

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.



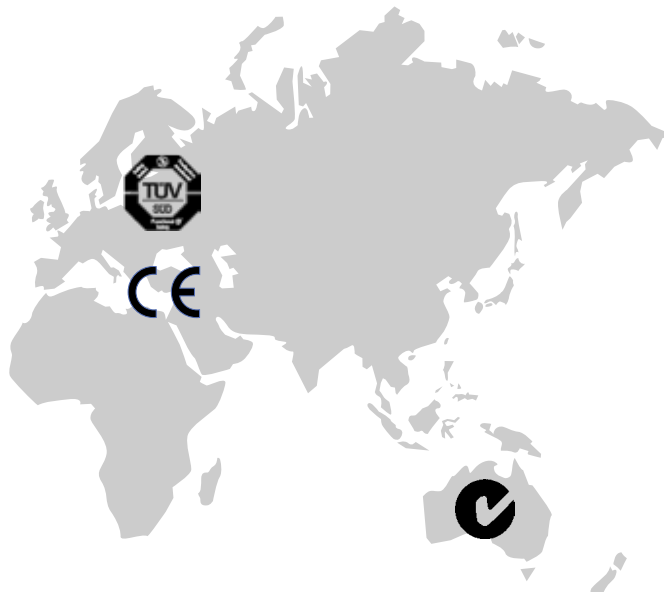
Highly Integrated Design results in fewer parts and interconnections, reducing the number of failure points.

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.

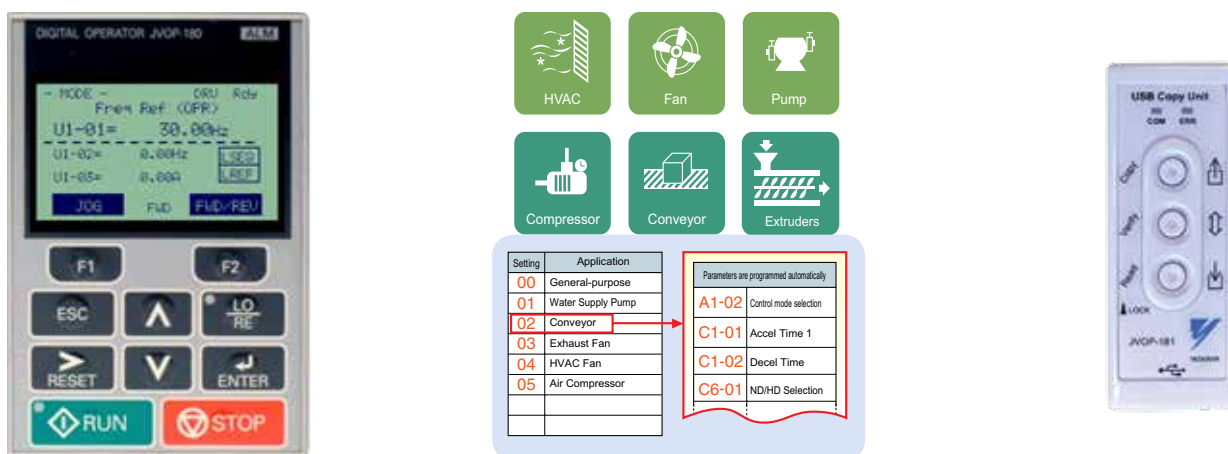
Enhanced Short Circuit Detection and Self Diagnostics provide additional protection against severe catastrophic conditions.

In addition, the A1000 is designed for use around the world, and carries agency certifications for all major geographical regions



Easy to Apply and Maintain

Whether your applications are simple or complex, the A1000 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.



DriveWizard® computer software delivers configuration, monitoring, and trending functions enhanced by direct connectivity through the A1000'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

Preventative Maintenance Monitors

Maximize production and intelligently schedule your maintenance by making use of the A1000'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



Highly Reliable and Easily Replaceable Cooling Fans

- Improved location for convenient access
- No tools required
- 24Vdc powered (including large ratings) eliminates need to make proper connection at time of installation



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)



Maximum Flexibility

Have it your way with the A1000's impressive flexibility. Take advantage of a significant quantity of control points as standard. For applications requiring more I/O, feedback, or network choices, the A1000 offers three expansion ports that support a wide variety of interface modules.



Standard I/O and Communications

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

Expansion Capability

I/O Modules

- Digital Inputs (16)
- Analog Inputs (3)
- Digital Outputs (8)
- Analog Outputs (2)

Feedback Modules

- Incremental Encoder
- Resolver
- Absolute Encoder (Stegmann, Heidenhain)

Communication Modules

- DeviceNet
- EtherNet/IP
- Modbus TCP/IP
- PROFIBUS-DP
- PROFINET
- MECHATROLINK-II
- EtherCAT
- Metasys N2/Apogee FLN (P1)
- BACnet
- LonWorks



Features and Benefits

Maximum Flexibility

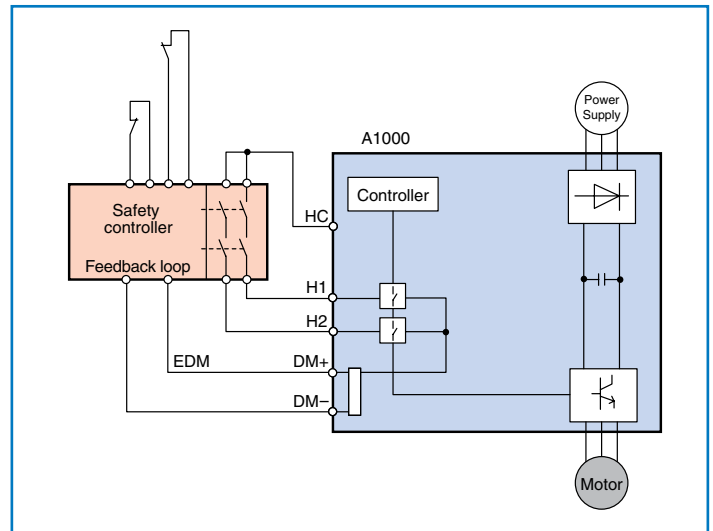
Auxiliary Control Power Input

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.



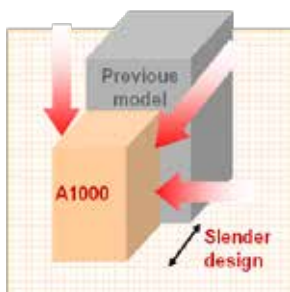
Embedded Functional Safety

Minimize downtime for applications requiring occasional or frequent mechanical intervention. Safe Torque Off provides safe removal of torque without removal of power to the drive. The A1000 provides this functionality as standard in a safety category 3 architecture, and is certified by TUV to PLd and SIL CL2 according to ISO/EN 13849-1 and IEC/EN 62061 respectively, meeting the requirements of IEC/EN 61508.

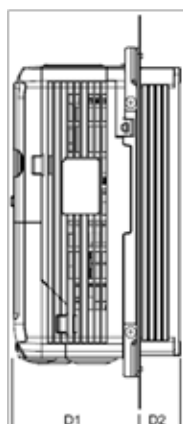


Space Saving Features

The A1000 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 or its Zero Side Clearance capability.



Physical Size Reduction



External Heatsink Solution
(Side View)

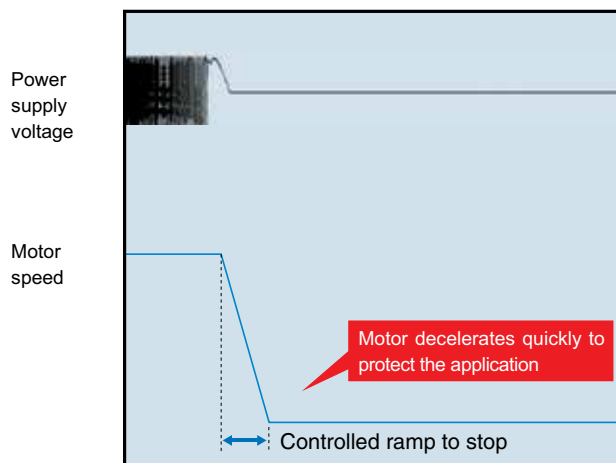


Zero Side Clearance
(40°C max ambient)

Maximum Flexibility

A variety of braking solutions optimized for your application.

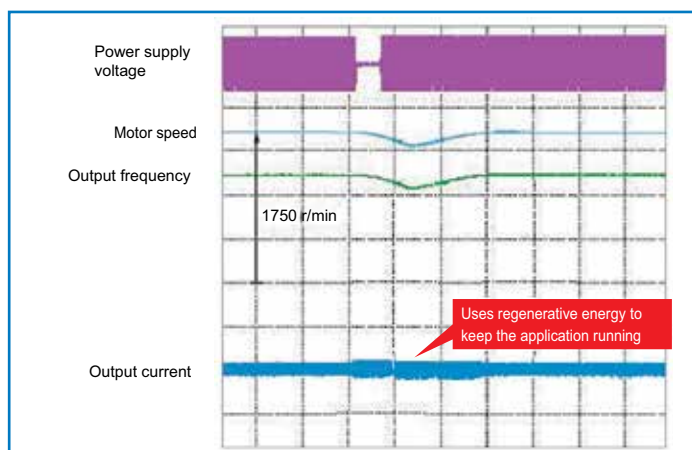
- For high demand braking conditions, the A1000 provides powerful Dynamic Braking with integrated brake transistors through 50HP normal duty (40HP heavy duty). For drives rated through 7.5HP normal duty (5HP heavy duty), drive mounted low duty cycle resistors are available
- For applications that can 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

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

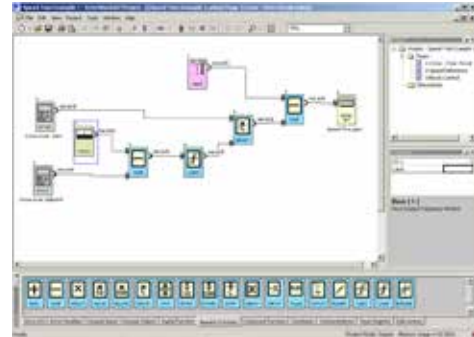


- Speed Search allows the drive to start into a rotating load by quickly matching its speed before delivering full power

Features and Benefits

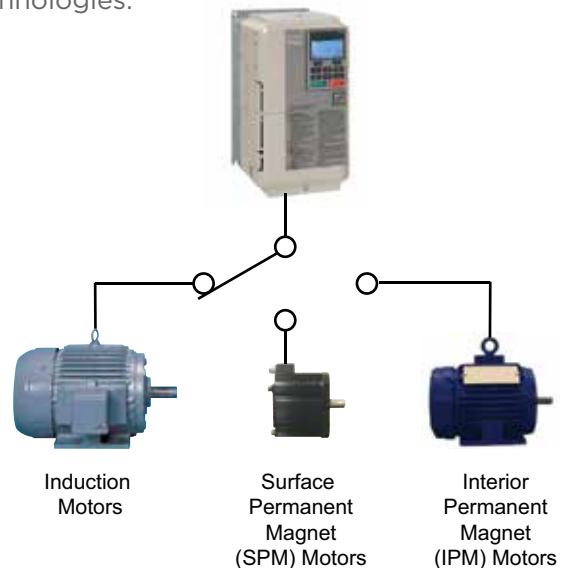
Maximum Flexibility

- Embedded Application Functions provide system level control without the use of a stand-alone controller.
- PID (Proportional Integral Derivative) Control regulates your process variable (flow, pressure, etc.).
- Droop Control automatically adjusts motor slip to perform load sharing in a multi-drive system.
- Function Block Programming supported by DriveWorksEZ® offers internal logic functions to build the application of your choice.
 - Drag and Drop Graphical Environment
 - Interface with I/O, Drive Data, Network Data
 - Logic Functions
 - Math Functions
 - Timers
 - Counters
 - Subroutine Creation
 - Up to 289 Function Blocks
 - Up to 100 Connections
 - 1 millisecond execution



A single drive to control traditional and emerging motor technologies:

- **Induction Motors**
 - Low cost
 - Widely available
 - Efficient
- **Interior Permanent Magnet (IPM) Motors**
 - Very Compact
 - Highly Efficient
 - Sensorless High Precision Control
- **Surface Permanent Magnet (SPM) Motors**
 - Ultra Compact
 - Highly Efficient



Type 12 Flange Configuration

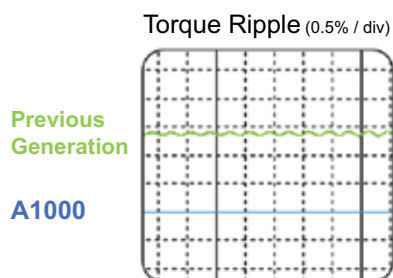
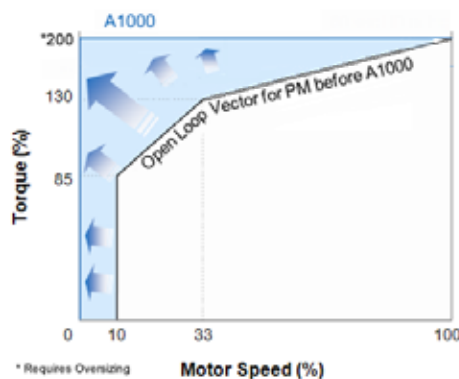
A1000 is available in all ratings as a Type 12 Flange configuration that allows for mounting the drive with its heatsink out the back of any Type 12 enclosure. This allows for the majority of the drive's heat to dissipate on the external side, while keeping the enclosure small and sealed with Type 12 integrity.



Outstanding Performance

The A1000 delivers incredible performance, producing up to 200% torque with or without feedback.

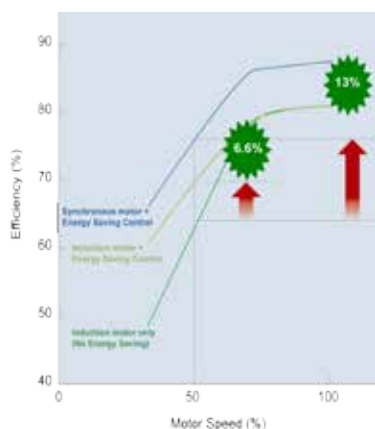
- Continuous Autotuning automatically compensates for changes in motor temperature
- Inertia Autotuning automatically sets gains for speed and torque loops
- Dead-Time Compensation drastically reduces torque ripple at low speeds
- High Frequency Injection (for IPM motors) enables high precision control without feedback, including positioning to within ± 5 degrees !



Speed Control Range	1500:1 Closed Loop Vector (Induction and PM Motors) 200:1 Open Loop Vector (Induction Motors) 100:1 Open Loop Vector (IPM Motors)
Speed Accuracy	0.02% - Closed Loop Vector (Induction Motors) 0.2% - Open Loop Vector (Induction Motors) 0.00% - Closed Loop Vector (IPM & SPM Motors) 0.00% - Open Loop Vector (IPM Motors)
Speed Response	60 Hz - Closed Loop Vector 10 Hz - Open Loop Vector
Torque Response	300 Hz - Closed Loop Vector

Environmentally Friendly

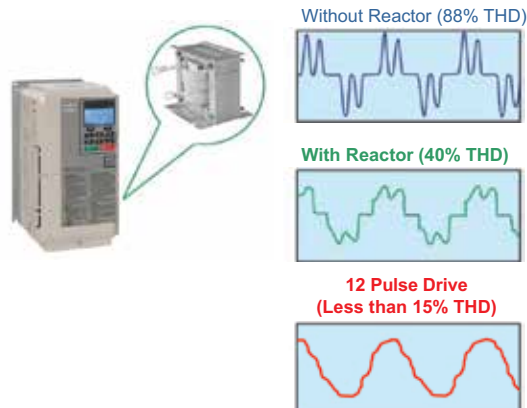
Reduce your energy bill and contribute towards a cleaner environment with sustainable features designed into the A1000.



Applying variable speed often results in large energy savings. Combining this with more efficient motors magnifies the result.

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 A1000 is available with an integrated 12-pulse diode bridge from 40 to 1000 HP @ 480 VAC (also requires the use of an external phase shifting transformer)



All materials used in the A1000 comply with the directive for Restriction of Hazardous Substances (RoHS)

Specifications

240V Class

Model CIMR-AU2A			0004	0006	0008	0010	0012	0018	0021	0030	0040	0056		
Max. Applicable Motor Capacity ^{*1}			Normal Duty	0.75	1.5	2	3	3	5	7.5	10	15	20	
			Heavy Duty	0.75	1	2	2	3	3	5	7.5	10	15	
Input	Rated Input Current ^{*2}		A	3.9	7.3	8.8	10.8	13.9	18.5	24	37	52	68	
				2.9	5.8	7	7.5	11	15.6	18.9	28	37	52	
Output	Rated Output Capacity ^{*4}		kVA	Normal Duty ^{*5}	1.3	2.3	3	3.7	4.6	6.7	8	11.4	15.2	21
				Heavy Duty	1.2 ^{*6}	1.9 ^{*6}	2.6 ^{*6}	3 ^{*6}	4.2 ^{*6}	5.3 ^{*6}	6.7 ^{*6}	9.5 ^{*5}	12.6 ^{*5}	17.9 ^{*5}
	Rated Output Current		A	Normal Duty ^{*5}	3.5	6	8	9.6	12	17.5	21	30	40	56
				Heavy Duty	3.2 ^{*6}	5 ^{*6}	6.9 ^{*6}	8 ^{*6}	11 ^{*6}	14 ^{*6}	17.5 ^{*6}	25 ^{*5}	33 ^{*5}	47 ^{*5}
	Overload Tolerance			Normal Duty Rating: 120% of rated output current for 60 sec. Heavy Duty Rating: 150% of rated output current for 60 sec. (Derating may be required for applications that start and stop frequently)										
	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%										
	Braking Transistor			Included										
	Fan			No fan					With fan					
	DC Link Choke			External Option										
	Power Supply		kVA	Normal Duty	2.2	3.1	4.1	5.8	7.8	9.5	14	18	27	36
				Heavy Duty	1.3	2.2	3.1	4.1	5.8	7.8	9.5	14	18	27

Model			CIMR-AU2A		0069	0081	0110	0138	0169	0211	0250	0312	0360	0415	
Max. Applicable Motor Capacity ^{*1}			HP	Normal Duty	25	30	40	50	60	75	100	125	150	175	
				Heavy Duty	20	25	30	40	50	60	75	100	125	150	
Input	Rated Input Current ^{*2}	A	Normal Duty	80	96	111	136	164	200	271	324	394	471		
			Heavy Duty	68	80	82	111	136	164	200	271	324	394		
Output	Rated Output Capacity ^{*4}	kVA	Normal Duty ^{*5}	26	31	42	53	64	80	95	119	137	158		
			Heavy Duty	23 ^{*6}	29 ^{*6}	32 ^{*6}	44 ^{*6}	55 ^{*6}	69 ^{*7}	82 ^{*7}	108 ^{*7}	132 ^{*7}	158 ^{*5}		
	Rated Output Current	A	Normal Duty ^{*5}	69	81	110	138	169	211	250	312	360	415		
			Heavy Duty	60 ^{*6}	75 ^{*6}	85 ^{*5}	115 ^{*6}	145 ^{*6}	180 ^{*7}	215 ^{*7}	283 ^{*7}	346 ^{*7}	415 ^{*5}		
	Overload Tolerance			Normal Duty Rating: 120% of rated output current for 60 sec. Heavy Duty Rating: 150% of rated output current for 60 sec. (Derating may be required for applications that start and stop frequently)											
	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%											
	Braking Transistor			Included						External Option					
	Fan			With fan											
	DC Link Choke			External Option			Included								
	Power Supply	kVA	Normal Duty	44	52	51	62	75	91	124	148	180	215		
Heavy Duty			36	44	37	51	62	75	91	124	148	180			

*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. DC is not available for UL/CE standards.

*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.

*6. Carrier frequency can be increased to 8 kHz while keeping this current derating. Higher carrier frequency settings require derating.

*7. Carrier frequency can be increased to 5 kHz while keeping this current derating. Higher carrier frequency settings require derating.

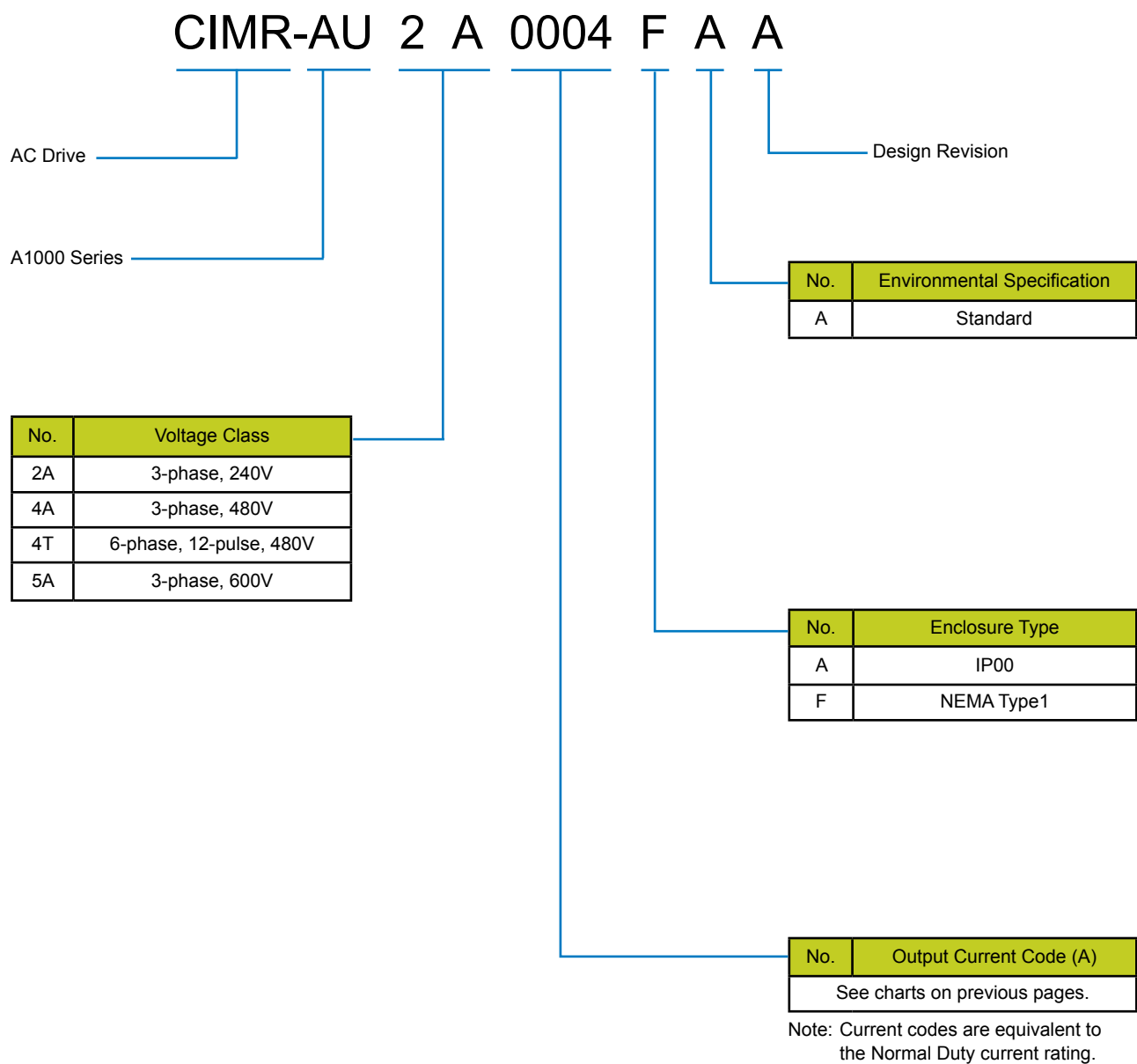
Common Specifications

Item		Specifications
Control Characteristics	Control Methods	•V/f Control (V/f) •V/f Control with PG (V/f w/PG) •Open Loop Vector Control (OLV) •Closed Loop Vector Control (CLV) •Open Loop Vector Control for PM (OLV/PM) •Advanced Open Loop Vector Control for PM (AOLV/PM) •Closed Loop Vector Control for PM (CLV/PM)
	Frequency Control Range	0.01 to 400 Hz (up to 1000 Hz is available with optional software)
	Frequency Accuracy (Temperature Fluctuation)	Digital input: within ±0.01% of the max output frequency (-10 to +40 °C) Analog input: within ±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	-10 to +10 V, 0 to +10 V, 4 to 20 mA, Pulse Train Input
	Starting Torque ^{<1>}	V/f, V/f w/PG: 150% at 3 Hz OLV: 200% at 0.3 Hz CLV, AOLV/PM, CLV/PM: 200% at 0 r/min OLV/PM: 100% at 5% speed
	Speed Control Range ^{<1>}	V/f, V/f w/PG: 1:40 OLV: 1:200 CLV, CLV/PM: 1:1500 V/f w/PG: 1:20 AOLV/PM: 1:100
	Speed Control Accuracy ^{<1>}	OLV: ±0.2% (25 °C ±10 °C) CLV: ±0.01% (25 °C ±10 °C)
	Speed Response ^{<1>}	OLV, OLV/PM, AOLV/PM: 10 Hz CLV, CLV/PM: 50 Hz
	Torque Limit	Separate limits in four quadrants (available in OLV, CLV, AOLV/PM, CLV/PM)
	Accel/Decel Time	0.0 to 6000.0 s (4 selectable combinations of independent acceleration and deceleration settings)
	Braking Torque	Approx. 20% (approx. 125% when using braking resistor) ^{<2>} • Short-time decel torque ^{<3>} : over 100% for 0.5/ 1.0 HP motors, over 50% for 2.0 HP motors, and over 20% for 3.0 HP and above motors ^{<4>} (overexcitation braking/High Slip Braking: approx. 40%). • Continuous regenerative torque: approx. 20% ^{<4>} (approx. 125% with dynamic braking resistor option ^{<2>} : 10% ED, 10s).
	Braking Transistor	Models 2A0004 to 2A0138, 4A0002 to 4A0072, and 5A0003 to 5A0032 have a built-in braking transistor.
	V/f Characteristics	User-selected programs and V/f preset patterns possible
	Main Control Functions	Torque Control, Droop Control, Speed/torque Control Switching, Feed Forward Control, Zero Servo Function, Momentary Power Loss Ride-Thru, Speed Search, Overtorque/Undertorque Detection, Torque Limit, 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, DriveWorksEZ (customized function), Removable Terminal Block with Parameter Backup Function, Online Tuning, KEB, Overexcitation Deceleration, Inertia (ASR) Tuning, Overvoltage Suppression, High Frequency Injection.
Protection Function	Motor Protection	Electronic thermal overload relay
	Momentary Overcurrent Protection	Drive stops when output current exceeds 200% of Heavy Duty Rating
	Overload Protection	Drive stops after 60 s at 150% of rated Heavy Duty output current ^{<5>}
	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 ^{<6>} Resumes operation if power loss is less than 2 s (standard) ^{<7>}
	Heatsink Overheat Protection	Thermistor
	Braking Resistance Overheat Protection	Overheat input signal for braking resistor (Optional ERF-type, 3% ED)
	Stall Prevention	Stall Prevention is available during acceleration, deceleration, and during run.
	Ground Fault Protection	Electronic circuit protection ^{<8>}
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, IEC/EN 61508, EN 61800-5-1 ^{<9>}
Protection Design		IP00 enclosure, IP20/NEMA Type 1 enclosure ^{<10>}

- <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> Disable Stall Prevention during deceleration (L3-O4 = 0) when using a regenerative converter, a regenerative unit, a braking resistor or the Braking Resistor Unit. The default setting for the Stall Prevention function will interfere with the braking resistor.
- <3> Instantaneous average deceleration torque refers to the torque required to decelerate the motor (uncoupled from the load) from the rated motor speed down to zero in the shortest time.
- <4> Actual specifications may vary depending on motor characteristics.
- <5> Overload protection may be triggered when operating with 150% of the rated output current if the output frequency is less than 6 Hz.
- <6> May be shorter due to load conditions and motor speed.
- <7> 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.
- <8> 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.
- <9> Terminals H1, H2, DM+, and DM- on 600 V class models are designed to the functionality, but are not certified to Insulation coordination: class1.
- <10> 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

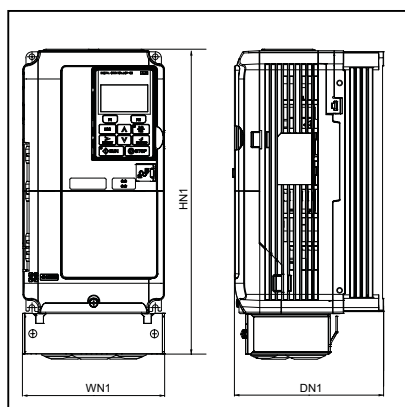
Model Number Key



Mechanical Installation Planning

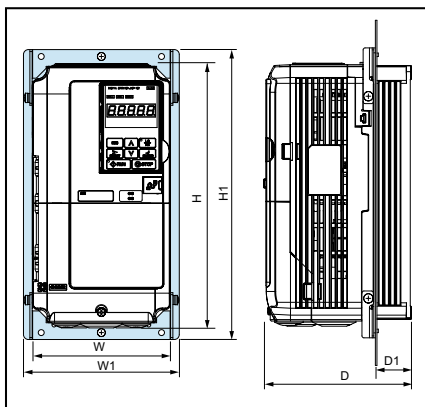
Drive Dimensions

NEMA Type 1 [IP20] Diagram



A1000 with NEMA Type 1 Kit Installed

Protected Chassis/External Heatsink Diagram



A1000 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 A1000 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-AU2A0004Fxx to 0081Fxx, CIMR-AU4A0002Fxx to 0044Fxx, and CIMR-AU5A0003Fxx 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-AU2A □□□□	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