



**CONNECT AND PROTECT**

# nVent Energy Storage Solutions

ERICO ERIFLEX HOFFMAN





At nVent, we believe that safer systems ensure a more secure world. We connect and protect our customers with inventive electrical solutions.

## One nVent

Explore nVent — backed by more than 100 years of excellence — at [nVent.com](https://www.nvent.com)

**130+**  
Manufacturing,  
service, sales and  
distribution centers



Global customers

**9,500+**  
Global  
workforce



Local capabilities and  
localized solutions

**500+**  
Patents



Positioned to serve  
fast-growing economies

# Welcome to the future of connection and protection

# Where we focus our energy

## ENERGY STORAGE TECHNOLOGIES

We offer solutions for many large-scale and grid-level electrical energy storage methods.



Flow Battery



Lead-Acid Battery



Nickel-Cadmium Battery



Nickel-Metal Battery



Lithium-Ion Battery



Lithium Polymer Battery



Molten Salt Battery



Hydrogen Storage



Thermal Energy Storage (TES)



Flywheel Energy Storage (FES)



Capacitor



Compressed Air Energy Storage (CAES)

## ENERGY GENERATION

Storing renewable energy or filling on-site needs: nVent is here to help you create reliable systems that protect your investments.



Distributed Generation



Peak Demand



Off-the-Grid (OTG)

## ENERGY TRANSMISSION & DISTRIBUTION

Maintaining durable and efficient systems: you can rely on nVent solutions to build a robust and resilient grid and distribution network.



Grid Energy Storage



Energy Demand Management



Transmission and Distribution

## ENERGY CONSUMPTION

Keeping systems locally ready to go when you need them: nVent solutions are also space saving and can reduce your total installed cost.



EV Charging



Back-up Power



Off-peak Pricing



# How nVent Improves Energy Storage

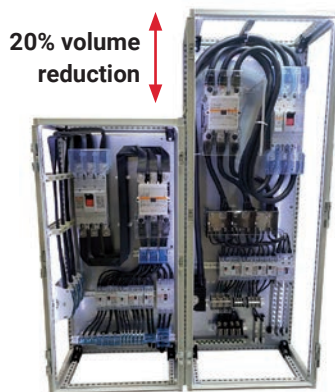


nVent is the leading provider of grounding, bonding, power connection and protection solutions for energy storage applications compliant with UL 9540 or the IEC 62933 series of standards.

Demand is increasing and transmission lines cannot support all generated electricity. That's why nVent supports customers with more advantages including:

## SPACE SAVINGS

Every inch counts within electrical cabinets when making connections. Thanks to space-saving nVent solutions, you can reduce your design footprint with products that are neater and tidier to install.



## TIME SAVINGS

Our products are easy to shape and allow for fast efficient visual inspection, so you spend less time configuring and maintaining electrical panels.



## RELIABILITY

Consistency comes from simplicity and repeatability. Our products bring order to panels and enclosures, making them easier to build and access. We use tin-plated material to provide strong corrosion protection and offer options for improved vibration resistance.

## SAFER SOLUTIONS

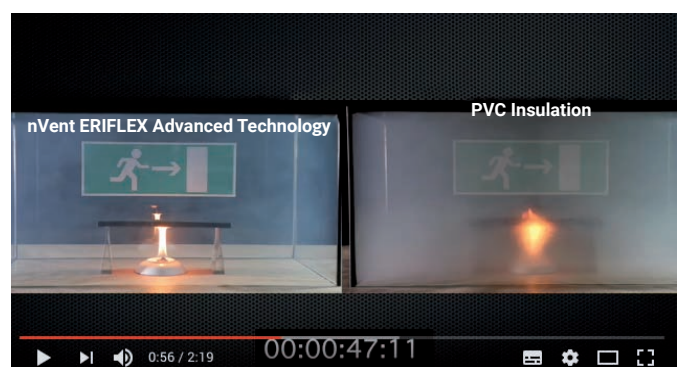
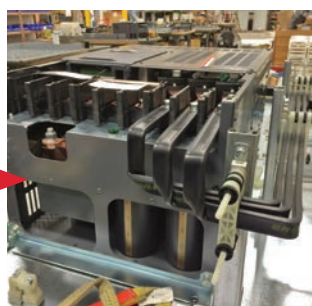
Catering to the unique needs of the energy storage market, the latest generation of nVent insulation material combines the following features:

- Low smoke, halogen-free, flame retardant
- High temperature resistance

Cabinet with cables

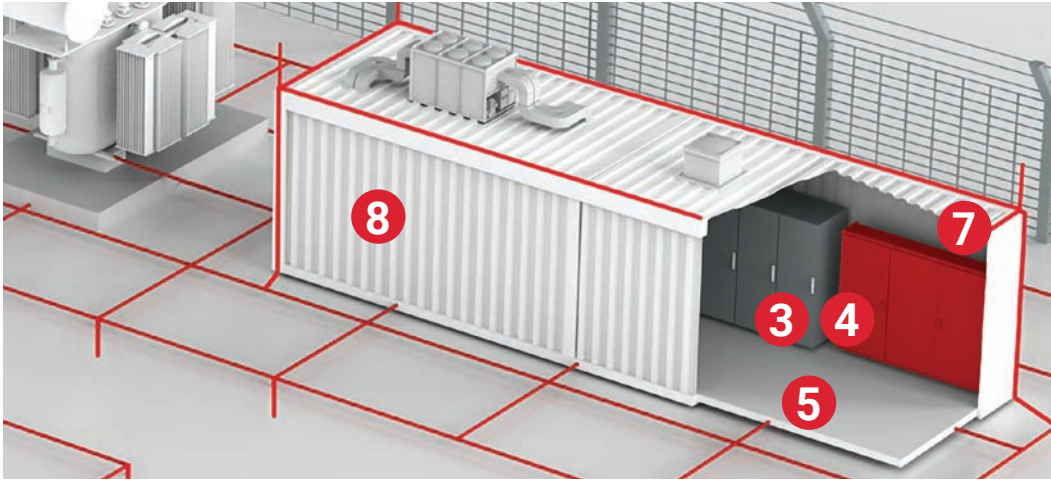


Application with nVent ERIFLEX Flexibar Advanced



# Energy Storage System Arrangements

## TYPICAL LAYOUT OF A BATTERY-BASED CONTAINERIZED/INDOOR ENERGY STORAGE SYSTEM



## TYPICAL LAYOUT OF A BATTERY-BASED OUTDOOR/STANDALONE ENERGY STORAGE SYSTEM



Whether you are on the DC side or on the AC side of your energy storage system (up to 1000 VAC and 1500 VAC), a wide range of nVent solutions can be used in the following subsystems:

- 1 Battery to battery and battery to BPU with nVent ERIFLEX Flexible Conductors
- 2 Connections inside BPU/BMS using nVent ERIFLEX Flexible Conductors
- 3 Full range of nVent ERIFLEX products inside DC aggregator
- 4 Full range of nVent ERIFLEX products inside power conditioning system
- 5 Full range of nVent ERIFLEX products inside LV switchgear and transformer (LV side)
- 6 nVent ERIFLEX FlexBus System\* between LV switchgear and transformer (LV side)
- 7 Full range of nVent ERICO surge protection devices for power and data communication circuit
- 8 Full range of nVent ERICO grounding and bonding solutions for indoor and outdoor uses
- 9 Full range of nVent HOFFMAN cooling and thermal management products
- 10 Full range of nVent HOFFMAN non-metallic, stainless steel, and mild steel enclosures to protect critical components

\* Please check availability of nVent ERIFLEX FlexBus in your region.



# Electrical Connections Solutions

## LOW VOLTAGE POWER CONNECTIONS

We deliver low voltage power distribution solutions that reduce total installed cost and increase design flexibility. Our deep knowledge of global end-user applications provides you a wide range of safe and reliable products suited for practically any electrical system need.

Tap into nVent ERIFLEX solutions for applications from 80 to 6000 Amps at 1000 VAC and 1500 VDC including:



### Low-Voltage Power Connection System

nVent ERIFLEX FleXbus System

The all-new nVent ERIFLEX FleXbus System provides a patented connection solution between two pieces of electrical equipment. This unique concept offers faster installation and reduces total installation cost without additional design study, a specialized workforce or expensive tools.

- Flexible insulated copper-plated, aluminum flat braid
- Better current/ampacity than cable due to skin effect
- More flexible than cable
- No bending radius to respect
- Ready-to-use from one side with direct connection on busbar or circuit breaker palm

*Please check availability of nVent ERIFLEX FleXbus in your region.*

### Flexible Busbar

nVent ERIFLEX Flexibar Advanced

*From 125 A to over 2800 A at 1000 VAC/1500 VDC*



IEC/UL compliant flexible busbar, made of tinned copper laminates and covered with an insulation that is:

- Reinforced per IEC 61439-1
- Low-smoke, halogen-free
- Flame retardant as per UL 94-V0
- Vibration tested per ISO 6469-1:2019
- Easy to shape, reliable solution

### Power and Distribution Blocks

nVent ERIFLEX Power and Distribution Blocks

*A complete range up to 1940 A as per IEC or 1680 A as per UL*



IP20 compact, lugless solution for distributing power with direct connection of the input/output cables that is:

- IEC 60947-7-1 tested (incl. short circuit)
- Space and labor-saving panel solution

### Ready-to-Use Power Shunts

nVent ERIFLEX IBSB Advanced

*From 80 A to 700 A at 1000 VAC/1500 VDC*



IEC/UL compliant braids or braided conductors made of tinned copper wires covered with an insulation that is:

- Reinforced per IEC 61439-1
- Low-smoke, halogen-free, flame retardant
- Direct connection into most MCCBs
- Easy to use, reliable solution

### Grounding and Bonding Braids and Straps for Indoor and Outdoor Applications



- Labor-savings
- Greater Reliability



See nVent ERIFLEX products in action at:  
<https://www.nvent.com/en-us/ERICO/solutions/commercial/applications/utility-virtual-world>.

\*To see a full list of nVent ERIFLEX Certifications, refer to page 7.

# nVent ERIFLEX Customized and Engineered Solutions

nVent ERIFLEX offers the necessary products and engineering support needed to specify and build a complete range of solutions for energy, transportation, construction and applications where low voltage power storage and transmission are critical. Our engineering team brings years of experience and expertise to every project, and will be with you from start to finish to advise on:



Standardized and customized product solutions



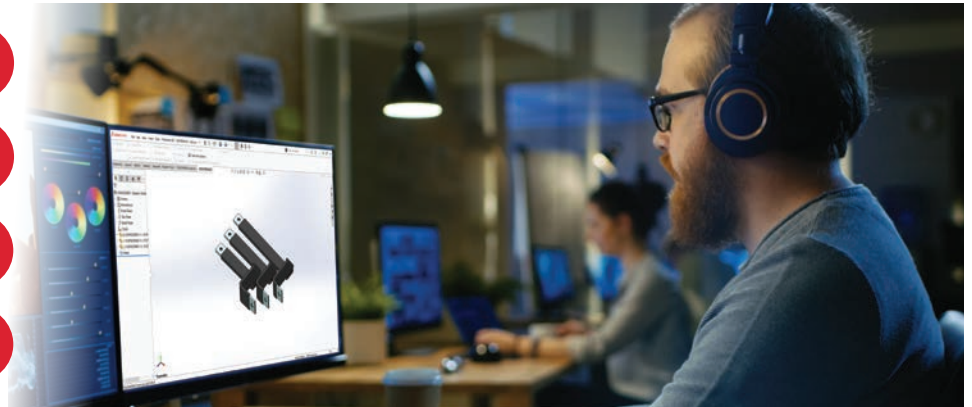
Engineering and prototype installation support



Global standards compliance



Post-installation support



## DESIGN FLEXIBILITY, IDEATION AND PROTOTYPING

Work with the nVent team to build a customized, compact low voltage power distribution panel solution that is safe, reliable, enables design flexibility and lowers the cost of implementation.



Have a need or requirement for an application? Submit a request and we will collaborate with your engineering team to find the best solution.



The team will collaborate from design concept to prototype to ensure the final design is able to be manufactured.



Once the design is finalized, the sales team will work with supply chain to ensure we meet the forecasted demands.

## SUPPORTING CUSTOMERS FROM DESIGN TO MANUFACTURING TO ONGOING MAINTENANCE

nVent ERIFLEX offers worldwide, high-volume manufacturing of these customized product solutions, with local warehouse stocking in your region. Not only will the team help with engineering and ordering, but will also remain on the project through installation and ongoing maintenance.

For upfront and ongoing training on nVent ERIFLEX, our team offers lunch and learns, engineering webinars and virtual presentations regarding nVent product offerings and benefits. In addition, our technical team can be on-site to perform application specific training.

### nVent ERIFLEX Certifications

- nVent ERIFLEX Flexibar Advanced: IEC 61 439-1 and UL 67 / UL 758
- nVent ERIFLEX IBS/IBSB Advanced: IEC 61 439-1 and UL 67 / UL 758
- Full nVent ERIFLEX product range is compliant with RoHS and CE

### nVent ERIFLEX Advanced Technology Certifications

- Halogen-free: IEC 60754-1 and/or UL 2885 standards
- Low smoke: UL 2885 and IEC 60754-2
- Flame retardant: IEC 60695-2-11 Glow Wire test 960°C and/or UL 94-V0
- UV resistance: UL 2556 and UL 854

# Thermal Management and Enclosure Solutions

## A FLEXIBLE, CUSTOMER-DRIVEN APPROACH TO SOLVING YOUR APPLICATION CHALLENGES

For more than 75 years, customers have relied on nVent HOFFMAN for electrical protection. Paired with panel shop automation solutions, our high-quality NEMA and IEC enclosure and cooling offerings suitable for vast range of energy storage applications.

### UNIVERSAL FREE-STAND ENCLOSURES



Six different base units with Universal type ratings 4, 4x, 12, 4R, IP66 and IK10 can be configured to meet large enclosure needs. We provide wireless and wireline protection such as advanced cabinet architecture, cooling, surge suppression and cable/copper/fiber management for high-density equipment environments.



Easily separate voltage with barrier panels, false floor and Sequestr enclosures for disconnect isolation and cable protection. Units feature heavy gauge welded steel frames with six rack angle mounting struts. Ideal for use in high vibration environments or areas with high load capacities. As well, the cabinets' passive cooling design can be augmented with optional fans.

### NVENT HOFFMAN SPECTRACOOL AND NVENT HOFFMAN SPECTRACOOL NARROW

SpectraCool and T-Series Air Conditioners are designed for robust cooling performance in demanding outdoor environments. Rotary compressors provide more energy efficiency than reciprocating compressors and allow for quick restart under pressure without causing damage. Dual impellers on G52 and G57 units pull air into the front of the unit and direct the air upward in a 90-degree angle for the most direct air path while providing redundancy.



**G28 Indoor/  
Outdoor**

4,000 &  
6,000 BTUs/Hr

1,172 & 1,758 Watts

**G52 Indoor/  
Outdoor**

8,000 &  
12,000 BTUs/Hr

2,300 & 3,500 Watts

**G57 Indoor/  
Outdoor**

20,000 BTUs/Hr  
5,900 Watts

**T62**

20,000 BTU/Hr  
5,860 Watts

**T70-36**

36,000 BTUs/Hr  
10,548 Watts

**T70-60**

59,000 BTUs/Hr  
17,287 Watts



See nVent HOFFMAN products in action at:  
<https://HOFFMAN.nVent.com/solutions/tm-industrial/applications/utility-tool>.







# Thermal Management Solutions

## MORE ADVANTAGES FOR YOUR APPLICATION

- Only supplier to offer extensive standard, modified, co-developed solutions
- industry-specific solutions:
  - Custom wellhead or process control panels
  - Internal barriers, hubs and reservoirs
  - Purge systems
  - Switchgear control enclosures
- Arc flash safety systems
- DCS control
- In-house UL, CSA, NEMA, CE and IEC certified solutions: Type 4, 4X, 9, 12 and more



See nVent HOFFMAN products in action at:  
<https://HOFFMAN.nVent.com/solutions/tm-industrial/applications/utility-tool>

A12L Two-Door with Floor Stands	A28M Heavy-Duty Disconnect Enclosure	MCSS-HP Modular Single Door	Universal Free-Stand Enclosures
			
<b>Type 12</b> 72.06x72.06x24.06 Steel	<b>Type 12</b> 90.12x197.75x24.12 Gray, Steel, LP	<b>NEMA Type 4X, 12, 13</b> Stainless Steel	<b>Type 12, 4, and 4X</b>
<ul style="list-style-type: none"> <li>• Seams continuously welded and ground smooth; no holes or knockouts</li> <li>• 3-point latch mechanism operated by oil-tight key-lock handle</li> <li>• Gasketed overlapping doors with no centerpost</li> <li>• Concealed, easy-to-remove hinges</li> <li>• Data pocket is high-impact thermoplastic</li> <li>• 12-in. floor stands welded to enclosure</li> <li>• Heavy-duty lifting eyes</li> <li>• Panel supports</li> <li>• Oil-resistant gasket</li> <li>• Collar studs for mounting optional panel</li> <li>• Bonding provision on door</li> <li>• Provision for mounting fluorescent light</li> </ul>	<ul style="list-style-type: none"> <li>• Seams continuously welded and ground smooth</li> <li>• Body stiffeners in larger enclosures for extra rigidity</li> <li>• Body flange trough excludes liquids and contaminants</li> <li>• Heavy-duty lifting eyes anchor into reinforced top</li> <li>• Removable centerposts permit easy panel installation</li> <li>• Concealed, easy-to-remove hinges</li> <li>• Heavy-duty 3-point latching mechanism operated by padlocking handle on all doors</li> <li>• Oil-resistant gasket</li> <li>• Mechanical interlock activated by master door prevents slave doors from being opened first; doors can be closed in any order</li> <li>• Models available with panel included or panel sold separately</li> </ul>	<ul style="list-style-type: none"> <li>• Frame: Seam welded reversed open profiles with 25 mm hole pattern, according to DIN 43660 including integrated external hole pattern</li> <li>• Door: Mounted with four hinges, allowing left or right hand opening; ncluding door frame with 25 mm hole pattern</li> <li>• Rear panel: Fitted by M6 torx screws; standard facilities for rear door mounting</li> <li>• Supplied as an accessory</li> <li>• Removable roof panel</li> <li>• Lock: Espagnolette 4-point locking system which does not interfere with the enclosure inner space; standard double-bit lock with 3 mm insert</li> <li>• Bottom plate: One piece bottom plate, with injected polyurethane gasket to ensure maximum sealing</li> <li>• Mounting plate: Double folded and slides into position with adjustable depths of 25 mm, with the MPD02 accessory</li> <li>• Earthing/Grounding: All panels are earthed/grounded through their fittings and equipped with a separate earthing stud</li> <li>• Mounting requirements: For stand-alone installation, add side panels; for combined installation, HPPG01 and baying brackets, CCI and CCM are required</li> <li>• Delivery: Frame with fitted door, rear panel, roof panel, bottom plate, mounting plate and door frame; delivery also includes earthing bolts</li> </ul>	<ul style="list-style-type: none"> <li>• Seams are continuously welded and ground smooth</li> <li>• Body stiffeners in larger enclosures for extra rigidity</li> <li>• Body flange trough excludes liquids and contaminants</li> <li>• Heavy-duty lifting eyes anchor into reinforced top</li> <li>• Concealed, easy-to-remove hinges</li> <li>• Heavy-duty 3-point latching mechanism operated by padlocking handle on all doors</li> <li>• Data pocket is high-impact thermoplastic</li> <li>• Oil-resistant door gasket</li> <li>• Bonding provision on door</li> <li>• Mechanical interlock standard on each enclosure; parts required to connect interlock system between adjacent enclosures are provided</li> </ul>

# Thermal Management Solutions

## MORE WAYS TO COOL CRITICAL EQUIPMENT

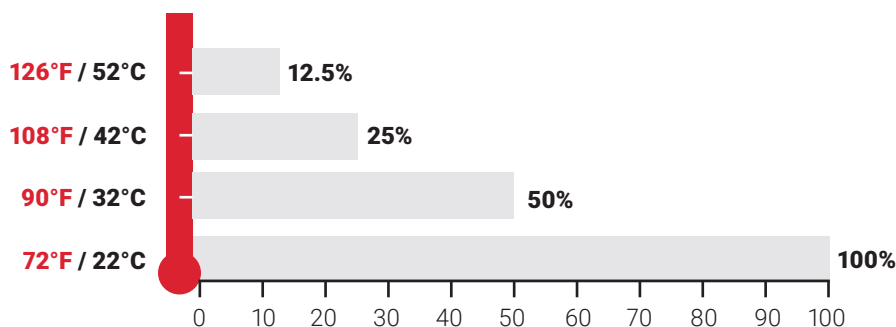


### CONSEQUENCES OF HEAT

- De-rated module performance
- Intermittent fluctuations in I/C-based devices
- MTBF decreases exponentially
- Catastrophic component failure
- Warranty revocation
- Component replacement costs
- Late shipments
- Customer dissatisfaction
- Lost revenue
- Service outages
- Hours of system downtime

### WHY USE COOLING? HEAT DAMAGES AND REDUCES THE LIFE OF YOUR ELECTRONICS

Electronics life expectancy is reduced by half with every 18°F (-7.8°C) increase above room temperature. (Every 10°C increase)



### ELECTRONICS LIFE EXPECTANCY = %

Source: Digital Equipment Corporation



See nVent HOFFMAN products in action at:  
<https://HOFFMAN.nVent.com/solutions/tm-industrial/applications/utility-tool>.

# Thermal Management Solutions

## EFFICIENT, FILTERLESS INDOOR/OUTDOOR AIR CONDITIONERS

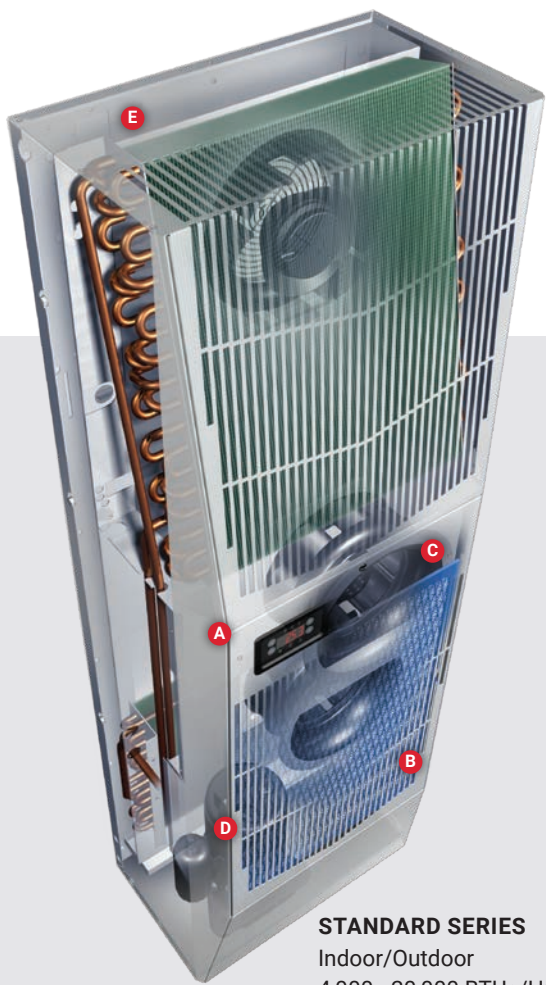
nVent HOFFMAN SpectraCool and T-Series Air Conditioners deliver reliable enclosure cooling in demanding environments, including industrial automation, telecommunications, wastewater treatment, material handling, security and defense systems, and more. SpectraCool Air Conditioners feature a new, filterless design that reduces clogging, which can lead to costly and time-consuming system failures. With its energy-efficient compressor and new earth-friendly refrigerant, SpectraCool Air Conditioners are available in three configurations that offer a broad range of cooling capacities, power input, and mounting options for your most critical enclosure cooling applications.



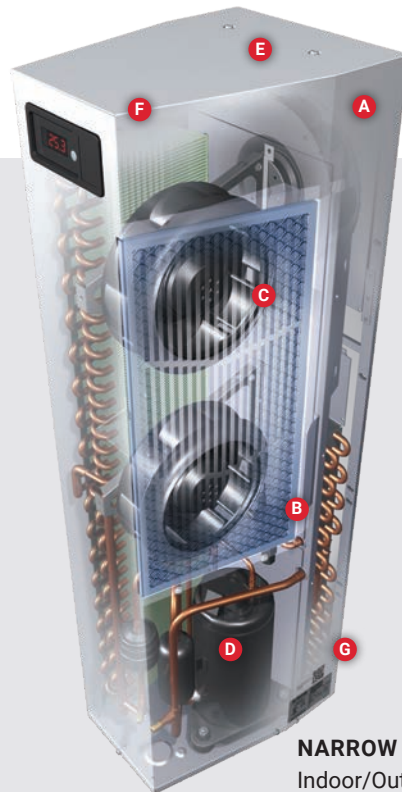
See nVent HOFFMAN products in action at: <https://HOFFMAN.nVent.com/solutions/tm-industrial/applications/utility-tool>.

nVent HOFFMAN SpectraCool air conditioners are available in standard, narrow and compact models. Find a wide range of cooling capacities for indoor and outdoor needs. Features include:

- Energy-efficient compressors that deliver up to 23% greater energy efficiency
- Quiet 68 dB operation
- Wide outdoor operating temperatures: 40°F/-40°C to 131°F/55°C
- Dust-resistant coil design supports filterless operation in most environments
- 115, 230 or 400/460 3-phase VAC power input options with terminal block power connection for easy installation
- Integrated active condensate evaporator with heater strip
- Thermal expansion valve controls refrigerant flow according to load changes on the evaporator
- Clean, aesthetic design adds value to system appearance
- R134a and R407c earth-friendly refrigerant
- Telcordia GR-487 capable
- Built-in easy-mount flanges for simple installation
- Available Easy Swap Adaptor Plenums for fast replacement of older air conditioners without modifying cut-out
- Optional Remote Access Control option for PC monitoring and control of multiple units



**STANDARD SERIES**  
Indoor/Outdoor  
4,000 - 20,000 BTUs/Hr



**NARROW SERIES**  
Indoor/Outdoor  
4,000 - 11,000 BTUs/Hr

- A** Rugged, all-metal shroud for demanding factory and outdoor environments
- B** Easy-to-access metal filter removes for filterless operation
- C** Dual condenser-side impellers for performance redundancy (G52, G57 and N43 models only)
- D** R134a and R407c compressor provides greater energy efficiency and environmental friendliness
- E** UL Listed, saving customers time and money by having agency approvals
- F** Narrow bevel design which works with wall-mount enclosures and accommodates 12-in. (305 mm) deep cabinets
- G** QR Code links directly to service information



# Grounding Solutions

## GET PROTECTED FROM THE GROUND UP

Grounding, equipotential bonding, surge protection and lightning protection are all interdependent disciplines. Reliable protection of property and personnel demands a systematic approach to minimizing threats caused by transients. nVent ERICO can help you design a comprehensive protection plan from the ground up.

### Grounding Busbar: nVent ERICO Standardized and Customized Solutions



Proper bonding is essential to create an equipotential plane between service grounds and equipment during fault and transient conditions.

- nVent ERICO grounding busbar provides a convenient, singlepoint grounding and bonding location
- Custom bars can be designed and manufactured to customer specifications

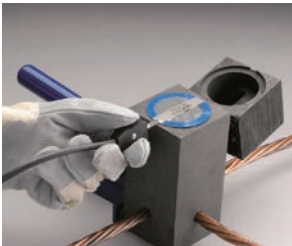
### Grounding Rods and Couplers



Find a complete line of ground rods and accessories to accommodate virtually any need. From our industry leading copper-bonded ground rods to solid copper, stainless steel or galvanized rods, nVent ERICO has proven solutions you can depend on.

### Grounding Connections

nVent ERICO Cadweld

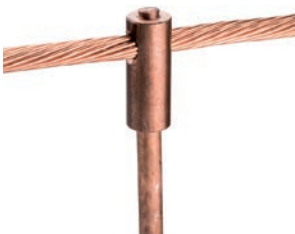


nVent ERICO Cadweld exothermically welded connections are engineered to provide a permanent, molecular bond that will not loosen or corrode. The connections are designed to maintain for the life of the conductor and/or installation. With reliable connections that consistently exceeded IEEE® 837 2014 EMF test requirements as certified by an independent lab, nVent ERICO Cadweld is the ultimate welded connection.

### Theft-Deterrent Grounding Solutions



Theft-deterrent composite cables (TDCC) are conductors that function as copper conductors, but incorporate an outer steel layer and are difficult to cut and steal. These conductors are ideal for exposed electrical grounding leads where copper theft may occur. Theft-deterrent conductors are difficult to cut with hand tools and the outer steel stranding is magnetic, which further deters thieves looking for copper.



### Mechanical Connections

Building a reliable grounding and bonding system requires quality components. Connect your system correctly the first time using nVent ERICO products. Our reputation is for providing peace-of-mind—choose products backed by years of engineering expertise and real-world use.



See nVent ERICO products in action at:  
<https://www.nvent.com/en-us/ERICO/solutions/commercial/applications/utility-virtual-world>.

# Surge and Lightning Protection Solutions

## FULL LIGHTNING PROTECTION SYSTEMS AND SURGE PROTECTIVE DEVICES

Protecting people and property from lightning strikes and harmful surges is a mission-critical job we've taken pride in for over a century. Turn to us for purpose-driven systems that take all threats into account.

### nVent ERICO System 1000



#### ESE Standard System

The nVent ERICO SI Series encompasses three air terminal models and accessories that are designed to comply with the requirements of the French NF C 17-102 Standard.

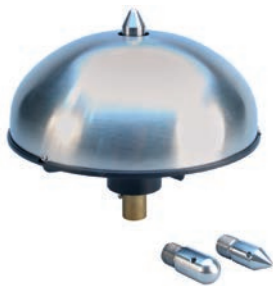
### nVent ERICO System 2000



#### Conventional Protection

The nVent ERICO System 2000 includes an engineered series of air terminals, downconductors and fittings in accordance with European IEC 62305 and USA UL 96 and NFPA 780 Standards.

### nVent ERICO System 3000



#### Enhanced Protection System

The nVent ERICO System 3000 is a technically advanced lightning protection system. The unique features of this system allow optimum performance, flexibility of design, and overall cost-effective installation. Efficient air terminal placement is in accordance with the Collection Volume Method (CVM).

### Surge Protective Devices



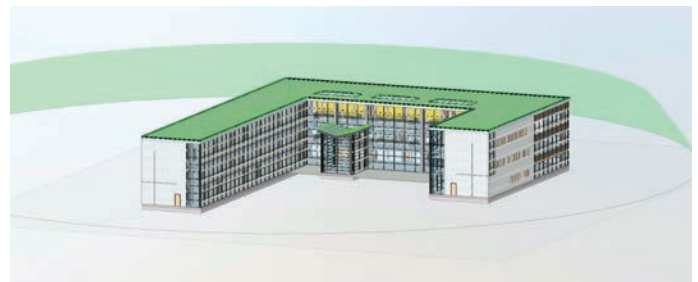
nVent ERICO surge protective devices work together to create a coordinated defense. Safeguard your technology from impulses generated internally and externally with systems designed to provide primary and secondary protection at distribution panels and the point of use.

## NVENT ERICO LPSD 4.0 DESIGN SOLUTION

The placement of air terminals in a lightning protection system is critical for optimal protection. Our dedicated teams of nVent ERICO engineers are available around the world to provide support for all major lightning protection standards.

Our new Lightning Protection System Design (LPSD) 4.0 software brings:

- Increased velocity and reduced design lead-time
- Conventional and active system design capability
- Complete submittal package, including drawings, BOM, component cut sheets and risk assessment
- Capable of accepting and returning 3D project models in AutoDesk Revit and SketchUp compatible formats



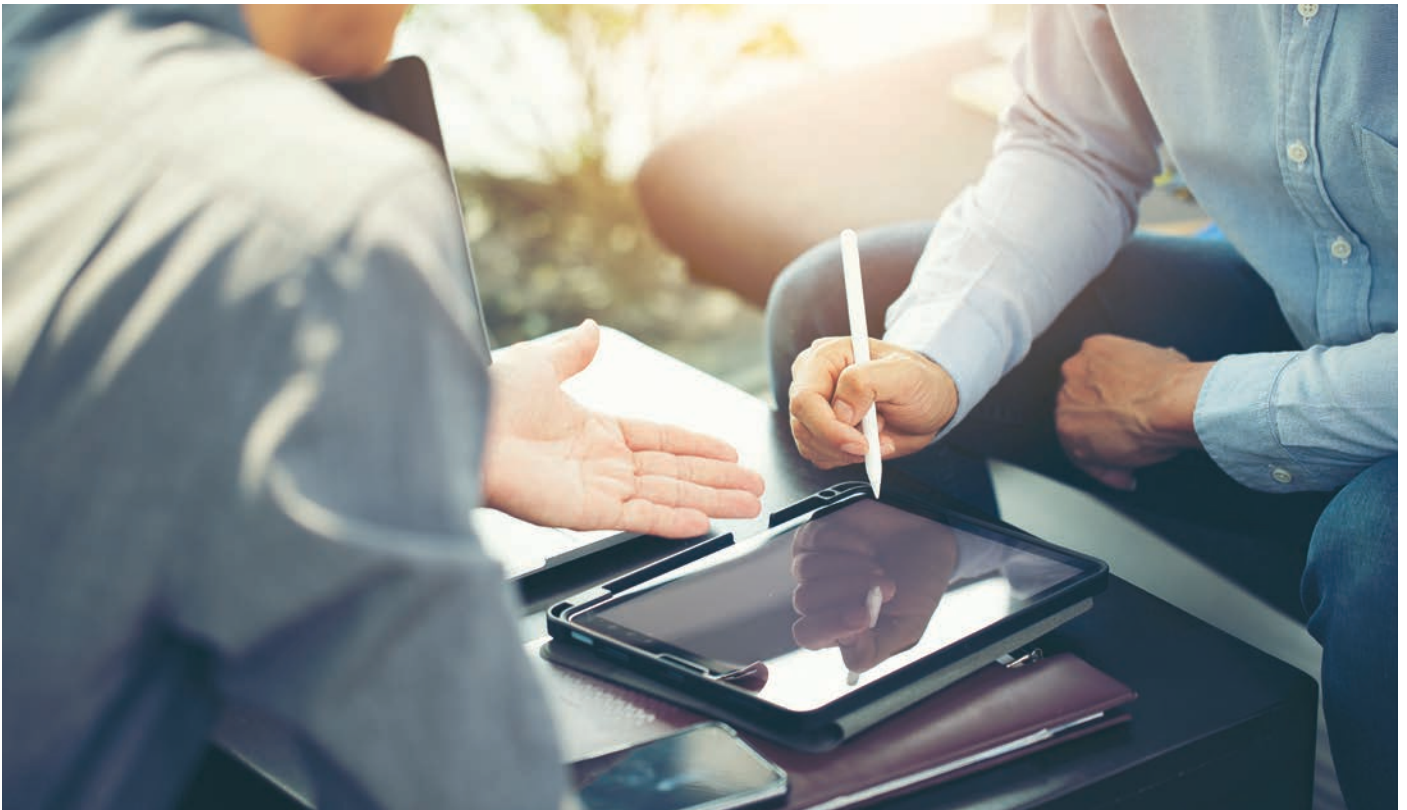
### nVent ERICO Certifications

- IEEE 837 for nVent ERICO Cadweld
- UL for most nVent ERICO components



See nVent ERICO products in action at:  
<https://www.nvent.com/en-us/ERICO/solutions/commercial/applications/utility-virtual-world>.


# Learning Tools and Resources



Find more resources for understanding energy storage electrical connection, protection and thermal management requirements at nVent.com. There are many tools to assist you including:


**Free Webinars**

To help your teams learn about the latest technology, industry trends and best practices to increase productivity. Topics include Energy Storage, Power Distribution, Surge Protection, Global Standards and more.




**nVent Training Center**

Virtual access allowing your teams to learn the complete nVent brand portfolio at their convenience including nVent ERICO, nVent ERIFLEX and nVent HOFFMAN products.



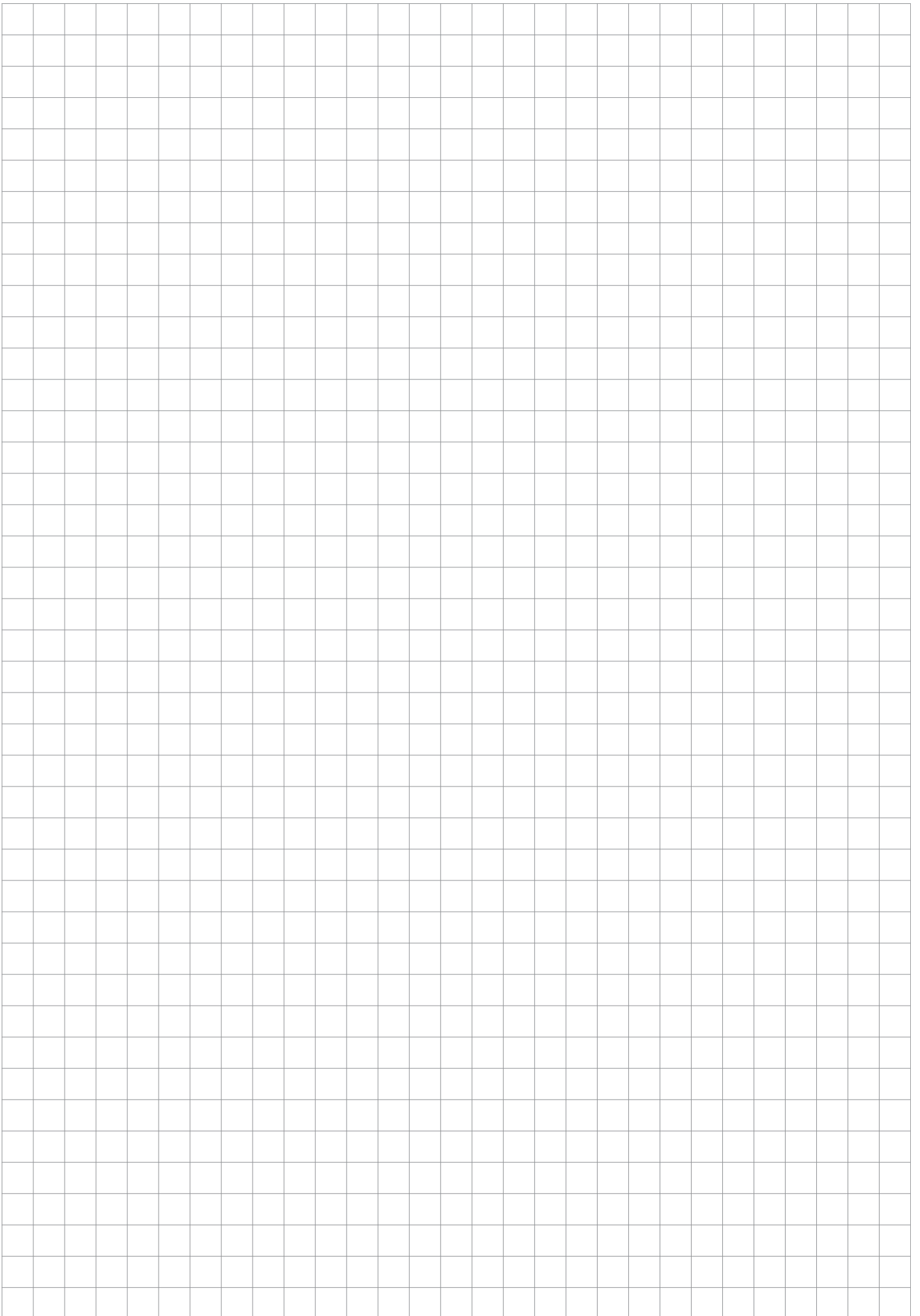
**Interactive Application Maps**

Allowing you to drill-down into detailed nVent products and solutions for energy storage installations.



See nVent products in action at:  
<https://HOFFMAN.nVent.com/solutions/tm-industrial/applications/utility-tool>.





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Our powerful portfolio of brands:

**CADDY ERICO HOFFMAN RAYCHEM SCHROFF TRACER**



**nVent.com**