

# Designed Exclusively for HVAC Fans and Pumps



## E7 Drives and E7/Bypass Packages 1/2 - 500 HP

The **E7 Drive** is a variable torque AC drive, designed specifically for HVAC applications in building automation. A new benchmark for size, cost, performance, benefits, and quality, the E7 includes numerous built-in features such as Network Communications, H/O/A, PI, and energy-savings functions.

The E7 has embedded communications for the popular building automation protocols, Johnson Controls Metasys<sup>®</sup> N2 and Siemens APOGEE<sup>™</sup> FLN, as well as Modbus. An optional LonWorks<sup>®</sup> interface card is also available.

The LCD keypad/operator is equipped with Hand/Off/Auto functions, copy feature, 7 language choices, and 5 lines of display, 16 characters per line. Optional software allows upload/download, as well as graphing and monitoring of drive parameters from a PC for ease of drive management. User parameter settings can be recovered at any time via "user re-initialization".

Built-in PI maintains set point for closed loop control of fans and pumps for pressure, flow or temperature regulation and eliminates the need for closed loop output signals from a BAS. It includes feedback display, inverse, square root and differential control functions.

A Sleep function provides significant energy savings by minimizing operating hours. Under-torque detection, alerts the operator to conditions such as loss of load or broken belts.

Energy savings control is an automatic output voltage adjustment in response to actual motor load. Real-time energy savings is based on motor algorithms. Motor efficiency is increased by several percent. Built-in kW-hour and kW display eliminates the need for external signal conditioner for energy monitoring.

If a phase-shifting input transformer is used, the E7 dual-diode bridge can be operated in 12-pulse rectification mode, reducing input current harmonic distortion factor by over 90%. With lower EMI/RFI emission and lower total harmonic distortion contribution, the E7 meets or exceeds the generally accepted power quality standards. Inherent motor protection features resulting from low noise/low carrier technology provides for longer lead lengths without additional motor protection devices.

The standard enclosure is NEMA 1. NEMA 3R and 12 are optional.

The E7/Bypass package is 3-contactor style bypass, allowing motor operation from the drive or across the line. This facilitates drive maintenance while the motor continues to operate. The E7/Bypass is available to 250HP and has been designed for flexibility in providing the features and options commonly demanded by facility designers.

## Performance Features

- VT Ratings: 1/2-150 HP, 208 VAC  
1/2-150 HP, 230 / 240 VAC  
1/2-500 HP, 480 VAC  
1/2-250 HP, Bypass
- Overload capacity: 110% for 60 sec (150% peak)
- Starting torque: 100% at 3 Hz
- DC injection braking: at start or stop, adjustable, current limited (anti-windmilling)
- Motor preheat function
- Adjustable accel/decel: 0.1 to 6000 sec.
- Controlled speed range: 40:1
- Critical frequency rejection: 3 selectable, adjustable bands
- Torque limiting: 30-180%
- Energy Saving control
- Torque boost: full range, auto
- Power loss ride-thru: 2 sec
- Inertia ride-thru
- Auto restart after power loss or resettable fault, selectable, programmable
- Feedback signal loss detection
- Serial communications loss detection
- "Up/Down" floating point control capability
- Stationary motor auto-tuning
- Customizable monitor display
- Sleep function
- Run permissive input
- Ramp-to-stop or coast-to-stop selection
- Runtime changes in control and display
- Project-specific parameter reinitialization

## Protective Features

- Current limited stall prevention
- Heat sink over-temperature, speed fold-back
- Cooling fan operating hours recorded
- Bi-directional start into rotating motor at synchronized speed
- DC bus charge indicator
- Current limiting DC bus fuse
- Optically-Isolated controls
- Short circuit protection: Phase-phase and phase-neutral
- Ground fault protection
- Short circuit withstand rating: 65K RMS, 100K RMS with bus reactor
- Electronic motor overload: UL
- Current and torque limit
- Fault display: last 10 faults
- Fault circuit: OC, OV, OT
- Over torque and under torque protection
- Program security code
- "Hunting" prevention logic
- Reverse prohibit selectability

## Design Features

- 32-bit microprocessor logic
- Flash upgradeable firmware
- Non-volatile memory, program retention
- Surface-mount devices
- Displacement power factor: 0.98
- Output frequency: 0.1 to 120 Hz
- Frequency resolution: 0.06 Hz
- Frequency regulation: 0.1%
- Control Terminal Board: Quick disconnect, removable
- Carrier frequency: selectable to 15 kHz
- 3% DC bus reactor: 30-150 HP, 208 VAC; 30-150 HP, 240 VAC; 40-500 HP, 480 VAC; optional on lower ratings
- Keypad Operator: Hand/Off/Auto, built-in copy feature, 7 languages
- LCD display: 5 lines, 16 characters each
- 24 VDC control logic
- Transmitter/Option power supply
- Output contacts: One form C and two programmable form A
- Input/output terminal status
- Input terminals: 5 programmable multi-function input terminals
- Fault input: Programmable
- Diagnostic fault indication in selected language
- Timer function: Elapsed time, Delay on start, Delay on stop
- RS-422/485 port: Embedded Metasys N2, APOGEE FLN, and Modbus
- Volts/hertz ratio: Preset and programmable V/Hz patterns
- Multi-speed settings: 5 available
- Remote speed command: 0-10 VDC or 4-20 mA, direct or reverse-acting
- Setpoint (PI) control with inverse or square root input, differential control via two feedback capability
- Feedback signal: low pass filter
- Speed command: bias and gain
- Analog outputs: Programmable, two, 0-10 VDC
- Meter Functions: Volt, amp, kilowatt, elapsed run time, speed command
- Output Current Transformers, qty 3
- NEMA 1 or protected chassis
- UL, cUL listed and CE marked; IEC 146;
- MTBF: exceeds 28 years

## Service Conditions

- Ambient Temperature: -10°C to 40°C  
NEMA 1, 45°C protected chassis  
(14° F to 104° F, 113° F)
- Humidity: 95% RH, non-condensing
- Altitude: 3300 ft; higher by derate
- Input voltage: +10%/-15%
- Input frequency: 50/60 Hz ± 5%
- 3-phase, 3-wire, phase sequence insensitive
- Plenum rated (UL 1995)

## Bypass Features

- Input, output, and bypass contactors
- Circuit breaker disconnect (MCP), with interlocked, through-the-door operating mechanism
- Thermal motor overload relay, class 20
- 115 VAC control transformer, fused
- Drive/Bypass selector switch
- Hand/Off/Auto selector switch
- Normal/Test selector switch
- Pilot lights, 22mm LED, for Control Power, Drive Run, Drive Fault, Bypass Run, Motor OL/Safety Fault and Smoke Purge
- Switch selectable auto transfer to bypass on drive fault
- Switch selectable remote transfer to bypass via contact closure
- Switch selectable smoke purge function
- Run mode and Fault contacts
- Safety circuit interlock
- Control and safety circuit terminal strip
- Damper circuit safety interlock
- Customer Use, 115V, 100VA

## Options

- Remote digital operator kit
- Input CB/disconnect
- Input fuses, I<sup>t</sup>
- Oversized control transformer
- NEMA 3R and 12 enclosures
- Input and/or output reactor
- Twelve-pulse rectification with input transformer: 30 -150 HP, 208 VAC; 30-150 HP, 240 VAC; 40-500 HP, 480 VAC
- Communication Interface: LonWorks
- RFI/EMI filter
- Pressure transducer, 3-15 PSI
- Multiple motor operation logic
- Speed potentiometer
- Run/Stop pushbuttons
- Motor protection dv/dt filter
- Engraved nameplates
- DriveWizard™ upload/download and monitoring/graphing software
- Analog outputs: programmable, two, 4-20 mA



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