Wirewound naked resistor

Description
Stainless steel terminals for screws M6, Very robust design for high energy pulses and heavy overload, Suitable for group assemblies

Mechanical characteristics
IP00, Wire wound on ceramic support mounted on a metallic bar

Applications
Dynamic braking, Neutral Grounding, Starting Motor, Charge/discharge capacitors, Load Bank

Market
Railways, Industrial automation, Energy

Special version
Fixing slots different, Adjustable, Not inductive, Mica bar

RMS

0.5 ÷ 3.6 KW

ELECTRICAL CHARACTERISTICS

refers to room temperature 40°C

ID	Range Rated Power (wire 600 °C)	Rated power UL	Resistance Range	Not inductive version Range Rated Power UL	Not inductive version Resistance Range
Unit	W	W	Ω	W	Ω
RMS 5	900 ÷ 1600	500 ÷ 700	1 ÷ 51	500 ÷ 600	1.0÷13
RMS 6	1100 ÷ 2050	840 ÷ 1200	1.2 ÷ 63	840 ÷ 1100	1.2÷16
RMS 7	1300 ÷ 2450	945 ÷ 1350	1.5 ÷ 74	945 ÷ 1200	1.5÷19
RMS 8	1500 ÷ 2850	1050 ÷ 1500	1.8 ÷ 86	1050 ÷ 1400	1.8÷22
RMS 9	1750 ÷ 3250	1225 ÷ 1750	2.0 ÷ 100	1225 ÷ 1600	2.0÷25
RMS 10	1950 ÷ 3650	1400 ÷ 2000	2.3 ÷ 110	1400 ÷ 1800	2.3÷28

Insulating Voltage: 1 000 V; for not inductive version 1 000 V or 800 V (see note); for mica bar version 3000 V
Dielectric strength test: 4250 V 50 Hz 60 s

Temp. Coefficient Resistance: low ohmic value are made with active material CuNi44 that has a TCR of 40 ppm/°C, whereas high ohmic value refers to wire material FeCrAl that has a TCR of 70 ppm/°C. The majority of ohmic values are made also with NiCr3020 alloys that has TCR 240 ppm/°C.

Rated power depends on total surface area according to Newton's law

$$\frac{dQ}{dt} = h \cdot A \cdot (T_{env} - T)$$

Where
Q is the thermal energy in joules
h is the heat transfer coefficient (W/m² K)
A is the surface area of the wire (m²)
T_{env} is the temperature of the environment
T is the temperature of the wire

In the case of model RMS, the total surface area depends on the ohmic value according to Ohm's law

$$R = \rho \cdot \frac{l}{S}$$

Where
R is the resistance
ρ is the resistivity of the used alloy
l is the length of the conductor (wire)
S is the cross section of the conductor (wire)

The number of the turns in the RMS model is fixed and depends on the diameter of the wire. As a result, the lower is the ohmic value, the higher is the surface area then the power. At the contrary the higher is the ohmic value, the lower is the surface area and then the power. In the above table min and max rated power refer to wire temperature 600 °C and resistor placed in free air, in the graph of rated power is shown the power that corresponds to a temperature of wire of 600 °C for ohmic values from the minimum to the maximum.

The same reason is for the energy absorption. Lower ohmic values have higher mass of active material because of this formula:

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$$m = S \cdot l \cdot \rho$$

Where

m is the mass of active material

S is the cross section of the conductor (wire)

l is the length of the conductor (wire)

ρ is the density of active material

In the graph of pulse load is shown the energy in kJ that corresponds to a ΔT of the wire of 900 °C according to the law

$$\Delta E = m \cdot cp \cdot \Delta T$$

Where

ΔE is the amount of energy that enters in the resistor

m is the mass of the wire

cp is the specific heat of the wire

ΔT is the over-temperature of the wire

This equation is valid only when the pulse is very short (< 0.5 s) and it is called adiabatic, it means that all the energy is dissipated by the wire itself. When the pulse duration is longer, the wire can exchange the energy with the surrounding ambient, then the energy that can be dissipated is higher. For pulse duration less than 60 s, the mass of the wire is determinant to calculate the overload conditions.

For pulse with duration between 0,5 and 60 s the overload in terms of rated power multiplier is represented in this table below:

Pulse duration (s)	Multiplier rated power
1	60
5	10
10	4,3
30	2
60	1,6

Please contact Fairfild technical office for more details.

UL Definitions: Insulating Voltage is defined as the voltage used to the spacings requirements and dielectric test, but not for supply directly the resistor (see Operating voltage).

For Not inductive version 1000 V when the metallic frame is insulated to Ground, or 800 V then the metallic frame is connected to Ground.

For UL applications when the metallic frame is connected to Ground the device must be connected to a Surge-protective device, any R/C (VZCA/7) or (VZCA/CSA Approved), type 1 or 2 or 3, rated minimum voltage according table of electrical ratings, with a maximum Voltage Protection Rating (VPR) 6000Vpk.

MECHANICAL DATA

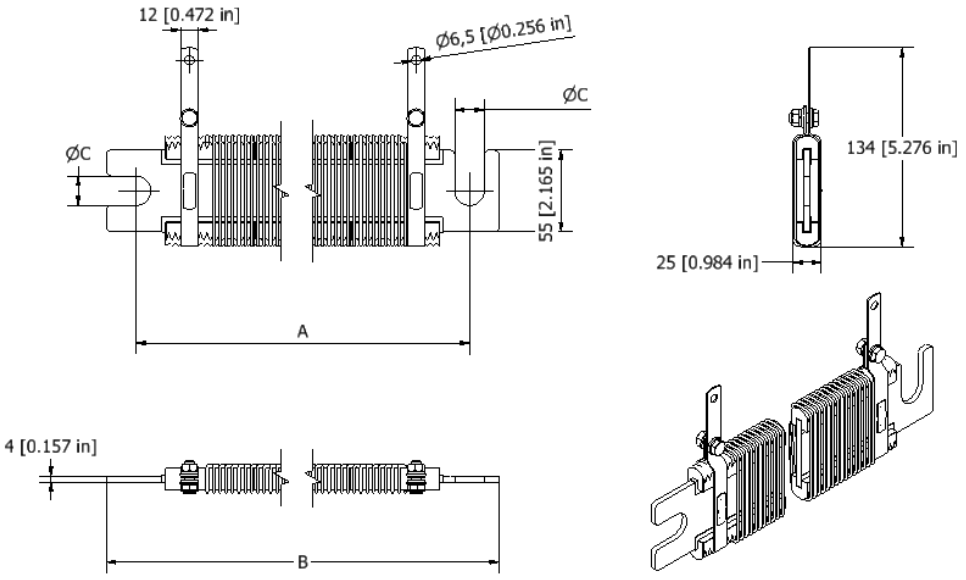
Unit [mm]	A [mm/in]	B [mm/in]	C [mm/in]	Weight [Kg/lbs]
RMS 5	340 /13.386	380 /14.961	20/0.787	1.05/2.31
RMS 6	400 /15.748	440 /17.323	20/0.787	1.2/2.65
RMS 7	460 /18.110	500 /19.685	20/0.787	1.35/2.98
RMS 8	520 /20.472	560 /22.047	20/0.787	1.5/3.31
RMS 9	580 /22.835	620 /24.409	20/0.787	1.6/3.53
RMS 10	650/25.591	700 /27.559	27/1.063	1.7/3.74

Unless otherwise specified, applicable standard of general tolerances for linear and angular dimensions is ISO 2768-1 class c.

Different slots positions are available: Axial – Axial, or Transversal – Transversal. Picture at page 1 refers to RMS Axial Axial.

Weight indicated in the table is an approximate data, the exact data depends on wire mass and on the material of bar. Mica bar allows to save weight.

DRAWING



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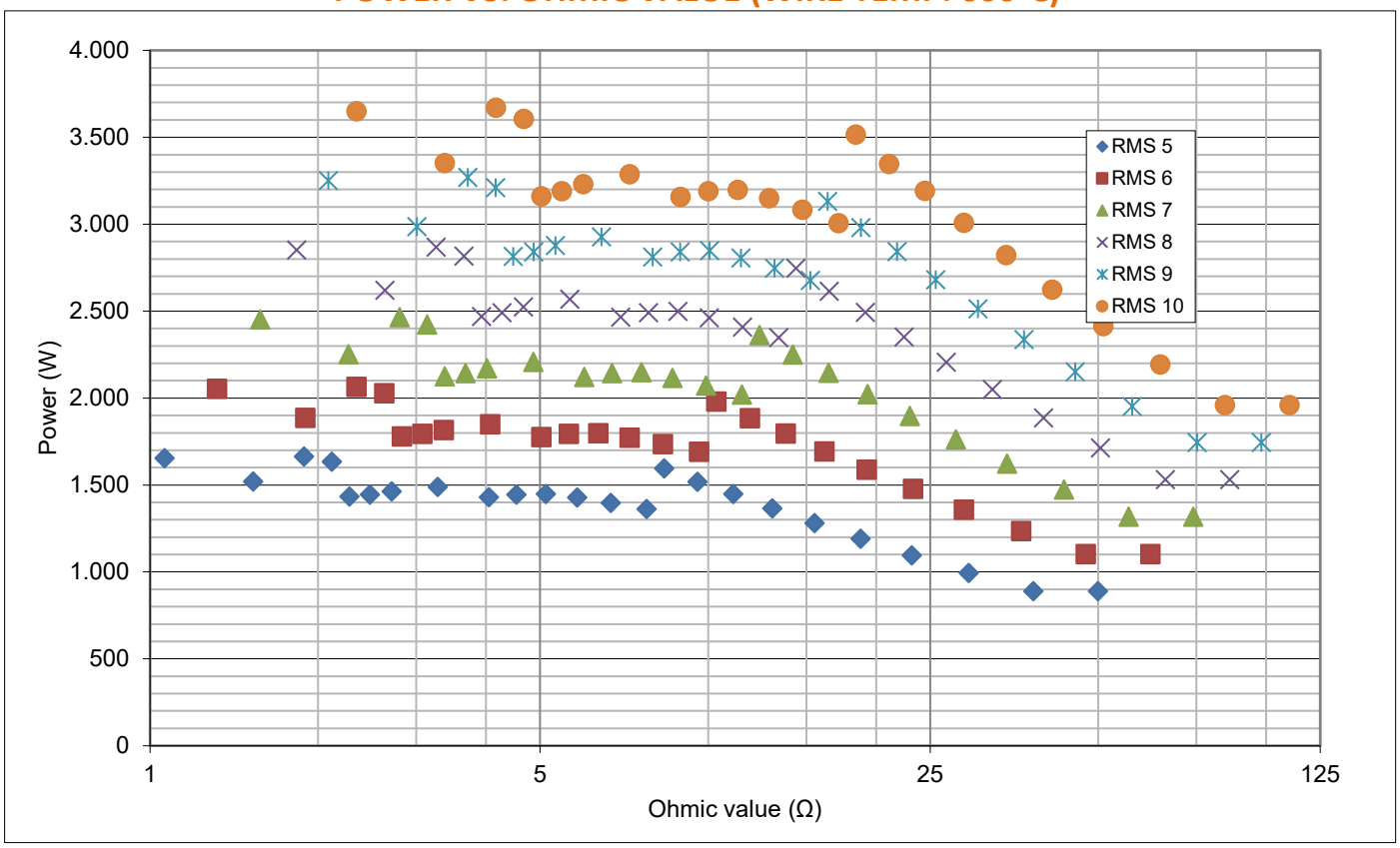
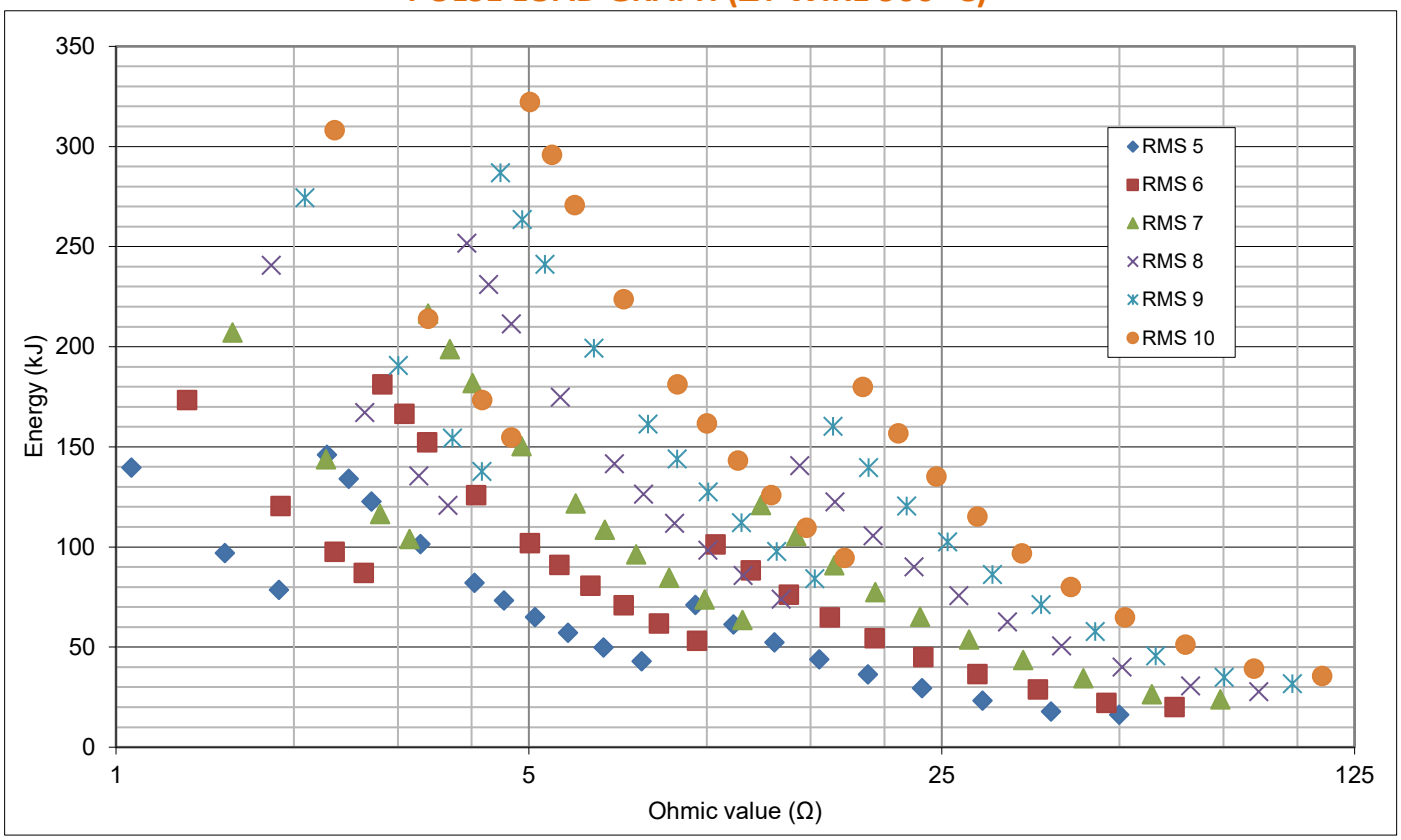
POWER VS. OHMIC VALUE (WIRE TEMP. 600°C)



PULSE LOAD GRAPH (ΔT WIRE 900 °C)



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Marking

The resistor is marked on the collar with laser printing machine:
FAIRFILD – RMS 5 15R 5% WW/YY (week / year)
In case of UL marked product this additional information are provided in the marking: Insulating voltage – Rated power

Installation

In case of group mounting keep a distance of at least 30 mm between consecutive resistors.

The unit can be mounted either is vertical or horizontal position.

Packing

The resistor is packed in a way to preserve incidental damages due to transport. The resistor is made by ceramic parts, accidental fall can damage it, handle with care.

Disclaimer

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Ordering Information

RMS/Y M RRRR 5% (mica)

Y	Blank : standard version	(available with or without UL certification)
	R : adjustable version	(not covered by UL certification)
	N : not-inductive version	(available with or without UL certification)
	MICA (at the end of description)	(not covered by UL certification)

M Model 5, 6, 7, 8, 9, 10

RRRR Resistance value (nominal at 20°C)

In case of UL marked product, the customer must specify in the order.

Example
RMSN 5 15R 5%
RMS is the name of the product
N means the resistor is made in not inductive version
15R means 15 Ω that is the nominal ohmic value at 20°C
5% is the tolerance on the ohmic value, in this case the value of the resistor is accepted when is within 14.25 Ω ÷ 15.75 Ω

Note: tolerance on ohmic value for adjustable resistors is normally -0+15%; tolerance on ohmic value for standard resistor is normally ±5%

Picture at page 1 refers to RMS 6 Axial Axial stainless steel bar.

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