



ADVANCED POWER
TECHNOLOGIES

Photovoltaic Effective Grounding Zigzag Transformer



SunnyGnd-Series Solar Power Effective Grounding System Solutions Brochure

www.appt-power.com
433 N. 36th Street
Lafayette, IN 47905
(765) 446-2343

**SAFE SMART SIMPLE SWITCHGEAR &
ENGINEERED POWER SYSTEM SOLUTIONS**



ALN: 535 Rev. 01

Design Criteria & Construction



Figure 1: High Resistance Grounding System NEMA 1 External/Internal

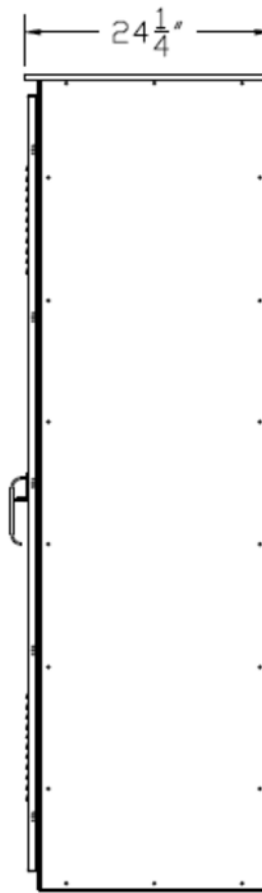
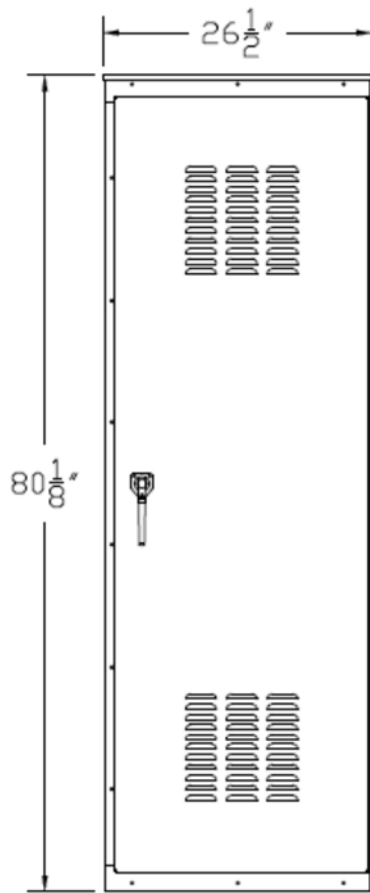
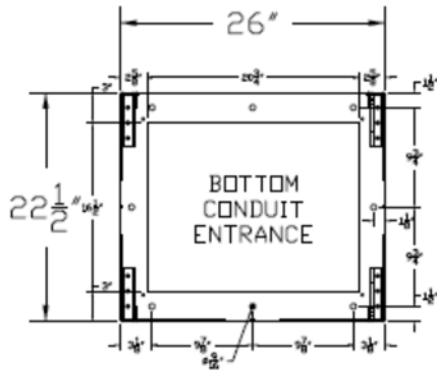


Figure 2: High Resistance Grounding System NEMA 3R Internal/External

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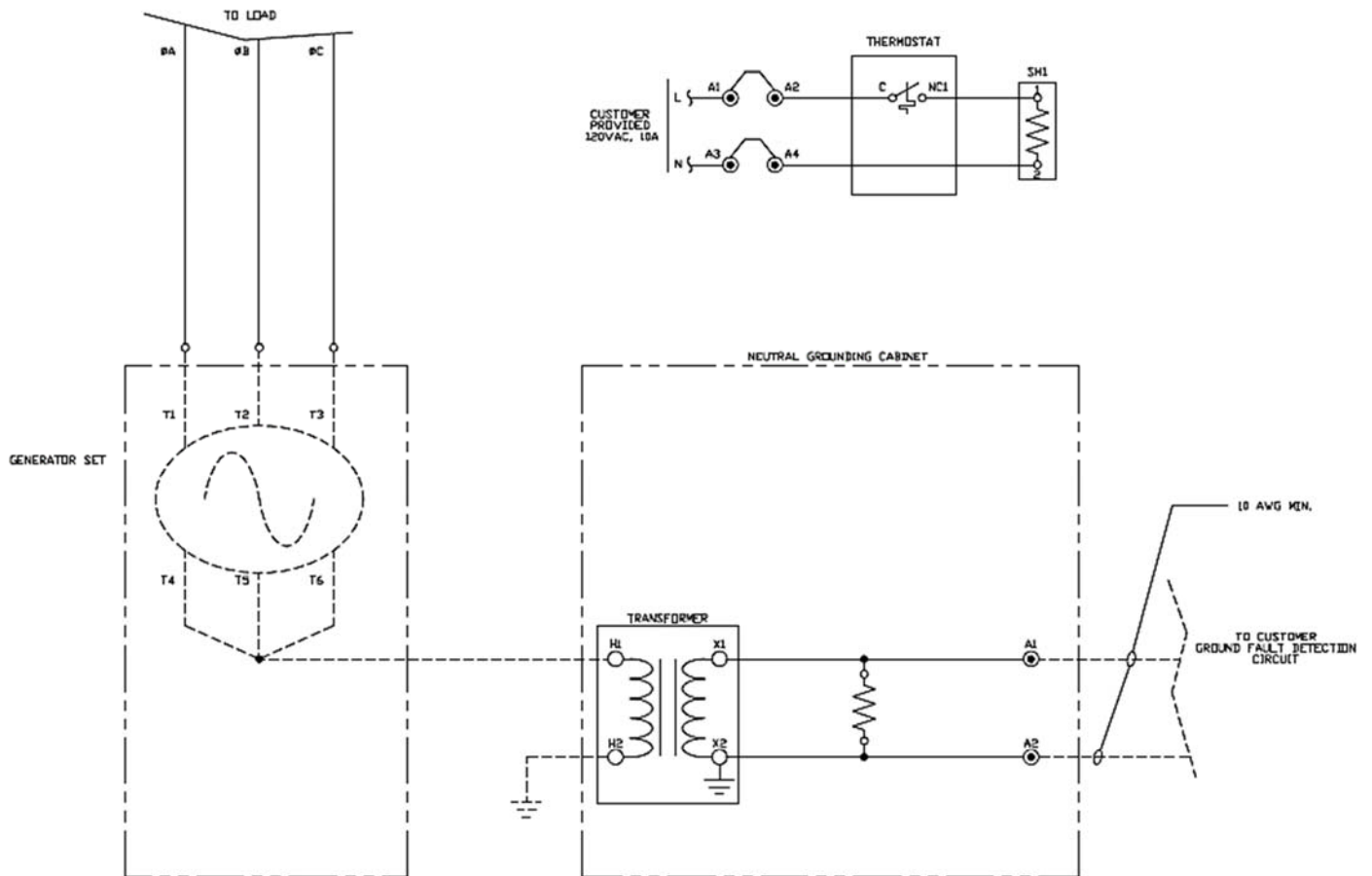
- ⦿ System Ratings:
 - Voltage: 480V (3Ø)
- ⦿ Designed & factory tested to IEEE Standard 32-1972
- ⦿ With the rapid increase in the construction of solar farms and the conversion of DC voltage to AC voltages, the question of how to provide effective grounding to the AC side of the system has taken center stage.
- ⦿ Many utilities are requiring that solar installations are effectively grounded.
- ⦿ An appropriately engineered APT SunnyGround-Series Photovoltaic Effective Grounding System will provide the hardware and controls necessary to effectively ground the AC side of the system.
- ⦿ The SunnyGround-Series is designed to satisfy stringent utility requirements for impedance, fault current, fault X/R ratio, and continuous current.
- ⦿ Complying to these requirements with the proper control scheme will make your solar installation as reliably protected from ground faults as traditional three phase AC grounded systems.
- ⦿ Transformer:
 - Over-fluxed to minimize the effect of magnetizing inrush when the ground fault occurs
 - Sized to minimize contribution to the creation of ferroresonant circuit in the power system
- ⦿ Transformer-Resistance Combination:
 - Matched duty rating
 - Sized to introduce the amount of zero sequence resistive fault current which exceeds the amount of capacitive ground fault current
- ⦿ Design Considerations:
 - Continuous duty
 - Total system capacitance
 - High re-striking voltages
 - Capacity provided for system expansion
- ⦿ Internal Climate Control to include (2) Space Heaters with a Thermostat
 - Requires customer supplied 120VAC, 10A circuit
- ⦿ Neutral Sensing & Monitoring for field interconnection to the ground fault alarm relay with secondary leads wired to terminal blocks:
 - Window Type Current Transformer
 - Unfused or Fused Voltage Transformer

5kV Dimensional Drawing



EXTERNAL

Schematic & Wiring



About Advanced Power Technologies



Advanced Power Technologies (APT) is on the cutting edge of the latest engineered power system smart technologies, as it relates to microgrid & storage management, renewable & conventional energy source deployment, demand peak shaving, and facility back-up and co-generation power systems. Located in the central United States and headquartered in Lafayette, Indiana with solutions development engineers around the country, APT provides domestic and international products and services to industry leading companies from around the world. APT engineers have decades of power system experience from working with some of the largest companies in industry. Over the last two decades, we have produced successful solutions for hundreds of large-scale electric power projects involving utility/generator paralleling, transfer, peak shaving, and distribution. We pride ourselves in providing electrical power systems that are engineered and custom built, utilizing state-of-the-art technologies to fit our customer's exact needs. The core of our business is low & medium voltage engineered power systems for a wide range of indoor & outdoor applications, such as:

- ⦿ Utility(ies) and Generator(s) Paralleling/Transfer/Peak Shaving/Distribution Switchgear
- ⦿ Microgrids, Microgrid Master Control Panels, SCADA systems
- ⦿ Containerized Battery Energy Storage Systems (BESS)
- ⦿ Photovoltaic (PV) Solar Power Collection/Distribution & Renewable Energy Storage Systems
- ⦿ Low & High Resistance Grounding Systems, Grounding Systems for Photovoltaic Effective Grounding
- ⦿ High Efficiency Combined Heat and Power Switchgear & Control Systems (CHP, Co-generation)
- ⦿ Outdoor Walk-In electrical houses (e-houses) & Skid-Mounted Switchgear
- ⦿ Motor Control Centers & Motor Control Switchgear
- ⦿ Automatic & Manual Load Transfer Switchgear
- ⦿ Bypass/Isolation & Power Distribution Circuit Breaker Switchboards
- ⦿ Generator/Loadbank Quick Connection Switchgear, Switchboards, & Tap boxes
- ⦿ Industrial Control Panels

Please see our product webpages on www.appt-power.com for product brochures and relevant information. Actual products may look different from images shown on the website and in brochures, based on actual specifications.

APT cares and understands that each power system is different. We will evaluate various solutions in order to develop the best solution for a site. APT focuses on our ability to a combine several traditional pieces of equipment/functionality into as little of a footprint possible. This saves on space, the cost of equipment, cost of installation, and accomplishes the most optimal/state-of-the-art design your facilities. APT's desires to foster and grow a culture of continued open communication with each customer. Let APT be your source to provide fully engineered power system equipment solutions for the full customer facility on time, on or under budget, and in the smallest footprint possible. We are always available to assist customers and engineers representing customers in the development of complex power solutions for all facility types.

Figure 11: High Impedance Grounding System
ANSI 61 Gray*

Figure 12: High Impedance Grounding System
with Custom Colors*

- ⦿ System Voltage Rating:
 - 2.4kV-15kV (3Ø)
- ⦿ Designed & factory tested to IEEE Standard 32-1972
- ⦿ Designed to meet all applicable specifications from:
 - Seismic Zone 2 requirements of the Uniform Building Code
 - ANSI, NEMA
 - NEC, NFPA
 - OSHA
- ⦿ Standard Enclosure:
 - Filtered ventilation louvers
 - Pad-lockable hinged access door
 - Metallic Mill-Galvanized Finish
 - NEMA 1/3R for indoor/outdoor applications
 - Bottom Entry/Exit
- ⦿ Enclosure Options:
 - Aluminum, Stainless Steel (304 or 316)
 - Powder coated ANSI 61 Gray or custom colors available.
- ⦿ Neutral Sensing & Monitoring:
 - Window Type or Bar Type Current Transformer
 - Secondary leads wired to terminal blocks for field interconnection to the generator ground fault relay
 - Unfused or Fused Voltage Transformer
- ⦿ Approximate Weight: 500 lbs.

Figure 13: High Impedance Grounding System
ANSI 61 Gray*

Figure 14: High Impedance Grounding System
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