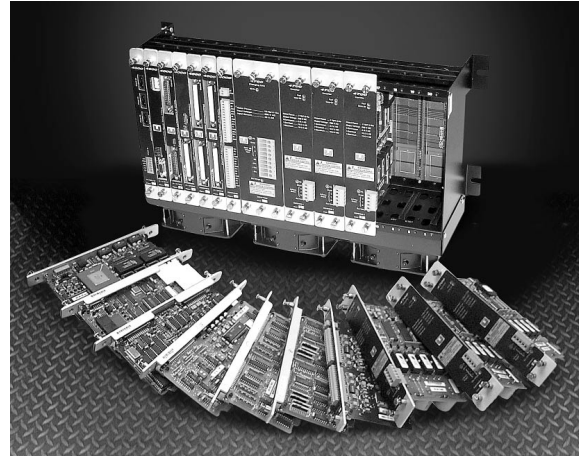


4700

Rack-Mounted AC Drive



Overview The 4700 is an all-digital pulse-width-modulated (PWM) AC servo drive. Its revolutionary technology and compact, modular design make it ideal for economically controlling multiple low-power motors.

Modular Design

The convenient modular design of the 4700 provides space, cost, and energy savings in many applications. As many as five drives can be mounted within a card rack along with a power supply unit, a real-time clock, a central processing unit, and up to five interface modules from the 4000 series. The power supply unit is comprised of a logic power supply, a full-wave diode bridge, bus-charging and dynamic braking circuits, and a capacitor bank. Each drive unit consists of a six-IGBT, four-quadrant PWM amplifier that generates three-phase motor control voltages from the DC bus of the power supply unit.

Application Flexibility

The 4700 can be configured for torque-, velocity-, and position-control servo applications. Depending upon application requirements, the control rack can be configured to provide the appropriate analog I/O, digital I/O, transducer interface, and serial communication options. A programming option allows customization for unique applications using IEC 1131 open-standard ladder diagram, function block diagram, sequential function chart, structured text, and/or instruction list languages.

Motor-Independent Design

A unique design incorporating a proprietary digital current regulator and a state-of-the-art controller allows the 4700 to operate any AC induction, AC synchronous, or brushless DC motor without the current-loop setup required by conventional drives.

Auto Tuning

Once routine electrical connections have been made, the simple-to-use auto-tuning features identify the appropriate parameter values for the given motor and connected load. Simply enter a few numbers from the motor nameplate, and the advanced setup routines do the rest. The drive is completely tuned within minutes.

Energy Savings

Applications that operate in a cyclic fashion may regenerate energy from inertial loads. That energy may be dissipated into a resistor using the dynamic braking control within the unit. The common-bus architecture allows energy to recirculate from regenerating to motoring drives, eliminating the need for dynamic braking in many instances. An external capacitor bank can also be connected to the unit to absorb and recycle regenerated energy.

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Overview*(continued)***Application-Specific Software**

The 4700 can be customized for definite-purpose applications using optional, application-specific software. Software is available for controlling press feeders, cranes, winders, rotary cutoffs, spindles, flying cutoffs, conveyors, index tables, machine tool slides, and orient stations, to name a few. The standard 4700 provides basic position and/or velocity control, and each rack can control up to five axes of motion.

Communication Interface Options

The central processing unit includes three fiber-optic channels and one RS-485 channel. A variety of serial communication interface modules are available, including asynchronous RS-232/422/485, Allen-Bradley Remote I/O, Allen-Bradley ControlNet, Modicon Modbus Plus, and Siemens Profibus.

Analog Interface Options

Analog-to-digital converter interface modules are available that provide for eight differential or 16 single-ended signals.

Digital I/O Interface Options

Digital input/output interface modules are available that provide 32-bit source- or sink-type 24 V DC signals as well as TTL logic levels.

Transducer Interface Options

A variety of dual transducer interface modules are available to accommodate incremental encoders, single-turn resolvers, linear absolute encoders, and rotary absolute encoders. Each interface module also provides a dual output digital-to-analog converter.

Features & Benefits**General**

- All-digital control for zero drift and repeatable motor operation
- 33 MHz 68360 computational power for fast, dynamic response
- High-switching-frequency IGBT devices for quiet operation
- Digital current loop regulator for fast response
- Flux vector control for full torque from zero to rated speed
- Servo loop operation for precise torque, velocity, or position control
- Broad selection of interface modules for integration flexibility

Ease of Installation, Setup, and Maintenance

- Complete, self-contained package requires few option boards
- Identical control boards across full power range reduces spare parts
- Plug-in modules for rapid replacement
- Snap-in signal connections for ease of wiring
- Automated setup feature requires no chart recorders or meters
- Software calibration and adjustment eliminates tuning components
- Software input and output scaling eliminates potentiometers
- Automated hardware configuration check
- RS-485 communication port for system setup and monitoring

Reliable Operation

- Tolerant of AC line fluctuations
- Extensive electronic protection circuits reduce failures
- Intelligent Power Module (IPM) protective features
- Fiber-optics for noise-free serial communication
- Designed to meet or exceed accepted international standards

Specifications Electrical

Input Supply

Voltage:	100 to 120 V AC, single-phase, or 200 to 240 V AC, single- or three-phase
Voltage tolerance:	-10% of minimum, +10% of maximum
Frequency:	47 to 63 Hz
Power rating:	3 hp (2.2 kW) for 115 V AC single-phase 7 1/2 hp (5.5 kW) for 230 V AC single-phase 15 hp (11 kW) for 230 V AC three-phase
Power factor:	Displacement (with 3% external line reactor): 0.89 for single-phase; 0.98 for three-phase Overall (with 3% external line reactor): 0.75 for single-phase; 0.93 for three-phase
Conversion:	Full-wave, single- or three-phase

Drive Output

Voltage:	Zero to 90% of input voltage for single-phase input Zero to 100% of input voltage for three-phase input
Frequency:	Zero to 120 Hz
Switching frequency:	2 to 8 kHz, selectable
Power ratings:	1/8 hp (0.1 kW) to 3 hp (2.2 kW) for 115 V AC 1/4 hp (0.2 kW) to 7 1/2 hp (5.5 kW) for 230 V AC
Overload current:	Constant torque: 150% of rated for 1 min; maximum of 200% of rated
Conversion:	Six-IGBT, four-quadrant, PWM

Environmental

Operating temperature:	32° to 104° F (0° to 40° C)
Storage temperature:	5° to 158° F (-15° to 70° C)
Relative humidity:	95% maximum, noncondensing
Altitude:	To 3,300 ft. (1,000 m) without derating

Performance

Position Control

Bandwidth:	50 rad/s
Settle time:	10 ms

Velocity Control

Bandwidth:	100 rad/s
Regulation:	±0.001% of base speed

Torque Control

Bandwidth:	200 rad/s
Regulation:	±2.0% of maximum torque

Control Options

The 4700 uses a 4050 configurable control rack that accommodates up to seven system-specific modules from UNICO's 4000 series. Two of these slots are reserved for the central processing unit and real-time clock modules. Five slots are available for additional communication, analog, digital, and transducer interface modules.

Basic Digital Control:

- Real-time clock/calendar
- 33 MHz 68360 central processor
- 2 megabyte program flash EPROM
- 512 kilobyte battery-backed static RAM
- 256 kilobyte high-speed RAM
- Three fiber-optic synchronous communication ports
- One RS-422/485 serial interface for drive setup

(continued)

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Specifications
(continued)

Control Options *(continued)*

- Communication Interfaces:**
- Dual asynchronous RS-232/422/485 interface
 - Dual Remote I/O interface
 - ControlNet interface
 - Modbus Plus interface
 - Profibus interface
- Analog Interfaces:**
- Eight differential/16 single-ended 12-bit ADC
- Digital Interfaces:**
- 32-bit contact in/32-bit driver out
 - 32-bit 24 V DC source in/32-bit 24 V DC source out
 - 32-bit 24 V DC source in/32-bit driver out
 - 32-bit TTL logic in/32-bit TTL logic out
 - 32-bit TTL logic in/32-bit driver out
- Transducer Interfaces:**
- Dual incremental encoder/dual 14-bit DAC
 - Dual 12-bit resolver/dual 12-bit DAC
 - Dual 14-bit resolver/dual 12-bit DAC
 - Dual linear absolute encoder/dual 8-bit DAC
 - Dual rotary absolute encoder/dual 8-bit DAC

Protection

- Ground fault
- Drive thermal overload
- Software circuit breaker
- DC bus overvoltage
- DC bus undervoltage
- Instantaneous overcurrent
- Motor thermal overload
- Braking unit overcurrent
- Heat sink overtemperature
- Power transistor thermal overload
- Power transistor short circuit
- Control power undervoltage
- Excessive position error
- Uncommanded motion
- Motor overspeed
- Feedback transducer failure
- Memory malfunction
- Processor running fault
- Serial communication error

Power Range

Input Voltage	Constant-Torque Applications
115 V AC	1/8-3 hp (0.1-2.2 kW)
230 V AC	1/4-7 1/2 hp (0.2-5.5 kW)

UNICO—Worldwide



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Specifications subject to change without notice.

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