

PowerFlex 6000 Medium Voltage AC Drives

Simple. Connected. Easy-to-use.

PowerFlex 6000T Introduces a Common Control Architecture

Help simplify your integration and operating experience by choosing PowerFlex 6000T medium voltage drives. They share the same control hardware, firmware and network interface software used in our latest generation of PowerFlex 755T low voltage drives. Using a common control platform across your entire installed base of variable frequency drives lowers integration, operation and support costs. A common platform also reduces product-specific training requirements and spare parts inventory.

PowerFlex 6000T medium voltage drives feature:

- Easy configuration, integration and visualization in the Studio 5000® design environment. The Add-on Profile is the preconfigured data translator, visual user interface, and data configurator all rolled into one. It is also the primary tool that sends drive data to the control system.
- Connected Components Workbench™ software full device profile support, which makes it easier to configure, program and visualize in a single software package
- Simplified and more intuitive local control, monitoring and diagnostics with a larger 10" color touch screen enhanced HIM
- Extensive input power monitoring functionality for kW, kVA, kVAR, elapsed kWh, MWh and power factor
- Quick and secure flash-over-fiber firmware updates for all main control boards and power cells from a single file
- More comprehensive and faster troubleshooting with Forensic Data Recorder functionality



PowerFlex® 6000 medium voltage drives are particularly well suited for general purpose applications such as fans, pumps and compressors. They are an ideal solution for motor control applications from 100 kW to 11,000 kW (190 Hp to 14,600 Hp) and for motors rated from 2.3 kV to 11 kV.

Air-cooled PowerFlex 6000 drives are designed to maximize energy efficiency by enabling soft-starting and variable-speed control in normal duty and heavy duty applications.

To achieve low input harmonics and near-unity power factor, the drives uses Cascaded "H" Bridge (CHB) topology. This topology combines an integrally mounted phase-shifting isolation transformer with series-connected power cells for each phase.

PowerFlex 6000 AC drives allow for flexibility in a variety of applications and are available in many configurations based on motor voltage.

- 100% starting torque with sensorless vector control
- Simple, air cooled design at all voltage and power ratings
- Eco design main cooling fans provide higher efficiency and reduces losses
- Integrally mounted multi-pulse isolation transformer helps ensure low line-side harmonics
- Automatic power cell bypass helps minimize downtime in your critical applications
- Common modular power cells designed for easy removal, minimizing Mean Time To Repair (MTTR)
- Internally powered cooling fans reduce customer supplied control power requirements
- Trapped key and electromechanical interlocks

PowerFlex 6000 Compact Design

- Available for 2.3 kV to 4.16 kV in three frame sizes - up to 70 A, 71...140 A, and 141...215 A.
- Rear access not required
- Top or bottom line/load cables
- Surge arrestors are standard
- IP31/IP42 enclosures available
- 80 dB(A)
- Reduced commissioning time
- Minimum 100,000 hours MTBF
- Automatic Power Cell Bypass option available without size increase

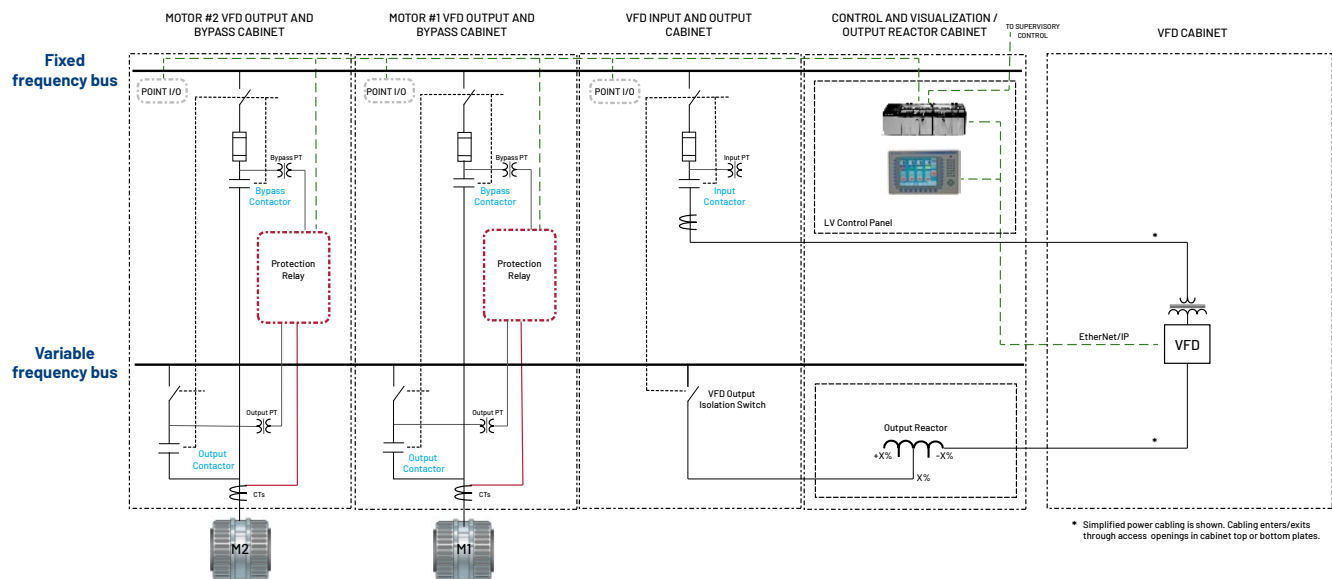


PowerFlex 6000 Synchronous Transfer Bypass

Synchronous transfer is used for controlled starting and speed control of multiple motors, with one drive. The drive can be used for soft-starting large motors to limit inrush current or for speed control of multiple motors, one at a time, as required by your operating conditions. Synchronous transfer helps to limit the mechanical wear and tear on the motor, which in turn prolongs the life of the motor. It also reduces the investment and operating costs for the user.

- Available from 2.3...11 kV
- Can start up to 10 motors on one drive, up to a maximum of 680 A (totaling up to 3000 A)
- Bumpless transfer
- Ideal for natural gas or oil pipeline applications

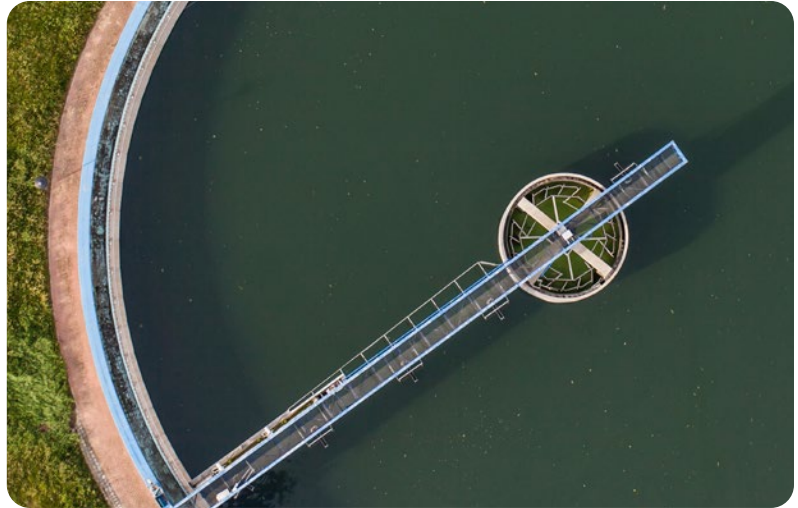
PowerFlex 6000 Drive Synchronous Transfer System Design Architecture



Automatic Power Cell Bypass

In the unlikely event of a power cell failure, the automatic power cell bypass option allows the PowerFlex 6000 drive to bypass that power cell, along with the corresponding power cells in the other two phases, so that the drive will remain running at a reduced capacity, providing time to plan for a scheduled shut-down.

- Helps minimize downtime in your critical applications
- Solid-state bypass circuit reduces process interruption time (faster than traditional DC contactor bypass method)



Cascaded "H" Bridge (CHB) Topology

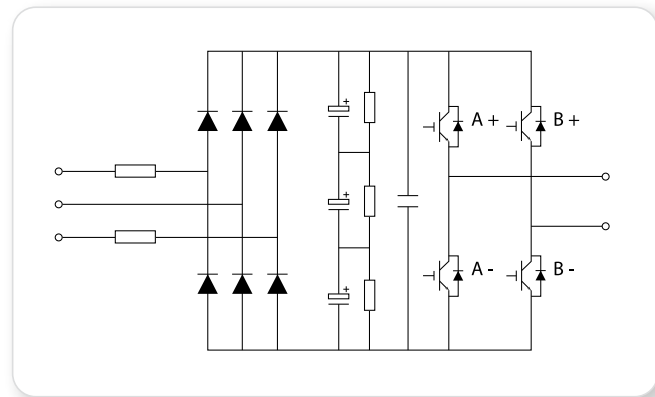
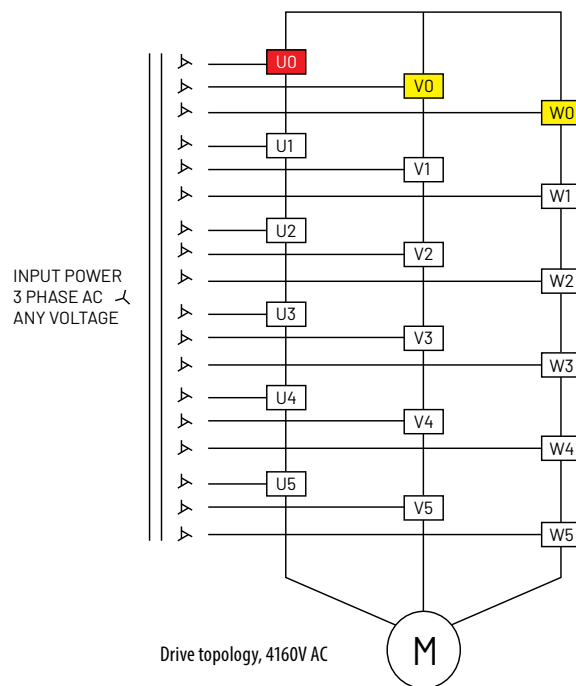
The proven CHB topology combines an integrally mounted phase shifting isolation transformer and series-connected power cells for each phase.

In addition to stepping down the input voltage, the isolation transformer also provides two other principal functions:

- Mitigate common mode voltage stress so motors with standard insulation levels can be used
- Reduce Total Harmonic Distortion (THD), due to the phase shifting of its secondary windings, so input side harmonics don't negatively impact the plant or utility power grid

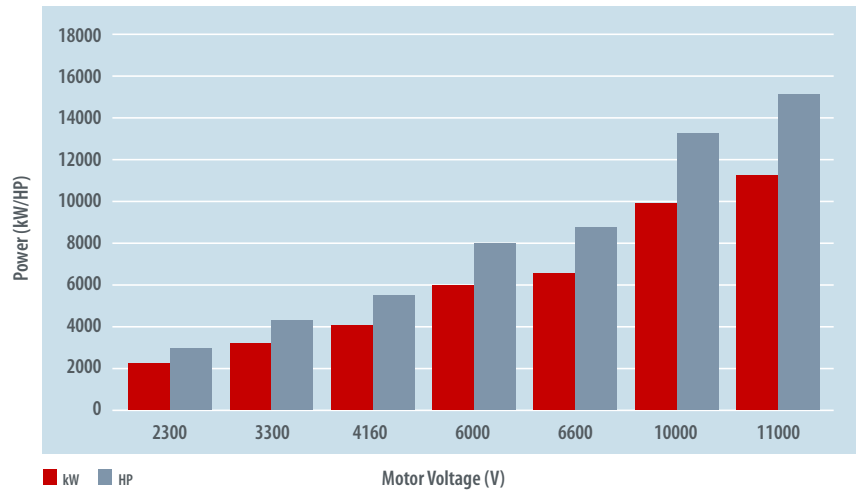
A number of identical low voltage power cells are series-connected (cascaded) together to produce the medium voltage levels required to operate the motor. The voltage step for each power cell is relatively small and a Pulse Width Modulation (PWM) switching pattern is used so output harmonics and torque pulsations at the motor are minimal, even at lower speeds. This technology allows standard motors to be used for new applications and it is ideal for retrofitting existing motors. This allows for longer motor cable lengths, without the requirement for output filtering.

This power cell concept makes maintenance quick and easy. Each power cell has built in diagnostics to identify and isolate a cell needing replacement, in the unlikely event of a failure. This minimizes power cell replacement time, so process uptime is maximized. A number of system bypass options are also available.

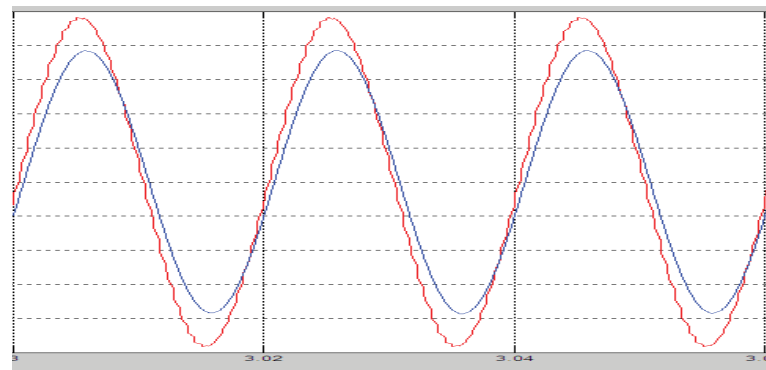




PowerFlex 6000 Maximum Power vs. Voltage Rating



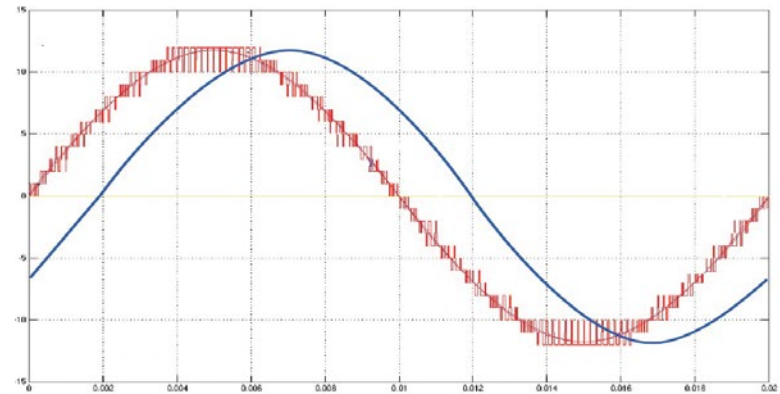
PowerFlex 6000 Line Side Waveforms



6.6 kV Input (36 Pulse) — Phase Current — Phase-to-Phase Voltage

Power system friendly input current and voltage waveforms comply with IEEE 519-2014 Harmonic Guidelines.

PowerFlex 6000 Motor Waveforms



6.6 kV Output — U Phase Current — U-V Phase Voltage

Motor friendly current and voltage waveforms are suitable for operation with new or existing standard motors. Inverter duty motors not required.

Technical Specifications

	PowerFlex 6000G AC Drive	PowerFlex 6000T AC Drive
Motor Voltages and Current Rating	2.3...4.16 kV	Not available
	6...11 kV	0...200 A
Automatic Power Cell Bypass	Up to 200 A	Up to 680 A
HIM	7" Color Touch Screen	10" Enhanced Color Touch Screen
Control Power Back-up	UPS with 15 minute battery back-up	Optional UPS with 15 minute battery back-up
Drive System Configurations	Standalone or synchronous transfer	
Typical Applications	Variable torque and constant torque	
Motor Types	Induction	
Input Harmonics	Meets IEEE 519-2014, GB/T 14549-1993, EN 61000-2/3 †	
Input Power Factor	>.95	
Cascaded "H" Bridge Topology	<ul style="list-style-type: none"> • 18-Pulse (2300/3300V) • 24-Pulse (4160V) • 30-Pulse (6000V) • 36-Pulse (6600/6900V) • 48-Pulse (10 kV) • 54-Pulse (11 kV) 	
Cooling Type	Air-cooled	
Cooling Fan Design	ECO-rated Fan and Motor design	
Motor Cable Lengths	Up to 800 m (2624 ft) without dv/dt filter	
Enclosure Rating	IP31 standard / IP42 optional (IEC), Type 1 (UL/CSA)	
Certification	IEC/CE, UL/CSA	
Communication Protocols	EtherNet/IP, Modbus-RTU Slave RS485, Modbus-TCP, Modbus-PLUS Slave RS-485, PROFIBUS Slave, PROFINET IO	
Drive Control	Volts/Hertz, or Sensorless Vector Control	
Regenerative Braking	No	
VFD Efficiency*	Drives up to 373 kW = 96%	
	Drives > 373 kW = 96.5%	
Output Frequency Range	1.0...75.0 Hz	
VFD Noise Level	<215A = 80dB(A)**; 216-680A = 85dB(A)**	





Information is subject to change. Please contact factory for any requirements not shown.

*Based on a typical 4-pole induction motor

**Without redundant fan option. With redundant fan option: <215 A is 83 dB(A), 216...680 A remains as 85 dB(A)

† In most cases

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