

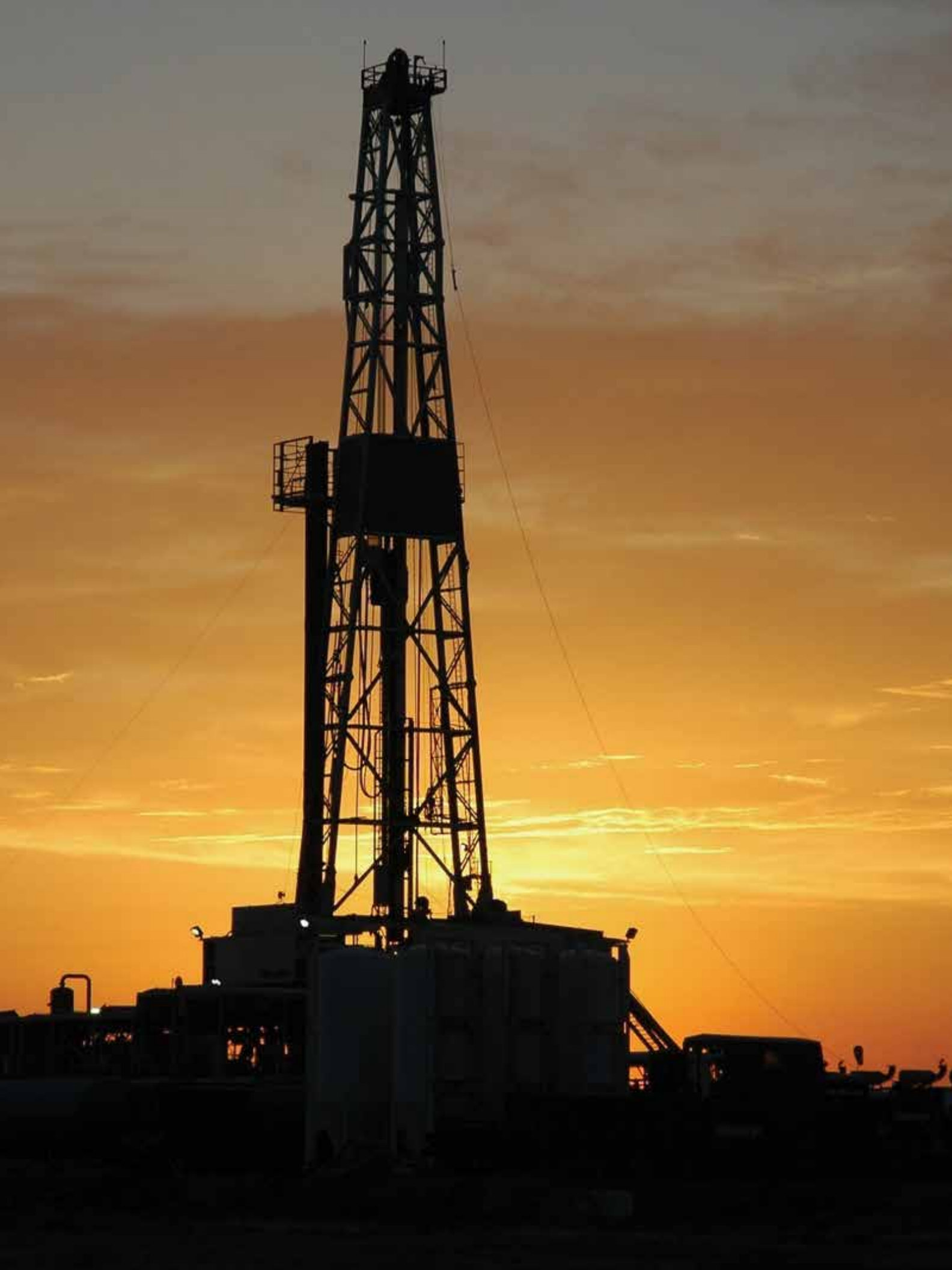
GE
Power Conversion

MV7000

Reliable, high performance
medium voltage drive



imagination at work



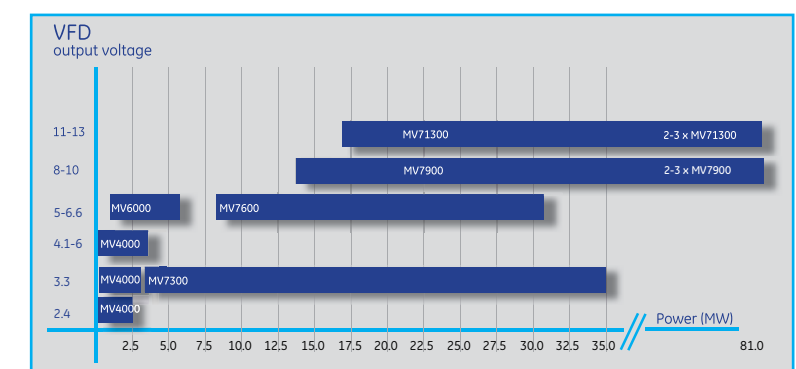
The next generation of drive technology

Cutting-edge power electronics technology and decades of process expertise come together in the MV7000 — a world-class water-cooled medium voltage drive suitable for a wide range of power conversion applications. Easy to install and maintain, the drive offers high reliability and availability and helps increase the uptime of critical processes. The MV7000 provides a flexible approach to achieve a customized solution across different applications.

With the MV7000 our power conversion expertise helps increase operating efficiency, power availability, plant throughput, operational precision, and process yield. We are helping our customers meet the demands and opportunities of the new electric age.

Benefits:

- **Peak power density** — our drive can deliver up to 15 MW with just 18 IGBTs, which is equivalent to a power density of 1.5 MVA/m³
- **High reliability and availability** — over 10 million hours in operation across an installed base of over 8.5 GW
- **Power scalability with à la carte option packaging** that can be adapted to a wide range of applications
- **A full family of drives** — GE is your one-stop provider with a wide portfolio of drives



The MV7000 belongs to GE's wide range of drives for all applications.

Advantages of a medium voltage variable frequency system

Reliability & availability

The higher reliability and lower maintenance needs of a variable speed drive system compared to gearboxes and hydraulic couplings result in lower lifecycle cost.

Saving energy, caring for the environment

In today's world more than ever, energy saved is energy produced. For a variety of loads, from water pumps to gas compressors, variable speed control offers the best way to capture energy savings.

Precise power delivery

In many applications, the superiority of electrical control simply cannot be matched by mechanical systems. Precise control of power means better outcomes, from the flatness of a steel sheet to the accuracy of offshore Oil & Gas exploration.

Variable frequency drives can be used in a variety of industries and applications

| Industry sector | Applications |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oil and gas | eLNG trains, injection compressors and pumps, gas storage, multiphase pumps, pipeline compressors |
| Marine | Cruise ships, LNG carriers, offshore drilling vessels, research vessels, megayachts, merchant vessels, navy support vessels |
| General and heavy industry | Metal rolling mills, test benches, grinders, water pumps, mine winders, crushers, ID fans, FD fans, wind turbines, static frequency converters, boiler feed pumps |

MV7000 — Enhanced technology

Key benefits

- Peak power density
- High reliability and availability
- Power scalability with customizable options featuring:
 - Low harmonics without additional equipment
 - Four quadrant operation for regenerative applications
 - Transformerless design for compactness
 - Common DC bus system for energy savings
 - High performance process control
 - Visor Connect supports warranty with remote real-time support and advice
- Front access maintenance
- Simplified cooling system architecture and gate drive power supply topology
- Fuseless design



Power stack



Inverter cubicle

Best-in-class power density

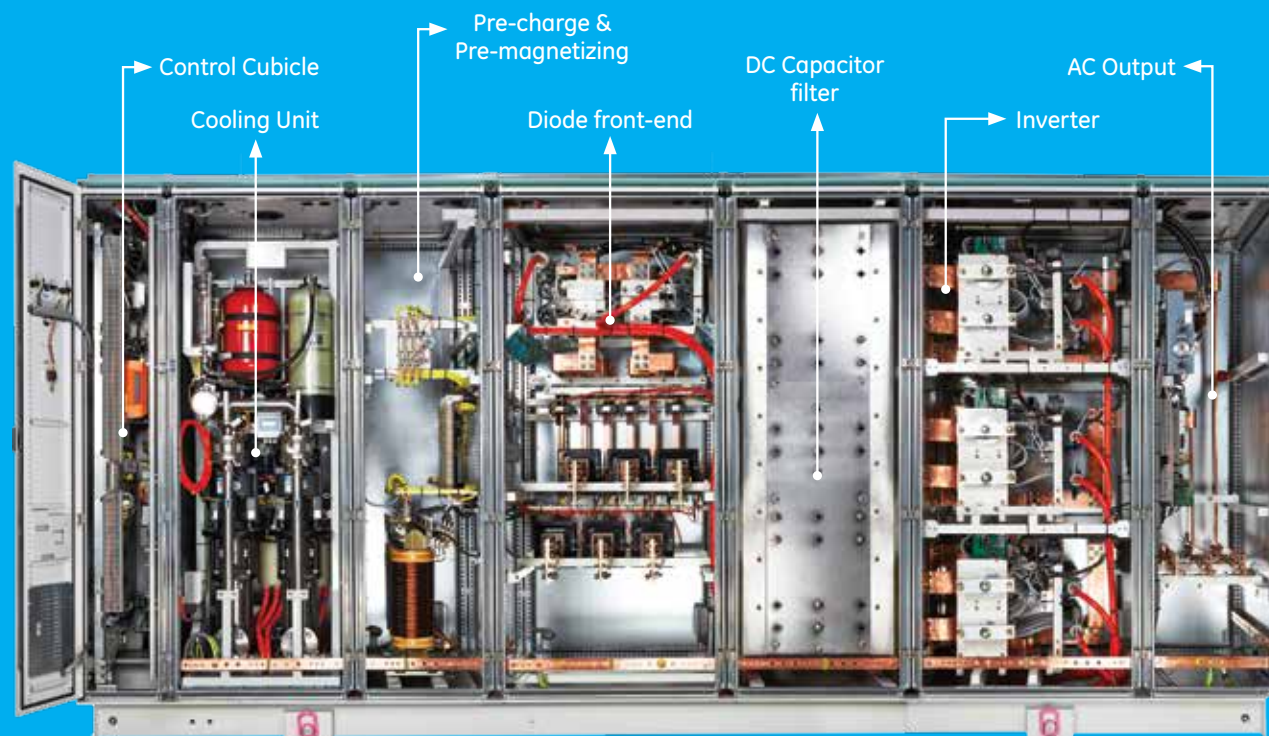
The phase power stack is the main modular building block of the three-level inverter.

- Compact enclosures thanks to double sided cooling of the IGBTs
- Just 18 IGBTs at 3.3 kV can deliver 15 MW
- Control hardware mounted on a slide in/out frame

High reliability and availability

The MV7000 is a great example of a design philosophy based on minimizing component count while retaining peak performance. Press-pack IGBT (PPI) power devices enable:

- The capability to limit overcurrent with safe turn-off under all operating and failure conditions
- Case rupture-free due to pressed contacts and no-wire bonding
- N+1 series redundancy thanks to the capability of PPI for continuous conduction under failure mode
- Long life expectancy even under load cycling
- Effective performance even at low motor frequency operation



Inside look at the MV7000

Power scalability with customizable options

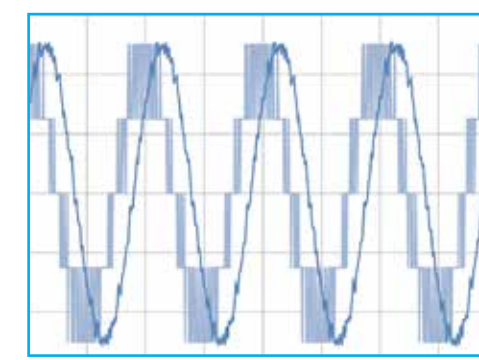
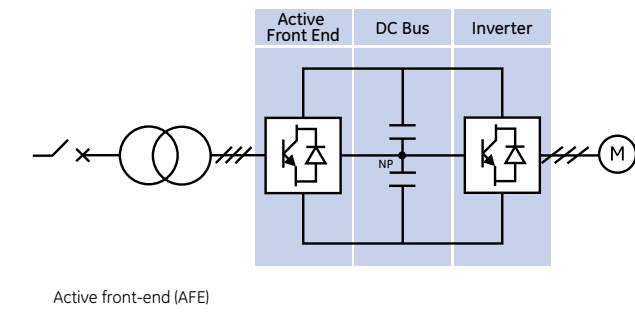
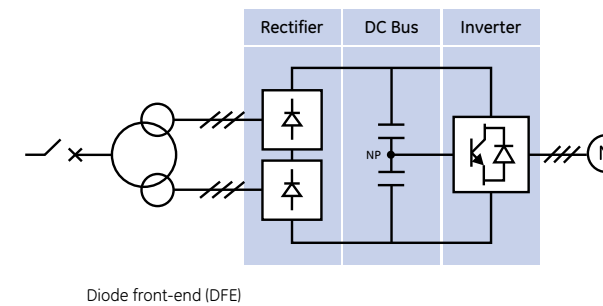
MV7000 comes in a standard Diode-Front-End (DFE) rectifier configuration.

Low harmonics without additional equipment

- Available in 12, 24 and 36-pulse configurations
- Low levels on harmonics – IEEE 519 compliant
- No additional filters necessary
- Fully able to handle faults such as voltage dips
- For reversing applications, an active-front-end (AFE) is available

Four quadrant operation for energy savings

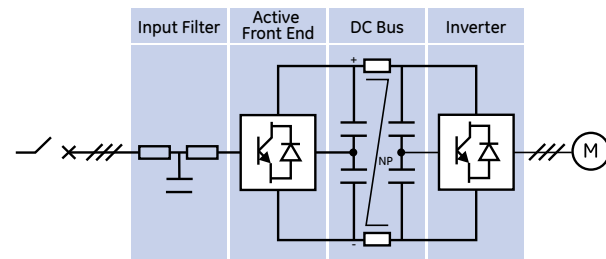
- Regeneration of the energy to the network through IGBT bridge
- Unity power factor
- Sinusoidal input with negligible harmonics



Transformerless design for compactness

The MV7000 is available in transformerless design

- AFE with additional input filter to reduce line harmonics
- Big savings in capital cost, installation cost and footprint
- Increased overall system efficiency and reliability



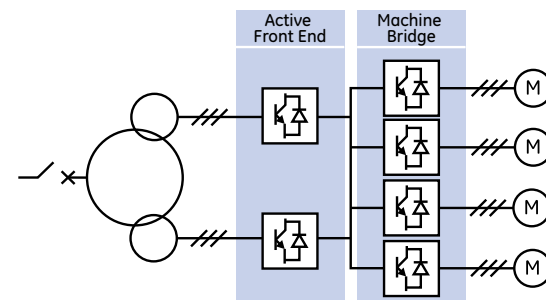
Transformerless design

Common DC bus system for energy savings

For multi-drive applications, a common DC link system is available

- Shared Active-Front-End (AFE) rectifier configuration

- Saves energy by the redistribution of power from braking
- Reduction in overall equipment cost, operating cost and footprint

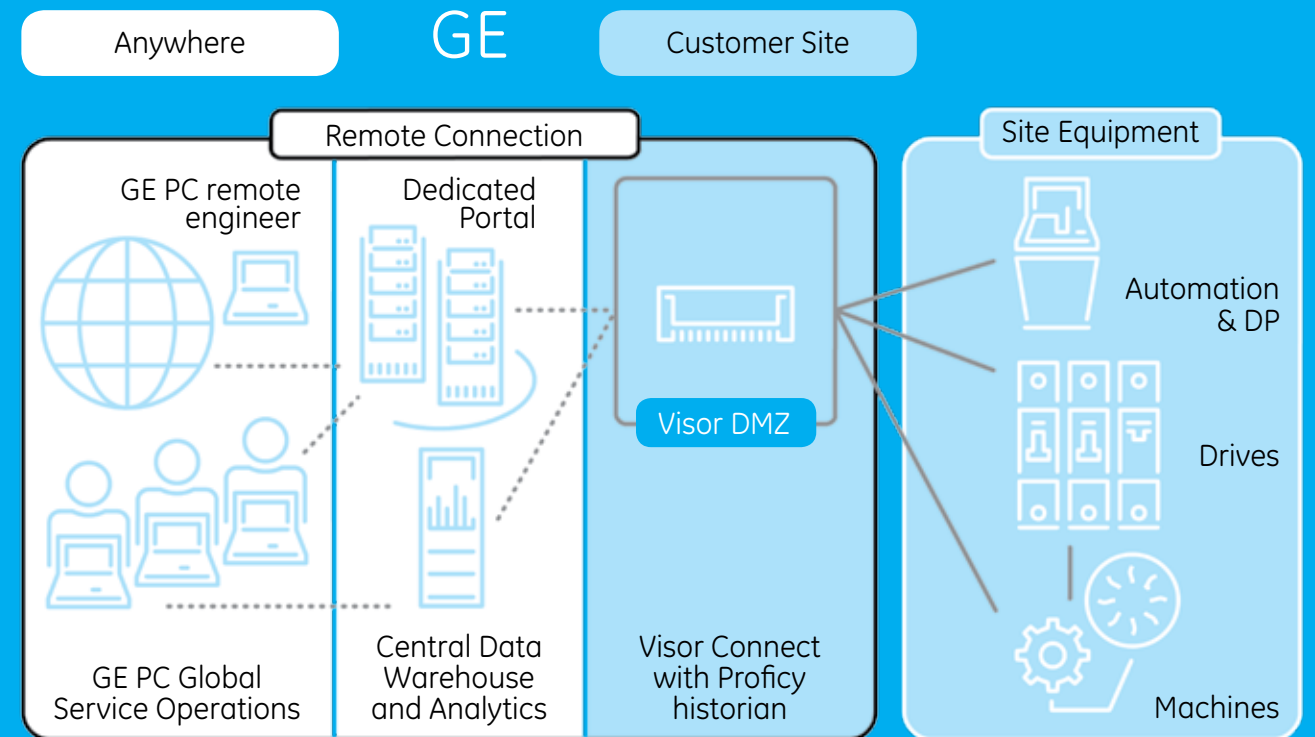


Common DC bus system

High performance process control

MV7000 is equipped with a standard Power Electronics Controller (PECe)

- Mounted on slide in/out frame for easy access and compactness
- Advanced Vector Control (AVC)
- Fast dynamic response
- Clean, robust power delivery
- Fully customizable



Visor Connect: Remote connection to equipment, monitoring and support

Visor Connect provides secured remote connection to GE equipment (outside the control network). Remote connection enables GE's service engineers to provide real-time support, ongoing health analytics and key performance indicators (KPIs), as well as basic configuration management support.

Key benefits

- Reduce unscheduled downtime
- Real-time support and advice
- Customers can access GE's global Services organization 24/7, 365 days a year from anywhere in the world

Process control benefits

Incoming power dip ride-through

The MV7000 provides incoming power loss ride-through and keeps the process running without tripping.

Under-voltage operation

The MV7000 operates continuously and provides power to the motor at a lower input supply voltage (down to 70% of nominal voltage).

Flying start into a spinning load

The MV7000 offers the ability to catch and take control of a spinning load without any damaging torque, voltage or current impacting the equipment if started while the load is already spinning.

Critical speed avoidance

The MV7000 can be programmed for up to three critical frequency bands and ride-through these without any resonance issues.

Independent acceleration and deceleration ramps

The MV7000 can be programmed into the drive controls as needed for controlled starting and stopping of the load.



High performance control

MV7000 — À la carte option packaging

Feature suite for every application

Standard product customizable with pre-engineered options including, but not limited to:

- Redundant pump for cooling
- Customizable process control
- DB chopper
- Communication protocols
- Harsh environment packaging
- Vibration and shock reinforcement
- Marine-class package
- Up and down synchronous transfer

Motor friendly

- Suited for synchronous induction and permanent magnet motors
- Output waveforms reduce motor losses
- Reduced motor noise and vibration
- No significant motor shaft torque pulsations
- Wide speed range with a consistent response

MV7000 ratings

| Output voltage | VFD frame size | Rectifier type | Power output | | Output current |
|----------------|----------------|----------------|--------------|------|----------------|
| | | | MW | MVA | A |
| 3.3kV | MV7303 | DFE 12p | 3.8 | 4.3 | 750 |
| | MV7303 | AFE | 3.8 | 4.3 | 750 |
| | MV7306 | DFE 12p | 6.9 | 7.7 | 1350 |
| | MV7306 | AFE | 6.9 | 7.7 | 1350 |
| | MV7310 | DFE 12p | 10.8 | 12 | 2100 |
| | MV7310 | AFE | 8.8 | 9.8 | 1550 |
| | MV7312 | DFE 24p | 13.3 | 14.8 | 2600 |
| | MV7312 | AFE | 13.3 | 14.8 | 2320 |
| | MV7315 | DFE 24p | 15 | 17 | 2900 |
| | MV7315 | AFE | 13.3 | 17 | 2320 |
| | 2xMV7310 | 2xDFE 12p | 21.6 | 24 | 4200 |
| | 2xMV7310 | AFE | 17.6 | 19.6 | 3100 |
| | 2xMV7312 | 2xDFE 24p | 26.6 | 29.6 | 5200 |
| | 2xMV7312 | AFE | 26.6 | 29.6 | 4640 |
| 2xMV7315 | 2xDFE 24p | 30 | 34 | 5800 | |
| 2xMV7315 | AFE | 26.6 | 34 | 4640 | |
| 5.2kV | MV7607 | DFE 24p | 7 | 8.6 | 950 |
| | MV7615 | DFE 24p | 14 | 16.2 | 1800 |
| 6.6kV | MV7609 | DFE 24p | 10 | 12.6 | 1100 |
| | MV7609 | AFE | 8 | 10 | 800 |
| | MV7616 | DFE 24p | 15.4 | 17 | 1500 |
| | MV7618 | DFE 24p | 18 | 22.8 | 2000 |
| 8.2kV | MV7618 | AFE | 14.3 | 17.9 | 1250 |
| | MV7821 | DFE 36p | 21 | 21.3 | 1500 |
| 10kV | MV7913 | DFE 36p | 13 | 17.1 | 1000 |
| | MV7927 | DFE 36p | 27 | 33.7 | 2000 |
| | MV7927 | AFE | 21.4 | 26.7 | 1250 |
| | 2xMV7927 | 2xDFE 36p | 54 | 67.4 | 4000 |
| | 3xMV7927 | 3xDFE 36p | 81 | 101 | 6000 |

Table shows the typical ratings for variable torque load applications. Please contact GE sales for constant torque applications.

Dimensions & weights

| Output voltage | VFD frame size | Width | Depth | Weight |
|----------------|----------------|--------------|---------------|---------------|
| | | inches/mm | inches/mm | lbs./kg |
| 3.3kV | MV7303 | 157 / 4000 | 39 / 1000 | 8818 / 4000 |
| | MV7303 | 189 / 4800 | 39 / 1000 | 10582 / 4800 |
| | MV7306 | 173 / 4400 | 39 / 1000 | 9700 / 4400 |
| | MV7306 | 205 / 5200 | 39 / 1000 | 11464 / 5200 |
| | MV7310 | 173 / 4400 | 39 / 1000 | 9700 / 4400 |
| | MV7310 | 220 / 5600 | 39 / 1000 | 12346 / 5600 |
| | MV7312 | 189 / 4800 | 39 / 1000 | 10582 / 4800 |
| | MV7312 | 252 / 6400 | 39 / 1000 | 14109 / 6400 |
| | MV7315 | 197 / 5000 | 39 / 1000 | 11023 / 5000 |
| | MV7315 | 260 / 6600 | 39 / 1000 | 14550 / 6600 |
| | 2xMV7310 | 425 / 10800 | 39 / 1000 | 23810 / 10800 |
| | 2xMV7310 | 441 / 11200 | 39 / 1000 | 24692 / 11200 |
| | 2xMV7312 | 457 / 11600 | 39 / 1000 | 25574 / 11600 |
| | 2xMV7312 | 582 / 14800 | 39 / 1000 | 32627 / 14800 |
| 2xMV7315 | 472 / 12000 | 39 / 1000 | 26455 / 12000 | |
| 2xMV7315 | 520 / 15200 | 39 / 1000 | 33508 / 15200 | |
| 5.2kV | MV7607 | 291 / 7400 | 55 / 1400 | 16314 / 7400 |
| | MV7615 | 299 / 7600 | 55 / 1400 | 16754 / 7600 |
| | MV7609 | 291 / 7400 | 55 / 1400 | 16314 / 7400 |
| 6.6kV | MV7609 | 409 / 10400 | 55 / 1400 | 22928 / 10400 |
| | MV7616 | 299 / 7600 | 47 / 1200 | 16754 / 7600 |
| | MV7618 | 299 / 7600 | 55 / 1400 | 16754 / 7600 |
| | MV7618 | 425 / 10600 | 55 / 1400 | 23368 / 10600 |
| 8.2kV | MV7821 | 402 / 10200 | 55 / 1400 | 22487 / 10200 |
| | MV7913 | 386 / 9800 | 55 / 1400 | 21605 / 9800 |
| 10kV | MV7927 | 402 / 10200 | 55 / 1400 | 22486 / 10200 |
| | MV7927 | 567 / 14400 | 55 / 1400 | 31745 / 14400 |
| | 2xMV7927 | 803 / 20400 | 55 / 1400 | 44972 / 20400 |
| | 3xMV7927 | 1205 / 30600 | 55 / 1400 | 67458 / 30600 |

MV7000 drive specifications

| VFD ratings | |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Output power | 3 – 81 MW |
| Output voltage | up to 10 kV |
| Output frequency | 15-90 Hz, 0 to 15 Hz on request |
| Input voltage | 3 to 10 kV ±10% |
| Input frequency | 50 or 60 Hz ±5% |
| Auxiliary voltage | 3 phase, 400 V, 440 V, 480 V, or 600 V; 50/60 Hz 1 phase, 110 V, 230 V, 50/60 Hz |
| Power quality | |
| Line side converter | DFE 12 to 36-pulse / AFE IGBT 6-pulse |
| Load side inverter | 3-level VSI; IGBTs |
| VFD system efficiency | Up to 99% |
| Power factor | >0.96 (DFE) / 1 (AFE) |
| Input harmonics | IEEE 519 compliant |
| Energy storage | |
| DC link | Self-healing, long life, film capacitors |
| VFD control | |
| Mode of operation | Four-quadrant |
| Mode of control | Flux vector / without encoder / induction motor & synchronous (option) |
| Analog input / output | (3) inputs / (3) outputs +/-10 Vdc or 4-20 mA standard |
| Digital input / output | (6) inputs / (6) outputs standard |
| Speed regulation | <0.5% without encoder and <0.1% with encoder |
| LAN interface | Ethernet modbus standard optional: profibus; devicenet |
| Protective functions | Over-current, current limit, over and under-voltage, motor stall |
| Environment & enclosure | |
| Enclosure | IP31, IP33, IP44, others on request |
| Ambient / elevation | 0-45°C / 1000m above sea level; higher with de-rating |
| Insulation coordination | Pollution degree 2 per EN 61800-5-1 and EN 50178 |
| Industry standards | |
| Standards | IEC 61800-3, IEC 61800-4, IEC 61800-5 Qualification to industry-specific standards available Marine classification society/compliant |

Services from GE – a focus on availability

We understand the vital importance of process availability – and our focus on service keeps us actively engaged, both when things are going right, and when they are going wrong.

Our world-class Global Customer Service and Support Center is available 24/7, 365 days a year. Our strategic distribution centers and authorized distributors carry an extensive inventory of GE's drives, allowing us to quickly fulfill your genuine replacement part needs, no matter where you are located.

With a comprehensive global network of service engineers and technicians, GE is uniquely positioned to provide the knowledge, experience and skills for your full range of industrial service requirements. From system design to maintenance and outage support, we have the resources and capabilities to advance your equipment's performance and reliability. Some key benefits of GE's support are:

- Single point of contact
- Reduced call-out rates
- 24/7 availability
- Rapid mobilization of engineers
- Routine maintenance visits
- Training
- System health checks
- Spares management
- Obsolescence management

GE also provides managed system upgrade paths for our legacy systems and has significant experience in replacing systems from other manufacturers with low disruption to the existing infrastructure.

Remote support

Visor Connect, GE's remote diagnostic and support system, is based on highly secure satellite communications links. It enables our experts, regardless of their geographical location, to look over the shoulder of your onsite equipment operator or technician and advise and assist you on fault finding and resolution.

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