The 2420 is an all-digital pulse-width-modulated (PWM) AC drive that provides superior control of three-phase AC motors. Its revolutionary technology and design make it the optimum solution where superior performance, flexibility, and ease of operation are important.

Motor-Independent Design
A unique design incorporating a proprietary digital current regulator and a state-of-the-art controller allows the 2420 to operate any AC induction, AC synchronous, or brushless DC motor without the current-loop setup required by conventional drives. Digital space vector control can be selected for reduced motor noise and low current ripple.

Application Flexibility
The 2420 is extremely flexible and can accommodate a wide range of servo applications. It can be configured to control torque, velocity, or position in applications requiring either constant-, variable-, or extended-torque. Extensive controller options enable the analog and digital I/O, feedback, and serial communication capabilities of the drive to be tailored to the requirements of the application.

Auto Tuning
Once routine electrical connections have been made, simple-to-use auto-tuning features adjust virtually all motor and inertial parameters to the given motor and connected load. Simply enter a few values from the motor nameplate, and the advanced setup routines do the rest. The drive is completely tuned within minutes.

Integrated Design
The convenient, integrated design of the 2420 provides space, cost, and energy savings in many applications. The drive package incorporates both rectifier and inverter units. The rectifier is comprised of a full-wave diode bridge, a link choke, a bus-charging circuit, a dynamic braking circuit, and a capacitor bank. The inverter consists of a six-IGBT, four-quadrant PWM amplifier that operates from the DC bus of the rectifier.

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. Optional capacitor banks can alternately be used to store and recycle the regenerative energy.
Overview
(continued)

Power Quality
The 2420 incorporates a link choke that provides near-unity overall power factor and low harmonic line currents at all motor speeds.

Application-Specific Software
Application software determines the specific features and operation of the 2420. A wide variety of general-purpose and application-engineered software options enables each drive to be tailored to specific customer requirements. Software is available for such applications as test stands, elevators, press feeders, winders, rotary cutoffs, spindles, flying cutoffs, and wire drawing, to name a few. Further customization is possible with many programs using UEdit™, a Windows-based programming tool that allows users to extend an application using ladder diagrams and function blocks.

Optically Isolated Digital I/O
All digital inputs and outputs are optically isolated. Depending upon the controller, as many as 32 individually isolated digital I/O are locally provided, each of which can be programmed by the application to be an input or output. The voltage of each can be selected from a wide range of AC and DC values.

Transducer/Transducerless Design
The 2420 can operate with or without a feedback transducer. An incremental encoder is typically used for feedback, although absolute encoders, resolvers, and serial sincos encoders are also supported. Transducerless operation is offered for less demanding velocity-loop applications.

Features & Benefits

General
• All-digital control for zero drift and repeatable motor operation
• 24-bit DSP computational power for fast, dynamic response
• High-switching-frequency IGBT devices for quiet operation
• Digital current regulator for high-speed operation and fast response
• Digital space vector control for reduced motor noise and low current ripple
• Flux vector control for full torque from zero to rated speed
• Servo loop operation for precise velocity, position, or torque control
• Field weakening at constant horsepower up to four times base speed

Ease of Installation, Setup, and Maintenance
• Complete, self-contained package requires few option boards
• Identical control boards across full power range reduces spare parts
• 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

Ease of Use
• Full keypad for easy entry of application-specific setup adjustments
• Two line by 24-character/line descriptive, plain-English display
• Process variable display in bar graph and engineering units
• Comprehensive plain-language, self-diagnostic message display
• Real-time motion information and historical fault log
• RS-232/422/485 for communication with process controllers
• Optional software for managing the drive from a personal or handheld computer

Reliable Operation
• Tolerant of AC line fluctuations
• Extensive electronic protection circuits reduce failures
• Optically isolated signals for high noise immunity
• S-curve acceleration reduces shock and extends equipment life
• Fiber-optics for noise-free serial communication
• Designed to meet or exceed accepted international standards

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## Specifications

### Electrical

### Input Supply
- **Line voltage:** 200 to 240 or 380 to 480 V AC, three-phase
- **Phase sequence insensitive**
- **Voltage tolerance:** –10% of minimum, +10% of maximum
- **Frequency:** 47 to 63 Hz
- **Power factor:** Displacement: 1.00 at all loads and speeds
  - Overall: 0.94 at rated load

### Output Rating
- **Voltage:** Zero to input voltage, three-phase
- **Frequency:**
  - Zero to 120 Hz without transducer
  - Zero to 480 Hz with transducer
- **Switching frequency:** Programmable from 2.0 to 12.0 kHz

### Service Conditions
- **Efficiency:** 97% nominal at rated switching frequency
- **Overload current:**
  - **Torque Overload (1 min) Maximum**
    - Constant: 150% to 200% of rated
    - Variable: 120% to 150% of rated
  - 200% of rated
- **Frequency:**
  - Zero to 120 Hz without transducer
  - Zero to 480 Hz with transducer
- **Regeneration:** Dynamic braking transistor with resistors or capacitor bank energy storage

### Conversion
- **Rectifier unit:** Full-wave, six-pulse
- **Inverter unit:** Six-IGBT, four-quadrant, PWM
- **Regeneration:**
  - Dynamic braking transistor with resistors or capacitor bank energy storage

### Environmental
- **Operating temperature:** 32° to 131° F (0° to 55° C)
- **Storage temperature:** –40° to 158° F (–40° to 70° C)
- **Relative humidity:** 95% maximum, noncondensing
- **Altitude:** To 3,300 ft. (1,000 m) without derating

### Performance

#### Position Control
- **Bandwidth:** 50 Hz
- **Settle time:** 10 ms

#### Velocity Control
- **Bandwidth:**
  - 100 Hz with transducer
  - 10 Hz without transducer
- **Range:**
  - Zero to base speed at full torque
  - Base speed to 480 Hz at constant power with transducer
  - Base speed to 120 Hz at constant power without transducer
- **Regulation:**
  - ±0.001% of base speed, down to zero, with transducer
  - ±0.5% of base speed, 2 Hz and above, without transducer

#### Torque Control
- **Bandwidth:**
  - 300 Hz with DCR control
  - 100 Hz with DSV control
- **Regulation:**
  - ±3.0% of maximum with transducer
  - ±10% of maximum without transducer

### Control Modules

#### Common Features:
- Three ±10 V DC or 0 to 20 mA 12-bit analog inputs
- Two ±10 V DC 12-bit analog outputs
- Two programmable contact outputs
- Fiber-optic high-speed synchronous/asynchronous serial port with clock synchronization up to 1 Mbaud
- Fiber-optic synchronous serial port with clock synchronization at 2 Mbaud
- One optional communication interface provision

#### Standard Control Module:
- Eight optional configurable I/O points
- One optional feedback interface provision
- One RS-422/485 asynchronous serial port up to 115.2 kbaud

#### Expandable Control Module:
- Two programmable isolated inputs
- 16 or 32 optional configurable I/O points
- One incremental encoder interface
- Two optional feedback interface provisions
- Two RS-422/485 asynchronous serial ports up to 115.2 kbaud
Specifications (continued)

**Communication Modules**

Serial Communications:
- Two isolated RS-232/422/485 synchronous/asynchronous serial ports (up to 1 Mbaud)

Fiber-Optic Communications:
- One isolated fiber-optic synchronous/asynchronous serial port (up to 1 Mbaud)
- One RS-232/422/485 synchronous/asynchronous serial port (up to 1 Mbaud)

Remote I/O Communications:
- Dual Remote I/O interface

Modbus Plus Communications:
- Modbus Plus interface

ControlNet Communications:
- ControlNet interface

Profibus Communications:
- Profibus DP interface

Ethernet Communications:
- Ethernet interface

**Transducer Options**

A variety of motor-mounted transducers are available to provide feedback of motor position, velocity, and acceleration.

- **Incremental Encoder:** Two quadrature channels with marker pulse operating up to a maximum frequency of 300 kHz per channel
- **Single-Turn Resolver:** Up to 14-bit resolution
- **Multiturn Absolute Encoder:** 24-bit resolution with RS-422/485 synchronous serial communication

**Inputs and Outputs**

Input Converters:
- 2.5 to 28 V DC @ 30 mA, 90 to 140 V AC @ 11 mA, or 180 to 280 V AC @ 5 mA

Output Converters:
- 5 to 60 V DC @ 3 A, 12 to 140 V AC @ 3 A, or 24 to 280 V AC @ 3 A

Relay Converters:
- 250 V AC @ 8 A, normally open or normally closed

Control Module Relay Contacts:
- Form A 250 V AC @ 5 A

Optional Analog Interface Module:
- Two ±10 V DC inputs and two ±10 V DC outputs

**Protection**

- Ground fault
- Drive thermal overload
- Software circuit breaker
- DC bus overvoltage
- DC bus undervoltage
- DC bus fuse and blown fuse
- Instantaneous overcurrent
- Motor thermal overload
- Braking unit overcurrent
- Heat sink overtemperature
- Phase loss
- Power transistor fault
- Control undervoltage
- Excessive position error
- Uncommanded motion
- Motor overspeed
- Feedback transducer failure
- Memory malfunction
- Processor not running fault
- Serial communication error

**Power Range**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Constant-Torque Applications</th>
<th>Variable-Torque Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>230 V AC</td>
<td>1½-25 hp (1.1-18 kW)</td>
<td>2-30 hp (1.5-22 kW)</td>
</tr>
<tr>
<td>380 V AC</td>
<td>1½-50 hp (1.1-37 kW)</td>
<td>2-60 hp (1.5-45 kW)</td>
</tr>
<tr>
<td>460 V AC</td>
<td>1½-50 hp (1.1-37 kW)</td>
<td>2-60 hp (1.5-45 kW)</td>
</tr>
</tbody>
</table>

Consult factory for other powers. Other voltages require appropriate derating or adjustment of the switching frequency.

**UNICO—Worldwide**

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Unico is a leading global innovator of motion-control solutions for industry. Founded in 1967, the company develops, manufactures, and services variable-speed drives, application-engineered drive products, integrated drive systems, and ancillary products that improve operations by increasing productivity, safety, and equipment life while lowering energy and maintenance costs.