



THE POWER
IN ELECTRICAL SAFETY

**High Resistance
Grounding Systems**

Enhance your system's safety

With Bender resistance-grounding solutions

In industrial and commercial power systems, as many as 95% of electrical faults begin as a single-phase, line-to-ground fault. In solidly grounded systems, the ground-fault current level can reach extremely high levels, 10's of thousands of amperes. In this situation, automatically interrupting the power supply is critical. However, coordination of tripping can be very difficult, and the protection is often not quick enough to prevent extensive equipment damage and arc flash incidents.

Bender high-resistance grounding systems reduce damage caused by ground faults. With Bender HRG systems, a neutral-grounding resistor (NGR) is installed between the power system's neutral and ground. The NGR limits the ground-fault current that may flow and allows the system to operate in a single-fault condition. This ground-fault current limitation minimizes additional equipment damage while dramatically reducing the probability of an arc-flash incident and the resulting hazard to personnel.



Bender's resistance-grounding equipment provides scalable solutions to a wide variety of industries where continuity of power is critical to operation:

- Oil and gas
- Pulp and paper
- Manufacturing
- Water and wastewater treatment
- Healthcare
- And many more

Bender resistance-grounding systems

- Minimize fault current
- Continue operation and locate faults while the system remains online in a single-fault condition
- Schedule maintenance instead of performing emergency service and repairs
- Reduce probability of arc flash by as much as 95%



Series 1

- Up to 12 feeders
- Ground-fault detection
- Pulsing
- Analog metering

Page 4

Series 2

- Up to 60 feeders
- AC/DC ground-fault detection
- Pulsing
- Resistor monitoring
- Harmonic filtering
- Communication / fieldbus
- Data logging

Page 5

Series 3

- Up to 120 feeders
- AC/DC ground-fault detection
- Second ground-fault protection
- Pulsing
- Resistor monitoring
- Harmonic filtering
- Communication / fieldbus
- Data logging
- Advanced feeder protection
- Touch screen HMI

Page 6

Series 1

High-resistance grounding system



Features

- **Limits ground-fault current** - Allows power systems to remain in operation in a single-fault condition by limiting ground-fault current to a low level (1 - 10 A)
- **Pulsing ground-fault function** - Reduces the time required to locate ground faults while the system remains online
- **Relay outputs** - Provide external indication or interruption where first-fault tripping is required
- **Artificial neutral** - Available to convert ungrounded systems to high-resistance grounded systems
- **Visual indicators** - a wide variety available, including LEDs, analog gauges, and HMIs
- **Wall-mount, painted galvanized steel enclosure** - Back-plane configuration available on request

Additional options

- **NGR connection monitoring** - Automatic detection of both open and shorted neutral-grounding resistors, preventing loss of ground-fault detection and dangerously high fault currents
- **AC/DC fault detection** - Detect faults from power conversion equipment, including variable frequency drives (VFD) and backup batteries (UPS)
- **Feeder-level fault location** - Up to 12 individually monitored feeders or loads
- **Separate NGR and controls** - Available in two separate enclosures

Series 2 - Intermediate High-resistance grounding system

Features

- **Limits ground-fault current** - Allows power systems to remain in operation in a single-fault condition by limiting ground-fault current to a low level (1 - 10 A)
- **Multi-channel fault detection** - Individually monitor up to 60 feeders or loads to quickly identify and locate ground-faults
- **AC/DC fault detection** - Works on systems with power conversion equipment, including variable frequency drives (VFD) and battery backup systems (UPS)
- **Pulsing ground-fault function** - Reduces the time required to locate ground faults while the system remains online
- **NGR connection monitoring** - Automatic detection of both open and shorted neutral-grounding resistors, preventing loss of ground-fault detection and dangerously high fault currents
- **Relay outputs** - Provide external indication or interruption where first-fault tripping is required
- **Artificial neutral** - Available to convert ungrounded systems to high-resistance grounded systems
- **Digital display** - Realtime readings using the built-in HMI
- **Wall-mount, painted galvanized steel enclosure** - Back-plane configuration available on request
- **Integrated web server** - Get real-time data from any connected PC or smartphone through a web browser
- **Fieldbus communication** - Integrate with building management systems with Modbus TCP/IP



Series 3 - Advanced Second-ground-fault protection system



Features

- **Limits ground-fault current** - Allows power systems to remain in operation in a single-fault condition by limiting ground-fault current to a low level (1 - 10 A)
- **Multi-channel fault detection** - Individually monitor up to 120 feeders or loads to quickly identify and locate ground-faults
- **AC/DC fault detection** - Works on systems with power conversion equipment, including variable frequency drives (VFD) and battery backup systems (UPS)
- **Multi-fault prioritization** - Prioritize circuit tripping in the event of a second ground fault, allowing critical circuits to remain in operation
- **Pulsing ground-fault function** - Reduces the time required to locate ground faults while the system remains online
- **NGR connection monitoring** - Automatic detection of both open and shorted neutral-grounding resistors, preventing loss of ground-fault detection and dangerously high fault currents
- **Artificial neutral** - Available to convert ungrounded systems into high-resistance grounded systems
- **Digital display** - Realtime readings and visualizations using the built-in HMI
- **Floor-mount, painted galvanized steel enclosure** - Back-plane configuration available on request
- **Integrated web server** - Get real-time data from any connected PC or smartphone through a web browser
- **Fieldbus communication** - Integrate with building management systems with Modbus TCP
- **Two bus-tie connections** - Provides an additional layer of protection

Ground-fault and NGR relays

For use with BHRG systems



RC48N

Features

- Adjustable AC ground fault trip value and time delays
- Monitors integrity of the neutral grounding resistor (NGR) up to 5 kV with compatible coupling device (CD1000 / CD5000)
- Two Form-C (SPDT) contact outputs
- Switchable wide band or band-pass filter



NGRM700

Features

- AC/DC ground-fault detection
- Monitors integrity of neutral grounding resistor (NGR) using active and passive methods - works when system is online or offline
- Open and shorted NGR detection
- Detachable HMI
- Integrated web server, Modbus TCP/IP, and Modbus RTU
- Phase-voltage monitoring



RCMS490 Series

Features

- AC/DC ground-fault detection
- Twelve channels with individual settings
- Digital display with real-time readout
- Separate Form A (SPST) outputs for each channel
- Connects to COM465IP communication gateway for web-based alarm notifications and Modbus TCP/IP integration



NGR Resistors

Features

- Open, helical stainless steel wire wrapped around tubular, porcelain core
- Ideal for low-current conditions
- Excellent power dissipation, stable resistance
- Shock proofing



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