



MegaResistors

Neutral Grounding Resistors & High Resistance Grounding Systems

Our company specializes in the design, manufacturing, and application of power resistors. Through our expertise in system grounding we have developed the best neutral grounding resistors and high resistance grounding systems available on the market.

To get a quote or help, call or email:
sales@megaresistors.com
+1 (905) 908-2376

Quote Request Form



User Manual



Purpose and application of product

The purpose of a **NEUTRAL GROUNDING RESISTOR (NGR)** or **NEUTRAL EARTHING RESISTOR (NER)** is to limit the magnitude of ground fault current in a power system in order to protect equipment and personnel. A NGR is the only current path between the Neutral of power transformers or generators and Ground. In the absence of a neutral, auxiliary equipment can be used to create one.

When the neutral of a system is not grounded it is possible for destructive transient overvoltages to appear from line to ground during normal switching of a circuit having a line-to-ground fault. Experience has proved that these overvoltages cause aging and failure of insulation at locations on the system other than at the point of fault. In this way, a relatively unimportant line-to-ground fault on one circuit may result in considerable damage to equipment and interruption of service on other circuits. Without resistance grounding, there is increased difficulty in finding the original location of the problem.

A NGR is designed to limit the ground fault current to a safe value while at the same time letting enough current flow to operate the protective relays that will alarm or clear the fault. While the disturbance lasts the resistor must be capable of absorbing and dissipating the energy generated without exceeding the temperature limits established by international standards. In this way the fault is safely limited, isolated, and the power system is protected against overvoltages.

Certifications and standards



AC156
Seismic Qualified



Type	Standard
Electrical codes	CSA 22.1
	NFPA 70
	IEEE C57.32
	IEEE 32
	C22.2 No. 295
Neutral grounding devices and switchgear	IEEE C37.20.3
	M421-16
	C22.2 No. 14-05
	UL 508
	C22.2 No. 31-14
Electrical equipment	IEC 61439-1
	C22.2 No. 94.1
	UL 50
	NEMA ICS 6
	NEMA 250
Electrical enclosures	ANSI/IEC 60529
	ANSI Z535.4

Working with MegaResistors

	Perfect pricing	<ul style="list-style-type: none"> Competitive in standard and custom products Price matching policy for equivalent quotations
	Superb sales and support	<ul style="list-style-type: none"> Average response time less than 24 hours Thorough documentation on installation and maintenance Communication in your language
	Exceptional engineering	<ul style="list-style-type: none"> Thorough analysis of your requirements 3D modeling and wiring schematics Structural and fluid simulation capabilities
	Quality products	<ul style="list-style-type: none"> Reliable products used by major companies all around the world for more than 12 years Backed by a 2 year warranty, with extension options
	Short lead times	<ul style="list-style-type: none"> Just-in-time delivery Rush options available

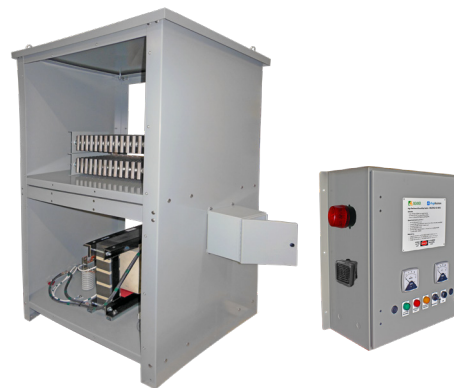
A solutions based approach

Switchgear manufacturers



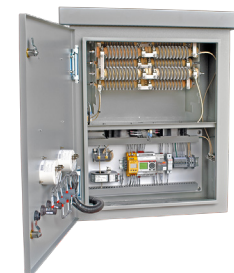
- Advanced enclosure designs with easy switchgear mounting, supreme ventilation, handling eyebolts, and a lockable front door
- Pre-wired backplates with relays, PLCs and instruments with plug-in connectors for easy attachment to the front plate
- Customizable front-plates with touch screens, indication lights, alarming, and OEM branding options
- Advanced M-T-M protection schemes

Generator manufacturers



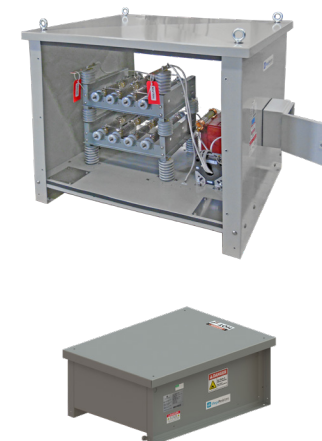
- Integrated systems available in configurations with step-down transformers, surge arrestors, surge capacitors, potential transformers, current transformers, low temperature resistors, and easy access terminals
- Remote control box solutions with metering, indication, alarming, and communications
- Generator paralleling protection schemes
- Hybrid grounding systems

End users



- Customizable products designed to be "plug-and-play", integrating into existing or newly designed systems
- Useful functionality and long-lasting equipment
- Solutions for utility companies, process manufacturing, and more

Transformer manufacturers



- Designed for easy mounting, handling, and field installation features



System Ratings

L/L Voltage (V)	L/N Voltage (V)	Current (A)	Time Rating	Type
Up to 1,000	Up to 577	1 to 1,600	Continuous	Low voltage, high resistance
Up to 1,000	Up to 577	1 to 10,000	1s to 60s	Low voltage, low resistance
1000 to 13800	577 to 8000	1 to 50	Continuous	Medium voltage, high resistance
Up to 69000	Up to 39500	1 to 10,000	1s to 60s	Medium voltage, low resistance

Enclosure Configuration

Protection Grade

Open	IP00
NEMA 2	IP11
NEMA 3R / 3RX	IP54
NEMA 4 / 4X	IP66

Hazardous Locations

Solutions available for all Classes, Divisions, and Zones.

Altitude

Standard altitude of installation: 0-1000 masl
We regularly design and build products for up to 6000 masl.

Material

Mild steel
Galvanized steel
Stainless steel 304 / 316 / 316L
Custom materials available

Paint

Powder coated ANSI 61 or ANSI 70 Gray
Custom paint colours and application methods available

Hardware

Stainless steel hardware standard. Tamper-proofing and stainless steel 316 hardware available.

Product Identification

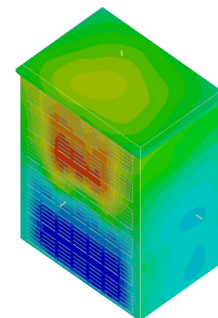
Stainless steel nameplates and custom product lamacoid tags available.



- A medium voltage resistor featuring dual CTs and a weather protected sensing resistor, coupled with a stainless steel control box featuring current and voltage monitoring



- Photo-realistic rendering of real equipment sold, featuring a stainless steel enclosure, and NEMA 7 (explosion-proof) disconnect switches and control panels
- Specifically designed for the oil and gas industry, with a very low temperature rise, proven by thermal simulation and testing
- Class 1, Div II, Group C & D, T3 temperature rating



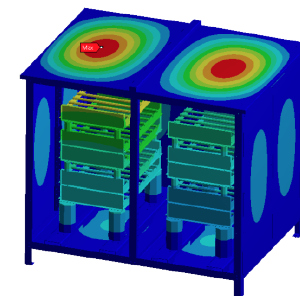
- A custom design featuring a fiberglass reinforced thermoset polyester grade electrical sheet
- Another showcase piece of a solutions based approach to the unique problems experienced in the industry



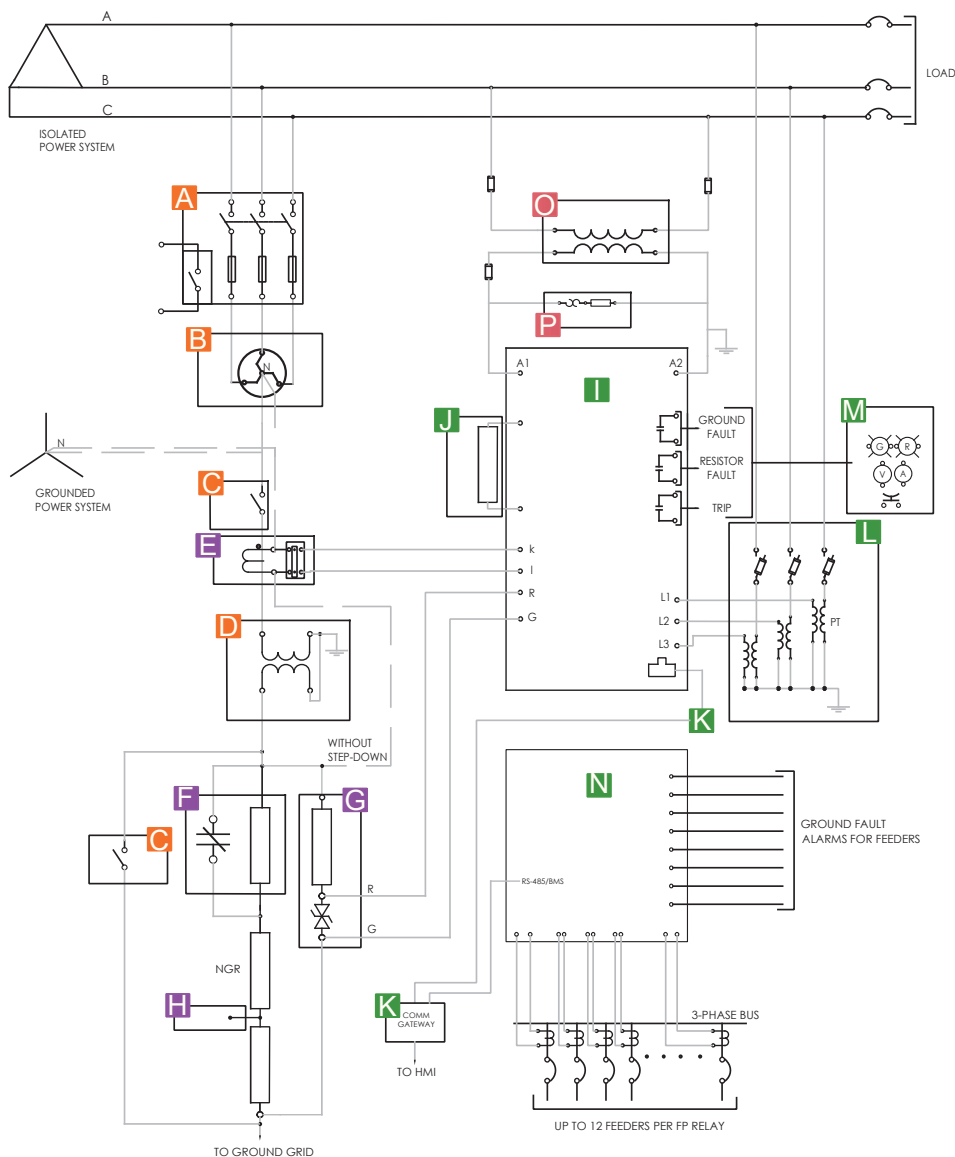
- A fully integrated high resistance grounding system connected to a delta wound transformer via an integrated zig-zag transformer
- Featuring pulsing with a vacuum contactor at medium voltage



- Our largest standard enclosure in a NEMA 4 ANSI 70 Gray configuration
- A wide range of enclosure sizes available to accommodate for varied requirements



- Removable covers for easy access for maintenance and inspection
- Displacement plot using a response-spectrum analysis (RSA)



A Load Break Switch

A load break switch can disconnect all downstream equipment in the presence of live currents.

Options:

- Customized operating handles
- Motor operators
- Auxiliary switches
- Shunt trip devices
- Fuse bases
- Interlocking

B Zig-Zag Transformer

Create an artificial neutral in systems where a neutral isn't available (i.e. delta secondary).

Options:

- Enclosure configurations: separate enclosure or in compartment of resistor enclosure
- Increased BIL
- Reduced temperature rise (standard is 150 degrees C)
- Higher altitudes of installation

C Disconnect Switch

A disconnect switch can be installed at the neutral and/or at the ground to safely disconnect equipment in the absence of live currents.

Options:

- Customized operating handles
- Motor operators
- Auxiliary switches
- Interlocking

D Grounding Transformer

A single-phase step-down grounding transformer can be connected to a generator or wye transformer neutral, resulting in a reduced voltage required for the use of some instruments and relays.

Options:

- Same as zig-zag transformer options

E Current Transformer

Measures current to coordinate relaying equipment.

Options:

- Metering class transformers
- Protection class transformers
- Custom burdens and classes
- Shorting terminal block

F Pulsing Mechanism

Local controls are used to activate a contactor to open and close an additional resistor path to modulate ground fault current at fixed levels. This allows for tracing the source of the ground fault current via the use of a handheld portable ammeter.

Options:

- Portable ammeter accessory

G Resistor Monitoring

Detection of a faulted Neutral Grounding Resistor path via the usage of a relay wired to a diode and resistor wired in parallel to the NGR.

Options:

- Open condition monitoring
- Shorted condition monitoring (CEC 2018 requirement)
- High frequency to bypass step-down transformers

H Tapped Resistor

Multiple taps are available to allow for future changes in system design that require a change of ground fault current. For example: ground fault current of both 50A and 100A, allowing you to adjust settings in the field.

I Ground fault relay

Detect ground faults and provide additional functionality.

Options:

- Voltage or current sensing
- Refer to relay table (next page) for standard relays and additional functionality

J Testing Circuit

A test resistor and controls are provided to simulate the conditions of a ground fault in order to ensure equipment is working as intended.

K Communications

Various communication forms are available including: wireless, SC fiber, and RJ45. Data logging also available and accessible via communications.

L Phase Voltage Monitoring

An additional layer of protection, allowing measurement of voltage on each phase.

M Indication and metering

Status of operation (such as system normal, resistor fault, or ground fault) can be displayed and indicated in multiple ways.

Options:

- Indication lights (push-to-test optional)
- Current and voltage measurement (analog or digital)
- Strobe light
- Audible alarm
- Remote alarms
- Touch screen display

N Multi-Feeder Protection

Monitor and protect multiple downstream feeders. In the event of a ground fault, the faulted feeder is quickly identified allowing for quick repair. In the event of multiple simultaneous ground faults, continuous operation can be maintained on the higher priority feeder, while lower priority feeders are tripped.

Options:

- Feeder monitoring (no second fault tripping)
- Feeder protection (high-low priority)
- Numbered priority feeder protection (99 priorities available)

O Control Power Transformer

Supply the required power to instruments, control, and relaying components directly from the step-down transformer.

Options:

- Custom primary voltage
- Custom secondary voltage (standard is 120 VAC)

P Enclosure Heater

Extreme environments can cause damage to components via cold or moisture from condensation. Heaters are available for control enclosures and resistor enclosures.

Other Customizations

Need capacitive charging current measurement?

Don't see a component or function you need here? No problem, contact us and we'll be able to create the best solution for you.



Features	NGRM700	RC48N	RCMA423	RCM420
AC and DC fault monitoring	Optional	-	Yes	-
Pulsing	Optional	Optional	Optional	Optional
Open resistor monitoring	Optional	Optional	-	-
Short resistor monitoring	Optional	-	-	-
Current transformer monitoring	Yes	-	-	-
Harmonics filtering	Yes	Yes	-	-
Data logging	Yes	-	-	-
Communications	Yes	-	-	-
Self-test capability	Yes	Yes	Yes	Yes
Password protection	Yes	-	-	-
Identify faulted feeders	+ RCMS490	+ RCMS490	+ RCMS490	+ RCMS490
Multi ground fault protection	+ RCMS490	+ RCMS490	+ RCMS490	+ RCMS490
Numbered feeder prioritization	+ RCMS490 + PLC	-	-	-
Multi-language	EN, FR, ES, GE	-	-	-

Current Transformers



WAB and W series CTs available for AC and AC/DC applications, various window sizes

Coupling Devices



Available up to 25 kV L/L



SE-330	SE-325	SE-701
-	-	-
Optional	Optional	Optional
Optional	Optional	-
Optional	-	-
-	-	-
Yes	-	Yes
Yes	-	-
Optional	-	-
Optional	Optional	Optional
-	-	-
+ SE701	-	-
+ SE701	-	-
-	-	-
-	-	-

Current Transformers



ELCT, CS, CT200, and more CT series available

Sensing Resistors



Available up to 72 kV L/L with weather protected terminal options

Integrated Systems and Control Boxes



Integrated high resistance grounding systems are available in a panel configuration. These units contain controls, indication lights, touch screen panels, ground fault relays, current transformers, sensing resistors, resistors, and more.

Compact control box solutions are also available, allowing you to install controls for the NGR in a physically distant location (such as in a control room for example). These can also be mounted on a side panel of an NGR enclosure.