Drives for every demand
The SINAMICS family of medium voltage drives

siemens.com/medium-voltage-converter
Proven reliability. Endless possibilities.

There’s no such thing as a one-size-fits-all variable frequency drive (VFD). That’s why the SINAMICS family of drives draws on the Siemens legacy of innovation to deliver reliable, high-quality power for a wide range of applications. Designed to save energy, reduce operating costs and reinforce reliability, SINAMICS VFDs are the preferred choice in power conversion.

**SINAMICS Medium Voltage Drives**

Siemens has more than four decades of experience manufacturing nearly every type of medium-voltage converter or inverter that exists today. We have developed our portfolio of drives to meet specific needs with the optimal solution for every type of medium-voltage application:

- Standard applications such as conveyors, pumps, fans and compressors
- Specialized applications such as rolling mills, horizontal mills, shaft generators and high-speed compressors

One single topology or drive configuration does not fit all applications. This is the reason we offer converters and inverters featuring six different technologies, motor voltage classes from 1.4 kV to 13.8 kV and power ratings from 150 kW to 85 MW. Plus, our drive systems match perfectly with our high-voltage motors to provide unparalleled levels of reliability, availability, flexibility and performance.

**The optimized drive for every application**

<table>
<thead>
<tr>
<th>Pumps</th>
<th>Compressors</th>
<th>Extruders</th>
<th>Test Benches</th>
<th>Conveyor Belts</th>
<th>Rolling Mills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fans</td>
<td>Propulsion</td>
<td>Crushers</td>
<td>Winders</td>
<td>Shaft Generators</td>
<td>Grids</td>
</tr>
<tr>
<td>Feeding (2/3)</td>
<td>Single motor</td>
<td>Variable torque</td>
<td>Application Complexity</td>
<td>Feeding &amp; Regenerative (2/3 &amp; 4/4)</td>
<td>Single &amp; multi motor</td>
</tr>
</tbody>
</table>

SIDRIVE IQ – IoT digitalization offering for drive systems

SINAMICS drives are an integral component of SIDRIVE IQ, the digital platform to optimize drive systems. SINAMICS drives are equipped with a connectivity box (SINAMICS CONNECT 500) so that they can be integrated into this digital, cloud-based solution. Condition monitoring data such as drive information, historic logs, parameter and fault logs are evaluated, processed and sent to the cloud for analysis.

After uploading this data, it can be analyzed with the brand new MindApp, SIDRIVE IQ. With the SIDRIVE IQ App users can track and visualize various drive system conditions, show trends, error messages and generate reports.

The goal of SIDRIVE IQ is to:
- Manage cloud based the connected installed base in real time
- Reduce service and maintenance
- Increase availability
- Shorten unplanned downtime

SIDRIVE IQ – the digital assistant for your drive system

[siemens.com/medium-voltage-converter]
Core Applications and Product Highlights

**SINAMICS GL150**

Core Applications
- Mainly used in large high-power and high-speed applications such as pumps, fans, compressors, main marine drives, extruders and rolling mills, shaft generators, boiler feed pumps, wire rod mills, starting generators, pump storage and starting applications (e.g., blast furnaces).

Product Highlights
- Compared to VSI drives, most cost-competitive solution for large power ratings – Power density per M2.
- Mature and proven LCI topology – With over 40 years of experience and large installed base.
- Rugged and compact design for complex high-power applications – Fault tolerant, high MTBF, utilized in marine, starting and high-power applications, most rugged thyristor technology.
- Regenerative capability for energy-saving drive system solutions.

**SINAMICS SH150**

Core Applications
- Special applications such as shaft generators on ships, onshore power supply for ships and offshore platforms, regenerating test stands, 50/60 Hz grid coupling, VAR compensation by AFE-drives.

Product Highlights
- Extremely motor- and line-friendly – Motors of literally any type – old or new – can be operated with standard winding insulation without additional stress. Transformer-less connection to local grids on request.
- Active Front End (AFE) for grid applications – Dedicated UfI droop control to create an island grid or to co-supply together with other generators. Additionally supply dynamic reactive power for voltage stabilization (STATCOM).
- Active Front End (AFE) for regenerating motors – Simultaneous 2Q or 4Q operation and grid VAR compensation with AFE and motor-side inverter. Also for rotating generators.
- Robust & reliable – Cell redundancy with automatic cell bypass for increased availability. Marine classification for ship and offshore applications.

**SINAMICS Perfect HARMONY GH180**

Core Applications
- Single-motor and sync-transfer motor applications such as pumps, fans, compressors, mills, crushers, conveyor systems, retrofit projects, etc.

Product Highlights
- Integrated and optimized drive and transformer design – Minimized plant footprint, combined cooling system and plug-and-play drive system setup.
- Over 15,000 drives sold worldwide – The most trusted and proven drive on the market today with installations in every major process industry.
- Extremely motor-friendly – Capable of being configured with virtually any motor thanks to an almost sinusoidal output voltage.
- Cell bypass and cell redundancy – Maximize process availability thanks to its Advanced Cell Bypass feature for maintaining a balanced output voltage without torque or speed reductions.

**SINAMICS Perfect HARMONY GH150**

Core Applications
- Single motor applications such as pumps, fans, compressors, conveyor systems (uphill) and retrofit projects.

Product Highlights
- Transformer flexibility – Able to utilize separate dry type or oil-filled standard converter transformers or high primary voltages or number of pulses.
- Flexible cooling arrangement perfect for any installation requirements – Water or air cooled design, duct air outside, use integral or separate air-to-air or integral air-to-water heat exchanger, stand alone control cabinet.
- Extremely motor-friendly – Capable of being configured with virtually any motor thanks to an almost sinusoidal output voltage up to 13.8 kV.
- Cell bypass and cell redundancy – Maximize process availability thanks to a high speed cell bypass feature for maintaining a balanced output voltage without torque or speed reduction.

**SINAMICS HARMONY GH150**

Core Applications
- Single-motor applications such as basic pump, fan and compressor applications, and mine hoists, especially in marine and offshore applications.

Product Highlights
- Easy to maintain and operate safely and reliably – Fuseless, arc fault.
- Optimized footprint and design – Compact, rugged; saves costs and space.
- Common housing system for IGBT and IGCT cooling principles – Freely selected based on customer needs to meet requirements.
- Transformer flexibility – Able to utilize dry type or oil-filled standard converter transformers or high primary voltages or number of pulses.
# SINAMICS Medium Voltage Drives

Discover why no other drive portfolio can match the flexibility and performance of our SINAMICS medium voltage drives. With systems in motor voltage classes from 1.4 kV to 13.8 kV, and power ratings from 150 kW to 85 MW, Siemens drives are built to provide the reliability, longevity and quality that modern applications demand - because in today's competitive market, downtime is not an option.

## Technical Specifications

<table>
<thead>
<tr>
<th>SINAMICS PERFECT HARMONY GH180</th>
<th>SINAMICS PERFECT HARMONY GH150</th>
<th>SINAMICS GM150</th>
<th>SINAMICS GL150</th>
<th>SINAMICS SH150</th>
<th>SINAMICS SM150</th>
<th>SINAMICS SL150</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of converter</strong></td>
<td>Multi-cell voltage source inverter featuring SINAMICS PERFECT HARMONY technology (PH-VSI)</td>
<td>Multi-cell voltage source inverter featuring M2C technology (M2C VSI) [Modular multilevel converter (M2C)]</td>
<td>Voltage source inverter with 3-level NPC and Diode Front End (DFE-VSI)</td>
<td>Current Source inverter with load-commutated inverter technology (LCI)</td>
<td>Multi-cell voltage source inverter with active front end (AFE) featuring M2C technology (M2C VSI)</td>
<td>Voltage source inverter with 3-level NPC and Active Front End (AFE-VSI)</td>
</tr>
<tr>
<td><strong>Converter cooling</strong></td>
<td>Air (A), water (W)</td>
<td>Air (A) incl. optional integral A/W and A/A-HEX, water (W)</td>
<td>Air (A), water (W)</td>
<td>Air (A), water (W)</td>
<td>Water (W)</td>
<td>Air (A), water (W)</td>
</tr>
<tr>
<td><strong>Power range</strong></td>
<td>A: up to 10 MVA W: up to 24.4 MVA</td>
<td>A: 4.35 MVA W: 4.47 MVA</td>
<td>A: 1.14 MVA W: 2.4 MVA</td>
<td>A: 1.4-30 MVA W: 6.85 MVA (higher on request)</td>
<td>A: 3.4-5.8 MVA W: 4.5-6.315 MVA</td>
<td>A: 2.9-18.8 MVA W: 12-40 MVA</td>
</tr>
<tr>
<td><strong>Transformer</strong></td>
<td>Integrated transformer</td>
<td>Separate transformer</td>
<td>Separate transformer</td>
<td>Separate transformer</td>
<td>Separate transformer</td>
<td>Separate transformer</td>
</tr>
<tr>
<td><strong>Input section</strong></td>
<td>A: 2Q (DFE) W: 2Q (DFE) and w/partial recharge</td>
<td>2Q (DFE)</td>
<td>2Q (DFE)</td>
<td>4Q</td>
<td>2Q (DFE) or 4Q (AFE)</td>
<td>4Q (AFE)</td>
</tr>
<tr>
<td><strong>Type of motor</strong></td>
<td>IM, SYN, PEM, WRM</td>
<td>IM, SYN</td>
<td>IM, SYN, PEM</td>
<td>SYN</td>
<td>IM, SYN, PEM</td>
<td>IM, SYN, PEM</td>
</tr>
<tr>
<td><strong>Output voltage</strong></td>
<td>A: 2.3 to 11 kV W: 4.0 to 11 kV</td>
<td>A: 4.16 to 13.8 kV W: 4.16 to 11 kV</td>
<td>2.3 to 4.16 kV 6.6 kV and Multi Motor</td>
<td>1.4 to 10.3 kV</td>
<td>3.3 to 7.2 kV</td>
<td>3.3 kV, 4.16 (IGBT only)</td>
</tr>
<tr>
<td><strong>Standards</strong></td>
<td>EN, IEC, CE, EAC, CSA, ANSI, UL, NEMA</td>
<td>EN, IEC, CE, EAC, CSA, ANSI, UL, NEMA</td>
<td>IEC, CE, EAC, CSA (on request)</td>
<td>IEC, CE, EAC, CSA (on request)</td>
<td>IEC, CE, EAC, CSA (on request)</td>
<td>IEC, CE, EAC, CSA (on request)</td>
</tr>
<tr>
<td><strong>Long cable capabilities</strong></td>
<td>2300 m; longer distances on request</td>
<td>1000 m; longer distances on request</td>
<td>1000 m; longer distances on request</td>
<td>Option L08: up to 1000 m</td>
<td>Option L05: up to 1000 m</td>
<td>1000 m; longer distances on request</td>
</tr>
</tbody>
</table>

Due to complex project requirements, it is always recommended that users contact their local Siemens representative for more advanced assistance in selecting the correct drive for the application.
<table>
<thead>
<tr>
<th>Features</th>
<th>SINAMICS PERFECT HARMONY GH180</th>
<th>SINAMICS PERFECT HARMONY GH150</th>
<th>SINAMICS GM150</th>
<th>SINAMICS GL150</th>
<th>SINAMICS SH150</th>
<th>SINAMICS SM150</th>
<th>SINAMICS SL150</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Differentiating Features</strong></td>
<td>[ ] Only 3 cables in &amp; out</td>
<td>[ ] Separate transformer</td>
<td>[ ] Separate transformer</td>
<td>[ ] Highest power ratings</td>
<td>[ ] Highest flexibility</td>
<td>[ ] High dynamic</td>
<td>[ ] Low speed</td>
</tr>
<tr>
<td></td>
<td>[ ] Cell redundancy</td>
<td>[ ] Cell redundancy</td>
<td>[ ] Marine &amp; offshore duty</td>
<td>[ ] Control redundancy</td>
<td>[ ] Line friendly</td>
<td>[ ] High overload</td>
<td>[ ] Highest overload capability</td>
</tr>
<tr>
<td><strong>Cell bypass</strong></td>
<td>[ ]</td>
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<tr>
<td><strong>Cell redundancy</strong></td>
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<tr>
<td><strong>ProToPS™ warning system</strong></td>
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<tr>
<td><strong>Separate control cabinet design</strong></td>
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<td><strong>Multi-axis</strong></td>
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<tr>
<td><strong>Dynamic braking</strong></td>
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<tr>
<td><strong>Marine certification</strong></td>
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<tr>
<td><strong>Arc-fault-tested design</strong></td>
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<tr>
<td><strong>Semiconductor technology</strong></td>
<td>IGBT</td>
<td>IGBT</td>
<td>IGBT, IGCT</td>
<td>Thyristor</td>
<td>IGBT</td>
<td>IGBT, IGCT</td>
<td>Thyristor</td>
</tr>
<tr>
<td><strong>Control system</strong></td>
<td>Sensorless vector control (optionally with sensor), automatic motor identification, automatic startup</td>
<td>Closed-loop vector control</td>
<td>Closed-loop vector control</td>
<td>Closed-loop vector control</td>
<td>Closed-loop vector control, active front end (AFE) control, droop control for grid supply</td>
<td>Closed-loop vector control</td>
<td>Closed-loop vector control</td>
</tr>
<tr>
<td><strong>Communication profiles</strong></td>
<td>EtherNet IP, Modbus RTU, Modbus Ethernet, DeviceNet, ControlNet, PROFINET, Ethernet/IP</td>
<td>PROFINET (standard); optional: PROFINET DP, CAN-bus, Modbus Plus, Modbus RTU, Modbus TCP, DeviceNet, ControlNet</td>
<td>PROFINET DP, PROFINET (further profiles available on request)</td>
<td>PROFINIBUS DP, PROFINET (standard); optional: PROFINET, CAN-bus, Modbus, DeviceNet</td>
<td>SH150: PROFINET (standard); optional: PROFINIBUS DP, CAN-bus, Modbus Plus, Modbus RTU, Modbus TCP, DeviceNet, ControlNet</td>
<td>PROFINIBUS DP, PROFINET (further profiles available on request)</td>
<td>PROFINIBUS DP, PROFINET (further profiles available on request)</td>
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<tr>
<td><strong>Reactive power compensation</strong></td>
<td>[ ]</td>
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<tr>
<td><strong>Synchronous bypass to grid</strong></td>
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<td>On request</td>
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<td><strong>Fuseless</strong></td>
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<tr>
<td><strong>Multi-motor starting/sync transfer</strong></td>
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</table>
Motor Compatibility

No drive or motor is perfect for every application or challenge. In addition to our medium voltage drives portfolio, Siemens also offers the most extensive portfolio of high voltage motors that have been crafted to work seamlessly with our medium voltage drives.

Application Compatibility

Below is a table detailing our most commonly supported applications. Siemens is experienced and able to support numerous other medium-voltage applications that are not listed here. Drive capabilities can differ based on their configurations and the options selected so there may be exceptions to the suitability of the drive assignments listed here.

<table>
<thead>
<tr>
<th>SIMOTICS High-Voltage Series Motors</th>
<th>SINAMICS PERFECT HARMONY GH180</th>
<th>SINAMICS PERFECT HARMONY GH150</th>
<th>SINAMICS GM150</th>
<th>SINAMICS GL150</th>
<th>SINAMICS SH150</th>
<th>SINAMICS SM150</th>
<th>SINAMICS SL150</th>
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<tbody>
<tr>
<td>SIMOTICS HV C</td>
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<td>SIMOTICS HV M</td>
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<td>SIMOTICS HV Series Hi-compact</td>
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<td>SIMOTICS HV series A-compact PLUS</td>
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<td>SIMOTICS HV ANEMA</td>
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<td>SIMOTICS HV HP</td>
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<td>SIMOTICS high-speed</td>
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<td>SIMOTICS HV Series Metals</td>
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<td>Simotics ring motors</td>
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<tr>
<td>SIMOTICS HV Series Mining</td>
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<td>SIMOTICS HV Series Ship</td>
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<td>SIMOTICS HV Series Injection Pump</td>
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</tbody>
</table>

A different drive may be required for each motor depending on the operational requirements, motor type selected and preference of drive technology. This table provides a basic view of which drives and motors are compatible in the majority of circumstances.

- **Fans**: ◆
- **Conveyors (downhill)**: ◆
- **Conveyors (uphill)**: ◆
- **Crushers**: ◆
- **Extruders**: ◆
- **Mixers**: ◆
- **Compressors**: ◆
- **Excavators**: ◆
- **Kilns**: ◆
- **High-pressure grinders**: ◆
- **Vertical mills**: ◆
- **Horizontal mills (geared)**: ◆
- **Horizontal mills (gearless)**: ◆
- **Existing line motors**: ◆
- **Blast furnace blowers**: ◆
- **Pump storage**: ◆
- **Rolling mills**: ◆
- **Propulsion**: ◆
- **Thrusters**: ◆
- **Mine winders**: ◆
- **Boiler feed pumps**: ◆
- **Starting generators**: ◆
- **Starting blast furnace blowers**: ◆
- **Onshore power supply**: ◆
- **Test stands**: ◆
- **Shaft generators**: ◆
- **Shaft generator (booster)**: ◆
- **LNG start (helper) (all-electric)**: ◆
High altitudes, temperatures and air quality, plus service routines, feedback and self-diagnostics, including thyristors, improved commissioning and tuning.

**Core Applications**

Perfect for complex high-torque and low-speed applications such as rolling mills, mine hoists, mine winders, ore and cement crushers, excavators and conveyors.

**Product Highlights**

- Fewest drive components for any given power rating
- SL150
- Optimized footprint and design
- Fuseless, arc fault
- Compact, rugged; saves costs and space
- Able to utilize dry type or transformer flexibility
- Cooling principles freely selected based on
- SIDRIVE IQ – the digital assistant for your drive system
- Shorten unplanned downtime
- Increase availability
- Manage cloud-based the connected installed base in real time
- The goal of SIDRIVE IQ is to: track and visualize various drive system conditions, show trends, error messages and generate reports.
- With the SIDRIVE IQ App users can
- SIDRIVE IQ – IoT
- Single- and multi-motor applications such as mills, crushers, conveyor systems (uphill) and retrofit projects.

**Mainly used in**

Large high-power and high-speed applications (e.g., blast furnaces).

**Compared to VSI drives, most cost-competitive solution**

- Mature and proven LCI topology
- Most rugged thyristor technology
- Regenerative capability for energy-saving drive system
- Feeding (2Q) Single
- Variable
- Motor
- Grids
- Feeding (2Q)
- Single
- Variable
- Motor
- Grids

**SINAMICS Medium Voltage Drives**

There's no such thing as a one-size-fits-all variable frequency drive (VFD). Operating costs and reinforce reliability, SINAMICS VFDs are the preferred choice in power of medium-voltage application:

- Specialized applications such as rolling mills, horizontal mills, and compressors
- VAR compensation by AFE-drives
- Motors of literally any type – old or new – can be operated with AFE and motor-side inverter. Also for rotating generators
- Over 15,000 drives sold worldwide
- Almost sinusoidal output voltage.
- Over 15,000 drives sold worldwide
- Almost sinusoidal output voltage.

**Published by Siemens AG**

Large Drives Applications
Vogelweiherstr. 1–15
90441 Nuremberg
Germany

For the U.S. published by
Siemens Industry Inc.
100 Technology Drive
Alpharetta, GA 30005
United States

Article No.: PDLD-Y10038-01-7600
Dispo 41505 TH 455-190527
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