

Features and Benefits

Exceptional Quality

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.

In addition, the P1000 is designed for use around the world, and carries agency certifications for all major geographical regions



Easy to Apply and Maintain

The P1000 is supported by user-friendly configuration tools. For local field access, the keypad interface features a multi-language LCD display, parameter storage, and application presets to make programming a simple task. It also has built-in memory for backup purposes. In addition, a USB Copy Unit can be loaded with a drive's program for convenient portable transfer of configuration between an office environment and the factory floor.



USB Copy Unit



HVAC



Fan



Pump

Fan and Pump Application Presets

Start-up time has been reduced with preprogrammed application presets that allow for simple and easy start-up by answering simple motor and application information.

Application Presets: General Purpose;
Pump & Pump with PI Feedback Control;
Fan & Fan with PI Feedback Control



DriveWizard® computer software delivers configuration, monitoring, and trending functions enhanced by direct connectivity through the P1000's standard USB port.

- Online and Offline Editing
- Application Wizard
- Monitoring and Diagnostic Panels
- Trend Recorder and Playback
- Network Configurator
- Multidrive Support
- Drive Flash Support
- Project Converter
- Report and Export Generation
- Search Engine



Features and Benefits

Easy to Apply and Maintain

Real Time Clock (RTC)

Take advantage of the battery-backed clock that's built into the P1000's keypad display. With this feature, the P1000 can be controlled based on time of day, and can also provide time-stamped event information.



PI Process Control

Two separate process control loops are embedded in the P1000. One modifies drive speed based on setpoint and sensor feedback. A second control loop (with its own setpoint and feedback inputs) can be output to control something completely independent of the drive. Additionally, the P1000 provides a 24VDC, 150mA supply for applying power to sensors.



Selectable and User-Customizable Engineering Units

Allow for easy configuration of keypad display to match process and feedback devices such as PSI, GPM, Feet.

Preventative Maintenance Monitors

Maximize production and intelligently schedule your maintenance by making use of the P1000's special monitors that provide alarm information when a drive requires attention. Use this information to trigger discrete outputs or send the status across a network for upper level decision making.

- Cooling Fan Remaining Life
- IGBT (Power Module) Remaining Life
- Bus Capacitor Remaining Life
- Precharge Relay
- Drive (Heatsink) Temperature



Easy to Apply and Maintain

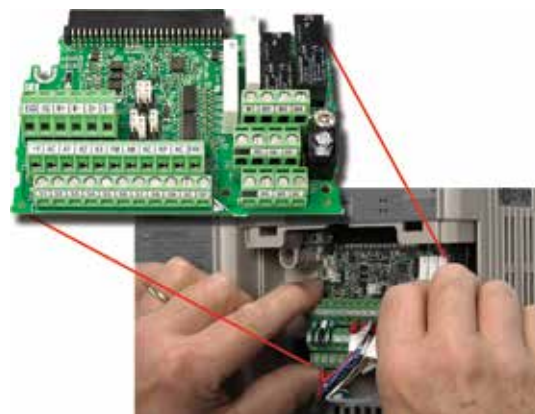
Highly Reliable and Easily Replaceable Cooling Fans

- Improved location for convenient access, even when mounted with heatsink external
- No tools required
- All ratings are 24Vdc powered



Removeable I/O Terminal Board with Drive Backup Memory

- All parameter changes automatically saved to both main control board and I/O board
- Leave I/O connected when replacing a drive
- Configuration is downloaded to replacement drive
- Reduces MTTR (Mean Time To Repair)



Underload Detection

Monitors the load and will stop the system in the event of a fan belt or pump shaft failure.

Dynamic Noise Control

Monitors the load at all times and reduces the output voltage automatically, reducing motor audible noise.

Features and Benefits

Maximum Flexibility

Enjoy a significant amount of standard control points. The P1000 can also expand to support popular communication networks.



Standard I/O and Communications

- Digital Inputs (8)
- Analog Inputs (3)
- Pulse Inputs (1)
- Digital Outputs (4)
- 2 Form C Relays
- 2 Form A Relays
- Analog Outputs (2)
- RS485 Modbus RTU Communication



Expansion Capability

- Analog Output Module (3 additional outputs)
- DeviceNet
- EtherNet/IP (Single and Dual Port)
- Modbus TCP/IP (Single and Dual Port)
- PROFIBUS-DP
- PROFINET
- BACnet
- Lonworks
- Metasys (N2)
- Apogee (P1)
- MECHATROLINK-II
- MECHATROLINK-III

Auxiliary Control Power Input

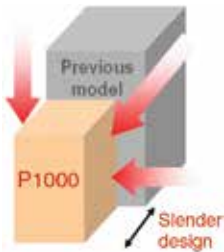
Keep your drives communicating over the network, even while main power is removed. The Auxiliary Control Power Input uses facility supplied 24Vdc to keep the drive's control and communication intact. Service your drive cabinets with the benefit of live control and communications without the need for main power and associated Arc Flash protection.



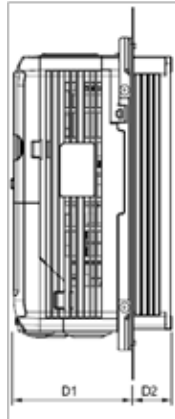
Maximum Flexibility

Space Saving Features

The P1000 offers world class power density resulting in an average size reduction of 30% as compared to previous generations (see individual rating dimensions). In addition, even more cabinet space can be saved by taking advantage of External Heatsink Mounting and Zero Side Clearance capability.



Physical Size Reduction



External Heatsink Solution
(Side View)



Zero Side Clearance
(40°C max ambient)

Type 12 Flange Configuration

P1000 is available in all ratings as a Type 12 Flange configuration that allows for mounting the drive with its heatsink out the back of any Type 12 enclosure. This allows for the majority of the drive's heat to dissipate on the external side, while keeping the enclosure small and sealed with Type 12 integrity.

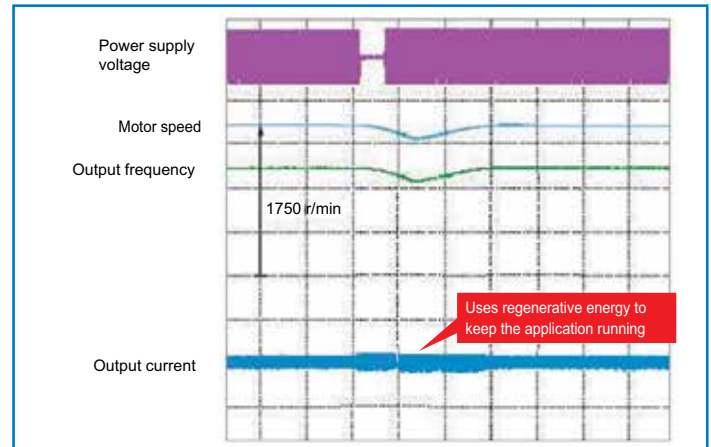


Features and Benefits

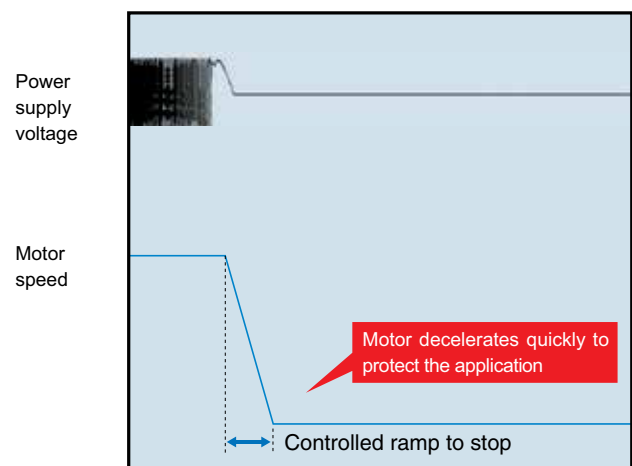
Trip-free Operation

Keep your applications running with features designed to avoid interruptions that are typical with demanding load conditions.

- Optimal Decel automatically extends the programmed deceleration time based on the load condition and drive capability.
- Overvoltage Suppression limits the DC bus voltage by modulating output frequency to keep the drive out of the regenerative region.
- Overload Fault Prevention responds to heavy load conditions by adjusting output frequency and voltage to keep the drive's current within operating limits.
- Momentary Power Loss Ride-Thru puts the drive in standby mode during transient power losses and then automatically restarts, avoiding potentially costly power related shut down conditions.
- Bi-directional speed search allows the drive to start into a rotating load by quickly sensing the speed and direction of the motor and then seamlessly matching the drive's output.
- For applications that can dissipate losses in the motor, Over-Excitation Braking and High Slip Braking are good-performing, money-saving alternatives to dynamic braking.
- In the event of a power loss, Kinetic Energy Braking uses energy stored in the rotating load to keep the drive powered and bring the process to a controlled stop.



Speed Search



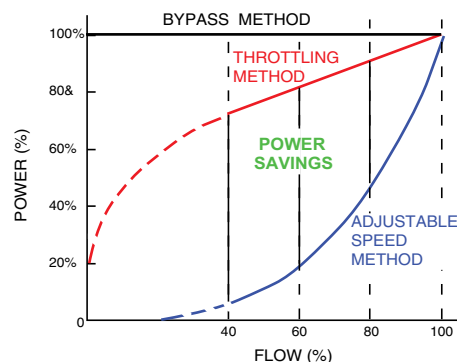
Kinetic Energy Braking

Environmental

Reduce your energy bill and contribute towards a cleaner environment with sustainable features designed into the P1000.

Energy Savings Benefits of Variable Speed

Using variable speed on pumps and fans results in very large energy savings as compared to other fluid or air control methods (valves, guide vanes, dampers, etc.). Additionally, the P1000 provides even greater savings with its Energy Saving Control that reduces unnecessary magnetizing current at reduced speeds.

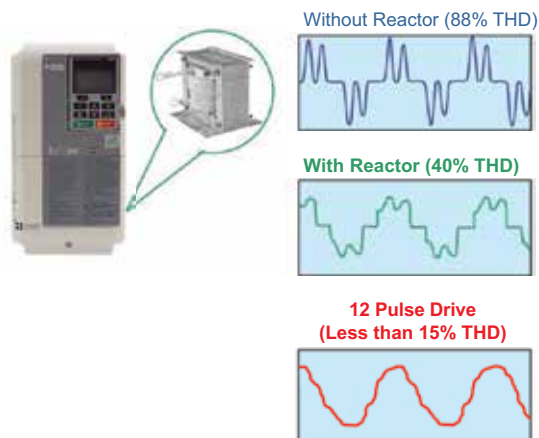


Comparison of Power Requirements for Variable Speed and Throttling method

Power Quality Conscious

Built-in DC reactors (30 HP and larger) provide input harmonics benefit, and protection from input disturbances.

To further reduce harmonics reflected back to the utility power line, the P1000 is available with an integrated 12-pulse diode bridge from 40 to 1000 HP @ 480VAC (also requires the use of an external phase-shifting transformer).



Product Life Cycle Responsibility

The future of our environment and the earth's natural resources is very important to Yaskawa. The P1000 has been designed to minimize the use of harmful materials (e.g. lead, mercury, cadmium, etc.) and meets the requirements of RoHS (Restriction of Hazardous Substances)



Specifications

240V Class

Model CIMR-PU2A			0004	0006	0008	0010	0012	0018	0021	0030	0040	0056
Max. Applicable Motor Capacity ^{*1}		HP	0.75	1.5	2	3	3	5	7.5	10	15	20
Input	Rated Input Current ^{*2}	A	3.9	7.3	8.8	10.8	13.9	18.5	24	37	52	68
Output	Rated Output Capacity ^{*4,*5}	kVA	1.3	2.3	3	3.7	4.6	6.7	8	11.4	15.2	21
	Rated Output Current ^{*5}	A	3.5	6	8	9.6	12	17.5	21	30	40	56
	Overload Tolerance		120% of rated output current for 60 sec.									
	Carrier Frequency (User Adjustable)		2 to 15 kHz									
	Max. Output Voltage		Three-phase 200 to 240 V (relative to input voltage)									
	Max. Output Frequency		400 Hz									
Power	Rated Voltage/Rated Frequency		Three-phase 200 to 240 Vac 50/60 Hz 270 to 340 Vdc ^{*3}									
	Allowable Voltage Fluctuation		-15% to +10%									
	Allowable Frequency Fluctuation		±5%									
	Fan		No fan						With fan			
	DC Link Choke		External Option									
	Power Supply		kVA	2.2	3.1	4.1	5.8	7.8	9.5	14	18	27

Model CIMR-PU2A			0069	0081	0110	0138	0169	0211	0250	0312	0360	0415	
Max. Applicable Motor Capacity ^{*1}		HP	25	30	40	50	60	75	100	125	150	175	
Input	Rated Input Current ^{*2}	A	80	96	111	136	164	200	271	324	394	471	
Output	Rated Output Capacity ^{*4,*5}	kVA	26	31	42	53	64	80	95	119	137	158	
	Rated Output Current ^{*5}	A	69	81	110	138	169	211	250	312	360	415	
	Overload Tolerance	120% of rated output current for 60 sec.											
	Carrier Frequency (User Adjustable)	2 to 15 kHz						2 to 10 kHz					
	Max. Output Voltage	Three-phase 200 to 240 V (relative to input voltage)											
	Max. Output Frequency	400 Hz (user-set)											
Power	Rated Voltage/Rated Frequency	Three-phase 200 to 240 Vac 50/60 Hz 270 to 340 Vdc ^{*3}											
	Allowable Voltage Fluctuation	-15% to +10%											
	Allowable Frequency Fluctuation	±5%											
	Fan	With fan											
	DC Link Choke	External Option			Included								
	Power Supply	kVA	44	52	51	62	75	91	124	148	180	215	

*1. The motor capacity (HP) refers to a NEC rated 4-pole motor. The rated output current of the drive output amps should be equal to or greater than the motor current. Select the appropriate capacity drive if operating the motor continuously above motor nameplate current.

*2. Assumes operation at the rated output current. Input current rating varies depending on the power supply transformer, input reactor, wiring connections, and power supply impedance.

*3. Direct application of DC power is not presently supported by the P1000's UL listing.

*4. Rated motor capacity is calculated with a rated output voltage of 230V.

*5. Carrier frequency is set to 2 kHz. Current derating is required in order to raise the carrier frequency.

Common Specifications

Item		Specifications
Control Characteristics	Control Methods	V/f Control (V/f)
	Frequency Control Range	0.01 to 400 Hz
	Frequency Accuracy (Temperature Fluctuation)	Digital input: within $\pm 0.01\%$ of the max output frequency (-10 to +40 °C) Analog input: within $\pm 0.1\%$ of the max output frequency (25 °C ± 10 °C)
	Frequency Setting Resolution	Digital inputs: 0.01 Hz Analog inputs: 1/2048 of the maximum output frequency setting (11 bit plus sign)
	Output Frequency Resolution	0.001 Hz
	Frequency Setting Methods	0 to +10 V, 4 to 20 mA, Pulse Train Input, Network Communications, Keypad
	Starting Torque ^{<1>}	V/f: 150% at 3 Hz
	Speed Control Range ^{<1>}	V/f: 1:40
	Accel/Decel Time	0.0 to 6000.0 s (4 selectable combinations of independent acceleration and deceleration settings)
	V/f Characteristics	User-selected programs and V/f preset patterns possible
Protection Function	Main Control Functions	Momentary Power Loss Ride-Thru, Speed Search, Overtorque/Undertorque Detection, 17 Step Speed (max), Accel/decel Switch, S-curve Accel/decel, 3-wire Sequence, Auto-tuning (rotational, stationary tuning), Dwell, Cooling Fan on/off Switch, Slip Compensation, Torque Compensation, Frequency Jump, Upper/lower Limits for Frequency Reference, DC Injection Braking at Start and Stop, Overexcitation Braking, High Slip Braking, PID Control (with sleep function), Energy Saving Control, Modbus Comm. (RS-422/485 max, 115.2 kbps), Fault Restart, Application Presets, Removable Terminal Block with Parameter Backup Function, Dynamic Noise Control.
	Motor Protection	Electronic thermal overload relay
	Momentary Overcurrent Protection	Drive stops when output exceeds 170%
	Overload Protection	Drive stops after 60 seconds at 120% of rated output current ^{<2>}
	Overvoltage Protection	240V class: Faults when DC bus voltage exceeds approx. 410 V; 480V class: Faults when DC bus voltage exceeds approx. 820 V; 600V class: Faults when DC bus voltage exceeds approx. 1040 V.
	Undervoltage Protection	240V class: Faults when DC bus voltage falls below approx. 190 V; 480V class: Faults when DC bus voltage falls below approx. 380 V; 600V class: Faults when DC bus voltage falls below approx. 475 V.
	Momentary Power Loss Ride-Thru	Stops modulating after 15 ms or longer power loss ^{<3>} . Resumes operation if power loss is less than 2 s (standard) ^{<4>}
	Heatsink Overheat Protection	Thermistor
	Stall Prevention	Stall Prevention is available during acceleration, deceleration, and during run.
	Ground Fault Protection	Electronic circuit protection ^{<5>}
Operating Environment	Charge LED	Remains lit until DC bus voltage falls below 50 V
	Area of Use	Indoors
	Ambient Temperature	-10 to +50°C (Chassis Installation) -10 to +40°C (Chassis with zero side clearance, or Type 1)
	Humidity	95% RH or less (no condensation)
	Storage Temperature	-20 to +60°C (short-term temperature during transportation)
	Altitude	Up to 1000 meters without derating, up to 3000 m with output current and voltage derating
	Shock	10 to 20 Hz: 9.8 m/s ² 20 to 55 Hz: 5.9 m/s ² (2A0004 to 2A0211, 4A0002 to 4A0165, and 5A0003 to 5A0032) 2.0 m/s ² (2A0250 to 2A0415 and 4A0208 to 4A0675)
Standards and Certifications		UL 508C, CSA C22.2, EN 61800-5-1
Protection Design		IP00 enclosure, IP20/NEMA Type 1 enclosure ^{<6>}

<1> The accuracy of these values depends on motor characteristics, ambient conditions, and drive settings. Specifications may vary with different motors and with changing motor temperature. Contact Yaskawa for consultation.

<2> Overload protection may be triggered when operating with 150% of the rated output current if the output frequency is less than 6 Hz.

<3> May be shorter due to load conditions and motor speed.

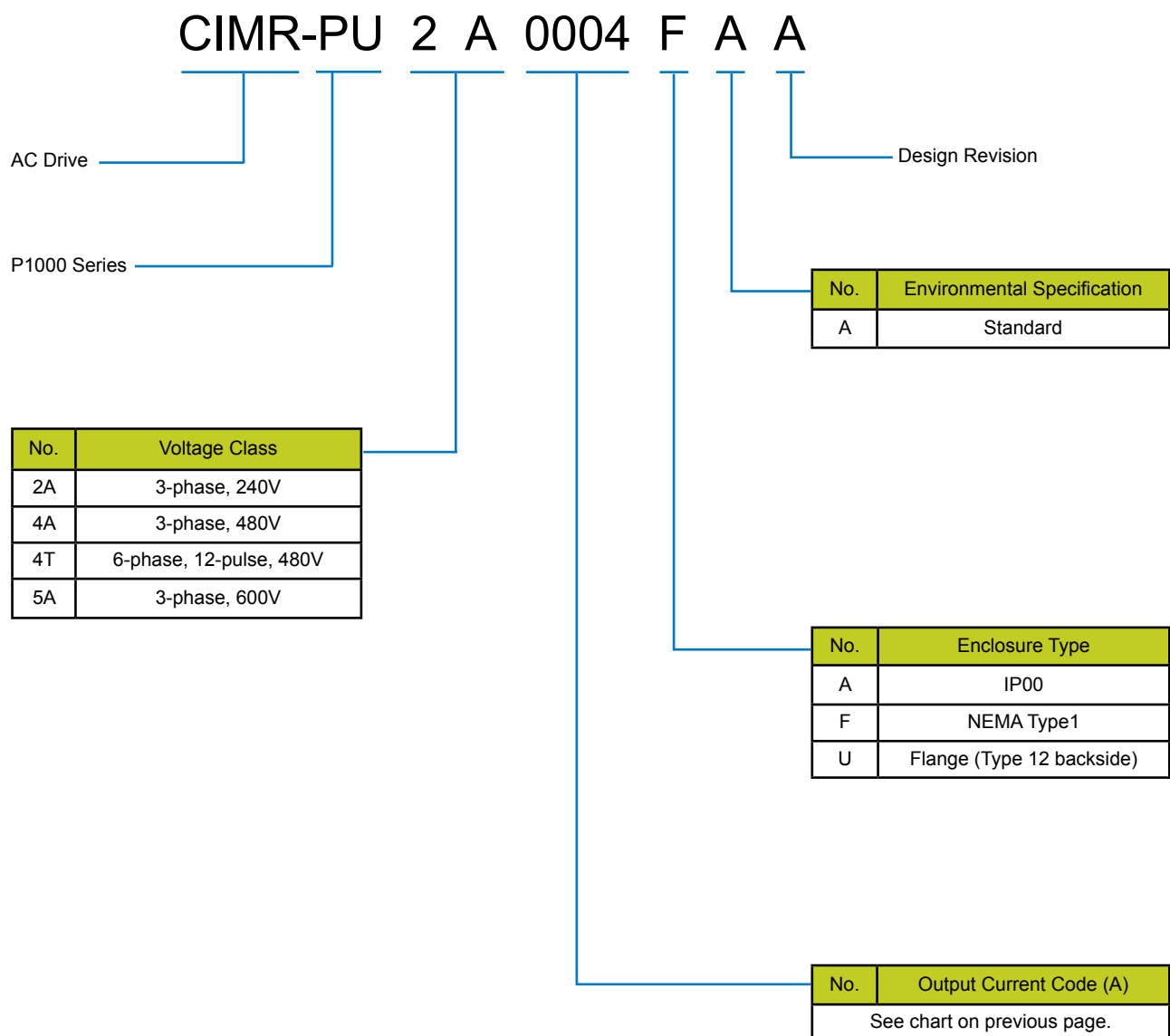
<4> A separate Momentary Power Loss Ride-Thru Unit is required for models 2A0004 to 2A0056, 4A0002 to 4A0031, and 5A0003 to 5A0032 if the application needs to continue running for up to 2 seconds during a momentary power loss.

<5> Ground protection cannot be provided when the impedance of the ground fault path is too low, or when the drive is powered up while a ground fault is present at the output.

<6> Removing the top protective cover or bottom conduit bracket from an IP20/NEMA Type 1 enclosure drive voids NEMA Type 1 protection while maintaining IP20 conformity. This is applicable to models 2A0004 to 2A0211, 4A0002 to 4A0165, and 5A0003 to 5A0032.

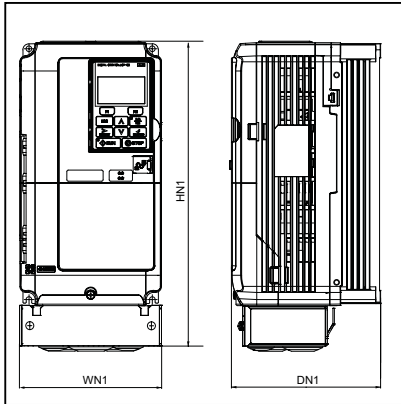
Drive Selection

Model Number Key



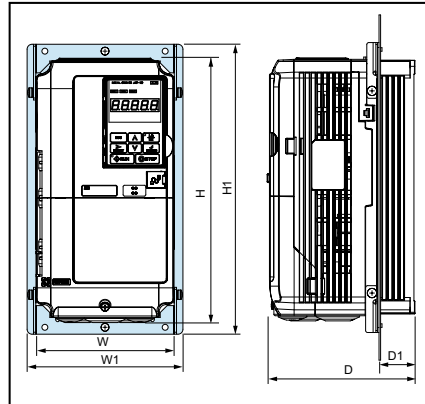
Drive Dimensions

NEMA Type 1 [IP20] Diagram



P1000 with NEMA Type 1 Kit Installed

Protected Chassis/External Heatsink Diagram



P1000 Protected Chassis / External Heatsink Configuration

Notes:

1. The diagrams shown are simplified dimensional diagrams designed to display key outer dimensions of the drive. They are meant for planning purposes only. For more detailed dimensional/mounting data, please refer to the P1000 dimensional drawings on www.yaskawa.com
2. Drives with NEMA Type 1 Enclosures can be converted to protected chassis by removing the top and bottom covers.
3. When mounting standard drives with heatsink external (NEMA 1 backside), the following models require a separately sold bracket kit: CIMR-PU2A0004Fxx to 0081Fxx, CIMR-PU4A0002Fxx to 0044Fxx, and CIMR-PU5A0003Fxx to 0032Fxx.
Larger standard drives include brackets that must be detached from the back and reattached at the midpoint.
4. When NEMA 12 backside integrity is required, the Flange version drives (ending with Uxx) must be ordered.

240V Class

Model CIMR-PU2A □□□□	Frame Size	Max. Applicable Motor Capacity (HP)	Dimensions (in.)									Weight (lb)	
			WN1	W	W1	HN1	H	H1	DN1	D	D1	NEMA 1	Protected Chassis
0004	1	0.75	5.51	5.51	7.64	12.06	10.24	11.81	5.79	5.79	1.34	7.3	--
0006		1.5	5.51	5.51	7.64	12.06	10.24	11.81	5.79	5.79	1.34	7.3	--
0008		2	5.51	5.51	7.64	12.06	10.24	11.81	5.79	5.79	1.34	7.5	--
0010		3	5.51	5.51	7.64	12.06	10.24	11.81	5.79	5.79	1.34	7.5	--
0012		3	5.51	5.51	7.64	12.06	10.24	11.81	5.79	5.79	1.34	7.5	--
0018	2	5	5.51	5.51	7.64	12.06	10.24	11.81	6.46	6.46	2.06	8.2	--
0021		7.5	5.51	5.51	7.64	12.06	10.24	11.81	6.46	6.46	2.06	8.2	--
0030	3	10	5.51	5.51	7.64	12.06	10.24	11.81	6.57	6.57	2.07	9.3	--
0040		15	5.51	5.51	7.64	12.06	10.24	11.81	6.57	6.57	2.07	9.3	--
0056	5	20	7.09	7.09	9.21	13.38	11.81	13.39	7.36	7.36	2.83	13.0	--
0069	6	25	8.66	8.66	11.65	15.47	13.78	16.54	7.76	7.76	2.91	20.1	--
0081		30	8.66	8.66	11.65	15.47	13.78	16.54	7.76	7.76	2.91	22.0	--
0110	7A	40	10.00	10.00	12.13	21.37	15.75	16.3	10.16	10.16	3.82	50.7	46.2
0138	8A	50	10.98	10.98	12.99	24.52	17.72	18.11	10.16	10.16	3.81	61.7	55.0
0169	10	60	12.95	12.95	15.2	30.08	21.65	22.13	11.14	11.14	4.21	90.2	81.4
0211		75	12.95	12.95	15.2	30.08	21.65	22.13	11.14	11.14	4.21	92.4	83.6
0250	11	100	17.95	17.72	22.05	37.80	27.76	28.54	12.99	12.99	5	191.8	167.6
0312		125	17.95	17.72	22.05	37.80	27.76	28.54	12.99	12.99	5	191.8	176.4
0360	12	150	19.84	19.69	23.62	45.98	31.50	32.28	13.78	13.78	5	233.7	216.1
0415		175	19.84	19.69	23.62	45.98	31.50	32.28	13.78	13.78	5	233.7	218.3