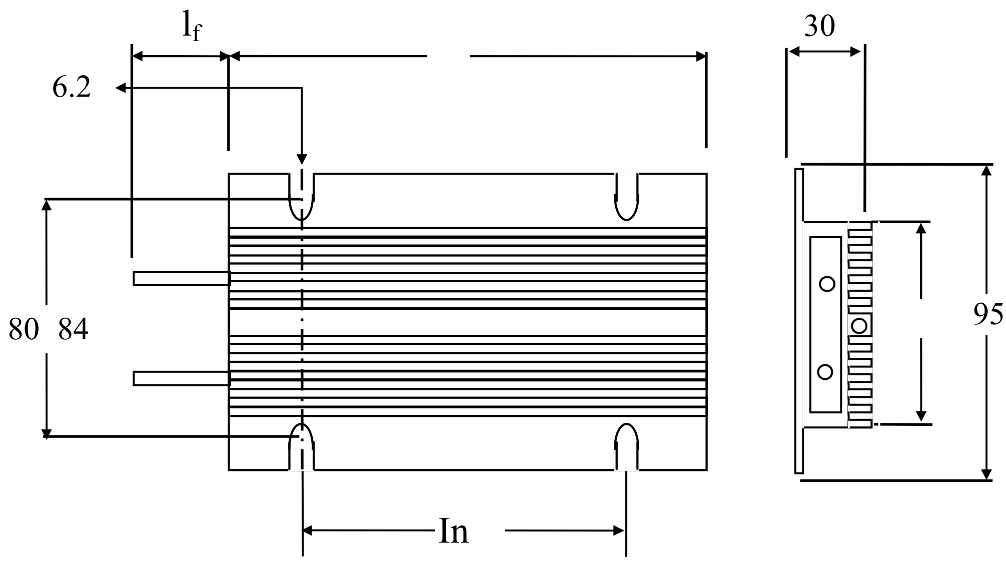
DATA SHEET

Approval Walter Cerutti
Verified Mauro Pellegatta
Revision 4 10.4.1998

Emission DT 12.3.1996

ALUMINIUM HOUSED POWER WIREWOUND RESISTORS MOD. RFH



	RFH 350	RFH 500	RFH 750	RFH 1100
L	110 mm	160 mm	220 mm	320 mm
In	60 mm	110 mm	140 mm	240 mm
weight	460 g	670 g	920 g	1250 g
protection grade	IP 55			
cable length l_f	300 mm standard			

1. SPECIFICATION

The SIR RFH style is a range of high quality power resistors, aluminium housed, designed to achieve some uncommon characteristics, as a high protection grade (IP55), an elevated dielectric strength and a very high capacity to power dissipation and to withstand adiabatic impulses.

These characteristics make the resistors RFH very valuable for applications where high reliability is required even in heavy duties, as:

- dynamic braking **- snubber resistors** **- inverter**
- capacitor charge limiting **- traction general employment**
- designed for heat sink mounting **-also employable without heat sink**

The rated power of RFH is particularly elevated, and this characteristic is obtained by using special material, withstanding temperatures higher than 400°C, without damage.
Moreover, the rated power of these resistors may be improved using a suitable heat sink.

This Data sheet will help, with the necessary information and application notes, for a first definition of the resistor required.

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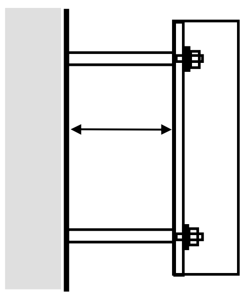
2. ELECTRICAL SPECIFICATIONS

CHARACTERISTICS		RFH 350	RFH 500	RFH 750	RFH 1100
Power rating (Pn)	W	300	400	650	950
Max.Power without heat sink	W	350	500	750	1.100
Surface temperature rise @ Pn		375°C	385°C	385°C	395°C
Max.Power rating heat sink mounted	W	550	750	1100	1.400
Power rat.water heat sink mounted	W	650	850	1.300	1.800
Absorbed energy @ 250°C ΔT	J	50.000	70.000	100.000	150.000
Absorbed energy in 5”	J	16.000	24.000	37.000	55.000
Resistance range	Ω	0,5 ÷10 k	0,5 ÷18 k	0,5 ÷27 k	0,5 ÷27 k
Tolerance for Resistance values		±5%			
Inductance @ 1.000 Hz	μH	5÷50	7÷70	10÷100	20÷200
Parasitic capacity (from 1 to 100 kHz)	pF	250÷60	300÷75	450÷120	600÷200
Limiting element voltage	V	1.500	2.500	3.500	4.000
Insulation resistance @ 1000 Vcc	MΩ	≥1.000			
Dielectric strength @ 50 Hz per 1’		4.500 Vrms			
Thermal time constant		18’(see graph)			

3. APPLICATION NOTES



3.1. Power rating.
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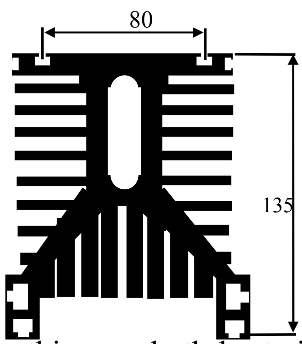
negatively (if it is small and insulating) to the thermal dissipation.

Data of power rating are referred to a resistor mounted

cm, in order to avoid thermal influence from the wall.



3.2 Surface temperature rise @ Pn.
surface temperature is not homogeneous,

dissipation).

3.3 Max.power rating of a resistor mounted onto a heat sink.
Standa

The distance between the axes of these two grooves is 80 mm.
In this case both heat sink and resistor will be mounted upright. The length of the heat sink shall be at least 40 mm longer than the resistor’s body (20 mm for each side).

3.4 Power rating of a resistor mounted on a water-cooled heat sink.
If the heat sink is water-cooled, power dissipation increases considerably, and the limiting power rating is due to temperature of the resistor body.

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In the case illustrated in the specifications board, the temperature of the heat sink is 40°C and the resistor's surface reaches 300°C. In this case too, the length of the heat sink shall be at least 20 mm longer than the resistor's body.

3.5 Absorbed energy @ 250°C ΔT. It represents the quantity of energy stored into the resistor when it has reached 250°C of temperature rise. The above indication is an index of the thermal capacity of the resistor.

3.6 Absorbed energy in 5". It gives an index of behaviour of the resistor to short overloads.

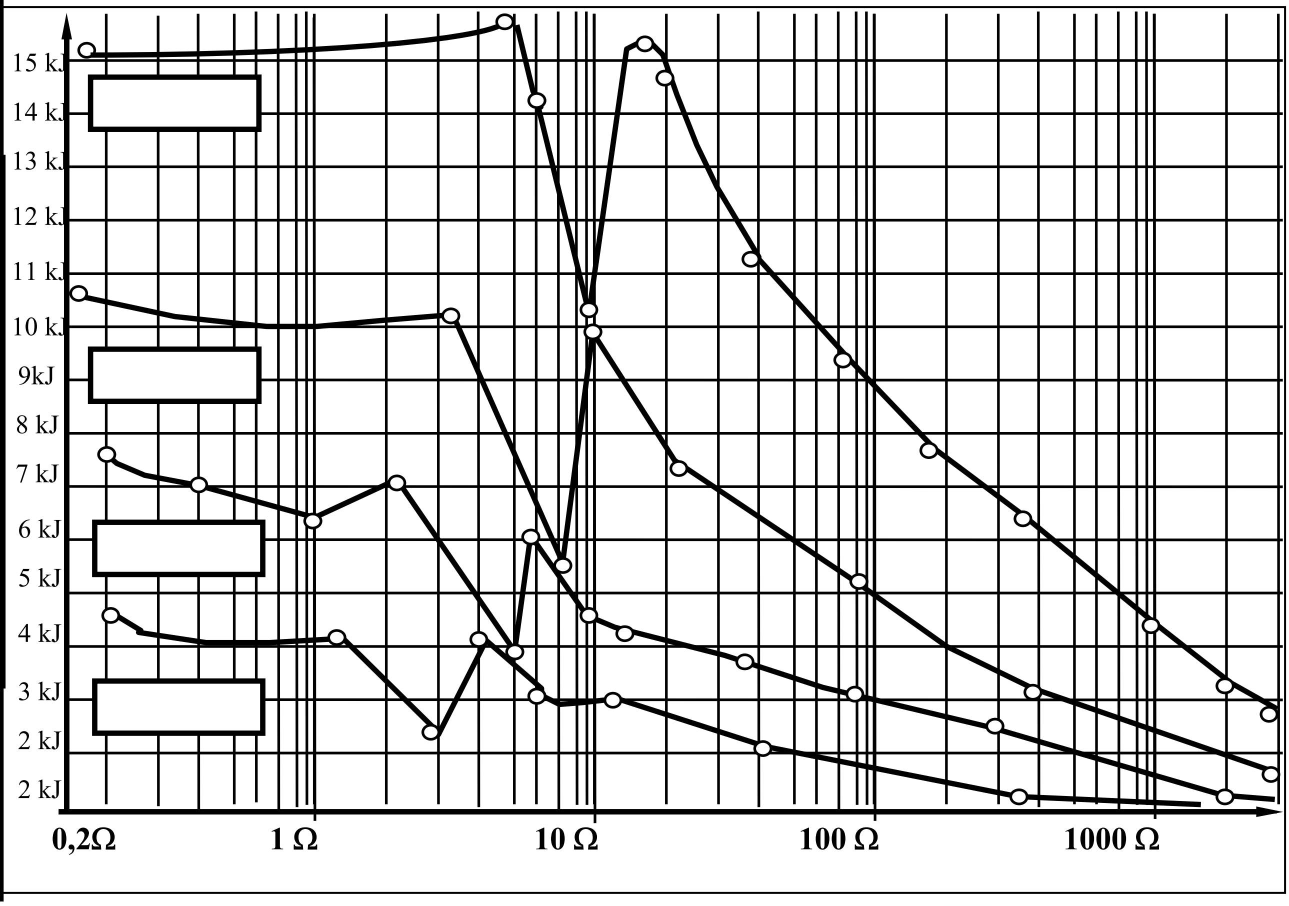
3.7 Absorbed energy in time ≤ 0,2". During a short impulse (from 0 to 2 sec.), the resistor may stand only the energy that the thermal capacity of the resistance wire is able to absorb.
In fact the phenomenon is too short to let significant heat conduction from wire to filling material.
The energy absorbed from the resistor in this case results from this simple equation.

$$Q_J = Cs \bullet P \bullet \Delta T$$ where:

- Q_J is the quantity of energy expressed in Joule, - Cs is the specific heat of the employed resistance alloy expressed in $J \bullet g^{-1} \bullet °K^{-1}$, - P is the weight of the wire in grams and - ΔT is the rise of temperature, expressed in °K, reached by the wire during the impulse.

As type and quantity of wire are characteristics of every resistance value and resistor model, the acceptable temperature limit of wire is relevant.
This limit (@ 25°C) is:
- 500°C for the standard operations (steady state load);
- 800°C for not repeatable overload.
The following graphs show these two conditions for each resistance value and resistor type

Graph 1: Absorbed energy for wire temperature of 500°C.(Impulse time ≤ 0,2")



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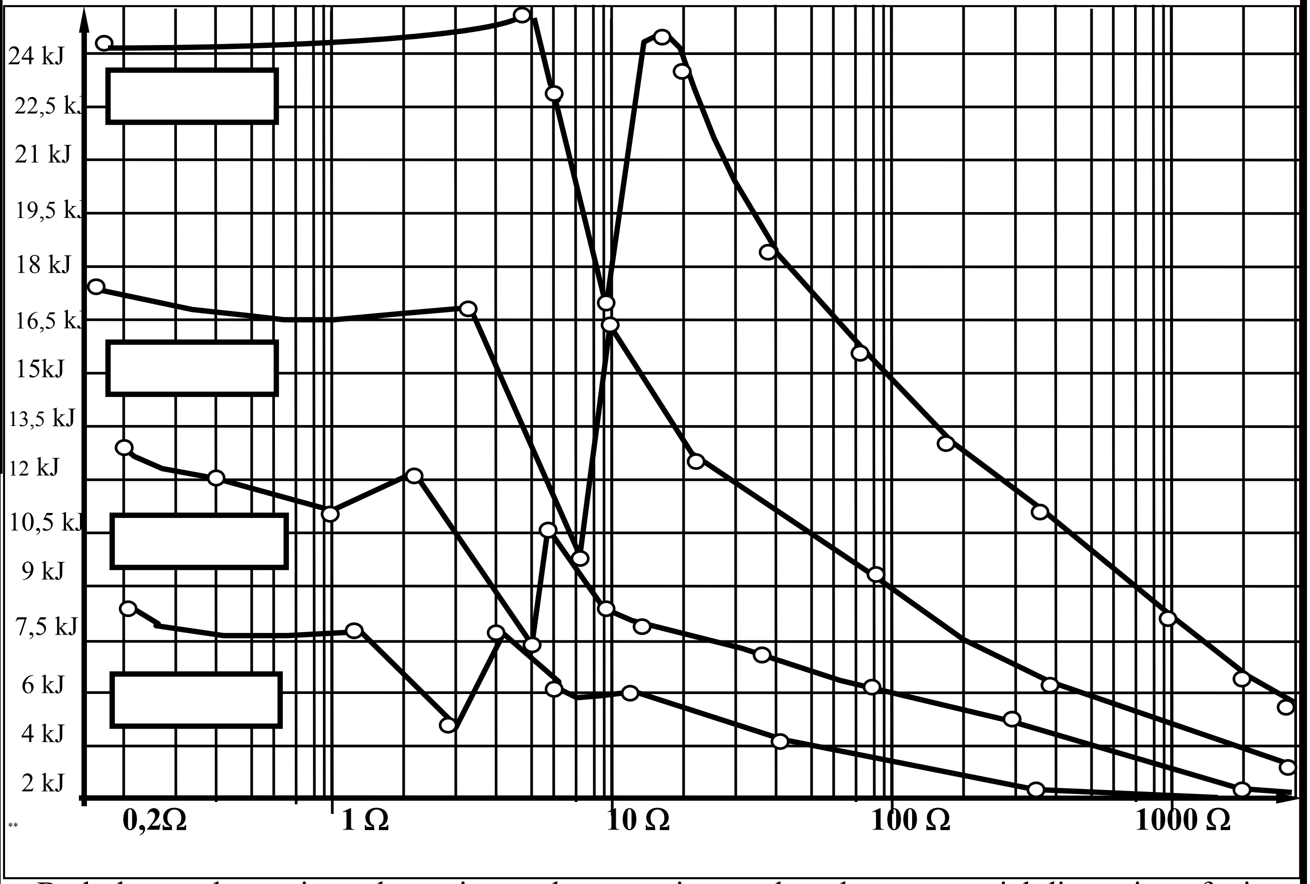
Graph 1: Absorbed energy for wire temperature of 800°C.(Impulse time ≤ 0,2”)



Both the graphs are irregular owing to the necessity to adapt the commercial dimension of wire to the resistance range, however they are enough to show the trend of this characteristic.

Should the energy value of an impulse be too close to the limits given from these graphs, it is suitable to consult the factory for further information concerning the precise value of absorbed energy for the used resistor.

3.8 Resistance range. The resistance range fulfils almost all the use of power resistors, but in cases of special requirements, lower or higher resistance values are available on request as well as closer tolerances.

3.9 Inductance. The inductance changes with the resistance value and is not very influenced from frequency. On request the RFH resistors are available with non inductive windings (Airton-Perry’s system) and are identified by adding the letter N after the RFH identification (e.g.RFHN500). he inductance of the RFHN resistors is less then 1 µH.

3.10 Parasitic capacity. Parasitic capacity does not depend on the resistance value, but it changes with frequency. The supplied value are just referred to 1 kHz (the higher) and 100 kHz.. During normal load conditions the effects of parasitic capacity are negligible. However in the presence of transients of high voltage (time < 10 µsec), the housing may be source of interference for the most sensible electronic circuits. For a correct grounding of the housing, RFH resistors are available, on request, with a threaded hole M5.

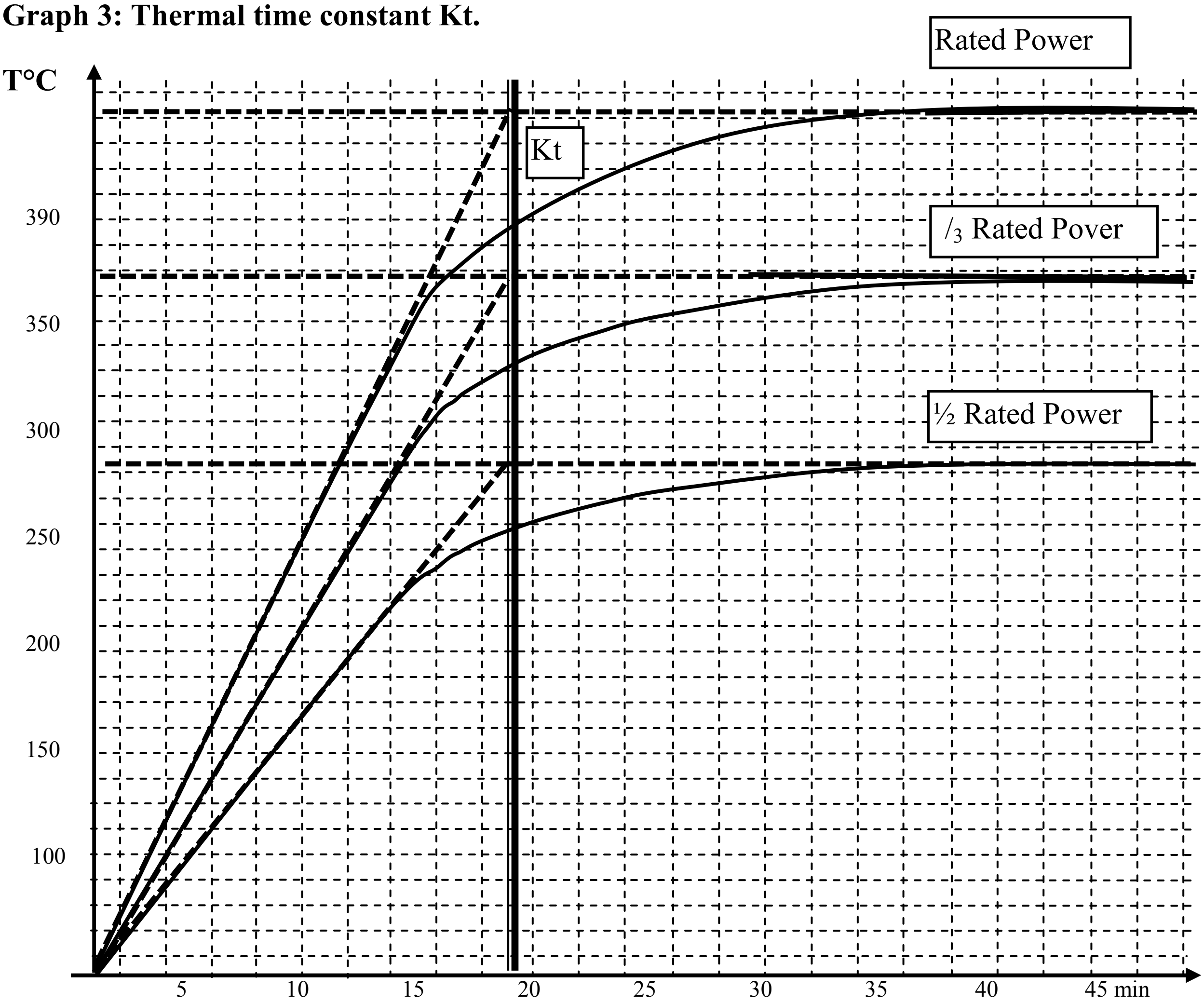
3.11 Limiting element voltage. This is the maximum voltage, which should not be exceeded during the application conditions. The rated values are rather elevated, but special designs with higher limiting element voltage are available for particular requirements.

The limiting element voltage of non inductive resistors is lower than the standard resistors (Please contact us for advice).

3.12 Insulation resistance and dielectric strength. After a long load time, the insulation resistance of RFH resistors keeps elevated as the employed insulating material does not get damaged despite the high thermal conditions.

3.13 Thermal time constant. The dimension of the resistor models is proportional to power rating and weight, therefore their behaviour during the rise of temperature, when the rated power is applied, is analogous.
Of course the application of a heat sinks or the mounting of the resistor on a surface, will modify the thermal time constant which is peculiar for each application.

Graph 3: Thermal time constant Kt.



4 FURTHER INFORMATION

In case, if it is necessary to deal a more exhaustive analysis of thermal behaviour of resistor for a design development, it is suitable to require “Thermal model of RFH resistors”

MODPR02/00-A12	SCHEDA AMBIENTALE – DICHIARAZIONE MATERIALI *ENVIRONMENTAL DATA SHEET – MATERIALS DECLARATION* Sirresistor pag. 1 di 1	– DMSA 0002 – rev. 00 - 27/08/2019 - emesso/issued: G.Ceriani UT - approvato/approved: C.Mortella RT

Modello resistore/ Resistor model	RFH 1100 4R7 5% lf=1000mm
Cliente/Customer	SEMIC
Specifica cliente/Customer specification	---

Tipo Materiale - Material Type	Riciclabile Recyclabe (YES/NO)			Peso Weight (g)	Norma di riferimento Reference standard
1 – Isolatori/Insulators: tipo/type .... (ceramico, epossidico, GPO3, mica) (ceramic, epoxy, GPO3, mica)	YES		CER 170604; R5	---	---
2 – Isolatori/Insulators: tipo/type .... (ceramico, epossidico, GPO3, mica) (ceramic, epoxy, GPO3, mica)	YES		CER 170604; R5	---	---
3 – Cassa esterna/external case	YES		CER 160117/118; R4	611,0	Aluminium alloy EN 6063
4 – Materiale attivo resistenza/resistance active material	YES		CER 160117/118; R4	31,0	Nickel Crome Alloy NiCr6015
5 – Isolamento ceramic/insulation ceramic	YES		CER 170604; R5	266,9	Cordierite C410
6 – Connessioni in Rame/copper connections	YES		CER 160118; R4	---	---
7 – Cablaggio/Cabling	YES		CER 200136; R5	39,3	THT/VT D.3,50-2,50 mm2 RR – EN50525, EN60228, EN50363, EN50395, EN50396, IEC60754, IEC61034 compliant
8 – Viteria/Screws	YES		CER 160117; R4	---	---
9 – Riempitivo/filler	YES		CER 100305; R5	253,1	Quartz Silica Sand SiO_2
10 – Cemento sigillante/cement sealant	YES		CER 170107; R5	50,6	Silicone Based Cement - Silox CB-460
11 – Tubi o lamina di mica/pipes or sheet of mica	YES		CER 170604; R5	48,1	Muscovite Mica, UL V0 certified (file number E332023)
12 – Targhette/Plates	YES		CER 160118; R4	---	---

RICICLABILE - RECYCLABLE	1300	
NON RICICLABILE - NOT RECYCLABLE	0,0	
TOT.	1300	