

GE
Power Conversion

MV7000 Flat Pack (FP)

Reliable, high performance
medium voltage drive



ecomagination



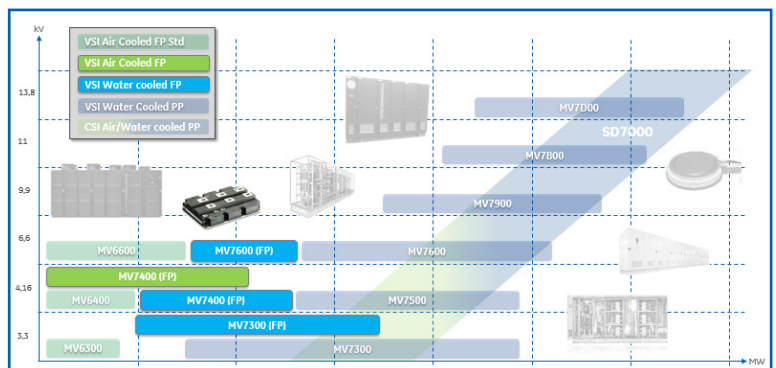
The next generation of drive technology

Cutting-edge power electronics technology and decades of process expertise come together in the MV7000 — a world-class 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 FP provides both a flexible approach to achieve a customized solution across different applications and on the shelf configurations.

With the MV7000 FP 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 10MW, which is equivalent to a power density of 0.8MVA/m³
- High reliability and availability — over 14 million hours in operation across an installed base of over 15+GW
- Power scalability with à la carte option packaging that can be adapted to a wide range of applications
- Standard configurations for improved delivery time and reduced price
- A full family of drives — GE is your one-stop provider with a wide portfolio of drives



The MV7000 FP 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.

Short repair times thanks to optimized design also directly improve customer system availability.

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.

The introduction of variable speed drives in customers' systems when they are upgraded directly improves efficiency, which answers to the latest regulations' requirements.

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, STATCOM (rail, wind, utilities)

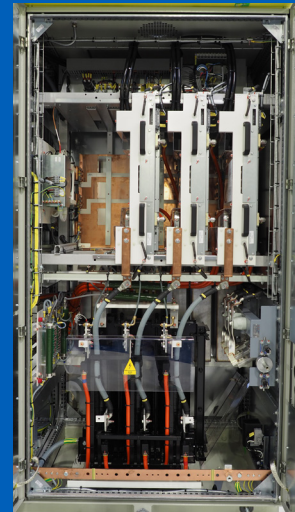
MV7000 FP drive — Enhanced technology

Key benefits

- High reliability and availability
- Power scalability with customizable options featuring:
 - Low harmonics without additional equipment
 - Four quadrant operation for regenerative applications
 - Optional Transformerless design allows for compactness and smooth integration of existing loads direct to line
 - 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
- Available in Air Cooled and Water Cooled versions to match most of installation constraints
- Inverters can be mounted against walls or back to back
- Low energy gating, with simple and reliable gate drivers
- Simplified cooling system architecture and gate drive power supply topology
- Fuseless design



MV7000 FP Water Cooled Power stacks

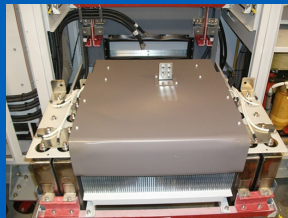


MV7000 FP Water Cooled Inverter

Best-in-class power density

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

- Compact enclosures thanks to water cooling
- Compactness with modularity for higher power scaling-up



MV7000 FP Air Cooled Power stacks

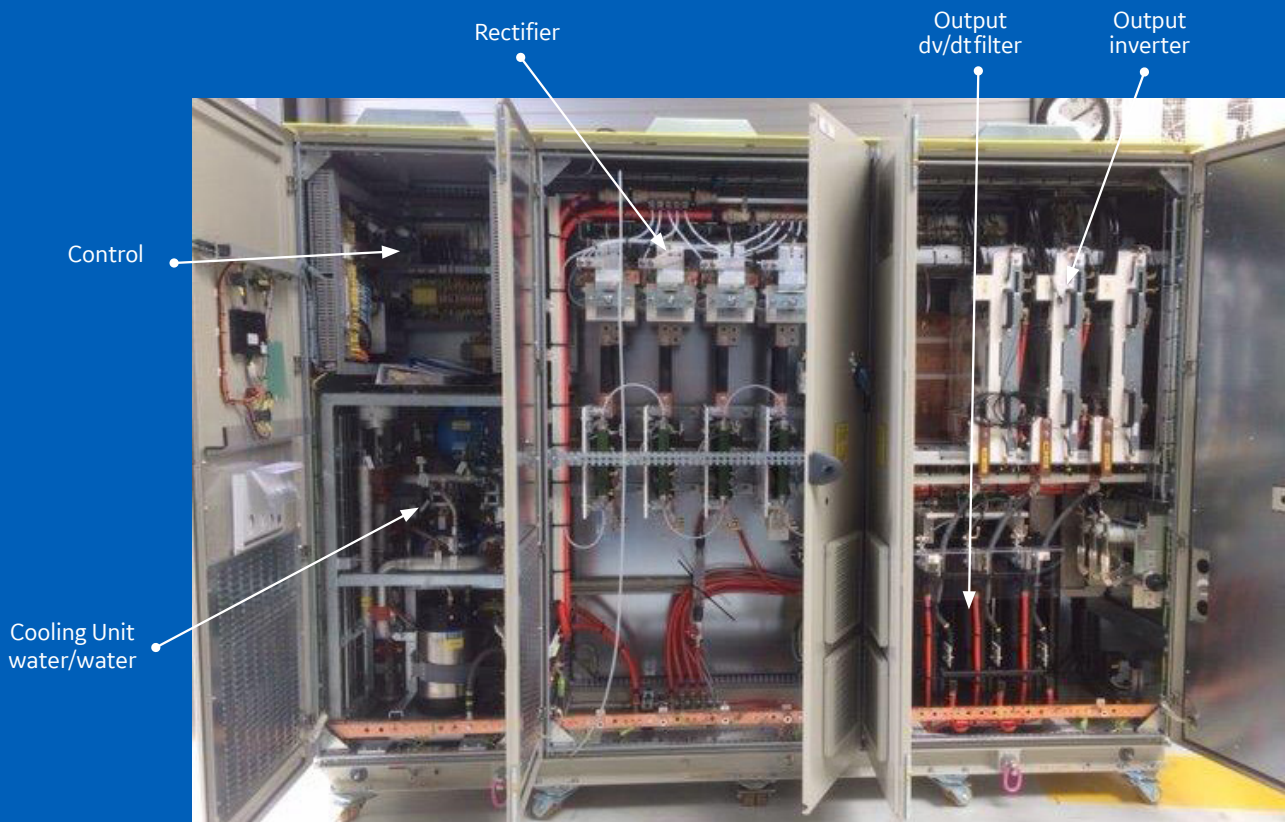


MV7000 FP Air Cooled drive

High reliability and availability

The MV7000 FP drive 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
- High commutation speed for high switching frequency and low losses
- Capability to limit over-current with safe turn-off
- Long life expectancy even under load cycling thanks to AISiC base plate
- Effective performance even at low motor frequency operation
- Modularity and scalability for low power operation



Inside look at the MV7000

Power scalability with customizable options

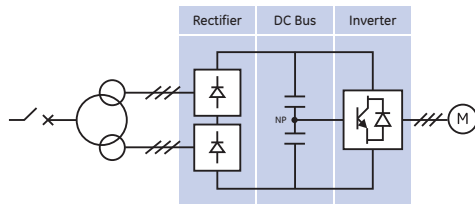
The MV7000 FP drive comes in a standard Diode-Front-End (DFE) rectifier configuration.

Low harmonics without additional equipment

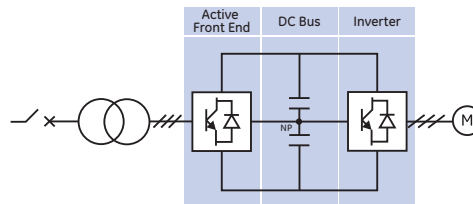
- Available in 12, 18 and 24-pulse DFE configuration
- Low levels on harmonics – IEEE 519 compliant
- No additional filters necessary
- Fully able to handle faults such as voltage dips
- For regenerative applications, an active-front-end (AFE) is available

Four quadrant operation for energy savings

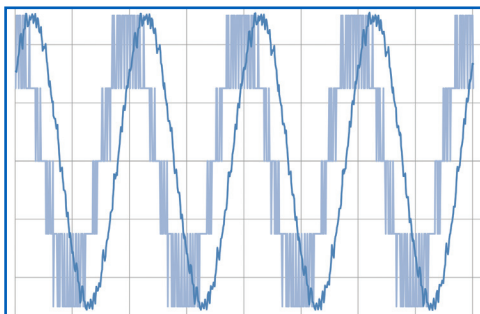
- Regeneration of the energy to the network through IGBT bridge
- Sinusoidal input with negligible harmonics
- Unity power factor for cable losses reduction
- Reactive compensation on network side



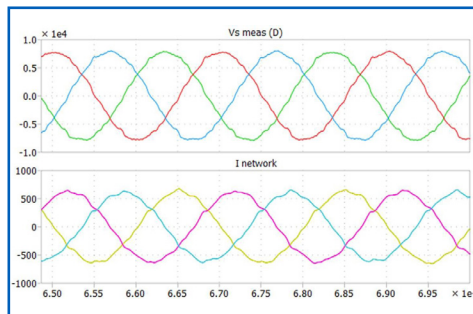
Diode front-end



Active front-end



Output voltage and current

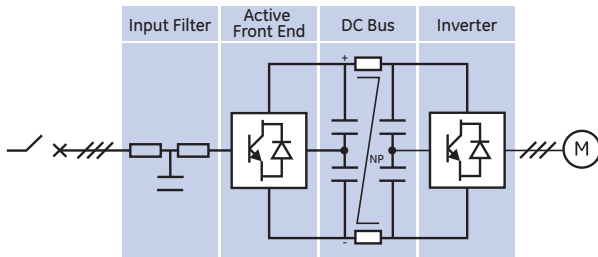


Ph-Ph voltages and line currents at common point of coupling

Transformerless design for compactness

The MV7000 FP drive 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



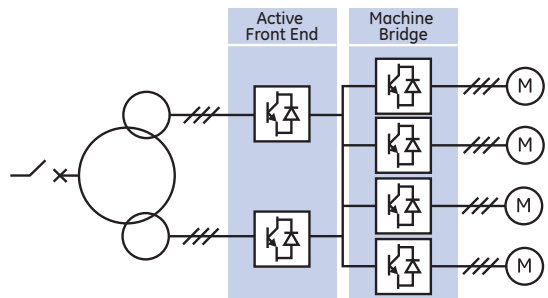
Transformerless design

Common DC bus system for energy savings

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

- Shared Active-Front-End rectifier configuration

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

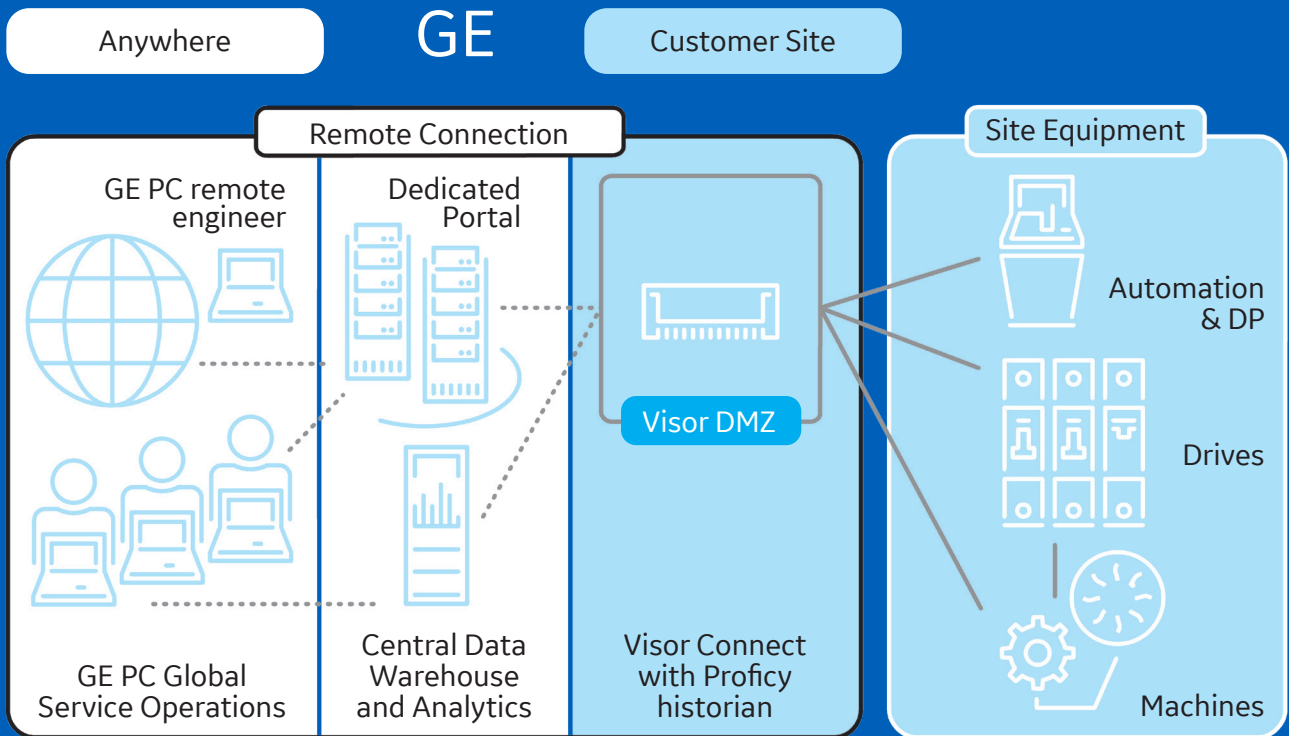


Common DC bus system

High performance process control

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

Under-voltage operation

The MV7000 FP drive 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

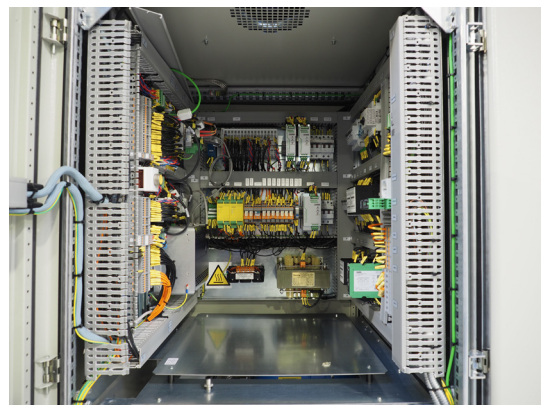
The MV7000 FP drive offers the ability to catch and take control of a spinning load without any damaging torque, voltage or current impacting the equipment if started while the load is already spinning.

Critical speed avoidance

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



High performance control

MV7000 FP drive

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
- Communication protocols
- Harsh environment packaging
- 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 FP drives ratings

Output voltage	VFD frame size	Cooling	Rectifier type	Power output	Output current
				MVA	A
3.3kV	MV7303-3L	Water	DFE 12p	4	700
	MV7303-3L	Water	AFE	4	700
	MV7306-3L	Water	DFE 24p	8	1,400
	MV7306-3L	Water	AFE	8	1,400
	MV7309-3L	Water	DFE 24p	12	2,100
	MV7309-3L	Water	AFE	12	2,100
4.1kV	MV7403-3L	Water	DFE 12P	3	424
	MV7403-3L	Water	DFE 24P	3	424
	MV7403-3L	Water	AFE	3	424
	MV7404-3L	Water	DFE 12P	5	715
	MV7404-3L	Water	DFE 24P	5	715
	MV7404-3L	Water	AFE	5	715
	MV7405-3L	Water	DFE 12P	6	840
	MV7405-3L	Water	DFE 24P	6	840
	MV7405-3L	Water	AFE	6	840
	MV7406-3L	Water	DFE 12P	8	1,060
	MV7406-3L	Water	DFE 24P	8	1,060
	MV7408-3L	Water	DFE 12P	10	1,400
	MV7408-3L	Water	DFE 24P	10	1,400
	MV7401-3L	Air	DFE 24P	1.6	237
	MV7401-3L	Air	AFE	1.6	237
	MV7402-3L	Air	DFE 24P	2.4	354
	MV7402-3L	Air	AFE	2.4	354
	MV7403-3L	Air	DFE 24P	3.6	530
	MV7403-3L	Air	AFE	3.6	530
	MV7404-3L	Air	DFE 24P	4.8	700
MV7405-3L	Air	DFE 24P	7.2	1,000	
6.6kV	MV7606-5L	Water	DFE 36P	8	700
	MV7606-5L	Water	AFE	8	700

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	MV7303-3L	165/4,200	39/1,000	9,257/4,200
	MV7303-3L	205/5,200	39/1,000	11,461/5,200
	MV7306-3L	228/5,800	39/1,000	12,786/5,800
	MV7306-3L	228/5,800	39/1,000	12,786/5,800
	MV7309-3L	276/7,000	39/1,000	15,432/7,000
	MV7309-3L	276/7,000	39/1,000	15,432/7,000
4.1kV	MV7403-3L	126/3,200	31/800	6,392/2,900
	MV7403-3L	142/3,600	31/800	6,832/3,100
	MV7403-3L	181/4,600	31/800	8,596/3,900
	MV7404-3L	134/3,400	39/1,000	7,053/3,200
	MV7404-3L	150/3,800	39/1,000	7,494/3,400
	MV7404-3L	197/5,000	39/1,000	8,375/3,800
	MV7405-3L	197/5,000	31/800	7,934/3,600
	MV7405-3L	205/5,200	31/800	8,375/3,800
	MV7405-3L	291/7,400	31/800	11,902/5,400
	MV7406-3L	213/5,400	39/1,000	8,816/4,000
	MV7406-3L	220/5,600	39/1,000	9,257/4,200
	MV7408-3L	213/5,400	39/1,000	8,816/4,000
	MV7408-3L	220/5,600	39/1,000	9,477/4,300
	MV7401-3L	87/2,200	39/1,000	5,400/2,450
	MV7401-3L	189/4,800	39/1,000	8,375/3,800
	MV7402-3L	110/2,800	39/1,000	6,392/2,900
	MV7402-3L	197/5,000	39/1,000	10,138/4,600
	MV7403-3L	110/2,800	39/1,000	7,273/3,300
	MV7403-3L	205/5,200	39/1,000	11,240/5,100
	MV7404-3L	157/4,000	39/1,000	10,138/4,600
MV7405-3L	157/4,000	39/1,000	10,800/4,900	
6.6kV	MV7606-5L	228/5,800	39/1,000	12,786/5,800
	MV7606-5L	228/5,800	39/1,000	12,786/5,800

MV7000 FP drive specifications

VFD ratings

Output power	0.7 – 10MW
Output voltage	3.3 up to 6.6kV
Output frequency	15-90 Hz, 0 to 15 Hz and 90 to 300Hz on request
Input voltage	3 to 6.6kV $\pm 10\%$ Txless, 3-650kV with transformer
Input frequency	50 or 60 Hz $\pm 5\%$
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- or 5-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
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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	Standard: Profinet, Modbus, Ethercat, IEC618150 Optional: profibus, devicenet, EGD
Protective functions	Over-current, current limit, over and under-voltage, motor stall

Environment & enclosure

Enclosure	IP31, standard, IP33, IP44, option, 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, IEC 60068-2-31 (vibration) Qualification to industry-specific standards available
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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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