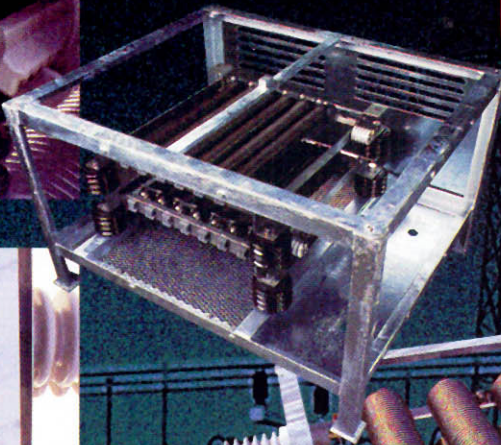
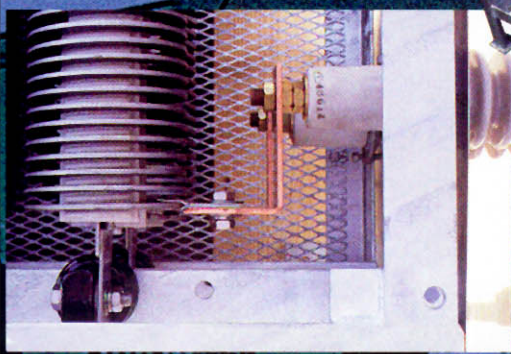
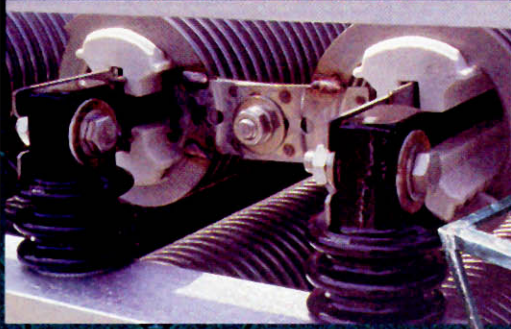
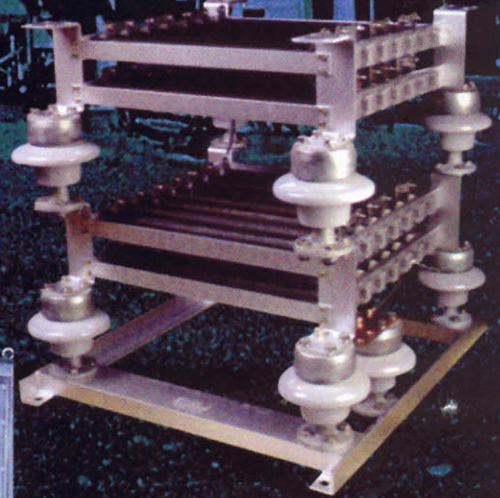


Grounding Resistors



Hubbell Neutral Grounding Resistors limit the maximum fault current to a value which will not damage equipment, yet allow sufficient fault current for protective relays to clear the fault, conforming to IEEE Standard 32-1972.



Applications

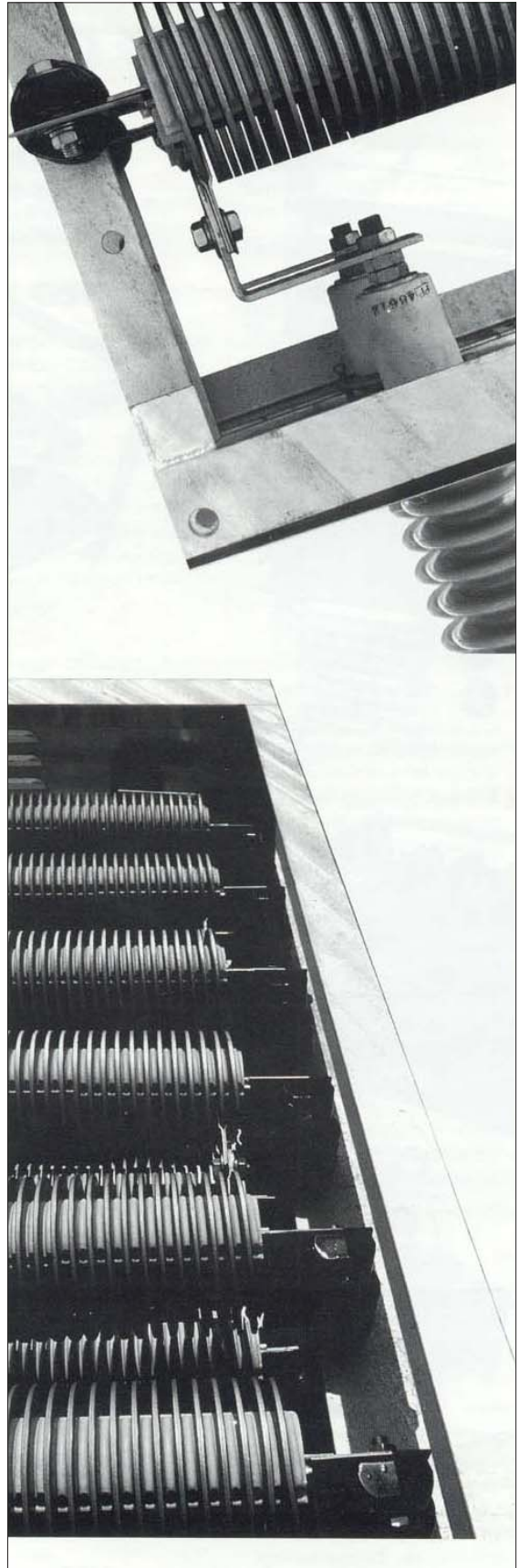
Type 3024 Neutral Grounding Resistors are used for resistance grounding of industrial power systems. Their primary purpose is to limit the maximum fault current to a value which will not damage generating, distribution and other associated equipment in the power system, yet allow sufficient fault current to flow to operate protective relays to clear the fault.

Features

- Rugged shock-resisting non-breakable construction throughout.
- Continuous corrosion resistant stainless steel resistive element.
- Resistive elements float on porcelain core strip - expands and contracts freely.
- No distortion with temperature rise.
- High thermal capacity absorbs high current surges.
- Double insulation.

Specifications

Neutral Grounding Resistors are rated in line to neutral voltage, initial current in amperes and allowable time on. Hubbell's Grounding Resistors consist of stainless steel continuous edgewound coils mounted in frames or enclosures. The resistor coils are mounted on insulators to isolate the coils from the frames. For resistors rated 600 volts or higher, the frames or enclosures are mounted on standoff insulators to provide proper insulation levels between frames and ground. All grounding resistors conform completely to IEEE Standard 32-1972.



Grounding Resistor Construction



SSR in Indoor Open Enclosure

GRE in Outdoor Safety Enclosure

GRE in Open Type/Outdoor Enclosure

GSK in Outdoor Louvered Grounded Enclosure with Entrance Bushings

- | | | | |
|---|--|----|--|
| 1 | Porcelain Standoff Insulators | 6 | Double Wide Coil Mnt. Frame |
| 2 | Stainless Steel Edgewound Resistor Coils | 7 | Support Bracket |
| 3 | Louvered Enclosure | 8 | Terminal Insulator for Connection to Ground |
| 4 | Coil Mounting Rail with Porcelain Mounting Insulator | 9 | Terminal Insulator for Connection to Transformer Neutral |
| 5 | Pin Cap Standoff Insulator | 10 | Entrance Bushings |

SSR

SSR Neutral Grounding Resistors are used for low voltage and low current applications. The basic resistor coil/frame construction provides adequate insulation without the use of mounting insulators. The resistor is available in standard open frames or with indoor cane metal covers or outdoor ventilated weather-proof covers. Refer to Specification Sheet 3003 for additional information.

Ratings

Max Voltage – 600 VAC
 Max Current (amps)
 Extended Time – 100
 Continuous – 100

GRE

GRE Neutral Grounding Resistors use the same resistor coil and frame as the SSR neutral grounding resistors except support insulators are used to provide proper insulation for the system voltage. The resistor stack is then housed

inside of a grounded type or safety type enclosure, or supplied open as shown in photo at left.

Ratings

Max Voltage – Unlimited
 Max Current (amps)
 10 Seconds – 300
 60 Seconds – 100
 Extended Time – 100

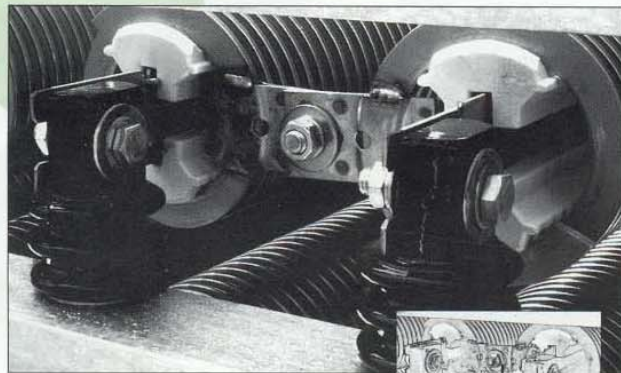
GSK

GSK Neutral Grounding Resistors use continuous corrosion resistive elements of heavy gauge stainless steel allowing the resistor to absorb high ground currents without damage or distortion. Each resistor coil is supported on two end insulators from the resistor frame. The frame in turn is further supported on mounting insulators providing proper insulation for the system voltage.

Ratings

Max Voltage – Unlimited
 Max Current (amps)
 10 Seconds – 2000 or more
 60 Seconds – 1000

Coil Connection Details



A Resistors are supported at both ends by glazed porcelain insulators and mounted in a galvanized steel frame.

B Hubbell's resistors are supported by a patented porcelain insulators on expandable steel core strips; providing a low temperature design for extended coil longevity and the flexibility needed to prevent chipping and cracking of the insulators.



C All elements are electrically interconnected with stainless straps that are both welded and bolted to provide positive connection under fault conditions.

D Hubbell's elements are edge-wound providing the optimum combination of electrical performance and heat disbursement.

Grounding Resistor Housings

Open Frames

Open type frames can be provided for either indoor or outdoor applications and offer the least personnel protection.

Louvered Frames

Louvered frames are provided for indoor or outdoor applications. They are designed to protect the resistive elements from falling and flying objects, to prohibit the entrance of animals, to prevent accidental contact of resistive elements by personnel, and to protect the resistive elements against weather.



Grounded Enclosures

Grounded enclosures are to provide additional protection to personnel by enclosing the resistive element in a grounded louvered enclosure with entrance bushings for the incoming and outgoing electrical connections.



Safety Enclosures

Safety enclosures provide additional protection to personnel by enclosing the resistive element in a grounded screened or louvered metal enclosure.



In the above enclosure illustrations, the top cover has been removed. Entrance bushings can be located on the side or top.

Time Ratings

Short Time Rated

Grounding Resistors having a time rating which is a short and definitely specified period of time. Standard short time ratings are 10 and 60 seconds. It is assumed that sufficient "Time Off" will elapse between conducting periods to permit cooling to ambient temperature. Because short time rated resistors can only withstand rated current for short periods of time they are usually used with fault clearing relays. The standard short time temperature rise for this type of resistive element is 760°C.

Extended Time Rated

Grounding Resistors having a time rating of longer than ten minutes which permits temperature rise of resistive elements to become constant. The "Time On" is to be of limited duration and average not more than 90 days per year. They are used where fault currents are permitted to persist for long periods of time. The standard extended temperature rise for the resistive element is 610°C.

Continuous Rated

Grounding Resistors which are capable of withstanding rated current continuously without limitations. The standard continuous temperature rise for the resistive element is 385°C.

Options

- Towers or stands
- Current and potential transformers
- Hook operated disconnect switch
- Special materials, paints or galvanized steel for enclosure and towers



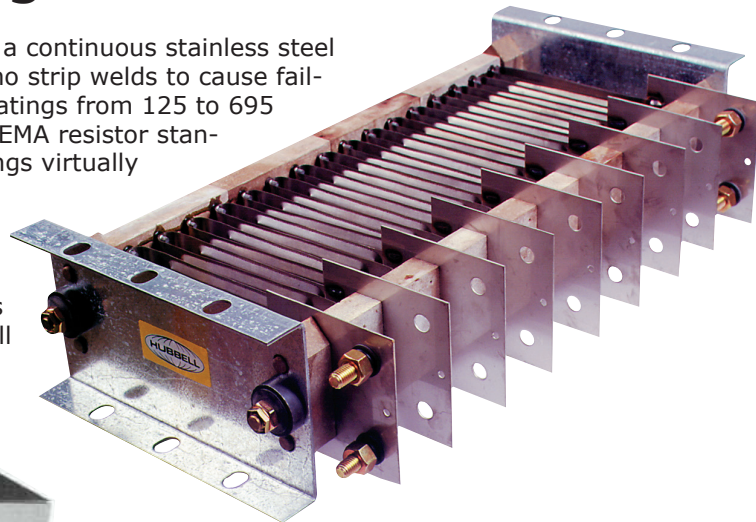
Other Hubbell Resistors

K1 Resistors

Hubbell's Euclid™ Type K1 non-breakable resistors have a single coil element and are available in ratings ranging from 30 to 200 amps. The resistor element is edge-wound with no welded connections to prevent hot spots. Each element is supported on non-corrosive rod bolt assemblies and is outed in a mill frame. The K1 resistor was designed for heavy duty industrial applications and meets all NEMA standards for resistors. They are ideal for mills, foundries, shipyards and mines.

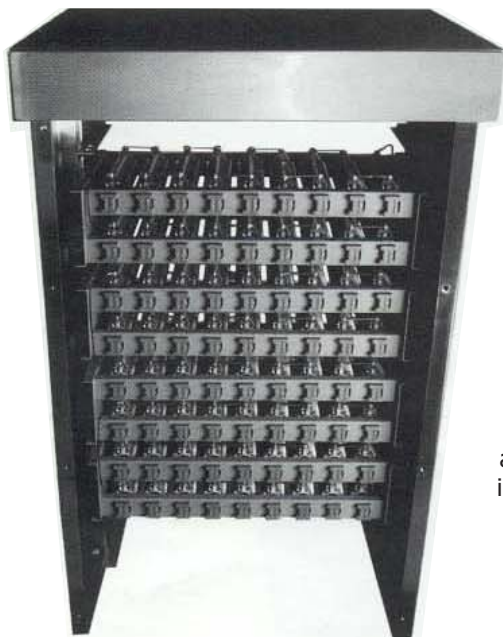
HHC Resistors

Hubbell's HHC Resistors use a continuous stainless steel folded ribbon element with no strip welds to cause failures. They are available in ratings from 125 to 695 amps and are designed to NEMA resistor standards. The high current ratings virtually eliminate the need to parallel resistor units on large horsepower applications, yielding a substantial cost and space savings. Hubbell's HHC resistors are ideal for all industrial applications.



Load Banks

Hubbell Load Bank Resistors are designed for convection cooling without the need for external fan cooling or regular maintenance. Available from 1 kw up to several megawatts, Hubbell load banks are ideal for applications requiring short time/high energy absorption capacity or are located in non-accessible dirty environments or subject to severe vibration. Constructed of heavy gauge edge-wound or fanfold stainless steel elements, Hubbell load bank resistors will operate reliably for years. Shown at left is a 50 kw resistor housed in an outdoor stainless enclosure (covers removed).



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