**UNICO**
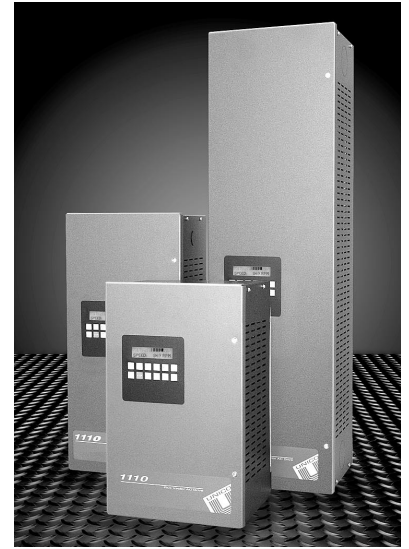
## Overview

The 1110 provides reliable, efficient, cost-effective variable-frequency (V/Hz) or flux vector control of ordinary three-phase AC motors from a single-phase power source. It incorporates the latest technologies in insulated gate bipolar transistors (IGBTs), pulse-width modulation (PWM), and digital signal processing (DSP) to deliver optimum motor performance, complete programmability, and simplicity of operation.

### Performance Flexibility
The 1110 accommodates a broad range of performance requirements. Units may be configured for constant-torque operation for heavy-duty cyclic loads, variable-torque operation for centrifugal loads such as fans and pumps. The drive operates in a transducerless vector control mode that does not require a feedback device and produces full torque to base speed with full starting torque. For demanding applications, an incremental encoder or resolver interface can be added for precise position, velocity, and torque regulation and improved dynamic performance. Dual- and triple-encoder interfaces are also available for position-following or dual-transducer applications. Variable-frequency control is alternately available for applications that do not require critical velocity or torque control.

### Motor-Independent Design
The 1110 can operate any standard- or inverter-duty AC induction or synchronous motor, making it ideal for retrofits and new applications alike. A unique, proprietary digital current regulator (DCR) tunes the drive continuously in real time, eliminating the usual current-loop tuning process required by conventional drives. Digital space vector (DSV) control can be selected for reduced motor noise and low current ripple.

### Auto Tuning
Once routine electrical connections have been made, simple-to-use auto-tuning features adjust virtually all motor- and load-dependent parameters. No motor maps are required. Simply enter basic motor information from the nameplate, and the advanced setup routines do the rest. The drive is completely tuned within minutes.

### Application Software
A wide variety of software options is available to tailor the 1110 to an application, from a fully featured velocity/torque control for general purposes to a host of powerful programs pre-engineered for specific applications. Customization is possible with many programs using UEdit™, a Windows-based programming tool that lets users extend an application using IEC 1131 standard ladder diagrams and function blocks.

### Digital Setup, Easy Operation
A graphical keypad display provide a simple interface for setting and viewing operating parameters and diagnostics. All controller settings are made digitally for precision and repeatability. Readouts and fault messages are displayed in readily understandable language.

## Overview
*(continued)*

### Multiaxis Operation

A built-in high-speed synchronous communication port allows the motion of multiple slave drives to be precisely coordinated. With optional master/slave software, the velocity ratio and position phasing of the drives can also be controlled. Multiple motors can be operated in parallel from a single drive using variable-frequency control.

### Power Quality

A built-in link choke provides near-unity overall power factor and low harmonic line currents at all motor speeds.

### Protection and Advanced Diagnostics

The 1110 monitors its operating conditions and provides a comprehensive set of overload, short circuit, and other electronic protective features to ensure safe, reliable operation. Faults indications are displayed in plain language. A log maintains a history of fault occurrences and externally triggered events.

### Serial Connectivity

A fully isolated RS-422/485 serial interface is provided for connecting the drive to a process controller, communication network, or programmable controller. A variety of popular communication protocols is available. The control module also accepts an AnyBus module with numerous industry-standard protocol options and a MaxStream module for wireless communications. An RS-232 connection is also provided on controller for connecting a personal computer. Windows-based PCs can set up, monitor, and control a network of drives using UEdit™ software.  Connected™ an iOS devices software make it easy to save and restore setups and capture charts using a IPhone and or IPad.

### Packaging

Compact and rugged, the 1110 is available either enclosed or as an open chassis for mounting inside an enclosure. Both versions can be foot-mounted to a wall or sub-plate or flange-mounted through a cutout to dissipate heat outside an enclosure.

## Features & Benefits

### General

- Digital Signal Processor (DSP) for fast, dynamic response
- Battery backup memory for application setup data
- Clock/calendar maintains accurate time during power outage
- Sine-coded PWM waveform output for improved torque performance
- High-switching-frequency IGBT devices for smooth, 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 starting torque and full torque to base speed
- Variable-frequency operation for simple control of motor speed
- Internal control loop for maintaining speed with sudden load changes
- Automatic field weakening for speeds up to three times base speed
- Integral DC link choke for high power factor and low total harmonic distortion
- Optional dynamic braking for fast deceleration or energy absorption
- Power disturbance ride-through for reducing nuisance trips
- User-programmable analog and digital inputs and outputs
- Through-hole heat sink mounting of chassis units for dissipating heat externally
- Optional NEMA 1 (IP23) and NEMA 4 (IP66) enclosures

### Ease of Installation, Setup, and Maintenance

- Automated setup features require no chart recorders or meters
- Software calibration and adjustment eliminates tuning components
- Digital parameter adjustment for precise and repeatable settings
- Software input and output scaling eliminates potentiometers
- Complete, self-contained package requires minimal option boards
- Identical control boards across full power range reduces spare parts

### Ease of Use

- Graphical keypad for easy parameter adjustment and access to displays
- Descriptive plain-language display with numerical and bar graph readouts
- Comprehensive fault diagnostics displayed in plain language
- Real-time motion information and time-stamped fault log

### Safe, Reliable Operation

- Extensive electronic protection circuits
- Tolerant of AC line voltage and frequency fluctuations
- S-curve acceleration reduces shock and extends equipment life
- Multilevel security code prevents unauthorized parameter changes
- Lockout of local operator controls for safe remote operation

## Specifications

### Electrical

**Input Supply**

| | |
|---|---|
| Voltage: | 220 to 240 or 440 to 480 V AC, single-phase |
| | Phase sequence insensitive |
| Voltage tolerance: | –10% of minimum, +10% of maximum |
| Frequency: | 47 to 63 Hz |
| Power factor: | Displacement: 0.89 at all loads and speeds |
| | Overall: 0.75 at rated load |

**Output Rating**

| | |
|---|---|
| Voltage: | Zero to 90% of input supply voltage, three-phase |
| Frequency: | Zero to 120 Hz for transducerless vector control |
| | Zero to 180 Hz for transducer-based vector control |
| | Zero to 300 Hz for variable-frequency control |
| Switching frequency: | 2 to 12 kHz, programmable and appropriated de-rating required |

**Service Conditions**

| | |
|---|---|
| Efficiency: | 97% nominal at rated switching frequency |
| Overload current: | |

| Torque | Overload (1 min) | Maximum |
|---|---|---|
| Constant | 150% to 200% of rated | 200% of rated |
| Variable | 120% to 150% of rated | 140% to 160% of rated |

### Environmental

| | |
|---|---|
| Operating temperature: | Control section: 32° to 131° F (0° to 55° C) |
| | Heat sink (standard): 32° to 104° F (0° to 40° C) Heat sink (derated): 32° to 122° F (0° to 50° C) |
| Storage temperature: | –40° to 158° F (–40° to 70° C) |
| Operating humidity: | 95% maximum, non-condensing |
| Altitude: | To 3,300 ft (1,000 m) without de-rating |

### Performance

**Frequency Control**

| | |
|---|---|
| Range: | Zero to base speed at full torque |
| | Base speed to 300 Hz at constant power |
| Resolution: | 0.024% with analog input (12-bit) |
| | 0.1 Hz with digital input |

**Velocity Control**

| | |
|---|---|
| Range: | Zero to base speed at full torque |
| | Base speed to 180 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**

| | |
|---|---|
| Starting torque: | Constant torque: zero to 150% of rated |
| | Variable torque: zero to 120% of rated |
| Regulation: | ±3.0% of maximum with transducer |
| | ±10% of maximum without transducer |

### Inputs and Outputs

**Analog Inputs**
Three (3) 12-bit analog inputs (±10 V DC or 0 to 20 mA)
*Analog Interface Module:* Additional eight (8) 12-bit analog inputs (0 to +10 V DC or 0 to 20 mA)

**Analog Outputs**
Two (2) 12-bit analog outputs (±10 V DC and 0 to 20 mA)
*Analog Interface Module:* Additional four (4) 12-bit analog outputs (±10 V DC)

**Digital Inputs**
Twelve (12) digital inputs (require sink of 1 mA to common)
*Converter Interface Module:* Provision for input converters rated 2.5 to 28 V DC @ 30 mA, 90 to 140 V AC @ 11 mA, and 180 to 280 V AC @ 5 mA

**Digital Outputs**
*Logic I/O controls:* Six (6) digital outputs (open-collector drivers rated 24 V DC @ 500 mA)
*Converter Interface Module:* Provision for output converters rated 5 to 60 V DC @ 3 A, 12 to 140 V AC @ 3 A, or 24 to 280 V AC @ 3 A; or for normally open or normally closed relay converters rated 250 V AC @ 8 A

**Specifications**
*(continued)*

## Serial Communications

### Asynchronous

Port(s): RS-232/422/485, isolated,
and (3) RS-422/485 ANSI-x3.28-2.5-A4, standard

Protocols: Modicon RTU, Unico ESP

### Synchronous

Port: RS-485 for high-speed master-slave networking

### Communication Modules

Provisions: One AnyBus and one MaxStream socket
AnyBus options: ControlNet, DeviceNet, Ethernet, Interbus,
LonWorks, Modbus Plus, Profibus DPV1

MaxStream options: 900 MHz and 2.4 GHz wireless communication modules

## Protection

The following hardware conditions are detected. Additional protective features are provided by the application software.

- Ground fault
- Motor phase-to-phase short circuit
- DC bus overvoltage
- DC bus undervoltage
- Instantaneous overcurrent
- Motor overload
- Heat sink overtemperature
- Ambient overtemperature
- Power transistor fault
- Logic power undervoltage
- Memory malfunction
- Processor not running fault

## Options

### Transducers

A motor-mounted incremental encoder or resolver and corresponding interface may be used for highest performance. The resolver interface provides an encoder emulation for paralleling feedback to other devices. Dual- and triple-encoder options are also available for position-following or dual-transducer applications.

### Expanded Analog I/O

An analog interface module may be used instead of a feedback interface to expand the analog I/O capabilities of the drive. The module provides eight additional inputs and four additional outputs.

### Dynamic Braking

The dynamic braking option is factory installed in the drive. Appropriately sized external braking resistors are required.

### Packaged Drives

Drives may be ordered as part of a packaged system including a circuit breaker, operator devices, and additional system components mounted inside a NEMA 4 (IP66) enclosure.

## Power Range

| Input Voltage | Constant-Torque Applications | Variable-Torque Applications |
|---|---|---|
| 230 V AC | 1$1/2$-40 hp (1.1-30 kW) | 2-50 hp (1.5-37 kW) |
| 460 V AC | 1$1/2$-75 hp (1.1-56 kW) | 2-100 hp (1.5-75 kW) |

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

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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.*