

SINAMICS PERFECT HARMONY

Harsh- Environment Drive Solutions

All-weather systems that promote VFD efficiency and durability in any environment

usa.siemens.com/perfectharmony



Environmental solutions that stand out

Environmental factors are among the top causes of drive failure, particularly temperature, moisture and contamination.

Siemens has 25+ years of experience developing and deploying controlled environments for drive systems.

You control a lot of things about your operations — costs, labor, production — but it's a lot harder to control your environment. Inside the plant, it can be dusty and hot or cold and wet, while outside there's salt-laden air, ice storms, chemical impurities or the sun's unrelenting heat to contend with.

For your drives, these conditions can be particularly challenging. Drives contain electrical elements that are susceptible to extreme temperatures, moisture and air contaminants. They require very specific operating conditions to perform reliably.

To accommodate the drives' requirements, you are usually left with a number of burdens:

Responsibility

The plant must prepare and maintain a controlled environment before the drive can be installed and commissioned.

Space and disruption

In addition to the disruption caused by any necessary demolition and construction, a sizeable amount of real estate within the plant must be allocated for the drive.

Site costs

A dedicated HVAC system and corresponding ductwork must be integrated into the plant's infrastructure to provide appropriate temperature control.

Utilities costs

Additional electrical costs for cooling the drive, both upfront and ongoing, contribute to an increased total cost of ownership for the drive system.



Only Siemens combines the world's most reliable drive with the world's most complete protection to deliver harsh-environment solutions that save space and minimize total cost of ownership (TCO).

Siemens has developed a range of modular solutions that not only eliminate these burdens, but also offer greater flexibility, protection, simplicity and savings than traditional solutions. This helps you extend the life and increase the efficiency of your drives.

Depending on your drive's HP, you can choose from three harsh-environment solutions. NEMA-rated enclosures ensure maximum protection in the harshest environments, and when paired with Siemens SINAMICS PERFECT HARMONY GH180 variable frequency drives (VFDs), they also help ensure optimal reliability for your operations.

Reliable operation in extreme environments

Siemens harsh-environment drive solutions have been successfully deployed to protect against a wide range of harsh conditions, including:

- Heat, dirt and sand at remote stations in the deserts of West Texas
- Subarctic temperatures (-40° F), snow and ice on the north slope of Alaska
- Air contamination and cold temperatures in the Canadian oil sands
- Salt and shipboard conditions in the Persian Gulf

Three harsh-environment solutions **to fit any need**

- Outdoor Duty Cabinets
- Containerized Enclosures
- Power distribution centers (PDCs) for all Hp ratings with switchgear, motor control centers (MCC), lighting, UPSs, office space, fire protection, HVAC and AC panelboards

Standout flexibility

With a full range of solutions, you can choose the environmental drive solution that best fits your needs.

Plus, there's no need to take up valuable floor space in your plant to accommodate your drive. The unique design of the Siemens SINAMICS PERFECT HARMONY GH180 VFD allows it to be placed up to 2.3 km away from the motor, giving you the flexibility to place the drive wherever it fits best. Longer distances may require output filters that can be integrated into the overall design.

Find the environmental drive solution that's right for you:



Outdoor Duty Drive
For drives < 1000 HP



Air-Cooled Containerized System
For drives > 1000 HP



Power Distribution Center (PDC)
For all HP ratings

	Summary	Key Features
<p>Outdoor Duty Drive For drives < 1000 HP</p>	<p>Compares to low voltage drive with step-up transformer</p> <p>Reduced overall footprint for facilities with limited space</p>	<p>3 wires in, 3 wires out configuration for low voltage input</p> <p>Closed-loop internal cooling</p> <p>Easily lifted from the top</p> <p>Access to main power connections without opening all main doors</p> <p>Lockable doors</p> <p>Standalone unit</p>
<p>Air-Cooled Containerized System For drives > 1000 HP</p>	<p>Higher HP ratings</p> <p>Accommodates auxiliary equipment: switchgear, input contactor, synchronous gear, breakers, options cabinet</p> <p>External heat exchangers or air conditioners</p>	<p>Full-voltage bypass switchgear</p> <p>Air-to-water or air-to-air heat exchanger</p> <p>Input contactor</p> <p>Output contactor</p> <p>Output filter</p> <p>Prevents condensation with full insulation</p> <p>Provides an additional envelope of safety for the operator, similar to metal-clad switchgear</p> <p>Protects the drive from impact with double steel-walled construction</p>
<p>Power Distribution Center (PDC) For all HP ratings</p>	<p>Can accommodate multiple drives</p> <p>Plant-style features: switchgear, low voltage mccs, lighting, UPSs, plant office space</p> <p>Fire protection, HVAC and AC panelboard</p>	<p>Complete range of auxiliary equipment (low voltage, etc.)</p> <p>Complete range of cooling methods</p> <p>Can provide additional logistics and administrative office spaces</p> <p>Personal environment meets OSHA operating and safety requirements</p>

Specifications

Temperature Rating: -45° C to +45° C | **Enclosure Rating:** Type 3R, 4, 4X
Altitude: Up to 2000 m | **Finish:** RAL 9010 external paint rated for harsh environments

Standout protection

Siemens free-standing NEMA all-weather drive enclosures with integral cooling offer the maximum protection against external elements.

This helps promote increased efficiency while prolonging the life of your drive for 20 years or more.

Siemens NEMA drive enclosures are designed to:

- Exceed NEMA 3R, 4 and even 4X style standards
- Maintain consistent temperature control, even in environments approaching -45° C
- Filter out air contaminants

The basic drive included with each solution is a standard SINAMICS PERFECT HARMONY GH180 air-cooled drive, which features identical operation, spares and maintenance as a unit located in a control room. No special parts or maintenance are required. And thanks to each enclosure’s unique design, no secondary barrier or fence is required around the drive to secure it.

All containerized and PDC enclosures stand by themselves and include an independent, third-party structural engineering review for each site. Each enclosure will bear stamps for compliance with the locations’ specific state building codes.

Load	Efficiency	Power Factor
100	96.2 to 97.1	.97
75	96.0 to 96.5	.97
50	95.5 to 96.0	.97
25	95.0 to 95.9	> .95
10	90.0 to 92.0	> .92



Standout **simplicity**

Siemens all-in-one solutions include virtually everything you need to integrate a drive into your existing infrastructure without disrupting operations.

In addition to not requiring dedicated space within the plant, all enclosures include integral temperature control, eliminating the need to install and integrate additional HVAC.

Plus, there is minimal engineering required on the customer's end: All that need to be supplied are a concrete pad and power cabling. Commissioning is fast and easy, completed in as little as 1-2 days.

The unique design of Siemens all-weather enclosures allows operators to easily access main power connections without exposing the drive to external elements. This helps further reduce maintenance and downtime due to environment-related drive failure.

Seamless, transparent PDC integration

With three options for integration, you have the freedom to use your own integrator or have Siemens handle everything, from procurement and delivery to integration and commissioning. Siemens has established relationships with a number of preferred PDC vendors.

Potential options include:

- Order your VFD from Siemens, and Siemens will work with a partnered local vendor to procure and integrate the drive with the PDC.
- Order your VFD from Siemens and work with your preferred PDC vendor to integrate the drive with the PDC.
- Order your VFD and PDC through your preferred vendor, who will order the drive from Siemens and handle the integration.

Standout savings

Together, the flexibility, protection and simplicity offered by the full range of Siemens harsh-environment solutions add up to significant savings.

Increased energy efficiency helps drive down utility costs, and the reduced need for maintenance helps minimize those costs — and related downtime costs — as well.

A Siemens 6000 Hp VFD was placed in a PDC with an air-to-air heat exchanger, replacing the need for a control room and conventional HVAC and resulting in:

- Savings in utility costs of thousands of dollars annually, offering a payback period under 3 years
- Reduced maintenance
- Extended VFD life



Factors that contribute to total cost of ownership (TCO)

	Traditional Drive Install	Siemens Harsh-Environment Drive Solutions Install
New or upgraded HVAC	X	
Demolition / construction	X	
Power cabling	X	X
Lost real estate within plant	X	
Utility cost	X	Minimal
Concrete pad		X
Dedicated space	X	

Legal Manufacturer

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Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit <https://www.siemens.com/industrialsecurity>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

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