

1140

Variable-Voltage AC Drive



Overview

The 1140 variable-voltage AC drive 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 variable-voltage controller. With the addition of a 100 MHz digital-signal-processor (DSP) control module, the unit can operate simple on/off type motor applications such as pumps and fans. Operation is fully programmable using ladder diagrams and function blocks. The controller provides 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. Additional transducer, digital I/O, and analog I/O interface options are also available 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 in processor-based units 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. An optional graphic display provides a variety of visual formats for accessing drive information.

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Overview Power Quality*(continued)*

At full voltage output, the 1140 has the displacement power factor of the attached motor or load. 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 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 for connecting a personal computer. Windows-based PCs can set up, monitor, and control a network of drives using optional DriveLink™ or UEdit™ software. Drive Archive™ and Drive Chart™ for the Palm OS make it easy to save and restore setups and capture charts using a handheld 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**

- Operates as a reduced-voltage starter or variable-voltage controller
- Optional analog or digital control covers a broad range of applications
- All-digital control for repeatable operation
- 24-bit digital signal processor (DSP) for fast, dynamic response
- 128 kilobytes battery backup memory for application setup data
- 1.5 megabytes scratch pad memory and 3.0 megabytes 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 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

- 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

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:	-40% 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	600% of rated
Variable	120% of rated	400% to 500% 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:	-40° to 158° F (-40° to 70° C)
Operating humidity:	95% maximum, noncondensing
Altitude:	To 3,300 ft (1,000 m) without derating

Performance

Voltage/Current Control

Range:	Zero to input supply voltage or rated current Continuous with analog control 0.10% of setting with digital control
Resolution:	0.05% with 12-bit analog input

Velocity Monitoring

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

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

Analog Inputs

100 MHz control: 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

100 MHz control: 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

100 MHz control: 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

100 MHz mixed I/O control: 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)
100 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): 100 MHz control: RS-232/422/485, isolated,
and (2) RS-422/485

Protocols: ANSI-x3.28-2.5-A4 or Modicon RTU

Synchronous

Port: 100 MHz control:
RS-485 for high-speed master/slave networking

Communication Modules

Provisions: 100 MHz control: one AnyBus and one MaxStream module

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.

- 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 may be used for highest performance. The resolver interface provides an encoder emulation for paralleling feedback to other devices. Dual- and triple encoder option 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.

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	5-75 hp (3.7-55 kW)	7½-100 hp (5.5-75 kW)
460 V AC	5-150 hp (3.7-110 kW)	7½-200 hp (5.5-150 kW)
575 V AC	5-200 hp (3.7-150 kW)	7½-250 hp (5.5-185 kW)

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

UNICO—Worldwide

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Specifications subject to change without notice.

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