



**Electrical  
Safety  
Solutions for  
Railways and  
Transit Systems**



# MAXIMIZE SYSTEM UPTIME

With Bender electrical safety equipment for transit networks.

Rail and transit operators frequently encounter ground faults in electrical power systems, whether in the signaling system, heaters, or rolling stock. If left unaddressed, ground faults can injure personnel, damage equipment, lead to signal failure, and affect system downtime.

Bender is a world leader in providing ground fault protection equipment to the transportation industry. Bender products ensure transportation technicians are quickly notified of both trending and catastrophic electrical safety issues. Developing faults are identified in real-time, with notification provided remotely with integratable network equipment.

## **Bender provides advanced electrical safety technology to the transportation industry:**

- Integratable solutions for virtually all rail and transit applications
- Equipment for monitoring infrastructure and rolling stock using the latest in system monitoring technology
- Custom solutions for location-specific requirements
- Early detection of ground faults which can cause damage to personnel and equipment, and signal failure
- Enables preventative maintenance
- Integration into existing modern communication networks, including industrial Ethernet protocols such as Modbus

# Signaling systems

## Detect and trend ground faults that can cause improper signaling



Ground detection is vital for the proper operation of railroad and transit signaling equipment. Ground fault current can be the difference between a signal relay improperly energizing or de-energizing, resulting in incorrect rail signals.

The Bender iso685 utilizes the latest in monitoring technology to detect ground faults in ungrounded AC/DC systems. The iso685 monitors the system's insulation resistance, and alarms when a breakdown is detected. Both symmetrical and asymmetrical faults are detected. Troubleshooting equipment has never been easier with the new isoGraph feature, which trends the system's insulation resistance over time.

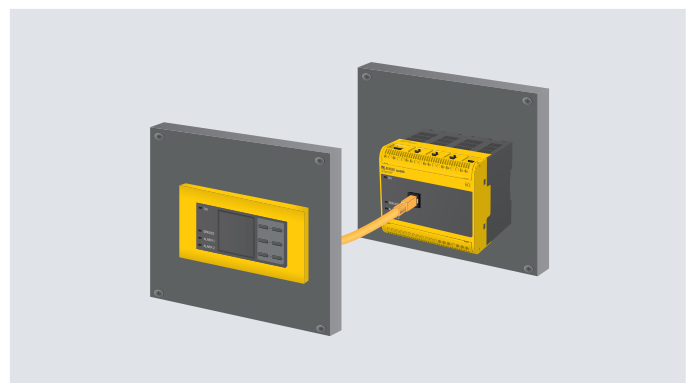
The iso685 supports remote communication back to control centers, using modern communication protocols such as Modbus/TCP.

### Features:

- Minimize equipment downtime with advanced notifications of AC/DC ground faults, both symmetrical and asymmetrical
- Digital display with real-time readout and trending over time via isoGraph
- Adjustable alarm values up to 10 MΩ
- Built-in web server - connect to the iso685 via Ethernet to view device status and change settings
- Built-in Modbus/TCP support

### Detachable front panel mounting - "S" models

- Duplicates all displays and push buttons on a detachable front plate
- Designed for flush mounting (other options available)
- Maintain low voltage at the panel front - system voltages remain with the core device
- Simple, low voltage connection with RJ45 cable



# Track heating systems

## Monitor for ground faults causing track heating malfunctions



RCM420 series ground fault monitor

Switch heaters require continuous operation, particularly during hazardous weather conditions. A ground fault condition, which can be caused by factors such as improper track grounding and wet areas, may cause little to no power to reach the heating resistor.

The RCM420 continuously monitors for ground faults in grounded heating systems. Its compact size is ideal for heater control panels. Features include true RMS readings, real-time values displayed onboard the device, and two separately adjustable alarms and contact outputs. A wide range of current transformer sizes allows for easy installation.

### Features:

- True RMS readings
- Digital display with real-time readout
- Adjustable trip level, from 10 mA up to 10 A
- Wide range of current transformer sizes
- Two separate SPDT contact outputs



# Inside cars and locomotives

## Protect essential systems onboard rolling stock



RCMS series multi-channel ground fault monitor

Bender's RCMS460 and RCMS490 monitor for ground faults in grounded and high-resistance grounded AC/DC systems, as well as systems with variable frequency drives. Up to twelve separate strings / inverters can be monitored in parallel, with individually set alarm levels. The device's LCD display shows the status of each channel in real-time.

### Features:

- Multi-channel ground fault monitoring for up to 12 separate AC/DC branches
- Individually set alarm levels for each branch - as low as 6 mA, and as high as 20 A
- Display shows each branch's measured ground fault level in real-time
- Harmonics analysis
- Option for individual output relays for each channel (available in RCMS490 models)
- Compatible with Bender's remote communication system

## The multi-channel advantage

Monitor up to twelve branches for AC and DC ground faults from a single device

- Monitor up to twelve branches from a single device
- Modular design allows for individualization - each channel has its own trip level, current transformer size, and more
- Simple bar graph indication shows the alarm status of each channel
- RCMS490 devices feature individual contact outputs for each branch - individually notify or interrupt
- Connect to Bender's remote communication system - remotely view alarm status, measured values, and more



# Communicate and integrate

Advanced tools to quickly locate, inform, and analyze



COM465IP communication gateway



CP700 communication gateway and HMI

## Standard features:

- Adds supported Bender and third party devices to modern industrial communication networks
- Modern, responsive web interface working in virtually any web browser
- Connects to standard Ethernet networks
- Check the status of devices and alarms across multiple communication protocols on a single screen
- Third party device support - connect third party Modbus/TCP devices to view specified data points
- Supports virtual setpoints - create custom alarms using conditional or mathematical alarms, combine multiple devices, and integrate third party devices

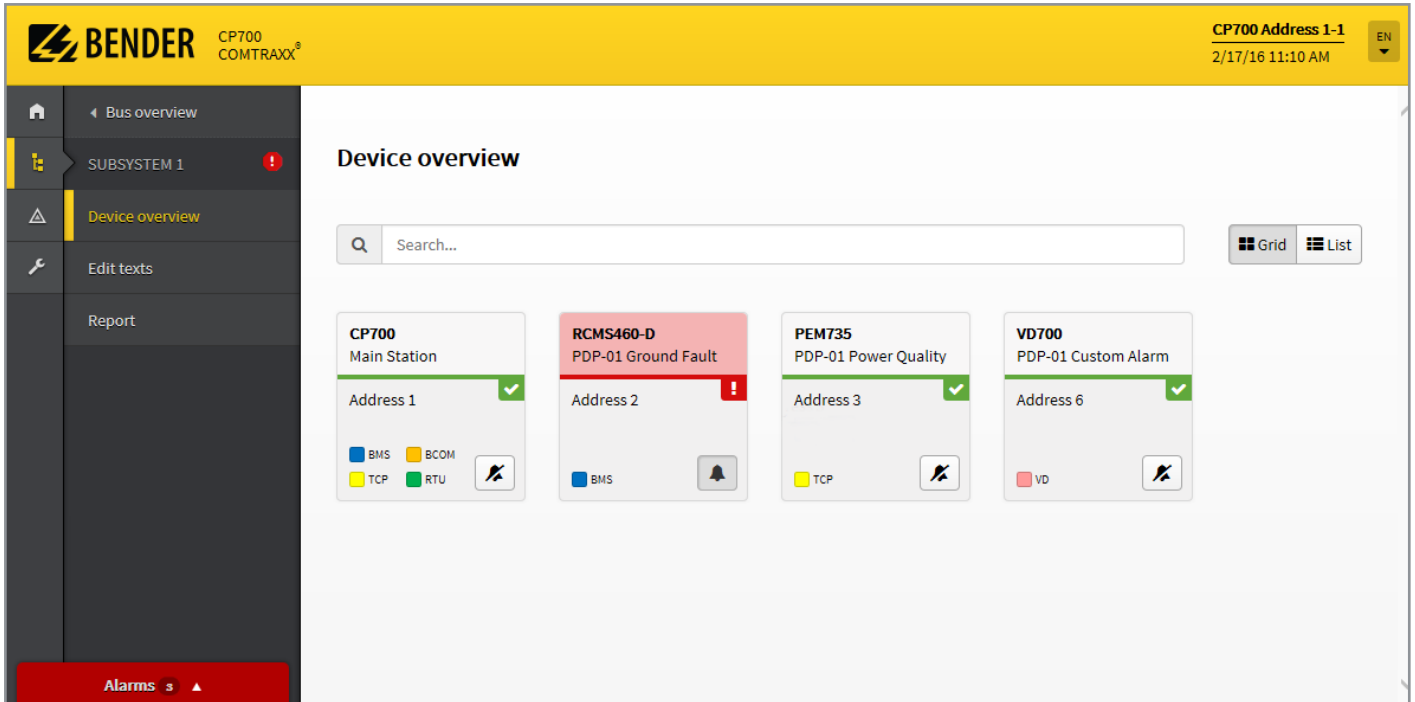
## Key additional options:

- Identify devices and alarm channels with custom names
- Receive e-mail notifications on specified trigger events
- Connect Bender devices to Modbus/TCP networks
- Remotely modify settings for connected Bender equipment
- System visualizations - visual overviews of systems with equipment locations; identify physical locations of alarms with no programming required

## CP700 features:

- All of the features of the COM465IP
- Touch screen interface showing device status and alarms, including features available through the web interface right on the device



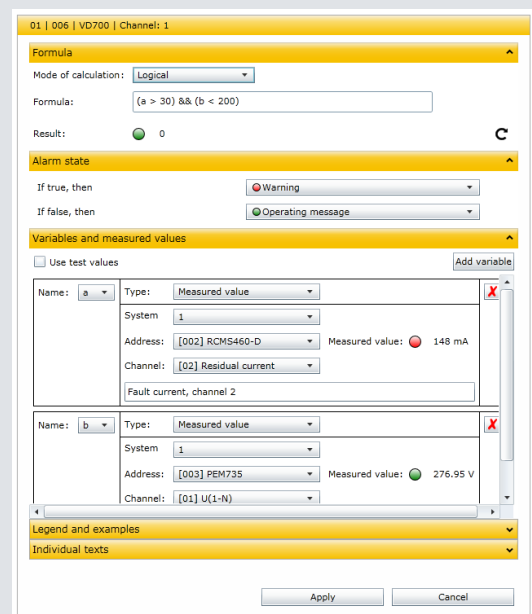


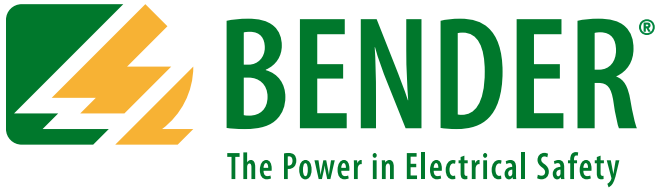
- Easy to use status indication for connected devices
- Unified status screen for devices connected across multiple communication buses (Bender RS-485 bus, Bender Ethernet bus, Modbus/RTU, Modbus/TCP)
- Drill-down for each device shows detailed readings, including values and alarms for all single- and multi-channel devices
- Modern design - HTML5-based interface, works in virtually all web browsers
- Touch-friendly, responsive layout for mobile devices
- Grid-type and list-type views available
- Custom alarms created with virtual setpoints appear in the same list as connected devices

## Virtual setpoints

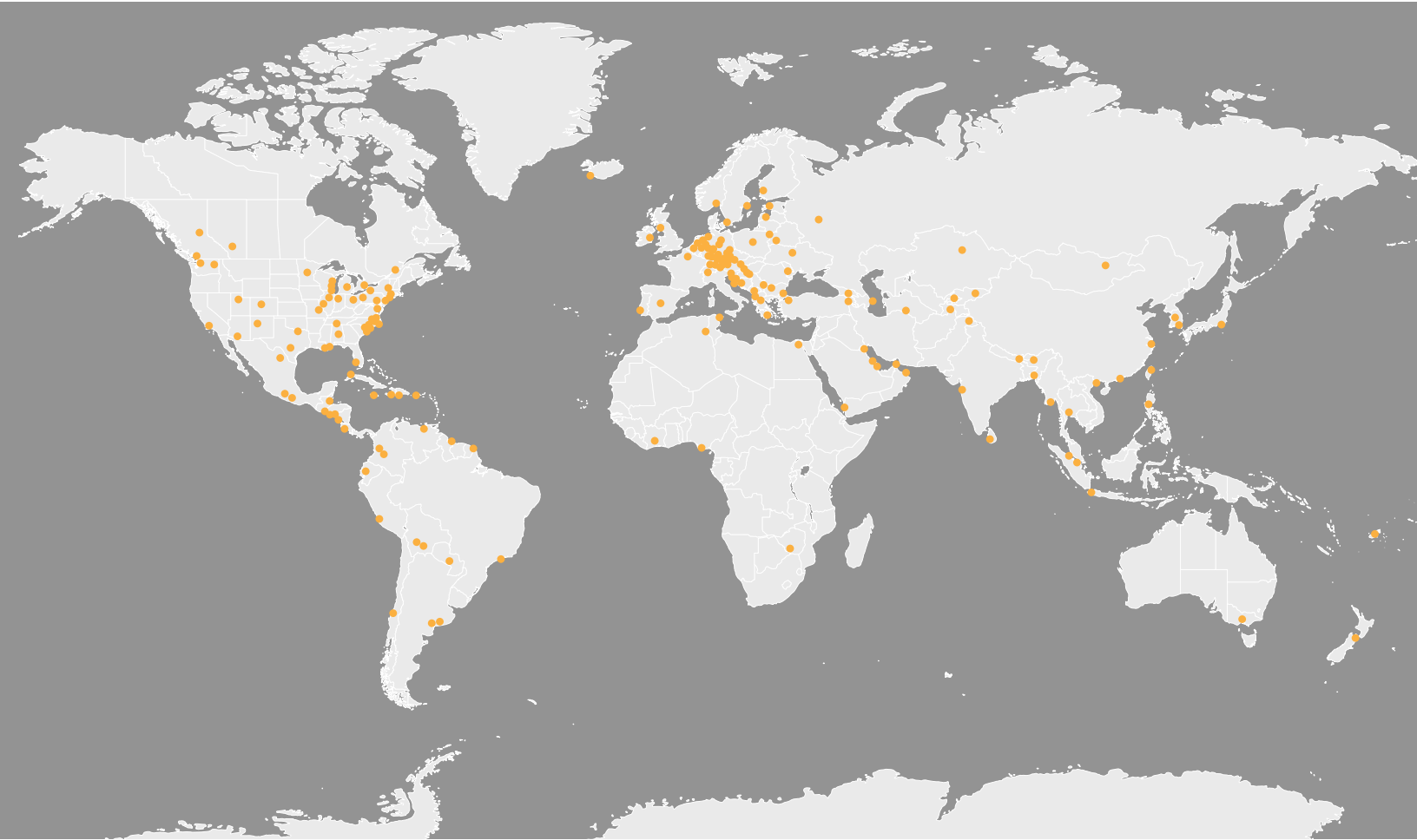
### Create custom alarms tailored to specific applications

- Create custom conditional or mathematical alarms
- Combine multiple devices or specific channels into a single alarm
- Tailor alarms to specific locations or applications
- Integrate third party Modbus devices into custom alarms
- Custom alarms appear as any other device type on the main screen, including custom naming





**Bender is located in over 70 countries around the world**



**USA • Exton, PA**

+1 800.356.4266 • [info@benderinc.com](mailto:info@benderinc.com)  
[www.benderinc.com](http://www.benderinc.com)

**Canada • Mississauga, ON**

+1 800.243.2438 • [info@bender-ca.com](mailto:info@bender-ca.com)  
[www.bender-ca.com](http://www.bender-ca.com)

**México • Ciudad de México**

+55 7916.2799 • [info@bender.com.mx](mailto:info@bender.com.mx)  
[www.bender.com.mx](http://www.bender.com.mx)

**South America, Central America, Caribbean**

+1 484.288.7434 • [info@bender-latinamerica.com](mailto:info@bender-latinamerica.com)  
[www.bender-latinamerica.com](http://www.bender-latinamerica.com)

**Chile • Santiago de Chile**

+56 2.2933.4211 • [info@bender-cl.com](mailto:info@bender-cl.com)  
[www.bender-cl.com](http://www.bender-cl.com)

**Spain • San Sebastián de los Reyes**

+34 9.1375.1202 • [info@bender.es](mailto:info@bender.es)  
[www.bender.es](http://www.bender.es)