Ohms) $^{1/2}$

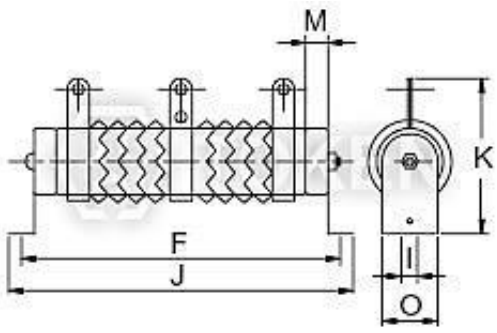
Dimensions

Dimensions (DQS 75W ~ 2000W)

Wattage Rating	Dimensions (Unit: mm)														Max. Pickable Resistance Value (Ω)
	A	B	C	D	E	F	G	H	I	J	K	L	M	O	
75W	110	25	16	30	8	150	5	18	6	166	58	1.2	6	27	1.5~8Ω
90W	90	28	18	32	8	130	5	19	6	146	60	1.2	6	27	1.5~9Ω
120W	110	28	18	32	8	150	5	19	6	166	60	1.2	6	27	2~12Ω
150W	140	28	18	32	8	180	5	19	6	196	60	1.2	6	27	2~15Ω
180W	160	28	18	32	8	200	5	19	6	216	60	1.2	6	27	3~18Ω
225W	195	28	18	32	8	235	5	19	6	251	60	1.2	6	27	3~23Ω
240W	185	35	24	36	10	225	5	19	8	245	76	1.6	6	34	5~24Ω
300W	210	35	24	36	10	250	5	19	8	274	76	1.6	6	34	5~30Ω
375W	210	40	25	38	12	250	5	20	8	274	78	1.6	6	34	6~38Ω
450W	260	40	25	38	12	300	5	20	8	320	78	1.6	6	34	6~45Ω
600W	330	40	25	38	12	370	5	20	8	395	78	1.6	6	34	7~60Ω
750W	330	50	35	50	12	380	6	25	9	400	100	1.6	8	40	8~75Ω
900W	400	50	35	50	12	450	6	25	9	470	100	1.6	8	40	8~90Ω
1000W	460	50	35	50	12	510	6	25	9	530	100	1.6	8	40	12~100Ω
1200W	460	60	40	55	15	515	6	30	10	535	110	1.6	10	50	12~120Ω
1500W	540	60	40	55	15	595	6	30	10	615	110	1.6	10	50	15~150Ω
2000W	650	65	42	62	15	702	6	30	10	722	115	1.6	10	50	15~200Ω



(DQS) N - No Mount



(DQS) G - Horizontal Mount

Characteristics

Characteristics (DQS)

Test Item	Test Methods	Characteristics
Resistance tolerance	JIS-C-5202 5-1	Resistance Nominal Tolerance 1≤R 1>R ±5%(J) ±10%(K)
Temperature coefficient	JIS-C-5202 5-2	±400PPM/℃ MAX
Load rating	JIS-C-5202 5-4	ΔR/R≤ ±(0.5%+0.1Ω) Surface temperature up 350℃ MAX
Short-term overload	JIS-C-5202 5-5 500% rated wattage 5 seconds	Free of appearance or structural irregularity ΔR/R≤ ±(2%+0.1Ω)
Insulation resistance	JIS-C-5202 5-6 500VDC	100MΩ min
Dielectric withstanding voltage	JIS-C-5202 5-7 1000VDC 1 minute Between terminal and anchor stand	Free of appearance or structural irregularity ΔR/R≤ ±(0.1%+0.05Ω)
Terminal strength	JIS-C-5202 6-1 8kg 30 seconds	Free of appearance or structural irregularity
Vibration	JIS-C-5202 6-3 1.5m/m 10 ~ 50 ~ 10 Hz/min X-Y-Z 2 hours each	Free of appearance or structural irregularity Surface coating crack ΔR/R≤ ±(1%+0.05Ω)
Thermal shock	JIS-C-5202 7-3 Room temp 30 minutes ON-55℃ 15 minutes OFF	Free of structural irregularity ΔR/R≤ ±(1%+0.05Ω)
Humidity	JIS-C-5202 7-5 40℃ 90%RH 240 hours	Free of appearance or structural irregularity Surface coating crack ΔR/R≤ ±(3%+0.1Ω)
Load life	JIS-C-5202 7-10 90 minutes ON - 30 minutes OFF500 hours	Free of appearance or structural irregularity Surface coating crack ΔR/R≤ ±(5%+0.1Ω)
Flame retardation	JIS-C-5202 7-13-3-2 100% - 600% rated wattage load	US UL-94 flame retardation test V-0 grade noncombustible
REMARKS:	1. Resistance and resistance tolerance were tested in-house with micro resistance meter. 2. Coating refers to UL-certified data provided by supplier	

Application Notes

Adjustable Wire wound Application Notes (DQS)

Determination of End Resistance Value of FVR, DQS, DSRA, DSRB, BSR, BSQ:

- Resistance Range means you can choose one maximum resistance value (Max. Pickable Resistance Value / End resistance value)
  at one of FVR, DQS, DSRA, DSRB, BSR, BSQ VR (Variable Resistor) type.
- After End Resistance Value confirmed, the minimum resistance (start resistance value) will be determined by depending on resistance of wire and wirewound type.

Power Rating of Variable Resistor:
The part Number formation of FVR, DQS, DSRA, DSRB, BSR and BSQ:

Product type	-	Rated Wattage	-	Max. Pickable Resistance Value (Ω)	-	Resistance Tolerance

Product type means one of FVR, DQS, DSRA, DSRB, BSR, BSQ.
Rated Wattage means power rating at End Resistance Value.
Resistance Value (Ω) means maximum resistance value (End Resistance Value).
Resistance Tolerance means precision range of End Resistance Value.

1. Power Rating of VR (Variable Resistor) is determined by the maximum resistance value (End Resistance Value).
2. Resistance and Power Rating should be decreased while you are adjusting the screw.

If you need current constant type or special specifications, please feel free to contact us.

Order Codes

Order Codes (DQS)

DQS	1500W	10R		K		G	
Part Number	Rated Power (W)	Resistance Value		Resistance Tolerance (%)		Assembly Method	
DQS	75W~2000W	0R1	0.1Ω	H	±3%	N	No mount.
		1R	1Ω	J	±5%	C	Clip mount.
		10R	10Ω	K	±10%	G	Horizontal mount.
		100R	100Ω			Z	Vertical mount.

General Information

Benefits & Features

Providing design engineers with an economical resistor with high quality performance, Token Electronics offers industry grade power wire wound devices.

Token provide terminal blocks, thermal switches, fusing, fans, junction boxes, screened or solid bottom plates, conduit knockouts, and customer specified requirements. For large applications a welded frame construction is utilized to provide a robust design for power resistor mounting in both indoor and outdoor environments.

Products range from large capacity metal clad, nonflammable fixed and adjustable, wave ribbon wire-wound, slide, starter, box type, to nonflammable flat type. Token extends a complete line for both military and commercial applications.

Utilization Notes

1. Smoke emitted from non-flammable resistors on initial use in powered circuits is a normal phenomenon and the component can be safely utilized.
2. All resistors manufactured by Token Electronics Industry Corporation comply with the U.S. UL-94 non- flammability test, Class V-0, a continuous combustion period of zero seconds.
3. Never use organic solvents to clean non-flammable resistors.
4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
7. Do not exceed the recommended usable load. Resistors must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.
8. Minimum load. Resistors must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up.
9. Although the hardness exceeds that of a 3H pencil lead, do not nick the resistor coating with screw drivers or other pointed objects.
10. Avoid touching non-flammable resistors in operation; the surface temperature ranges from approximately 350℃ ~ 400℃ when utilized at the full rated value. Maintaining a surface temperature of 200℃ or less will extend resistor service life.
11. Keep temperature from rising by choosing a resistor with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the resistor rating should be more than four times higher than the actual wattage involved, but never use a resistor at less than 25% of its rated power.
12. Application and Placement: Wire-wound resistors use different gauges of wire as resistance elements. Sometimes the gauge is extremely thin (finer than a strand of human hair) and very susceptible to breakage in environments containing salts, ash, dust and corrosives. Avoid utilization in such environments. Do not install in dusty areas because the accumulation will cause shorts and poor conductance.

Smooth Wound Adjustable Resistor (DRS)

Product Introduction

Choose Token's smooth-wound adjustable power resistor (DRS) for applications requiring settings at different resistance values.

These high energy wire wounds are equipped with an adjustable lug, making them ideal for adjusting circuits, obtaining unique resistance values and setting equipment to meet various line voltages.

DRS resistors feature a hollow core to permit secure fastening with thru bolts with washers or spring-type clips. They also offer the durability of lead free vitreous enamel, or silicone coating and all-welded construction.

The Power (DRS) Adjustable Resistor is RoHS compliant and lead free. For non-standard technical requirements and custom special applications, please contact us. Or link to Token official website "High Power Resistors" to get more information.

To Calculate Max. Amperes:

- Voltage = (Watts × Ohms) $^{1/2}$

Power Rating:

- Based on 25℃ free air rating. The stated wattage rating applies only when the entire resistance is in the circuit.
- Setting the lug at an intermediate point reduces the wattage rating by approximately the same proportion.
- Example: If the lug is set at half resistance, the wattage is reduced by approximately one-half.
- Wattage is proportional to this adjusted resistance value.
- Adjustability is 10% to 90% of full resistance value.

Features:

- Adjustable lug supplied.
- High wattage applications.
- Flame resistant and rugged lead coating.
- Terminals suitable for soldering or bolt connection.
- Resistance Tolerance: J(±5%), K(±10%).

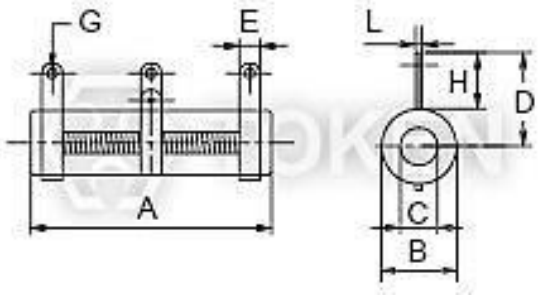
Options:

- Adjustable, fixed, or tapped styles are available.
- Special terminals available for non-standard applications.
- Single and double quick connect terminals can be specified.
- Standard lug terminals available with or without terminal hardware.
- Non-inductive Ayrton Perry windings can be specified.
- Special temperature coefficients, tolerances

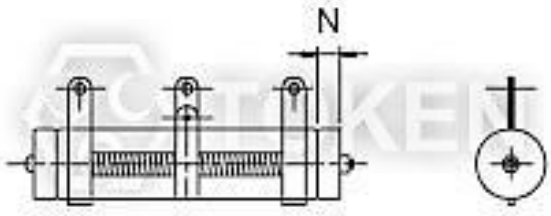
DRSA Dimensions

Dimensions (DRS-A 20W ~ 1300W)

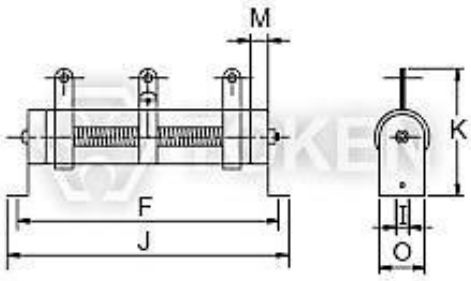
Wattage Rating	Dimensions (Unit: mm)															Max. Pickable Resistance Value (Ω)
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
20W	60	17	8	22	5	78	2	12	4	90	36	1.0	-	6	16	1~150Ω
30W	80	17	8	22	5	100	2	12	4	112	36	1.0	-	6	16	1~250Ω
40W	110	17	8	22	5	128	2	12	4	140	36	1.0	-	6	16	1~400Ω
50W	110	25	16	30	8	150	5	18	6	166	58	1.2	6	-	27	1.5~500Ω
60W	90	28	18	32	8	130	5	19	6	146	60	1.2	6	-	27	1.5~550Ω
80W	110	28	18	32	8	150	5	19	6	166	60	1.2	6	-	27	2~650Ω
100W	140	28	18	32	8	180	5	19	6	196	60	1.2	6	-	27	2~750Ω
120W	160	28	18	32	8	200	5	19	6	216	60	1.2	6	-	27	3~850Ω
150W	195	28	18	32	8	235	5	19	6	251	60	1.2	6	-	27	3~1.2KΩ
160W	185	35	24	36	10	225	5	19	8	245	76	1.6	6	-	34	5~1.3KΩ
200W	210	35	24	36	10	250	5	19	8	274	76	1.6	6	-	34	6~1.5KΩ
250W	210	40	25	38	12	250	5	20	8	274	78	1.6	6	-	34	6~2KΩ
300W	260	40	25	38	12	300	5	20	8	320	78	1.6	6	-	34	7~2.5KΩ
400W	330	40	25	38	12	370	5	20	8	395	78	1.6	6	-	34	8~3.5KΩ
500W	330	50	35	50	12	380	6	25	9	400	100	1.6	8	-	40	8~4.5KΩ
600W	400	50	35	50	12	450	6	25	9	470	100	1.6	8	-	40	8~5.5KΩ
700W	460	50	35	50	12	510	6	25	9	530	100	1.6	8	-	40	12~7KΩ
800W	460	60	40	55	15	515	6	30	10	535	110	1.6	10	-	50	12~8KΩ
1000W	540	60	40	55	15	595	6	30	10	615	110	1.6	10	-	50	15~9KΩ
1300W	650	65	42	62	15	702	6	30	10	722	115	1.6	10	-	50	15~11KΩ



(DRSA) N - No Mount



(DRSA) Z - Vertical Mount

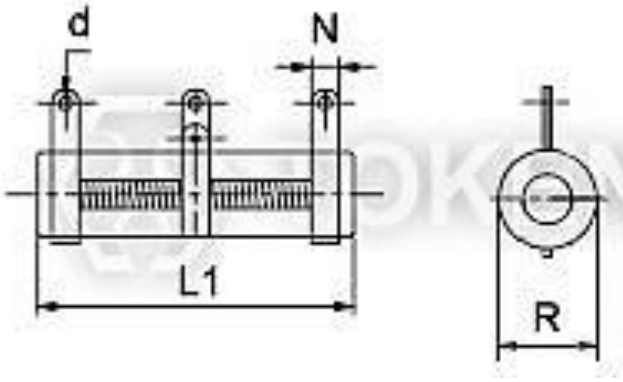


(DRSA) G - Horizontal Mount

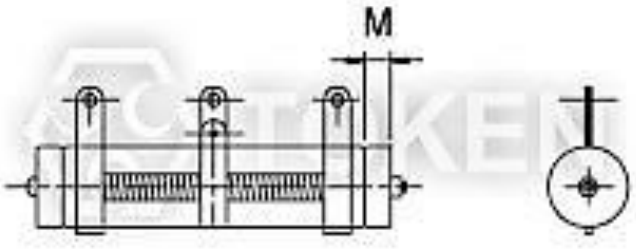
DRSB Dimensions

Dimensions (DRSB 15W ~ 20000W)

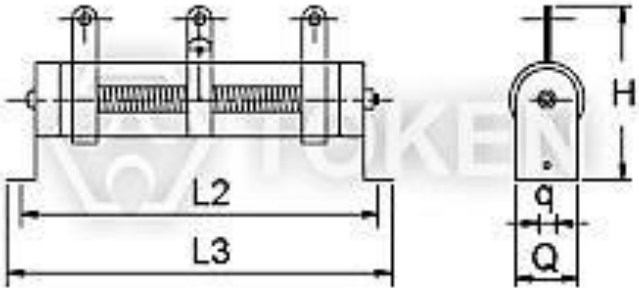
Wattage Rating	Dimensions (Unit: mm)										Max. Pickable Resistance Value (Ω)
	R	L1	L2	L3	H	N	d	M	q	Q	
15W	15	45	65	85	40	6	3.5	3.5	4.5	15	1~1KΩ
20W	15	50	70	90	40	6	3.5	3.5	4.5	15	1~1KΩ
25W	20	50	80	100	50	6	3.5	5	5	20	2~1KΩ
30W	20	70	100	120	50	6	3.5	5	5	20	2~1KΩ
40W	20	87	115	137	50	6	3.5	5	5	20	2~1KΩ
50W	28	90	115	143	68	9	4.5	5.5	6	27	5~1KΩ
80W	28	90	115	143	68	9	4.5	5.5	6	27	5~2KΩ
100W	28	170	195	223	68	9	4.5	5.5	6	27	10~3KΩ
150W	28	215	240	268	68	9	4.5	5.5	6	27	10~3KΩ
200W	28	267	292	320	68	9	4.5	5.5	6	27	10~5KΩ
250W	28	267	292	320	68	9	4.5	5.5	6	27	10~5KΩ
300W	40	267	300	343	90	10	4.5	6	6	39	20~5KΩ
400W	40	330	365	406	90	10	4.5	6	6	39	20~5KΩ
500W	50	330	365	415	98	10	6	8.5	8	49	20~5KΩ
600W	50	330	365	415	98	10	6	8.5	8	49	20~5KΩ
700W	50	400	435	485	95	10	6	8.5	8	49	20~5KΩ
800W	70	300	320	362	138	15	8	-	8	69	40~500Ω
1000W	70	300	320	362	138	15	8	-	8	69	40~500Ω
1500W	70	415	435	477	138	15	8	-	8	69	40~500Ω
2000W	70	510	530	572	138	15	8	-	8	69	40~500Ω
2500W	70	600	620	662	138	15	8	-	8	69	40~500Ω
3000W	70	600	620	662	138	15	8	-	8	69	40~500Ω
4000W	100	430	450	521	155	15	8	-	8	99	40~500Ω
5000W	100	500	620	691	155	15	8	-	8	99	40~500Ω
6000W	100	600	720	791	155	15	8	-	8	99	40~500Ω
10000W	150	600	625	720	350	30	8	-	10	150	40~500Ω
12000W	150	660	685	780	350	30	8	-	10	150	40~500Ω
15000W	150	660	685	780	350	30	8	-	10	150	40~500Ω
20000W	150	1000	1030	1120	350	30	8	-	10	150	40~500Ω



(DRSB) N - No Mount



(DRSB) Z - Vertical Mount



(DRSB) G - Horizontal Mount

Specification

Specification (DRS)

Test Item	Test Methods	Characteristics
Load life	JIS-C-5202 7-10 90 minutes ON - 30 minutes OFF500 hours	Free of appearance or structural irregularity Surface coating crack ΔR/R≤ ±(1%+0.05Ω)
Load rating	JIS-C-5202 5-4	ΔR/R≤±(0.5%+0.1Ω) Surface temperature up 350℃ MAX
Humidity	JIS-C-5202 7-5 40℃ 90%RH 240 hours	Free of appearance or structural irregularity Surface coating crack ΔR/R≤ ±(3%+0.1Ω)
Vibration	JIS-C-5202 6-3 1.5m/m 10 ~ 50 ~ 10 Hz/min X-Y-Z 2 hours each	Free of appearance or structural irregularity Surface coating crack ΔR/R≤ ±(1%+0.05Ω)
Thermal shock	JIS-C-5202 7-3 Room temp 30 minutes ON-55℃ 15 minutes OFF	Free of structural irregularity ΔR/R≤ ±(2%+0.1Ω)
Terminal strength	JIS-C-5202 6-1 8kg 30 seconds	Free of appearance or structural irregularity
Flame retardation	JIS-C-5202 7-13-3-2 100% - 600% rated wattage load	US UL-94 flame retardation test V-0 grade noncombustible
Resistance tolerance	JIS-C-5202 5-1	Resistance Nominal Tolerance 1≤R 1>R ±5%(J) ±10%(K)
Short-term overload	JIS-C-5202 5-5 1000% rated wattage 5 seconds	Free of appearance or structural irregularity ΔR/R≤ ±(2%+0.1Ω)
Insulation resistance	JIS-C-5202 5-6 500VDC	100MΩ min
Temperature coefficient	JIS-C-5202 5-2	±200PPM/℃ MAX
Dielectric withstanding voltage	JIS-C-5202 5-7 1000VDC 1 minute Between terminal and anchor stand	Free of appearance or structural irregularity ΔR/R≤ ±(0.1%+0.05Ω)
REMARKS:	1. Resistance and resistance tolerance were tested in-house with micro resistance meter. 2. Coating refers to UL-certified data provided by supplier.	

Application Notes

Application Notes of Adjustable Wire wound (DQS)

Determination of End Resistance Value of FVR, DQS, DSRA, DSRB, BSR, BSQ:

- Resistance Range means you can choose one maximum resistance value (Max. Pickable Resistance / End resistance value) at one of FVR, DQS, DSRA, DSRB, BSR, BSQ VR (Variable Resistor) type.
- After End Resistance Value confirmed, the minimum resistance (start resistance value) will be determined by depending on resistance of wire and wirewound type.

Power Rating of Variable Resistor:

The part Number formation of FVR, DQS, DSRA, DSRB, BSR and BSQ:

Product type	-	Rated Wattage	-	Max. Pickable Resistance (Ω)	-	Resistance Tolerance

Product type means one of FVR, DQS, DSRA, DSRB, BSR, BSQ.
Rated Wattage means power rating at End Resistance Value.
Resistance Value (Ω) means maximum resistance value (End Resistance Value).
Resistance Tolerance means precision range of End Resistance Value.

1. Power Rating of VR (Variable Resistor) is determined by the maximum resistance value (End Resistance Value).
2. Resistance and Power Rating should be decreased while you are adjusting the screw.

Power Rating:

- Based on 25℃ free air rating. The stated wattage rating applies only when the entire resistance is in the circuit.
- Setting the lug at an intermediate point reduces the wattage rating by approximately the same proportion.
- Example: If the lug is set at half resistance, the wattage is reduced by approximately one-half.
- Adjustability is 10% to 90% of full resistance value.
- Wattage is proportional to this adjusted resistance value.

If you need current constant type or special specifications, please feel free to contact us.

Order Codes

Order Codes (DRS)

DRSA	600W	250R		J		G	
Part Number	Rated Power (W)	Resistance Value		Resistance Tolerance (%)		Assembly Method	
DRSA	20W~1300W	0R1	0.1Ω	J	±5%	N	No mount.
DRSB	15W~20000W	1R	1Ω	K	±10%	C	Clip mount.
		10R	10Ω			G	Horizontal mount.
		100R	100Ω			Z	Vertical mount.
		1K	1KΩ				
		10K	10KΩ				
		100K	100KΩ				

General Information

Benefits & Features

Providing design engineers with an economical resistor with high quality performance, Token Electronics offers industry grade power wire wound devices.

Token provide terminal blocks, thermal switches, fusing, fans, junction boxes, screened or solid bottom plates, conduit knockouts, and customer specified requirements. For large applications a welded frame construction is utilized to provide a robust design for power resistor mounting in both indoor and outdoor environments.

Products range from large capacity metal clad, nonflammable fixed and adjustable, wave ribbon wire-wound, slide, starter, box type, to nonflammable flat type. Token extends a complete line for both military and commercial applications.

Utilization Notes

1. Smoke emitted from non-flammable resistors on initial use in powered circuits is a normal phenomenon and the component can be safely utilized.
2. All resistors manufactured by Token Electronics Industry Corporation comply with the U.S. UL-94 non- flammability test, Class V-0, a continuous combustion period of zero seconds.
3. Never use organic solvents to clean non-flammable resistors.
4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
7. Do not exceed the recommended usable load. Resistors must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.
8. Minimum load. Resistors must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up.
9. Although the hardness exceeds that of a 3H pencil lead, do not nick the resistor coating with screw drivers or other pointed objects.
10. Avoid touching non-flammable resistors in operation; the surface temperature ranges from approximately 350℃ ~ 400℃ when utilized at the full rated value. Maintaining a surface temperature of 200℃ or less will extend resistor service life.
11. Keep temperature from rising by choosing a resistor with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the resistor rating should be more than four times higher than the actual wattage involved, but never use a resistor at less than 25% of its rated power.
12. Application and Placement: Wire-wound resistors use different gauges of wire as resistance elements. Sometimes the gauge is extremely thin (finer than a strand of human hair) and very susceptible to breakage in environments containing salts, ash, dust and corrosives. Avoid utilization in such environments. Do not install in dusty areas because the accumulation will cause shorts and poor conductance.

Enclosure of High Energy and High Voltage Resistors (BOX)

Product Introduction

Power grid box high voltage resistors (BOX) quick build dynamic braking resistors and enclosures.

Features :

- Excellent heat dissipation,
- High power load capability and durability,
- Low temperature coefficient that is directly proportional.

Applications :

- Electric Power Distribution Resistor,
- Suitable for educational modeling applications,
- Load Testing, Industrial Machinery, Dynamic Braking Resistor,
- Instruments and Automation Control Installations.

Token offers power resistors mounted in BOX type enclosures and can be pre-wired for easy installation both at the OEM's factory and at an industrial job-site.

(BOX) series is able to absorb high energy at high voltage while remaining non-inductive (for non-inductance version). Sizes up to 4800 watts are available for shipment depending on the resistance value required. Token engineering staff can assist customers in meeting their design needs. Our production capabilities allow us to design and manufacturer some of the most unique resistor packages offered. Custom is standard at Token Electronics. Contact us with your specific needs. Or you can link to Token official website "High Power Resistors" to get more information.

Construction:

- An assembly-type enclosure contains DR (Round-Wound Power Units) series or DQ (Wave-Shape Ribbon-Wound Power Units) series.
- The BOX (grid, screened cover or solid bottom plates) Series offers excellent protection and safety.
- A welded frame construction for large applications is utilized to provide a robust design for resistor mounting in both indoor and outdoor environments.
- The design of Token's BOX Series provides to enclosure unlimited combinations of power wirewound resistor units to meet customer requirements.

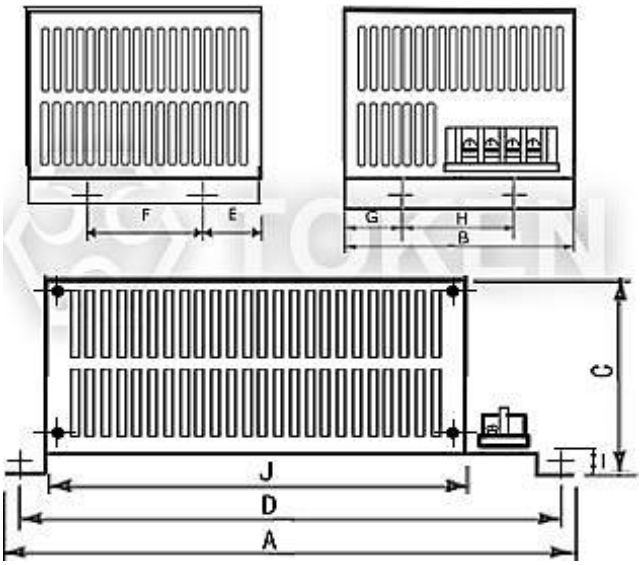
Options:

- Terminal blocks, thermal switches, conduit knockouts, fusing, fans, and other customer specified requirements are available on request.
- Accommodates a flexible range of assembly options for convenient utilization and installation. Refer to the DR and DQ features for exact specifications.

BDR Dimensions

Round-Wound Enclosure Dimensions (BDR 200W - 3200W)

Power Rating	Dimensions (Unit: mm)											Resistance Range(Ω)
	CASE	A	B	C	D	E	F	G	H	I	J	
200W	A	345	90	76	325	45		43		8	268	5.5~20KΩ
400W	A	345	90	76	325	45		43		8	268	5~40KΩ
400W	B	450	152	100	428	30	90	74		10	355	4.5~40KΩ
800W	B	450	152	100	428	30	90	74		10	355	4~80KΩ
1200W	C	450	300	100	428	74	146	74	146	10	355	3.5~120KΩ
1600W	C	450	300	100	428	74	146	74	146	10	355	3~160KΩ
2000W	D	560	250	195	535	27	190	122		10	420	2.5~200KΩ
2400W	D	560	250	195	535	27	190	122		10	420	2~240KΩ
2800W	D	560	250	195	535	27	190	122		10	420	1.5~280KΩ
3200W	D	560	250	195	535	27	190	122		10	420	1~320KΩ

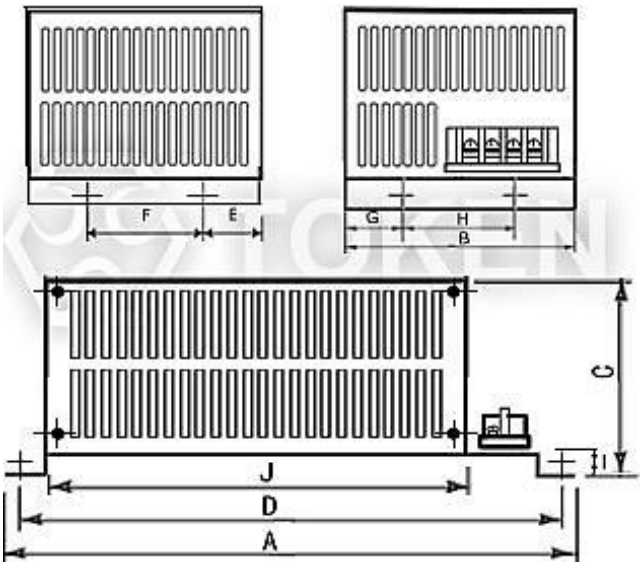


Round-Wound Resistor Enclosure (BDR) Dimensions

BQR Dimensions

Ribbon-Wound Enclosure Dimensions (BQR 300W - 4800W)

Power Rating	Dimensions (Unit: mm)											Resistance Range(Ω)
	CASE	A	B	C	D	E	F	G	H	I	J	
300W	A	345	90	76	325	45		43		8	268	5.5~30Ω
600W	A	345	90	76	325	45		43		8	268	5~60Ω
600W	B	450	152	100	428	30	90	74		10	355	4.5~60Ω
1200W	B	450	152	100	428	30	90	74		10	355	4~120Ω
1800W	C	450	300	100	428	74	146	74	146	10	355	3.5~180Ω
2400W	C	450	300	100	428	74	146	74	146	10	355	3~240Ω
3000W	D	560	250	195	535	27	190	122		10	420	2.5~300Ω
3600W	D	560	250	195	535	27	190	122		10	420	2~360Ω
4200W	D	560	250	195	535	27	190	122		10	420	1.5~420Ω
4800W	D	560	250	195	535	27	190	122		10	420	1~480Ω



Ribbon-Wound Resistor Enclosure (BQR) Dimensions

- **Notice: All dimensions might be changed or modified, please refer to last updating specification.**

Order Codes

Order Codes (BOX)

BDR	2400W	13.6R	K

Part Number	Rated Power (W)	Resistance Value (Ω)	Resistance Tolerance (%)	
BDR	200W~3200W	Indicates resistance value in units of ohms.	J	±5%
BQR	300W~4800W		K	±10%

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4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
7. Do not exceed the recommended usable load. Resistors must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.
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High current Round Edge wound Resistors (DRE)

Product Introduction

Token coiling customer special round edge wound resistors fit renewable energy, load banks, dynamic braking, and inverters design.

Features :

- Power Current from 5.1(A) to 105(A)
- Resistance nominal tolerance ±10%(K)
- Resistance value range 0.08Ω to 42.1#937;,
- suitable for high current applications

Applications :

- Power Industrial Machinery Resistors.
- Dynamic Braking Resistors, Load Banks, Motor Starting Resistor.
- Plugging Resistor, Electric Distribution Resistors.
- Wind Turbines, Harmonic Filters.

Token (DRE) Round Edge wound Resistor is a versatile, heavy-duty unit with lightweight construction, consisting of a non-corrodible, high quality stainless steel alloy. This tough resistor is appropriate for the following applications: VFD braking, motor control, load banks and neutral grounding applications.

(DRE) resistor includes through-rods, through-bars, fixed terminals, hardware and stainless steel element. It is supported by a mounting bar which is slotted at both ends. Fixed terminations are made by welding stainless steel tabs to either end of the element, or at various points for multiple connections. The ribbon-like element is coiled on edge in the form of a helix, and then spun onto a porcelain core which a threaded rod passing through the center of the ceramic core.

Token (DRE) series is also available in many mounting configurations such as stud mount version, universal edge wound, mounting bracket options of Vishay, or Ohmite. Many standard hardware options allow resistors to be purchased fully assembled, allowing easy integration into the final assembly. Assemblies are wired in parallel or in series to meet the needs of the application. Terminal blocks and thermal switches are also available.

Value-add wiring and connectors allow for a "plug-and-play" solution that easily integrates into the final assembly. Custom resistors are designed to order by our engineers and can be customized to fit unique electrical and mechanical constraints.

For more dynamic braking resistors, please link to Token official website "High Power Resistors" to get more information. Or contact us with your specific needs.

Customer special design options:

- Mechanical: Overall dimensions, mounting type, and configuration, insulation.
- Connection: Wire leads, connectors, terminal type, size, set-in, and material.
- Electrical: Tolerance, wattage, resistance, dielectric withstanding voltage, surge ability, temperature coefficient.

DRE-P

Round Edge wound Standard Dimensions (DRE-P)

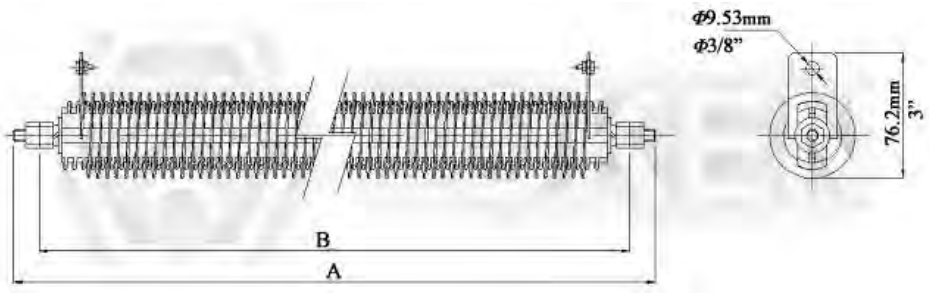
High power (DRE) series edge power resistors are constructed by coiling a resistance-alloy ribbon wire and winding it on edge over specially designed ceramic insulators. The porcelain insulators separate coils of the resistance elements from each other and the frame. The advantage is an open coil construction is to easily accommodate surges and overloads that allows efficient heat dissipation .

Round Edge wound Construction:

- Insulators provide insulation from threaded stud mount and proper turn-to-turn spacing.
- A sturdy welded steel frame supports the refractory insulators and finished with a zinc chromate conversion for corrosion resistance.
- The resistance element is a stainless steel strip with negligible temperature coefficient and anti-corrosion features,
  used for its current carrying capacity vs Ohms per length.
- The resistance element is designed by edgewinding a stainless strip into a continuous coil of the proper scaling length.
- Zinc plated terminals are welded to the resistive wire for a reliable electrical connection.

Length Code	2		3		4		5		6		7		8		9	
Dimensions	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
A	228.6	9	285.75	11.25	381	15	438.15	17.25	615.95	24.25	615.95	24.25	762	30	838.2	33
B	177.8	7	254.0	10	330.2	13	406.4	16	457.2	18	558.8	22	635	25	711.2	28

Round Edgewound Resistor (DRE-P)



Round Edgewound Standard Dimensions (DRE-P)

Edge wound Electrical Ratings (DRE-P)

Length Code	2	3	4	5	6	7	8	9
Amps (A)	**Resistance (Ω) at 25℃, Resistance Tolerance (10%)**							
11	2.3	3.7	5.1	6.5	7.9	9.3	10.7	12.0
12	1.9	3.1	4.3	5.4	6.6	7.8	8.9	10.0
18	1.1	1.7	2.4	3.0	3.6	4.3	4.9	5.5
21	0.79	1.26	1.73	2.2	2.67	3.14	3.6	4.1
24	0.62	1.0	1.4	1.75	2.1	2.5	2.87	3.2
27	0.50	0.80	1.1	1.4	1.7	2.0	2.3	2.6
29	0.44	0.70	0.96	1.2	1.5	1.7	1.95	2.2
35	0.31	0.50	0.69	0.88	1.1	1.3	1.5	1.7
40	0.24	0.39	0.54	0.68	0.83	0.97	1.12	1.3
45	0.22	0.35	0.46	0.61	0.74	0.87	1.0	1.1
50	0.17	0.27	0.37	0.47	0.57	0.67	0.77	0.87
60	-	0.20	0.27	0.33	0.40	0.47	0.58	0.65
70	-	0.15	0.20	0.25	0.30	0.35	0.40	0.45
85	-	0.12	0.15	0.18	0.23	0.27	0.31	0.35
105	-	0.09	0.12	0.15	0.18	0.21	0.24	0.27

- **The continuous current ratings are based on a 375℃ temperature rise.**
- **The resistance values are measured at 25℃ and have a ±10% tolerance.**

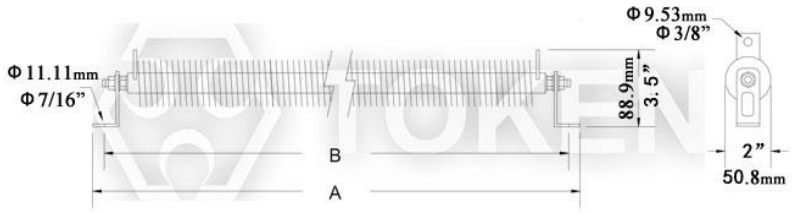
DRE-G

Round Edge wound Bracket Assembly Options Dimensions (DRE-G)

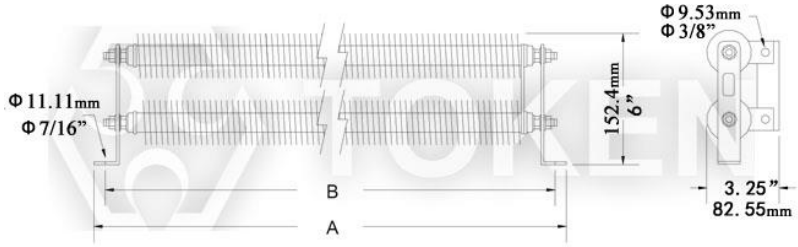
Fully assembled on open-style brackets are available in Token (DRE-G) Edge wound Resistor series. Mill galvanized brackets complete with all hardware and stainless steel bus bars with this open-style construction consist of resistors installed.

Length Code	2		3		4		5		6		7		8		9	
Dimensions	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
A	228.6	9	304.8	12	381	15	457.2	18	508	20	609.6	24	685.8	27	762	30
B	203.2	8	579.4	11	355.6	14	431.8	17	482.6	19	584.2	23	660.4	26	736.6	29

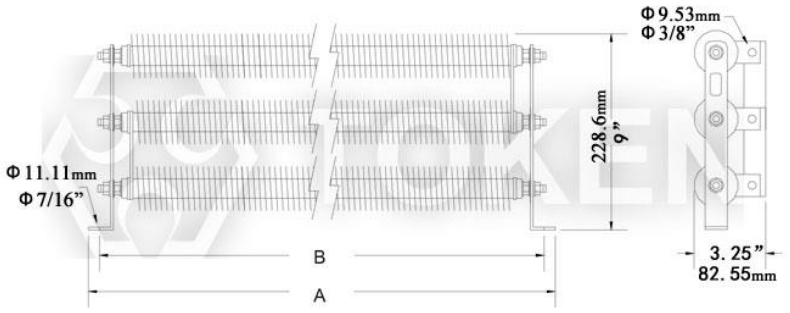
Round Edgewound Resistor (DRE-G)



Bracket Assembly Options Dimensions (DRE-G1)



Bracket Assembly Options Dimensions (DRE-G2)



Bracket Assembly Options Dimensions (DRE-G3)

- **Standard assemblies of 2 or more coils include series jumpers. Add "-N" to eliminate jumpers and "-P" for parallel jumpers.**

Length Code	2	3	4	5	6	7	8	9
Amps (A)	Resistance (Ω) at 25℃, Resistance Tolerance (10%)							
11	2.3	3.7	5.1	6.5	7.9	9.3	10.7	12.0
12	1.9	3.1	4.3	5.4	6.6	7.8	8.9	10.0
18	1.1	1.7	2.4	3.0	3.6	4.3	4.9	5.5
21	0.79	1.26	1.73	2.2	2.67	3.14	3.6	4.1
24	0.62	1.0	1.4	1.75	2.1	2.5	2.87	3.2
27	0.50	0.80	1.1	1.4	1.7	2.0	2.3	2.6
29	0.44	0.70	0.96	1.2	1.5	1.7	1.95	2.2
35	0.31	0.50	0.69	0.88	1.1	1.3	1.5	1.7
40	0.24	0.39	0.54	0.68	0.83	0.97	1.12	1.3
45	0.22	0.35	0.46	0.61	0.74	0.87	1.0	1.1
50	0.17	0.27	0.37	0.47	0.57	0.67	0.77	0.87
60	-	0.20	0.27	0.33	0.40	0.47	0.58	0.65
70	-	0.15	0.20	0.25	0.30	0.35	0.40	0.45
85	-	0.12	0.15	0.18	0.23	0.27	0.31	0.35
105	-	0.09	0.12	0.15	0.18	0.21	0.24	0.27

- The continuous current ratings are based on a 375℃ temperature rise.
- Power: varies. •Tolerance: ± 10 %.

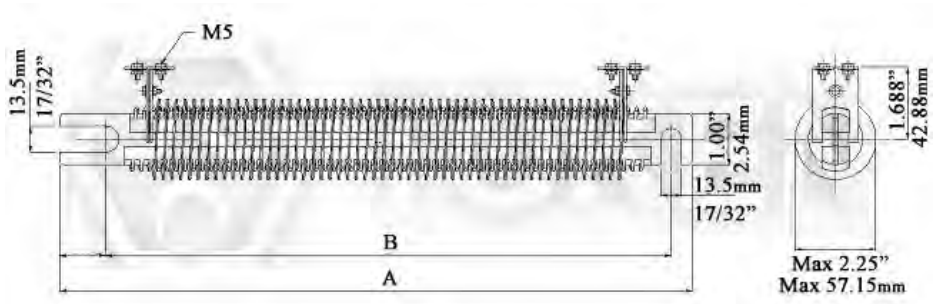
DRE-R

Bar-Mount Edge wound Dimensions (DRE-R)

Token (DRE-R) bar-mounted edge wounds are existing with the same electrical ratings as the Type (DRE-G) edge wounds. All units have the same approximate diameter of 2 inches (50.8mm). Units are equipped with through-bar and terminal hardware.

Length Code	2		3		4		5		6		7		8	
Dimensions	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
A	225.43	8.875	301.63	11.875	377.83	14.875	454.03	17.875	530.23	20.875	606.43	23.875	682.63	26.875
B	184.15	7.25	260.35	10.25	336.55	13.25	412.75	16.25	488.95	19.25	565.15	22.25	641.35	25.256

Bar-Mount Edgewound Resistor (DRE-R)



Bar-Mount Edgewound Dimensions (DRE-R)

Bar-Mount Edgewound Resistor Custom Type

Edgewound Electrical Ratings (DRE-R)

Length Code	2	3	4	5	6	7	8
Amps (A)	Resistance (Ω) at 25℃, Resistance Tolerance (10%)						
5.1	7.9	13.6	19.3	25.0	30.7	36.4	42.1
5.9	6.3	10.9	15.4	20.0	24.5	29.0	33.5
6.6	5.3	9.2	13.0	17.0	20.8	24.6	28.4
7.6	4.1	7.1	10.0	13.0	15.9	18.8	21.7
8.3	3.4	5.9	8.5	11.0	13.5	16.0	18.5
9.4	2.70	4.60	6.50	8.50	10.4	12.3	14.2
10.3	2.10	3.70	6.30	6.80	8.30	9.80	11.3
11.8	1.70	2.90	4.20	5.40	6.60	7.80	9.00
12.7	1.40	2.40	3.50	4.50	5.50	6.50	7.50
14.6	1.10	1.90	2.70	3.50	4.30	5.10	5.90
16.3	0.88	1.50	2.20	2.80	3.40	4.00	4.60
18.4	0.69	1.20	1.70	2.20	2.70	3.10	3.50
26	0.56	0.90	1.20	1.60	1.90	2.20	2.50
29	0.45	0.73	1.00	1.30	1.50	1.75	2.00
33	0.35	0.56	0.77	1.00	1.20	1.40	1.60
39	0.26	0.42	0.58	0.75	0.90	1.05	1.20
41	0.23	0.36	0.51	0.67	0.80	0.93	1.06
43	0.21	0.33	0.46	0.60	0.72	0.85	0.98
47	0.17	0.28	0.38	0.50	0.60	0.70	0.80
50	0.12	0.20	0.28	0.37	0.45	0.53	0.61
54	0.11	0.18	0.25	0.33	0.40	0.47	0.54
57	0.10	0.16	0.23	0.30	0.36	0.42	0.48
63	0.80	0.13	0.19	0.25	0.30	0.35	0.40
68	0.07	0.12	0.18	0.22	0.26	0.30	0.34
75	0.06	0.10	0.14	0.18	0.21	0.25	0.30
78	0.052	0.088	0.12	0.16	0.16	0.22	0.25
89	0.046	0.078	0.11	0.14	0.17	0.20	0.23
91	0.040	0.070	0.10	0.12	0.14	0.16	0.18
100	0.033	0.057	0.08	0.10	0.12	0.14	0.16

- The rating of continuous current (Amps) is based on a 375℃ temperature rise.
- Power: varies. •Tolerance: ± 10 %.

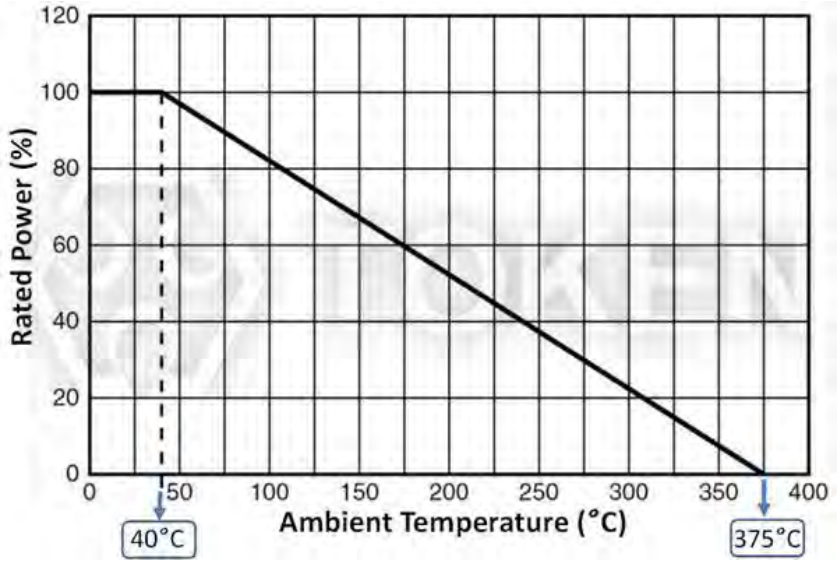
Electrical Characteristics

Electrical Characteristics (DRE)

Test Item	Specification	Test Methods
Ambient Temperatures	Ambient Temperature: -55℃ ~350℃. Derated current rating: 95% for 50℃ ambient, 90% for 75℃ ambient, 85% for 100℃ ambient, 10% for 350℃ ambient.	Standard ratings are based on maximum ambient temperatures of 40℃.
Continuous current ratings and temperatures Rise	375℃ Max.	The rating of continuous current is based on a 375℃ temperature rise at ambient temperatures of 40℃.
Resistance tolerance	Resistance Nominal Tolerance ±10%(K) for all units; as low as ±3% if required.	JIS-C-5202 5-1
Thermal Shock	Δ≤±(2%R+0.1Ω)	JIS-C-5202 7.3, Room temp 30 minutes, -55℃ 15 minutes.
Terminal strength	Δ≤±(2%R+0.1Ω)	JIS-C-5202 6.1, 45N, 30S
Short-term Overload	Δ≤±(2%R+0.1Ω)	JIS-C-5202 5.5, 10PR, 5S.

- **Resistance and resistance tolerance were tested in-house at room temperature (25℃) with micro resistance meter.**
- **Ambient Temperature: refers to the temperature inside the subject and around the specimen, not to the air-temperature outside the subject.**

Edge wound Derating Curve (DRE)



Edge wound Derating Curve (DRE)

Order Codes

Order Codes (DRE)

DRE	2	11	2R3	K	G

Part Number
DRE

Length Code
2
3
4
5
6
7
8
9

Amps (A)
11
12
18
21
24
27
29
35
...

Resistance Value	
2R3	2.3Ω
R62	0.62Ω
R37	0.37Ω

Resistance Tolerance (%)	
K	±10%

Mounting Options	
P	Standard
R	Bar-Mount
G1	Standard Bracket
G2	Bracket (Series Jumper included for 2 or more Standard Assembly)
G3	Bracket (Series Jumper included for 2 or more Standard Assembly)
G2P	Parallel Jumper (2 or more Assembly)
G3P	Parallel Jumper (2 or more Assembly)
G2N	No Jumper (2 or more Assembly)
G3N	No Jumper (2 or more Assembly)

General Information

Benefits & Features

Providing design engineers with an economical resistor with high quality performance, Token Electronics offers industry grade power wire wound devices.

Token provide terminal blocks, thermal switches, fusing, fans, junction boxes, screened or solid bottom plates, conduit knockouts, and customer specified requirements. For large applications a welded frame construction is utilized to provide a robust design for power resistor mounting in both indoor and outdoor environments.

Products range from large capacity metal clad, nonflammable fixed and adjustable, wave ribbon wire-wound, slide, starter, box type, to nonflammable flat type. Token extends a complete line for both military and commercial applications.

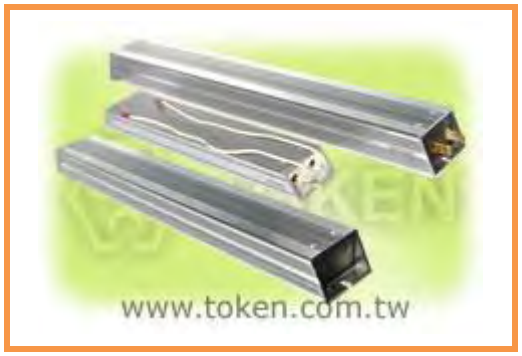
Utilization Notes

1. Smoke emitted from non-flammable resistors on initial use in powered circuits is a normal phenomenon and the component can be safely utilized.
2. All resistors manufactured by Token Electronics Industry Corporation comply with the U.S. UL-94 non- flammability test, Class V-0, a continuous combustion period of zero seconds.
3. Never use organic solvents to clean non-flammable resistors.
4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
7. Do not exceed the recommended usable load. Resistors must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.
8. Minimum load. Resistors must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up.
9. Although the hardness exceeds that of a 3H pencil lead, do not nick the resistor coating with screw drivers or other pointed objects.
10. Avoid touching non-flammable resistors in operation; the surface temperature ranges from approximately 350℃ ~ 400℃ when utilized at the full rated value. Maintaining a surface temperature of 200℃ or less will extend resistor service life.
11. Keep temperature from rising by choosing a resistor with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the resistor rating should be more than four times higher than the actual wattage involved, but never use a resistor at less than 25% of its rated power.
12. Application and Placement: Wire-wound resistors use different gauges of wire as resistance elements. Sometimes the gauge is extremely thin (finer than a strand of human hair) and very susceptible to breakage in environments containing salts, ash, dust and corrosives. Avoid utilization in such environments. Do not install in dusty areas because the accumulation will cause shorts and poor conductance.

Aluminum Chassis Mount Resistors (AL)

Product Introduction

Low profile aluminum encased wire wound power resistors boost up high energy applications.



Token's flat core winding technology allows for aluminum chassis mount heat sinkable resistor affording a very low profile, and superior thermal transfer characteristics when compared to conventional power wire wound resistors.

(AL) Low Profile Aluminum Encased Series is durable, vibration-proof, dissipates heat well and low temperature coefficient with resistance varying in direct proportion.

The rugged structure, economic price aluminum housed resistor (AL) is easy to utilize and install, and suitable for a wide range applications. Key applications include industrial machinery resistor, load testing resistor, electric power distribution resistors, instruments, and automated control installations.

The (AL) series is RoHS compliant and lead free. For non-standard technical requirements and custom special applications, please contact us to discuss the details, or link to Token official website "High Power Resistors" to get more information.

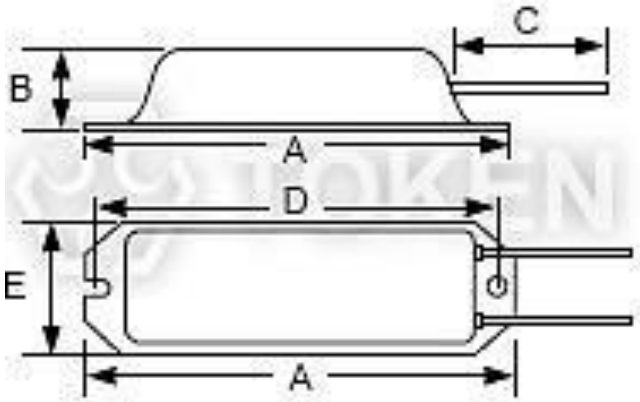
Construction:

- Insulation is applied through a high-temperature process.
- An aluminum encased consists of an alloy metal coil-type resistance element assembled into an aluminum enclosure.
- After high-temperature anodization, the enclosure is filled with a special non-flammable cement paste and hardening.
- Since this component is embedded in the heat-proof cement, it is not affected by external mechanical force, and dusty environments.

ASQ Dimensions

Dimensions (ASQ 60W ~ 120W)

Power Rating	Dimensions (Unit: mm)					Resistance Range(Ω)
	A	B	C	D	E	
60W	100	13	100	90	30	0.1~10K
80W	130	19	100	116	42	0.1~10K
100W	130	19	100	116	42	0.1~10K
120W	130	19	100	116	42	0.1~10K
120W	182	19	100	172	42	0.1~10K

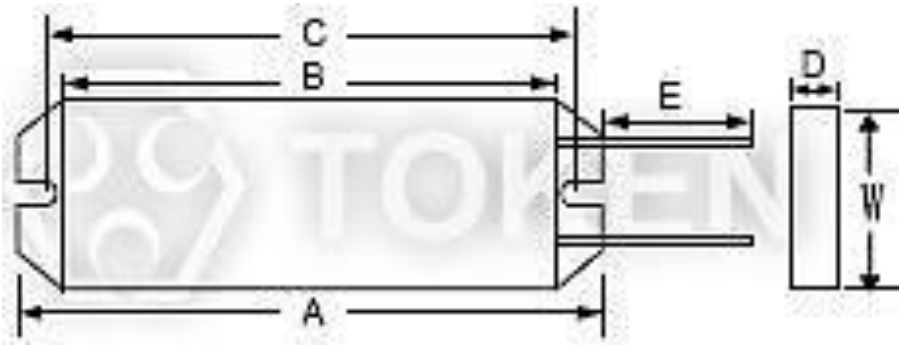


(ASQ 60W ~ 120W) Dimensions

ASP Dimensions

Dimensions (ASP 60W - 150W)

Power Rating	Dimensions (Unit: mm)						Resistance Range(Ω)
	A	B	C	D	E	W	
60W	100	75	85	8	100	45	0.1~10K
80W	120	95	105	8	100	45	0.1~10K
100W	120	95	105	8	100	45	0.1~10K
120W	150	125	135	8	100	45	0.1~10K
150W	215	190	200	8	100	45	0.1~10K

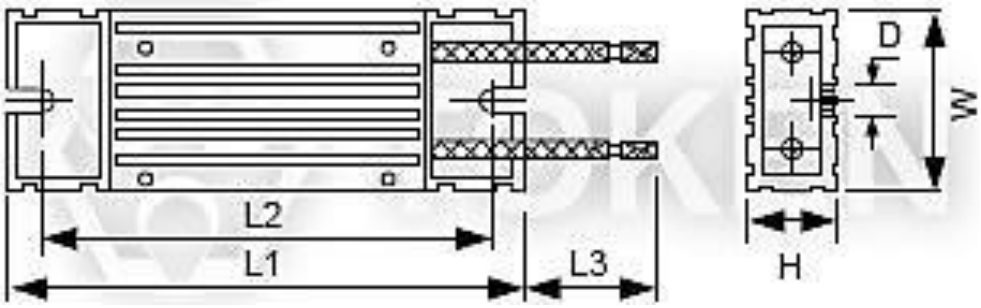


(ASP 60W - 150W) Dimensions

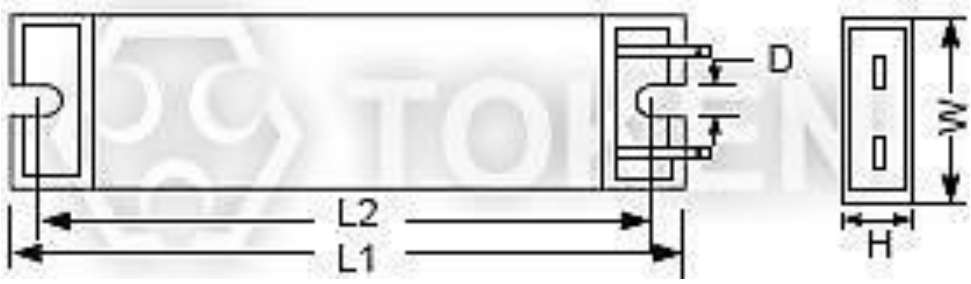
ASZ Dimensions

Dimensions (ASZ 40W ~ 2000W)

Power Rating	Dimensions (Unit: mm)							Resistance Range(Ω)
	W±1.5	H±1.5	L1±2	L2±2	D±0.5	L3±10	TYPE	
40W	40	20	90	75	5.2	300	A	0.1~2K
60W	40	20	115	100	5.2	300	A	0.1~2K
80W	40	20	140	125	5.2	300	A	0.1~2K
100W	40	20	140	125	5.2	300	A	0.1~3K
120W	40	20	185	170	5.2	300	A	0.1~5K
150W	40	20	185	170	5.2	300	A	0.1~5K
200W	60	30	165	150	5.2	300	A	0.1~5K
250W	60	30	165	150	5.2	300	A	0.1~10K
300W	60	30	215	200	5.2	300	A	0.1~10K
400W	60	30	265	250	5.2	300	A	0.1~10K
500W	60	30	335	320	5.2	300	A	0.1~10K
600W	60	30	335	320	5.2	300	A	0.1~10K
800W	60	30	365	350	5.2	300	A	0.1~10K
1000W	70/76/100	45/44/50	335/400	320/385	5.2		B	0.1~10K
1200W	70/76/100	45/44/50	400	385	5.2		B	0.1~10K
1500W	70/76/100	45/44/50	450	435	5.2		B	0.1~10K
1800W	70/76/100	45/44/50	500	485	5.2		B	0.1~10K
2000W	70/76/100	45/44/50	500	485	5.2		B	0.1~10K
2500W	70/76/100	45/44/50	550	535	5.2		B	0.1~10K
3000W	70/76/100	45/44/50	600	585	5.2		B	0.1~10K



(ASZ-A Type) Dimensions



(ASZ-B Type) Dimensions

- **Notice: All dimensions might be changed or modified, please refer to last updating specification.**

Performance Specifications

Performance Specifications (AL)

Test Item	Test Methods	Characteristics
Resistance tolerance	JIS-C-5202 5-1	Resistance Nominal Tolerance 1≤R 1>R ±5%(J) ±10%(K)
Temperature coefficient	JIS-C-5202 5-2	±400PPM/℃ MAX
Power rating load	JIS-C-5202 5-4	ΔR/R≤ ±(0.5%+0.1Ω) Surface temperature up 350℃ MAX
Short-term overload	JIS-C-5202 5-5 1000% rated power 5 seconds	Free of appearance or structural irregularity ΔR/R≤ ±(2%+0.1Ω)
Insulation resistance	JIS-C-5202 5-6 1000VDC	100MΩ min
Dielectric withstanding voltage	JIS-C-5202 5-7 2000VDC 1 minute	Free of appearance or structural irregularity ΔR/R≤ ±(0.1%+0.05Ω)
Terminal strength	JIS-C-5202 6-1 8kg 30 seconds	Free of appearance or structural irregularity
Resistor strength	JIS-C-5202 6-2 30kg 30 seconds	Free of appearance or structural irregularity
Vibration	JIS-C-5202 6-3 1.5m/m 10 ~ 50 ~ 10 Hz/min X-Y-Z 2 hours each	Free of appearance or structural irregularity Surface coating crack ΔR/R≤ ±(1%+0.05Ω)
Thermal shock	JIS-C-5202 7-3 Room temp 30 minutes ON-55℃ 15 minutes OFF	Resistor free of structural irregularity ΔR/R≤±(2%+0.1Ω)
Humidity	JIS-C-5202 7-5 40℃ 90%RH 240 hours	Free of appearance or structural irregularity Surface coating crack ΔR/R≤±(3%+0.1Ω)
Load life	JIS-C-5202 7-10 90 minutes ON - 30 minutes OFF, 500 hours	Free of appearance or structural irregularity Surface coating crack ΔR/R≤ ±(3%+0.1Ω)
Flame retardation	JIS-C-5202 7-13-3-2 100% - 600% rated power load	US UL-94 flame retardation test V-0 grade noncombustible
Remarks	1. Resistance and resistance tolerance were tested in-house with micro resistance meter. 2. Resistor coating refers to UL-certified data provided by supplier	

Order Codes

Order Codes (AL)

ASQ	400W	20R	K

Part Number	Rated Power (W)	Resistance Value (Ω)	Resistance Tolerance (%)	
ASQ	60W~120W	Indicates resistance value in units of ohms.	J	±5%
ASP	60W~150W		K	±10%
ASZ-A, ASZ-B	40W~2000W			

General Information

Benefits & Features

Providing design engineers with an economical resistor with high quality performance, Token Electronics offers industry grade power wire wound devices.

Token provide terminal blocks, thermal switches, fusing, fans, junction boxes, screened or solid bottom plates, conduit knockouts, and customer specified requirements. For large applications a welded frame construction is utilized to provide a robust design for power resistor mounting in both indoor and outdoor environments.

Products range from large capacity metal clad, nonflammable fixed and adjustable, wave ribbon wire-wound, slide, starter, box type, to nonflammable flat type. Token extends a complete line for both military and commercial applications.

Utilization Notes

1. Smoke emitted from non-flammable resistors on initial use in powered circuits is a normal phenomenon and the component can be safely utilized.
2. All resistors manufactured by Token Electronics Industry Corporation comply with the U.S. UL-94 non- flammability test, Class V-0, a continuous combustion period of zero seconds.
3. Never use organic solvents to clean non-flammable resistors.
4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
7. Do not exceed the recommended usable load. Resistors must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.
8. Minimum load. Resistors must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up.
9. Although the hardness exceeds that of a 3H pencil lead, do not nick the resistor coating with screw drivers or other pointed objects.
10. Avoid touching non-flammable resistors in operation; the surface temperature ranges from approximately 350℃ ~ 400℃ when utilized at the full rated value. Maintaining a surface temperature of 200℃ or less will extend resistor service life.
11. Keep temperature from rising by choosing a resistor with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the resistor rating should be more than four times higher than the actual wattage involved, but never use a resistor at less than 25% of its rated power.
12. Application and Placement: Wire-wound resistors use different gauges of wire as resistance elements. Sometimes the gauge is extremely thin (finer than a strand of human hair) and very susceptible to breakage in environments containing salts, ash, dust and corrosives. Avoid utilization in such environments. Do not install in dusty areas because the accumulation will cause shorts and poor conductance.

Slide Rotary Resistor Enclosure (BSR, BSQ)

Product Introduction

One-of-A-Kind Enclosure Application to Hundreds of Enclosures.

Following market demands, Token Electronics provides enclosures to house unlimited combinations of resistors (DR or DQ Power Series) to meet design engineers and customer requirements.

Token's high current adjustable power BSR, BSQ resistor is one-of-a-kind enclosure application to hundreds of enclosures per mount housing various resistor packages. Our engineering staff can assist the customer in meeting their unique design needs.

These quality design features include all stainless steel grids and terminals, high temperature insulation, welded construction, end-frames with gussets for added mechanical strength. Slotted mounting holes for easy installation.

Also accommodates a flexible range of assembly options for convenient utilization and installation. BSQ Ribwound resistors are particularly useful where high energy is to be dissipated in the lower Ohmic ranges. Replacements for many standard BSR round-wire resistors are available resulting in significant savings in space and cost.

The Power Adjustable BSR and BSQ Resistor is RoHS compliant and lead free. For unusual technical requirements and custom special applications, please contact us. Or link to Token official website "High Power Resistors" to get more information.

Features:

- Resistance Tolerance: K(±10%).
- High power and high current applications.
- Flame resistant and rugged lead free coating.
- One-of-a-kind enclosure application to fit mount housing various resistor packages.

To Calculate Max. Amperes:

- Amperes = (Watts / Ohms) $^{1/2}$

Construction

Rotary Slide Construction (BSR, BSQ)

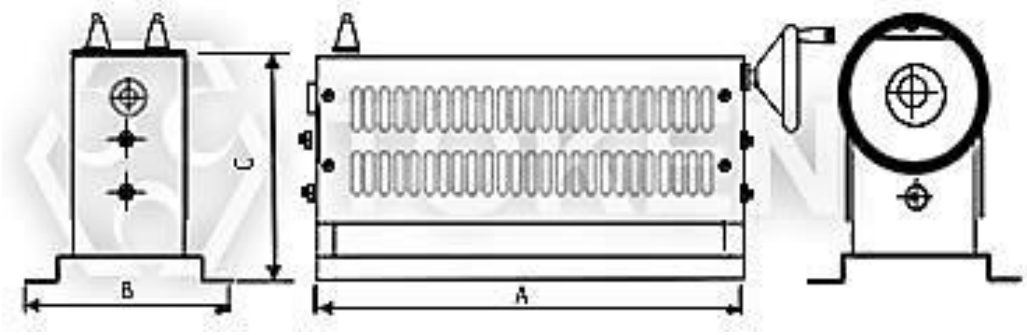
High Current Adjustable Power Resistor Construction:

- A tubular ceramic form has copper-alloy or chromium-alloy windings as a resistance element, with the mount attachment enclosures.
- These quality design features include all stainless steel grids and terminals, welded construction, high temperature insulation, end-frames with gussets for added mechanical strength. Slotted mounting holes for easy installation.
- The entire component is coated with a high-temperature non-flammable resin.
- The adjustable mechanism is a firm rotating point that slides directly on the resistance element, which allows variation of the desired resistance value.
- Also accommodates a flexible range of assembly options for convenient utilization and installation.

BSR Dimensions

Rotary Slide Dimensions (BSR)

Wattage Rating	Dimensions (Unit: mm)						Max. Pickable Resistance Value (Ω)
	Case	A	B	C	Ceramic Rod	Bakelite	
200W	A	285	130	135	28×250	120×70×10	6-1KΩ
400W	B	360	150	185	40×325	170×90×10	8-2KΩ
500W	B	360	150	185	40×325	170×90×10	10-2.5KΩ
1000W	C	570	160	200	60×535	185×100×10	15-5KΩ
1300W	D	680	160	200	65×645	185×100×10	16-6KΩ

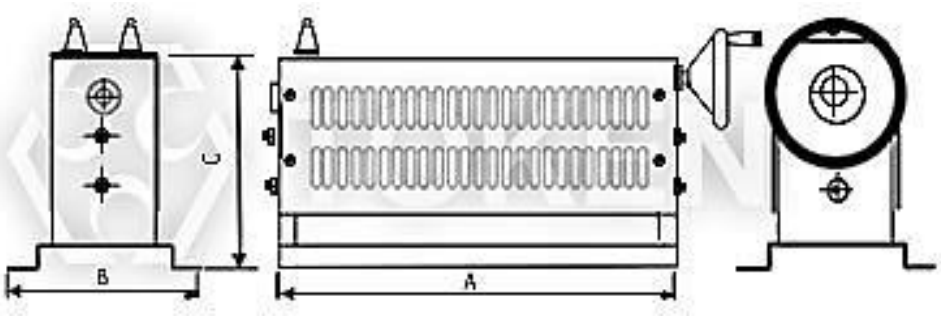


Power Adjustable Slide Resistor (BSR) Dimensions

BSQ Dimensions

Rotary Slide Dimensions (BSQ)

Wattage Rating	Dimensions (Unit: mm)						Max. Pickable Resistance Value (Ω)
	Case	A	B	C	Ceramic Rod	Bakelite	
300W	A	285	130	135	28×250	120×70×10	6-30Ω
600W	B	360	150	185	40×325	170×90×10	8-60Ω
750W	B	360	150	185	40×325	170×90×10	10-75Ω
1500W	C	570	160	200	60×535	185×100×10	15-150Ω
2000W	D	680	160	200	65×645	185×100×10	16-200Ω



Power Adjustable Slide Resistor (BSQ) Dimensions

Application Notes

Power Adjustable Application Notes (BSR, BSQ)

Determination of End Resistance Value of FVR, DQS, DSRA, DSRB, BSR, BSQ:

- Resistance Range means you can choose one maximum resistance value (Max. Pickable Resistance / End resistance value) at one of FVR, DQS, DSRA, DSRB, BSR, BSQ VR (Variable Resistor) type.
- After End Resistance Value confirmed, the minimum resistance (start resistance value) will be determined by depending on resistance of wire and wirewound type.

Power Rating of Variable Resistor:

The part Number formation of FVR, DQS, DSRA, DSRB, BSR, and BSQ:

Product type	-	Rated Wattage	-	Max. Pickable Resistance (Ω)	-	Resistance Tolerance

Product type means one of FVR, DQS, DSRA, DSRB, BSR, BSQ.
Rated Wattage means power rating at End Resistance Value.
Resistance Value (Ω) means maximum resistance value (End Resistance Value).
Resistance Tolerance means precision range of End Resistance Value.

1. Power Rating of VR (Variable Resistor) is determined by the maximum resistance value (End Resistance Value).
2. Resistance and Power Rating should be decreased while you are adjusting the screw.

Notes:

- Adjustability is 10% to 90% of full resistance value.
- Wattage is proportional to this adjusted resistance value.

Power Rating:

- Based on 25℃ free air rating. The stated wattage rating applies only when the entire resistance is in the circuit.
- Setting the lug at an intermediate point reduces the wattage rating by approximately the same proportion.
- Example: If the lug is set at half resistance, the wattage is reduced by approximately one-half.

If you need current constant type or special specifications, please feel free to contact us.

Order Codes

Order Codes (BSR, BSQ)

BSQ	2000W	20R	K

Part Number	Rated Power (W)	Max.Resistance Value (Ω)	Resistance Tolerance (%)	
BSR	200W~1300W	Indicates resistance value in units of ohms.	K	±10%
BSQ	300W~2000W			

General Information

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7. Do not exceed the recommended usable load. Resistors must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.
8. Minimum load. Resistors must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up.
9. Although the hardness exceeds that of a 3H pencil lead, do not nick the resistor coating with screw drivers or other pointed objects.
10. Avoid touching non-flammable resistors in operation; the surface temperature ranges from approximately 350℃ ~ 400℃ when utilized at the full rated value. Maintaining a surface temperature of 200℃ or less will extend resistor service life.
11. Keep temperature from rising by choosing a resistor with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the resistor rating should be more than four times higher than the actual wattage involved, but never use a resistor at less than 25% of its rated power.
12. Application and Placement: Wire-wound resistors use different gauges of wire as resistance elements. Sometimes the gauge is extremely thin (finer than a strand of human hair) and very susceptible to breakage in environments containing salts, ash, dust and corrosives. Avoid utilization in such environments. Do not install in dusty areas because the accumulation will cause shorts and poor conductance.

Power Resistor Chamber (RNW)

Product Introduction

Token's Power Modules Simplify Your Power Resistor Chamber Design (RNW)

Token Electronics produces various kinds of power load bank/chamber which can be used for any resistor, chamber AC or DC power application. Units are most commonly used for motor acceleration and braking, load banks, harmonic filtering and neutral grounding applications.

Assembly:
All units are coiled consist of stainless steel edge wound non-inductive elements wound around core which is mounted on a stainless steel rod. Glazed insulators are attached to each end of the coils and fastened to a heavy gage, corrosion resistant frame. Resistor elements are joined by stainless connectors to form a positive electrical path.

Safety Enclosure:
Token resistor assemblies are available with grounded safety enclosures to protect personnel and wildlife from harm. Screened and louvered enclosures are available in a variety of finishes including painted, powder coated, mill galvanized, hot-dipped galvanized, aluminum and stainless steel.

Option:
A number of additional options are available including entrance bushings, current transformers, elevating stands and disconnect switches.

The series is lead-free and RoHS compliant. Detailed specifications, both mechanical and electrical, please contact our sales representative for more information. Or you can link to Token official website "High Power Resistors" to get more information.

Appearance

Load Bank Appearance (RNW)

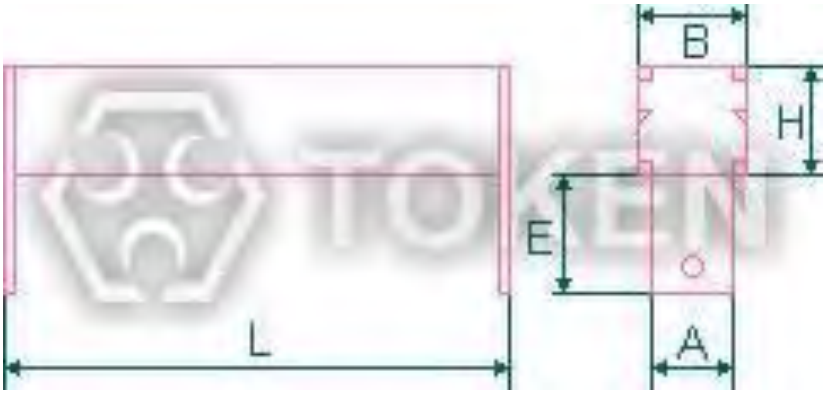
(RNW) Load Bank Appearance - 1

(RNW) Load Bank Appearance - 2

RNW-T Component

Electric Parameter and External Dimensions (RNW-T)

Type	Wattage (W)	Dimensions (Unit: mm)				
		L	H	B	A	E
T5	5	35	9	9	6	15
T10	10	48	10	10	6	15
T20	20	64	14	14	8	20
T30	30	75	19	19	8	20
T50	50	88	20	20	10	20
T100	100	135	25	25	10	25

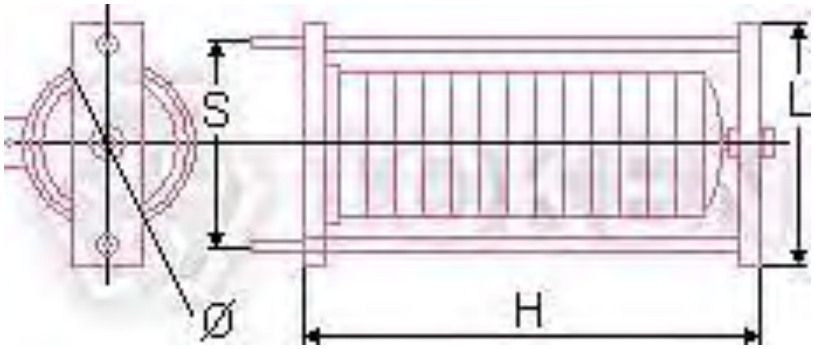


Load Bank Unit (RNW-T) Dimensions

RNW-B Component

Electric Parameter and External Dimensions (RNW-B)

Series	Resistance Range (Ω)	Capacity (KJ)	Dimensions (Unit: mm)			Mounting Hole		
			Ø	H	L	Quantity [N]	Diameter [Ø]	Center Spacing [S]
B11	0.5-30	400	110	190	185	2	10.5	158
B12	0.5-60	800	110	290	185	2	10.5	158
B13	0.5-90	1200	110	390	185	2	10.5	158
B21	0.5-30	300	110	214	254	2	10.5	238
B22	0.5-60	600	110	370	410	2	10.5	294
B23	0.5-90	900	110	526	566	2	10.5	550

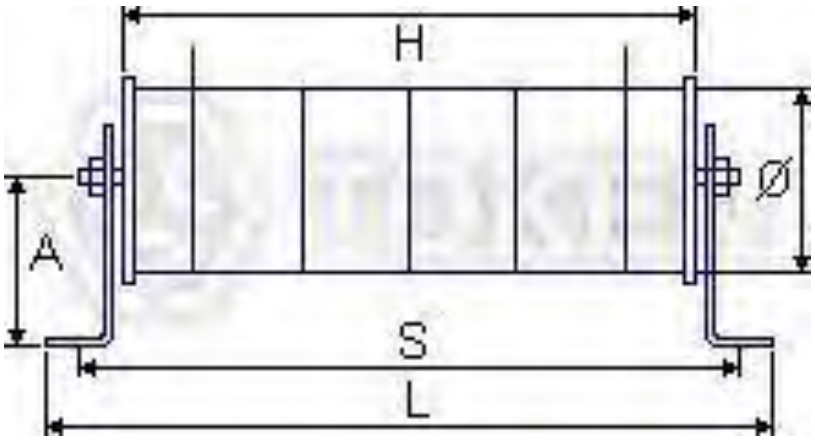


Load Bank Unit (RNW-B) Dimensions

RNW-H Component

Electric Parameter and External Dimensions (RNW-H)

Series	Rated Wattage (W)	Resistance Range (Ω)	Dimensions (Unit: mm)			Mounting Hole			Center Height [A]
			Ø	H	L	Quantity [N]	Diameter [Ø]	Center Spacing [S]	
H	200	1-30	100	134	174	2	8.5	158	90
	400	2-60	100	194	234	2	8.5	218	
	500	3-90	100	254	294	2	8.5	278	
	750	4-120	100	314	354	2	8.5	338	
	1000	5-150	100	374	414	2	8.5	398	



Load Bank Unit (RNW-H) Dimensions

- **Notice: All dimensions might be changed or modified, please refer to last updating specification.**

General Information

Benefits & Features

Providing design engineers with an economical resistor with high quality performance, Token Electronics offers industry grade power wire wound devices.

Token provide terminal blocks, thermal switches, fusing, fans, junction boxes, screened or solid bottom plates, conduit knockouts, and customer specified requirements. For large applications a welded frame construction is utilized to provide a robust design for power resistor mounting in both indoor and outdoor environments.

Products range from large capacity metal clad, nonflammable fixed and adjustable, wave ribbon wire-wound, slide, starter, box type, to nonflammable flat type. Token extends a complete line for both military and commercial applications.

Utilization Notes

1. Smoke emitted from non-flammable resistors on initial use in powered circuits is a normal phenomenon and the component can be safely utilized.
2. All resistors manufactured by Token Electronics Industry Corporation comply with the U.S. UL-94 non- flammability test, Class V-0, a continuous combustion period of zero seconds.
3. Never use organic solvents to clean non-flammable resistors.
4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
7. Do not exceed the recommended usable load. Resistors must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.
8. Minimum load. Resistors must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up.
9. Although the hardness exceeds that of a 3H pencil lead, do not nick the resistor coating with screw drivers or other pointed objects.
10. Avoid touching non-flammable resistors in operation; the surface temperature ranges from approximately 350℃ ~ 400℃ when utilized at the full rated value. Maintaining a surface temperature of 200℃ or less will extend resistor service life.
11. Keep temperature from rising by choosing a resistor with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the resistor rating should be more than four times higher than the actual wattage involved, but never use a resistor at less than 25% of its rated power.
12. Application and Placement: Wire-wound resistors use different gauges of wire as resistance elements. Sometimes the gauge is extremely thin (finer than a strand of human hair) and very susceptible to breakage in environments containing salts, ash, dust and corrosives. Avoid utilization in such environments. Do not install in dusty areas because the accumulation will cause shorts and poor conductance.

Smooth Wound Tubular Power Resistor (DR)

Product Introduction

Token's (DR) series is the best cost-effective smooth-wound tubular power resistors for high energy applications.

Features :

- Fixed, adjustable, or tapped styles are available.
- Special terminals are available for unusual applications.
- Special temperature coefficients, tolerances, and resistance value can be specified.
- Ayrton Perry type non-inductive winding formats are available. See DRS Series when requied.
- Standard resistance tolerance is ±5% and ±10%. Closer tolerances are available upon request.
- Standard lug terminals available with or without terminal hardware.
- Single and double quick connect terminals can be specified.
- The wire is spot welded to the terminal bands and then "fastened" onto the core with a silicone, cement, or vitreous enamel coating.

Applications :

- Ideal for educational modeling applications, load testing, industrial machinery, electric power distribution, instruments, automation control installations, etc.
- Typical applications for roundwire (DR) series in motor/motion control include areas such as dynamic braking, motor starting, speed/torque control, industrial machinery, electric power distribution, and plugging.
- Other applications include load dumping, current limiting, elevators, UPS systems, lift trucks, and voltage dropping.

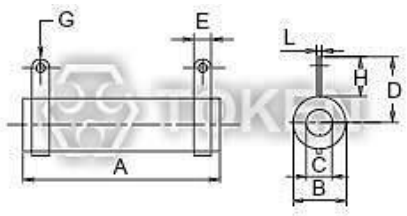
A tubular ceramic has two terminals and is wound with copper round wire or chromium alloy round wire to provide the resistance. Coated with non-flammable resin in high temperature. Insulation is applied through a high-temperature process and the mounts are attached. Due to Token excellent winding technology applied, many taps can be added, impedance is low and the shape can be altered to produce many types.

The (DR) Series is RoHS compliant and lead free. Order individual replacement units, or entire grids with various mounting configurations, or custom specifications, contact us to discuss the details. Or link to Token official website "High Power Resistors" to get more information.

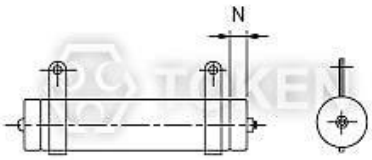
DR-A Dimensions

Dimensions (DR-A 10W ~ 1300W)

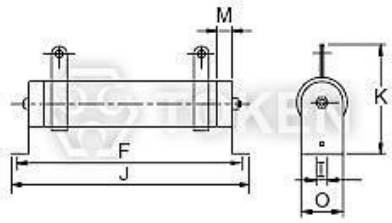
Wattage Rating	Dimensions (Unit: mm)															Resistance Range
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
10W	45	12	6	15	4	54	2	9	3	62	28	1.0	-	6	10	1~1KΩ
20W	60	17	8	22	5	78	2	12	4	90	36	1.0	-	6	16	1~2KΩ
30W	80	17	8	22	5	100	2	12	4	112	36	1.0	-	6	16	1~3KΩ
40W	110	17	8	22	5	128	2	12	4	140	36	1.0	-	6	16	1~4KΩ
50W	110	25	16	30	8	150	5	18	6	166	58	1.2	6	-	27	1.5~5KΩ
60W	90	28	18	32	8	130	5	19	6	146	60	1.2	6	-	27	1.5~6KΩ
80W	110	28	18	32	8	150	5	19	6	166	60	1.2	6	-	27	2~8KΩ
100W	140	28	18	32	8	180	5	19	6	196	60	1.2	6	-	27	2~10KΩ
120W	160	28	18	32	8	200	5	19	6	216	60	1.2	6	-	27	3~12KΩ
150W	195	28	18	32	8	235	5	19	6	251	60	1.2	6	-	27	3~15KΩ
160W	185	35	24	36	10	225	5	19	8	245	76	1.6	6	-	34	5~16KΩ
200W	210	35	24	36	10	250	5	19	8	274	76	1.6	6	-	34	6~20KΩ
250W	210	40	25	38	12	250	5	20	8	274	78	1.6	6	-	34	6~25KΩ
300W	260	40	25	38	12	300	5	20	8	320	78	1.6	6	-	34	7~30KΩ
400W	330	40	25	38	12	370	5	20	8	395	78	1.6	6	-	34	8~40KΩ
500W	330	50	35	50	12	380	6	25	9	400	100	1.6	8	-	40	8~50KΩ
600W	400	50	35	50	12	450	6	25	9	470	100	1.6	8	-	40	8~60KΩ
700W	460	50	35	50	12	510	6	25	9	530	100	1.6	8	-	40	12~70KΩ
800W	460	60	40	55	15	515	6	30	10	535	110	1.6	10	-	50	12~80KΩ
1000W	540	60	40	55	15	595	6	30	10	615	110	1.6	10	-	50	15~100KΩ
1300W	650	65	42	62	15	702	6	30	10	722	115	1.6	10	-	50	15~130KΩ



(DR-A) N - No Mount



(DR-A) Z - Vertical Mount

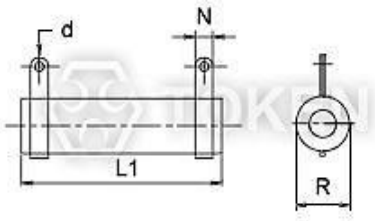


(DR-A) G - Horizontal Mount

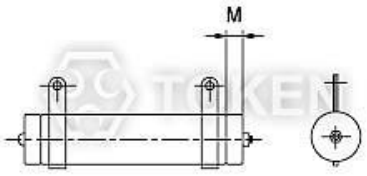
DR-B Dimensions

Dimensions (DR-B 15W ~ 20000W)

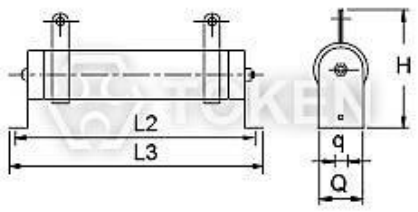
Wattage Rating	Dimensions (Unit: mm)										Resistance Range
	R	L1	L2	L3	H	N	d	M	q	Q	
15W	15	45	65	85	40	6	3.5	3.5	4.5	15	1~1KΩ
20W	15	50	70	90	40	6	3.5	3.5	4.5	15	1~1KΩ
25W	20	50	80	100	50	6	3.5	5	5	20	2~1KΩ
30W	20	70	100	120	50	6	3.5	5	5	20	2~1KΩ
40W	20	87	115	137	50	6	3.5	5	5	20	2~1KΩ
50W	28	90	115	143	68	9	4.5	5.5	6	27	5~1KΩ
80W	28	90	115	143	68	9	4.5	5.5	6	27	5~2KΩ
100W	28	170	195	223	68	9	4.5	5.5	6	27	10~3KΩ
150W	28	215	240	268	68	9	4.5	5.5	6	27	10~3KΩ
200W	28	267	292	320	68	9	4.5	5.5	6	27	10~5KΩ
250W	28	267	292	320	68	9	4.5	5.5	6	27	10~5KΩ
300W	40	267	300	343	90	10	4.5	6	6	39	20~5KΩ
400W	40	330	365	406	90	10	4.5	6	6	39	20~5KΩ
500W	50	330	365	415	98	10	6	8.5	8	49	20~5KΩ
600W	50	330	365	415	98	10	6	8.5	8	49	20~5KΩ
700W	50	400	435	485	95	10	6	8.5	8	49	20~5KΩ
800W	70	300	320	362	138	15	8	-	8	69	40~500Ω
1000W	70	300	320	362	138	15	8	-	8	69	40~500Ω
1500W	70	415	435	477	138	15	8	-	8	69	40~500Ω
2000W	70	510	530	572	138	15	8	-	8	69	40~500Ω
2500W	70	600	620	662	138	15	8	-	8	69	40~500Ω
3000W	70	600	620	662	138	15	8	-	8	69	40~500Ω
4000W	100	430	450	521	155	15	8	-	8	99	40~500Ω
5000W	100	500	620	691	155	15	8	-	8	99	40~500Ω
6000W	100	600	720	791	155	15	8	-	8	99	40~500Ω
10000W	150	600	625	720	350	30	8	-	10	150	40~500Ω
12000W	150	660	685	780	350	30	8	-	10	150	40~500Ω
15000W	150	660	685	780	350	30	8	-	10	150	40~500Ω
20000W	150	1000	1030	1120	350	30	8	-	10	150	40~500Ω



(DR-B) N - No Mount



(DR-B) Z - Vertical Mount



(DR-B) G - Horizontal Mount

Order Codes

Order Codes (DR)

DRA	600W	100R		J		G	
Part Number	Rated Power (W)	Resistance Value (Ω)		Resistance Tolerance (%)		Assembly Method	
DRA	10W~1300W	0R1	0.1Ω	J	±5%	N	No mount.
DRB	15W~20000W	1R	1Ω	K	±10%	C	Clip mount.
DRAN	50W~1300W	10R	10Ω			G	Horizontal mount.
DRBN	15W~20000W	100R	100Ω			Z	Vertical mount.
		1K	1KΩ				
		10K	10KΩ				
		100K	100KΩ				

General Information

Benefits & Features

Providing design engineers with an economical resistor with high quality performance, Token Electronics offers industry grade power wire wound devices.

Token provide terminal blocks, thermal switches, fusing, fans, junction boxes, screened or solid bottom plates, conduit knockouts, and customer specified requirements. For large applications a welded frame construction is utilized to provide a robust design for power resistor mounting in both indoor and outdoor environments.

Products range from large capacity metal clad, nonflammable fixed and adjustable, wave ribbon wire-wound, slide, starter, box type, to nonflammable flat type. Token extends a complete line for both military and commercial applications.

Utilization Notes

1. Smoke emitted from non-flammable resistors on initial use in powered circuits is a normal phenomenon and the component can be safely utilized.
2. All resistors manufactured by Token Electronics Industry Corporation comply with the U.S. UL-94 non- flammability test, Class V-0, a continuous combustion period of zero seconds.
3. Never use organic solvents to clean non-flammable resistors.
4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
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Oval Edge-Wound High Power Resistor (DOE)

Product Introduction

High current oval edge wire wound resistor (DOE) is the best choice when conditions demand top-notch performance.

Features :

- Power rating from 525W to 1750W
- Resistance nominal tolerance ±10%(K)
- Resistance value range 0.0426Ω to 6.13Ω,
- suitable for high current applications

Applications :

- Power Industrial Machinery Resistors.
- Dynamic Braking Resistors, Load Banks, Motor Starting Resistor.
- Plugging Resistor, Power Load Measurements, Electric Distribution Resistors.
- Instrumentation, Automation Control Installations.

Token DOE Series are commonly used as a dynamic braking resistor on Transit applications. Built to perform in rugged environments, they feature corrosion resistant stainless steel insulator supports, solid nickel terminals, and special electroless nickel-plated solid copper terminal supports.

The resistance element is made of a stainless steel resistance alloy. Terminals are welded or silver brazed to the oval, spiral edge-wound resistance element. Toothed ceramic insulators isolate the resistance element from the center support. Ceramic end bushings insulate the center support from the mountings.

Order individual replacement units or entire grids with various mounting configurations. Contact us with your specific needs, or you can link to Token official website "High Power Resistors" to get more information.

Options:

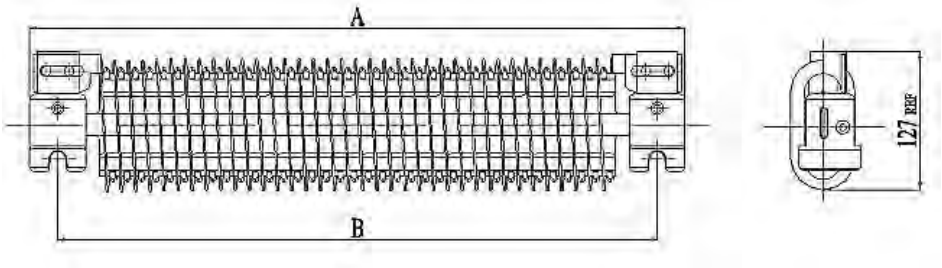
- Terminal blocks, thermal switches, conduit knockouts, fusing, fans, and other customer specified requirements are available on request.

Dimensions

Oval Edge-Wound Dimensions (DOE 525W - 1750W)

Power Rating	A			B		
	mm	inch		mm	inch	
525W	295.3	11.375	$11\frac{5}{8}$	244.5	9.625	$9\frac{5}{8}$
850W	385.7	15.1875	$15\frac{3}{16}$	334.9	13.1875	$13\frac{3}{16}$
1200W	469.9	18.5	$18\frac{1}{2}$	419.1	16.5	$16\frac{1}{2}$
1450W	555.6	21.875	$21\frac{7}{8}$	504.8	19.875	$19\frac{7}{8}$
1750W	638.2	25.125	$25\frac{1}{8}$	587.4	23.125	$23\frac{1}{8}$

High Current Oval Edge-Wound (DOE)



High Current Oval Edge-Wound (DOE) Dimensions

Electrical Characteristics

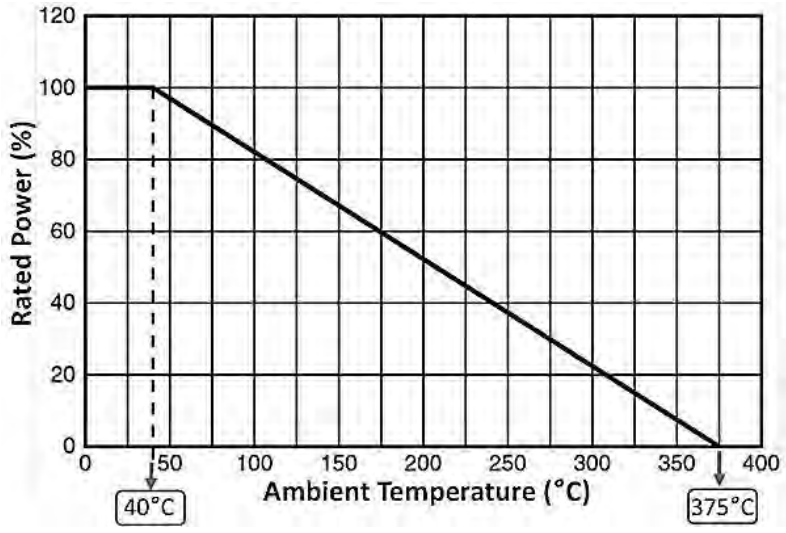
Electrical Characteristics (DOE)

Test Item	Specification	Test Methods
Ambient Temperatures	Ambient Temperature: -55℃ ~350℃. Derated current rating: 95% for 50℃ ambient, 90% for 75℃ ambient, 85% for 100℃ ambient, 10% for 350℃ ambient.	Standard ratings are based on maximum ambient temperatures of 40℃.
Continuous current ratings and temperatures Rise	375℃ Max.	The rating of continuous current is based on a 375℃ temperature rise at ambient temperatures of 40℃.
Resistance tolerance	Resistance Nominal Tolerance ±10 %(K) for all units; as low as ±3% if required.	JIS-C-5202 5-1
Thermal Shock	Δ≤±(2%R+0.1Ω)	JIS-C-5202 7.3, Room temp 30 minutes, -55℃ 15 minutes.
Terminal strength	Δ≤±(2%R+0.1Ω)	JIS-C-5202 6.1, 45N, 30S
Short-term Overload	Δ≤±(2%R+0.1Ω)	JIS-C-5202 5.5, 10PR, 5S.

- **Resistance and resistance tolerance were tested in-house at room temperature (25℃) with micro resistance meter.**
- **Ambient Temperature: refers to the temperature inside the subject and around the specimen, not to the air-temperature outside the subject.**

Derating Curve

Oval Edge-Wound Derating Curve (DOE)



High Current Oval Edge-Wound (DOE) Derating Curve

Nominal Current

Nominal Current & Resistance Oval Edge-Wound Resistor (DOE)

525W		850W		1200W		1450W		1750W	
Amps	Ohms	Amps	Ohms	Amps	Ohms	Amps	Ohms	Amps	Ohms
-	-	-	-	146	0.055	-	-	146	0.082
-	-	-	-	135	0.0677	-	-	-	-
-	-	-	-	124	0.080	-	-	-	-
-	-	-	-	116	0.0915	-	-	116	0.142
113	0.0426	113	0.071	113	0.092	113	0.121	113	0.142
103	0.0497	103	0.0781	103	0.107	103	0.140	103	0.163
-	-	100	0.080	100	0.122	-	-	100	0.185
94	0.0581	94	0.0913	94	0.125	94	0.158	94	0.191
86	0.0747	86	0.116	86	0.158	86	0.199	86	0.241
85	0.0671	85	0.116	85	0.159	85	0.201	85	0.244
80	0.0864	80	0.134	80	0.182	80	0.230	80	0.278
79	0.0781	79	0.135	79	0.185	79	0.234	79	0.284
74	0.0984	74	0.156	74	0.213	74	0.279	74	0.336
70	0.110	70	0.171	70	0.232	70	0.293	70	0.354
69	0.115	69	0.182	69	0.249	69	0.326	69	0.394
65	0.128	65	0.199	65	0.270	65	0.341	65	0.412
62	0.146	62	0.220	62	0.305	62	0.390	62	0.463
61	0.148	61	0.230	61	0.312	61	0.394	61	0.476
56	0.170	56	0.270	56	0.369	56	0.483	56	0.568
-	-	54	0.269	54	0.378	-	-	54	0.573
51	0.213	51	0.327	51	0.440	51	0.554	51	0.667
47	0.249	47	0.382	47	0.514	47	0.647	47	0.780
43	0.299	43	0.465	43	0.631	43	0.796	43	0.963
39	0.364	39	0.566	39	0.768	39	0.970	39	1.170
35	0.465	35	0.707	35	0.909	35	1.190	35	1.390
32	0.544	32	0.846	32	1.148	32	1.450	32	1.750
30	0.695	30	1.057	30	1.360	30	1.780	30	2.080
26	0.860	26	1.310	26	1.680	26	2.210	26	2.580
25	1.060	25	1.620	25	2.080	25	2.730	25	3.190
22	1.200	22	1.830	22	2.450	22	3.070	22	3.700
18	2.040	18	3.110	18	3.990	18	5.240	18	6.130

- Call or e-mail for information on mounting, grid configurations, unusual service conditions, or special requests.
- The rating of continuous current (Amps) is based on a 375℃ temperature rise.
- Power: varies. •Tolerance: ± 10 %.

Order Codes

Order Codes (DOE)

DOE	1750W	1R2		K		F
Part Number	Rated Power (W)	Resistance Value		Resistance Tolerance (%)		Lead Free
DOE	525W~1750W	1R2	1.2Ω	K	±10%	
		R23	0.23Ω			

General Information

Benefits & Features

Providing design engineers with an economical resistor with high quality performance, Token Electronics offers industry grade power wire wound devices.

Token provide terminal blocks, thermal switches, fusing, fans, junction boxes, screened or solid bottom plates, conduit knockouts, and customer specified requirements. For large applications a welded frame construction is utilized to provide a robust design for power resistor mounting in both indoor and outdoor environments.

Products range from large capacity metal clad, nonflammable fixed and adjustable, wave ribbon wire-wound, slide, starter, box type, to nonflammable flat type. Token extends a complete line for both military and commercial applications.

Utilization Notes

1. Smoke emitted from non-flammable resistors on initial use in powered circuits is a normal phenomenon and the component can be safely utilized.
2. All resistors manufactured by Token Electronics Industry Corporation comply with the U.S. UL-94 non- flammability test, Class V-0, a continuous combustion period of zero seconds.
3. Never use organic solvents to clean non-flammable resistors.
4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
7. Do not exceed the recommended usable load. Resistors must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.
8. Minimum load. Resistors must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up.
9. Although the hardness exceeds that of a 3H pencil lead, do not nick the resistor coating with screw drivers or other pointed objects.
10. Avoid touching non-flammable resistors in operation; the surface temperature ranges from approximately 350℃ ~ 400℃ when utilized at the full rated value. Maintaining a surface temperature of 200℃ or less will extend resistor service life.
11. Keep temperature from rising by choosing a resistor with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the resistor rating should be more than four times higher than the actual wattage involved, but never use a resistor at less than 25% of its rated power.
12. Application and Placement: Wire-wound resistors use different gauges of wire as resistance elements. Sometimes the gauge is extremely thin (finer than a strand of human hair) and very susceptible to breakage in environments containing salts, ash, dust and corrosives. Avoid utilization in such environments. Do not install in dusty areas because the accumulation will cause shorts and poor conductance.

Tubular Round Edge Wound Power Resistor (DST)

Product Introduction

Tubular edge-wound power resistor starter (DST) is suitable for application loads involving brief current surges.

(DST) Starter Construction:

- A tubular ceramic insulator has a fixed number of windings and is wound with heavy alloy wire as a resistance element. The staggering wound is made according to the desired resistance value, followed by the placement of the component mounts.
- Metal parts are heavily plated to prevent oxidation at high operating temperatures and to prevent corrosion. DST's high power rating (500W~1000W) and low resistance value (0.5Ω-7Ω) provide applications high starter power and capacity.
- This power wirewound resistor is high temperature-resistant, dissipates heat well, has a low temperature coefficient that varies in direct proportion, and is suitable for application loads involving brief current surges.

Applications:

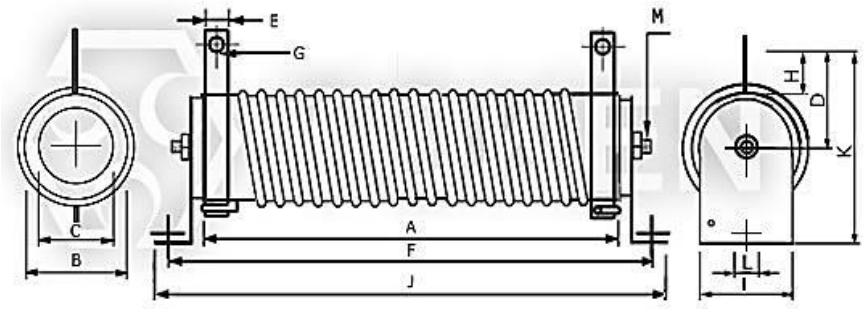
- Typical applications as motor starters, load measurements, industrial machinery resistor, electric distribution resistors, dynamic braking resistors, load dumping resistor, current limiting resistors, instrumentation, and automation control installations.
- Due to the set number of windings on the ceramic form, the resistance value range is relatively low. Tolerance is ±10% and this product is available in various shapes or in resistance boxes.

The (DST) Series is RoHS compliant and lead free. For non-standard technical requirements and special applications, please contact us. For more dynamic braking resistors, please link to Token official website "High Power Resistors" to get more information.

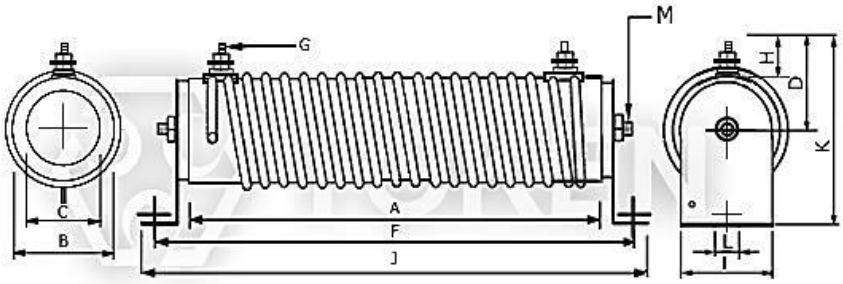
Dimensions

Power Starter Dimensions (DST)

Wattage Rating	Dimensions (Unit: mm)													Resistance Range(Ω)
	A	B	C	D	E	F	G	H	I	J	K	L	Weight	
500W	280	40	23	45	15	326	6	22	34	346	85	8	970/g	3.5Ω-7Ω
600W	300	44	26	50	15	342	8	32	34	362	90	8	1277/g	0.5Ω-3Ω
1000W	420	48	30	56	15	470	8	32	40	490	105	9	1887/g	0.8Ω-3Ω



Power Starter (DST 500W) Dimensions



Power Starter (DST 600W ~ 1000W) Dimensions

- **Notice: All dimensions might be changed or modified, please refer to last updating specification.**

Order Codes

Order Codes (DST)

DST	1000W	0.5R	K	G
Part Number	Rated Power (W)	Resistance Value (Ω)	Resistance Tolerance (%)	Assembly Method
DST	500W~1000W	Indicates resistance value in units of ohms.	K ±10%	C Clip Mount. G Horizontal M nt. N No Mount. Z Vertical Mount.

General Information

Benefits & Features

Providing design engineers with an economical resistor with high quality performance, Token Electronics offers industry grade power wire wound devices.

Token provide terminal blocks, thermal switches, fusing, fans, junction boxes, screened or solid bottom plates, conduit knockouts, and customer specified requirements. For large applications a welded frame construction is utilized to provide a robust design for power resistor mounting in both indoor and outdoor environments.

Products range from large capacity metal clad, nonflammable fixed and adjustable, wave ribbon wire-wound, slide, starter, box type, to nonflammable flat type. Token extends a complete line for both military and commercial applications.

Utilization Notes

1. Smoke emitted from non-flammable resistors on initial use in powered circuits is a normal phenomenon and the component can be safely utilized.
2. All resistors manufactured by Token Electronics Industry Corporation comply with the U.S. UL-94 non- flammability test, Class V-0, a continuous combustion period of zero seconds.
3. Never use organic solvents to clean non-flammable resistors.
4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
7. Do not exceed the recommended usable load. Resistors must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.
8. Minimum load. Resistors must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up.
9. Although the hardness exceeds that of a 3H pencil lead, do not nick the resistor coating with screw drivers or other pointed objects.
10. Avoid touching non-flammable resistors in operation; the surface temperature ranges from approximately 350℃ ~ 400℃ when utilized at the full rated value. Maintaining a surface temperature of 200℃ or less will extend resistor service life.
11. Keep temperature from rising by choosing a resistor with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the resistor rating should be more than four times higher than the actual wattage involved, but never use a resistor at less than 25% of its rated power.
12. Application and Placement: Wire-wound resistors use different gauges of wire as resistance elements. Sometimes the gauge is extremely thin (finer than a strand of human hair) and very susceptible to breakage in environments containing salts, ash, dust and corrosives. Avoid utilization in such environments. Do not install in dusty areas because the accumulation will cause shorts and poor conductance.

Rheostat Power Variable Resistor (FVR)

Product Introduction

Rheostats, power variable resistors control the speed of a motor.

Token's (FVR) Series is a C-shaped ceramic rod and wound with copper or chromium-alloy wire as a resistance element. Except for the slide contact surface, the entire component is coated with a high-temperature, non-flammable resin. After cooling and drying, insulation is applied through a high-temperature process. Then, a centered rotating adjuster component is installed, which slides along the resistance element and varies the resistance to the desired value.

Adjustable wire wound resistors are often called potentiometers in books and catalogues. Variable (FVR) may be used as a power rheostat with two connections (the wiper and just one end of the track) or as a potentiometer with all three connections in use. The FVR Series is RoHS compliant and lead free. For non-standard technical requirements and custom special applications, please contact us. Or link to Token official website "High Power Resistors" to get more information.

Applications:

- Motor controller also use FVR Series as rheostats or potentiometer to control the speed of a motor by limiting the flow of current through them.
- They are used in many small appliances such as blenders, mixers, fans, and power tools.
- FVR Rheostats Series are also used as test instruments to provide an accurate resistance value.
- While FVR can be used to control electric ovens and cooktops, thermostats are preferred because they have additional parts which automatically adjust the current flow to maintain a constant temperature.

The scope of the application also includes educational modeling, load simulations, industrial machinery RPM adjustment, voltage and current adjustment, instruments, and automated control installations.

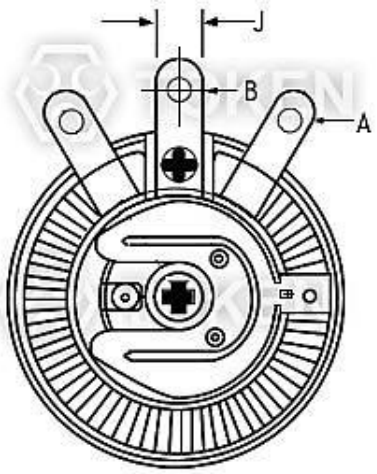
Features:

- Standard resistance tolerance is K (±10%). Closer tolerances are available upon request.
- 3 Wattage Rating styles to choose: 25W, 50W, and 100W.
- Wide Max. Resistance range: 5Ω ~ 5KΩ.

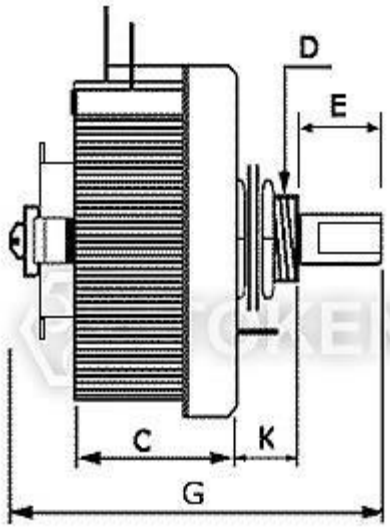
Dimensions

Dimensions (FVR 25W - 100W)

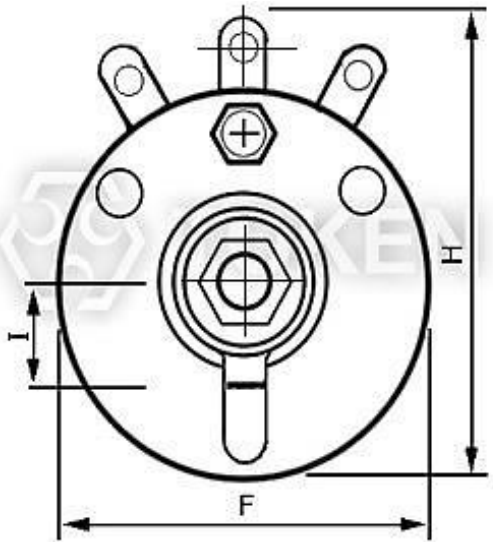
Wattage Rating	Dimensions(mm)												Max. Pickable Resistance Value (Ω)
	A	B	C	D	E	F	G	H	I	J	K	Weight	
25W	2.5	3.2	22	3/8"	6x12	42	50	50	11	5	10	74/g	5Ω-2.5KΩ
50W	4.2	4.2	28	3/8"	6x12	64	60	70	11	8	14	160/g	7Ω-3.5KΩ
100W	4.2	4.2	42	3/8"	6x12	85	75	90	11	8	14	372/g	10Ω-5KΩ



Top View (FVR) Dimensions



Side View (FVR) Dimensions



Bottom View (FVR) Dimensions

Application Notes

Application Notes (FVR)

Determination of End Resistance Value of FVR, DQS, DSRA, DSRB, BSR, BSQ:

- Resistance Range means you can choose one maximum resistance value (Max. Pickable Resistance / End resistance value) at one of FVR, DQS, DSRA, DSRB, BSR, BSQ VR (Variable Resistor) type.
- After End Resistance Value confirmed, the minimum resistance (start resistance value) will be determined by depending on resistance of wire and wirewound type.

Power Rating of Variable Resistor:

The part Number formation of FVR, DQS, DSRA, DSRB, BSR, and BSQ:

Product type	-	Rated Wattage	-	Max. Pickable Resistance (Ω)	-	Resistance Tolerance

Product type means one of FVR, DQS, DSRA, DSRB, BSR, BSQ.
Rated Wattage means power rating at End Resistance Value.
Resistance Value (Ω) means maximum resistance value (End Resistance Value).
Resistance Tolerance means precision range of End Resistance Value.

1. Power Rating of VR (Variable Resistor) is determined by the maximum resistance value (End Resistance Value).
2. Resistance and Power Rating should be decreased while you are adjusting the screw.

Notes:

- Adjustability is 10% to 90% of full resistance value.
- Wattage is proportional to this adjusted resistance value.

Power Rating:

- Based on 25℃ free air rating. The stated wattage rating applies only when the entire resistance is in the circuit.
- Setting the lug at an intermediate point reduces the wattage rating by approximately the same proportion.
- Example: If the lug is set at half resistance, the wattage is reduced by approximately one-half.

If you need current constant type or special specifications, please feel free to contact us.

Performance Specifications

Performance Specifications (FVR)

Test Item	Test Methods	Characteristics
Resistance tolerance	JIS-C-5261 5-1	Resistance tolerance ±10%
Insulation resistance	JIS-C-5261 6-1 500VDC	100MΩ min
Dielectric withstanding voltage	JIS-C-5261 7-1 1000VDC 1 minute Between terminal and axis	Free of appearance or structural irregularity
Terminal strength	JIS-C-5261 6-5 3kg 30 seconds	Free of appearance or structural irregularity ΔR/R≤ ±(2%+0.1Ω)
Vibration	JIS-C-5261 6-6 1.5m/m 10 ~ 50 ~ 10 Hz/min X-Y-Z 2 hours each	Free of appearance or structural irregularity ΔR/R≤ ±(2%+0.1Ω)
Load life	JIS-C-5261 7-7	Free of appearance or structural irregularity ΔR/R≤ ±(5%+0.1Ω)
Full gyration angle	JIS-C-5261 6-1	300± 5℃
Flame retardation	100% - 600% rated wattage load	US UL-94 flame retardation test V-0 grade noncombustible
Remarks	1. Resistance and resistance tolerance were tested in-house with micro resistance meter. 2. Coating refers to UL-certified data provided by supplier.	

Order Codes

Order Codes (FVR)

FVR	25W	2.5KR	K

Part Number	Rated Power (W)	Resistance Value (Ω)	Resistance Tolerance (%)	
FVR	25W	Indicates resistance value in units of ohms.	K	±10%
	50W			
	100W			

General Information

Benefits & Features

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Utilization Notes

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4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
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Power Precision Heat Sinkable Resistors (AH)

Product Introduction

Outstanding Heat sink Aluminum Housed Wire wound Power Resistors (AH)

Token Electronics aluminum chassis mount units are designed for maximum heat dissipation mounting solidly to metal chassis surface for maximum heat transfer. AH series are outstanding for their high power dissipation with precision tolerances in minimum physical sizes.

Lower hot spot ratings due to exclusive complete encapsulation of element within anodized aluminum body. AH series high-performance welded construction throughout assures long stable load life with threaded heavy stud axial-terminals.

The AH Series is RoHS compliant and lead free. For non-standard technical requirements and custom special applications, please contact us to discuss the details, or link to Token official website "High Power Resistors" to get more information.

Materials:

- Encapsulant: S: Silicone, C: Cement; End caps: Stainless steel.
- Core: Ceramic steatite or alumina.
- Housing: Aluminum with hard anodic coating.
- Element: Copper-nickel alloy, nickel-chrome alloy or manganese copper.
- AHS Standard Terminals: 5~150 W Tinned terminals, 200~500 W Threaded terminals.
- AHC Standard Terminals: 5~50 W Tinned terminals, 80~300 W Threaded terminals.

General Specification:

- Operating Temperature Range: -55℃ to +275℃.
- Resistance Tolerance: ±10%, ±5%, ±2%, ±1%, ±0.5%, ±0.25%, ±0.1%
- Wattage Range: 11 styles to choose ranging from 5 to 500 watts.

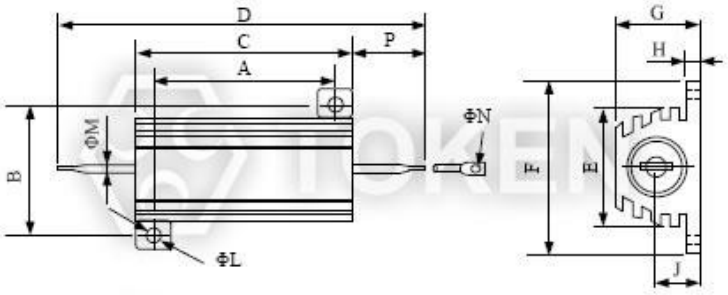
Non-Inductive & Features:

- Ayrton Perry type non-inductive winding is available. When required add "N" to the part number.
- Standard winding & non-inductive winding avaiable. High power rating, strong construction, small size, and ultra precision.
- Aluminum housing allows chassis mounting and provides heat sink capability.

AHS Dimensions

Heat Sinkable Dimensions (AHS-5, AHS-5N, AHS-10, AHS-10N, AHS-25, AHS-25N, AHS-50, AHS-50N)

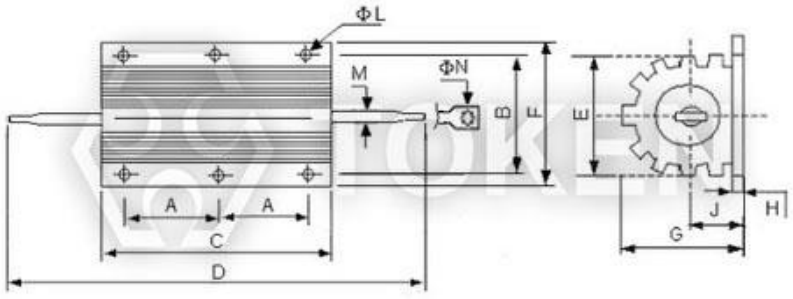
Type	A	B	C	D	E	F	G	H	J	Φ L	Φ M	Φ N	P
	± 1.0	± 1.0	± 1.0	± 2.0	± 1.0	± 1.0	± 1.0	± 0.8	± 1.0	± 0.8	± 0.8	± 0.8	Ref.
AHS-5 AHS-5N	11.4	12.5	15.5	31	8.5	16	8	1.5	4.4	2.2	1.2	1.3	8
AHS-10 AHS-10N	14	16	19.5	40.5	11.2	21	10	2	5	2.5	2	2.2	10.5
AHS-25/30 AHS-25/30N	18.3	20	27	48	14.3	27	13	2	7	3.5	2	2.2	10.5
AHS-50 AHS-50N	40	22	50	71	16.3	29	15.5	2	7.3	3.5	2	2.2	10.5



Heat Sinkable Dimensions (AHS)

Heat Sinkable Dimensions (AHS-75, AHS-75N, AHS-100, AHS-100N, AHS-150, AHS-150N)

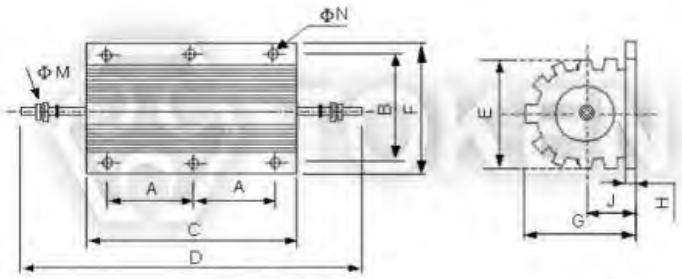
Type	A	B	C	D	E	F	G	H	J	Φ L	M	Φ N
	± 1.5	± 1.5	± 2.0	± 2.0	± 1.5	± 1.5	± 1.5	± 0.8	± 1.5	± 1.2	± 0.8	± 0.8
AHS-75 AHS-75N	23.5	37	65.5	90	27	48	26	3.5	12	4.5	3	2.7
AHS-100F AHS-100FN	35	37	98	119	27	48	26	3.5	11.5	4.5	2	2.7
AHS-150 AHS-150N	52	37	130	151	27	48	26	3.5	11.5	4.5	3	2.7



Heat Sinkable Dimensions Dimensions (AHS)

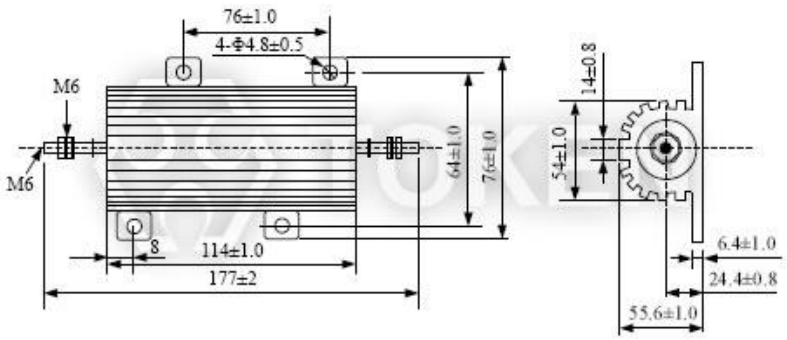
Heat Sinkable Dimensions (AHS-200, AHS-200N, AHS-250F, AHS-250FN, AHS-300, AHS-300N, AHS-500, AHS-500N)

Type	A	B	C	D	E	F	G	H	J	Φ M	Φ N
	± 2.5	± 2.5	± 3.5	± 2.5	± 2.5	± 3.5	± 2.5	± 1.5	± 2.0	± 1.5	± 1.5
AHS-200 AHS-200N	35	58	92	151	46.5	72	45	5	20	M5	5.5
AHS-250F AHS-250FN	45	60	112	165	46.5	73	45	5	21	M6	5.5
AHS-300 AHS-300N	51	58	130	170	46.5	73	45	5	21	M6	5.5
AHS-500 AHS-500N	87	58	204	244	46.5	73	45	5	21	M6	5.5



Heat Sinkable Dimensions (AHS)

Heat Sinkable Dimensions (AHS-250, AHS-250N)

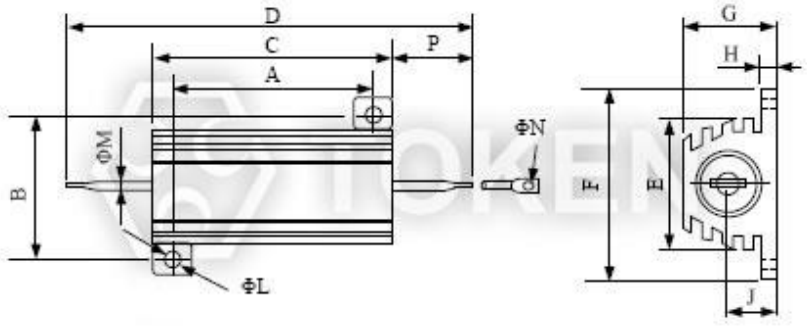


Heat Sinkable Dimensions (AHS)

AHC Dimensions

Heat Sinkable Dimensions (AHC-5, AHC-5N, AHC-10, AHC-10N, AHC-25, AHC-25N, AHC-50, AHC-50N)

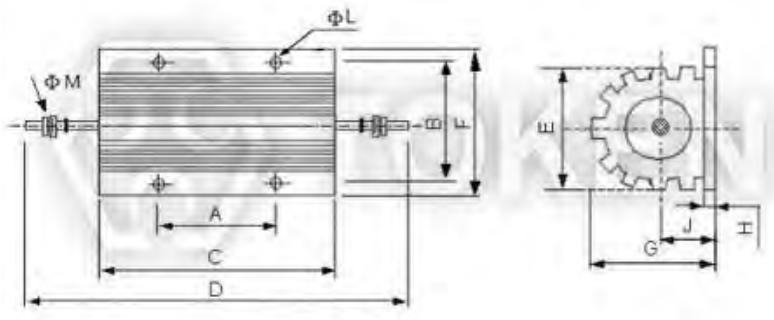
Type	A	B	C	D	E	F	G	H	J	Φ L	Φ M	Φ N	P
	± 1.0	± 1.0	± 1.0	± 2.0	± 1.0	± 1.0	± 1.0	± 0.8	± 1.0	± 0.8	± 0.8	± 0.8	Ref.
AHC-5 AHC-5N	10	12.5	15	25	8.5	16.5	8	1.5	4	2	1.2	1.3	5
AHC-10 AHC-10N	14	15.5	19	32	10.5	20	10	2	5	2	2	2.2	6
AHC-25 AHC-25N	18	19	27	47	15	27	15.5	2	7	3.2	2	2.2	10
AHC-50 AHC-50N	39	21	50	70	15	29	15.5	2	7	3.2	2	2.2	10



Heat Sinkable Dimensions (AHC)

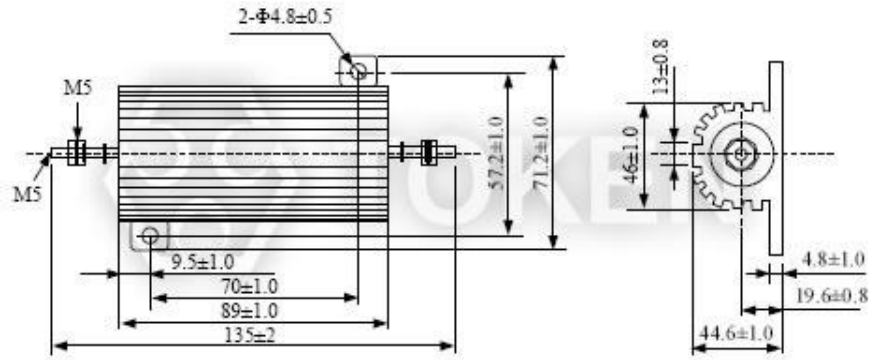
Heat Sinkable Dimensions (AHC-80, AHC-80N, AHC-100S, AHC-100SN)

Type	A	B	C	D	E	F	G	H	J	Φ L	Φ M
	± 1.5	± 1.5	± 2.0	± 2.0	± 1.5	± 1.5	± 1.5	± 0.8	± 1.5	± 1.2	± 1.5
AHC-80 AHC-80N	35	37	66	102	28	47	25	3.5	12	4.5	M5
AHC-100S AHC-100SN	35	37	66	102	28	47	25	3.5	12	4.5	M5



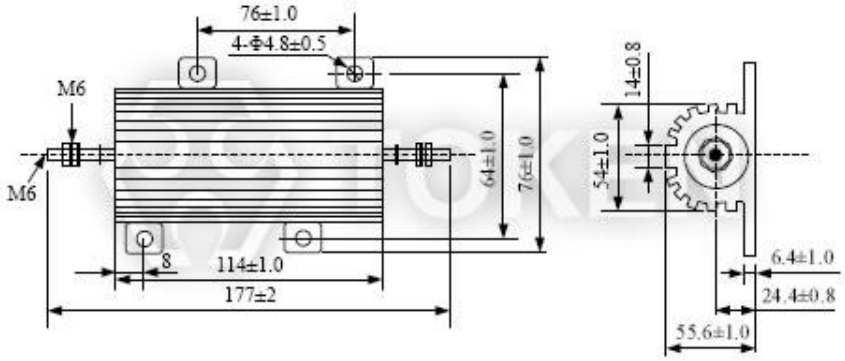
Heat Sinkable Dimensions (AHC)

Heat Sinkable Dimensions (AHC-100, AHC-100N)



Heat Sinkable Dimensions (AHC)

Heat Sinkable Dimensions (AHC-250, AHC-250N, AHC-300, AHC-300N)



Heat Sinkable Dimensions (AHC)

AHS Electrical Spec.

Standard Electrical Specification (AHS)

Type	MIL Style	Wattage Rating (W)	Resistance Range (Ω)		Resistance Tolerance (%)		Max. Working (V)		Max. Weight (g)t	Proper heat sink (Aluminum chassis)	
			AHS Inductive	AHSN Non-inductive	AHS	AHSN	AHS	AHSN		Area (cm2)	Thickness (mm)
AHS-5	RE60	5	0.01R~3K	0.01R~750R	B (±0.1%) C (±0.25%) D (±0.5%) F (±1%) G (±2%) J (±5%) K (±10%)	F (±1%) G (±2%) J (±5%) K (±10%)	$\sqrt{(P*R)}$		3	415	1
AHS-10	RE65	10	0.01R~5K	0.01R~1K25					6	415	
AHS-25	RE70	25	0.01R~10K	0.01R~2K					11	535	
AHS-30		30	0.01R~10K	0.01R~2K					18	535	
AHS-50	RE75	50	0.01R~10K	0.01R~2K					30	995	
AHS-75		75	0.01R~20K	0.5R~5K					90	995	3
AHS-100	RE77	100	1R~30K	1R~7K					265	2780	
AHS-150		150	1R~40K	1R~10K					265	995	
AHS-200		200	1R~50K	1R~12K					420	3750	
AHS-250	RE80	250	1R~50K	1R~12K					510	4900	
AHS-250F	RE80	250	1R~50K	1R~12K					480	4765	
AHS-300		300	1R~50K	1R~12K					580	5780	
AHS-500		500	1R~50K	1R~12K					970	8500	

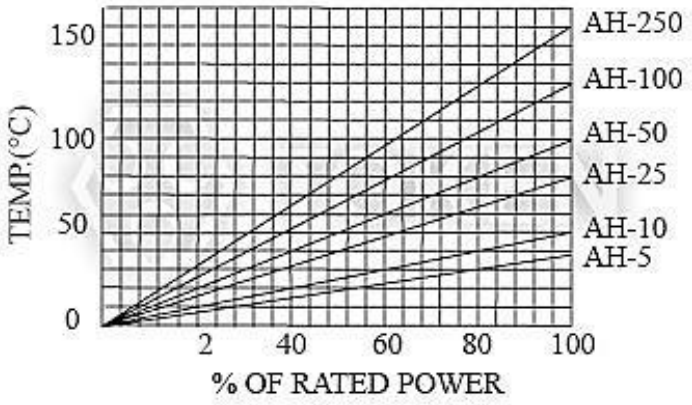
AHC Electrical Spec.

Standard Electrical Specification (AHC)

Type	MIL Style	Wattage Rating (W)	Resistance Range (Ω)		Resistance Tolerance (%)		Max. Working (V)		Max. Weight (g)t	Proper heat sink (Aluminum chassis)	
			AHC Inductive	AHCN Non-inductive	AHC	AHCN	AHC	AHCN		Area (cm2)	Thickness (mm)
AHC-5	RE60	5	0.1R~3K	0.1R~750R	B (±0.1%) C (±0.25%) D (±0.5%) F (±1%) G (±2%) J (±5%) K (±10%)	F (±1%) G (±2%) J (±5%) K (±10%)	$\sqrt{(P*R)}$		6	415	1
AHC-10	RE65	10	0.1R~5K	0.1R~1K25					11	415	
AHC-25	RE70	25	0.1R~10K	0.1R~2K					20	535	
AHC-50	RE75	50	0.1R~10K	0.1R~2K					30	995	
AHC-80		75	0.1R~20K	0.5R~5K					90	995	
AHC-100S		100	1R~30K	1R~7K					160	2780	3
AHC-100	RE77	100	1R~3K	1R~3K					100	995	
AHC-250	RE80	250	1R~3K	1R~3K					480	4900	
AHC-300		300	1R~3K	1R~3K					580	5780	

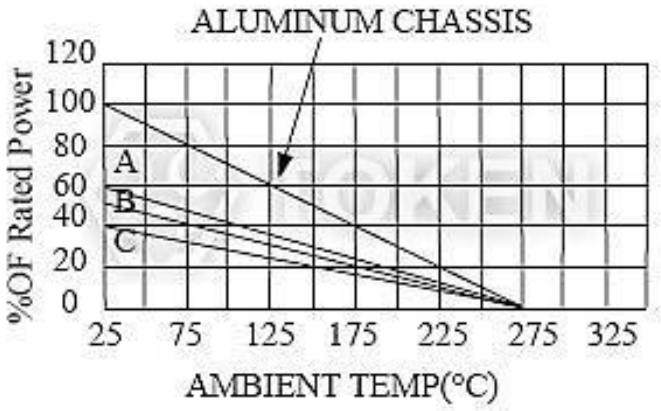
Heat-Sink & Derating Curve

Surface Temperature Versus Power Load (Mounted on heat-sink chassis) (AH)



(AH) Surface Temperature Versus Power Load

Ambient Temperature Derating (AH)

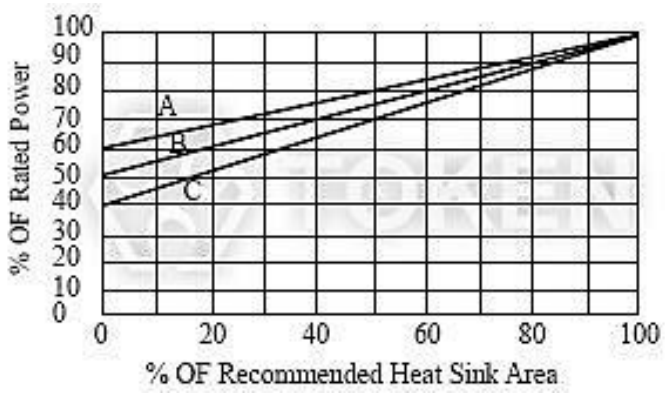


(AH) Ambient Temperature Derating

Derating is required for ambient temperatures above 25℃, see the graph.
Curve Aluminum Chassis applies to all types when mounted to specified heat sink.
Curves A, B, C applies to operation of unmounted resistors.

- Curves A: AH 5 and 10 watt unites, unmounted.
- Curves B: AH 25 watt units, unmounted.
- Curves C: AH 50, 100 and 250 watt units, unmounted.

Reduced Heat Sink Derating (AH)



(AH) Reduced Heat Sink Derating

Derating is also required when recommended heat sink area is reduced.

- Curves A: AH-5 and AH-10 size resistor.
- Curves B: AH-25 size resistor.
- Curves C: AH-50, AH-100 and AH-250 size resistor.

Test Conditions

Test Conditions (AH)

Parameters	Test Conditions	Specifications
T.C.R.	Room temperature /100°C up.	±25, 50, 100, 250ppm/°C
Short Time Over Load	5 × wattage rating-5sec.	Δ R±(2%+0.05Ω)Max.
Vibration	10~50~10Hz/Min -X- Y- Z Axis 2 Hours each.	Δ R±(0.2%+0.05Ω)Max.
Load Life	Load Rating (chassis mounted) (1.5 Hour on 0.5 Hour OFF) Repeat 1000 Hours	Δ R±(5%+0.05Ω)Max.
Terminal Strength	(1) Pull Test (30 sec Min) AH-5: 1kg, AH-10: 2.3kg, AH-25, AH-50: 4.5kg (2) Torque Test (5~15sec) AH-100: 27kg-cm, AH-250: 36kg-cm	Δ R±(0.2%+0.05Ω)Max.
Dielectric Strength	AHS-5 AHS-10 AHS-25 1000V AHS-30, AHS-50, AHS-75, AHS-100 2000V AHS-150, AHS-200, AHS-250, AHS-300, AHS-500 2500V	Δ R±(0.5%+0.05Ω)Max.
	AHC-5 AHC-10 AHC-25 800V AHC-50, AHC-80, AHC-100 1000V AHC-250, AHC-300 2500V	
Insulation Resistance	Under the same test condition of Dielectric Strength, Load DC500V and measure the Insulation R.	AHS: 1000 MΩ Min. AHC: 100 MΩ Min.
Moisture Resistance	Temp 40°C moisture 95% DC 100V 100 Hrs.	Δ R±(5%+0.05Ω)Max.
Moisture Load Life	Temp 40°C moisture 90% 1/10 X wattage rating (1.5hrs on-0.5hrs off)-Repeat 200 Hrs.	Δ R±(5%+0.05Ω)Max.
Resistance to Soldering Heat	350°C ± 10°C for 3±0.5 Seconds	Δ R±(1%+0.05Ω)Max.

Order Codes

Order Codes (AH)

AH	S	10		20Ω		D	
Part Number	Encapsulant	Rated Power (W)		Resistance Value (Ω)		Resistance Tolerance (%)	
	S: Silicone	10	10W	R51	0.51Ω	B	±0.10%
	C: Cement	10N	10W	5R1	5.1Ω	C	±0.25%
		250	250W	51R	51Ω	D	±0.5%
		250N	250W	510R	510Ω	F	±1%
		N	Non-Inductive	5K1	5.1KΩ	G	±2%
						J	±5%
						K	±10%

General Information

Benefits & Features

Providing design engineers with an economical resistor with high quality performance, Token Electronics offers industry grade power wire wound devices.

Token provide terminal blocks, thermal switches, fusing, fans, junction boxes, screened or solid bottom plates, conduit knockouts, and customer specified requirements. For large applications a welded frame construction is utilized to provide a robust design for power resistor mounting in both indoor and outdoor environments.

Products range from large capacity metal clad, nonflammable fixed and adjustable, wave ribbon wire-wound, slide, starter, box type, to nonflammable flat type. Token extends a complete line for both military and commercial applications.

Utilization Notes

1. Smoke emitted from non-flammable resistors on initial use in powered circuits is a normal phenomenon and the component can be safely utilized.
2. All resistors manufactured by Token Electronics Industry Corporation comply with the U.S. UL-94 non- flammability test, Class V-0, a continuous combustion period of zero seconds.
3. Never use organic solvents to clean non-flammable resistors.
4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
7. Do not exceed the recommended usable load. Resistors must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.
8. Minimum load. Resistors must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up.
9. Although the hardness exceeds that of a 3H pencil lead, do not nick the resistor coating with screw drivers or other pointed objects.
10. Avoid touching non-flammable resistors in operation; the surface temperature ranges from approximately 350℃ ~ 400℃ when utilized at the full rated value. Maintaining a surface temperature of 200℃ or less will extend resistor service life.
11. Keep temperature from rising by choosing a resistor with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the resistor rating should be more than four times higher than the actual wattage involved, but never use a resistor at less than 25% of its rated power.
12. Application and Placement: Wire-wound resistors use different gauges of wire as resistance elements. Sometimes the gauge is extremely thin (finer than a strand of human hair) and very susceptible to breakage in environments containing salts, ash, dust and corrosives. Avoid utilization in such environments. Do not install in dusty areas because the accumulation will cause shorts and poor conductance.

Aluminum Encased Heat Sinkable Resistor (AHL)

Product Introduction

Power Wire wound Aluminum Encased Heat Sinkable Resistors.

Features :

- High stability, strong construction.
- Standard winding & non-inductive winding types.
- High power rating, small size and ultra precision.
- Aluminum housing allows chassis mounting and provides heatsink capability.

General Specification :

- Resistance Tolerance: ±10%, ±5%.
- Operating Temperature Range: -55℃ to +275℃.
- Wattage Range: 4 styles to choose ranging from 25 to 150 watts.
- Dielectric Strength: AHL-25 1000V, AHL-50 1500V, AHL-150 2500V.

(AHL) Reach unreachable points and simplify your PCB design. Token Electronics extended lead wire aluminum housed wire wound Power resistor (AHL) provides design engineers a flexible connection in distance between connections.

(AHL) is a high-performance axial-terminal type resistor with flexible connections. These molded-construction aluminum-chassis resistors are available in higher power ratings than standard axial-terminal resistors and are better suited to withstanding vibration, shock and harsh environmental conditions.

(AHL) resistors are aluminum encased to maintain high stability during operation and to permit secure mounting to chassis surfaces. The metal housing also provides heat sinkable capabilities, allowing the units to exceed the power ratings.

The (AHL) Series is RoHS compliant and lead free. For non-standard technical requirements and custom special applications, please contact us for details with your specific needs. Or link to Token official website "High Power Resistors" to get more information.

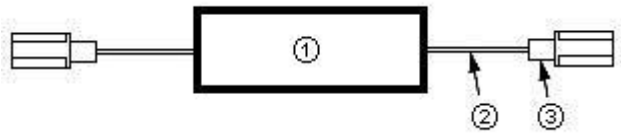
Non-Inductive:

Ayrton Perry type non-inductive winding is available. When required add "N" to the part number.

Materials

Materials Extended Lead Wire (AHL)

①	Encapsulant	Silicone			
	End caps	Stainless steel			
	Core	Ceramic steatite or aluminum			
	Housing	Aluminum with hard anodic coating			
	Element	Copper-nickel alloy, nickel-chrome alloy or manganese copper			
②	Wire (14AWG)	AHL-25, AHL-25N	AHL-50, AHL-50N	AHL-150, AHL-150N	AHL-150A, AHL-150AN
		Length=160mm	Length=340mm	Length=500mm	Length=300mm
③	Terminals	LVA2-250, Cu (Nickel-plate), W7.5 × L10mm			

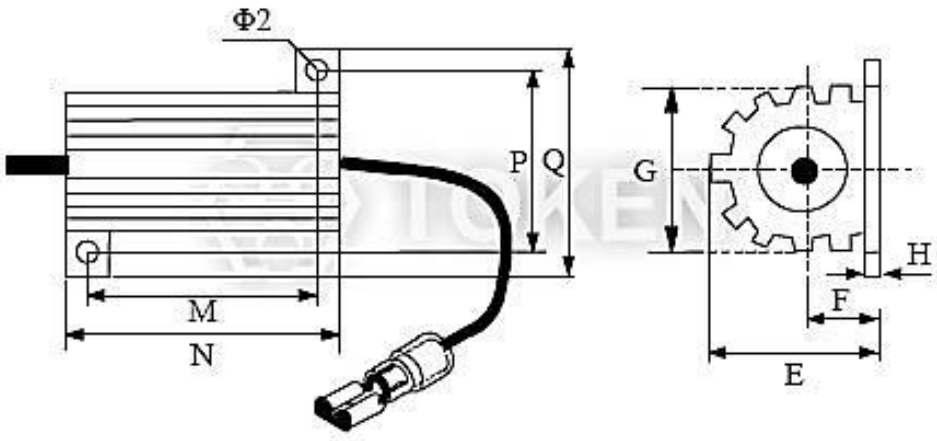


- Note: All values might be changed or modified, please consult factory for details.

Dimensions

Dimensions Extended Lead Wire (AHL-25, AHL-50)

Type	Dimensions (Unit: mm)							
	E	F	G	H	M	N	P	Q
AHL-25, AHL-25N	13	7	14.3	2	18.3	27	20	27
AHL-50, AHL-50N	15.5	7.3	16	2	40	50	22	29

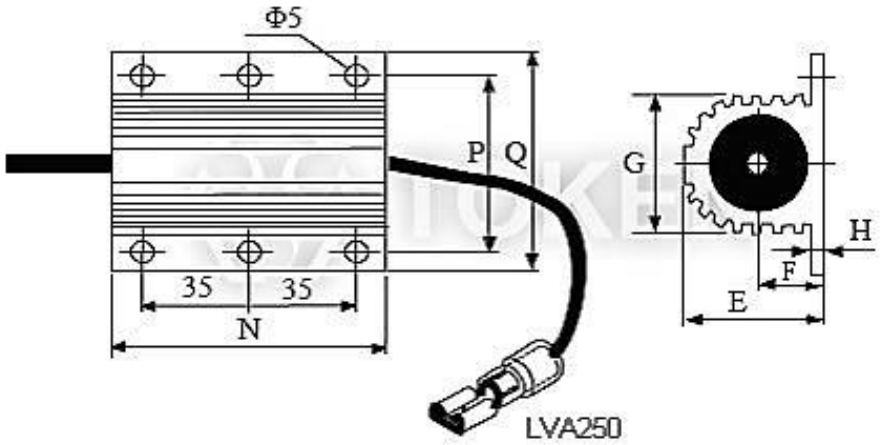


Extended Lead Wire (AHL-25, AHL-50) Dimensions

- Note: All values might be changed or modified, please consult factory for details.

Dimensions Extended Lead Wire (AHL-150, AHL-150A)

Type	Dimensions (Unit: mm)						
	E	F	G	H	N	P	Q
AHL-150, AHL-150N	45	9.6	46	5	92	57	72
AHL-150A, AHL-150AN	26	11.5	27	3.5	97	37	48

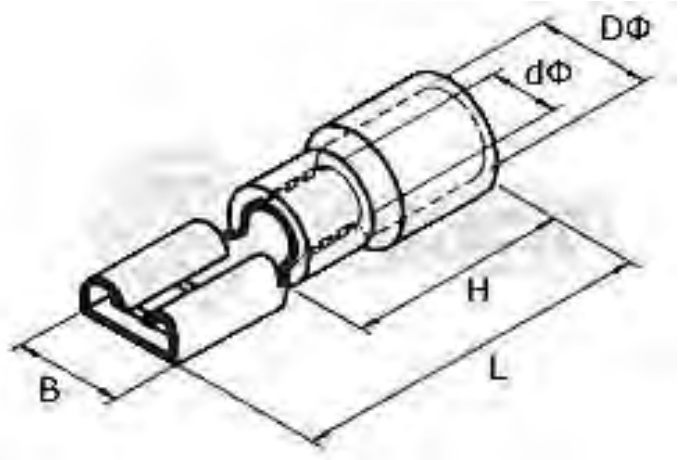


Extended Lead Wire (AHL-150, AHL-150A) Dimensions

- Note: All values might be changed or modified, please consult factory for details.

Dimensions - LVA250 Terminals (AHL)

Suitable for 14~16AWG		Imax=15A		Unit: mm		Tol.: ±0.2mm	
ITEM	NEMA-TAB	Thickness	B (Ref.)	dΦ	DΦ	L	H
LVA 2-250	0.8 × 6.35	0.4	7.4	2.3	4.3	21.0	10.0



LVA250 Terminals Dimensions

- Note: All values might be changed or modified, please consult factory for details.

Electrical Specification

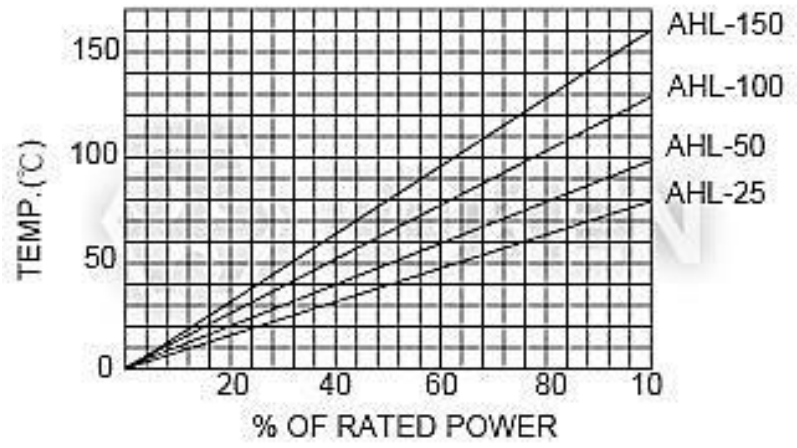
Electrical Specification Extended Lead Wire (AHL)

Type	Wattage Rating (W)	Resistance Range (Ω)		Max. Working (V)		Proper heat sink (Aluminum chassis)
		Inductive	Non-inductive	Inductive	Non-inductive	
AHL-25	25	0.012~15K	-	500	-	1077 cm2 × 1.0 mm thick or equiv
AHL-25N	25	-	0.02~5.5K	-	300	1077 cm2 × 1.0 mm thick or equiv
AHL-50	50	0.01~40K	-	1300	-	1877 cm2 × 1.5 mm thick or equiv
AHL-50N	50	-	0.02~12K	-	600	1877 cm2 × 1.5 mm thick or equiv
AHL-150	150	0.4~50K	-	1900	-	1896 cm2 × 3.2 mm thick or equiv
AHL-150N	150	-	0.12~25K	-	1340	1896 cm2 × 3.2 mm thick or equiv
AHL-150A	150	0.4~50K	-	1900	-	1896 cm2 × 3.2 mm thick or equiv
AHL-150AN	150	-	0.12~25K	-	1340	1896 cm2 × 3.2 mm thick or equiv

- **Note: All values might be changed or modified, please consult factory for details.**

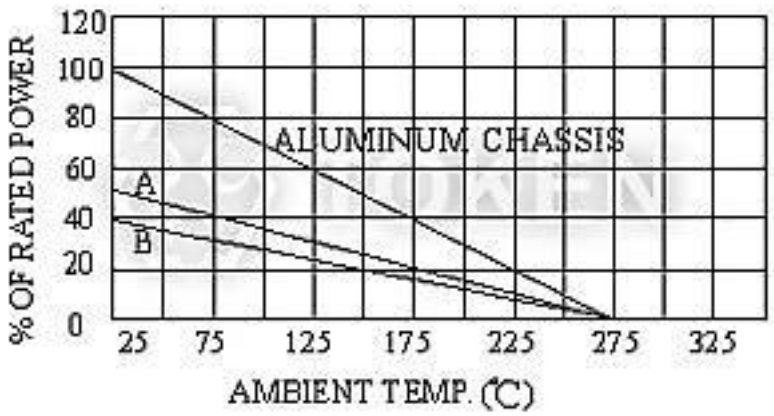
Heat-Sink & Derating Curve

Surface Temperature Versus Power Load Extended Lead Wire (AHL)



Surface Temperature Versus Power Load
(AHL on Chassis)

Ambient Temperature Derating (AHL)

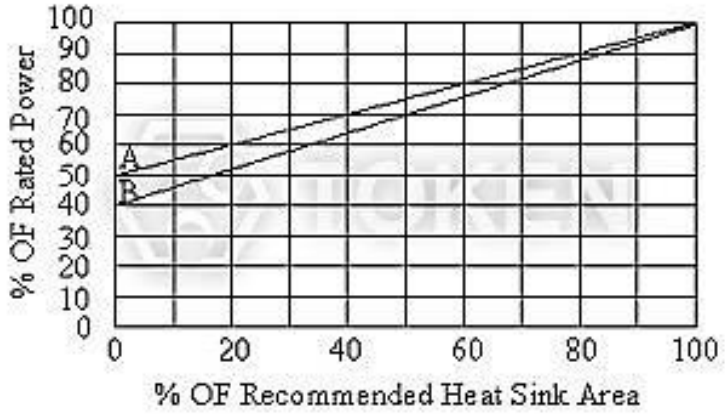


(AHL) Ambient Temperature Derating

Derating is required for ambient temperatures above 25℃, see the graph.
Curve Aluminum Chassis applies to all types when mounted to specified heat sink.
Curves A, B apply to operation of unmounted resistors.

- Curves A: AHL 25 watt units, unmounted.
- Curves B: AHL 50, 100 and 250 watt units, unmounted.

Reduced Heat Sink Derating (AHL)



(AHL) Reduced Heat Sink Derating

Derating is also required when recommended heat sink area is reduced.

- Curves A: AHL-25 size resistor.
- Curves B: AHL-50, AHL-100 and AHL-250 size resistor.

Test Conditions

Test Conditions (AHL)

Parameters	Test Conditions	Specifications
Vibration	10c/s~50c/s~10c/s (1Min) - 2Hours each of paralleled and right angle	Δ R± (1%+0.05Ω) Max.
Load Life	Load Rating (chassis mounted) (1.5Hour on 0.5Hour OFF) Repeat 1000Hours	Δ R± (5%+0.1Ω) Max.
Heat Resistance	260±5℃, 10±1Sec.	Δ R± (1%+0.05Ω) Max.
Terminal Strength	Pull Test (30 sec Min) 4.5kg	Δ R± (0.2%+0.05Ω) Max.
Dielectric Strength	AHL-25 1000V AHL-50 1500V AHL-100, AHL-150 2000V	Δ R± (0.5%+0.05Ω) Max.
Moisture Load Life	Temp 40℃ moisture 95% 1/10 × wattage rating (1.5Hr on-0.5Hr OFF) - Repeat 200Hr	Δ R± (1%+0.1Ω) Max.
Moisture Resistance	Temp 40℃ moisture 95% DC 100V 500Hr	Δ R± (1%+0.1Ω) Max.
Insulation Resistance	Under the same test condition of Dielectric Strength, Load DC500V and measure the Insulation R.	10MΩ Min.
Short Time Over Load	5 × wattage rating-5sec.	Δ R± (2%+0.1Ω) Max.

Order Codes

Order Codes Extended Lead Wire (AHL)

AHL-50	50W	L340	14AWG	510R		K	
Part Number	Rated Power (W)	Wire Length (min.)	Wire Type	Resistance Value (Ω)		Resistance Tolerance (%)	
AHL-25 / AHL-25N	25W	L160	14AWG	R51	0.51Ω	J	±5%
AHL-50 / AHL-50N	50W	L340		5R1	5.1Ω	K	±10%
AHL-150 / AHL-150N	150W	L500		51R	51Ω		
AHL-150A / AHL-150AN	150W	L300		510R	510Ω		
				5K1	5.1KΩ		
				47K	47KΩ		
				47K3	47.3KΩ		

General Information

Benefits & Features

Providing design engineers with an economical resistor with high quality performance, Token Electronics offers industry grade power wire wound devices.

Token provide terminal blocks, thermal switches, fusing, fans, junction boxes, screened or solid bottom plates, conduit knockouts, and customer specified requirements. For large applications a welded frame construction is utilized to provide a robust design for power resistor mounting in both indoor and outdoor environments.

Products range from large capacity metal clad, nonflammable fixed and adjustable, wave ribbon wire-wound, slide, starter, box type, to nonflammable flat type. Token extends a complete line for both military and commercial applications.

Utilization Notes

1. Smoke emitted from non-flammable resistors on initial use in powered circuits is a normal phenomenon and the component can be safely utilized.
2. All resistors manufactured by Token Electronics Industry Corporation comply with the U.S. UL-94 non- flammability test, Class V-0, a continuous combustion period of zero seconds.
3. Never use organic solvents to clean non-flammable resistors.
4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
7. Do not exceed the recommended usable load. Resistors must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.
8. Minimum load. Resistors must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up.
9. Although the hardness exceeds that of a 3H pencil lead, do not nick the resistor coating with screw drivers or other pointed objects.
10. Avoid touching non-flammable resistors in operation; the surface temperature ranges from approximately 350℃ ~ 400℃ when utilized at the full rated value. Maintaining a surface temperature of 200℃ or less will extend resistor service life.
11. Keep temperature from rising by choosing a resistor with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the resistor rating should be more than four times higher than the actual wattage involved, but never use a resistor at less than 25% of its rated power.
12. Application and Placement: Wire-wound resistors use different gauges of wire as resistance elements. Sometimes the gauge is extremely thin (finer than a strand of human hair) and very susceptible to breakage in environments containing salts, ash, dust and corrosives. Avoid utilization in such environments. Do not install in dusty areas because the accumulation will cause shorts and poor conductance.

Wave-Shape Power Resistor (DQ)

Product Introduction

Wave-Shape Ribbon-Wound Power Resistor Design Neutralizes Inductance Parasitoid

Features :

- Fixed, tapped styles, or adjustable type are available.
- Special terminals are available for unusual applications.
- Special tolerances, temperature coefficients, and resistance value can be specified.
- Ayrton Perry type non-inductive winding formats are available. See DQS Series when requied.
- Standard resistance tolerance is H(±3%), J(±5%) and K(±10%). Closer tolerances are available upon request.
- The wire is spot welded to the terminal bands and then "fastened" onto the core with a silicone, cement, or vitreous enamel coating.
- Standard lug terminals available with or without terminal hardware. Single and double quick connect terminals can be specified.
- DQ Series Design allows for efficient heat dissipation at higher temperature ranges so the resistor is half the physical size of an equivalent rated roundwire resistor.

Applications :

- The Power Ribwound DQ Series is suitable for educational modeling applications, load testing, industrial machinery resistor, electric power distribution resistors, instruments, automation control installations,etc.
- Typical applications for roundwire (DQ) series in motor/motion control include areas such as lift trucks, overhead cranes, elevator resistors, arc and spot welders, battery charger resistors, machine tools, conveyor resistors, and UPS systems.

A tubular ceramic has two terminals, and is wound with a resistance element consisting of a wave-shaped alloy ribbon.

Terminal bands are spot welded after installation on the core and then a resistance-alloy ribbon wire is crimped and edge wound onto the core.

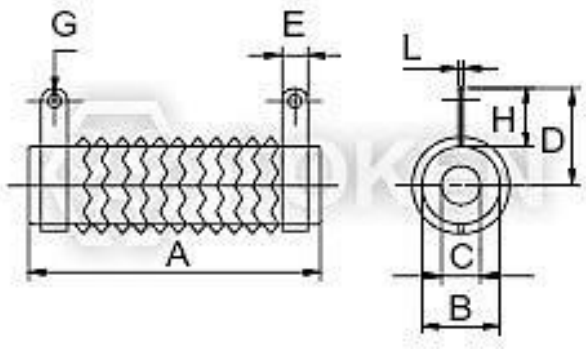
Non-flammable resin insulation is applied after cooling and drying through a temperature process and then the component mounts are attached.The resistance value range is relatively low due to alloy material limitations; see the DR series if upper resistance values required.

Power Wave-Shape Ribbon wound Resistor supports the use of numerous taps, has low impedance, and can be fabricated in various shapes to support a wide range of applications. The DQ Series is RoHS compliant and lead free. For custom specifications, or order individual replacement units, entire grids with various mounting configurations, please contact us to discuss the details. Or link to Token official website "High Power Resistors" to get more information.

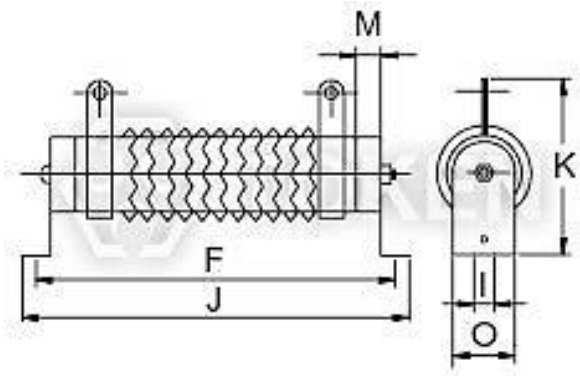
DQ-A Dimensions

Dimensions Rib-Wound (DQ-A 75W ~ 2000W)

Wattage Rating	Dimensions (Unit: mm)														Resistance Range
	A	B	C	D	E	F	G	H	I	J	K	L	M	O	
75W	110	25	16	30	8	150	5	18	6	166	58	1.2	6	27	1.5~8Ω
90W	90	28	18	32	8	130	5	19	6	146	60	1.2	6	27	1.5~9Ω
120W	110	28	18	32	8	150	5	19	6	166	60	1.2	6	27	2~12Ω
150W	140	28	18	32	8	180	5	19	6	196	60	1.2	6	27	2~15Ω
180W	160	28	18	32	8	200	5	19	6	216	60	1.2	6	27	3~18Ω
225W	195	28	18	32	8	235	5	19	6	251	60	1.2	6	27	3~23Ω
240W	185	35	24	36	10	225	5	19	8	245	76	1.6	6	34	5~24Ω
300W	210	35	24	36	10	250	5	19	8	274	76	1.6	6	34	5~30Ω
375W	210	40	25	38	12	250	5	20	8	274	78	1.6	6	34	6~38Ω
450W	260	40	25	38	12	300	5	20	8	320	78	1.6	6	34	6~45Ω
600W	330	40	25	38	12	370	5	20	8	395	78	1.6	6	34	7~60Ω
750W	330	50	35	50	12	380	6	25	9	400	100	1.6	8	40	8~75Ω
900W	400	50	35	50	12	450	6	25	9	470	100	1.6	8	40	8~90Ω
1000W	460	50	35	50	12	510	6	25	9	530	100	1.6	8	40	12~100Ω
1200W	460	60	40	55	15	515	6	30	10	535	110	1.6	10	50	12~120Ω
1500W	540	60	40	55	15	595	6	30	10	615	110	1.6	10	50	15~150Ω
2000W	650	65	42	62	15	702	6	30	10	722	115	1.6	10	50	15~200Ω



(DQ-A) N - No Mount

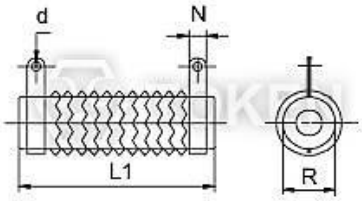


(DQ-A) G - Horizontal Mount

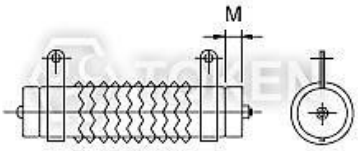
DQ-B Dimensions

Dimensions Rib-Wound (DQ-B 30W ~ 20000W)

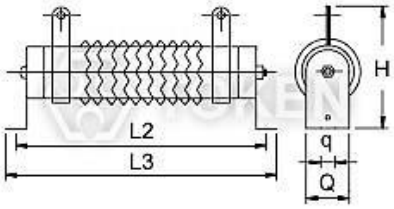
Wattage Rating	Dimensions (Unit: mm)										Resistance Range
	R	L1	L2	L3	H	N	d	M	q	Q	
30W	20	70	100	120	50	6	3.5	5	5	20	2~1KΩ
40W	20	87	115	137	50	6	3.5	5	5	20	2~1KΩ
50W	28	90	122	143	68	9	4.5	5.5	6	28	5~1KΩ
80W	28	90	122	143	68	9	4.5	5.5	6	28	5~2KΩ
100W	28	170	202	223	68	9	4.5	5.5	6	28	10~3KΩ
150W	28	215	247	268	68	9	4.5	5.5	6	28	10~3KΩ
200W	28	267	299	320	68	9	4.5	5.5	6	28	10~5KΩ
250W	28	267	299	320	68	9	4.5	5.5	6	28	10~5KΩ
300W	40	267	305	343	90	10	4.5	6	6	40	20~5KΩ
400W	40	330	367	406	90	10	4.5	6	6	40	20~5KΩ
500W	50	330	370	415	98	10	6	8.5	8	50	20~5KΩ
600W	50	330	370	415	98	10	6	8.5	8	50	20~5KΩ
700W	50	400	440	485	95	10	6	8.5	8	50	20~5KΩ
800W	70	300	331	362	135	15	8	-	8	70	40~500Ω
1000W	70	300	331	362	135	15	8	-	8	70	40~500Ω
1500W	70	415	446	477	135	15	8	-	8	70	40~500Ω
2000W	70	510	541	572	135	15	8	-	8	70	40~500Ω
2500W	70	600	631	662	135	15	8	-	8	70	40~500Ω
3000W	70	600	631	662	135	15	8	-	8	70	40~500Ω
4000W	100	430	468	521	155	15	8	-	8	100	40~500Ω
5000W	100	500	538	591	155	15	8	-	8	100.	40~500Ω
6000W	100	600	638	691	155	15	8	-	8	100.	40~500Ω
10000W	150	600	640	720	260	30	8	-	10	150	40~500Ω
12000W	150	660	700	780	260	30	8	-	10	150	40~500Ω
15000W	150	660	700	780	260	30	8	-	10	150	40~500Ω
20000W	150	1000	1040	1120	260	30	8	-	10	150	40~500Ω



(DQ-B) N - No Mount



(DQ-B) Z - Vertical Mount



(DQ-B) G - Horizontal Mount

Order Codes

Order Codes (DQ)

DQA	1500W	100R		K		G	
Part Number	Rated Power (W)	Resistance Value		Resistance Tolerance (%)		Assembly Method	
DQA	75W~2000W	0R1	0.1Ω	H	±3%	N	No mount.
DQB	30W~20000W	1R	1Ω	J	±5%	C	Clip mount.
DQAN	75W~2000W	10R	10Ω	K	±10%	G	Horizontal mount.
DQBN	30W~20000W	12R	12Ω			Z	Vertical mount.
		100R	100Ω				

General Information

Benefits & Features

Providing design engineers with an economical resistor with high quality performance, Token Electronics offers industry grade power wire wound devices.

Token provide terminal blocks, thermal switches, fusing, fans, junction boxes, screened or solid bottom plates, conduit knockouts, and customer specified requirements. For large applications a welded frame construction is utilized to provide a robust design for power resistor mounting in both indoor and outdoor environments.

Products range from large capacity metal clad, nonflammable fixed and adjustable, wave ribbon wire-wound, slide, starter, box type, to nonflammable flat type. Token extends a complete line for both military and commercial applications.

Utilization Notes

1. Smoke emitted from non-flammable resistors on initial use in powered circuits is a normal phenomenon and the component can be safely utilized.
2. All resistors manufactured by Token Electronics Industry Corporation comply with the U.S. UL-94 non- flammability test, Class V-0, a continuous combustion period of zero seconds.
3. Never use organic solvents to clean non-flammable resistors.
4. Non-flammable resistors cannot be utilized in oil.
5. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings. A suitable type of resistor must be selected. Contact us for details.
6. In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.
7. Do not exceed the recommended usable load. Resistors must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.
8. Minimum load. Resistors must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up.
9. Although the hardness exceeds that of a 3H pencil lead, do not nick the resistor coating with screw drivers or other pointed objects.
10. Avoid touching non-flammable resistors in operation; the surface temperature ranges from approximately 350℃ ~ 400℃ when utilized at the full rated value. Maintaining a surface temperature of 200℃ or less will extend resistor service life.
11. Keep temperature from rising by choosing a resistor with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the resistor rating should be more than four times higher than the actual wattage involved, but never use a resistor at less than 25% of its rated power.
12. Application and Placement: Wire-wound resistors use different gauges of wire as resistance elements. Sometimes the gauge is extremely thin (finer than a strand of human hair) and very susceptible to breakage in environments containing salts, ash, dust and corrosives. Avoid utilization in such environments. Do not install in dusty areas because the accumulation will cause shorts and poor conductance.

Wire Wound Flat Thin Resistors (ZR)

Product Introduction

When limited space is required, choose Token's "Thin" flat wire-wound stackable power resistors.

Token oval-shaped ceramic-core resistors feature a low profile to permit installation in spaces with height restrictions.

They are also equipped with integral mounting brackets so they can be fastened to a chassis and stacked in locations with limited surface area. When properly fastened, the mounting brackets add a heat sinking benefit resulting in a smaller size per watt. Durable ZR flat resistors are fully welded and coated with lead free non-flammable resin.

ZR resistors are suitable for educational modeling applications, load testing, industrial machinery, electric power distribution, instruments, automation control installations, etc.

The ZR Series is RoHS compliant and lead free. For non-standard technical requirements and custom special applications, please contact us, or link to Token official website "High Power Resistors" to get more information.

Non-Inductive:

- Ayrton Perry type non-inductive winding is available. When required add "N" to the part number.

Construction:

- (ZR) resistor is a flat tubular ceramic rod has two terminals and is wirewound with either copper wire or chromium alloy wire as a resistance element.
- Mainly utilized for industrial installations where height is limited. Features excellent windings, taps adding, low impedance, and PC board insertable.

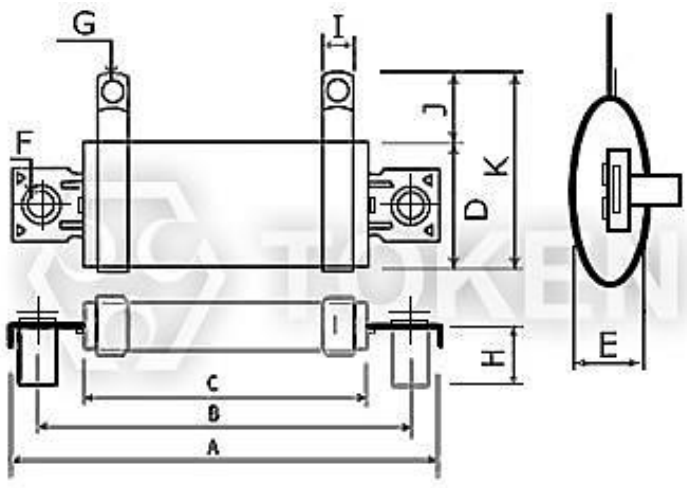
Notes:

- When resistors are stacked, use washers or spacers as required to insure clearance and improve power dissipation.

ZDR Dimensions

Dimensions Set-Type (ZDR 40W ~ 300W)

Wattage Rating	Dimensions(Unit: mm)											Resistance Range(Ω)
	A	B	C	D	E	F	G	H	I	J	K	
40W	83	70	50	28	11	5.2	4.1	13	6.5	12	42	1~1KΩ
55W	123	110	90	28	11	5.2	4.1	13	6.5	12	42	1.5~2KΩ
70W	153	140	120	28	11	5.2	4.1	13	6.5	12	42	2~3KΩ
95W	183	170	150	28	11	5.2	4.1	13	6.5	12	42	2.5~4KΩ
100W	193	180	160	28	11	5.2	4.1	13	6.5	12	42	3~5KΩ
120W	218	205	185	28	11	5.2	4.1	13	9	12	42	3.5~6KΩ
150W	218	205	185	35	11	5.2	5.2	13	9	13	48	4~7KΩ
200W	243	230	210	35	11	5.2	5.2	13	9	13	48	4.5~8KΩ
250W	287	274	254	35	11	5.2	5.2	13	9	13	48	5~9KΩ
300W	333	320	300	35	11	5.2	5.2	13	9	13	48	5.5~10KΩ

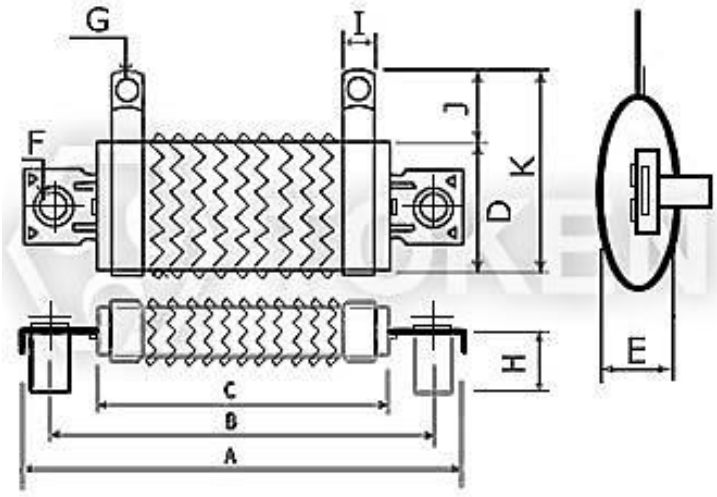


Set-Type (ZDR 40W ~ 300W) Dimensions

ZQR Dimensions

Dimensions Wave Type (ZQR 60W ~ 450W)

Wattage Rating	Dimensions(Unit: mm)											Resistance Range(Ω)
	A	B	C	D	E	F	G	H	I	J	K	
60W	83	70	50	28	11	5.2	4.1	13	6.5	12	42	1~4Ω
80W	123	110	90	28	11	5.2	4.1	13	6.5	12	42	1.5~5Ω
100W	153	140	120	28	11	5.2	4.1	13	6.5	12	42	2~7Ω
140W	183	170	150	28	11	5.2	4.1	13	6.5	12	42	2.5~9Ω
150W	193	180	160	28	11	5.2	4.1	13	6.5	12	42	3~10Ω
180W	218	205	185	28	11	5.2	4.1	13	9	12	42	3.5~12Ω
225W	218	205	185	35	11	5.2	5.2	13	9	13	48	4~15Ω
300W	243	230	210	35	11	5.2	5.2	13	9	13	48	4.5~20Ω
375W	287	274	254	35	11	5.2	5.2	13	9	13	48	5~25Ω
450W	333	320	300	35	11	5.2	5.2	13	9	13	48	5.5~30Ω

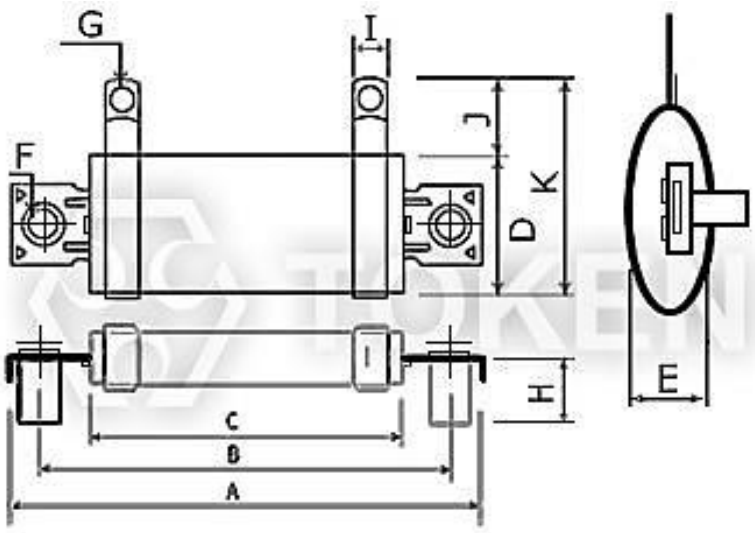


Wave Type (ZQR 60W ~ 450W) Dimensions

ZDN Dimensions

Dimensions Set-Type Non-Inductive (ZDN 40W ~ 300W)

Wattage Rating	Dimensions(Unit: mm)											Resistance Range(Ω)
	A	B	C	D	E	F	G	H	I	J	K	
40W	83	70	50	28	11	5.2	4.1	13	6.5	12	42	1~1KΩ
55W	123	110	90	28	11	5.2	4.1	13	6.5	12	42	1.5~2KΩ
70W	153	140	120	28	11	5.2	4.1	13	6.5	12	42	2~3KΩ
95W	183	170	150	28	11	5.2	4.1	13	6.5	12	42	2.5~4KΩ
100W	193	180	160	28	11	5.2	4.1	13	6.5	12	42	3~5KΩ
120W	218	205	185	28	11	5.2	4.1	13	9	12	42	3.5~6KΩ
150W	218	205	185	35	11	5.2	5.2	13	9	13	48	4~7KΩ
200W	243	230	210	35	11	5.2	5.2	13	9	13	48	4.5~8KΩ
250W	287	274	254	35	11	5.2	5.2	13	9	13	48	5~9KΩ
300W	333	320	300	35	11	5.2	5.2	13	9	13	48	5.5~10KΩ



Set-Type Non-Inductive (ZDN 40W ~ 300W) Dimensions

ZQN Dimensions

Dimensions Wave Type Non-Inductive (ZQN 60W ~ 450W)

Wattage Rating	Dimensions(Unit: mm)											Resistance Range(Ω)
	A	B	C	D	E	F	G	H	I	J	K	
60W	83	70	50	28	11	5.2	4.1	13	6.5	12	42	1~4Ω
80W	123	110	90	28	11	5.2	4.1	13	6.5	12	42	1.5~5Ω
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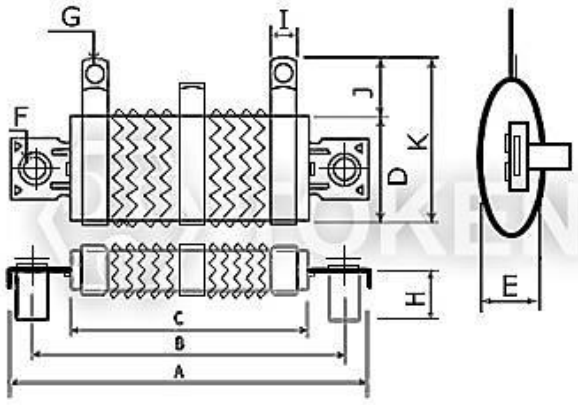

Wave Type Non-Inductive (ZQN 60W ~ 450W) Dimensions

Order Codes

Order Codes (ZR)

ZDR	250W	250R		J	
Part Number	Rated Power (W)	Resistance Value (Ω)		Resistance Tolerance (%)	
ZDR	40W~300W	0R1	0.1Ω	H	±3%
ZQR	60W~450W	1R	1Ω	J	±5%
ZDN	40W~300W	10R	10Ω	K	±10%
ZQN	60W~450W	12R	12Ω		
		12K	12KΩ		

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