

**YASKAWA**

# AC Drives

Product Range



# Yaskawa - Balancing power to perfection

Cost-saving by optimized application  
Efficiency

Experience from 30 million  
installed AC drives

Application Reliability by 10 years of  
maintenance free drive operation

Flexibility to master any challenge

Maximize machine Performance

Ease of use minimizes setup times



# At home. In any application.

We have extensive knowledge and many years of experience in automation with more than 30 million AC drives installed worldwide. Thanks to our high manufacturing quality and the design for long, maintenance-free operation, our drives perform their work discretely for many years.

This makes our AC drives special:

#### **Scalable**

Embedded programming environment to customize drive functions can replace external controllers.

#### **Common menus**

Menus and parameters are arranged and named as with any other Yaskawa drive, thus reducing training expenses.

#### **24 VDC power input for controller**

Simplify your wiring and keep your control system operational, even during standby or power outages.

#### **24 VDC power for sensors**

Internal power supply delivers an extra 150 mA for use with external sensors, thus eliminating the need for a separate power supply.

#### **Built-in EMC filter**

Easy compliance with global standards and simplified machine design due to a reduced number of parts.

#### **Optimal rating**

Normal Duty rating allows operation of a motor that is one size larger in variable torque applications.

#### **Predictive maintenance**

Service life indicators for main components prevent production losses due to sudden breakdowns.

Our AC drives perform well in many applications, like:



*HVAC*



*Pumps & Fans*



*Marine*



*Crane & Hoist*



*Winders*



*Metalworking*

# AC Drives Overview

The background of the slide is a solid blue color. It features a central point from which several lines radiate outwards, creating a star-like or geometric pattern. The lines are thin and light blue, dividing the space into several angular sections. The overall effect is modern and technical.

# GA700

AC Drives for Industrial Applications

Technical Data	GA700
Motor power range [kW]	0.55 – 355
Induction motor (IM)	√
Permanent magnet motor (PM)	√
Synchronous reluctance motor	√

## Standard AC Drive

The GA700 precisely controls induction, permanent magnet, and synchronous reluctance motors providing versatility to run a variety of applications with just one drive. The times of complex motor set-up are over. With the new EZ vector mode, the GA700 can run all of these motor types without the need for comprehensive tuning.

## Easy Programming

DriveWorksEZ® is our intuitive graphical programming environment. Create customized functions for your application in a very short time by dragging and dropping function blocks. The online diagnosis tool supports testing.

## Features

- Easy set-up due to the integrated start-up wizard
- Integrated features (STO with SIL 3, Braking transistor [up to 75 kW], EMC filter, DC reactor [22 kW and above] ...)
- Data logging with real time stamp up to 32 GB on MicroSD card
- Mobile Device Connectivity: Cloud connected DriveWizard Mobile App for drive management on smartphones and tablets, Manual App providing technical documentation exactly where you need it
- Safe programming when switched off
- Network up to five GA700 drives with a single communication card



# GA500

AC Drives for Industrial Applications

Technical Data	GA500
Motor power range [kW]	0.1 – 30
Induction motor (IM)	√
Permanent magnet motor (PM)	√
Synchronous reluctance motor	√

## Standard AC Drive

Compact in size and flexible in terms of motor type and connectivity, the GA500 is designed to easily master nearly any application.

## Easy Programming

DriveWorksEZ® is our intuitive graphical programming environment. Create customized functions for your application in a very short time by dragging and dropping function blocks. The online diagnosis tool supports testing.

## Features

- Easy network integration
- Robust design. Operation up to 4000 m altitude and 60 °C environment
- Coated PCBs
- Embedded braking chopper
- Integrated programming environment
- 24 VDC power input for controller
- USB port
- 10 years maintenance-free design
- Screwless control terminals
- Easily accessible mains terminals
- 24 VDC power for sensors
- Built-in EMC filter
- One drive for various applications (induction, permanent magnet and synchronous reluctance motors)



# CR700

AC Drives for Crane Applications

## Crane AC Drive

Continuous improvements of the key functions for crane applications has won the trust of our customers for over 30 years. The CR700 balances the hoist application in perfection. Made possible by innovative design advantages the CR700 crane drive helps you to lower initial investment for factory construction, supports you by increasing your productivity, lowers the efforts for daily maintenance and helps to reduce energy consumption.



Technical Data	CR700
Motor power range [kW]	0.55 – 315
Induction motor (IM)	√

## Features

- Synchronous position control and tandem application
- Anti-sway function
- Light-load function
- Load balance without encoder
- Wire length monitor
- Maintenance monitor
- Travel limit
- Brake command monitor

# J1000, V1000, A1000

The Legacy AC Drives

## Standard AC Drive

The 1000-series AC drives have a long history of reliable operation in a huge range of applications. We offer the J1000 compact drive for use with induction motors - you only need to set up a few parameters and you're ready to go. The V1000 is also suitable for PM motors and offers more adjustment possibilities, but is just as compact as the little brother. When you need high output power, or want to use a motor encoder, then the A1000 is your best and most flexible choice.

Technical Data	J1000	V1000	A1000
Motor power range [kW]	0.1 – 5.5	0.1 – 18.5	0.55 – 630
Induction motor (IM)	√	√	√
Permanent magnet motor (PM)	-	√	√



# T1000A, T1000V

Multi-Purpose Textile Drives

Technical Data	T1000A	T1000V
Motor power range [kW]	0.55 – 185	0.1 – 18.5
Induction motor (IM)	✓	✓
Permanent magnet motor (PM)	✓	✓

## Textile AC Drive

The T1000A is an AC drive with current vector control with or without speed sensor. Thanks to specially coated circuit boards, the reliable power failure bridging or the heat sink and fanless version for mounting on a water cooler, the T1000A is perfectly suited for equipping reliable and durable textile machines.

The T1000V is the compact solution for applications in the textile industry.



## T1000A Features

- High-precision open- and closed-loop-control of induction and permanent magnet motors
- Heat sink and cold plate versions for water cooler mounting available
- Integrated textile functions, e.g. for thread laying and power failure detection/treatment
- Very robust drive for harsh environments, designed for 10 years maintenance-free operation
- Built-in maintenance monitors for IGBT, capacitors or operation time
- Built-in SIL2 / PL-d safety

## T1000V Features

- Encoderless control of asynchronous and PM motors
- Heat sink and cold plate versions for water cooler mounting available
- Specially coated PCBs for textile applications
- Compact and cost effective textile solution
- Built-in maintenance monitors for IGBT, capacitors, fan and charging circuit
- Very robust AC drive designed for 10 years continuous and maintenance-free operation

# L1000A, LA500

Standard Drives for Lift Applications

Technical Data	L1000A	LA500
Motor power range [kW]	1.5 – 110	4.0 – 22
Induction motor (IM)	✓	✓
Permanent magnet motor (PM)	✓	-

## Lift AC Drive

The L1000A lift drive is the perfect solution for technical requirements of today's lifts. L1000A controls induction and permanent magnet motors and is the first choice for new installations, machine room less lifts and lift modernization.

The compact LA500 is the economic solution for modernization and new installation of lifts with gear box motors without speed feedback. By sticking to the basics, this AC drive combines usability and outstanding ride performance with a robust and durable design.

## L1000A Features

- Open- and closed-loop-control for IM and PM motors
- Large power range
- Programming in lift terminology and in 13 languages
- Displays parameter in lift-specific terms and units (m/s, m/s<sup>2</sup> ...)
- Automatic evacuation with UPS system/battery
- Flexible controller interface
- Best ride comfort
- Operation without motor contactors (SIL3 STO)
- DCP3/DCP4/CANLift

## LA500 Features

- Open- and closed-loop-control for induction motors
- Programming in lift terminology and in 8 languages
- State-of-the-art motor control algorithms for a smooth ride and a precise stop
- Designed for long performance and low life-cycle cost
- Preventive maintenance indicator for IGBT, capacitors and cooling fans



# Green Performance Solutions

Model	R1000	D1000	U1000
Energy saving by braking power regeneration	●	●	●
Motor drive	–	–	●
Improve power factor	–	●	●
Suppress input current harmonics	–	●	●
DC voltage boost	–	●	–
Feed-in of multiple drives	○	●	–
Simple wiring	○	○	●
Downsize panel	○	○	●
Integrated Bypass function at 50 Hz	–	–	●

## R1000

Energy Saving Regenerative Unit

### Intelligent Braking Resistor

The R1000 regenerative unit replaces conventional braking resistors in machines and systems and makes braking energy available to other consumers in the same system. This saves energy and reduces costs.

### Features

- Allows 4-quadrant-operation without braking resistors
- No wasted heat due to braking resistors, thus less need for cooling/ventilation, reduced fire hazard and operating costs
- Provides regenerative energy for other consumers in the plant, reducing total power consumption
- Quick amortisation of investments

Technical Data	R1000
Regeneration capacity [kW]	3.5 – 300
Apply to multiple drives	√





# D1000

Regenerative Converter Unit With Low Harmonics

Technical Data	D1000
Power range [kW]	5.0 – 630
Supress power supply harmonics	√
Apply to multiple drives	√

## Low Harmonic Energy Recovery Unit

D1000 is a regenerative unit for DC power supply of single drives or systems consisting of AC drives, servos or robots. In addition to the use of braking energy, the D1000 enables particularly efficient and network-friendly system operation.

## Features

- 4-quadrant-operation without braking resistors
- Sinusoidal input current (total harmonic distortion < 5 %) and  $\cos\phi = 1$  minimize losses in cables, transformers and generators and allow an optimal utilization of the system
- Controlled, customizable DC voltage guarantees the same level of DC voltage independent of the power supply voltage (Boost function)
- D1000 reduces the cost for energy and maintenance, which allows for a short payback period
- No wasted heat due to braking resistors, thus less need for cooling/ventilation, reduced fire hazard and operating costs



# U1000

The AC-to-AC drive For Maximum Efficiency

## Matrix Converter

The U1000 is a highly efficient AC drive based on latest Matrix converter technology. With full power regeneration capability it offers great energy saving potential while sinusoidal input currents and a power factor close to one reduce stress on grid components, cables and wires. With an ultra-compact shape, it is the first choice for innovative, energy-efficient drive solutions with or without power regeneration.



## Features

- Innovative Matrix Drive technology without DC bus capacitors up to 500 kW
- Built-in power regeneration
- Extremely compact compared to conventional solutions for feedback or low harmonics
- Completely integrated solution minimizes installation and wiring effort
- Built-in bypass operation at 50 Hz for IM motor
- Maximum flexibility through integrated PLC functionality
- Low-loss and smooth system operation thanks to sinusoidal input current and  $\cos\phi$  of almost 1
- Built-in SIL3 STO function for machine safety
- Induction motor and permanent magnet motor control
- Approved for global marine installation

Technical Data	U1000
Power range [kW]	4.0 – 500
Supress power supply harmonics	√
Apply multiple drives	√
Induction and PM motor control	√
Approved for marine installation	BV, ABS, ClassNK, LR, DNV GL, KR

# Easy engineering and customization

The GA500 and GA700 drives come with powerful yet intuitive engineering tools that help minimize setup time while also offering great potential for simplification of machinery and installations.

## DriveWizard® 10

DriveWizard® 10 enables easy configuration of GA500 drives. Its comprehensive monitoring functions and integrated oscilloscope allow easy process optimization and fast troubleshooting.

- Connect to the GA500 via USB – even without mains power!
- Configure the GA500 online or offline.
- Log your process with up to six channels of recorded data.
- Create reports to export and send via email.
- Simplify operation and save valuable time during setup, maintenance, or troubleshooting.
- Import and export data with DriveWizard mobile.
- Connect to multiple drives through ProfiNet, EtherNet/IP or Modbus TCP.



## DriveWorksEZ® 10

DriveWorksEZ® is an icon-based, drag-and-drop graphical environment for adding programmable functions allowing the drive to be tailored for a variety of machine and application requirements without the cost of external controllers, such as PLCs or additional controller hardware options.

- Select from 400+ function blocks
- Logic/math functions
- Timers/counters
- Up to 100 connections
- Offline simulation mode for testing without the risk of application malfunctions
- Protection of intellectual property with project lock
- Online monitor for visual debugging
- Fast cycle time of 2 ms, independent of program size



### DriveWorks Application Library

The DWEZ Application Library provides pre-configured applications that can be used instantly or can be modified and expanded to fit the need of your application or machine.

These are just a few of the applications available:

- Brake sequence
- Flexible timer
- Torque limits
- Master-Slave via serial communication without PLC
- Dual PI controller
- Unbalance detection

# Always handy

Anything needed to operate a GA500 or a GA700 fits in your pocket. The DriveWizard® mobile and the Manuals App turn your smartphone or tablet into a versatile and indispensable toolbox.

## DriveWizard Mobile

DriveWizard mobile is the ultimate setup tool for GA500 drives. From simple parameter editing through Setup Wizard with an 8 channel fully featured oscilloscope, it provides all tools needed for setup, monitoring and process optimization.

- Intuitive parameter editing with help and search function
- Create favorite parameter lists
- 8-channel oscilloscope with comprehensive trigger functions and data analysis
- Parameter backup/verify
- Setup Wizard for quick setup without knowledge about menus and parameters
- Troubleshooting support with fault analysis and countermeasures
- Export to DriveWizard PC tool
- Worry-free data recovery: Parameter back-up/retrieval anytime via Yaskawa cloud service for registered drives
- Usable offline in areas without mobile reception

## Yaskawa Manuals app

Never carry heavy paper manuals again. With the Yaskawa Manuals app the latest manuals for GA500 and GA700 drives are always with you.

- Responsive layout - line breaks automatically adjust to zoom level for best readability without panning left/right
- Quickly find the information you really need using the search function
- Set own bookmarks to frequently used pages
- All books can be downloaded for offline use
- Always up-to-date documents






Mobile device connectivity is achieved through using the built-in USB port (USB on-the-go) or wireless communication with the Bluetooth® LCD keypad option.

Bluetooth® and the Bluetooth logo are registered trademarks of Bluetooth SIG, Inc. USA. Android™ is a trademark of Google Inc. iOS® is a registered trademark of Cisco and is used under license by Apple, Inc.













# AC Drives Comparison

	GA700	GA500	CR700
Type			
Max. motor output			
1-phase AC	–	230 V AC 0.1 - 4.0 kW	–
3-phase AC	200 V AC 0.55 - 110 kW	200 V AC 0.1 - 22 kW	200 V AC 0.55 - 110 kW
	400 V AC 0.55 - 355 kW	400 V AC 0.37 - 30 kW	400 V AC 0.55 - 355 kW
Applicable motor			
Induction motor with/without encoder	●/●	–/●	●/●
Permanent magnet motor with/without encoder	●/●	–/●	–/–
Synchronous reluctance motor	•	•	–
Cooling method			
Air cooling	•	•	•
Coldplate	–	◇	–
Torque control	•	• (using DriveWorksEZ)	•
Braking chopper built-in	• (up to 75 kW)	•	• (up to 75 kW)
Max. output frequency	590 Hz	590 Hz / ◇ 2000 Hz	590 Hz
I/O built-in			
Analog input/output	3/2	2/1	3/2
Digital input/output	8/4	7/3	8/4
Motor thermal protection	•	•	•
Fieldbus			
RS-422/485 (Memobus/Modbus)	• (RS-485)	• (RS-485)	• (RS-485)
RS-232C	•	•	•
Mechatrolink-III	◇	◇	◇
Ethernet/IP	◇	◇	◇
EtherCAT	◇	◇	◇
Modbus TCP	◇	◇	◇
Profinet	◇	◇	◇
CC-Link	◇	◇	◇
DeviceNet	◇	◇	◇
Profibus-DP	◇	◇	◇
CANopen	◇	◇	◇
Powerlink	◇	◇	◇



	GA700	GA500	CR700
Type			
Functions			
Energy saving	•	•	•
Dual Rating (ND/HD)	•	•	•
Speed search	•	•	•
PID control (with sleep function)	•	•	•
Momentary power loss ride-thru	•	•	•
Application parameter presets	•	•	•
Predictive maintenance functions	•	•	•
USB interface	•	•	•
Coated PCB	•	•	•
External 24 V power supply input	•	•	•
PLC function (DriveWorksEZ)	•	•	•
Functional safety options			
Safety	SIL3/PL e	SIL3/PL e	SIL3/PL e
Standards			
CE/RoHS	•/•	•/•	•/•
UL/cUL/UL508C	•	•	•
Marine (GL)	–	–	–

# AC Drives Comparison



	A1000	V1000	J1000	T1000A	T1000V
Type					
Max. motor output					
1-phase AC	–	230 V AC 0.1 - 4.0 kW	230 V AC 0.1 - 2.2 kW	–	230 V AC 0.1 - 4.0 kW
3-phase AC	200 V AC 0.55 - 110 kW	200 V AC 0.1 - 18.5 kW	200 V AC 0.1 - 5.5 kW	200 V AC 0.55 - 110 kW	200 V AC 0.1 - 18.5 kW
	400 V AC 0.55 - 630 kW	400 V AC 0.2 - 18.5 kW	400 V AC 0.2 - 5.5 kW	400 V AC 0.55 - 185 kW	400 V AC 0.1 - 18.5 kW
Applicable motor					
Induction motor with/without encoder	●/●	–/●	–/●	●/●	–/●
Permanent magnet motor with/without encoder	●/●	–/●	–/–	●/●	–/●
Synchronous reluctance motor	–	–	–	–	–
Cooling method					
Air cooling	●	●	●	●	●
Coldplate	◇	◇	–	◇	◇
Torque control	●	–	–	●	–
Braking chopper built-in	● (up to 30 kW)	●	●	●	●
Max. output frequency	400 Hz / ◇ 1000 Hz	400 Hz / ◇ 1000 Hz	400 Hz	400 Hz	400 Hz
I/O built-in					
Analog input/output	3/2	2/1	1/1	3/2	2/1
Digital input/output	8/4	6/3	5/1	8/4	6/3
Motor thermal protection	●	●	●	●	●
Fieldbus					
RS-422/485 (Memobus/Modbus)	●	●	◇	●	●
RS-232C	●	●	◇	●	●
Mechatrolink-III	◇	◇	–	◇	◇
Ethernet/IP	◇	◇	–	–	–
EtherCAT	◇	◇	–	–	–
Modbus TCP	◇	◇	–	◇	◇
Profinet	◇	◇	–	–	–
CC-Link	◇	◇	–	◇	◇
DeviceNet	◇	◇	–	–	–
Profibus-DP	◇	◇	–	◇	◇
CANopen	◇	◇	–	◇	◇
Powerlink	◇	◇	–	◇	◇

	A1000	V1000	J1000	T1000A	T1000V
Type					
Functions					
Energy saving	•	•	–	•	•
Dual Rating (ND/HD)	•	•	•	•	•
Speed search	•	•	–	•	•
PID control (with sleep function)	•	•	–	•	•
Momentary power loss ride-thru	•	•	•	•	•
Application parameter presets	•	•	–	–	–
Predictive maintenance functions	•	•	•	•	•
USB interface	•	–	–	•	–
Coated PCB	◊	◊	–	•	•
External 24 V power supply input	◊	◊	–	◊	◊
PLC function (DriveWorksEZ)	•	•	–	–	–
Functional safety options					
Safety	SIL2/PL d	SIL2/PL d	–	SIL2/PL d	SIL2/PL d
Standards					
CE/RoHS	•/•	•/•	•/•	•/•	•/•
UL/cUL/UL508C	•	•	•	•	•
Marine (GL)	•	–	–	–	–

# Regenerative Units Comparison


	U1000	D1000	R1000
Type			
Max. motor output			
1-phase AC	–	–	–
3-phase AC	200 V AC 5.5 - 55 kW	200 V AC 5.0 - 130 kW	200 V AC 3.5 - 105 kW
	400 V AC 3.9 - 500 kW	400 V AC 5.0 - 630 kW	400 V AC 3.5 - 300 kW
Applicable motor			
Induction motor with/without encoder	●/●	-/-	-/-
Permanent magnet motor with/without encoder	●/●	-/-	-/-
Synchronous reluctance motor	–	–	–
Cooling method			
Air cooling	●	●	●
Coldplate	–	–	–
Torque control	●	–	–
Braking chopper built-in	Not required	–	–
Max. output frequency	400 Hz	–	–
I/O built-in			
Analog input/output	3/2	3/2	3/2
Digital input/output	8/4	8/4	8/4
Motor thermal protection	●	–	–
Fieldbus			
RS-422/485 (Memobus/Modbus)	●	●	●
RS-232C	●	●	●
Mechatrolink-III	◇	◇	◇
Ethernet/IP	◇	◇	◇
EtherCAT	◇	◇	◇
Modbus TCP	◇	◇	◇
Profinet	◇	◇	◇
CC-Link	◇	◇	◇
DeviceNet	◇	◇	◇
Profibus-DP	◇	◇	◇
CANopen	◇	◇	◇
Powerlink	◇	◇	◇



	U1000	D1000	R1000
Type			
Functions			
Energy saving	•	–	–
Dual Rating (ND/HD)	•	–	–
Low harmonics (THDi < 5 %)	•	•	–
Power regeneration operation	•	‡	‡
Speed search	•	–	–
PID control (with sleep function)	•	–	–
Momentary power loss ride-thru	–	•	–
Application parameter presets	•	–	–
Predictive maintenance functions	•	•	•
USB interface	•	•	•
Coated PCB	•	–	–
External 24 V power supply input	◊	◊	◊
PLC function (DriveWorksEZ)	•	–	–
Functional safety options			
Safety	(SIL3/PL e)	–	–
Standards			
CE/RoHS	•/•	•/•	•/•
UL/cUL/UL508C	•	•	•
Marine (GL)	•	–	–



# Lift Drives Comparison

	L1000A	LA500
Type		
Max. motor output		
3-phase AC	200 V AC 1.5 - 110 kW 400 V AC 1.5 - 110 kW	200 V AC 4.0 - 18.5 kW 400 V AC 4.0 - 22 kW
Motor		
Induction motor with/without encoder	●/●	-/●
Permanent magnet motor with/without encoder	●/-	-/-
Cooling method		
Air cooling	•	•
Braking chopper built-in	• (up to 22kW)	•
Max. output frequency	200 Hz	120 Hz
I/O built-in		
Analog input/output	2/2	-/1
Digital input/output	8/6	7/3
Motor thermal protection	•	•
Fieldbus		
RS-422/485 (Memobus/Modbus)	•	-
RS-232C	•	•
CANopen	◇ CANopen-Lift	-
DCP3/DCP4	•	-
Functions		
Energy saving	•	-
Predictive maintenance functions	•	•
USB interface	-	•
Battery rescue operation/UPS	•	•
External 24 V power supply unit	◇	•
Brake sequence	•	•
Short floor operation	•	•
Elevator units	•	•
Functional safety options		
Safe Torque Off	• SIL2/PL d / ◇ SIL3/PL e	SIL3/PL e
Standards		
CE/RoHS	●/●	●/●
UL/cUL/UL508C	•	•
Lift Standard EN81	•	•

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