

Z1000 HVAC Drive

3 HP to 500 HP

Fan and Pump Applications

The Z1000 variable speed drive is designed for building automation applications such as fans, pumps, and cooling towers through 500 HP. The Z1000 features an easy-to-read LCD keypad that provides Hand-Off-Auto interface and a real time clock. These features make the Z1000 perfect for most building automation applications that require reliable motor control.

Harmonic Mitigation*

Built-in 5% line impedance for input harmonic reduction.

Noise Filter*

On board EMI/RFI filter complies with IEC 61800-3 restricted distribution for first environment.

Serial Communications

Embedded BACnet communications (BTL Certified), along with Modbus/Memobus.

Ratings

Plenum Rated (UL 1995). Seismic Rated (IBC 2006 - Certification 12/2011). Made with RoHS compliant materials.

Internal Real-Time Clock

Time and date stamping for events, along with timer controls for starting stopping and speed changes without the need for external controls.

PI Feature

Maintains a set point for closed loop control of fans and pumps for pressure, flow or temperature regulation and eliminates the need for a closed loop output signal from a BAS. Independent PI to control an external device in the system.

LCD Operator

5-Line 16 character alpha-numeric, easy to read and understand display, with Hand-Off-Auto functions.

Carrier Frequency

5 kHz carrier frequency with dynamic noise control for quiet motor operation.

Application Macros

Choose from pre-configured set up macros to match the application for quick and easy set up.

Sealed Heatsink

Allows for drive to be mounted in a NEMA 12 enclosure with heatsink external.



Specifications

Overload Capacity

- 110% for 60 seconds,

Output Frequency

- 0.01 to 240 Hz

Control Methods

- V/Hz Control
- Open Loop Vector Control for Permanent Magnet motors

Motor Types

- Squirrel Cage Induction
- Interior Permanent Magnet (IPM)

Enclosures

- NEMA Type 1 / IP20 : 3 - 100 HP 208V and 3 - 250 HP 480V
- Open Type / IP00 : 125 - 150 HP 208V and 300 - 500 HP 480V

Ambient Operating Temperature

- -10°C to 40°C (14°F to 104°F)

Global Certification

- UL, CSA, CE, RoHS

Standard I/O

- Seven Multi-Function Programmable Digital Inputs (24Vdc)
- Two Multi-Function Programmable Analog Inputs (0-10VDC or 4-20mA)
- One Fault Relay Output (Form C - 2 Amps at 250Vac max)
- Three Multi-Function Programmable Relay Output (Form A - 2 Amps @ 250Vac max)
- Two Multi-Function Programmable Analog Outputs (0-10Vdc or 4-20mA)
- One 24 Vdc, 150 mA Transducer or Transmitter Power Supply for customer use

Network Communications

- Built-in BACnet, RS485/422 - Programmable up to 76.8 kbps
- Optional: LonWorks, Metasys, APOGEE FLN, EtherNet/IP

* Available only as options, 300-500HP ratings.



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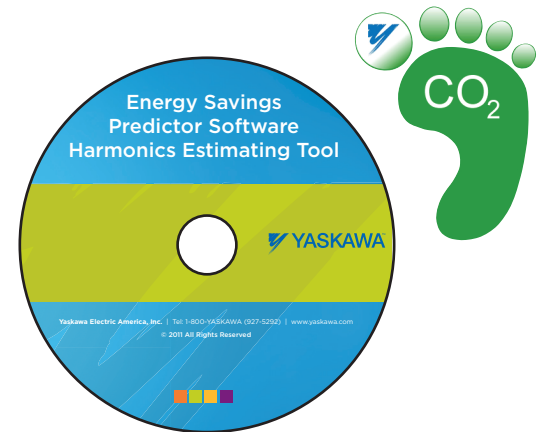
Fan and Pump Applications

Model Number CIMR-ZU2A	Rated Output Current (Amps)	HP	Dimensions (in.)			Enclosure Type
			H	W	D	
0011FAA	10.6	3	14.1	4.9	8.6	IP20 NEMA Type 1
0017FAA	16.7	5				
0024FAA	24.2	7.5	17.6	7.9	9.2	
0031FAA	30.8	10				
0046FAA	46.2	15	20.1	10.0	9.4	
0059FAA	59.4	20				
0075FAA	74.8	25	21.3	13.4	10.3	
0088FAA	88.0	30				
0114FAA	114	40	30.5	19.7	15.7	
0143FAA	143	50				
0169FAA	169	60				
0211FAA	211	75				
0273FAA	273	100				
0343AAA	343	125	31.5	13.8	13.8	IP00 Open-Type
0396AAA	396	150				

Model Number CIMR-ZU4A	Rated Output Current (Amps)	HP	Dimensions (in.)			Enclosure Type
			H	W	D	
0005FAA	4.8	3	14.1	4.9	8.6	IP20 NEMA Type 1
0008FAA	7.6	5				
0011FAA	11.0	7.5	17.6	7.9	9.2	
0014FAA	14.0	10				
0021FAA	21.0	15	20.1	10	9.4	
0027FAA	27.0	20				
0034FAA	34.0	25	21.3	11.8	10.3	
0040FAA	40.0	30				
0052FAA	52.0	40	27.6	14.2	11.4	
0065FAA	65.0	50				
0077FAA	77.0	60	30.5	15.7	15.7	
0096FAA	96.0	75				
0124FAA	124	100	41.1	18.9	18.9	
0156FAA	156	125				
0180FAA	180	150	37.4	19.7	19.7	IP00 Open-Type
0240FAA	240	200				
0302FAA	302	250	44.9	26.4	14.6	
0361AAA	361	300				
0414AAA	414	350				
0480AAA	480	400				
0515AAA	515	450	44.9	26.4	14.6	
0590AAA	590	500				

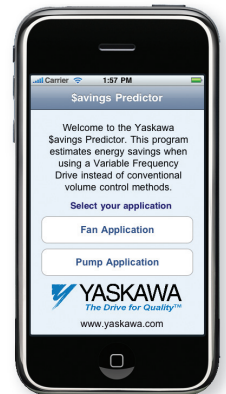
FREE Estimating Tools

- Energy Savings Predictor
- Harmonics Estimator
- Carbon Footprint Calculator



iTunes App

Energy savings app for the iPhone and the iPod touch is available at iTunes.com - search for Yaskawa.



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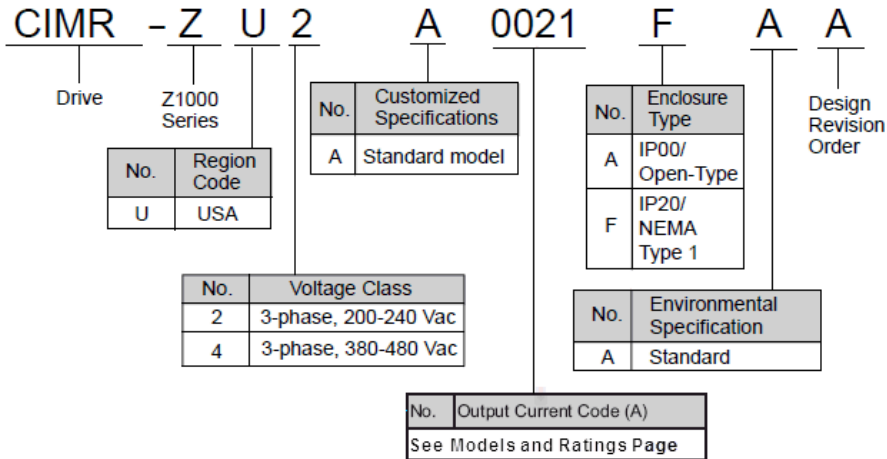
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- Z1000 Configured
- E7 Drive
- E7S Slim Configured Package
- E7C Drive Configured
- E7N Narrow Bypass Package
- E7L Drive Bypass
- E7B Drive Bypass
- E7E Drive Engineered

Model Number Designation for Z1000 Drive



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Drives & Motion Division



Variable Frequency Drive (VFD) Z1000 Mechanical Specification Submittal (For NEMA 1 Rated Drives)

GENERAL

The Z1000 is a high performance PWM (pulse-width-modulated) AC drive. Three-phase input line power is converted to a sine-coded, variable frequency output, which provides optimum speed control of any conventional squirrel cage induction motor and permanent magnet motor. The use of IGBTs (Insulated Gate Bipolar Transistors), with a carrier frequency range of 1 kHz to 12.5 kHz, permits quiet motor operation.

This drive has one control logic board for all horsepower ratings. Printed circuit boards employ surface mount technology, providing both high reliability, and small physical size of the printed circuit assemblies. The dual 32 bit microprocessors deliver the computing power necessary for complete three phase motor control in building automation systems.

Operating Principle: Input three phase AC line voltage is first rectified to a fixed DC voltage. Using pulse width modulation (PWM) inverter technology, the DC voltage is processed, to produce an output waveform in a series of variable-width pulses. Unique firmware algorithms optimize motor magnetization through control of voltage, current and frequency applied to generate a nearly sinusoidal output waveform.

STANDARDS

UL 508C (Power Conversion)
CSA 22.2 No. 14-95 (Industrial Control Equipment)
UL 1995 (Plenum)
CE mark 2006/95/EC LVD
CE mark 2004/108/EC
IEC 61800-5-1 (LVD)
EN 61800-3
IEC 529
IEEE C62.41
BTL Listed
UL, cUL listed; CE marked

ENVIRONMENTAL & SERVICE CONDITIONS

Ambient service temperature:

NEMA 1 (IP20): -10°C to 40°C (14°F to 104°F)

Ambient storage temperature: -20°C to 70°C (-4°F to 158°F)

Humidity: 0 % to 95 %, non-condensing

Altitude: to 1000 meters (3300 feet), higher by derating

Service factor: 1.0

Vibration: 9.81m/s² (1 G) maximum at 10 to 20 Hz, 2.0 m/s² (0.2 G) at 20 Hz to 55 Hz.

Plenum mounting capable (IP20)

RoHS Compliant

QUALITY ASSURANCE

In circuit testing of all printed circuit boards is conducted, to ensure proper manufacturing.

Final printed circuit board assemblies are functionally tested, via computerized test equipment.

All fully assembled controls are computer tested with induction motor loads to assure unit specifications are met.

The average MTBF (Mean Time Between Failure) is 28 years

CONSTRUCTION

Input Section - VFD power input stage converts three phase AC line power into a fixed DC voltage, via a solid state full wave diode rectifier, with MOV (Metal Oxide Varistor) surge protection. An internal 5% DC bus reactor reduces harmonics for cleaner power.

Intermediate Section - DC bus maintains a fixed DC voltage, with filtering and short circuit protection, as a DC supply to the VFD output section. It is interfaced with the VFD diagnostic logic circuit, to continuously monitor and protect the power components.

Output Section - Insulated Gate Bipolar Transistors (IGBTs) convert DC bus voltage to a variable frequency and voltage, utilizing a PWM sine-coded output to the motor. IGBT output allows motor noise, at 60 Hz, to measure less than 2 dB (@ 1 meter) above that resulting from across the line operation.

Power and control electronics housings:

NEMA 1 (IP20) wall-mounted enclosure:

208 V, 3 thru 100 HP; 480 V, 3 thru 250 HP

CONSTRUCTION (continued)

Microprocessor based control circuit

Non-Volatile memory (NV RAM); all programming memory is saved when the VFD is disconnected from power.

Current transformers detect the output current for motor control and protective functions

Digital operator keypad and display, with copy function, provides local control and readout capability:

Hand/Off/Auto commands

Speed Reference command

Reset command

Easy to remove heat sink cooling fan with programmable on/off control

USB Type B port for quick and easy PC Connection

PRODUCT FEATURES

Displacement power factor of .98 throughout the motor speed range

Input phase insensitive; sequencing of the three phase input is unnecessary

Internal EMI/RFI filter complies with IEC 61800-3 restricted distribution for first environment

Built-In real time clock for time and date stamping events along with timer functions for starting, stopping and speed changes without the need for external controls

Volt meter, ammeter, kilowatt meter elapsed run time meter and heat sink temperature monitoring functions

Two internal (PI) Controls

1. Drive internal PI closed loop control with selectable engineering units
2. Independent PI control for use with external device

Differential PI feedback feature

Sleep function in both closed loop and open loop control

Feedback signal low pass filter

Feedback signal loss detection and selectable response strategy

Feedback signal inverse and square root capability

24 Vdc, 150ma transmitter power supply

Input and output terminal status indication

Diagnostic fault indication

VFD efficiency: 96% at half-speed; 98% at full-speed

"S-curve" soft start / soft stop capability

Run/Fault output contacts

Serial communication loss detection and selectable response strategy

"Up/Down" floating point control capability

Controlled speed range of 40:1

Critical frequency rejection capability: 3 selectable, adjustable bandwidths

100% starting torque capability, available from 3 Hz to 60 Hz

Remote speed reference (speed command) signal:

0 to 10 VDC (20 k Ω)

4 to 20 mA DC (250 Ω)

Adjustable carrier frequency, from 1 kHz to 12.5 kHz

Dynamic noise control for quiet motor operation

Programmable security code

7 programmable multi-function input terminals (24Vdc) providing 60+ programmable features, including:

Customer Safeties

BAS / Damper Interlock

Emergency Override

Preset Speed

PI control enable / disable

3 programmable multi-function output relays (Form A rated 2 amps @ 250Vac & 30Vdc), providing 50+ functions, including:

Damper control

Hand / Auto Status

Contact Control for External Bypass

Overtorque/undertorque detection

Serial communication status

No load detection (broken belt alert)

One fixed "Fault" form C output relay (Rated 2 amps @ 250Vac & 30Vdc)

7 preset speeds

Built-in BACnet protocol along with Modbus/Memobus. Protocol are accessible via RS-422/485 communication, which is standard

Stationary motor auto-tuning

"Kinetic Energy Braking" (KEB) function stops the motor in up to half the time it would take without this function.

LCD keypad: Hand/Off/Auto functions with a built-in copy feature,

Motor preheat function

Flash upgradeable firmware

Customizable monitor display

Heat sink over temperature speed fold-back feature

"Bumpless" transfer between Hand and Auto modes

Emergency override can be used as "smoke purge" function

Fan failure detection and selectable drive action

OPERATION

Output frequency and speed display can be programmed for other speed-related and control indications, including: RPM, CFM, GPM, PSI, in WC, % of maximum RPM or custom

Power loss ride-thru (2 seconds capable)

Time delay on start, peak avoidance

VFD accepts either a direct acting or a reverse acting speed command signal

Bi-directional "Speed Search" capability, in order to start into a rotating load. Two types: current detection and residual voltage detection

DC injection braking, to prevent fan "wind milling"

Remote Run/Stop command input

Two programmable 0 to 10 VDC or 4-20ma analog outputs, proportional to drive monitor functions including: output frequency, output current, output power, PI feedback, output voltage and more.....

5-Line 16 Character LCD display provides readout functions that include: output frequency, output voltage, output current, output power, DC bus voltage, interface terminal status, PI feedback and fault status.

Programmable HVAC specific application macros

Over 100 programmable functions, resettable to factory HVAC presets

User parameter initialization, re-establish project specific parameters

Ramp-to-stop or coast-to-stop selection

Auto restart capability: 0 to 10 attempts with adjustable delay time between attempts

One custom selectable Volts/Hertz pattern and multiple preset Volts/Hertz patterns

Auto speed reference input signal, adjustable for bias and gain

While the VFD is running, operational changes in control and display functions are possible, including:

- Acceleration time (0 to 6000 seconds)

- Deceleration time (0 to 6000 seconds)

- Frequency reference command

- Hand/Off/Auto commands

- Monitor display

- Removable digital operator

Automatic energy saving, reduced voltage operation

PROTECTION

Output current overload rating of 110 % of drive's continuous current rating for 60 seconds

Output short circuit protection

Current limited stall prevention (overload trip prevention) during acceleration, deceleration, and run conditions

Optically isolated operator controls

Fault display and last 10 faults storage

"Hunting" prevention logic

Electronic ground fault protection

Electronic thermal motor overload protection (UL approved)

DC bus charge indication

Heat sink over temperature protection

Cooling fan operating hours recorded

Input/Output phase loss protection

Reverse prohibit selectability

Short circuit withstand rating of 100K amps RMS

OPTIONS

- LonWorks Interface

- EtherNet/IP

- Siemens Apogee FLN

- Metasys N2