

# 1140

## Variable-Voltage AC Controller



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### Overview

The 1140 AC controller provides reliable, efficient, cost-effective control of ordinary three-phase AC motors using variable-voltage control. It combines rugged silicon-controlled rectifiers (SCRs) with the latest digital-signal-processing (DSP) technology to deliver soft-starting motor control, variable-voltage torque limiting, complete programmability, and simplicity of operation in a reliable package.

### Performance Flexibility

The 1140 accommodates a broad variety of applications. In its simplest form, the unit can be used as a stand-alone reduced-voltage motor starter or simple AC variable-voltage controller. With the addition of a 16 MHz microprocessor-based control module, the unit can operate simple on/off type motor applications such as pumps and fans. With a 40 MHz digital-signal-processor (DSP) control module, unit operation is fully programmable using ladder diagrams and function blocks. Both controllers provide precise measurement of motor parameters such as voltage, current, power, speed, and torque as well as remote access to those parameters through a variety of popular communication protocols. The 40 MHz control also offers additional transducer, digital I/O, and analog I/O interface options for more complex programmable control applications.

### Motor-Independent Design

The 1140 can operate any standard- or inverter-duty AC induction motor, making it ideal for retrofits and new applications alike.

### 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 unit is completely tuned within minutes.

### Application Software

A wide variety of software options is available to tailor the 1140 to an application, including powerful programs pre-engineered for specific applications. Customization is possible with some programs using UEdit™, a Windows-based programming tool that lets users extend an application using ladder diagrams and function blocks.

### Digital Setup, Easy Operation

A keypad and liquid crystal 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 Power Quality***(continued)*

At full voltage output, the 1140 has the displacement power factor of the attached AC motor. The unit has zero harmonic distortion, giving it an attractive advantage over variable-speed drives in certain applications.

**Protection and Advanced Diagnostics**

The 1140 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.

**Serial Connectivity**

A fully isolated EIA RS-422/485 serial interface is provided for connecting the 1140 to a process controller, communication network, or programmable controller. A variety of popular communication protocols is available. An EIA RS-232 connection is also provided on 40 MHz controllers for connecting a personal computer. Optional DriveLink™ drive management software allows a network of units to be set up, monitored, and controlled from a Windows-based personal computer.

**Packaging**

Compact and rugged, the 1140 is available either enclosed or as an open chassis for mounting inside an enclosure. Both versions can be foot-mounted to a wall or subplate or flange-mounted through a cutout to dissipate heat outside an enclosure.

**Features & Benefits****General**

- All-digital control for repeatable operation
- 16-bit 16 MHz microprocessor version for dedicated control applications
- 24-bit 40 MHz digital signal processor (DSP) for fully programmable operation
- 32 kilobyte battery backup memory for application setup data
- 142 kilobyte scratch pad memory and 1.5 megabyte firmware memory
- Clock/calendar maintains accurate time during power outage
- Robust silicon-controlled rectifier (SCR) power section
- Variable-voltage operation for simple control of motor torque
- Power loss 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**

- Touch keypad for easy parameter adjustment and access to displays
- Two line 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
- Optional DriveLink™ software for managing the controller from a personal computer

**Safe, Reliable Operation**

- Extensive electronic protection circuits
- Tolerant of AC line voltage and frequency fluctuations
- Multilevel security code prevents unauthorized parameter changes
- Lockout of local operator controls for safe remote operation

## Specifications Electrical

### Input Supply

Voltage:	200 to 240, 380 to 480 V, 575 to 600 V AC, three-phase Phase sequence insensitive
Voltage tolerance:	-10% of minimum, +10% of maximum
Frequency:	47 to 63 Hz
Power factor:	Same as motor or load at full voltage

### Output Rating

Voltage:	Zero to input supply voltage, three-phase
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### Service Conditions

Efficiency:	99% nominal at rated output power
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### Overload current:

	<i>Torque</i>	<i>Overload (1 min)</i>	<i>Maximum</i>
Constant	150% of rated	500% of rated	500% of rated
Variable	120% of rated	400% of rated	400% of rated
Extended	110% of rated	300% of rated	300% of rated

## Environmental

Operating temperature:	Control section: 32° to 131° F (0° to 55° C) Heat sink: 32° to 104° F (0° to 40° C)
Storage temperature:	5° to 158° F (-15° to 70° C)
Operating humidity:	95% maximum, noncondensing
Altitude:	To 3,300 ft (1,000 m) without derating

## Performance

### Voltage Control

Range:	Zero to input supply voltage
Resolution:	0.20% with analog input (10-bit) 0.10% with digital input

### Velocity Monitoring (40 MHz control)

Resolution:	±0.001% of base speed, down to zero, with transducer ±0.5% of base speed, 2 Hz and above, without transducer
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### Torque Monitoring (40 MHz control)

Resolution:	±3.0% of maximum with transducer ±10% of maximum without transducer
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## Inputs and Outputs

### Analog Inputs

*16 MHz and 40 MHz controls:* 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

*16 MHz and 40 MHz controls:* 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

*16 MHz and 40 MHz controls:* 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

*16 MHz and 40 MHz contact I/O controls:* Three (3) digital outputs (Form C contacts rated  
250 V AC @ 5 A, Form A contact rated 250 V AC @ 5 A, and open-collector driver  
rated 24 V DC @ 500 mA)  
*40 MHz logic I/O control:* 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): 16 MHz control: EIA RS-485, isolated  
40 MHz control: EIA RS-232/422/485, isolated,  
and RS-422/485

Protocols: ANSI-x3.28-2.5-A4, standard; Allen-Bradley DF1,  
Modicon RTU, and Johnson Controls N2  
protocols available

**Synchronous**

Port: 40 MHz control:  
EIA RS-485 for high-speed master/slave networking

**Protection**

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

- AC line overvoltage
- AC line undervoltage
- Instantaneous overcurrent
- Motor overload
- Heat sink overtemperature
- Ambient overtemperature
- Logic power undervoltage
- Memory malfunction
- Processor not running fault

**Options****Transducers**

A motor-mounted incremental encoder or resolver and corresponding interface module may be used for monitoring of position and/or velocity. The resolver interface provides an encoder emulation for paralleling feedback to other devices. A dual-encoder option is also available to provide a second monitoring channel.

**Expanded Analog I/O**

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

**Packaged Controllers**

Controllers may be ordered as part of a packaged system including a circuit breaker, operator devices, and additional system components mounted inside a NEMA 1 (IP23) or NEMA 4 (IP66) enclosure.

**Power Range**

Input Voltage	Constant-Torque Applications	Variable-Torque Applications	Extended-Torque Applications
230 V AC	5-60 hp (3.7-45 kW)	7 1/2-75 hp (5.5-55 kW)	25-100 hp (18-75 kW)
460 V AC	5-125 hp (3.7-90 kW)	7 1/2-150 hp (5.5-110 kW)	25-200 hp (18-150 kW)
575 V AC	5-125 hp (3.7-90 kW)	7 1/2-150 hp (5.5-110 kW)	25-200 hp (18-150 kW)

Consult factory for other powers. Other voltages require appropriate derating.

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Specifications subject to change without notice.

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