

# CR700

AC Drives for Crane Applications



# Best value for cranes

Our number one priority is to always keep the customer's perspective in mind. We offer the highest market benchmark in quality and product reliability.

We can now deliver ideal solutions for various tasks related to the operation of cranes, including brake sequences that have evolved from the technologies we have developed to date.



**Equipped with specialized crane functions for ensuring site safety**

**Shorter cycle times achieved with priority given to safe operation**

**Efficiency of design and adjustment enhanced**



# New generation crane drives

The new CR700 crane drive was developed based on over 30 years of crane industry experience to further optimize crane applications with a focus on flexible, easy and sustainable operation.



- Anti-sway function
- Synchronized position control
- Tandem control
- Load balance without encoder
- Rope length monitor
- Brake command monitor
- Light load function
- Overload detection
- Lifetime monitor
- Rollback prevention
- Brake sequence
- Travel limit
- Crawl speed

Designed for  
**10 YEARS**  
of maintenance  
free operation



10

307

330

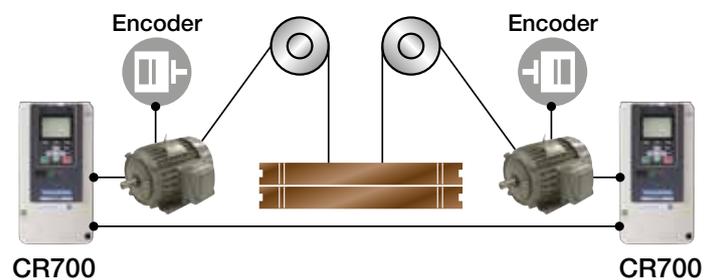
# Hoist

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.

## Synchronous position control and tandem application

The outstanding master-follower position control of the CR700 is the key function for applications where multiple motors are not mechanically connected together but still require synchronous and precise position control. The speed and position control functions constantly monitor and compare the target and actual value of the motor shaft position and ensure extremely precise tandem operation.

- Master-follower position control
- Super precise tandem applications
- Speed controlled positioning
- No external controller needed, all control features built-in
- Automatic operation stop in case of position deviation

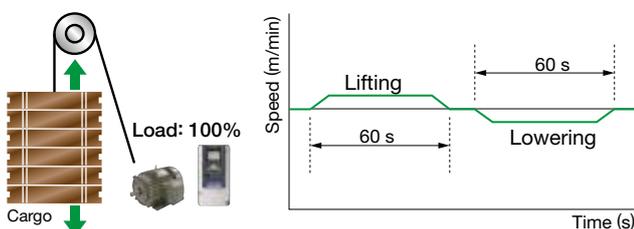


## Light load function

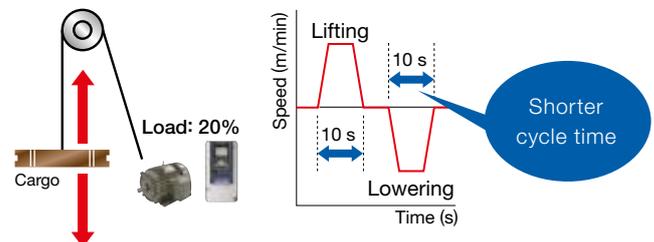
The light load function optimizes cycle times of the crane by adjusting the hoist speed according to the weight of the load. When a light load is detected, it automatically switches the operation speed to maximum. This minimizes hoist operating time and increases productivity.

- Detects load
- Automatically adjusts operation speed
- Shorter cycle time
- Increases hoist efficiency

### Heavy Loads



### Light Loads



## Brake command monitor

The programmable counter monitors the number of run commands and brake release commands and outputs an alarm once the number reaches the operation value. This supports the maintenance team to schedule preventive maintenance of the mechanical brake.

- Preventive maintenance
- Reduce brake wear
- Increase brake safety and reliability

## Rope length monitor

In applications with long hoisting distance, the rope length detection function supports the crane operator to work more safely by sharing the information about actual load position.

- Prevents operation range mismatch
- Monitors hook and load position
- Improves hoist safety
- Travel limit monitor

# Long and cross travel

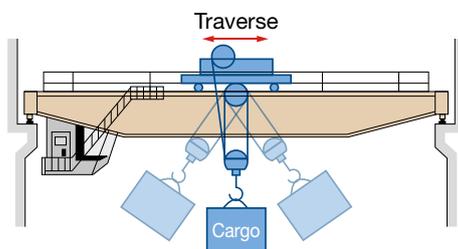
Long and cross travel systems require one of the most advanced crane controls. They can be realized by one motor per drive setup, but may also be realized by multiple motors on each side, that have to be driven synchronously.

## Anti-sway function

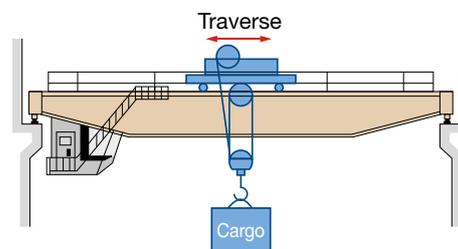
The anti-sway function improves the efficiency and safety in long and cross travel applications. Minimizing horizontal load sway allows for faster and easier positioning of the load. This intelligent function supports the crane operator and reduces maintenance costs by reducing wear.

- Reduces accidents and damage caused by load sway
- Works without external anti-sway sensors
- No motor encoder necessary
- Improves crane productivity and efficiency
- Applicable for long and cross travel

*Disabled*



*Enabled*



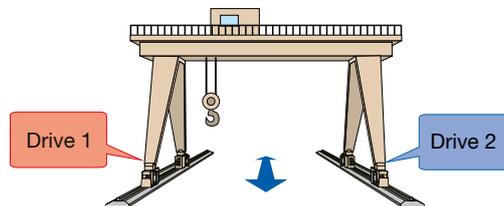
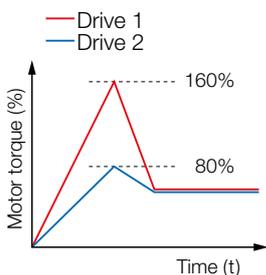


### Load balance without encoder

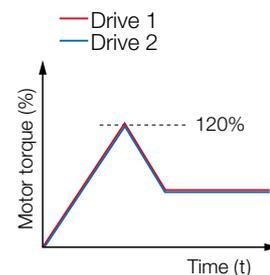
The CR700 is optimized to combine the required power gained from all travel drives to overcome friction forces during travel in Open Loop Vector Control. This feature solves the problem of overloading one motor due to an unbalanced load and minimizes the risk of mechanical wear by distributing the load impact across multiple drives.

- Reduces costs and the risk of encoder failure
- Prevents unbalanced load and motor overload
- Reduces mechanical friction and crane wear
- Smooth and precise travel acceleration

Conventional Drives



CR700



### Maintenance monitor

Preventive maintenance monitors increase crane safety and product availability. All drive lifetime monitors can be easily accessed via keypad operator or network communication options. These comprehensive service functions support you to schedule preventive maintenance before fault happens.

- Number of run commands
- Drive and cooling fan operation time
- Capacitor, IGBT and SoftCharge relay lifetime
- Drive temperature
- Actual operation peak load

### Travel limit

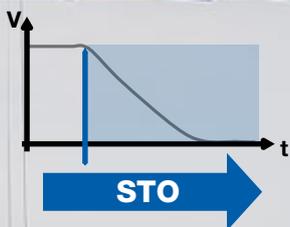
The travel limit sensor connected to the drive prevents overrun and overwinding outside the defined working area.

- Defined working area limits
- Anti-collision measures supported

# Reliability and safety at it's core

## Integrated functional safety

With the built-in dual channel STO (safe torque off, SIL3/PLe), the CR700 provides the right tools for easy machine integration of emergency stop functions, even when a higher level of risk mitigation is required.



TÜV certified



Designed for  
**10 YEARS**  
of maintenance  
free operation

## At home in harsh environments

Designed for 10 years of maintenance-free operation, the CR700 is built tough to withstand even harsh and demanding conditions.

### Coated board protection

Coated PCBs as standard protect the electronics from dust or humidity while ensuring reliable operation even in harsh environments (IEC 60723-3-3, 3C2, 3S2).

### Wide ambient temperature range

CR700 drives can be safely operated in ambient temperatures ranging from -10 up to 60°C. In environments with conditions up to 50°C no derating is necessary.



# Usability first

**Copy function**  
Multiple sets of parameters can be stored and easily transferred (copied) to additional drives

**Hi-resolution display**  
Contrast control offers clear and readable full-text descriptions

**Automatic backup function**  
Saves the current parameter settings after a period of user inactivity. After an incident, settings can be retrieved from the keypad in a couple of seconds.

**Advanced keypad navigation**  
Faster scrolling and function keys provide more responsive navigation and shortcuts that reduce programming time.



**Micro SD storage**  
Micro SD for data logging storage

**Real-time clock**  
Real-time clock for time stamp of fault information (battery compartment in back)

**Optional LCD keypad with Bluetooth®**  
Wireless communication capability between the mobile device and drive

## Keypad benefits and features:

### Reduce set-up time

- Start-up wizard
- Favorite parameter/monitor function
- Copy function integrated into the keypad
- Parameter set is backward compatible with previous generation drive products
- Fast navigation
- Parameter description

### Drive parameter management

- Storage of up to 4 drive parameter sets
- Data logging with real time stamp e.g. for fault analysis, load profile analysis etc. (up to 32 GB on a Micro SD card)
- Fault logging with real time stamp for better analysis
- Multiple parameter storage
- Automatic parameter back-up

### Easy to use

- LCD keypad with Bluetooth® option
- Display contrast control
- Real-time clock with time stamp
- Tactile feel buttons
- Remote mounting of keypad using standard RJ45 extension cable

## Start-up wizard

Reduce basic set-up time to minutes using the start-up wizard without any drive parameter knowledge



# Quick & easy set-up

The CR700 provides a user programming experience with an intuitively-designed keypad and tactile user interface. Self-guiding navigation menus and start-up wizards make the programming and set-up faster and easier than ever. With DriveWizard Mobile the CR700 can easily be managed and controlled from your smartphone or tablet.

## Mobile device connectivity

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



1. Bluetooth keypad optional
2. Supports Android and iOS

# Always handy

Everything needed to operate a CR700 fits right in your pocket. The apps DriveWizard® mobile and Yaskawa Manuals turn your smart-phone or tablet into a versatile and indispensable toolbox for CR700 drives.

## DriveWizard Mobile

DriveWizard mobile is the ultimate setup tool for CR700 drives. From simple parameter editing to the Setup Wizard with an 8 channel fully featured oscilloscope, it provides all the tools needed for setup, monitoring, and process optimization.

- Intuitive parameter editing with help and search functions
- Create favorite parameter lists
- 8-channel oscilloscope with comprehensive trigger functions and data analysis
- Parameter backup/verify
- Setup Wizard for quick setup without knowledge of 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



Mobile device connectivity is enabled using the built-in USB port (USB on-the-go) or via 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 Apple, Inc. and is used under license by Apple, Inc.

## Yaskawa Manuals App

Never carry heavy paper manuals again. With the Yaskawa Manuals App latest manuals for CR700 drives are always close at hand on your phone.

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



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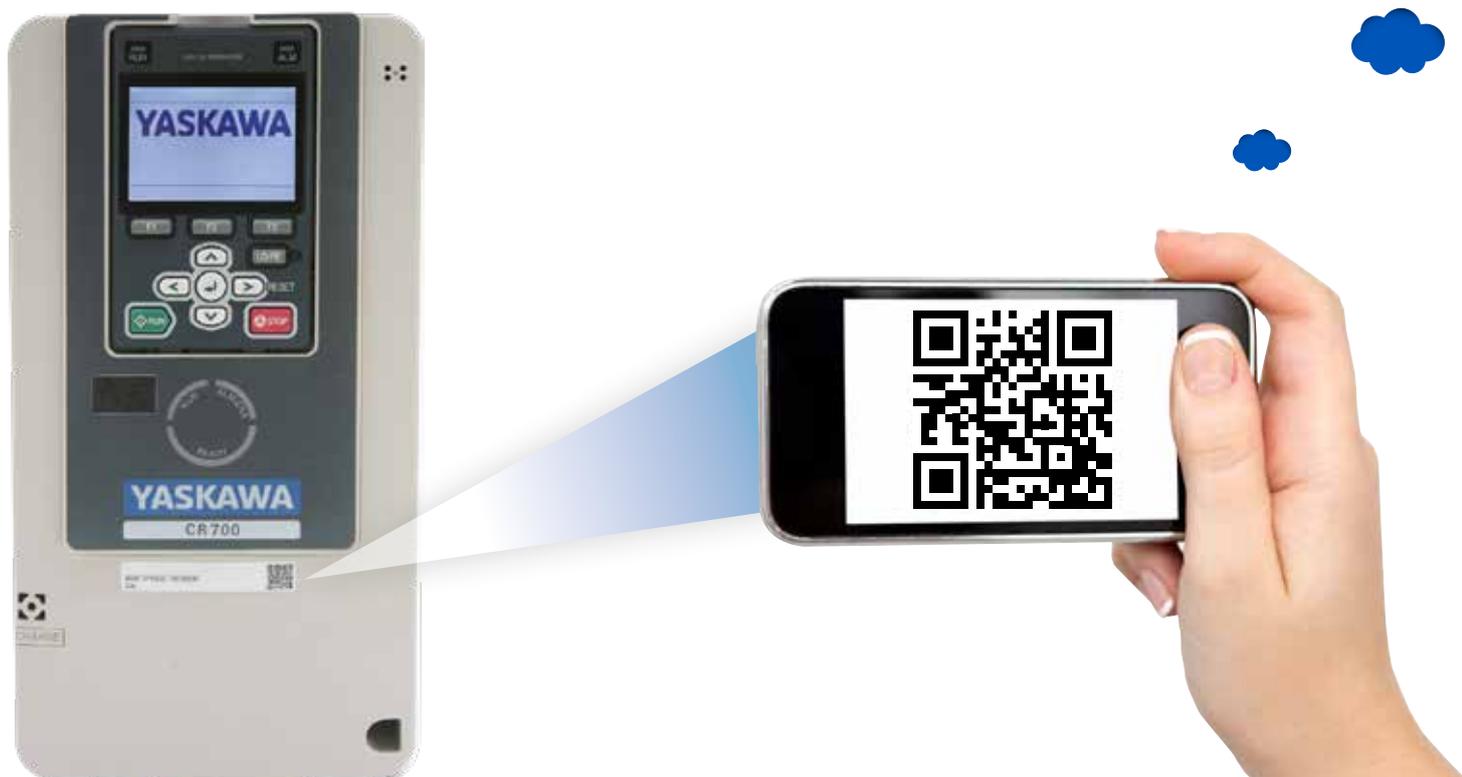
# Convenient set-up and monitoring

Using DriveWizard Mobile the CR700 can be set up, controlled and monitored from your smartphone or tablet easily and intuitively. Connected with the YASKAWA Drive Cloud, DriveWizard Mobile provides quick access to latest product manuals and your drive data, anywhere and anytime.

## DriveWizard® Mobile App

DriveWizard® Mobile turns your smartphone or tablet into a control center for your CR700 drives. It allows parameter setup and drive control but also back up your drive data locally on your smart device or in the YASKAWA Drive Cloud. With DriveWizard® Mobile all your information for parameter setup and troubleshooting of your CR700 drives are in your pocket when you need them.

Scanning the drive QR code can provide easy access to drive information and status with the DriveWizard Mobile application software.



### YASKAWA Drive Cloud service

With the YASKAWA Drive Cloud, we provide free drive registration access to latest product information and online storage for parameter and application backup data. YASKAWA Drive Cloud is the easy and safe way to keep a record of your drive data and to have them available whenever you need them.



### Convenient set-up and monitoring:

#### DriveWizard® Mobile App

- Quick and easy drive management apps for smart devices
- Easy USB OTG cable or Bluetooth® connection
- Drive registration via cloud by scanning QR code
- Paperless and easy access to latest online manual and troubleshooting
- Archive and retrieve parameter settings with comments on your smart device
- Carefree data recovery: Parameter back-up/retrieval anytime via cloud service for registered drives

#### YASKAWA Drive Cloud service

- Online manual
- Complimentary storage for parameter backup and application records
- Convenient drive data storage accessible anywhere
- Direct access to your personal CR700 data package

Search for

YASKAWA 

on



# Energy-saving solutions

We offer customer-friendly solutions with the D1000 regenerative converter unit and the R1000 regenerative unit, which can make a significant contribution to reducing power consumption by feeding braking energy back into the power grid. This reduces costs and ensures efficient operation.



## R1000 regenerative unit

The R1000 regenerative unit with block circuit is an environmentally friendly, sustainable alternative for braking resistors.

Compared to conventional solutions, the R1000 regenerative unit saves space and reduces maintenance work. The energy fed back into the grid also contributes to cost savings and at the same time protects the environment!

- Suitable for 4-quadrant operation without braking resistors
- Eliminating braking resistors saves space and simplifies installation
- Less cooling required for the control cabinet because no heat is generated by resistors
- Recovered energy can be made available to other consumers in the plant, thus reducing the total energy consumption of buildings or factories
- Quick amortization of initial costs
- Proven Yaskawa quality

	Model	Braking resistor	D1000	R1000
<b>Merit</b>				
Use for regenerative applications		○	●	●
Energy saving by power regeneration		-	●	●
Improve power factor		-	●	-
Suppress input current harmonics		-	●	-
DC voltage boost		-	●	-
Multiple drives		-	●	-

**Best performance**

**Minimum operation cost**

**Small carbon footprint**





### D1000 regenerative converter unit

The D1000 regenerative unit saves both power and space. It is suitable for individual regenerative AC drives as well as for systems of AC drives, servo axes or robots.

It feeds excess braking energy back into the power grid instead of converting it to heat. The DC voltage amplification function increases the reliability of the system even when variable or fluctuating input voltages are present.

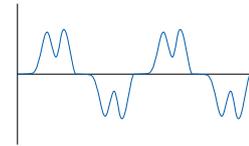
- Constant sinusoidal input and feedback
- No distortion of the input voltage
- Stable intermediate circuit voltage
- DC gain
- Very low harmonics
- Common DC bus for several AC drives

## Clean grid with D1000

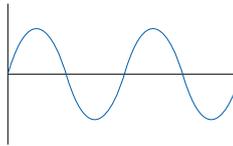
**88%**  
Current distortion

**0.75**  
Power factor

Input current  
Standard AC drive

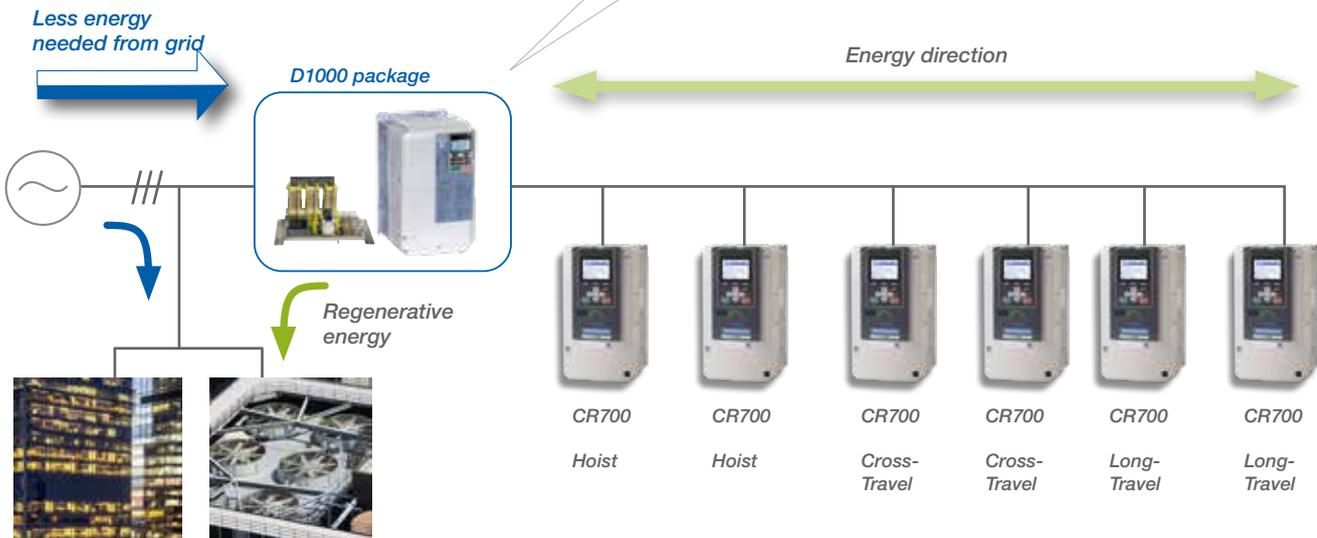


Sinusoidal input current  
with D1000



**5%**  
Current distortion

**0.98**  
Power factor

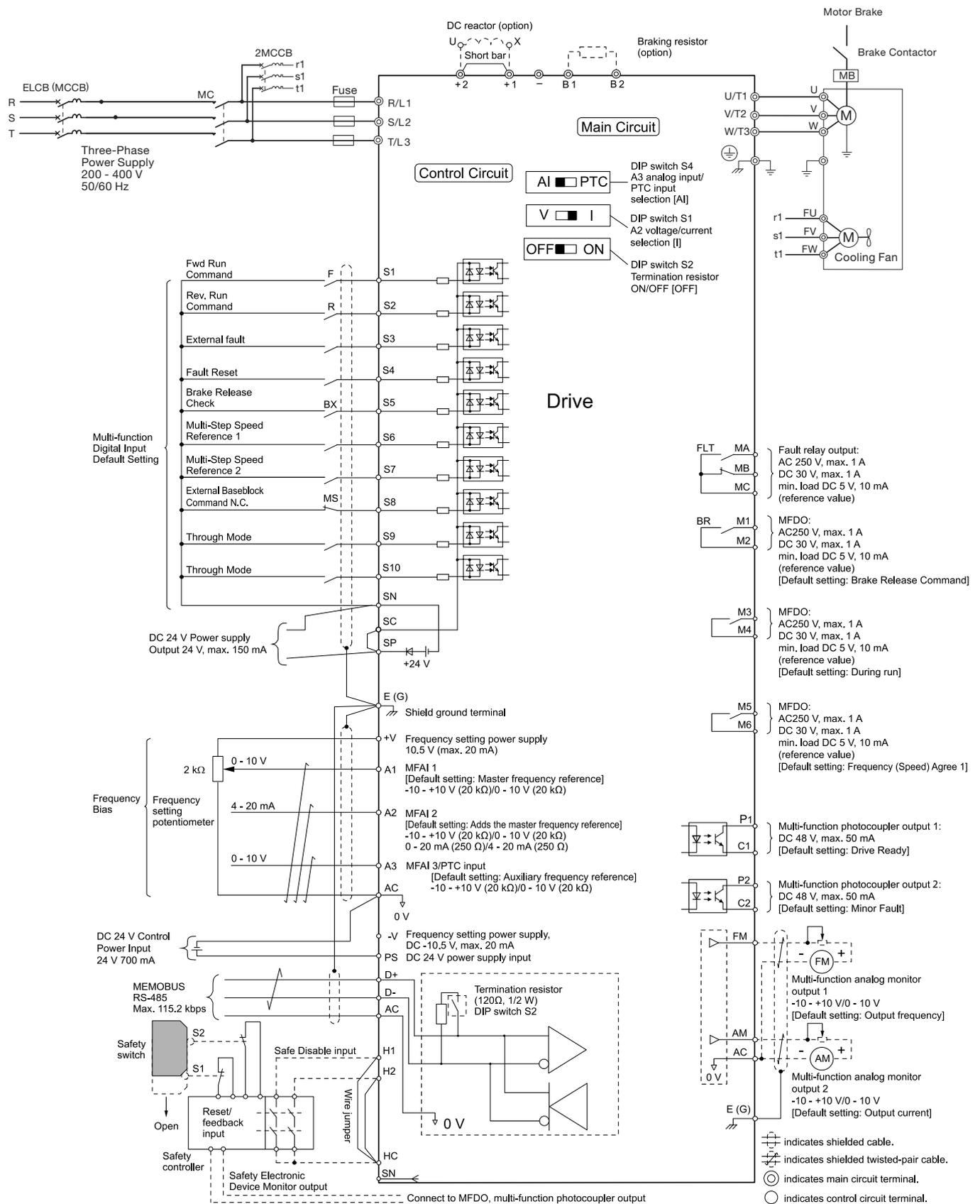


# Specification overview

Control characteristics	
<b>Control methods</b>	V/f Control, Closed Loop V/f Control, Open Loop Vector Control, Closed Loop Vector Control, Advanced Open Loop Vector Control
<b>Frequency control range</b>	Advanced Open Loop Vector Control: 0.01 Hz - 120Hz Closed Loop V/f Control, Closed Loop Vector Control: 0.01 Hz - 400Hz V/f Control, Open Loop Vector Control: 0.01 Hz - 590Hz
<b>Zero speed</b>	Possible in Closed Loop Vector Control
<b>Frequency accuracy (Temperature fluctuation)</b>	Digital inputs: Within $\pm 0.01\%$ of the maximum output frequency ( $-10^{\circ}\text{C}$ to $+40^{\circ}\text{C}$ ) Analog inputs: Within $\pm 0.1\%$ of the maximum output frequency ( $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ )
<b>Frequency setting resolution</b>	Digital inputs: 0.01 Hz Analog inputs: 1/2048 of the maximum output frequency (11-bit signed)
<b>Output frequency resolution</b>	0.001 Hz
<b>Frequency setting signal</b>	Main speed frequency reference: $-10\text{Vdc}$ to $+10\text{Vdc}$ (20k $\Omega$ ), $0\text{Vdc}$ to $10\text{Vdc}$ (20k $\Omega$ ), 4 mA to 20 mA (250 $\Omega$ ), 0 mA to 20 mA (250 $\Omega$ )
<b>Starting torque</b>	V/f Control: 150%/3Hz, Closed Loop V/f Control: 150%/3Hz, Open Loop Vector Control: 200%/0.3Hz, Closed Loop Vector Control: 200%/0 min <sup>-1</sup> , Advanced Open Loop Vector: 200%/0.3Hz
<b>Speed control range</b>	V/f Control: 1:40 Closed V/f Control: 1:40 Open Loop Vector Control: 1:200 Closed Loop Vector Control: 1:1500 Advanced Open Loop Vector Control: 1:200
<b>Accel &amp; decel time</b>	0.0 s to 6000.0 s
<b>Braking torque</b>	Approx. 20% Approx. 125% with a dynamic braking option
<b>V/f characteristics</b>	Select from 15 predefined V/f patterns, or a user-set V/f pattern

Drive features	
Anti-sway function, Synchronized position control, Load balance function without encoder, High-speed operation at light loads, Rope length detection, 3 different motor operation, Brake commands counter, Gateway function, Travel limit function, Overtorque detection function, External heatsink mounting, Bluetooth option, Varnish coated printed circuit board (chemical gas: 3C3, solid particle: 3S2), etc.	
Main control functions	
Droop Control, Feed Forward Control, Zero Servo Control, torque limit, 9 Step Speed (max.), accel/decel switch, S-curve accel/decel, Auto-Tuning (rotational, stationary), cooling fan on/off switch, slip compensation, torque compensation, Frequency Jump, Upper/lower limits for frequency reference, Injection Braking at start and stop, Overexcitation Deceleration, MEMOBUS/Modbus (RTU mode) Communications (RS-485, max. 115.2 kbit/s), Parameter Backup Function, Online Tuning, Overexcitation Deceleration, Inertia Tuning and ASR Tuning, Crane Sequence, etc.	
Protective functions	
Stall prevention, overload protection, overheat prevention and further protective functions for the motor, the application and the AC drive	
Other options	
Bluetooth® keypad, attachment for external heatsink, external EMC filter, shield clamp kit, AC reactors, DC reactors, braking resistors, braking modules	
Operating environment	
<b>Ambient temperature</b>	-10 to +50°C (IP20), -10 to +40°C (UL Type 1), up to +60°C with derating
<b>Storage temperature</b>	-20 to +70°C
<b>Humidity</b>	95% RH or less (non-condensing)
<b>Altitude</b>	Up to 1000m without derating, up to 4000m with derating
<b>Vibration/Shock</b>	10 to 20 Hz: 1G (9.8m/s <sup>2</sup> ) 20 to 55 Hz: CR70C4002 - 4150: 0.6G (5.9m/s <sup>2</sup> ); CR70C4180 - 4605: 0.2G (2m/s <sup>2</sup> )
<b>Protection design</b>	IP20 standard, UL Type 1-Kit (optional)
<b>Environmental conditions</b>	IEC 60721-3-3, Class 3C2 (chemical gases), Class 3S2 (solid particles)
Conformity / Standards	
<b>Standards</b>	UL61800-5-1, EN61800-3, IEC/EN61800-5-1
<b>Functional safety</b>	ISO/EN13849-1 Cat.3 PL <sub>e</sub> , IEC/EN61508 SIL3

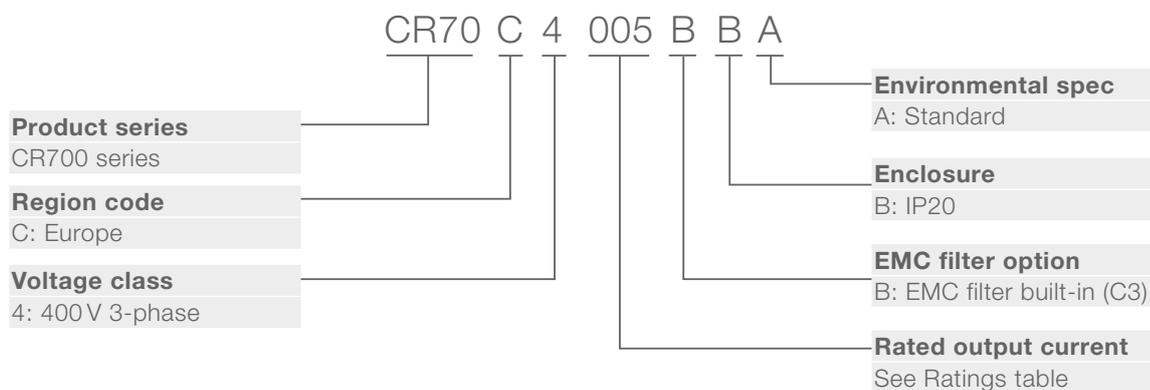
# Connection diagram



For more information please refer to the CR700 Technical Manual or contact your Yaskawa representative.

# Technical data

## Catalog code

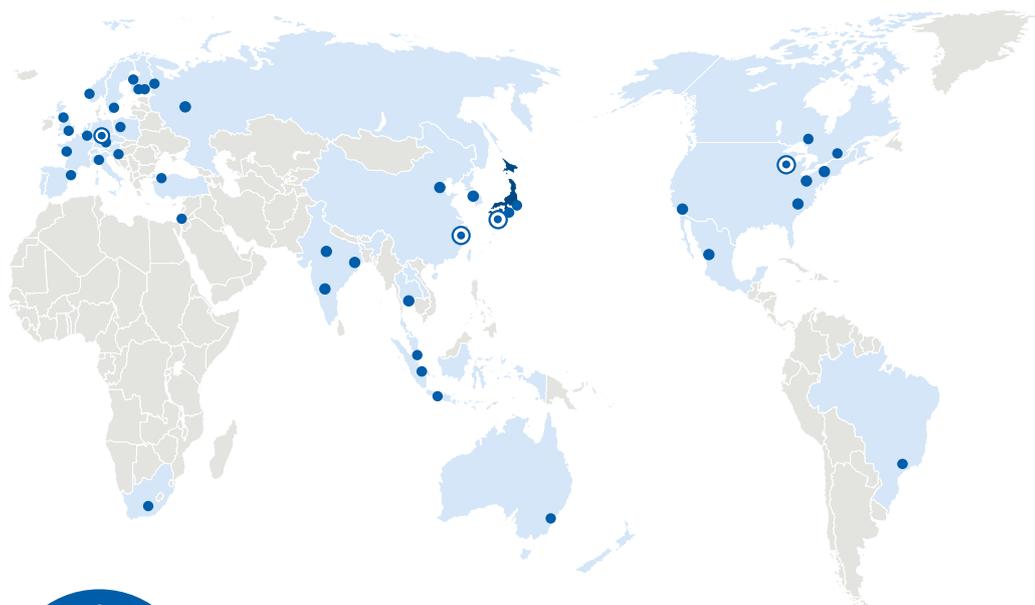


## Ratings

380 - 480 VAC, 3-phase

Catalog code CR70C□□□□B□	Max. applicable motor power [kW]	Rated output current [A]	Dimensions [mm]			Weight [kg]
			H	W	D	
4002	0.55	1.8	260	140	176	3.5
4003	1.1	3.4				
4005	1.5	4.8				
4006	2.2	5.5				
4007	3.0	7.2			211	3.9
4009	4.0	9.2				
4015	5.5	14.8				
4018	7.5	18				
4024	11	24	300	180	202	6.0
4031	15	31				
4039	18.5	39	350	220	227	7.5
4045	22	45			246	13
4060	30	60	400	240	280	16
4075	37	75	450	255		35
4091	45	91				
4112	55	112	543	264	335	40
4150	75	150				
4180	90	180	700	312	420	80
4216	110	216				
4260	132	260				
4304	160	304	800	440	472	120
4371	200	371				
4414	220	414	1140	510	480	175
4453	250	453				
4605	315	605				

# Global company – European player



• Top 100 Global Innovator 2016, 2017, 2018, 2019, 2020 and 2021\*

\* Derwent Top 100 Global Innovators

• More than 100 European Channel Partners

• Network of System Integrators

## Engineering capacity in Europe

### Application Engineering

- Machine solutions
- Application adaption
- Training & support

> 2010 > > > > 2021 >

### Product Development

- Firmware, Communication
- Hardware, Mechanics
- Safety solutions
- Software tools
- Chip development



## European production sites

Glasgow, Scotland  
Production of drives and servo products



Ribnica, Slovenia  
Plant construction and robot systems



Torsås, Sweden  
Assembly of controllers, positioners and portals



Allershausen, Germany  
Plant construction and robot systems



Kočevje, Slovenia  
Robot manufacturing and R&D center



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11/2021  
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