

SIEMENS
Ingenuity for life



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Order No: LABR-03100-0618
Printed in USA
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Up time.
All the time.

The SINAMICS PERFECT HARMONY
GH180 water-cooled drive

usa.siemens.com/perfectharmony

Downtime is not an option.

When you're drilling on the well bottom with 10 feet to go, shutdowns are serious business.

When your rig is anchored 20 miles offshore without a speck of land in sight, service calls aren't simple. And when your pipeline has to pump 150,000 barrels a day to stay on schedule, uptime is everything. Operating conditions will never be perfect—but at least your drives can be.

SINAMICS PERFECT HARMONY fits any application

The SINAMICS PERFECT HARMONY GH180 water-cooled variable frequency drive (VFD) draws on decades of experience to deliver the most reliable performance for the widest range of applications yet. Once available exclusively for the most demanding applications with the largest capital expenditures, now the SINAMICS PERFECT

HARMONY GH180 VFD can be paired with any application to provide optimal versatility, efficiency and process availability.

Every element of a SINAMICS PERFECT HARMONY drive is engineered to maximize productivity and protect your process in a way that other drives can't. Its modularity and 50+ patented technologies allow for a scalable solution that achieves 99.99% availability, which means greater productivity and a reduced total cost of ownership over the drive's lifecycle. And now it can pack more power into a smaller footprint, resulting in a 20% smaller unit while reducing the total lifecycle cost.



SINAMICS PERFECT HARMONY GH180 is:

- **Highly reliable**
Provides fault tolerance via cell redundancy and Advanced Cell Bypass
- **Energy-efficient**
Increases process control to improve throughput and reduce energy waste
- **Easier to maintain**
Requires fewer repairs and spare parts, thanks to a simplified design
- **More powerful**
Offers high-horsepower options (up to 30,500 Hp and 11 kV) that fit more applications
- **Ultra-compact**
Reduces space requirements by fitting into a 20% smaller footprint

The reliability behind the world's #1 selling drive.

Advanced cell bypass

In less than a quarter of a second, the SINAMICS PERFECT HARMONY GH180 drive can bypass multiple failed cells to maintain a balanced output voltage. With one cell in bypass, the drive still produces sufficient voltage to allow the process to continue uninterrupted, and the quality of the voltage and the waveform remain virtually unchanged.

Synchronous transfer

Synchronous transfer is used to soft-start multiple motors in a series and efficiently transfer them across the line without over-stressing the power grid. This closed-transfer approach not only increases energy efficiency, but also helps protect motors and equipment from excessive torque transients.

Process-tolerant

Protection strategy (ProToPS™)

With a proven record of 99.99% process uptime, ProToPS™ protects your process from faulty sensors or data. Unlike typical systems that simply trip the drive and automatically shut down the system due to a malfunction, ProToPS™ offers a proactive control strategy for applications where failure avoidance is critical.

Clean power input

SINAMICS PERFECT HARMONY drives meet the most stringent IEEE 519 requirements for voltage and current harmonic distortion. An integrated sinusoidal convertor eliminates the need for harmonic filters, power factor correction capacitors or extra bus capacity, and it protects other online equipment from harmonic disturbances.

High-quality output

No drive offers a higher-quality waveform output than SINAMICS PERFECT HARMONY VFDs. With up to 33 levels of non-harmonic output voltage, it accommodates any standard motor without requiring additional output or dv/dt filters, which can reduce efficiency and reliability. In addition, it helps extend motor life by providing the lowest peak voltage to the motor windings.

Environmental tolerance

Only SINAMICS PERFECT HARMONY drives are engineered to operate reliably in environments with ambient temperatures ranging from -40° C to +50° C. No other drives can tolerate such a broad range of extreme conditions. An optional PDC allows the drives to withstand even the harshest outdoor conditions, from tropical environments to ocean platforms.

Technical data at a glance

Efficiency

- Typical power converter: 99%
- Typical total drive system: 97%

Input Transformer

- Copper windings, water-cooled

Line Supply Connection

- Input voltage and voltage tolerance: 2.3 to 13.8 kV, $\pm 10\%$
- Input frequency: 50 or 60 Hz, $\pm 5\%$
- Input power factor: ≥ 0.95 above 10% load

Motor-Side Inverter

- Multilevel drive PWM topology
- IGBT power modules

Motor Control

- Induction motors
- Synchronous motors
- Permanent magnet motors
- Wound rotor motors

Output dv/dt

- 1,000 to 3,000 V/ μ s (dependent on model)

Output Torque

- Rated torque (2Q) available from 10 to 167 Hz

Control

- Open or closed loop Vector v Control

Input Current Harmonics

- $\leq 5\%$ TDD (total demand distortion)
- Meets or exceeds IEEE 519

Ride-Through

- Minimum of five cycles after loss of input MV without tripping

Regenerative Operation

- Regenerative breaking is an option

Output Frequency and Drift

- 0.5 to 330 Hz, $\pm 0.5\%$

Output Voltage Harmonics (THDi)

- 2.0 to 2.5%



Fully integrated solutions.

Based on the world's most comprehensive range of drive products, Siemens Integrated Drive Systems (IDS) address the increasingly complex challenges of drive technology by providing a single source for your entire drive system—drive, motor, gearbox and couplings. The integrated design not only simplifies specification, purchase, implementation, operation and maintenance, but also increases your drive system's overall reliability with integrated design efficiencies.

Each component is engineered for optimal compatibility and performance, and upon delivery the Integrated Drive System is installed directly onto the equipment—saving you a significant amount of time in project startup. Every aspect of IDS is designed to your specifications, including custom service contracts and extended warranty options that reinforce the lifetime reliability of your system.



Advantages of an Integrated Drive System:

Reliability

- Improved operating times
- Faster supply of new and replacement components
- Condition monitoring
- CAPEX security

Productivity

- Higher throughput
- Reduced engineering effort
- High degree of flexibility
- Shorter time to market

Efficiency

- More energy-efficient
- Simplified maintenance
- Better environmental protection
- Reduced OPEX

Maximum reliability. Minimal size.

Bigger isn't always better

Today's increasingly demanding applications require drives to be squeezed into ever-smaller sites. Whether you're mining on a mountainside or deepwater drilling, space is a constant concern. And with high real estate costs, most manufacturers can't afford to waste a single inch of real estate—nor a single minute of production time.

To support critical applications in out-of-the-way places, Siemens redesigned its SINAMICS PERFECT HARMONY GH180 VFDs to be 20% more compact. The new streamlined design offers the same proven reliability and performance as before, but within a smaller footprint that makes it even more versatile and cost-efficient.

High value, low complexity

To shrink the size of its SINAMICS PERFECT HARMONY GH180 drives, Siemens simplified the system so that it's composed solely of a transformer cabinet, cell cabinet and cooling cabinet. There's less programming needed, and fewer components with fewer connections means maintenance time is minimized, too.

Reliability is improved by reducing the number of threaded fittings on water-cooled VFDs and replacing long hoses with stainless steel pipe. Every aspect of the drive is optimized to fit small spaces while remaining compatible with—and delivering superior reliability to—virtually every application.

Smaller size means smaller costs

In addition to saving valuable square footage, the new compact SINAMICS PERFECT HARMONY GH180 VFDs also help reduce your total cost of ownership. The size of the drive determines both the size of its enclosure and the power required to keep it cool. With a smaller enclosure, you spend less on cooling power.

In many cases, Siemens also provides manufacturers with an Electrical Equipment House (E-House), a plug-and-play power supply solution with a fully integrated VFD. Reducing the size of the VFD automatically reduces the size of the E-House as well.



Maximum flexibility:

Drive type:

- Water-cooled VFD

Cooling options:

- Water-to-air heat exchanger



No drive is more trusted

The SINAMICS PERFECT HARMONY GH180 VFD is in its 20th year of innovation. With each advancement, it continues to evolve in ways that bring increased reliability to critical processes.

From kiln lines and vertical ball mills to mud pumps and extruders, the vast majority of applications can be paired or retrofit with a SINAMICS PERFECT HARMONY GH180 VFD to optimize process improvement. It's the No. 1 selling drive in the world—with more than 11,000 drives sold—because it's the most trusted.

Same technology. Smaller size.

SINAMICS PERFECT HARMONY GH180 Water-Cooled VFD Features	
Original Footprint	396 - 451" L
New Footprint	309 - 386" L
Drive Ambient	5 - 50° C
Output Voltage Rating	Up to 11 kV
Output Current Rating	Up to 1375 A
HP Rating	Up to 34,000 Hp
Customer Inlet Water	0 - 40° C
Glycol	Up to 60%
Advanced Cooling System	Optional
External W-W HEX	Optional
External W-A HEX	Single-loop configuration
Redundant Pump	✓
Redundant W-W HEX	Optional
ProToPS™	Optional
Closed-loop Vector Control	Optional

SINAMICS PERFECT HARMONY GH180 Water-Cooled VFD Applications

Variable Torque Applications: Fans, Pumps, Compressors	✓
Constant Torque Applications: Pumps and Compressors, Extruders and Pelletizers	✓
Parallel Drives (Master-Slave Configuration)	✓
High Starting Torque	✓
High-speed Applications	✓
Applications that Require Braking	✓
Test Stand	✓
High Availability/ Critical Application Requirements	✓
High Starting Torque Using Closed-Loop Vector Control	✓
High Ambient Environment > 40° C	✓

Bigger power in a smaller package.

Same topology, new possibilities

In an industry where downtime is measured in hundreds of thousands of dollars an hour, reliability is essential. That's why, for years, the oil and gas industry has relied on SINAMICS PERFECT HARMONY medium voltage VFDs. The drive's innovative cell-based topology protects against failures that would overwhelm conventional drive systems.

Each 750 v cell includes Advanced Cell Bypass technology to help prevent interruptions in the unlikely event of a cell fault. And because the low-voltage cells are linked in series, the drive can be scaled to fit a wide range of voltage and output power needs.

Now that range has broadened further—up to 30,500 Hp and 11 kV output voltage. More critical applications than ever before can benefit from the superior reliability, availability and energy-efficiency offered by SINAMICS PERFECT HARMONY technology.

Streamlined for greater savings

To increase the drive's power without growing its footprint, the entire system was streamlined.

Nothing has changed within the cell topology itself; the enhanced power capabilities come from an expanded 24-cell configuration and an integral water-cooled transformer that optimizes system efficiency.

The Advanced Coolant System cools each power cell by routing water through heat sinks, and an additional water-to-air heat exchanger on top of the cabinet helps further regulate temperature. This allows for greater power output without greater HVAC requirements. Coolant levels can even be monitored remotely, and should the primary pump fail, a redundant pump ensures continuous circulation.

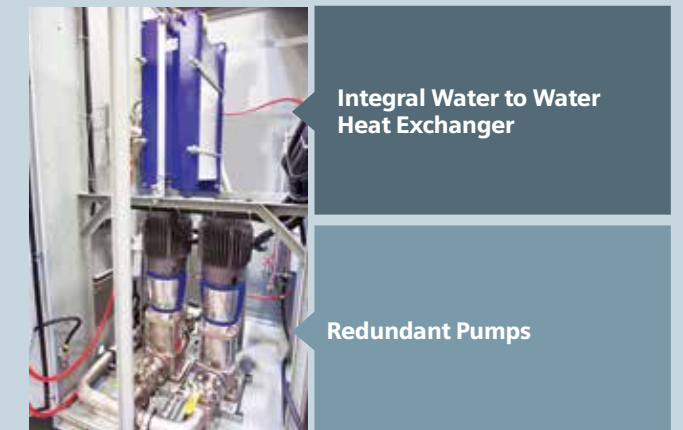
The result is a compact, cool-running drive with a cabinet that tops out at 60" (and spans only 48" at its smallest). Plus, not only does the drive's new design shrink its size by 20%; it also reduces the lifecycle cost. There are fewer components and connections to maintain, which means there are fewer spare parts required as well.

Reduced arc-fault risk

Every SINAMICS PERFECT HARMONY GH180 water-cooled drive includes the Arc Detection System as a standard feature. The distributed inverter section consists of power cells equipped with arc-detection sensors and the control to communicate with the drive system. This communication is supported by advanced protocol software. In the rare event of cell arcing, the advanced protocol will initiate the shutdown of the inverter within 20 ms. The drive control will issue a trip signal to an external breaker. The distributed power structure of the SINAMICS PERFECT HARMONY topology results in significantly reduced fault energy in the inverter section as compared to other available technologies.

More power for more applications

The SINAMICS PERFECT HARMONY GH180 VFD is the world's most trusted drive because when reliability matters most, it delivers. Rather than merely meeting the industry's baseline, the SINAMICS PERFECT HARMONY GH180 drive raises the bar with its integral arc-fault protection, Advanced Cooling System and streamlined design.



Integral Water to Water Heat Exchanger

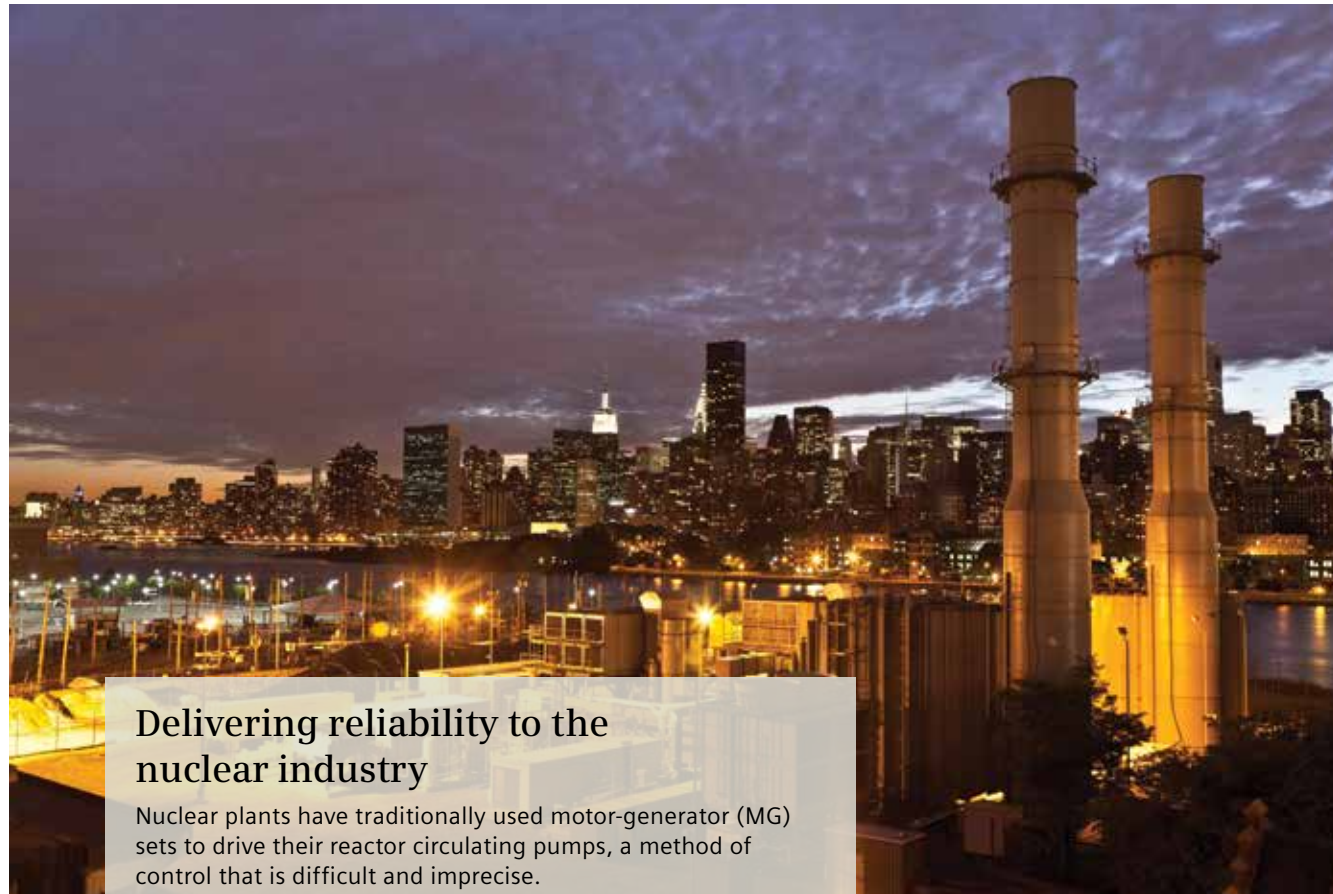
Redundant Pumps

And now its newly increased power capabilities and smaller size make it available to an even greater number of critical applications—further enhancing reliability and energy efficiency throughout the oil and gas industry.

To learn more about how the SINAMICS PERFECT HARMONY GH180 water-cooled VFD defends against downtime, please visit usa.siemens.com/perfectharmony.



When uptime is everything, everything has to be perfect.



Delivering reliability to the nuclear industry

Nuclear plants have traditionally used motor-generator (MG) sets to drive their reactor circulating pumps, a method of control that is difficult and imprecise.

In 2000, the nuclear power industry turned to Siemens for a more reliable solution, and six SINAMICS PERFECT HARMONY VFDs were installed at the Browns Ferry Nuclear Plant.

The drives were able to predictably and accurately control the nuclear plant's circulating pump speed to within 1 rpm of the desired speed command, allowing the plant to operate closer to the reactor's allowed thermal power limit and generate additional electricity.

At full load and full speed, Siemens VFDs achieve 97% efficiency. By improving energy efficiency and enabling power plants to generate additional electricity, VFDs deliver a significant return on investment.

Even more importantly, they feature Advanced Cell Bypass, which ensures continuous operation even in the event of a power cell failure. This level of reliability is essential for the nuclear power industry.

Any variable frequency drive will improve control over your process, but only SINAMICS PERFECT HARMONY GH180 drives will optimize the control you have. With 50+ patented technologies proven to increase reliability and reduce energy consumption, the SINAMICS PERFECT HARMONY GH180 water-cooled VFD is designed to fit more applications, more spaces and more budgets.

Visit usa.siemens.com/perfectharmony to take a tour of the GH180 water-cooled drive and learn more about how it can help you improve your process, your production and your bottom line.

SINAMICS PERFECT HARMONY GH180 water-cooled drive specifications

No. of Cells	Output Current	Type Rating	Shaft Output*		Motor Voltage	Height		Width		Depth		Order No. (MLFB)**
	A	kVa	kW	Hp	kV	in.	mm	in.	mm	in.	mm	
9	880	5,025	4,271	5,726	3.3	114	2,896	370	9,398	66	1,677	6SR3252-0[B46-0][]0
9	1,250	7,140	6,067	8,133	3.3	115	2,921	378	9,602	66	1,677	6SR3252-0[C48-5][]0
9	880	6,095	5,177	6,940	4.16	114	2,896	370	9,398	66	1,677	6SR3252-0[B47-0][]0
9	1,250	8,660	7,354	9,858	4.16	115	2,921	378	9,602	66	1,677	6SR3252-0[C52-0][]0
12	880	7,315	6,213	8,329	4.6/4.8	115	2,921	406	10,313	66	1,677	6SR3252-1[B48-5][]0
12	1,250	10,390	8,825	11,830	4.6/4.8	115	2,921	412	10,469	70	1,778	6SR3252-1[C52-4][]0
15	880	9,140	7,766	10,411	6.0	115	2,921	439	11,151	70	1,778	6SR3252-2[B52-2][]0
15	1,250	12,990	11,031	14,787	6.0	115	2,921	439	11,151	70	1,778	6SR3252-2[C53-0][]0
15	880	10,055	8,542	11,451	6.6	115	2,921	439	11,151	70	1,778	6SR3252-2[B52-4][]0
15	1,250	14,285	12,134	16,266	6.6	115	2,921	439	11,151	70	1,778	6SR3252-2[C53-4][]0
18	880	10,970	9,319	12,492	6.9/7.2	115	2,921	474	12,040	70	1,778	6SR3252-3[B52-6][]0
18	1,250	15,585	13,237	17,744	6.9/7.2	125	3,175	478	12,142	76	1,931	6SR3252-3[C53-6][]0

* Typical output value provided; output power may change based on the type or size of motor.
 ** Brackets denote additional digits to be determined based on order detail.

No. of Cells	Output Current	Type Rating	Shaft Output*		Motor Voltage	Height		Width		Depth		Order No. (MLFB)**
	A	kVa	kW	Hp	kV	in.	mm	in.	mm	in.	mm	
9	880	5,025	4,271	5,726	3.3	115	2,921	305	7,747	70	1,778	6SR3272-0[B46-0][]0
9	1,000	5,709	4,879	6,544	3.3	115	2,921	305	7,747	70	1,778	6SR3272-0[B47-0][]0
9	1,250	7,140	6,067	8,133	3.3	115	2,921	305	7,747	70	1,778	6SR3272-0[C48-5][]0
9	1,375	7,850	6,709	8,997	3.3	115	2,921	305	7,747	70	1,778	6SR3272-0[C48-7][]0
9	880	6,095	5,177	6,940	4.16	115	2,921	305	7,747	70	1,778	6SR3272-0[B47-0][]0
9	1,000	7,197	6,151	8,249	4.16	115	2,921	305	7,747	70	1,778	6SR3272-0[B48-7][]0
9	1,250	8,660	7,354	9,858	4.16	115	2,921	305	7,747	70	1,778	6SR3272-0[C52-0][]0
9	1,375	9,896	8,458	11,342	4.16	115	2,921	305	7,747	70	1,778	6SR3272-0[C52-4][]0
12	880	7,315	6,213	8,329	4.6/4.8	115	2,921	331	8,395	70	1,778	6SR3272-1[B48-5][]0
12	1,000	8,304	7,097	9,518	4.6/4.8	115	2,921	331	8,395	70	1,778	6SR3272-1[B52-0][]0
12	1,250	10,390	8,825	11,830	4.6/4.8	115	2,921	331	8,395	70	1,778	6SR3272-1[C52-4][]0
12	1,375	11,418	9,759	13,087	4.6/4.8	115	2,921	331	8,395	70	1,778	6SR3272-1[C52-8][]0
15	880	9,140	7,766	10,411	6	115	2,921	356	9,043	70	1,778	6SR3272-2[B52-2][]0
15	1,000	10,380	8,872	11,897	6	115	2,921	356	9,043	70	1,778	6SR3272-2[B52-4][]0
15	1,250	12,990	11,031	14,787	6	115	2,921	356	9,043	70	1,778	6SR3272-2[C53-0][]0
15	1,375	14,273	12,199	16,359	6	115	2,921	356	9,043	70	1,778	6SR3272-2[C53-4][]0
15	880	10,055	8,542	11,451	6.6	115	2,921	356	9,043	70	1,778	6SR3272-2[B52-4][]0
15	1,000	11,418	9,759	13,087	6.6	115	2,921	356	9,043	70	1,778	6SR3272-2[B52-8][]0
15	1,250	14,285	12,134	16,266	6.6	115	2,921	356	9,043	70	1,778	6SR3272-2[C53-4][]0
15	1,375	15,700	13,419	17,995	6.6	115	2,921	356	9,043	70	1,778	6SR3272-2[C53-6][]0
18	880	10,970	9,319	12,492	6.9/7.2	125	3,175	386	9,792	76	1,931	6SR3272-3[B52-6][]0
18	1,000	11,937	10,203	13,682	6.9/7.2	125	3,175	386	9,792	76	1,931	6SR3272-3[B52-8][]0
18	1,250	15,585	13,237	17,744	6.9/7.2	140	3,556	394	9,995	84	2,134	6SR3272-3[C53-6][]0
18	1,375	16,413	14,029	18,813	6.9/7.2	140	3,556	394	9,995	84	2,134	6SR3272-3[C53-8][]0
24	880	15,224	13,012	17,449	10.0/11.0	140	3,556	445	11,303	84	2,134	6SR3272-5[B53-4][]0
24	1,000	17,300	14,786	19,829	10.0/11.0	140	3,556	445	11,303	84	2,134	6SR3272-5[B54-0][]0
24	1,250	21,625	18,483	24,786	10.0/11.0	148	3,759	450	11,430	90	2,286	6SR3272-5[C55-6][]0
24	1,375	23,788	20,331	27,265	10.0/11.0	148	3,759	450	11,430	90	2,286	6SR3272-5[C55-6][]0

* Typical output value provided; output power may change based on the type or size of motor.
 ** Brackets denote additional digits to be determined based on order detail.