

Z1000 Family of AC Drives for Building Automation



200V Class: 1/2 to 150 HP
400V Class: 1/2 to 500 HP



YASKAWA

**IT'S PERSONAL
YASKAWA**

“It’s Personal” means each Yaskawa associate is committed to providing you with a great experience every time you deal with us.

We train our people, we treat our customers, we design, engineer and manufacture our products in ways that say everything we do matters. And, when your job is to make sure that everything that matters is done well, you take that pretty personally.

We commit to that at Yaskawa. We can make it happen. Because to us, our relationship with you is personal.



Pushing Expectations

Yaskawa America, Inc. has been building packages for the HVAC industry since 1988. Over that time, we have worked rigorously to evolve our products and exceed industry standards, while ensuring an exceptional customer experience.

Our latest offering for the HVAC industry, the Z1000 family of drives, pushes past the industry requirements to establish a new benchmark for expectations within the industry.

Yaskawa embraces the challenge of supplying an essential product into a growing and changing market. Customers of all types are demanding more flexibility, more control, more power, less downtime and more packaging options. The Z1000 family of drives is able to address and exceed all of these expectations.



Performance

Whether you are the building owner, facility manager or mechanical contractor specifying the drive, we know you need drive performance you can trust. Yaskawa is widely used in HVAC applications because we offer great benefits, including:

- **Industry Experience.** We’re hands on. We have the knowledge to match the right drive to your specific custom design. And, our distributors are consistent in their service quality and strong support.
- **Easy-to-Program, Easy-to-Use.** Our drives are easy to get up and running with simple programming and maintainability.
- **Quick Delivery.** Most times, the turnaround time for HVAC drives is short. Yaskawa typically delivers in one-third the time of our competition.
- **No Worries.** Once you plug a Yaskawa drive into your system, you won’t have to worry about reliability. Our product quality far exceeds industry standards.

Z1000 Family of Drives



Z1000: Uniquely Designed For Building Automation Applications.

The Z1000 variable frequency drive provides many benefits for building automation applications that require reliable motor control.



Listen and Evolve

In order to serve the HVAC industry, an organization must first understand its customers. Yaskawa’s building automation group is dedicated to listening to each of our different customer types to better understand each of their needs. This enables us to evolve products and services that exceed the expectations of each of the following customers.

Building Owners

Expect maximum customer comfort at minimal cost.

Facility Managers

Expect specifications to be met, simple maintenance, and error free operation.

Specifying Engineers

Expect compliance to industry trends, customer acceptance, and quick and accurate commissioning.

Mechanical or Electrical Contractors

Expect easy installation and programming and quick response to any questions.

Temperature Control Contractors

Expect integrated control, stable software, and compatibility across various platforms.

After-Sales Service Contractors

Expect to easily identify problems and quickly resolve them by replacement or field maintenance.

Intelligent Building Design

Energy Costs

Energy usage in a typical office building costs the owner between \$1 to \$3 per square foot. Air handling systems account for approximately 25% and cooling systems for about 14% of the electricity consumed. These systems represent key focus areas for cost reduction. You have the means of reducing air handling and cooling energy costs by 20%. For a 100,000 sq. ft. building, total savings can range from \$10,000 to \$30,000 every year. The key to savings is the judicious use of variable frequency drives (VFDs).

Variable Frequency Drives Reduce Energy Use

The primary reason VFDs reduce energy and improve system efficiency is due to the elimination of throttling. Throttling has been the historic method of mechanically adjusting air or water flow in a system. VFDs electronically control the speed of fans, pumps, and compressors. **A typical fan or pump running at 75% speed will use half as much energy compared to systems using mechanical control methods.**

Payback on a system utilizing VFDs is typically less than two years and installations with payback less than one year are common. Rebates and other benefits justify installing the Z1000 family of drives and will only improve the financial payback.

Other Benefits

- Precise motor control will result in less mechanical and electrical stress on the system
- Reductions of excess capacities at peak periods
- Reduction or elimination of demand charges
- Improvement in Power Factor
- Total control and monitoring via the facility's preferred communication protocol
- Soft Starting eliminates stress on equipment that historically was started or connected across-the-line, including fan belts, compressors and pumps
- Trimming the impellers on pumps may be eliminated. Water hammering will be eliminated

Our "Green" Future

Over the next 20 years, it can be argued that variable frequency drives will become the most important technology to gain acceptance and help intelligent buildings truly become intelligent. Building owners continue to strive toward "green" or any energy efficiency goals that reduce their carbon footprint and help meet corporate sustainability goals. The Z1000 family of drives contributes towards LEED credits and certification and will also be a key technology to help buildings meet or exceed the requirements for Energy Star Certification.



Intelligent Building Design

Top Applications for Variable Frequency Drives

- Supply & return fans
- Cooling tower fans
- Condenser water pumps
- Chiller compressors
- Condensing fans
- Fan walls
- Chilled water pumps

Building Types that Will Benefit

While it is a priority to improve occupant comfort while reducing electrical consumption in office buildings, other building types offer ideal opportunities for energy savings and carbon footprint reduction.

- Government facilities
- Medical facilities
- Data centers
- Educational facilities
- Parking structures

A Yaskawa representative or partner can help you identify where drives will have the biggest payback.

Commitment to Quality

All phases of Yaskawa's business, including research and development, supply chain management, production and quality control, sales and marketing, as well as technical service and distribution, are committed to delivering high quality products and services.



With ISO 9001 certification, a Supplier Rating Program, and rigorous testing, Yaskawa ensures that quality and reliability are designed and built in. Field data confirms that calculated MTBF (Mean Time Between Failure) targets are exceeded in actual production units. Yaskawa is the only manufacturer in the field of industrial electronic equipment to receive the Deming Prize for Quality.

Conformance to Industry Standards

Z1000 drives conform to a variety of industry standards from various governing bodies.



Network Compatibility

Z1000 drives are compatible with the most popular HVAC protocols



Environmental Considerations

Yaskawa maintains a corporate commitment to sustainability goals with an emphasis on the following environmental guidelines

RoHS

Restriction of Hazardous Substances



Leadership in Energy and Environmental Design



EPA program to promote superior energy efficiency



Energy Efficiency with Reduction of Carbon Footprint

Merging Green and Technology



Yaskawa Advantages

Exceptional Design

Enjoy peace of mind by knowing that you are considering a product from Yaskawa, the factory automation controls company with the highest reputation for quality and reliability. Historically, Yaskawa drives have demonstrated extremely high reliability with an average MTBF (Mean Time Between Failure) of 28 years or more. The new 1000 series products take reliability to the next level with a calculated design life that is twice as long as previous generations.



Highly Integrated Design results in fewer parts and interconnections, reducing the number of failure points.

Component Derating extends the life of any single part by selecting higher specifications (e.g., voltage, current) than what a circuit requires for normal operation.

Latest Generation IGBT Power Modules, capable of four times more thermal cycles than previous designs.

Enhanced Short Circuit Detection and Self Diagnostics provide additional protection against severe catastrophic conditions.

Inclusive power solutions ensure protection and error free operation due to the use of integrated EMI/RFI filters, integrated line impedance, and integrated superior MOVs.

Z1000 Intelligent Bypass

Yaskawa offers the Z1000 in a Bypass Package. The intelligent bypass, when enabled, can transfer the motor across the line when the application requires 60Hz. Most HVAC systems require 60Hz at peak demand (summer months, daytime). The removal of the drive at 60Hz saves energy and reduces utility costs for the user.

Flawless Transitions into and out of intelligent bypass mode.

Field Programming is quick and intuitive. The fully functional keypad allows the user to adjust the sensitivity of the drive to determine when the bypass engages and disengages.

Serial Communications maintained in bypass mode.

Safety Circuits supported in bypass mode.

Power Loss, Harmonic Distortion, and EMI/RFI completely eliminated in bypass mode.

Operation	Normal Operation	Bypass Engaged
Power Loss	3.5% or more	0
Harmonic Distortion	30%	0
EMI/RFI	Compliant to IEC 61800-3	0



Yaskawa Advantages

Features for HVAC

The Z1000 features an array of important features that have been designed specifically for the Building Automation/HVAC industry.

Integrated EMI/RFI Filters ensure the drive does not contribute towards an electrical noise problem.

Integrated Line Impedance of 5% which reduces line harmonics, reduces ripple on the DC bus and provides light buffering from transient power fluctuations.

Integrated and improved MOV protection provides quick and reliable protection against surge events.

Internal Phase Sensing protects your Z1000 investment from premature failures.

Premature Contactor Coil Failure is eliminated in the Z1000 bypass. Low voltage threshold is selectable and sensitivity is adjustable. The Z1000 bypass will stop and open all contactors when this condition is detected.

Building Communication Protocols support more than 100 data points ensuring maximum flexibility.

Pass Thru I/O Support through facilities preferred communication protocol

- Digital Inputs: 8 Bypass, 6 Drive
- Digital Outputs: 4 Bypass, 3 Drive
- Analog Inputs: 2 Drive
- Analog Outputs: 2 Drive

Bypass Sync speeds up start up and commissioning by verifying bypass rotation without actually viewing motor rotation.

Belt Break Indication thru keypad, digital output or building's communication protocol indication of fan belt has failed.

Stand Alone Operation enables continued operation of the Z1000 bypass while the Z1000 drive has been removed for maintenance or service. All bypass features continue to function including serial communications.

LCD Keypad is standard on every Z1000. It features HVAC-specific application macros, an easy-to-read LCD display that provides Hand-Off-Auto interface, and a real time clock.

Easy To Commission

Yaskawa Drives are factory-programmed and ready to run. The LCD keypad enhances ease of use with its parameter copy feature that allows duplication of settings between drives. In addition, a portable USB Copy Unit provides a very convenient method of desktop configuration, transportable to the factory floor.



**USB Copy Unit
(For Z1000 series)**

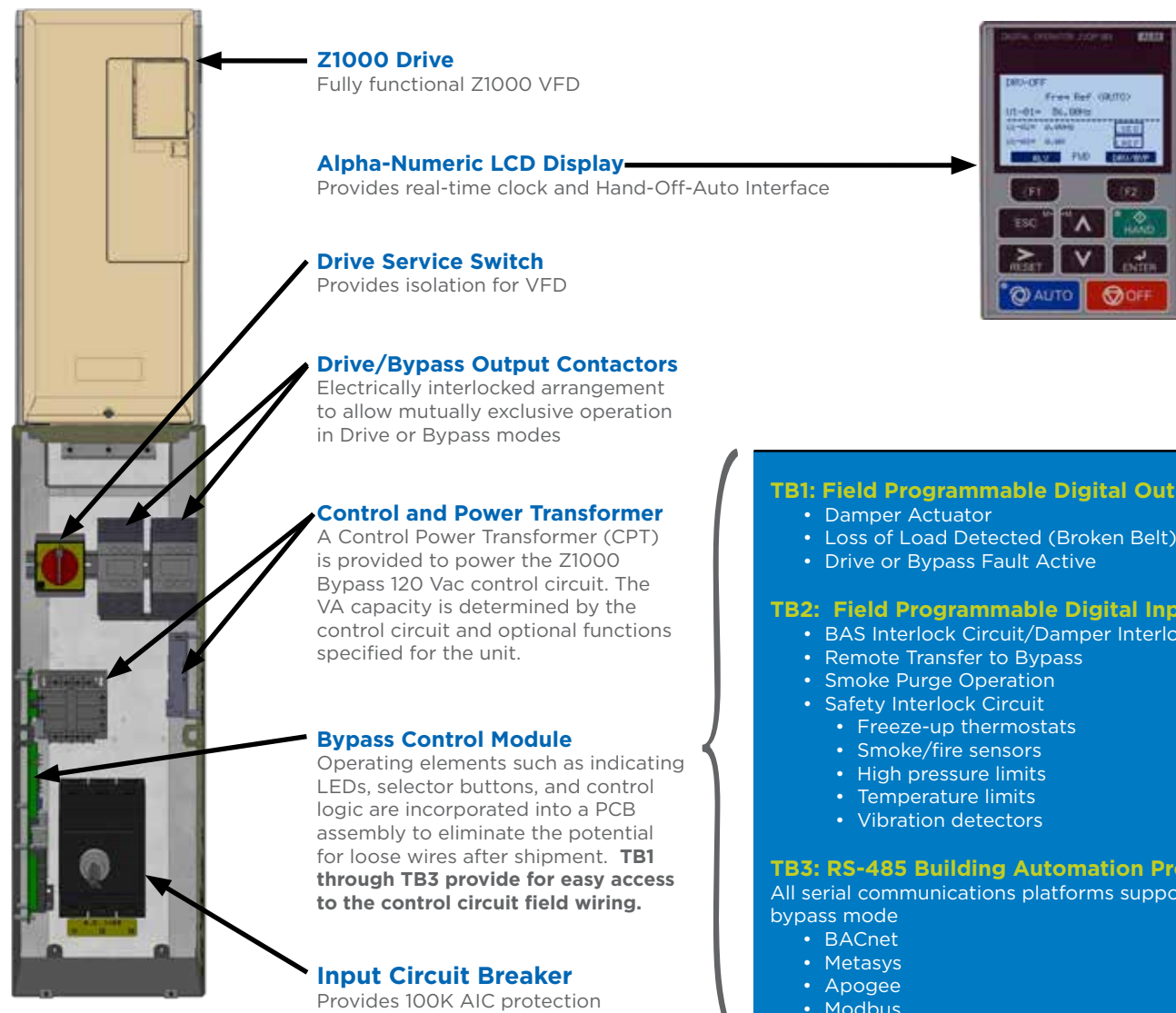
Yaskawa Advantages

Easy to Install and Service

All Z1000 drives and packages come with a standard LCD alpha-numeric keypad. This keypad provides a real time clock and Hand-Off-Auto interface. Start-up and configuration are simplified by the intuitive programming menu. With minimal information, these packages are ready to run and integrate into the building owner's system. Additionally, this keypad can be configured to display information in user defined units, information regarding maintenance data, diagnostics, and status.

Control field wiring is made simple by easy to access terminals with ample flexibility to meet your application needs.

For long term maintenance, detachable cooling fans are easy to replace and on/off fan control can extend operating life. Accumulated operation time and cooling fan run time are recorded and can be displayed for preventive maintenance programs. Stand-Alone operation is supported to keep your motors running while maintenance or service is provided on the variable frequency drive



Example of Z1000 Bypass Package: Easy Power and Control Terminal Access

Yaskawa Advantages

Technical Training

Both standard and customized courses are available with hands-on activities and demonstrations. Instruction is offered at Yaskawa locations as well as traveling road schools, and is supplemented by live web classes and e-Learning Modules / Videos to provide the right level of training to fit your needs. Trainers are degreed engineers with extensive industry experience.



Traveling Road Show Van

Worldwide Services

Yaskawa offers worldwide support with application assistance, start-up, maintenance, troubleshooting and repair, as well as internet tools and telephone support. Sales and service offices are located around the world.

Through one website address, yaskawa.com, customers can access several Yaskawa global websites that best service their geographic area, in several languages. The websites have an extensive document and knowledge database. Customers can easily locate information, select products, as well as maintain products. Our FAQs cover many facets of ownership and are derived from our field and telephone assistance with our customers.

In the Americas, telephone assistance is available 24/7/365 at 800-YASKAWA (927-5292). Our phone support group is product certified to assist you with current and legacy drive requirements.

Yaskawa's Field Service personnel and local Authorized Service Providers can provide on-site start-up assistance, troubleshooting, and repair. Same day exchange units or fast turnaround repairs are available.

HVAC Software Tools



DriveWizard HVAC

Innovative software tool that allows users to commission, startup and diagnose the Yaskawa family of HVAC drives in a quick and easy manner. Built-in features include a monitor panel, status panel, 6 channel trend recorder, and application wizard.

Energy Savings Predictor

Predicts energy savings achieved when using a Yaskawa HVAC drives instead of conventional control methods in HVAC applications. The results can be viewed in graphical and text format with built-in functions to generate an energy prediction report especially designed for consultants.

Harmonics Estimator

Estimates total harmonic distortion when using Yaskawa HVAC drives and references IEEE519 to determine if the defined system meets the required standard. The results can be viewed in graphical and text format with built-in functions to generate an energy prediction report especially designed for consultants.

Packages for any Environment

NEMA 1 Packages

Yaskawa offers a standard NEMA 1 (UL Type 1) package for Z1000 bypass and configured units.

All units are UL rated, with the bypass and configured packages built to UL 508A (Industrial Control Panel) standards.

Installation, setup, service, and quick delivery have all been considered in these package designs.

Available options include:

- 100K AIC Rated Package with Circuit Breaker Option
- 2 or 3 Contactor Bypass Options
- Custom Nameplates
- Serial Communication Network Cards including LonWorks and Ethernet/IP



NEMA 12 Packages



Z1000 bypass and configured packages are available with a NEMA 12 (UL Type 12) enclosure option.

Fans, when required are provided with Type 12 rated filters to maintain a Type 12 rating on the enclosure.

The bypass comes standard as a 2-contactor style with input disconnect switch.

The configured unit comes standard with an input disconnect.

Both offer several commonly used options in their standard packages.

Standard Construction Features include:

- 12 Gauge Steel
- Padlock Hasp
- Integral ¼ Turn Door Latches
- Whole Door Gasket
- Lifting Eyes
- Removable Air Filter from Outside of Cabinet

Packages for any Environment

NEMA 3R Packages

Z1000 bypass and configured packages are offered with a NEMA 3R (UL Type 3R) enclosure option.

The bypass comes standard with a flange mount main input circuit breaker and a 3-contactor style, allowing motor operation from either the drive or across the line.

The configured unit comes standard with an input disconnect.

Both have been designed for flexibility in providing the features and options commonly specified by facility designers.

Standard Construction Features include:

- 12 Gauge Steel
- Padlock Hasp
- Integral ¼ Turn Door Latches
- Whole Door Gasket
- Brass Hinges
- UV/Type 3R Keypad Membrane
- Lifting Eyes
- Stainless Steel Hardware
- Sun Reflective White Powder Coat Paint



Engineered Packages

Both end users and OEM customers have come to rely on our fully-engineered products. These products are based off of our standard configurations but evolve into a customized package just for you.

Engineered packages include:

- Redundant Drive Packages
- 12 or 18 Pulse Configurations
- Soft Start Bypass Packages
- Integrated Trap Filter Packages
- Multiple Motor Configurations (2 motor "OR", 2 motor "AND", and fan array)

Engineered packages can be provided as NEMA 1, 12 or 3R. They are supported with custom engineered drawings and documentation.

Z1000 AC Drive



3 - 500 HP

Advanced Fan/Pump Control

The Z1000 variable frequency 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), with Apogee, Metasys, Modbus/Memobus.

Industry Compliance

Plenum Rated (UL 1995). Seismic Rated (IBC 2012), OSHPD (OSP-0293-10). 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 copy and 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.

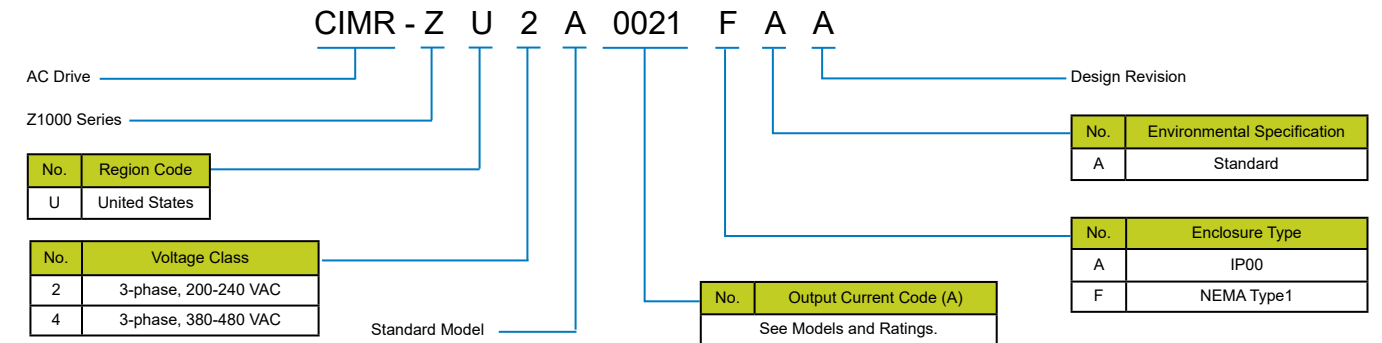
* Available only as options, 300-500HP ratings.

APPLICATIONS

- ▶ Supply and Return Fans
- ▶ Cooling Tower Fans
- ▶ Condensing Fans
- ▶ Fan Walls
- ▶ Condenser Water Pumps
- ▶ Chilled Water Pumps
- ▶ Chiller Compressors

Z1000 AC Drive

Model Number Designation



Models and Ratings

208V Models

CIMR-ZU2A: AA	0011F	0017F	0024F	0031F	0046F	0059F	0075F	0088F	0114F	0143F	0169F	0211F	0273F	0343A	0396A	
Rated Output Current (A)	10.6	16.7	24.2	30.8	46.2	59.4	74.8	88.0	114	143	169	211	273	343	396	
Nominal HP	3	5	7.5	10	15	20	25	30	40	50	60	75	100	125	150	
Dim (in)	Height	14.06		17.60		20.08		21.33		30.47			31.5			
	Width	4.88				7.87		10.04			13.39			19.69		
	Depth	8.58		9.17		9.35		10.37		15.75			13.78			
Heat Loss (W)	Weight (lb)	12.3	13.0	16.3	17.2	26.5	28.7	59.5	61.7	63.9	143.3	149.9	154.3	160.9	216	218
	Heatsink	121	176	280	378	396	542	557	670	864	1191	1447	1753	2378	1964	2435
	Internal	28	37	55	73	86	116	132	157	200	307	365	471	625	655	829
Total	148	214	335	451	482	658	688	827	1064	1499	1811	2224	3003	2620	3264	

480V Models

CIMR-ZU4A: AA	0005FAA	0008FAA	0011FAA	0014FAA	0021FAA	0027FAA	0034FAA	0040FAA	0052FAB	0052FAA	0065FAA	0077FAA	
Rated Output Current (A)	4.8	7.6	11.0	14.0	21.0	27.0	34.0	40.0	52.0	52.0	65.0	77.0	
Nominal HP	3	5	7.5	10	15	20	25	30	40	40	50	60	
Dim (in)	Height	14.06		17.60		20.08		21.33			21.33		
	Width	4.88				7.87		10.04			10.04		
	Depth	8.58		9.17		9.35		10.37			10.37		
Heat Loss (W)	Weight (lb)	11.9	12.6	13.4	16.1	16.8	18.5	28.7		59.5	63.9	68.3	
	Heatsink	93	143	184	231	306	390	457	558	584	463	576	891
	Internal	24	33	38	52	69	85	105	118	151	130	161	225
Total	117	178	222	283	375	475	562	677	734	594	737	1116	

CIMR-ZU4A: AA	0096F	0124F	0156F	0180F	0240F	0302F	0361A	0414A	0480A	0590A	
Rated Output Current (A)	96.0	124	156	180	240	302	361	414	480	590	
Nominal HP	75	100	125	150	200	250	300	350	400	500	
Dim (in)	Height	21.33	27.56	30.47		41.14		31.50	37.40	44.88	
	Width	10.04	10.87	13.39		17.91		19.70		26.38	
	Depth	10.37	11.38	15.75		18.90		13.78	14.57		
Heat Loss (W)	Weight (lb)	70.5	101.4	160.9	167.6	174.2	286.6	236.0	275.0	476.0	487.0
	Heatsink	1131	1581	1929	2342	2863	3278	3009	3206	3881	4130
	Internal	288	398	535	621	790	929	1157	1633	2011	1964
Total	1419	1979	2464	2963	3653	4207	4166	4840	5893	6094	

Note: Data subject to change.

Z1000 Bypass Package

Z1000 Bypass Package

HVAC Optimized with Intelligent Bypass and Advanced BAS Interface

Features

- Two Contactor Bypass
- 100K AIC Package Rating
- Input "Non-Fused" Disconnect
- Drive H-O-A Keypad used for Bypass
- Standard Digital Inputs (5)
 - Run
 - Safety
 - BAS Interlock
 - Auto Transfer to Bypass
 - Smoke Purge
- Programmable Digital Inputs (3)
- Form "C" Programmable Relays (4)
- Built-in BACnet protocol (BTL certified), Apogee, Metasys, Modbus/Memobus accessible via RS-422/485 communication, which is standard
- All Bypass Functions Work with Serial Communications
- Phase Loss & Low Voltage Monitor - Protects Against Contactor Coil Burn-out
- Motor Amp Display in Bypass
- Duct Pressurization Function (Pre-run)
- Bypass Sync



1 - 500 HP



NEMA 1 Wall-Mount Enclosed

- 50 - 100HP, 208V
- 100 - 200HP, 480V



NEMA 1 Floor Mount

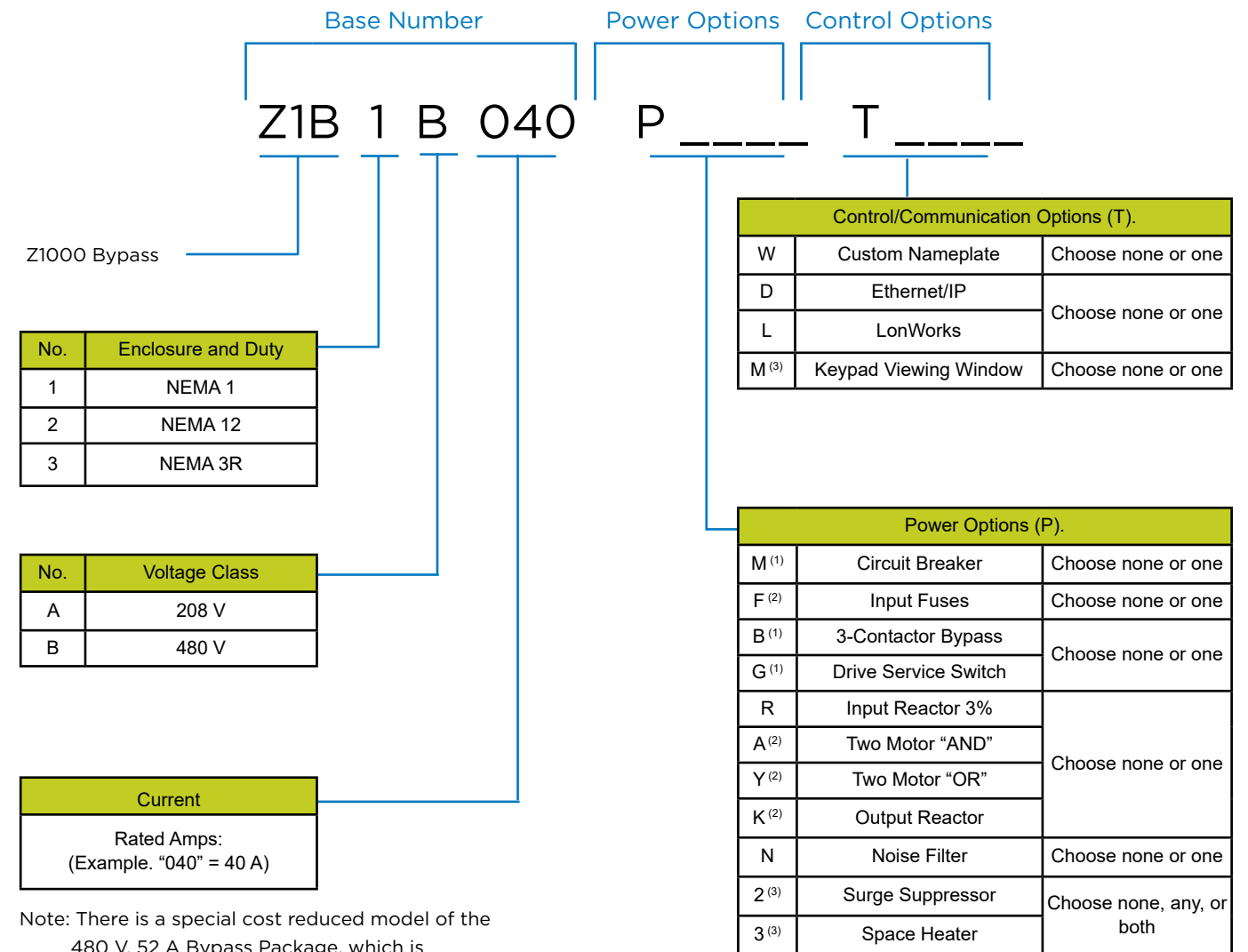
- 125 - 150HP, 208V
- 250 - 500HP, 480V

OPTIONS

- ▶ Circuit Breaker - 100K AIC
- ▶ Drive Service Switch
- ▶ Three Contactor Bypass
- ▶ Custom Nameplate
- ▶ EtherNet/IP
- ▶ LonWorks

How to Select a Z1000 Bypass Package

To construct a Bypass model number, find the base number for the required enclosure type, voltage, and current rating. Add the option code for each required option. Power options are preceded by P and Control options are preceded by T.



Note: There is a special cost reduced model of the 480 V, 52 A Bypass Package, which is denoted by "52L"

(1) Type 1 and 12 enclosures only
 (2) Type 12 and 3R enclosures only
 (3) Type 3R enclosures only.

Note: Contact Yaskawa representative for possible exclusions.

Z1000 Bypass Package

Models and Ratings

208V Models

Base No.: Z1Bx (x denotes enclosure type)		D002	D003	D004	D007	D010	D016	D024	D030	D046	D059		
Rated Output Current (A)		2.4	3.5	4.6	7.5	10.6	16.7	24.2	30.8	46.2	59.4		
Nominal HP		0.5	0.75	1	2	3	5	7.5	10	15	20		
Dimensions (in) and Weight (lb)	Type 1	Height	41.60				45.10			48.20			
		Width	6.77						10.18				
		Depth	12.92						13.19				
	Type 12	Weight	70				80			90			
		Height	28.8				34.8			39.8			
		Width	17.9						20.5			25.5	
		Depth	17.9						17.3				
		Weight	150				210			275			
		Weight	29.1				34.8			40.1			
Type 3R	Width	21.2				23.7			28.7				
	Depth	21.4						28.7					
	Weight	150				210			275				

Base No.: Z1Bx (x denotes enclosure type)		D074	D088	D114	D143	D169	D211	D273	D343	D396		
Rated Output Current (A)		74.8	88.0	114.0	143.0	169.0	211.0	273	343	396		
Nominal HP		25	30	40	50	60	75	100	125	150		
Dimensions (in) and Weight (lb)	Type 1	Height	52.80	42.79		49.09			84.16			
		Width	12.68	25.80		28.41			41.26			
		Depth	14.20	16.06		20.87			33.94			
	Type 12	Weight	160	280		380			950	1250	1650	1700
		Height	39.8	51.2				84.2				
		Width	25.5	32.7				41.3				
		Depth	17.3	22.8				32.0				
		Weight	275	420	490	850	945	1215	1300	1350		
		Weight	40.1	51.1		91.1						
Type 3R	Width	28.7	39.0		41.3			46.6				
	Depth	21.4		50.7			46.6					
	Weight	275	420	490	850	945	1215	1300	1350			

Note: Data subject to change.



Z1000 Bypass Package

Models and Ratings

480V Models

Base No.: Z1Bx (x denotes enclosure type)		B001	B002	B003	B004	B007	B011	B014	B021	B027	B034	B040	B52L	B052
Rated Output Current (A)		1.6	2.1	3.2	4.8	7.6	11.0	14.0	21.0	27.0	34.0	40.0	52.0	52.0
Nominal HP		0.5 / 0.75	1	2	3	5	7.5	10	15	20	25	30	40	40
Dimensions (in) and Weight (lb)	Type 1	Height	41.60				45.10			48.20			52.80	
		Width	6.77						10.18			12.68		
		Depth	12.92						13.19			14.20		
	Type 12	Weight	70				80			90			160	
		Height	28.8				34.8			39.8				
		Width	17.9						20.5			25.5		
		Depth	17.9						17.3					
		Weight	150				210			275				
		Weight	29.1				34.8			40.1				
Type 3R	Width	21.2				23.7			28.7					
	Depth	21.4						28.7						
	Weight	150				210			275					

Base No.: Z1Bx (x denotes enclosure type)		B065	B077	B096	B124	B156	B180	B240	B302	B361	B414	B477	B590		
Rated Output Current (A)		65.0	77.0	96.0	124.0	156.0	180.0	240.0	302	361	414	477	590		
Nominal HP		50	60	75	100	125	150	200	250	300	350	400	500		
Dimensions (in) and Weight (lb)	Type 1	Height	52.80		42.79		49.09			84.16					
		Width	12.68		25.80			28.41		41.26			69.76		
		Depth	14.20		16.06			20.87		33.94			30.50		
	Type 12	Weight	160		280		380			1250	1600	1700	1800	2100	2200
		Height	51.2				84.2								
		Width	32.7				41.3			69.8					
		Depth	22.8				32.0			30.5					
		Weight	410	475	500	550	850	950	1200	1300	1315	1900	2100		
		Weight	51.1		91.1										
Type 3R	Width	39.0		41.3			66.3								
	Depth	21.4		50.7			46.6		43.5						
	Weight	410	475	500	550	850	950	1200	1300	1315	1900	2100			

Note: Data subject to change.



Z1000 Configured Package

Z1000 Configured Package

The Z1000 drive sets a new benchmark for cost, performance, benefits and quality.

Features

- Lockable main input disconnect switch
- Drive internal PI closed loop control with selectable engineering units
- Independent PI control for use with external device
- Differential PI feedback feature
- Sleep function in both closed loop and open loop control
- 24 Vdc, 150 mA transmitter power supply
- Input and output terminal status indication
- Serial communication loss detection and selectable response strategy
- Serial communication status
- Built-in BACnet protocol (BTL certified), Apogee, Metasys, Modbus/Memobus accessible via RS-422/485 communication, which is standard
- LCD keypad: Hand/Off/Auto functions with built-in copy feature
- Flash upgradeable firmware
- “Bumpless” transfer between Hand and Auto modes
- Emergency override can be used as “smoke purge” function

How to Select a Z1000 Configured Package

To construct a Configured model number, find the base number for the required enclosure type, voltage, and current rating. Add the option code for each required option. Power options are preceded by P and Control options are preceded by T.



1 - 500 HP



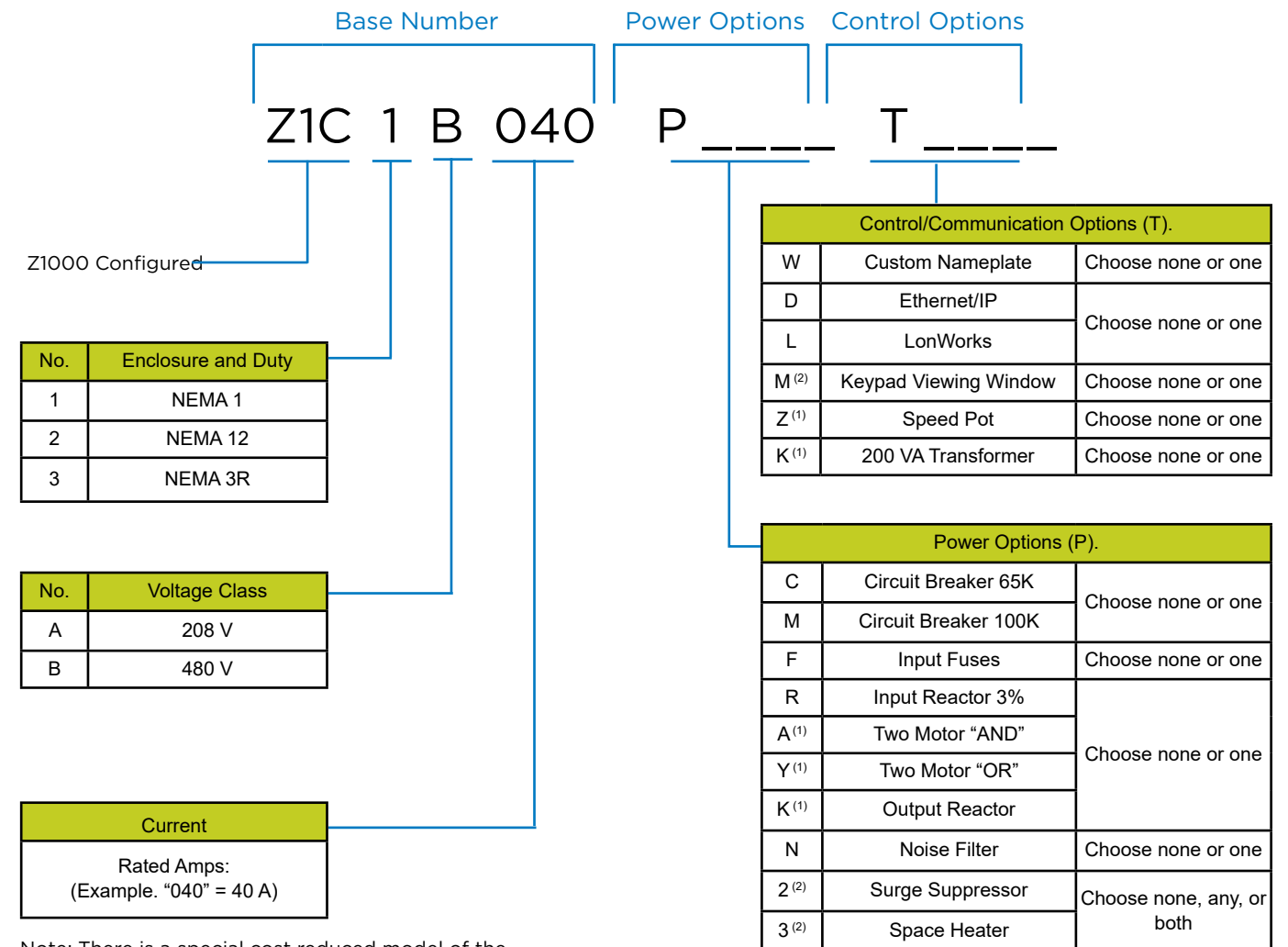
NEMA 12 Z1000 Configured



NEMA 3R Z1000 Configured

OPTIONS

- ▶ Circuit Breaker - (65K AIC or 100K AIC)
- ▶ Input Fuses
- ▶ Input Reactor
- ▶ Input Filter
- ▶ Custom Nameplate
- ▶ LonWorks
- ▶ EtherNet/IP



Note: There is a special cost reduced model of the 480 V, 52 A Configured Package, which is denoted by "52L"

(1) Type 12 and 3R enclosures only

(2) Type 3R enclosures only.

Note: Contact Yaskawa representative for possible exclusions.

Z1000 Configured Package

Models and Ratings

208V Models

Base No.: Z1Cx (x denotes enclosure type)		D002	D003	D004	D007	D010	D016	D024	D030	D046	D059			
Rated Output Current (A)		2.4	3.5	4.6	7.5	10.6	16.7	24.2	30.8	46.2	59.4			
Nominal HP		0.5	0.75	1	2	3	5	7.5	10	15	20			
Dimensions (in) and Weight (lb)	Type 1	Height	41.60				45.10			48.20				
		Width	6.77						10.18					
		Depth	12.92						13.19					
	Type 12	Height	65				75			85				
		Width	29.00						35.00			40.00		
		Depth	18.00						20.50			25.50		
	Type 3R	Height	140				200			260				
		Width	29.00						35.00			40.00		
		Depth	21.2						23.7			28.7		
Weight		140				200			260					

Base No.: Z1Cx (x denotes enclosure type)		D074	D088	D114	D143	D169	D211	D273	D343	D396			
Rated Output Current (A)		74.8	88.0	114.0	143.0	169.0	211.0	273	343	396			
Nominal HP		25	30	40	50	60	75	100	125	150			
Dimensions (in) and Weight (lb)	Type 1	Height	52.80				49.09			84.00			
		Width	12.68						28.41			41.50	
		Depth	14.20						20.87			34.00	
	Type 12	Height	150	155	160	360	370	385	450	1150	1300		
		Width	40.00	51.00			84.00			1250			
		Depth	25.50	33.00			41.50			1250			
	Type 3R	Height	17.3	22.8			32.0			1250			
		Width	260	395	465	800	910	1150	1200	1250	1250		
		Depth	40.00	51.00			91.00			1250			
Weight		28.7	39.0			41.3			1250				
Weight		260	395	465	800	910	1150	1200	1250	1250			

Note: Data subject to change.



NEMA 1



NEMA 12



NEMA 3R

Z1000 Configured Package

Models and Ratings

480V Models

Base No.: Z1Cx (x denotes enclosure type)		B001	B002	B003	B004	B007	B011	B014	B021	B027	B034	B040	B52L	B052	
Rated Output Current (A)		1.6	2.1	3.2	4.8	7.6	11.0	14.0	21.0	27.0	34.0	40.0	52.0	52.0	
Nominal HP		0.5 / 0.75	1	2	3	5	7.5	10	15	20	25	30	40	40	
Dimensions (in) and Weight (lb)	Type 1	Height	41.60				45.10			48.20			52.80		
		Width	6.77						10.18			12.68			
		Depth	12.92						13.19			14.20			
	Type 12	Height	65				75			85			150		
		Width	29.00						35.00			40.00			
		Depth	18.00						20.50			25.50			
	Type 3R	Height	140				200			260			260		
		Width	29.00						35.00			40.00			
		Depth	21.2						23.7			28.7			
Weight		140				200			260			260			

Base No.: Z1Cx (x denotes enclosure type)		B065	B077	B096	B124	B156	B180	B240	B302	B361	B414	B477	B590			
Rated Output Current (A)		65.0	77.0	96.0	124.0	156.0	180.0	240.0	302	361	414	477	590			
Nominal HP		50	60	75	100	125	150	200	250	300	350	400	500			
Dimensions (in) and Weight (lb)	Type 1	Height	52.80				42.79			49.09			84.00			
		Width	12.68						25.80			28.41			41.50	
		Depth	14.20						16.06			20.87			32.00	
	Type 12	Height	155	160	180	240	355	385	450	1150	1300	1400	1500	1600		
		Width	40.00	51.00			84.00			92.00			1600			
		Depth	25.50	33.00			41.50			41.50			1600			
	Type 3R	Height	17.50	23.00			32.50			32.00			1600			
		Width	260	435	465	505	795	895	1100	1200	1250	1500	1600	1600		
		Depth	40.00	51.00			91.00			91.00			1600			
Weight		39.0	41.3			66.3			66.3			1600				
Weight		260	21.50			50.50			46.50			43.50				
Weight		375	435	465	505	795	895	1100	1200	1250	1700	1900	1900			

Note: Data subject to change.



NEMA 1



NEMA 12



NEMA 3R

Z1000U HVAC Matrix Drive



Increase your green space with the Yaskawa HVAC Matrix Drive (Z1000U), the product that goes beyond conventional drives by combining excellent harmonic mitigation, input power factor control and energy saving capabilities.

The HVAC Matrix drive (Z1000U) provides extremely low harmonic distortion in a space-saving design, along with the same HVAC-specific features as the standard Z1000. This single component solution achieves excellent low distortion levels all by itself, completely without the need for additional countermeasures such as passive filters or multi-pulse arrangements. Unlike conventional drives, Yaskawa's matrix technology creates a variable output by switching directly from the input power (no DC bus). Not only does the Matrix drive provide outstanding harmonic performance, but being a member of the Z1000 family, it provides the same user experience for those already familiar with commissioning and maintaining the standard Z1000.

Primary Features and Benefits:

- Low Input Distortion Across a Wide Load and Speed Range
- IEEE-519 Compliant (<5% THD)
- Eco-Mode to Achieve Near Across-the-Line THD
- High Efficiency Design Provides Extra Energy Savings as Compared to Other Low Harmonic Solutions
- Near Unity True Power Factor at Full Load
- Integrated Input Fusing Provides 100kA SCCR
- Integrated C2 EMC Filter
- Compact Design
- High Reliability with an MTBF of 28 Years
- Embedded BACnet Communications (BTL Certified)
- Embedded Real Time Clock for Event Stamping
- High Carrier Frequency (Low Motor Noise) Capability
- 0-400 Hz Output Frequency
- 120% Overload for 60 Seconds
- Motor Auto-tuning
- Multi-language LCD Display, with Hand/Off/Auto and Copy function
- DriveWizard® HVAC Software
- Embedded Timer Functions for Starting, Stopping and Speed Changes
- Start into Spinning Load (Speed Search)
- Both Induction and Permanent Magnet Motor Control
- Available I/O:
 - (8) Multi-function digital inputs,
 - (3) Multi-function analog inputs,
 - (3) Multi-function relay outputs,
 - (2) Multi-function 0-10 VDC or 4-20 mA analog outputs,
 - (1) Fault relay

Power Range

- 208 - 240 V : 10 - 100 HP
- 380 - 480 V : 7.5 - 350 HP

Available Packages

- Bypass,
- Configured,

Enclosures

- Open Type (IP00)
- NEMA 1 Kit

APPLICATIONS

- ▶ Supply and Return Fans
- ▶ Cooling Tower Fans
- ▶ Chilled Water Pumps
- ▶ Chiller Compressors

Z1000U HVAC Matrix Drive

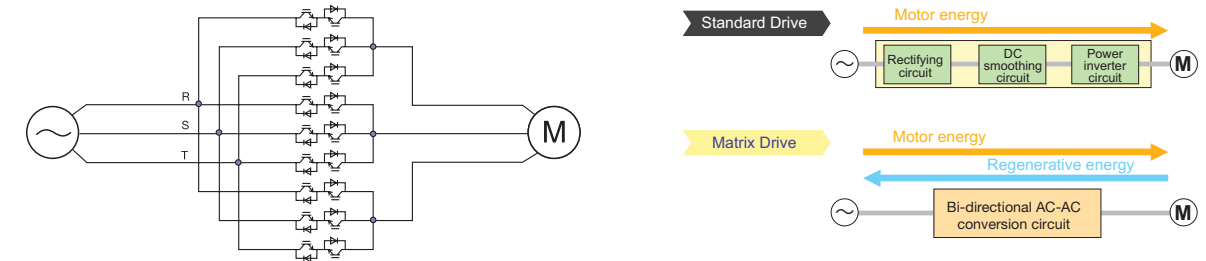
Matrix Innovation



Yaskawa's development of matrix converter technology in 2006 made it possible to overcome traditional issues caused by the harmonic distortion created by variable frequency drives. Further refinement of this technology has resulted in the Z1000U HVAC Matrix Drive.

How is Matrix Technology Different?

Matrix technology employs a system of 9 bi-directional switches that are arranged in a matrix to convert a three-phase AC input voltage directly into a three phase AC output voltage. It eliminates the need for a rectifying circuit and a DC smoothing circuit that are used in traditional AC drive "inverters". This results in a compact drive with power regenerative capability and reduced harmonic distortion.



Reduced Harmonic Distortion to Increase Power Quality

When a conventional AC drive converts power, the input current becomes distorted, resulting in reduced power quality. Matrix technology reduces total harmonic distortion levels to 5%, without the need for reactors and filters. The result is a smoother current waveform that reduces stress on the system power supply and infrastructure. Additionally, reduced distortion equals improved power factor and thus, reduced energy costs.

	Power Current Waveform Samples	Input Current Spectrums	Current Distortion	Power factor
AC drive without reactor			88%	0.75
AC drive with DC reactor			33%	0.90
Matrix Converter U1000			5%	0.98



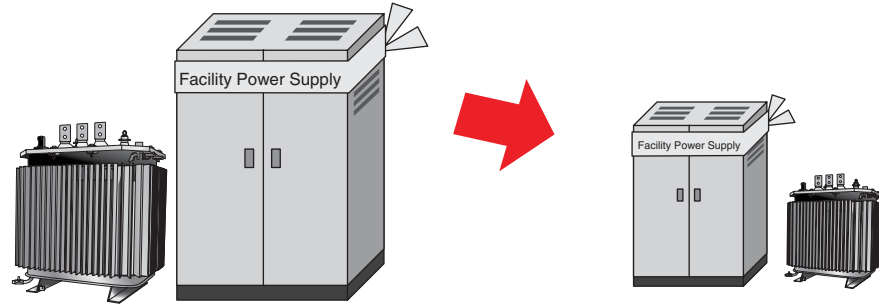
Z1000U HVAC Matrix Drive

Reduce Power Supply Capacity

The increased power factor enables the use of a lower power supply capacity, which reduces cost. Additional cost savings come from a reduction in wire sizes and generator capacity.

Conventional AC Drive
Power Factor = **0.75**
at rated current load

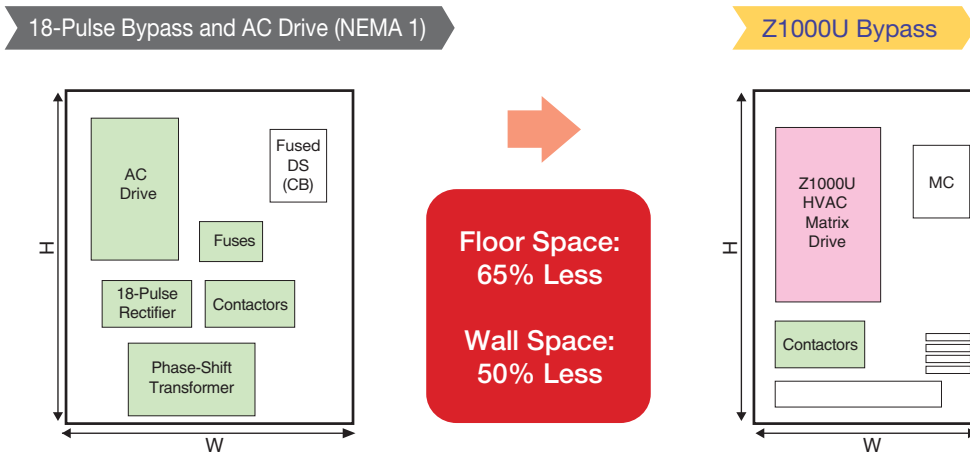
Z1000U Matrix Drive
Power Factor = **0.98**
at rated current load



Compact Design

Harmonic countermeasures that were previously required, such as input AC reactors, harmonic filter reactors, and capacitors, are not necessary, which helps you save wiring, space, and energy costs.

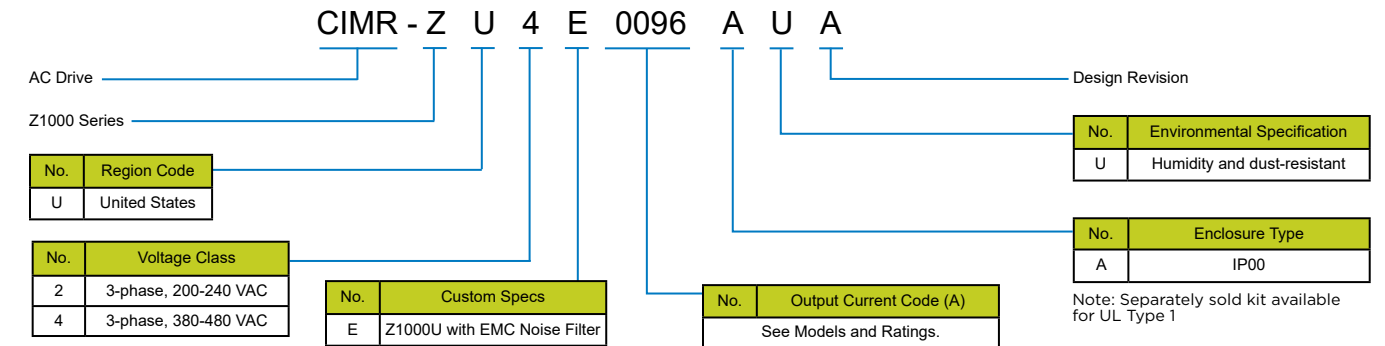
Integrating the attributes of multi-pulse into one compact package dramatically reduces cabinet space.



HP	18 Pulse Bypass			Z1000U Bypass		
	H	W	D	H	W	D
50	78.7	31.5	33.2	62	20	19
125	79	64	35	74	35	21

Z1000U HVAC Matrix Drive

Model Number Designation



Models and Ratings

208 - 240V Class

CIMR-ZU2E AUA	0028	0042	0054	0068	0081	0104	0130	0154	0192	0248
Rated Output Current (A)	28	42	54	68	81	104	130	154	192	248
Nominal HP 240V (208V)	10 (7.5)	15 (10)	20 (15)	25 (20)	30 (25)	40 (30)	50 (40)	60 (50)	75 (60)	100 (75)
Dim (in)	Height	19	26			32		39		45
	Width	10	10			10		16		19
	Depth	14	17			18		16		18
Heat Loss (W)	Weight (lb)	46	73		79		139		254	
	Heatsink	659	854	1037	1295	1420	1696	2157	2441	3064
	Internal	103	168	195	225	238	282	341	366	447
Total	762	1022	1232	1520	1658	1978	2498	2807	3511	4363

480V Class

CIMR-ZU4E AUA	0011	0014	0021	0027	0034	0040	0052	0065	0077	
Rated Output Current (A)	11	14	21	27	34	40	52	65	77	
Nominal HP	7.5	10	15	20	25	30	40	50	60	
Dim (in)	Height	19			26		26			
	Width	10			10		10			
	Depth	14			17		17			
Heat Loss (W)	Weight (lb)	46			73		79			
	Heatsink	452	459	641	675	798	877	1109	1369	1479
	Internal	80	79	105	106	124	174	209	240	251
Total	532	538	746	781	922	1051	1318	1609	1730	

CIMR-ZU4E AUA	0096	0124	0156	0180	0216	0240	0302	0361	0414
Rated Output Current (A)	96	124	156	180	216	240	302	361	414
Nominal HP	75	100	125	150	175	200	250	300	350
Dim (in)	Height	32		39		45		45	
	Width	10		16		19		27	
	Depth	18		16		18		18	
Heat Loss (W)	Weight (lb)	139		254		399		589	
	Heatsink	1715	2256	2857	3316	3720	3897	5202	5434
	Internal	290	362	421	482	587	600	857	863
Total	2005	2618	3278	3798	4307	4497	6059	6297	7456

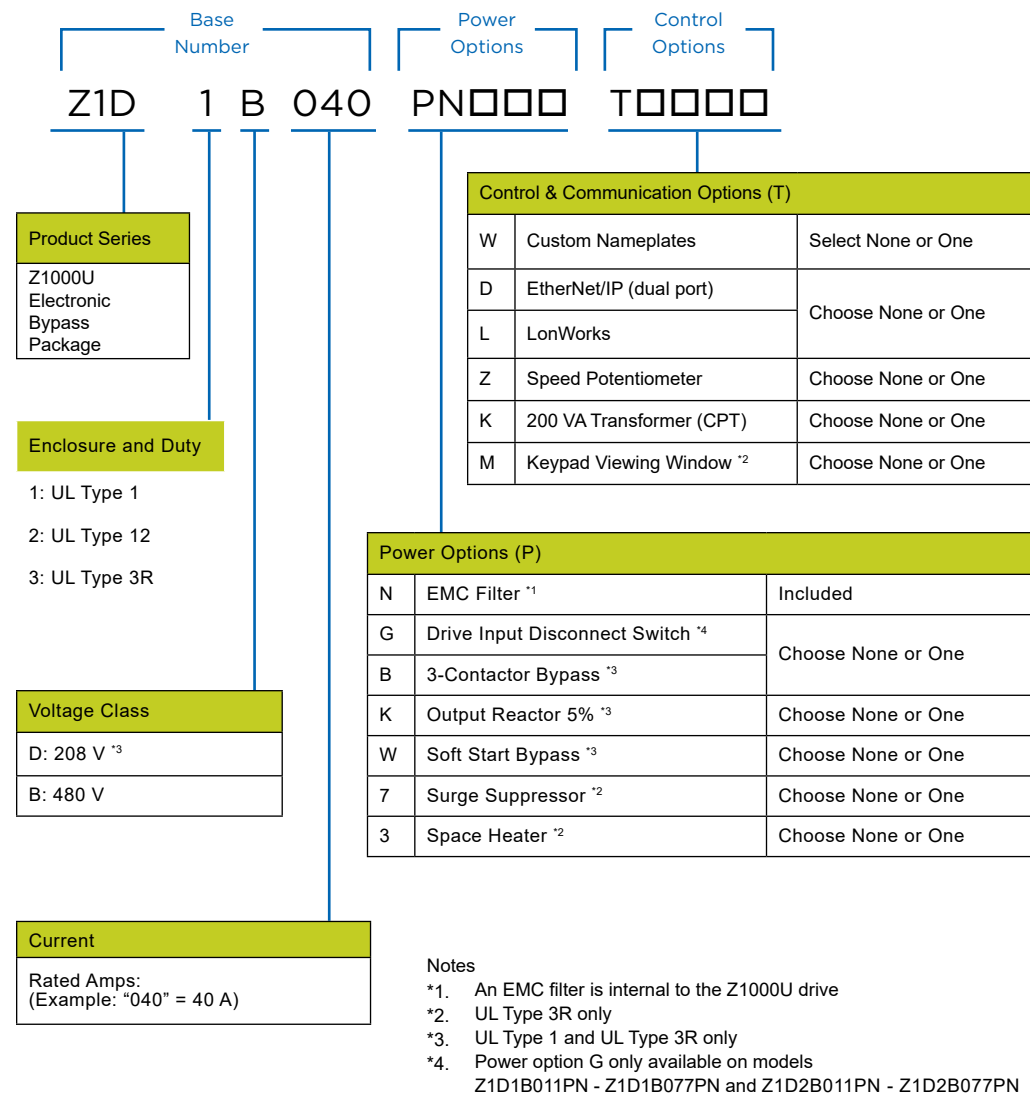
Note: Data subject to change.

Z1000U Enclosed Electronic Bypass

Matrix VFD packages with electronic bypass for low harmonics and IEEE 519 compliance

How to Select a Z1000U Enclosed Electronic Bypass Package

To construct an Enclosed Electronic Bypass model number, find the base number for the required enclosure type, voltage, and current rating. Add the option code for each required option. Power options are preceded by 'PN', control options are preceded by 'T'.



UL Type 3R, UL Type 12, and UL Type 1 Matrix Drive Packages

Features

- Facilitates IEEE 519 compliance
- Electronic bypass
- 100 kAIC package rating
- Lockable main input disconnect switch
- Standard digital inputs
 - Run
 - Safety
 - BAS interlock
 - Auto transfer to bypass
 - Emergency override
- (3) Programmable digital inputs
- (4) Form C programmable relays
- Built-in communications
 - BACnet
 - APOGEE
 - Metasys
 - Modbus
- HOA Keypad
- Flash upgradeable firmware

Options

- Drive input service switch
- 3-contactor bypass
- Output Reactor
- Soft start bypass
- Surge Suppressor
- Space Heater
- Custom nameplate
- LonWorks
- EtherNet/IP
- BACnet/IP
- Speed pot
- 200 VA transformer
- Keypad viewing window

Z1000U Enclosed Electronic Bypass

Models and Ratings

208 VAC Models

Base No.: Z1D□□□□□		024	030	046	059	074	088	114	143	169	211	
Rated Output Current (A)		28	42	54	68	81	104	130	154	192	248	
Nominal HP		7.5	10	15	20	25	30	40	50	60	75	
Physical Size	UL Type 1 Z1D1D□□□□	Height	48.0	60.0	60.0	60.0	60.0	60.0	60.0	86.0	86.0	86.0
		Width	22.0	22.0	22.0	22.0	22.0	30.0	30.0	41.0	41.0	41.0
		Depth	18.0	22.0	22.0	22.0	22.0	20.0	20.0	32.0	32.0	32.0
		Weight	230	325	340	350	350	465	475	825	825	1050
	UL Type 3R Z1D3D□□□□	Height	38.0	44.9	44.9	44.9	44.9	54.2	54.2	92.0	92.0	92.0
		Width	28.5	31.3	31.3	31.3	31.3	35.0	35.0	41.3	41.3	41.3
		Depth	20.8	23.2	23.2	23.2	23.2	24.4	24.4	47.4	47.4	47.4
		Weight	201	260	269	277	290	435	452	948	943	1128

Note: UL Type 3R package dimensions (Z1D3D) represent approximate dimensions for a package without power option K, W, 3 and control option K selected. For the dimensions of a specific Z1D3D configuration, reference PD.Z1000.01.

480 VAC Models

Base No. : Z1D□B□□□□		011	014	021	027	034	040	052	065	077	096	124	156	180	240	302	361	414
Rated Output Current (A)		11	14	21	27	34	40	52	65	77	96	124	156	180	240	302	361	414
Nominal HP		7.5	10	15	20	25	30	40	50	60	75	100	125	150	200	250	300	350
Physical Size	UL Type 1 Z1D1B□□□□	Height	48.0	48.0	48.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	86.0	86.0	86.0	86.0	86.0	86.0
		Width	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	30.0	30.0	41.0	41.0	41.0	70.0	70.0
		Depth	18.0	18.0	18.0	22.0	22.0	22.0	22.0	22.0	22.0	20.0	20.0	32.0	32.0	32.0	31.0	31.0
		Weight	220	230	230	300	300	315	350	360	375	475	490	850	900	1100	1600	1750
	UL Type 12 Z1D2B□□□□	Height	40.2	40.2	40.2	40.2	47.0	47.0	47.0	47.0	56.2	56.2	84.0	84.0	-	-	-	-
		Width	23.3	23.3	23.3	23.3	27.3	27.3	27.3	27.3	33.3	33.3	37.9	37.9	-	-	-	-
		Depth	19.1	19.1	19.1	19.1	21.6	21.6	21.6	21.6	21.6	27.0	27.0	26.9	26.9	-	-	-
		Weight	217	218	218	220	279	308	312	326	327	497	501	923	938	-	-	-
	UL Type 3R Z1D3B□□□□	Height	38.0	38.0	38.0	38.0	38.0	44.9	44.9	44.9	54.2	54.2	92.0	92.0	92.0	93.5	93.5	93.5
		Width	28.5	28.5	28.5	28.5	28.5	31.3	31.3	31.3	35.0	35.0	41.3	41.3	41.3	66.3	66.3	
		Depth	20.8	20.8	20.8	20.8	20.8	23.2	23.2	23.2	23.2	24.4	24.4	47.4	47.4	47.4	48.2	
		Weight	199	200	203	203	209	268	269	289	290	438	453	954	951	1148	1656	

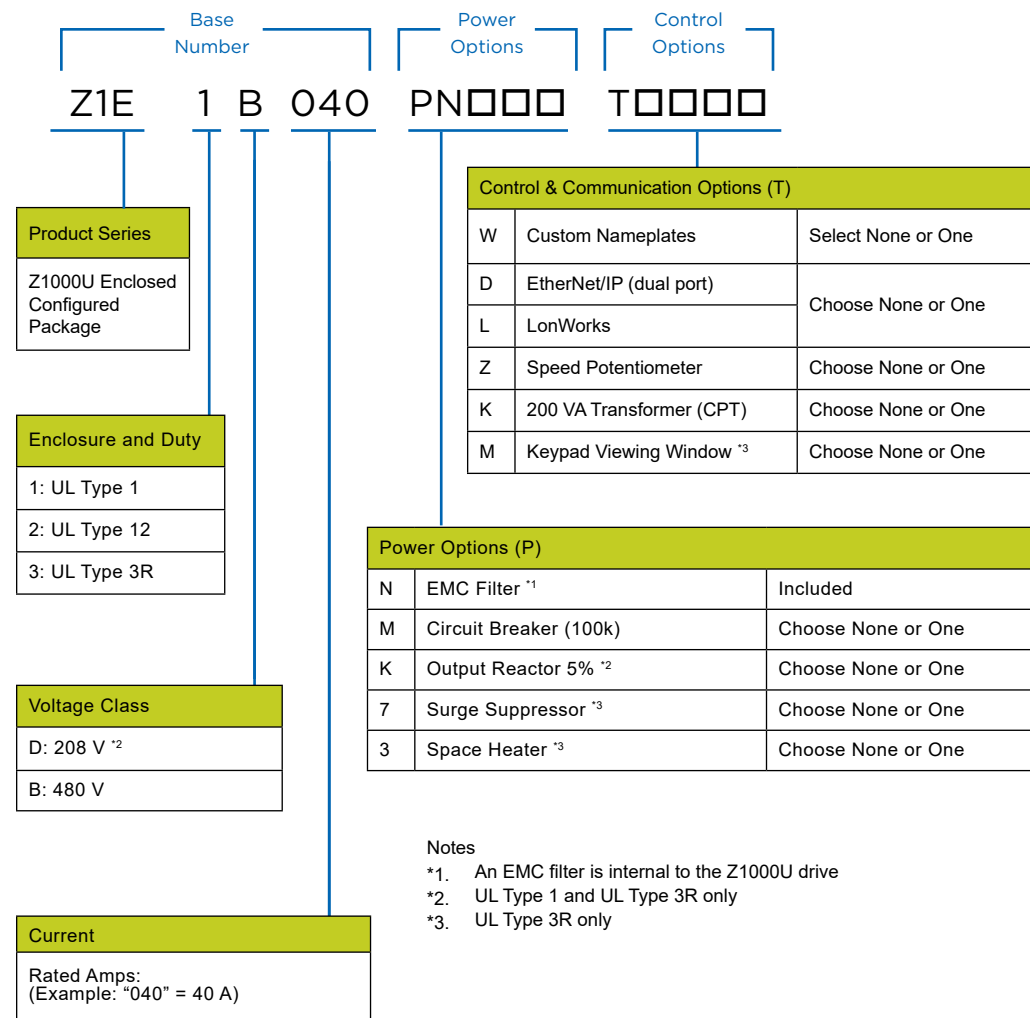
Note: UL Type 3R package dimensions (Z1D3B) represent approximate dimensions for a package without power option K, W, 3 and control option K selected. For the dimensions of a specific Z1D3B configuration, reference PD.Z1000.02.

Z1000U Enclosed Configured

Matrix VFD packages with features & options to achieve low harmonics and IEEE 519 compliance

How to Select a Z1000U Enclosed Configured Package

To construct an Enclosed Configured model number, find the base number for the required enclosure type, voltage, and current rating. Add the option code for each required option. Power options are preceded by 'PN', control options are preceded by 'T'.



UL Type 3R, UL Type 12, and UL Type 1 Matrix Drive Packages

Features

- Facilitates IEEE 519 compliance
- Lockable main input disconnect switch
- PID control with selectable engineering units
- Independent PID control for use with external device
- Differential PID feedback feature
- Sleep function
- 24 VDC, 150 mA power supply
- Input and output status indication
- Serial communication loss detection and selectable response
- Built-in communications
 - BACnet
 - APOGEE
 - Metasys
 - Modbus
- HOA Keypad
- Flash upgradeable firmware
- Bumpless transfer between Hand and Auto Modes

Options

- Lockable Input Circuit Breaker
- Output Reactor
- Surge Suppressor
- Space Heater
- Custom nameplate
- LonWorks
- EtherNet/IP
- BACnet/IP
- Speed pot
- 200 VA transformer
- Keypad viewing window

Z1000U Enclosed Configured

Models and Ratings

208 VAC Models

Base No. : Z1E□□□□□		024	030	046	059	074	088	114	143	169	211	
Rated Output Current (A)		28	42	54	68	81	104	130	154	192	248	
Nominal HP		7.5	10	15	20	25	30	40	50	60	75	
Physical Size	UL Type 1 Z1E1□□□□□	Height	48.0	60.0	60.0	60.0	60.0	60.0	60.0	86.0	86.0	86.0
		Width	22.0	22.0	22.0	22.0	22.0	30.0	30.0	41.0	41.0	41.0
		Depth	18.0	22.0	22.0	22.0	22.0	20.0	20.0	32.0	32.0	32.0
		Weight	210	300	305	315	315	420	430	745	745	945
	UL Type 3R Z1E3□□□□□	Height	38.0	44.9	44.9	44.9	44.9	54.2	54.2	92.0	92.0	92.0
		Width	28.5	31.3	31.3	31.3	31.3	35.0	35.0	41.3	41.3	41.3
		Depth	20.8	23.2	23.2	23.2	23.2	24.4	24.4	47.4	47.4	47.4
		Weight	194	253	257	265	272	410	428	900	906	1068

Note: UL Type 3R package dimensions (Z1E3D) represent approximate dimensions for a package without power option K, 3 and control option K selected. For the dimensions of a specific Z1E3D configuration, reference PD.Z1000.05.

480 VAC Models

Base No. : Z1E□B□□□□		011	014	021	027	034	040	052	065	077	096	124	156	180	240	302	361	414	
Rated Output Current (A)		11	14	21	27	34	40	52	65	77	96	124	156	180	240	302	361	414	
Nominal HP		7.5	10	15	20	25	30	40	50	60	75	100	125	150	200	250	300	350	
Physical Size	UL Type 1 Z1E1B□□□□□	Height	48.0	48.0	48.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	86.0	86.0	86	86	86	86	
		Width	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	30.0	30.0	41.0	41.0	41	70	70	70
		Depth	18.0	18.0	18.0	22.0	22.0	22.0	22.0	22.0	22.0	20.0	20.0	32.0	32.0	32	31	31	31
		Weight	200	210	210	270	270	285	315	325	340	425	440	765	810	990	1440	1575	1620
	UL Type 12 Z1E2B□□□□□	Height	40.2	40.2	40.2	40.2	47.0	47.0	47.0	47.0	56.2	56.2	84.0	84.0	-	-	-	-	
		Width	23.3	23.3	23.3	23.3	27.3	27.3	27.3	27.3	33.3	33.3	37.9	37.9	-	-	-	-	
		Depth	19.1	19.1	19.1	19.1	21.6	21.6	21.6	21.6	27.0	27.0	26.9	26.9	-	-	-	-	
		Weight	214	214	215	215	269	296	300	308	311	481	485	888	897	-	-	-	-
	UL Type 3R Z1E3B□□□□□	Height	38.0	38.0	38.0	38.0	38.0	44.9	44.9	44.9	54.2	54.2	92.0	92.0	92	93.5	93.5	93.5	
		Width	28.5	28.5	28.5	28.5	28.5	31.3	31.3	31.3	35.0	35.0	41.3	41.3	41.3	66.3	66.3	66.3	
		Depth	20.8	20.8	20.8	20.8	20.8	23.2	23.2	23.2	24.4	24.4	47.4	47.4	47.4	48.2	48.2	48.2	
		Weight	193	193	196	196	198	257	257	271	272	414	429	903	909	1069	1586	1604	1622

Note: UL Type 3R package dimensions (Z1E3B) represent approximate dimensions for a package without power option K, 3 and control option K selected. For the dimensions of a specific Z1E3B configuration, reference PD.Z1000.06.

We take quality personally at Yaskawa. Our drives and servo packages offer the highest MTBF in the world. The relationships we have with our customers ensure mutual benefits. The partnerships we cultivate with our distributors add value to the way we work with you. We hire great people and continuously train them to be able to serve your needs better. We deliver product on time. It works out of the box.

We answer questions promptly and never say, "we can't."

To us, quality means doing everything we can to make our customer, partner, and employee experiences great.

We commit to that philosophy every day. We make it happen.
We can because, to us, IT'S PERSONAL.

IT'S PERSONAL
YASKAWA

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