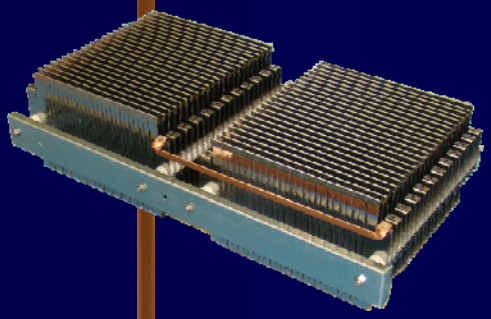
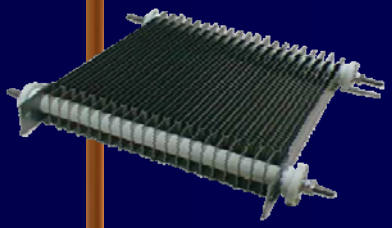
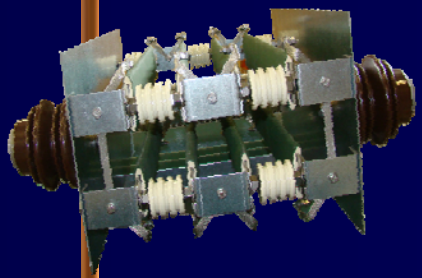




High Voltage & High Power RESISTORS



Improved Designs
Approved Quality
High Technical Performances
...
The Global Quality

M.S. RESISTANCES
MICROELETTRICA SCIENTIFICA
The Independent Resistor Builder .. Since 1952

Presentation

Certified **ISO 9001** & **ISO 14001,**
Microelettrica Scientifica Resistances
(**MS Resistances**) is part of **Knorr Bremse Group.**

Since **1952**, we design and manufacture **High Voltage Equipment**, such as:
Neutral Earthing Resistors (NER), Harmonic Filter Resistors, High voltage Load banks, Starting & Braking Resistors, Neutral Earthing Switchgears (NES) and Contactors.

Global Quality & High Technical Performance is the key of our policy to gain & maintain the confidence of our customers & partners

From Alaska to the desert of Saudi Arabia through the high mountains of Chile, our resistors operate with full satisfaction.

Quality & Environmental Respect

Our work is controlled in continuous and at each level of processes from calculation till hand-over to the customer.

We only provide the best of MS. Resistances to all our customers.

- Our **ISO 9001** certification helps to continuously improve all aspects of our quality.. This quality involvement helped us being early recognized by the major & highly skilled actors on the field.
- Through the **ISO 14001** certification of our mother company, we follow all requirements to respect Environment.

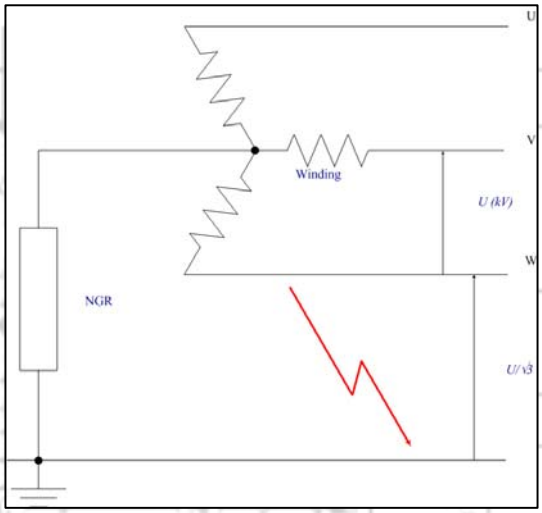
Design, Fabrication & Testing Facilities

All our resistors are designed & drawn using the latest **knowledge & CAD software** which were specially developed and tuned to our particular needs.

Resistive elements are manufactured by **automates & CNC machines** with severe controls.

Neutral Earthing / Grounding Resistors

This is the **most common** & **easiest to implement** solution when the neutral of the **Transformer or Generator** is available.
The advantage of this solution becomes even greater where **Nickel Chromium stainless steel** resistance grids are used.



*No **IEC standard** defines the NERs in overall. They deal with **part of the design** such as IP Level, Insulation Level...*
***IEEE - 32** standard defines the way the Equipment should be sized. As per this standard, allowed temperature rises of Neutral Earthing Resistor having Stainless Steel grids are:*
-760 ° c above ambient for 10, 30 or 60 sec fault
-610 ° c above ambient for extended time rating
-385 ° c above ambient for continuous rating.

Harmonic Filter Damping Resistors

Where electrical Network carry harmonics, **Filter Circuits** are installed. The traditional electro-technical manner to implement those filters is to use **Capacitors** (**C**) & **Reactors** (**L**) in various configurations providing a well defined frequency response. The high quality factor of those components results in very losses that may induce resonance phenomena or poor performance with variable frequencies. In these cases, **Resistors** (**R**) will be inserted in the circuit and act as a damping component.

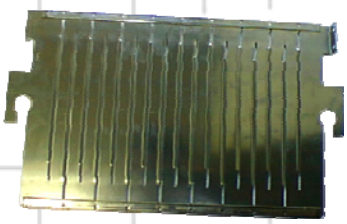
*The **Resistor** acts as a **shock absorber** in the suspension of a car, where the **spring** and the **mass of the car** can be compared to the **Reactors** and the **Capacitors** in the electrical system*

Technologies

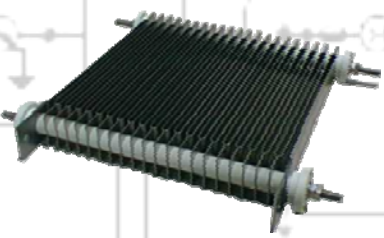
M.S. Resistances uses **different technologies** of Resistances Elements to suit the **particular applications** we handle.
All technologies are metal type of grids made of **Nickel Chromium Stainless Steel**
They are all developed and manufactured in our main factory in **Milano**

RL & CL

Those Resistance grids are cut from stainless steel sheets of various thicknesses. Resistance value is defined by cutting an appropriate number of slots using technical procedure which ensure a constant radiating surface and constant stiffness of grid elements.



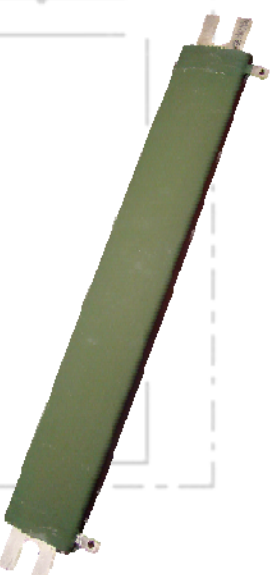
JF



JF grids elements are produced from a stainless steel strip of appropriate thickness.
The strip is fed into a totally automatic machine where it is stamped and cut in various size.

SCE & SCEN

Stainless Steel Wire is wounded around a Ceramic Core and then protected by Special Cement & Silicone Coating. No inductive applications are covered by double-winding this wire in opposite sides.
They are very effective in applications where very high ohmic values and / or BIL withstand are required.



Resistive Load Banks

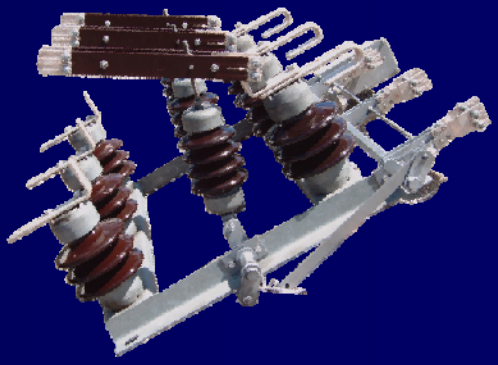
The Load Banks are used to accurately mimic the operational load that a power source will see in real application. Load banks are used in a variety of applications. They are mainly Resistive, Reactive or Capacitive load banks.

A Resistive Load Bank converts Electrical Energy into Heat Energy via power resistors. This heat must be dissipated from the load bank, either in air or in water, by forced or natural convection.

Accessories

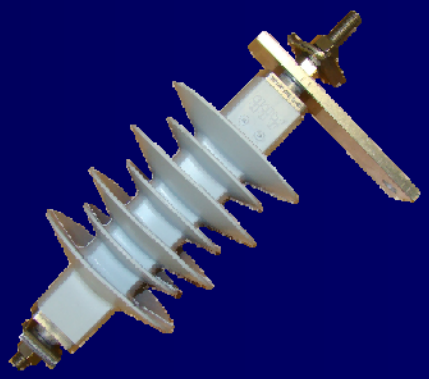
In order to fulfill the growing demand, we are proposing a wide range of accessories in association with our main activities:

Current Transformers: from low voltage up to 36 kV
- **Wire Wounded or Ring type**
- **Single or Multiple Cores**
- **Indoor or Outdoor**
- **Ratio, Accuracy and Burden … on demand**



Voltage Transformers: from low voltage up to 36 kV
- **Wire Wounded or Ring type**
- **Single or Multiple Cores**
- **Indoor or Outdoor**
- **Ratio, Accuracy and Burden … on demand**

Disconnectors: from low voltage up to 52kV
- **Off-load / On-Load**
- **Single or Three Poles**
- **Indoor or Outdoor**
- **With or Without Earthing Switch(es)**
- **Manual or Motor Operated**
- **Rated & Short-Circuit Currents … on demand**



Surge Arrestors: up to 36kV

Contactors: up to 4kV

M.S. RESISTANCES
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Argentina

Chile

South Korea

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Algeria