



CONNECT AND PROTECT

nVent Solutions for Energy Storage

CADDY ERICO HOFFMAN RAYCHEM SCHROFF TRACER





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)



Welcome to the future of connection and protection

Area of focus for nVent Solutions

EXAMPLE OF ENERGY STORAGE TECHNOLOGIES



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 onsite 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

ENERGY CONSUMPTION

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



EV Charging



Back-up Power



Off-peak Pricing

nVent Solutions

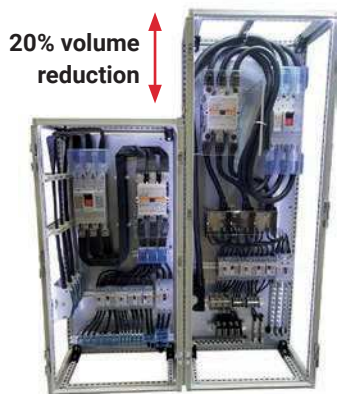


nVent Solutions is the leading provider of grounding, bonding and power connection solutions for energy storage applications compliant with UL 9540 or the IEC 62933 series of standards.

NEVENT SOLUTIONS PROVIDE

SPACE SAVINGS

Within an energy storage system, space is critical for electrical cabinets and connections. Thanks to the innovative technology from nVent Solution you can reduce your footprint of your electrical cabinet.



TIME SAVINGS

The design of an electrical panel is important. nVent helps to simplify the connection with solutions that reduce labor.

Our products are easy to shape and enable more efficient visual inspection.



RELIABILITY

To enhance safety and reliability in enclosed spaces, nVent has developed a complete and reliable range that uses tin-plated material for better corrosion resistance. Additionally, our unique products help provide better access and improved vibration resistance.

SAFER SOLUTIONS

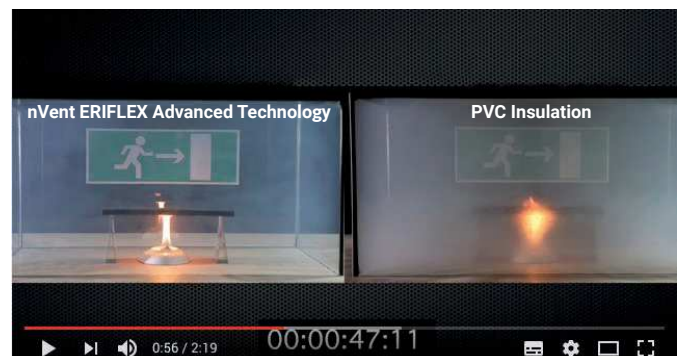
Catering to the unique needs of the energy storage market, the latest generation of nVent insulation material combines the following features:

- Low smoke, halogen-free, flame retardant
- High temperature resistant
- Tin-plated

Cabinet with cables

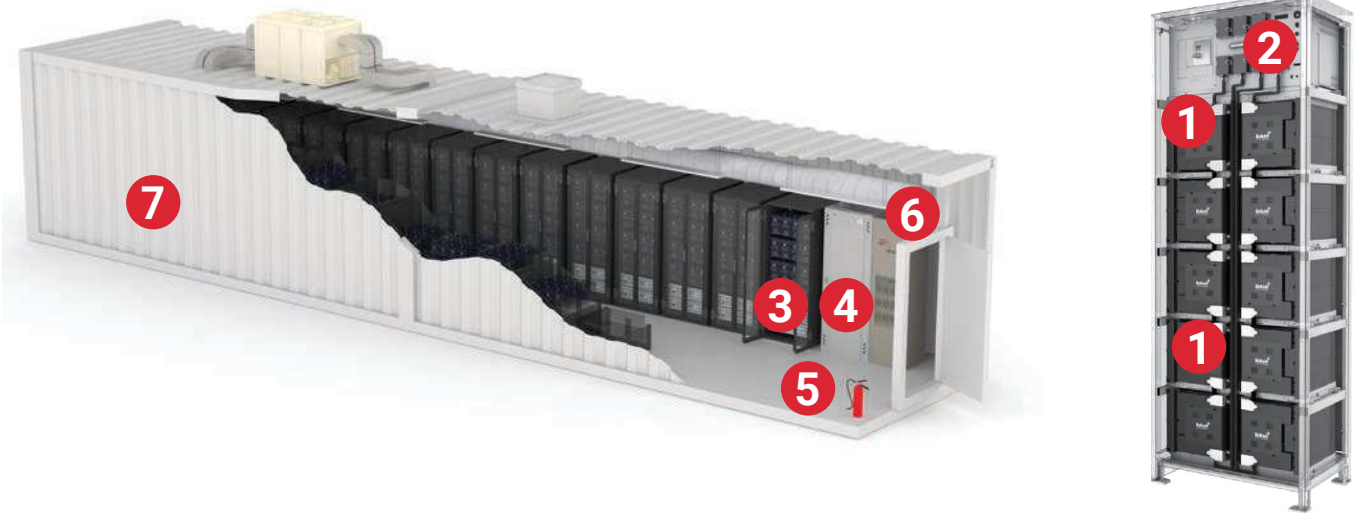


nVent ERIFLEX Flexibar Advanced



Arrangement of energy storage system

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 1000VAC and 1500VAC), a wide range of nVent solutions can be used in the following sub-systems:

- 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 Full range of nVent ERICO surge protection devices for power and data communication circuit.
- 7 Full range of nVent ERICO grounding and bonding solutions for indoor and outdoor uses
- 8 Full range of nVent HOFFMAN cooling and thermal management products.

nVent Engineering Support

nVent engineering experts can support your system design, provide technical and configuration advice, and help you complete your grounding and low voltage power solutions.

Trusted nVent solutions are designed to meet your most challenging panel design and production requirements.

nVent Electrical Solutions with a complete portfolio

nVent ERIFLEX

LOW VOLTAGE POWER CONNECTION SOLUTIONS

We deliver low voltage power distribution solutions that reduce total installed cost and increase design flexibility by providing a comprehensive range of innovative and reliable products through global end user application expertise and intimacy.

nVent ERIFLEX covers applications from 80 Amps to 6000 Amps at 1000V AC and 1500V DC

Flexible Busbar (Flexibar Advanced) & MTO



- From 125A to over 2800A at 1000VAC/1500VDC
- IEC/UL compliant flexible busbar made of tinned copper laminates covered with an insulation that is:
 - Reinforced per IEC 61439-1
 - Low-smoke
 - Halogen-free
 - Flame retardant as per UL 94-V0
 - Vibration testing per ISO 6469-1:2019
 - Greater reliability
 - Easy to shape

A complete range of power and distribution blocks



- A complete range up to 1940 A as per IEC or 1680 A as per UL
- IP20 compact solution for distributing power with direct connection of the input/output cables (no lug needed)
- IEC 60947-7-1 tested (incl. short circuit)
- Significant space and labor-saving solution

Insulated Power Shunts ready-to-use (IBSB Advanced)



- From 80A to 700A at 1000VAC/1500VDC
- 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
 - Ready-to-Use and Easy-to-use solution
 - Greater reliability

Made-To-Order Engineering Solutions



nVent ERIFLEX has the products and engineering support you need to specify and build a complete range of solutions for industries like: energy, transportation, construction and other applications where low voltage power storage and transmission are critical.

Grounding strap for indoor and outdoor with MBJ and CPI



- Labor saving
- Greater reliability
- Vibration testing per ISO 6469-1:2019

nVent Solutions Certifications

nVent is a trusted partner for assistance with designing your electrical cabinet. Our range of world-class certifications include:

- 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

nVent Electrical Solutions with a complete portfolio

nVent HOFFMAN

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

Go-to global provider for tailored customer specified protection solutions – delivering value by providing industry leading application based innovation and intimate support and services.

UNIVERSAL FREE-STAND ENCLOSURES



Six base enclosures with Universal type ratings 4, 4x, 12, 4R, IP66 and IK10 can be configured to meet customers 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 barriers panels, false floor, and Sequestr for disconnect isolation and cable protection. Heavy gauge welded steel frame with six rack angle mounting struts Ideal for use in high vibration areas or areas with high load capacities. The cabinet's passive cooling design can be augmented with optional fans.

NVENT HOFFMAN SPECTRACOOL AND NVENT HOFFMAN SPECTRACOOL NARROW

SpectraCool Standard Series Air Conditioners are designed for robust cooling performance in demanding indoor and harsh outdoor environments. Rotary compressors provide more energy efficiency than reciprocating compressors, and allow quick re-start under pressure without causing damage. Dual impellers on G52 and G57 units pull air into the front of the unit and direct the air upwards 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



N28 Indoor/Outdoor

4,000 BTUs/Hr

1,172 Watts



N36 Indoor/Outdoor

6,000 & 8,000 BTUs/Hr

1,758 & 2,344 Watts



N43 Indoor/Outdoor

11,000 BTUs/Hr

3,223 Watts

nVent Electrical Solutions with a complete portfolio

nVent HOFFMAN

ADVANTAGES FOR ENERGY STORAGE SOLUTIONS

- Only supplier to offer extensive standard, modified, co-developed and custom capabilities
- 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
- Rapid response to engineering requests and modifications

A12L Two-Door with Floor Stands	A28M Heavy-Duty Disconnect Enclosure	Proline G2 Disconnect Packages	Universal Free-Stand Enclosures Type 4
			
Type 12 72.06x72.06x24.06 Steel	Type 12 90.12x197.75x24.12 Gray, Steel, LP	Type 12	Type 4 & 4X
<ul style="list-style-type: none"> • Seams continuously welded and ground smooth; no holes or knockouts • 3-point latch mechanism operated by oil-tight key-lock handle • Gasketed overlapping doors with no centerpost • Concealed, easy-to-remove hinges • Data pocket is high-impact thermoplastic • 12-in. floor stands welded to enclosure • Heavy-duty lifting eyes • Panel supports • Oil-resistant gasket • Collar studs for mounting optional panel • Bonding provision on door • Provision for mounting fluorescent light 	<ul style="list-style-type: none"> • Seams continuously welded and ground smooth • Body stiffeners in larger enclosures for extra rigidity • Body flange trough excludes liquids and contaminants • Heavy-duty lifting eyes anchor into reinforced top • Removable centerposts permit easy panel installation • Concealed, easy-to-remove hinges • Heavy-duty 3-point latching mechanism operated by padlocking handle on all doors • Oil-resistant gasket • Mechanical interlock activated by master door prevents slave doors from being opened first; doors can be closed in any order • Models available with panel included or panel sold separately 	<ul style="list-style-type: none"> • ProLine G2 Disconnect Packages are full-featured, ready-to-use enclosures which make it easy to create flange-mount disconnect solutions using major brand disconnect switches and circuit breakers. • A hinged disconnect mullion provides unobstructed access to the interior and maximum access to the Full Mounting Subpanel (Mounting Plate). • A flush swing handle with defeater operates an internal 3-point latch system on the disconnect door and latches to the disconnect mullion. Interlocking is provided from the primary door to the disconnect mullion. • Side covers are included with ProLine G2 Disconnect Packages. 	<ul style="list-style-type: none"> • Seams are continuously welded and ground smooth • Body stiffeners in larger enclosures for extra rigidity • Body flange trough excludes liquids and contaminants • Heavy-duty lifting eyes anchor into reinforced top • Concealed, easy-to-remove hinges • Heavy-duty 3-point latching mechanism operated by padlocking handle on all doors • Data pocket is high-impact thermoplastic • Oil-resistant door gasket • Bonding provision on door • Mechanical interlock standard on each enclosure; parts required to connect interlock system between adjacent enclosures are provided

nVent HOFFMAN Cooling

A WIDE RANGE OF THERMAL MANAGEMENT SOLUTIONS FOR CRITICAL APPLICATIONS

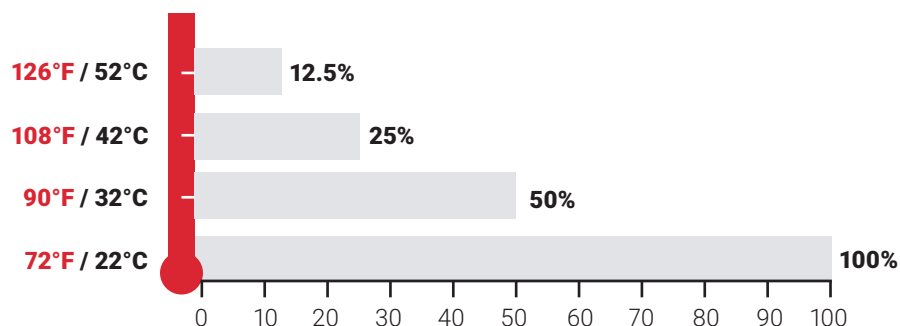


CONSEQUENCES OF HEAT

- De-rated drive 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 factory downtime

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

Electronics life expectancy is reduced by half with every 18F (-7,8°C) increase above room temperature. (Every 10°C increase)



ELECTRONICS LIFE EXPECTANCY = %

Source: Digital Equipment Corporation

nVent HOFFMAN Spectracool

Indoor/Outdoor Air Conditioners

ENERGY-EFFICIENT, FILTERLESS AIR CONDITIONERS NOW AVAILABLE WITH ETHERNET/IP

nVent HOFFMAN SpectraCool Air Conditioners deliver reliable enclosure cooling in demanding environments, including industrial automation, telecommunications, waste water 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.

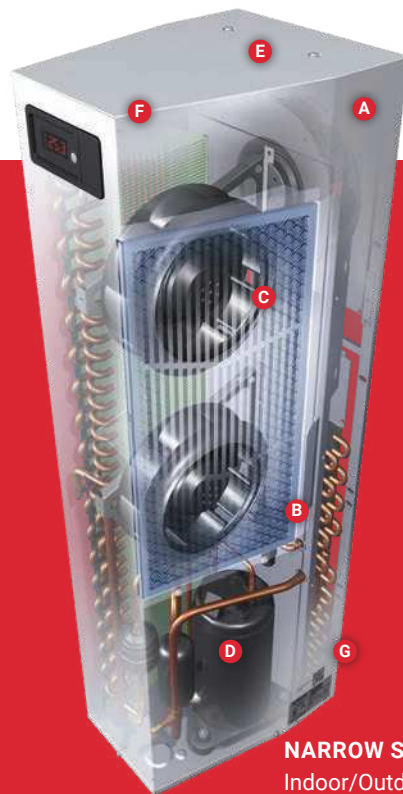
nVent HOFFMAN Spectracool Series Features

- A wide range of cooling capacities for indoor, outdoor, and harsh environments
- Available in standard, narrow and compact models
- Energy-efficient compressors that deliver up to 23 percent 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
- HOFFMAN Easy Swap Adaptor Plenums available for easy replacement of older air conditioners without modifying cut-out
- Optional HOFFMAN SpectraCool Remote Access Control option for PC monitoring and control of multiple SpectraCool 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 with works with wall mount enclosures and accommodates 12-in. (300 mm) deep cabinets
- G** QR Code links directly to service information

nVent Electrical Solutions with a complete portfolio

nVent ERICO

GROUND UP SOLUTIONS

Grounding, equipotential bonding, surge protection and lightning protection are all interdependent disciplines. Reliable protection of structures, industrial and commercial operations and personnel demands a systematic and comprehensive approach to minimizing threats caused by transients, from the ground up.

Grounding busbar: Standard / Customized solutions



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

- Provides a convenient, singlepoint grounding and bonding location.
- Custom bars can be designed and manufactured to customer specifications

Ground rods and Grounding couplers



Ground rods offer a complete line of ground rods and accessories to accommodate various types of customer requests. From our industry leading copper-bonded ground rods to solid copper rods, stainless steel rods, or galvanized rods, nVent ERICO has the ground rod solution that you can depend on.

Grounding connectors



- **Exothermic** : 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** Building a reliable grounding and bonding system requires quality components. Connecting your system correctly by using nVent ERICO products gives you peace-of-mind and assurance that you are choosing products backed by years of engineering expertise and real-world use

nVent Electrical Solutions with a complete portfolio

nVent ERICO

FULL LIGHTNING PROTECTION SYSTEMS AND SURGE PROTECTIVE DEVICES

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

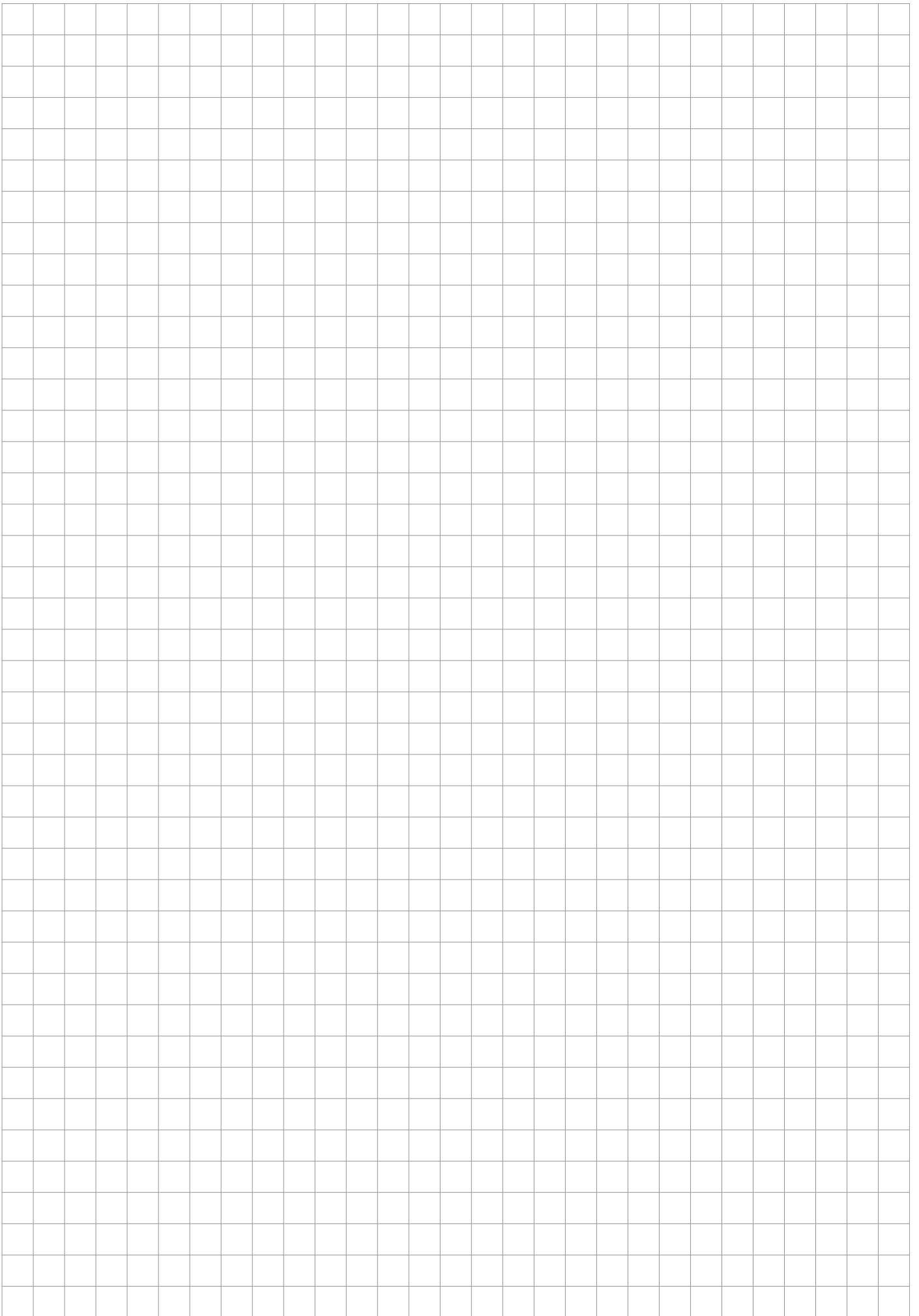


Modern industry relies heavily on electronic automation to increase productivity, ensure safety and provide economic benefits. However, power, control, and communications circuits are often disrupted with electrical disturbances from switching of electrical loads, electrical noise and the occasional induced transient.

nVent Solutions Certifications

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







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Our powerful portfolio of brands:

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