BENDER
The Power in Electrical Safety™

Ground fault protection

For marinas and shore power

Brochure

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Complete electrical safety solutions for marinas - Stay on top of any potential water shock hazards

Why does a marina need ground fault protection?
The combination of water and electricity can create a hazardous situation. Boats continuously connecting to and disconnecting from shore power, poor ground bonding, "hot" conductors touching ground, and corrosion can lead to the possibility of electric current flow through the hull of a ship and into the water. This situation can become hazardous for people who may come into contact with the water, resulting in severe injury or even death by electric shock drowning.

Requirements for ground fault protection
There are several standards, code requirements, and state laws that require ground fault protection on marina shore power, including but not limited to:

- National Electric Code (NFPA 70 / NEC), Article 555.3 (2011)
- NFPA 303 (Fire Protection Standard for Marinas and Boatyards)
- KRS Chapter 235, Commonweath of Kentucky

Advanced ground fault monitoring systems by Bender
Bender provides advanced ground fault monitoring and protection systems to assist in the mitigation of ground faults and the electric shock hazards when connecting to shore power. Alarms activate when a ground fault is detected, including at the time a boat connects to shore power. Monitoring capabilities can be provided anywhere from the main feeder down to the individual pedestals and boats. Low-level ground fault current can be detected, even at the "let-go" current level and below. Remote communication options quickly notify staff and technicians of ground fault issues, assisting in predictive maintenance.

Marina-ready GFCI protection at the dock
Suggested changes to the 2017 edition of the NEC include adding Class A GFCI protection to individual marina docks. Bender's DockGuard provides advanced, Class A GFCI protection in an easy to install solution designed specifically for marina docks. The DockGuard provides ground fault monitoring and circuit interruption, ideal for both new construction and retrofit installatrions.

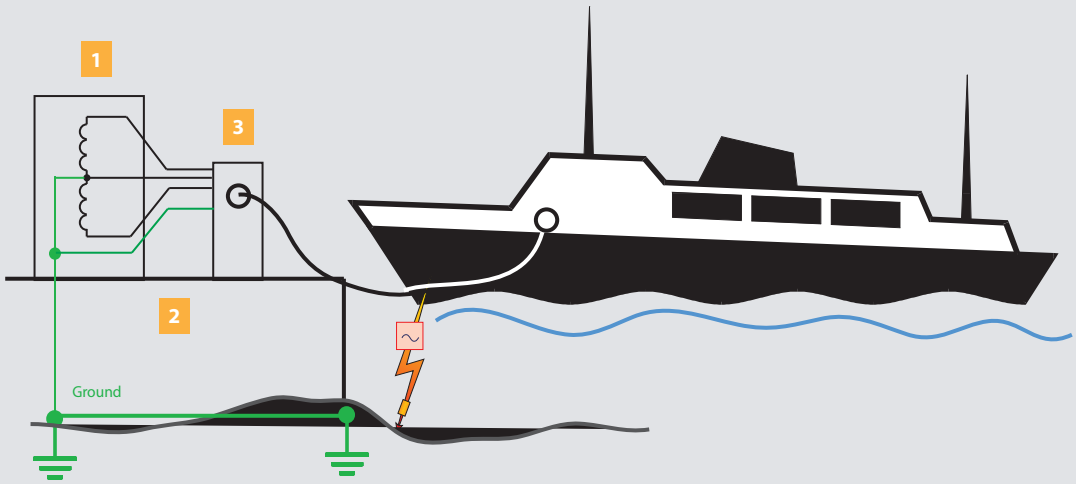
Ground fault protection across the entire marina

Advanced monitoring available from the main feeder to the individual pedestals

1 **Main feeder monitoring -** MarinaGuard series

2 **Individual dock protection -** DockGuard series

3 **Component integration into pedestals -** RCM420, RCMS series



Individual dock protection

Protect people and equipment with the DockGuard marina-ready GFCI

DockGuard ground fault protection panel

Features:

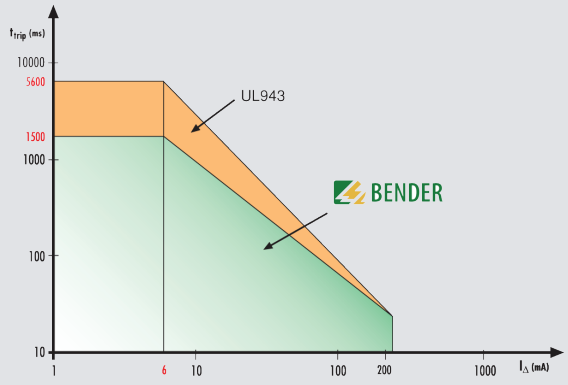
- Electric Shock Drowning Protection - Designed to provide Class A personnel protection, in compliance with UL 943, to marina docks
- Equipment Protection - Additional field-adjustable models available for equipment protection to docks and boats
- Future Proof - Complient to suggested 2017 National Electric Code requirements of Section 555
- Adaptable - Works on virtually any electrical system, detecting both AC and DC ground faults
- Real-Time - Provides real-time readings of ground fault current on a digital display inside enclosure
- Easy To Install - Simple, flexible installation method for virtually all dock types and locations

Advanced Class A GFCI protection with Bender equipment

Advanced monitoring available from the main feeder to the individual pedestals

The Bender GFCI advantage

- Class A listed GFCIs for up to 100 A circuits
- Detects and interrupts on both AC and DC ground faults
- Nuisance tripping mitigation with integrated inverse trip time curve and advanced filtering circuitry
- Connection monitoring and grounded neutral protection
- Digital display allows for reading of ground fault current in real-time



Inverse trip time curve built into the Bender GFCI

Main feeder monitoring

A complete monitoring solution for shore power

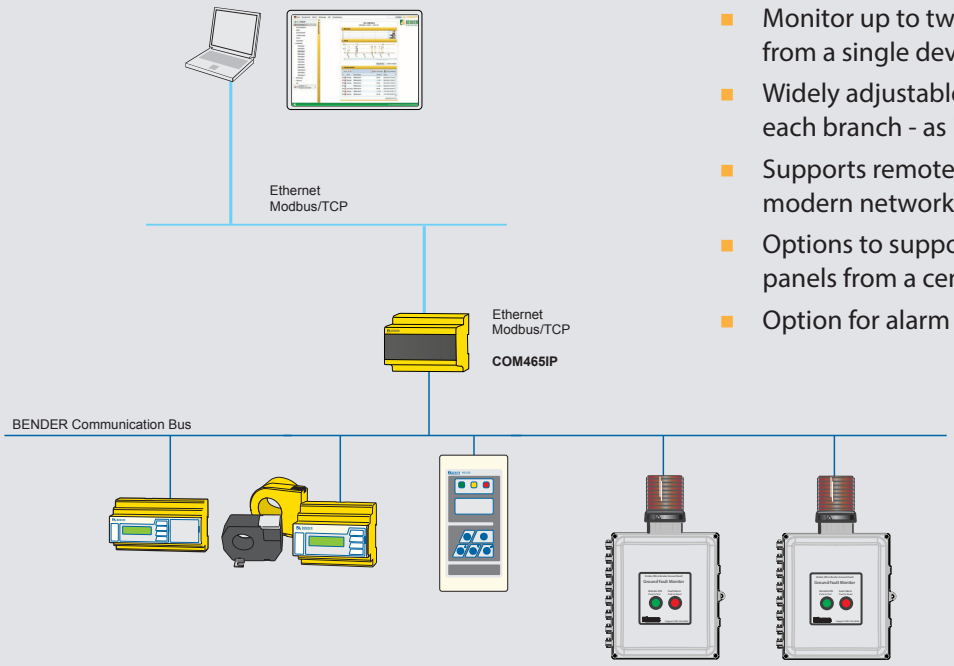
MarinaGuard series ground fault monitoring system

Features:

- Fufills requirements of various codes and laws, including NEC article 555.3, "Ground-Fault Protection"
- A complete ground fault monitoring solution for shore power feeders and docks
- Various alarm level options available - as low as 10 mA and as high as 20 A - includes the 100 mA required alarm level
- Perfect for system retrofits to comply with new regulations and requirements
- Strobe light for clear visual indication of alarm status
- Options available for monitoring 1, 2, 3 or 12 separate branches from a single panel
- Remote communication options

Communication and centralized branch monitoring with MarinaGuard

Identify ground faults in an individual branch, from a centralized location, and keep the rest of the marina up and running



- Monitor up to twelve (12) individual branches in parallel from a single device
- Widely adjustable trip levels, individually adjustable for each branch - as low as 6 mA and as high as 20 A
- Supports remote digital communication - connect up to modern networks such as Ethernet and Modbus/TCP
- Options to support remote stations to monitor multiple panels from a centralized location
- Option for alarm notification via text message / SMS

Pedestal integration solutions

Advanced ground fault monitoring at individual pedestals

RCM420 series ground fault monitor

Features:

- Small form factor allows for easy integration into pedestals
- Varying size external current transformers available for various system sizes and installation flexibility - from 1" to over 8"
- Digital display with real-time reading; can be displayed for easy technician access to read-time ground fault current readings
- Adjustable trip level from 10 mA to 10 A
- Two separate SPDT contact outputs

Integrate Bender's advanced protection solutions into marina pedestals

Harbor Light SS power pedestal, courtesy Marina Electrical Equipment, Inc.

RCM420 ground fault monitor

- Small form factor fits into virtually all pedestal sizes
- Adjustable trip levels
- Modular sized current transformers to fit varying branch sizes
- Digital display allows for reading of values in real-time
- Output contact connects to contactor or shunt trip to provide interruption on a ground fault

RCMS series multi-channel ground fault monitor

- Monitor multiple branches / receptacles from a single device
- Individually adjustable trip levels
- Individual outputs available to individually trip contactors or shunt trip coils
- Compatible with remote communication system for central monitoring of monitoring equipment

Pedestal integration solutions

Advanced ground fault monitoring at individual pedestals

RCMS490 series multi-channel ground fault monitor

Features:

- Monitor up to twelve separate branches from one device
- Varying size external current transformers available for various system sizes and installation flexibility - from 1" to over 8"
- Monitors for AC, DC, and mixed AC/DC ground faults (when using appropriate current transformer)
- Individual trip level settings for each channel / branch
- Digital display with real-time reading; can be displayed for easy technician access to read-time ground fault current readings
- Adjustable trip level from 10 mA to 20 A
- Individual contact outputs for each branch

Current transformers

Features:

- Sensitive current transformers for use with Bender ground fault relays
- Varying sizes allows for flexible, modular installation
- AC current transformers available for use with the RCM420 series ground fault monitor
- AC and DC current transformers available for use with the RCMS series multi-channel ground fault monitor

Global Experts in Electrical Safety

For over 70 years, Bender has been a global leader in ground fault protection. With over 50 agencies and partners across the globe, Bender has a local office to help you from the design phase through the support phase of your project. Our years of technical experience and broad portfolio of products, utilizing the latest in protection technology, will help you create the best solution to meet your needs. Top-notch service and support across the globe ensure that your electrical network remains in peak condition. From industrial plants to mines to hospitals, Bender is the right choice to protect your electrical system.

Bender online: Your electrical safety resource

- Complete listings of products with comparisons, documentation, datasheets, and technical information
- Industry specific knowledge to help you pick the right product
- Your electrical safety questions answered in our extensive knowledgebase with application notes
- Product selection tools
- Isolated power solution builder for hospitals
- Local representative information

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