

Microcontroller Based Low Voltage Digital High Resistance Grounding System

Powerohm Digital High Resistance Grounding Systems are an economical means of improving a three-phase ungrounded power system by providing the following advantages:

System Protection: Offers protection by providing a ground-to-neutral connection for a three-phase power system, while still allowing to operate as an "ungrounded system." When the neutral of a system is not grounded, the system is vulnerable to potentially damaging ground faults.

Transient Overvoltage Reduction: A high resistance grounding system reduces the magnitude of high transient overvoltages appearing during normal switching of a circuit having a ground fault. High transient overvoltages may cause failure of equipment or insulation at locations on the system other than at the point of the fault.

Ground Fault Detection Warning: Instantly provides a warning when the first ground fault occurs through an alarm signal. An optional audible horn or red warning beacon is available.

Ground Fault Location Simplified: A pulsing contactor allows the ground fault location to be quickly located by use of a portable clamp-on current detector. The ease and swiftness of ground fault location eliminates the need to trace faults by opening and closing secondary feeders, branch circuits and individual loads one at a time.

Uninterrupted Service: A single line-to-ground fault left in operation may result in a second ground fault. If a second fault occurs on another phase before the first is removed, considerable damage may be caused by the relatively high line-to-line fault current. The potential for quickly locating and removing faults before damage occurs to critical processes minimizes outages, and costly manufacturing shutdowns.

Improved Personnel Safety: Reducing transient overvoltages, equipment arcing, fault levels, insulation failures and fault tracing through circuit isolation schemes decreases hazards to personnel.



Touch Screen Features

- Large 7" color LCD touch screen
- Simultaneous display on Home screen for neutral ground current, three phase voltage, and neutral voltage.
- On-screen Icons for Quick Start, System Set Points, User Settings, Data Log, Diagnostics, and others for ease of installation and data log/event history retrieval.
- The Quick Start feature guides the user automatically step-by-step through the settings required at start up.
- View data log history in Calendar screen to easily find a specific event.
- View up to one year's history of neutral current/voltage in a graph, allowing for easy visual observation of how the neutral current/voltage has changed throughout the year.
- Diagnostics features include voltage/current calibration, ground fault simulation, and automated capacitive charging current detection.

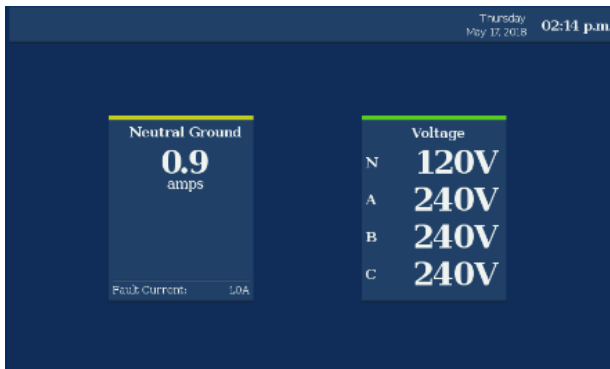


Figure 1: Home Screen

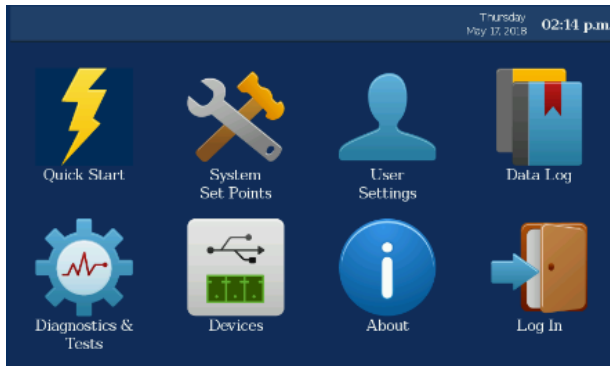


Figure 2: Main Menu

Standard Features

- User-selectable ground fault detection method: neutral current or line voltage
- Automatic NGR connectivity test
- Microprocessor based logic with real time clock capable of running 7+ years without AC power. The clock is accurate to plus/minus two minutes per year over the full temperature range. Includes low battery indicator.
- The on-board data log memory can store over two years of event history (approx. 112,000 events). The event history can be viewed on screen or by saving it to a USB flash drive. The event history is recorded as a tab delimited file and can be easily opened in Microsoft Excel.
- Multilevel password protection
- On-screen language support for English, Spanish, and French.
- For added safety, a through-door USB port is provided to access data log history without opening the controller door.
- Status LEDs on PCB board inputs/outputs provide visual indication of on/off status.
- System self-test on power up
- Serial communication to PCBs reduces the number of wires for improved reliability
- Audible horn with 12-hour, 24-hour, and 48-hour alarm silence
- Remote alarm contacts for ground fault, low voltage, NGR fault, and control power available

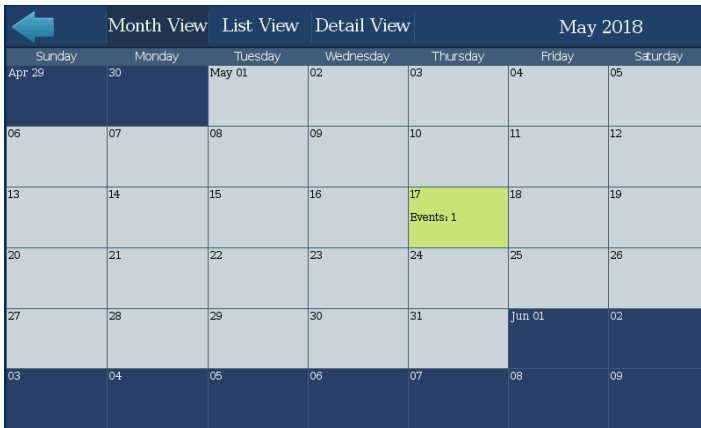


Figure 3: Data Log Calendar View

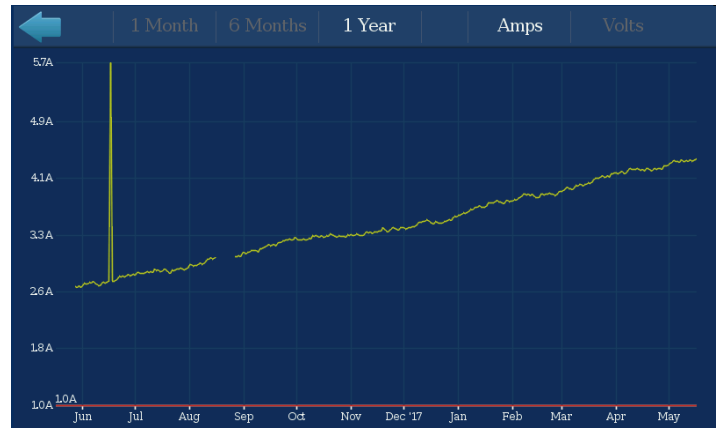


Figure 4: Average Daily Amps/Volts Graph

Auxiliary Programs

The controller includes as standard ten (10) discrete auxiliary inputs and eight (8) outputs. All auxiliary I/O can be field programmed using the touchscreen and include the ability to add custom messages for on-screen display and data logging. Expandable 12-Channel I/O board for additional I/O.

Events & Alarms

Each record tracks:

- Date and time
- Neutral Current
- Neutral Voltage
- Line voltage for all connected phases
- Login state
- State of every alarm
- The state of all aux programs (48 aux programs available)

Alarm Messages

- Phase A/B/C Ground Fault
- NGR Fault
- Low Current
- Low Voltage
- Low/Missing Clock Battery
- Pulser Fault

Event Messages

- System Reboot
- User Login
- Logged Out
- Date Changed
- Time Changed
- Pulser Turned ON
- Pulser Turned OFF
- NGR Test Begin
- NGR Test End

Set point changes are recorded in the data log, tracking the previous value and the new value.

Model Number Designator

	HRG	<u>4</u>	<u>W6</u>	<u>C</u>	<u>F</u>	<u>N1</u>	<u>61</u>	<u>E</u>	<u>1</u>	<u>*</u>
SYSTEM VOLTAGE		↑	↑	↑	↑	↑	↑	↑	↑	↑
	240V	2								
	480V	4								
	600V	6								
SYSTEM TYPE										
	WYE, 50 Hz		W5							
	WYE, 60 Hz		W6							
	DELTA, 50 Hz		D5							
	DELTA, 60 Hz		D6							
GROUND FAULT CURRENT										
	1-5/2-7			A						
	2-5/3-7			B						
	1-7/2-10			C						
	2-7/3-10			D						
	2-10/3-15			E						
ENCLOSURE STYLE										
	WALL MOUNTED (600V OR LESS)				W					
	FLOOR MOUNTED				F					
	SWITCHGEAR				P					
ENCLOSURE TYPE										
	NEMA 1					N1				
	NEMA 3R					N3				
	NEMA 12					N2				
	NEMA 4					N4				
	NEMA 4X					NX				
ENCLOSURE FINISH										
	Painted Ansi-61 Gray					61				
	Painted Tiger Black					TB				
	Stainless Steel 304					S4				
	Stainless Steel 316					S6				
LANGUAGE										
	English							E		
	Spanish							S		
	French							F		
LABELS										
	Printed								1	
	Etched								2	
	Stainless Steel								3	
OPTIONS										*

Options

- AC – Anti-Condensation Heater
- AH – Edwards Horn
- BS – Bug Screens
- DL – Door Lock
- MB – Modbus over RS485
- ME – Modbus over Ethernet
- P1 – Amber Pulsing Pilot Light
- P2 – White Pulsing Pilot Light
- ST – Shorting Terminal
- UL – UL Rated
- WB – Warning Beacon

Consult factor for other options.