

YASKAWA

YASKAWA AC Drive CH700

For Cranes

200 V Class, 0.4 to 110 kW

400 V Class, 0.4 to 315 kW



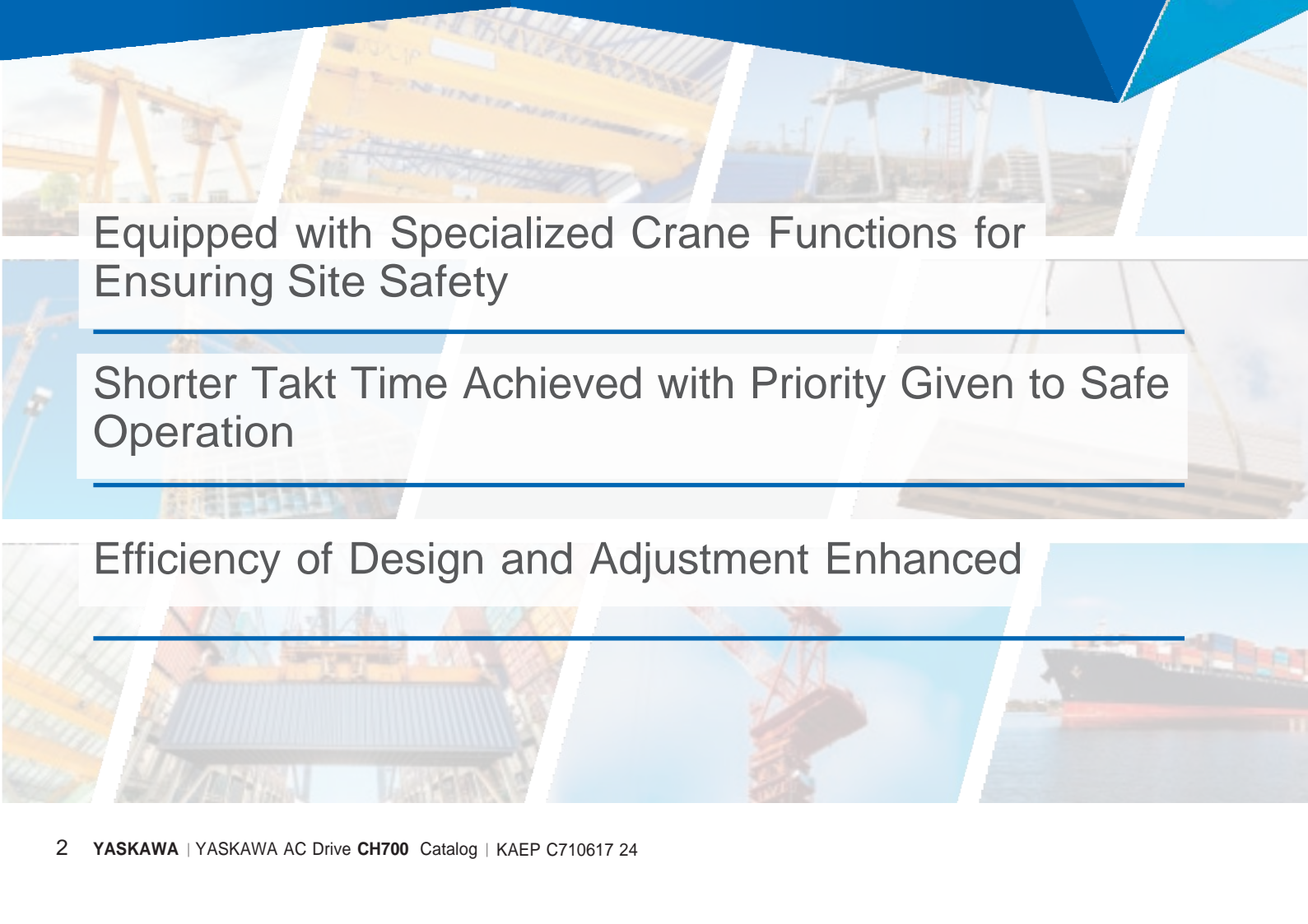
Best Value for Your Cranes

Specialized high-performance drives for cranes

Our number one priority at Yaskawa Electric Corporation is to always keep the customer's perspective in mind by leading the industry in meeting demands with uncompromising quality and trust.

Our new CH700 was developed to further optimize cranes based on the concepts of Flexible, Easy, Sustainable.

Yaskawa can now deliver the most 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 Takt Time Achieved with Priority Given to Safe
Operation

Efficiency of Design and Adjustment Enhanced



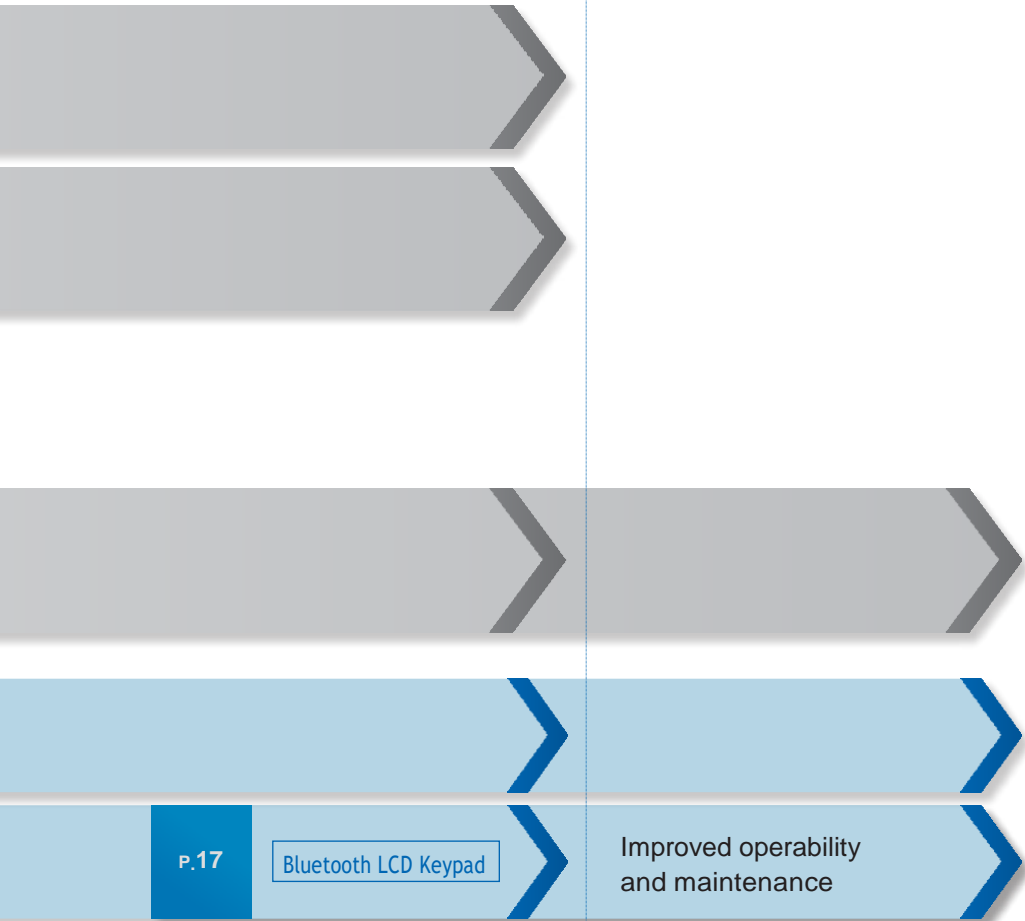
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	P. 17	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-right: 10px;">YASKAWA Drive Cloud</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">DriveWizard Mobile</div>	Use your smartphone to control everything, from drive startup to monitoring

Production Technology

Maintenance



Note: Bluetooth is a trademark of Bluetooth SIG, Inc.

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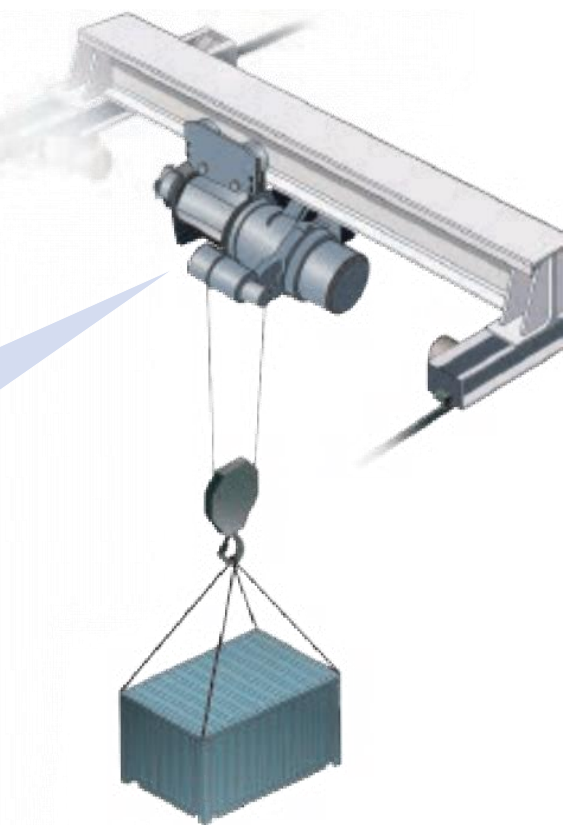
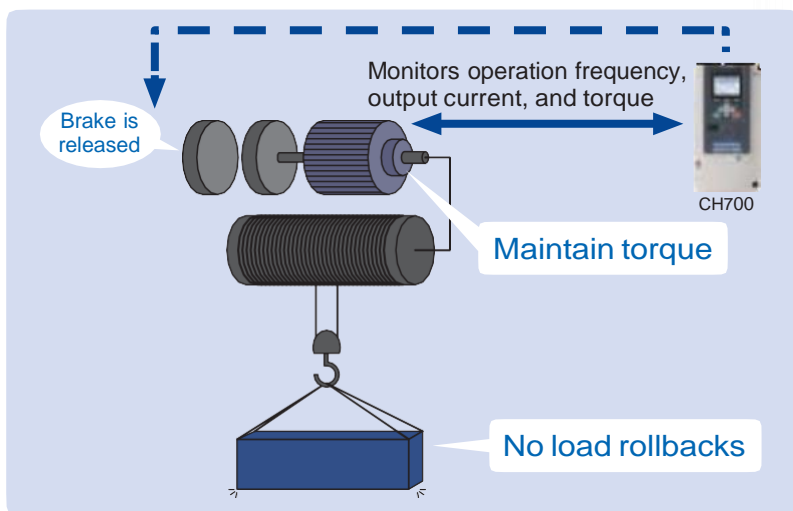
Equipped with Specialized Crane Functions for Ensuring Site Safety

Equipped with specialized crane functions gained through years of active service of Yaskawa AC drives in the field.



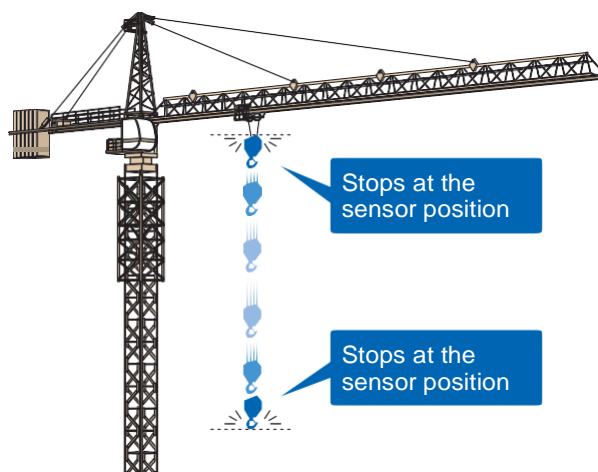
Rollback Prevented by Integrated Brake Sequence

The brake release command is judged and output in relation to the operation frequency of the drive, output current, and amount of torque. Brakes are released and applied while ensuring enough torque to maintain the load during starts and stops to prevent load rollback.



Travel Limit Function Ensures Safe Stops

The limit sensor set in the allowable movement range prevents over-traveling and overwinding.



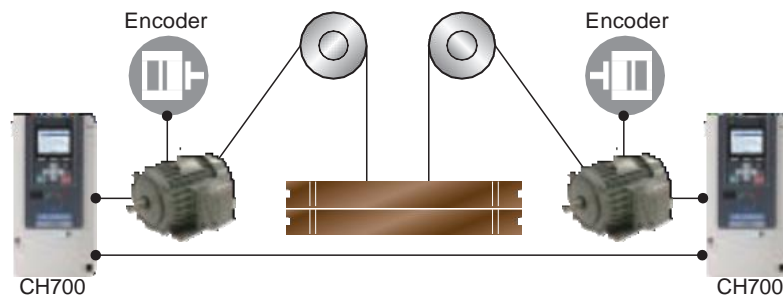
Slope Prevention Function Achieves Safe Traveling

High-precision control is performed in accordance with the operating conditions of machines to enable stable traveling and operation.

Synchronization Control*

Synchronization control is performed to prevent positional deviation that can occur when lifting a load jointly with two elevators using Closed Loop Vector Control. Separate equipment and control to reduce slope are not required.

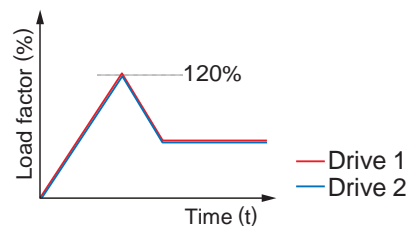
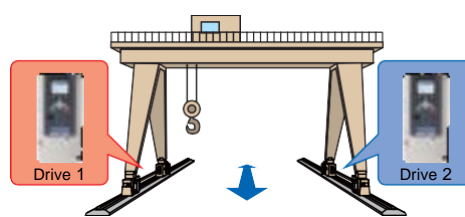
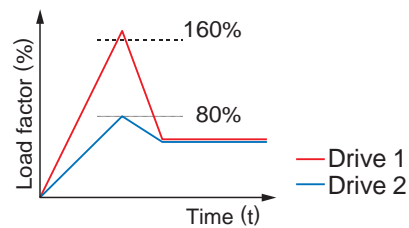
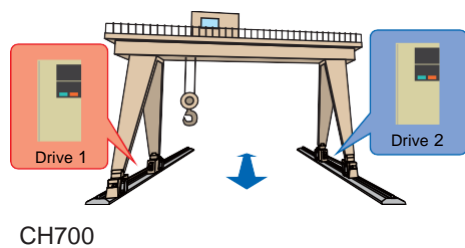
*: Contact your Yaskawa representative when applying synchronization control.



Load Balancing Function

The load can be distributed evenly between drives without the use of encoders.

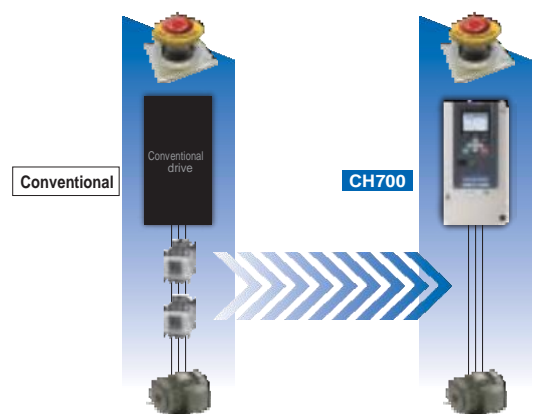
■ Conventional drives



SIL3 Supported as Standard. Safety Ensured without the Need for Additional Equipment

STO from two-terminal input (safety shut-off torque) is equipped as standard. Complies with IEC/EN61508 SIL3 and ISO13849-1 Cat.3 PLe.

With this function, a high degree of safety can be built without additional equipment, such as an electromagnetic contactor. Saves wiring and space.



Shorter Takt Time Achieved with Priority Given to Safe Operation

This drive offers the worthwhile advantage of achieving enhanced workability while ensuring safety.

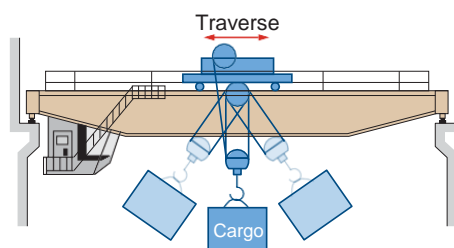


Workability Improved by Cargo Swing Suppression Function

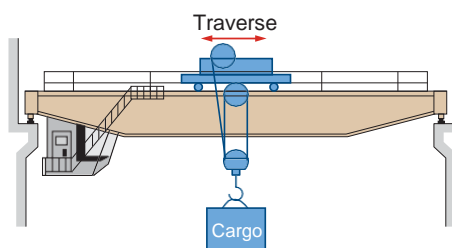
Cargo swing during traverse motion can be reduced with the built-in Cargo Swing Suppression function.

This enables cargo to be lowered without any swing, which reduces takt times.

■ Disabled



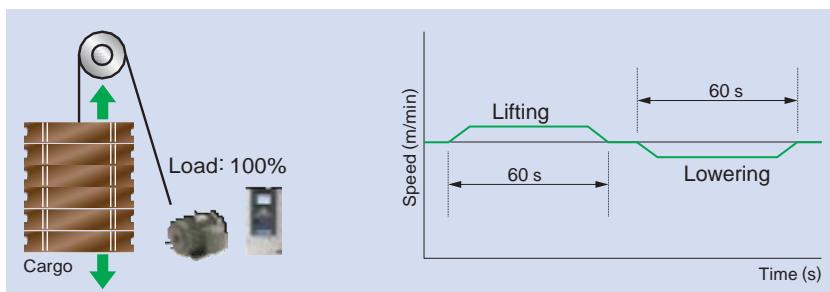
■ Enabled



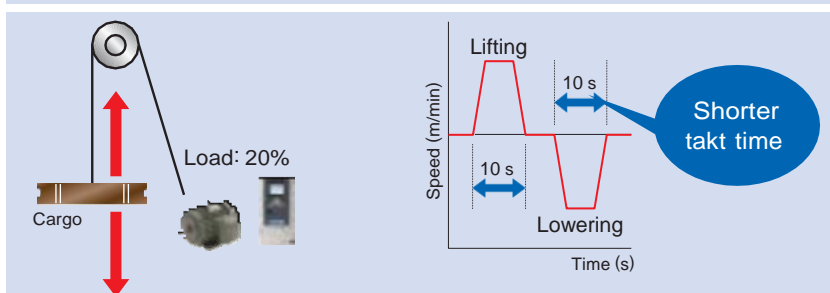
Light-load Acceleration Function Achieves Shorter Takt Time

With this light-load, high-speed function, our drive operates at optimal speed in accordance with the load. High-speed operation can be performed when handling light loads. This shortens the tact times when using long lifting cranes, such as those used in constructions.

■ Heavy loads



■ Light loads



Drive Functions Ensure Safe Operation

Run Command Adjustment Function

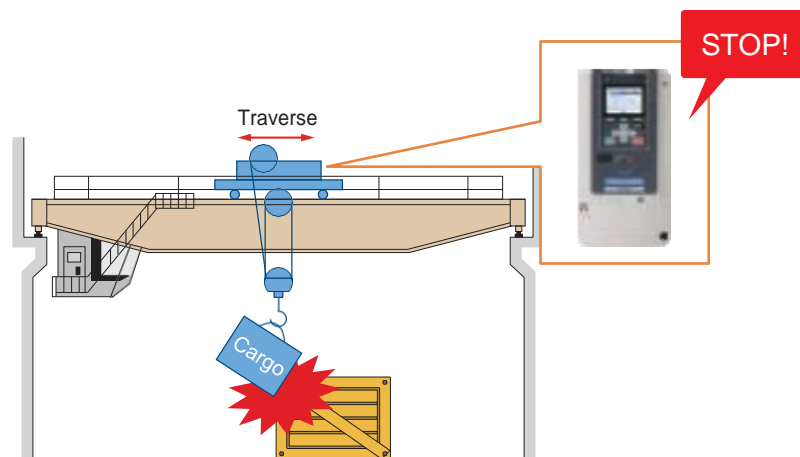
Reliable movement during inching. Our system prevents excessive current from flowing during lifting operations performed immediately after lowering operations.

Wire Length Detection

Information on the height of the hook that is not visible from the operating room can be externally output using only the drive.

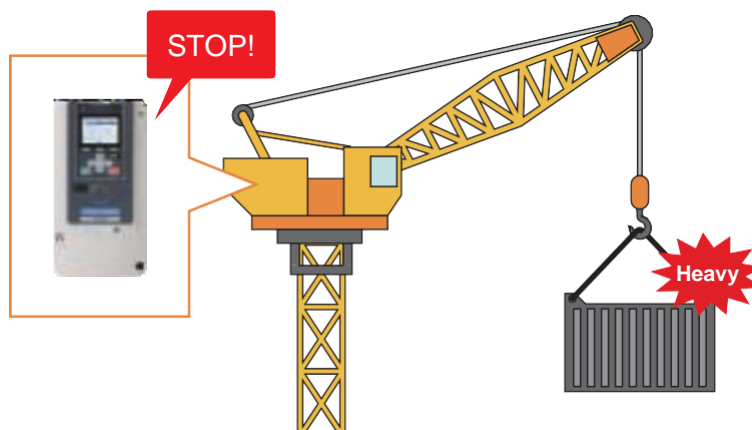
Overtorque Detection Function

Detects an increased torque value when a load comes into contact with an object. The drive stops the motor automatically to prevent machine malfunctions and increase safety.



Overload Detection Function

The drive restricts the operation of the crane (lifting) when the load exceeds a predetermined upper limit value. The drive can be configured to display alarms and stop crane operation to prevent operation with an overload that could lead to a dangerous situation.



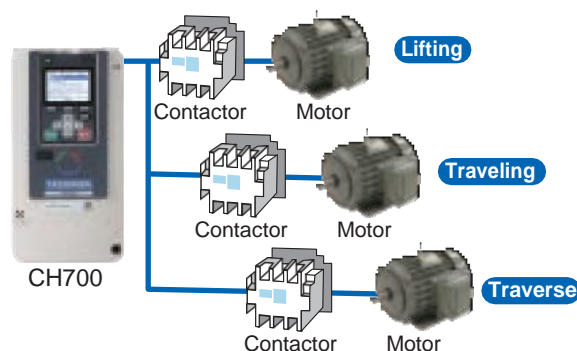
Efficiency of Design and Adjustment Enhanced

Ensuring that specifications required for crane operation are maintained helps shorten the time until machinery and equipment startup.

3-Motor Switching Function

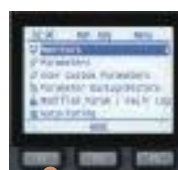
One drive can switch between and control motors with three axes for lifting/lowering, travelling, and transverse operations. Our drive can support individual brake sequences for each motor, so downtime during a drive failure can also be reduced as a result of the ability of drives to act as substitutes for other motors. Traditionally, one drive was needed for each motor. However, one drive can switch between motors to reduce the number of drives needed.

	Control mode	Application	Brake Sequence
Motor 1	Any	Any	Possible
Motor 2	Any except for Advanced Open Loop Vector Control	Any	Possible
Motor 3	V/f Control only	Traveling and turning	Only brake release and apply control can be set.



Application Preset Simplifies Setup

Simply set parameter A1-06 (Application Preset) matched to the intended crane application (lifting/traverse/traveling) to let the drive automatically set the best parameter settings for the selected application. This greatly reduces the task of setting parameters.



Application	A1-06
Hoist (lifting)	1
Crane (traverse/traveling)	2
Hoist with PG (lifting)	3

Contact Positioning Function

When the Stop command is valid while a contact position command is in effect for applications, such as transport lines, the drive detects collision and stops operating if the torque reference or output current are higher than the standard value.

Quick positioning can be performed using this contact positioning function.

Note: This is only enabled when ramp to stop mode is selected.
Do not use this function with machines such as trucks with wheels that may spin freely when there is a crash because the motor will not be constrained, and the torque reference or output current will not increase.

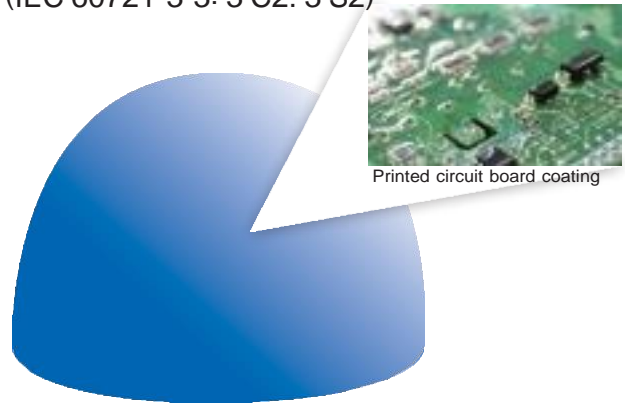
Wide range of protection for various environmental specifications

Resistant to vibration, gas, moisture, dust, and oil.



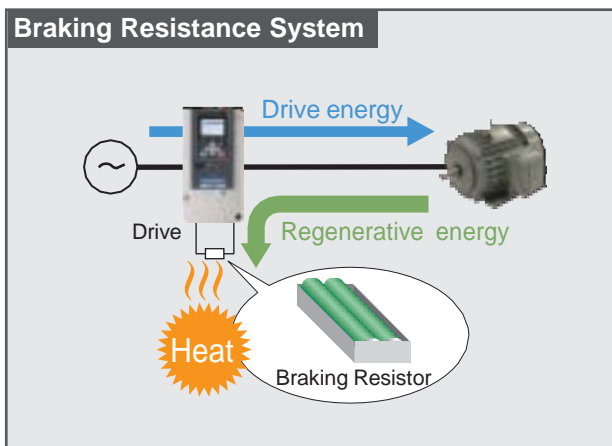
Varnish-Coated Printed Circuit Board

The printed circuit board is treated with varnish as standard and can be used under harsh environmental conditions. (IEC 60721-3-3: 3 C2, 3 S2)



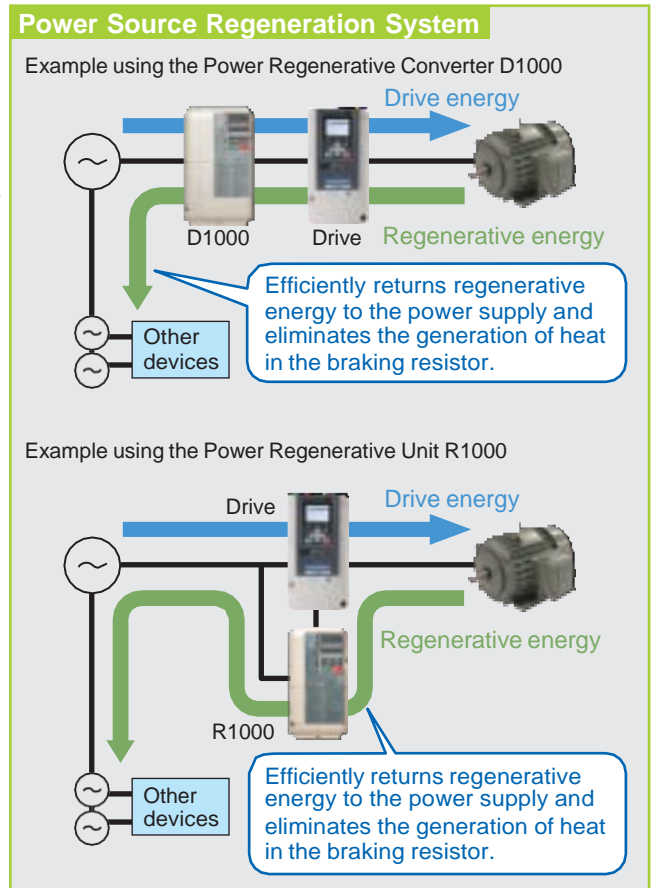
Minimal Drive Watt Loss and Energy Savings

Regenerative energy that has conventionally been wasted as heat can be effectively used. The CH700 can minimize the generation of heat and avoid issues caused by heat in surrounding equipment.



How regenerative energy is processed

Model	Dynamic Braking Option	Power Regenerative Converter D1000	Power Regenerative Unit R1000
Merit			
Regenerative energy treatment	○	○	○
Use power regeneration to save energy.	×	○	○
Suppression of harmonics	×	○	△
Use with more than one drive	×	○	×
Reduction of power supply capacity	×	○	△



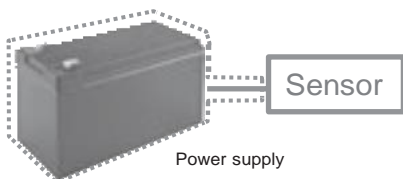
Priority Given to Minimize Space and Initial Investment

In designing this drive, we thoroughly looked into how far the number of required peripheral devices and installation space can be reduced.

Peripheral Device Functions Incorporated for Minimal Initial Investment

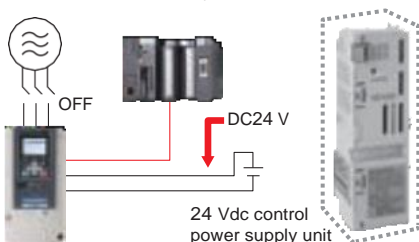
Built-in Power Supply for the Sensor

Separate power supply not required because the drive provides a 24 Vdc output (150 mA) for external sensors.



24 Vdc Control Power Input Terminal Standard Equipped

By using an external 24 VDC power supply, sequences and fault history can be checked even when the main circuit power supply is OFF.



SIL3* Correspondence STO Standard Equipped

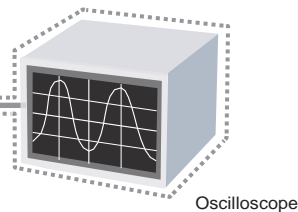
Two contactors are no longer needed.
*: Safety performance measurement under IEC/EN61508



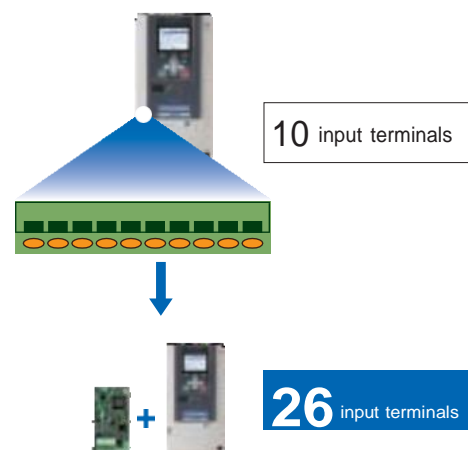
High Performance Control Even Without an Encoder

Oscilloscope Function

With the improved oscilloscope function performance for the DriveWizard support tool, adjustments can be made without the need for external measuring instruments.



10 input terminals Standard Equipped



The digital frequency reference card DI-A3 input terminal can also be used as the multi-function input terminal. PG option cards and I/O option cards for the 1000 series can also be used.

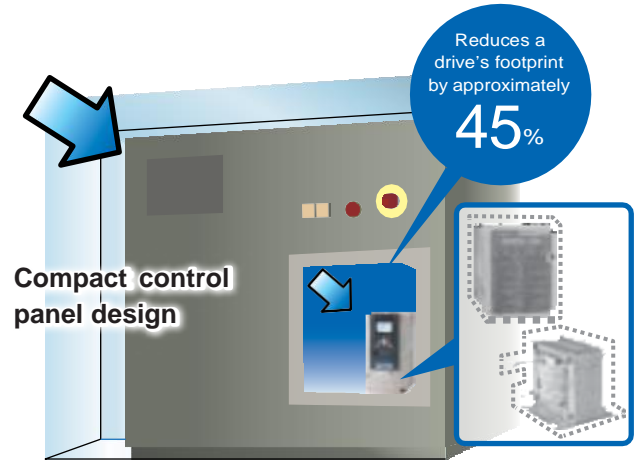
(Applicable up to 75 kW for 200 V Class/400 V Class)

Minimal Installation Space

Braking Transistor / DC Reactor Built-in

Harmonics resulting from built-in DC reactors are taken into consideration. The braking transistor is also built in to eliminate the need for a stand-alone braking unit. This reduces a drive's footprint by approximately 45% in comparison with the conventional drives, which enables the design for more compact control panels.

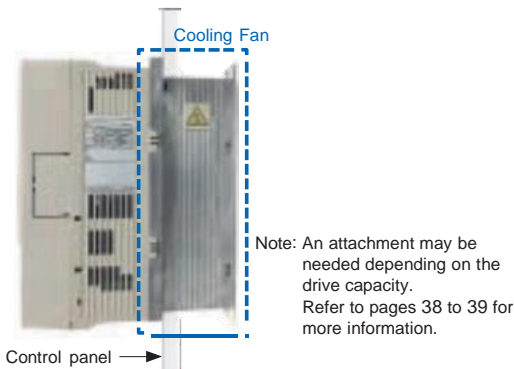
Built-in Braking Transistor and DC Reactor				
200 V class	DC Reactor Built-in			
	0.4 kW	22 kW	30 kW	110 kW
	Braking Transistor Built-in			
400 V class	DC Reactor Built-in			
	0.4 kW	22 kW	75 kW	315 kW
	Braking Transistor Built-in			



Note: Comparison with our conventional models. In this case, a 400 V 110 kW model is used as an example. Reductions in footprints vary depending on the capacity.

External Heatsink

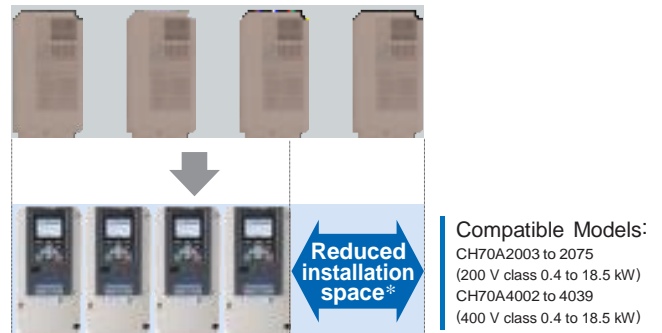
The drive heatsink can be installed outside of the panel, and the control panel can be minimized.



Side-by-Side Installation

Multiple drives can be installed in close proximity (side-by-side installation). Note: Derating must be considered.

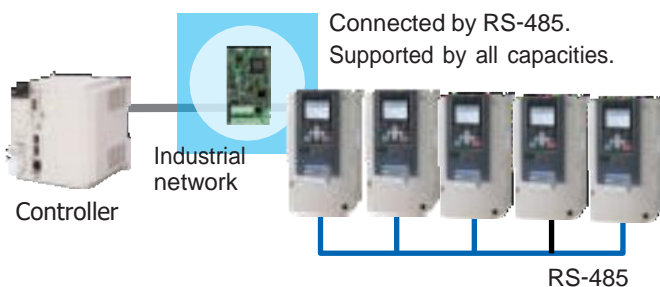
(ex. 200 V class 0.4 kW)



*: At least 30 mm of space is needed if installed near a wall.

Reduced Number of Parts

The network protocol for industrial use has been converted to RS-485 to enable control of up to five drives from a single communication option.



Enhanced Communication Option Card

A variety of field networks, including MECHATROLINK-II, MECHATROLINK-III, PROFIBUS-DP, DeviceNet, CC-Link, CANopen, LONWORKS, including Industrial Ethernet, such as EtherNet/IP, can be supported with the use of one communication option card.

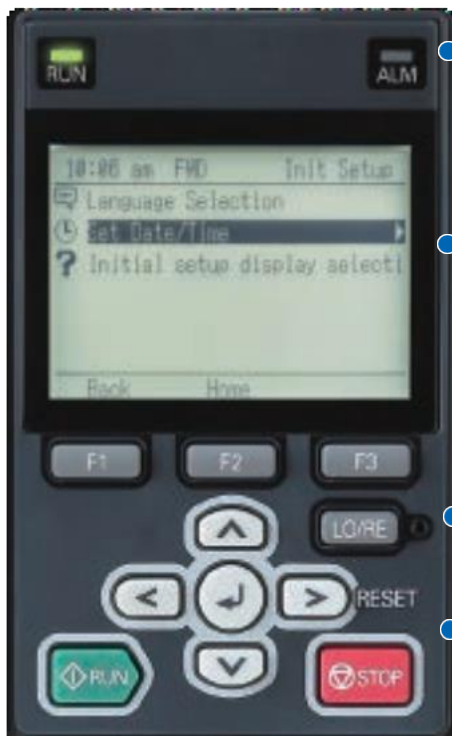
Note: MECHATROLINK is a trademark of MECHATROLINK Members Association. PROFIBUS is a trademark of PROFIBUS Nutzerorganisation e.V. DeviceNet is a trademark of ODVA. Ethernet is a trademark of Fuji Xerox Co., Ltd.

Dead Time During Maintenance and Downtime Eliminated

Monitor functions and tools are available that allow anyone to perform maintenance and recovery work quickly and easily.

Very Latest LCD Keypad Considerably Reduces Maintenance and Downtime

Downtime: Non-operating time due to equipment problems.



Built-in Clock Functions

Easily identify the time of the malfunction with the built-in clock function.

Note: Requires a Hitachi Maxell "CR2016 Lithium Manganese Dioxide Battery" or equivalent.

microSD Slot

Save log data to the microSD card. Saved data can be displayed as a waveform with the "DriveWizard" support tool, which helps you to understand what malfunction has occurred and simplifies analysis.



Capable of Storing Parameters of the Four Drives

The keypad can now store the parameters of up to four drives.

Automatic Parameter Backup Function

In the unlikely event that there is a problem with the drive, you can connect the keypad to the replacement drive and copy the parameters using the automatic parameter backup function.



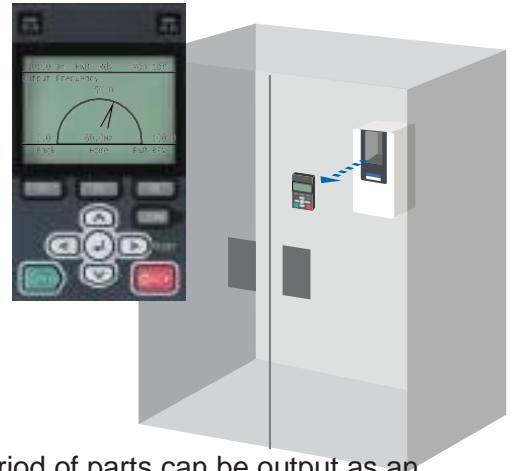
Closed-Door Operations and Monitoring*1

By installing an LCD keypad on the surface of the control panel, you can operate and monitor the drive installed inside the panel without having to open a door.

*1: Requires compact Keypad Panel Mounting Kit (optional)

Crane Maintenance Monitor

The monitor keeps a count of the number of brake commands. This information is helpful in determining brake maintenance schedules for inspecting system and replacing parts.

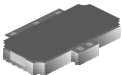





Monitor Performance Life

Performance Life Monitors

With performance life monitors, the approximate maintenance period of parts can be output as an alarm signal to notify users in advance. In addition, you can monitor the deterioration status of the parts which can help you to make a maintenance plan easier.

▼ Limited lifetime service parts of drive

IGBT 	Main circuit capacitors 	Soft charge bypass relays 	Cooling fans 
---------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------



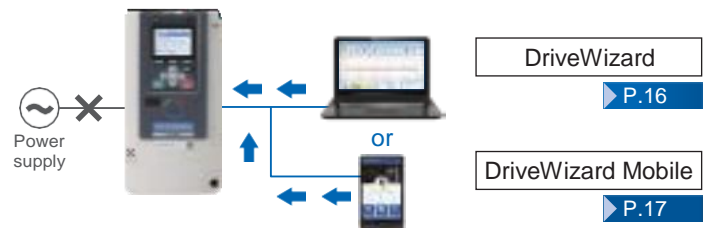
Quick Response

You can perform recovery work and confirm malfunctions without applying main circuit power.

Method 1: Supply power from 24Vdc external power supply



Method 2: Supply power from a computer or a smartphone via USB cable*2

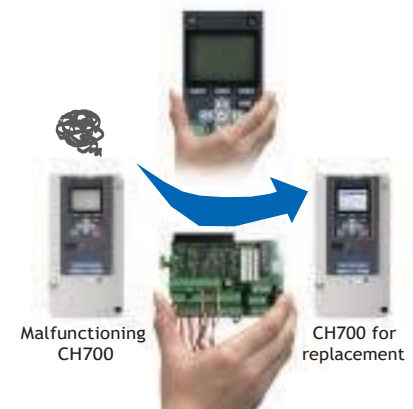


*2: A commercially-available USB cable can be used.

Less Downtime

There is no need to reprogram and rewire the replacement drive in the event of failure. Simply replace the LCD keypad and terminal board to quickly replace the drive securely. You can select various parameter backup methods.

- **Standard LCD keypad:**
Stores the parameters of up to four drives and is equipped with a built-in automatic parameter backup function.
- **Easy replacement just by switching with a removable control circuit terminal block**



Support from Machinery and Equipment Startup to Maintenance

Support Tool DriveWizard

Simply connect the drive to a computer with a USB cable to centrally manage the parameters. You can use the oscilloscope function to monitor operations and assist with maintenance.

Simple Connection

- Connect using a commercially-available USB cable (Mini B to Type A)
- Connect even when no power is supplied to the drive

Connectible immediately in a factory setting



USB connection

Simple Adjustment

- Read/write drive parameters
- Auto-Tuning
- Visual monitor that is easy to understand at a glance



Easy Maintenance

- Use the drive monitor to confirm the status of the machinery
 - Output frequency (Motor Rotation Speed)
 - Load Current
 - Output voltage
 - Power consumption
 - Torque
 - Hours of operation
 - Maintenance period

Easy Fault Analysis

- Displays the saved data on a microSD card as a waveform
- Displays the drive monitor data as a graph
- Displays the I/O terminal status
- Displays the fault history



Use a Smartphone to Adjust the Drive and Perform Maintenance

Web Product Management Service YASKAWA Drive Cloud

Efficient Production Management via the Cloud

By registering the machinery and equipment data or the parameters to a dedicated customer page, you can efficiently perform maintenance of machinery and equipment.



Smartphone App DriveWizard Mobile Wireless Access with a Smartphone

By installing a Bluetooth integrated keypad (option) to the panel surface, you can remotely access the drive with a smartphone. Edit parameters, perform operations and check monitored data in real-time.

- Monitor the operation status
- Stop operation and perform tuning
- Check fault history and parameter settings



Download DriveWizard Mobile for free from the App Store or Google Play. You can also use hyper-links on Yaskawa's product and technical information website (<http://www.e-mechatronics.com>) to access the App Store and Google Play.

Note: Apple and the Apple logo are trademarks of Apple Inc., registered in the U.S. and other countries.

App Store is a service mark of Apple Inc.

Google Play and the Google Play logo are trademarks of Google LLC.

The "iOS" trademark is used based on the license from Cisco Systems, Inc., USA.

QR Code is a trademark of DENSO WAVE INCORPORATED.

Bluetooth is a trademark of Bluetooth SIG, Inc.

Model Number

Drives can be customized according to your specifications.

CIPR- CH70 A 2 003 A B A A - G A A A A A

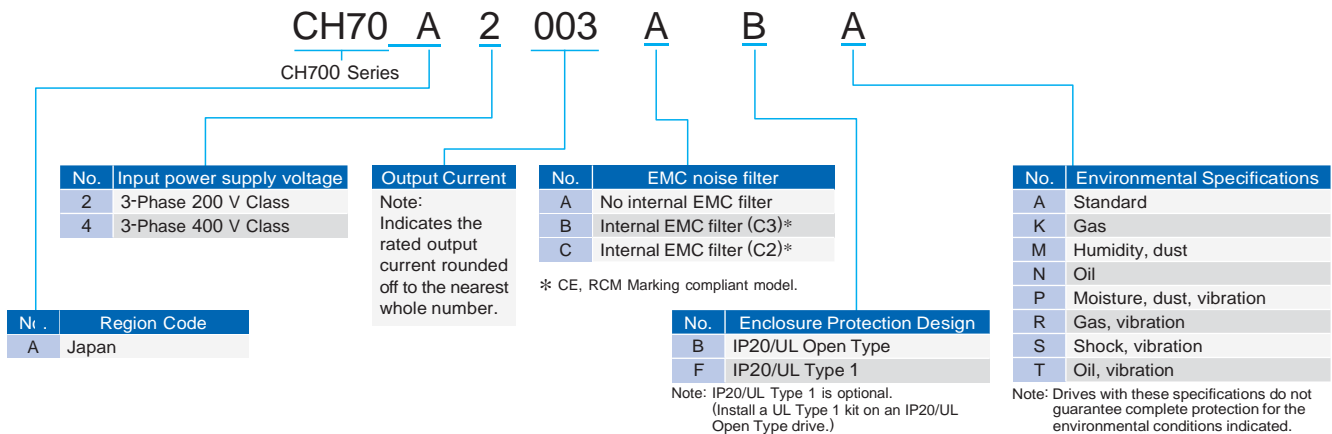
1 2 3 4 5 6 7 8 9 10 11 12 13 14

No	Description
1	Product series ·CH700 series
2	Region code ·A: Japan
3	Input power supply voltage ·2: 3-phase AC 200 V Class ·4: 3-phase AC 400 V Class
4	Output Current*1
5	EMC noise filter ·A: No internal EMC filter (Standard) ·B: Internal category C3 EMC filter ·C: Internal category C2 EMC filter
6	Enclosure Protection Design ·B: IP20/UL Open Type (Standard) ·F: IP20/UL Type 1 Note: IP20/UL Type 1 is optional. (Install a UL Type 1 kit on an IP20/UL Open Type drive.)
7	Environmental specifications ·A: Standard ·K: Gas-resistant ·M: Humidity-resistant and dust-resistant ·N: Oil-resistant ·P: Humidity-resistant, dust-resistant, and vibration-resistant ·R: Gas-resistant and vibration-resistant ·S: Vibration-resistant ·T: Oil-resistant and vibration-resistant Note: Drives with these specifications do not guarantee complete protection for the environmental conditions indicated.
8	Design revision order

No	Description
9	Control circuit terminal board ·G: 10 digital input, screw clamp terminal board type
10	Option card (connector CN5-A) ·A: No option card (Standard) ·D: AI-A3 (Analog Input) ·E: DI-A3 (Digital Input) ·F: SI-C3 (CC-Link) ·G: SI-ET3 (MECHATROLINK-III) ·H: SI-N3 (DeviceNet) ·J: SI-P3 (PROFIBUS-DP) ·K: SI-T3 (MECHATROLINK-II) ·M: SI-S3 (CANopen) ·S: SI-EP3 (PROFINET)
11	Option card (connector CN5-B) ·A: No option card (Standard) ·B: AO-A3 (Analog Monitor) ·C: DO-A3 (Digital Output)
12	Option card (connector CN5-C) ·A: No option card (Standard) ·U: PG-B3 (Complementary Type PG) ·V: PG-X3 (Motor PG Feedback Line Driver Interface) ·Y: PG-RT3 (Motor Feedback Resolver TS2640N321E64 Interface)
13	Keypad ·A: LCD keypad (Standard)*2 ·B: LCD keypad (humidity-resistant and dust-resistant)*2 ·D: Bluetooth LCD Keypad*2 ·E: Bluetooth LCD Keypad (humidity-resistant and dust-resistant)*2 ·F: LED keypad*2 ·G: LED keypad (humidity-resistant and dust-resistant)*2
14	Special applications ·A: Standard

*1: Indicates the rated output current rounded off to the nearest whole number. Refer to Rated Output Current column on page 22 to 23 for detailed values.
*2: A separate cable must be purchased to connect the drive and the keypad. Refer to Keypad Extension Cable on page 60 for more details.

Catalog Code



Selecting the Capacity

When using the drive for shaft spinning, traversing, and traveling, the drive should be selected so that the rated output current of the drive output amps are equal to or greater than the motor rated current.

When using the drive for a lifting shaft, the current upon startup must be maintained to 150% or less of the rated output current. Yaskawa recommends selecting the drive according to the following formula.

Formula: rated output current of the drive × coefficient (0.6 to 0.9) > motor rated current

Coefficient for each control mode

- Closed Loop Vector Control: 0.9
- Open Loop Vector Control, Advanced Open Loop Vector Control: 0.8
- V/f Control*, Closed Loop V/f Control: 0.7

*: When driving multiple motors using one drive, it is calculated with a coefficient of 0.6. Calculate the motor rated current by the total value of two or more motors.

Basic Instructions

Outstanding operability and quick setup

Keypad Names and Functions

- ① **RUN LED**
Lit while the drive is operating the motor.
- ② **ALM LED**
The drive lights up if a fault is detected.
Flashes when minor faults, tuning errors and operational errors occur.

- ⑤ **LO/RE LED**
Lit : When the keypad is selected for Run command and frequency reference control (LOCAL).
Off : When a device other than the keypad is selected for Run command and frequency reference control (REMOTE).

- ⑥ **RUN Key**
Starts the drive in LOCAL mode.
- ⑦ **STOP Key**
Stops drive operation.

- ⑧ **Com port**
For connecting to a PC (DriveWizard), a USB copy unit or a LCD keypad.

- ⑨ **LED Status Ring**
The corresponding lamp lights depending on the operation status.

- ⑩ **QR code**
Import the dedicated smartphone application "DriveWizard Mobile" and use it to retrieve product information.



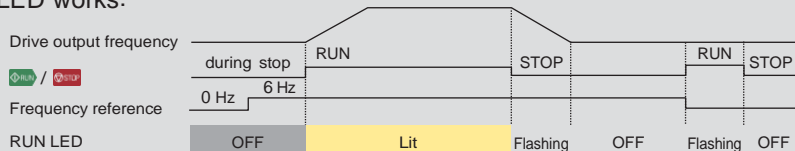
- ③ **Function Keys: F1, F2, F3**
The functions of the function key depend on the menu that is being displayed. The name of each function appears in the lower half of the display window.
- ④ **Display Operation Keys: LEFT Arrow Key**
 - Moves the cursor to the left.
 - Returns to the previous screen.
- UP Arrow Key / DOWN Arrow Key**
 - Scrolls up to display the next item.
 - Scrolls down to display the previous item.
 - Selects parameter numbers.
 - Increments setting values.
 - Decrements setting values.
- RIGHT Arrow (RESET) Key**
 - Moves the cursor to the right.
 - Proceeds to the next screen.
 - Resets the drive to clear a fault.
 - Used as the start key in Auto-Tuning Mode.
- ENTER Key**
 - Inputs parameter numbers and setting values. Press to enter values, edit parameters and set the control mode.
 - Switches between displays with selection of menu items.

Note: QR code is a trademark of DENSO WAVE INCORPORATED.

Keypad LED

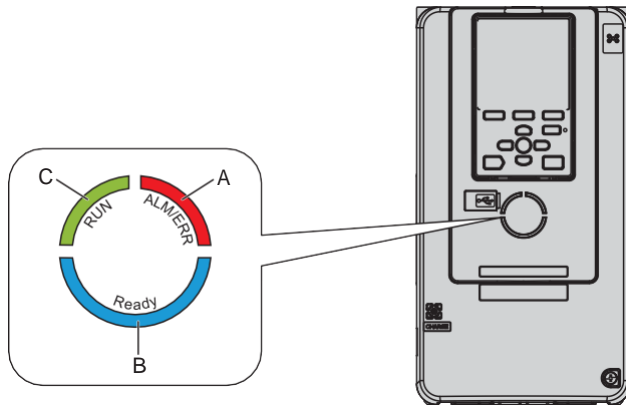
Indicator LED	Lit	Flashing	Flashing Quickly	OFF
	Motor running.	<ul style="list-style-type: none"> • The motor is performing ramp to stop. • The Run command was inputted when the frequency reference was 0 Hz 	<ul style="list-style-type: none"> • With a Run command inputted from an external command when the Run command source was in LOCAL, the Run command source switched to REMOTE. • When the drive was not in the Drive Ready (READY) state, a Run command was inputted from an external command. • An emergency stop command has been inputted. • The Safe Disable input function was running and the drive output was shut off. • When the Run command source was REMOTE, the STOP key on the keypad was pressed and the motor was stopped. • The power supply for the drive is turned on when the Run command is inputted from an external source. 	Drive is stopped.
	A fault was detected.	<ul style="list-style-type: none"> • Minor fault was detected. • Operation error was detected. • Auto-Tuning was detected. 	—	Normal operation
	Sets the Run command source to the keypad (LOCAL).	—	—	Sets the Run command source to a non-keypad external command (REMOTE).

How the RUN LED works:



Basic Instructions (continued)

LED Status Ring



LED Status Ring	State	Content
A 	Lit	The drive detected a fault.
	Flashing	The drive has detected: <ul style="list-style-type: none"> - An error - An oPE - An error during Auto-Tuning. Note: If the drive detects a fault and an error at the same time, this LED will be lit to indicate the fault.
	OFF	The drive is in normal operation. There are no alarms of faults present.
B 	Lit	The drive is operating or is ready for operation.
	Flashing	When the drive is in STo [Safe Torque Off] mode. The drive is in STo [Safe Torque Off] mode.
	OFF	<ul style="list-style-type: none"> - The drive detected a fault. - There is no fault and the drive received an operation command, but the drive cannot operate (such as when in Programming Mode, or when is flashing).
C 	Lit	The drive is in regular operation.
	Flashing	<ul style="list-style-type: none"> - The drive is decelerating to stop. - The drive was issued a Run command and the frequency reference is 0 Hz. - A DC injection braking command is input via a multi-function digital input terminal while the drive is stopped.
	Flashing Quickly	<ul style="list-style-type: none"> - Entering a Run command via the input terminals, then switching to REMOTE while the drive is set to LOCAL. - Entering a Run command via the input terminals when the drive is not in Drive Mode. - Entering a Fast Stop command. - The safety function shuts off the drive output. - Pushing STOP on the keypad while the drive is running in REMOTE mode. - Setting b1-17 = 0 [Run Command at Power Up = Accept existing RUN command] and powering up the drive while the Run command is active.
	OFF	The drive output stops.

Keypad Example

Turn the power on

10:00	FwD	Rdy	Home
Freq Reference (A1)			0.00
U1-01 Hz			0.00
Output Frequency			0.00
U1-02 Hz			0.00
Output Current			0.00
U1-03 A			0.00
JOG	Menu	FWD/REV	

Home



10:00	FwD	Rdy	Menu
Monitors			
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Home			

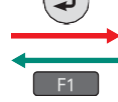


10:00	FwD	Rdy	Monitor
Standard Monitor			
Custom Monitor			
Bar Graph			
Analog Gauge			
Back			Home

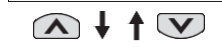
Drive Mode



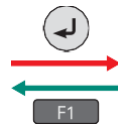
10:00	FwD	Menu
Monitors		
Parameters		
User Custom Parameters		
Parameter Backup/Restore		
Modified Param / Fault Log		
Auto-Tuning		
Home		



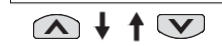
10:00	FwD	Parameters
Initialization Parameters		
Application		
Tuning		
References		
Motor Parameters		
Options		
Back		Home



10:00	FwD	Menu
Monitors		
Parameters		
User Custom Parameters		
Parameter Backup/Restore		
Modified Param / Fault Log		
Auto-Tuning		
Home		



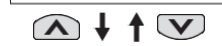
10:00	FwD	Parameters
Application Preset		
A1-06	0	(0)
Control Method Selection		
A1-02	3	(2)
Frequency Reference Selection 1		
b1-01	0	(1)
Back		Home



10:00	FwD	Menu
Monitors		
Parameters		
User Custom Parameters		
Parameter Backup/Restore		
Modified Param / Fault Log		
Auto-Tuning		
Home		



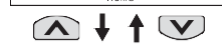
10:00	FwD	Backup
Select Items to Backup/Restore		
Standard Parameters		
Back		Home



10:00	FwD	Menu
Monitors		
Parameters		
User Custom Parameters		
Parameter Backup/Restore		
Modified Param / Fault Log		
Auto-Tuning		
Home		



10:00	FwD	History
Modified Parameters		
Fault Log		
Back		Home



10:00	FwD	Menu
Parameters		
User Custom Parameters		
Parameter Backup/Restore		
Modified Param / Fault Log		
Auto-Tuning		
Initial Setup		
Home		



10:00	FwD	Auto Tuning
Select Auto-Tuning mode		
Motor Parameter Tuning		
Back		Home



10:00	FwD	Menu
User Custom Parameters		
Parameter Backup/Restore		
Modified Param / Fault Log		
Auto-Tuning		
Initial Setup		
Dagnostic Tools		
Home		



10:00	FwD	Init Setup
Language Selection		
Set Date/Time		
Show Initial Setup Screen		
Back		Home



10:00	FwD	Menu
User Custom Parameters		
Parameter Backup/Restore		
Modified Param / Fault Log		
Auto-Tuning		
Initial Setup		
Dagnostic Tools		
Home		



10:00	FwD	Tools
Data Log		
Backlight		
Drive Information		
Back		Home Setup

Program Mode

- Note:
- Energizing the drive with factory defaults will display the initial start-up screen. Press F2 Key (Home) to display the Home screen.
 - To prevent the drive from displaying the initial start-up screen, Select [No] from the [Show Initial Setup Screen] setting.
 - Press Left Arrow Key from the Home screen to display the monitors.

- When U1-01 [Freq. Reference] is displayed on the Home screen in LOCAL mode, press ENTER Key to change parameter d1-01 [Frequency Reference].
- The keypad will display [Rdy] when the drive is in Drive Mode and ready to accept a Run command.

Standard Specifications

200 V Class

Catalog Code CH70A2		003	005	008	011	014	018	025	033	047	060	075	088	115	145	180	215	283	346	415		
Max. Applicable Motor Capacity*1	kW	0.4	0.75	1.5	2.2	3	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110		
Input	Rated Input Current	A	3.6	4.8	8.9	12.7	17	20.7	30	40.3	58.2	78.4	96	82	111	136	164	200	271	324	394	
Output	Rated Output Current	A	3.2	5	8	11	14	17.5	25	33	47	60	75	88	115	145	180	215	283	346	415	
	Overload Tolerance	150% of rated output current for 60 s Note: Derating may be required for applications that start and stop frequently.																				
	Carrier Frequency	Derating the output current enables a maximum of 15 kHz to be set. (Derating the output current is not necessary up to 8 kHz.)														Derating the output current enables a maximum of 10 kHz to be set. (Derating the output current is not necessary up to 5 kHz.)						
	Max. Output Voltage	Three-phase 200 to 240 V Note: The maximum output voltage is proportional to the input voltage.																				
	Max. Output Frequency	590 Hz The frequencies that can be set vary depending on the control mode used.																				
Measures for Harmonics	DC Reactor	External options											Built-in									
Braking Function	Braking Transistor	Built-in													External options							
EMC filter	EMC filter EN61800-3, C2/C3	Internal (factory option)																				
Power	Rated Voltage / Rated Frequency	· Three-phase AC power supply 200 V to 240 V 50/60 Hz · DC power supply 270 V to 340 V																				
	Allowable Voltage Fluctuation	-15% to 10%																				
	Allowable Frequency Fluctuation	±5%																				
	Power Supply*2	kVA	1.5	2.0	3.7	5.3	7.1	8.6	12.5	16.8	24.2	32.6	39.9	34.1	46.1	56.5	68.2	83.1	113	135	164	

*1: For the most appropriate selection, contact your Yaskawa or nearest sales representative.

*2: Rated input capacity is calculated with a power line voltage of 240 V.

400 V Class

Catalog Code CH70A4			002	003	005	006	007	009	015	018	024	031	039	045	060	075	091
Max. Applicable Motor Capacity*1		kW	0.4	0.75	1.5	2.2	3	3.7	5.5	7.5	11	15	18.5	22	30	37	45
Input	Rated Input Current	A	1.9	3.5	4.7	6.7	8.9	11.7	15.8	21.2	30.6	41.3	50.5	43.1	58.3	71.5	86.5
	Rated Output Current	A	1.8	3.4	4.8	5.5	7.2	9.2	14.8	18	24	31	39	45	60	75	91
Output	Overload Tolerance	150% of rated output current for 60 s Note: Derating may be required for applications that start and stop frequently.															
	Carrier Frequency	Derating the output current enables a maximum of 15 kHz to be set. (Derating the output current is not necessary up to 8 kHz.)															
	Max. Output Voltage	Three-phase 380 to 480 V Note: The maximum output voltage is proportional to the input voltage.															
	Max. Output Frequency	590 Hz The frequencies that can be set vary depending on the control mode used.															
	Measures for Harmonics	DC Reactor	External options												Built-in		
Braking Function	Braking Transistor	Built-in															
EMC filter	EMC filter EN61800-3, C2/C3	Internal (factory option)															
Power	Rated Voltage / Rated Frequency	·Three-phase AC power supply 380 V to 480 V 50/60 Hz ·DC power supply 513 V to 679 V															
	Allowable Voltage Fluctuation	- 15% to 10%															
	Allowable Frequency Fluctuation	±5%															
	Power Supply*2	kVA	1.5	2.8	3.7	5.3	7.1	9.3	13	17	24	33	40	34	46	57	69
Catalog Code CH70A4□□			112	150	180	216	260	304	371	414	453	605					
Max. Applicable Motor Capacity*1		kW	55	75	90	110	132	160	200	220	250	315					
Input	Rated Input Current	A	105	142	170	207	248	300	373	410	465	584					
	Rated Output Current	A	112	150	180	216	260	304	371	414	453	605					
Output	Overload Tolerance	150% of rated output current for 60 s Note: Derating may be required for applications that start and stop frequently.															
	Carrier Frequency	Derating the output current enables a maximum of 10 kHz to be set. (Derating the output current is not necessary up to 5 kHz.)										Derating the output current enables a maximum of 5 kHz to be set. (Derating the output current is not necessary up to 2 kHz.)					
	Max. Output Voltage	Three-phase 380 to 480 V Note: The maximum output voltage is proportional to the input voltage.															
	Max. Output Frequency	590 Hz The frequencies that can be set vary depending on the control mode used.															
	Measures for Harmonics	DC Reactor	Built-in														
Braking Function	Braking Transistor	Built-in				External options											
EMC filter	EMC filter EN61800-3, C2/C3	Internal (factory option)															
Power	Rated Voltage / Rated Frequency	·Three-phase AC power supply 380 V to 480 V 50/60 Hz ·DC power supply 513 V to 679 V															
	Allowable Voltage Fluctuation	- 15% to 10%															
	Allowable Frequency Fluctuation	±5%															
	Power Supply*2	kVA	84	113	136	165	198	239	297	327	370	465					

*1: For the most appropriate selection, contact your Yaskawa or nearest sales representative.

*2: Rated input capacity is calculated with a power line voltage of 480 V.

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Standard Specifications

Common Specifications

Item	Specifications	
Control Characteristics	Control Method	The following controls are selected by parameters. <ul style="list-style-type: none"> • V/f Control • Closed Loop V/f Control • Open Loop Vector Control • Closed Loop Vector Control • Advanced Open Loop Vector Control
	Maximum Output Frequency	<ul style="list-style-type: none"> • Advanced Open Loop Vector Control: 120 Hz • Closed Loop V/f Control, Closed Loop Vector Control: 400 Hz • V/f Control, Open Loop Vector Control: 590 Hz
	Frequency Accuracy (Temperature Fluctuation)	Digital reference: within $\pm 0.01\%$ of the max. output frequency (-10°C to $+40^{\circ}\text{C}$) Analog reference: within $\pm 0.1\%$ of the max. output frequency ($25^{\circ}\text{C} \pm 10^{\circ}\text{C}$)
	Frequency Setting Resolution	Digital reference: 0.01 Hz Analog reference: 1/2048 of the maximum output frequency setting (11 bit plus sign)
	Output Frequency Resolution	0.001 Hz
	Frequency Setting Signal	Main frequency reference: -10 to $+10$ Vdc, 0 to 10 Vdc (20 k▲), 4 to 20 mA (250 ▲), 0 to 20 mA (250 ▲)
	Starting Torque	<ul style="list-style-type: none"> • V/f Control: 150%/3 Hz • Closed Loop V/f Control: 150%/3 Hz • Open Loop Vector Control: 200%/0.3 Hz*1 • Closed Loop Vector Control: 200%/0 min⁻¹*1 • Advanced Open Loop Vector Control: 200%/0.3 Hz*1
	Speed Control Range	<ul style="list-style-type: none"> • V/f Control 1:40 • Closed Loop V/f Control 1:40 • Open Loop Vector Control 1:200 • Closed Loop Vector Control 1:1500 • Advanced Open Loop Vector Control 1:200
	Zero Speed Control	Possible in Closed Loop Vector Control.
	Torque Limit	Parameter settings allow separate limits in four quadrants in Open Loop Vector Control, Closed Loop Vector Control, and Advanced Open Loop Vector Control.
	Accel/Decel Time	0.0 s to 6000.0 s The drive allows four selectable combinations of independent acceleration and deceleration settings.
	Braking Torque	Approx. 20% Approx. 125% with a dynamic braking option <ul style="list-style-type: none"> • Short-time average deceleration torque Motor capacity 0.4/0.75 kW: over 100% Motor capacity 1.5 kW: over 50% Motors 2.2 kW and larger: over 20%, Overexcitation Braking allow for approx. 40% <ul style="list-style-type: none"> • Continuous regenerative torque: Approx. 20%. Dynamic braking option allows for approx. 125%, 10% ED, 10 s Note: <ul style="list-style-type: none"> • Catalog codes CH70A2003 to 2115 and 4002 to 4150 have a built-in braking transistor. • Set L3-04 = 0 [Disabled] (default setting) when connecting the regenerative converter, regenerative unit, braking unit and braking resistor unit. The drive may not stop within the specified deceleration time if L3-04 is changed to 1 through 5 [Enabled]. • Short-time deceleration torque refers to the torque required to decelerate the motor (uncoupled from the load) from the rated speed to zero. Actual specifications may vary depending on motor characteristics. • Continuous regenerative torque and short-time deceleration torque for motors 2.2 kW and larger vary depending on motor characteristics.
	V/f Characteristics	Select from 15 predefined V/f patterns, or a user-set V/f pattern.
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 kbps), Parameter Backup Function, Online Tuning, Overexcitation Deceleration, Inertia Tuning and ASR Tuning, Crane Sequence, etc.	
Protection Function	Motor Protection	Motor overheat protection based on output current
	Momentary Overcurrent Protection	Drive stops when output current exceeds 200%*2 of rated output current.
	Overload Protection	Drive stops after 60 s at 150% of rated output current. Note: The drive may trigger the overload protection function at 150% of the drive rated output in under 60 s if the output frequency is less than 6 Hz.
	Overvoltage Protection	200 V class: Stops when DC bus exceeds approx. 410 V 400 V class: Stops when DC bus exceeds approx. 820 V
	Undervoltage Protection	200 V class: Stops when DC bus falls below approx. 190 V 400 V class: Stops when DC bus falls below approx. 380 V
	Heatsink Overheat Protection	Thermistor
	Braking Resistance Overheat Protection	Overheat sensor for braking resistor (optional ERF-type, 3% ED)
	Stall Prevention	Stall prevention during acceleration/deceleration and constant speed operation
	Ground Fault Protection	Protection by electronic circuit Note: Protection may not be provided under the following conditions as the motor windings are grounded internally during run: Low resistance to ground from the motor cable or terminal block. Drive already has a short-circuit when the power is turned on.
	Charge LED	Charge LED remains lit until DC bus has fallen below approx. 50 V

Item		Specifications
Environment	Area of Use	Indoors ·chemical gas: IEC 60721-3-3: 3 C2 ·solid particle: IEC 60721-3-3: 3 S2
	Power Supply	Overcurrent Category III
	Ambient Temperature	IP20/UL Open Type: -10°C to +50°C IP20/UL Type 1: -10°C to +40°C ·Do not use the drive in a location where the temperature changes suddenly to improve the drive reliability. ·When installing the drive in an enclosure, use a cooling fan or air conditioner to keep the internal air temperature in the permitted range. ·Do not let the drive freeze. - To install IP20/UL Open Type drives in areas with ambient temperatures 殊60°C, derate the output current. - To install IP20/UL Type 1 drives in areas with ambient temperatures 殊50°C, derate the output current.
	Humidity	95% RH or less (no condensation)
	Storage Temperature	Short-term temperature during transportation is -20 °C to +70 °C
	Surrounding Area	Pollution degree 2 or less Install the drive in an area without: ·Oil mist, corrosive or flammable gas, or dust ·Metal powder, oil, water, or other unwanted materials ·Radioactive materials or flammable materials, including wood ·Harmful gas or fluids - Salt ·Direct sunlight Keep wood or other flammable materials away from the drive.
	Altitude	1000 m or less*3
	Shock	·10 Hz to 20 Hz, 1 G (9.8 m/s ²) ·20 Hz to 55 Hz, Catalog code CH70A2003 to 2180, 4002 to 4150: 0.6 G (5.9 m/s ²), Catalog code CH70A2215 to 2415, 4180 to 4605: 0.2 G (2.0 m/s ²)
	Standards Compliance	·UL61800-5-1 ·EN61800-3:2004+A1:2012 ·IEC/EN61800-5-1 ·Two Safe Disable inputs and 1EDM output according to ISO/EN13849-1 Cat.3 Ple, IEC/EN61508 SIL3 Note: Used by setting functions to multi-function digital output terminals.
Enclosure Protection Design	IP20/UL Open Type, IP20/UL Type 1 Note: Install a UL Type 1 kit on an IP20/UL Open Type drive to convert the drive to IP20/UL Type 1.	

*1: Increase the drive and motor capacities.

*2: 200% is the target value. The value varies depending on the capacity.

*3: Altitudes over 1000 m and up to 4000 m are possible by derating the output current by 1% for every 100 m.

Contact Yaskawa or your nearest sales representative for details.

Note: 1. Perform Rotational Auto-Tuning to achieve specifications listed for Open Loop Vector Control, Close Loop Vector Control and Advanced Open Loop Vector Control.

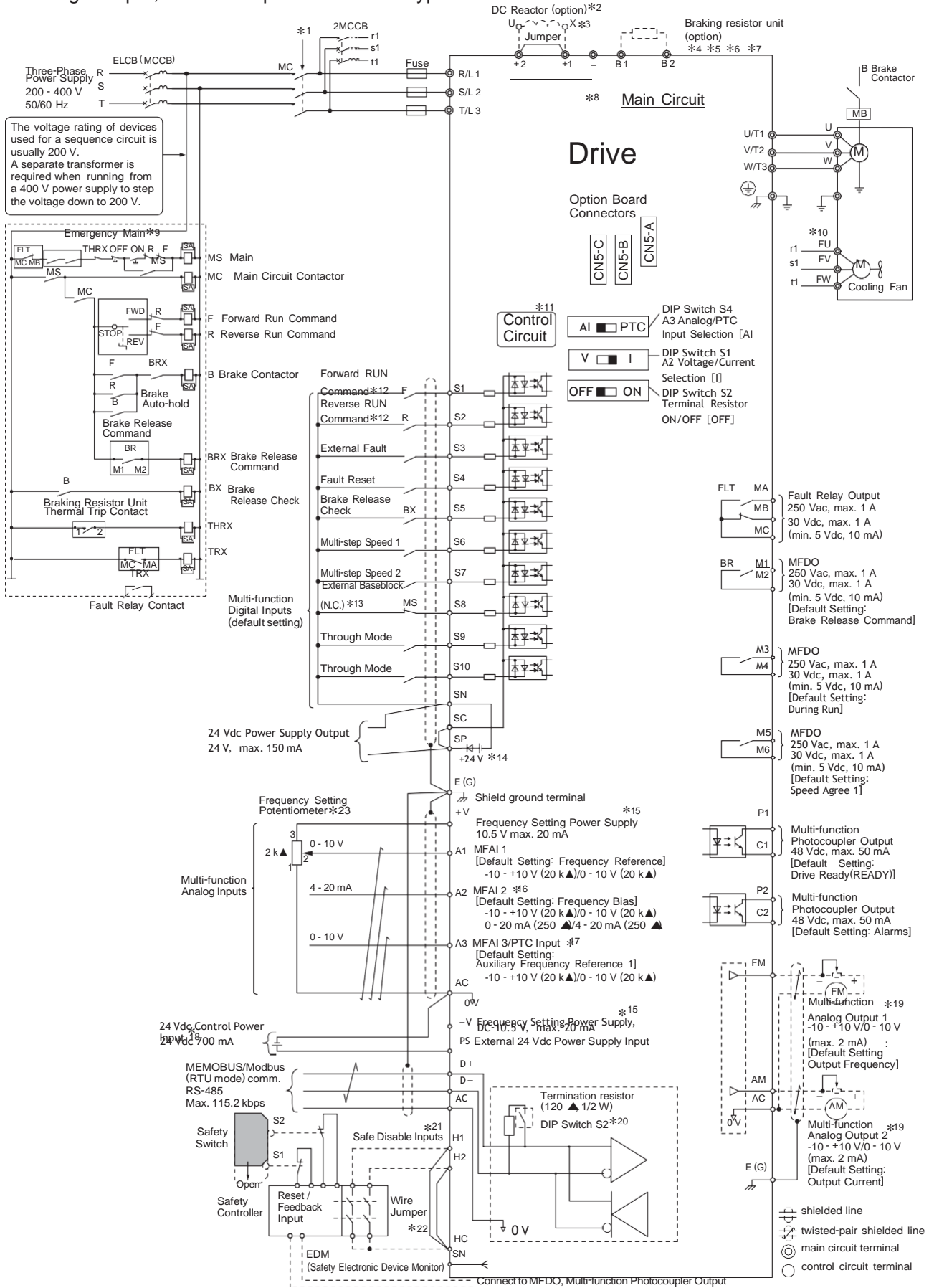
2. Install the drive in an environment matching the specifications in the table above for optimum performance life.

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Standard Connection Diagram

Standard Connection Diagram

10 digital input, screw clamp terminal board type



- *1: We recommend that the sequence that de-energizes the power supply be set via the fault relay output for the drive.
- *2: Be sure to remove the jumper between terminals +1 and +2 when installing a DC reactor (option).
- *3: Catalog codes CH70A2088 to 2415 and 4045 to 4605 have a built-in DC reactor.
- *4: Be sure to set L8-55 = 0 [Internal DB Transistor Protection = Disable] when using an optional regenerative converter, regenerative unit, or braking unit. Leaving L8-55 = 1 [Protection Enabled] can cause rF [Braking Resistor Fault].
- *5: Set L3-04 = 0 [Disabled] (default setting) when connecting the regenerative converter, regenerative unit, braking unit and braking resistor unit. The drive may not stop within the specified deceleration time if L3-04 is changed to 1 through 5 [Enabled].
- *6: Set L8-01 = 1 [3% ERF DB Resistor Protection = Enabled] and set a sequence to de-energize the drive with the fault relay output when using an ERF-type braking resistor.
- *7: When connecting a braking unit (CDBR series) or a braking resistor unit (LKEB series) to the catalog code CH70A2088, 2115, and 4091, use wires that are in the range of the applicable gauges for the drive. A junction terminal is required when connecting wires that are less than the applicable gauge to the drive. Contact Yaskawa or your nearest sales representative for details on selection and installation of the junction terminal.
- *8: Terminals -, +1, +2, B1 and B2 are the optional connection terminals. Do not connect an AC power supply to terminals -, +1, +2, B1, and B2. Failure to obey can cause damage to the drive and peripheral devices.
- *9: Use a sequence that shuts the power OFF by Fault relay output.
- *10: Self-cooling motors do not require the wiring for the motors with cooling fans.
- *11: Connect a 24 V power supply to terminals PS-AC to operate the control circuit while the main circuit power supply is OFF.
- *12: Check that the wiring is set up so that the motor rotates in forward (FOR) when hoisting, and reverse (REV) when lowering in every control method.
- *13: The baseblock is released when the external baseblock command is ON.
- *14: Use a wire jumper between terminals SC and SP or SC and SN to set the MFDI power supply to SINK Mode, SOURCE Mode, or External power supply. Do not short circuit terminals SP and SN. Failure to obey will cause damage to the drive.
 - SINK Mode: Install a jumper between terminals SC and SP. Do not short circuit terminals SC and SN. Failure to obey will cause damage to the drive.
 - SOURCE Mode: Install a jumper between terminals SC and SN. Do not short circuit terminals SC and SP. Failure to obey will cause damage to the drive.
 - External power supply: No jumper necessary between terminals SC and SN or terminals SC and SP.
- *15: The output current capacity of the +V and -V terminals on the control circuit is 20 mA. Do not install a jumper between terminals +V, -V, and AC. Failure to obey can cause damage to the drive.
- *16: DIP switch S1 set terminal A2 for voltage or current input. The default setting for S1 is current input ("1" side).
- *17: DIP switch S4 sets terminal A3 for analog or PTC input.
- *18: Connect the positive lead from an external 24 Vdc power supply to terminal PS and the negative lead to terminal AC. Reversing polarity can cause damage to the drive.
- *19: Use multi-function analog monitor outputs with analog frequency meters, ammeters, voltmeters, and wattmeters. Do not use monitor outputs with feedback-type signal devices.
- *20: Set DIP switch S2 to "ON" to enable the termination resistor in the last drive in a MEMOBUS/Modbus (RTU mode) network.
- *21: Use sourcing mode when using an internal power supply for Safe Disable input.
- *22: Disconnect the wire jumper between H1 and HC, and H2 and HC to use the Safe Disable input.
- *23: A frequency setting potentiometer is connected with model RV30YN(2 k ▲).

Terminal Specifications

Terminal Functions

Main Circuit Terminals

Voltage	200 V Class			400 V Class			
Catalog Code CH70A	2003 to 2075	2088 to 2115	2145 to 2415	4002 to 4039	4045 to 4150	4180 to 4371	4414 to 4605
Max. Applicable Motor Capacity kW	0.4 to 18.5	22, 30	37 to 110	0.4 to 18.5	22 to 75	90 to 200	220 to 315
R/L1, S/L2, T/L3	Main circuit input power supply			Main circuit input power supply			
U/T1, V/T2, W/T3	Drive output			Drive output			
B1, B2	Braking resistor unit connection			Braking resistor unit connection			
+2	DC reactor (+1, +2)	–	–	DC reactor (+1, +2)	–	–	–
+1	DC power supply (+1, –)	DC power supply (+1, –)	DC power supply (+1, –)	DC power supply (+1, –)	DC power supply (+1, –)	DC power supply (+1, –)	
–	–	–	Braking unit (+3, –)	–	–	Braking unit (+3, –)	
+3	–	–	–	–	–	–	
⊕	Ground terminal (100 ▲ or less)			Ground terminal (10 ▲ or less)			

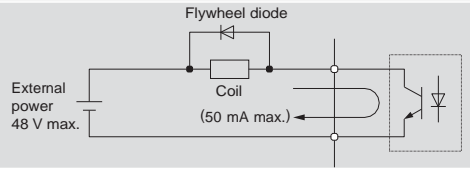
Note: 1. Use terminals B1 and - to connect a CDBR braking unit to drive models CH70A2003 to 2115 and CH70A4002 to 4150 with built-in braking transistors.
2. CH70A2180 and CH70A4150 or less are used for European terminals.

Control Circuit Input Terminals (200 V/400 V Class)

Terminal Type	Terminal	Signal Function (default)	Description (Signal Level)	
Multi-Function Digital Input	S1	Multi-function input selection 1 (Forward RUN Command)	<ul style="list-style-type: none"> • Photocoupler • 24 V, 6 mA Note: Use a wire jumper between terminals SC and SP or SC and SN to set the MFDI power supply to SINK Mode, SOURCE Mode, or External power supply. • SINK Mode: Install a jumper between terminals SC and SP. Do not short circuit terminals SC and SN. Failure to obey will cause damage to the drive. • SOURCE Mode: Install a jumper between terminals SC and SN. Do not short circuit terminals SC and SP. Failure to obey will cause damage to the drive. • External power supply: No jumper necessary between terminals SC and SN or terminals SC and SP. 	
	S2	Multi-function input selection 2 (Reverse RUN Command)		
	S3	Multi-function input selection 3 (External fault, N.O.)		
	S4	Multi-function input selection 4 (Fault reset)		
	S5	Multi-function input selection 5 (Brake Release Check)		
	S6	Multi-function input selection 6 (Multi-step speed reference 1)		
	S7	Multi-function input selection 7 (Multi-step speed reference 2)		
	S8	Multi-function input selection 8 (External Baseblock, N.C.)		
	S9	Multi-function input selection 9 (Through Mode)		
	S10	Multi-function input selection 10 (Through Mode)		
	SN	Digital input power supply 0V 24V transducer power supply 0V		MFDI power supply and sensor power supply, 24 Vdc (max. 150 mA) Note: Do not install a jumper between terminals SP and SN. Failure to comply will damage the drive.
	SC	Multi-functions input common		
SP	Multi-function input power supply +24 Vdc			
Safety Input	H1	Safety Input 1	Remove the jumper between terminals H1-HC and H2-HC when using the Safe Disable input. • 24 Vdc 6 mA • ON: Normal operation • OFF: Output disabled • Internal impedance 4.7 k ▲ • Switching time at least 2 ms	
	H2	Safety Input 2		
	HC	Safety input common	Safety input common Note: Do not install a jumper between terminals HC and SN. Failure to comply will damage the drive.	
Main Frequency Reference Input	+V	Setting power supply	10.5 V (20 mA max.)	
	-V	Setting power supply	-10.5 V (20 mA max.)	
	A1	Multi-function analog input 1 (Main frequency reference)	Voltage input Select the signal level with H3-01 [Terminal A1 Signal Level Select]. • -10 to +10 Vdc for -100 to +100% (impedance 20 k ▲) • 0 to 10 Vdc for 0 to 100% (impedance 20 k ▲)	
	A2	Multi-function analog input 2 (Frequency reference bias with terminal A1)	Voltage input or current input Select the signal level with DIP switch S1 and H3-09 [Terminal A2 Signal Level Select]. • -10 to +10 Vdc for -100 to +100% (impedance 20 k ▲) • 0 to 10 Vdc for 0 to 100% (impedance 20 k ▲) • 4 to 20 mA for 0 to 100%, 0 to 20 mA for 0 to 100% (impedance 250 ▲)	
	A3	Multi-function analog input 3/PTC input (Auxiliary frequency reference)	Voltage input Select the signal level with H3-05 [Terminal A3 Signal Level Select]. • -10 to +10 Vdc for -100 to +100% (impedance 20 k ▲) • 0 to 10 Vdc for 0 to 100% (impedance 20 k ▲) PTC input (For motor overheat protection) Set DIP switch S4 to "PTC" to set terminal A3 for PTC input.	
	AC	Frequency reference common	0 V	
	E(G)	Shielded cable	–	

Control Circuit Input Terminals (200 V/400 V) (continued)

Terminal Type	Terminal	Signal Function (default)	Description (Signal Level)
Fault Relay Output	MA	N.O. output (Fault)	·Relay output ·30 Vdc or less, 10 mA to 1 A ·250 Vac or less, 10 mA to 1 A ·Minimum load: 5 Vdc, 10 mA (Values only for reference)
	MB	N.C. output (Fault)	
	MC	Digital output common	
Multi-Function Digital Output	M1	Multi-function digital output (Brake Release Command)	·Relay output ·30 Vdc or less, 10 mA to 1 A ·250 Vac or less, 10 mA to 1 A ·Minimum load: 5 Vdc, 10 mA (Values only for reference) Note: Switching life is estimated at 8,000,000 times (assumes 30 mA, inductive load) and 200,000 times (assumes 1 A, resistive load). When an inductive load such as relay coils is switched on and off, connecting the surge absorber parallel to the load is an effective means to protect the contacts.
	M2		
	M3		
	M4	Multi-function digital output (During run)	
	M5	Multi-function digital output (Speed agree 1)	
	M6		
Multi-Function Photocoupler Output	P1	Multi-Function Photocoupler Output (Drive Ready (READY))	·Photocoupler output ·48 Vdc or less, 2 to 50 mA Note: Connect a flywheel diode as shown below when driving a reactive load such as a relay coil. Diode must be rated higher than the circuit voltage.
	C1		
	P2	Multi-Function Photocoupler Output (Alarms)	
Monitor Output	FM	analog monitor (1) (Output frequency)	Voltage output ·0 to 10 Vdc for 0 to 100% ·- 10 to 10 Vdc for -100 to 100% Note: Select the signal level with H4-07 [Terminal FM Signal Level Select] and H4-08 [Terminal AM Signal Level Select].
	AM	analog monitor (2) (Output current)	
	AC	Monitor common	



External Power Supply Input Terminals (200 V/400 V Class)

Type	Terminal	Terminal Name (Default)	Function
External Power Supply Input Terminals	PS	External 24 V power supply input	Supplies backup power to the drive control circuit, keypad, and option card. 21.6 Vdc to 26.4 Vdc, 700 mA
	AC	External 24 V power supply ground	0 V

Serial Communication Terminals (200 V/400 V Class)

Classification	Terminal	Signal Function	Description(Signal Level)
MEMOBUS / Modbus (RTU mode) Communications	D+	Communications input (+)	MEMOBUS/Modbus (RTU mode) communications: Use an RS-485 cable to connect the drive. Note: Set DIP switch S2 to ON to enable the termination resistor in the last drive in a MEMOBUS/Modbus (RTU mode) network.
	D-	Communications input (-)	
	AC	Shield ground	0 V

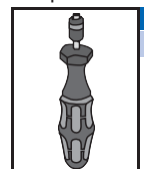
● Tools for Wiring European Style Terminal Blocks (Recommended product)

Check the "Terminal size / Wire gauge" on the next page and prepare the tools for wiring.

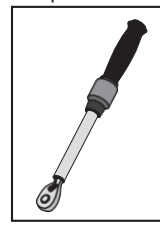
Screw size	Screw type	Recommended Product
M4	Slot	Prepare the following two tools. - Bit[PHOENIX CONTACT] Model: SF-BIT-SL 1,0X4,0-70 - Torque screwdriver[PHOENIX CONTACT] Model: TSD-M 3NM (1.2 to 3 N·m)
M5	Slot	When wiring drive models CH70A2047 and CH70A4075 or earlier models, be sure to correctly select tools based on the wire gauges. Wiring Gauge: ≤25 mm ² or AWG10 - Bit[PHOENIX CONTACT] Model: SF-BIT-SL 1,2X6,5-70 - Torque screwdriver[PHOENIX CONTACT] Model: TSD-M 3NM (1.2 to 3 N·m) Wiring Gauge: ≥30 mm ² or AWG8 - Torque wrench that includes a torque measurement range of 4.5 N·m - Bit socket holder of 6.35 mm
M6	Hex socket (WAF: 5)	Prepare the following three tools. - Bit[PHOENIX CONTACT] Model: SF-BIT-HEX 5-50 - Torque wrench that includes a torque measurement range of 9 N·m - Bit socket holder of 6.35 mm
	Minus	Prepare the following three tools for the models CH70A2088 to 2115, and CH70A4091. - Bit[PHOENIX CONTACT] Model: SF-BIT-SL 1,2X6,5-70 - Torque wrench that includes a torque measurement range of 3.5 N·m - Bit socket holder of 6.35 mm
M8	Hex socket (WAF: 6)	Prepare the following three tools. - Bit[PHOENIX CONTACT] Model: SF-BIT-HEX 6-50 - Torque wrench that includes a torque measurement range of 12 N·m - Bit socket holder of 6.35 mm
M10	Hex socket (WAF: 8)	Prepare the following three tools. - Bit[PHOENIX CONTACT] Model: SF-BIT-HEX 8-50 - Torque wrench that includes a torque measurement range of 14 N·m - Bit socket holder of 6.35 mm

Application screw slot	Model	Tip of Bit	Code No.
	SF-BIT-SL 1,0X4,0-70	Slot Tip, M4	100-250-491
	SF-BIT-SL 1,2X6,5-70	Slot Tip, M5	100-250-492
	SF-BIT-HEX 5-50	Hexagon Tip, M6	100-250-488
	SF-BIT-HEX 6-50	Hexagon Tip, M8	100-250-489
	SF-BIT-HEX 8-50	Hexagon Tip, M10	100-250-490

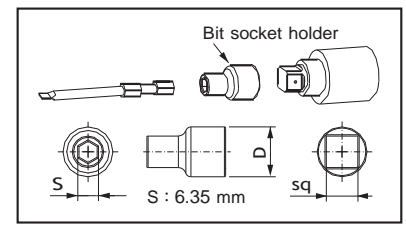
Model	Measurement Range	Code No.
TSD-M 3NM	1.2 to 3 N·m	100-250-493



Torque wrench



Bit socket holder



Terminal Specifications

Terminal Size / Wire Gauge

Symbols indication the shape of the terminal screws:

⊖ : Slot (-), ⊖ : Minus (-), ⑤ : Hex socket (WAF: 5), ⑥ : Hex socket (WAF: 6), ⑧ : Hex socket (WAF: 8)

200 V Class

Catalog code CH70A□	Terminal	Recommended Gauge mm ²	Wire Range (IP20 Compatible Gauge) mm ²	Wire Stripping Length*1 mm	Terminal Screw		Tightening Torque N·m	Catalog code CH70A□	Terminal	Recommended Gauge mm ²	Wire Range (IP20 Compatible Gauge) mm ²	Wire Stripping Length*1 mm	Terminal Screw		Tightening Torque N·m
					Size	Shape							Size	Shape	
2003	R/L1, S/L2, T/L3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	2060	R/L1, S/L2, T/L3	38	2 to 38 (22 to 38)	20	M6	⑤	5 to 5.5
	U/T1, V/T2, W/T3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	22	2 to 22 (14 to 22)	20	M6	⑤	5 to 5.5
	- , +1, +2	2	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , +1, +2	50	2 to 50 (22 to 50)	20	M6	⑤	5 to 5.5
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	14	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7
2005	R/L1, S/L2, T/L3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	2075	R/L1, S/L2, T/L3	50	2 to 50 (22 to 50)	20	M6	⑤	5 to 5.5
	U/T1, V/T2, W/T3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	30	2 to 30 (14 to 30)	20	M6	⑤	5 to 5.5
	- , +1, +2	2	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , +1, +2	60	2 to 60 (22 to 60)	20	M6	⑤	5 to 5.5
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	14	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7
2008	R/L1, S/L2, T/L3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	2088	R/L1, S/L2, T/L3	38	22 to 38 (22 to 38)	27	M6	⑤	8 to 9
	U/T1, V/T2, W/T3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	38	22 to 38 (22 to 38)	27	M6	⑤	8 to 9
	- , +1, +2	2	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , +1	60	30 to 60 (30 to 60)	27	M8	⑤	10 to 12
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	22	8 to 22 (8 to 22)	21	M6	⊖	3 to 3.5
2011	R/L1, S/L2, T/L3	3.5	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	2115	R/L1, S/L2, T/L3	60	22 to 60 (38 to 60)	27	M6	⑤	8 to 9
	U/T1, V/T2, W/T3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	60	22 to 60 (38 to 60)	27	M6	⑤	8 to 9
	- , +1, +2	3.5	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , +1	80	30 to 80 (50 to 80)	27	M8	⑥	10 to 12
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	30	8 to 30 (8 to 30)	21	M6	⊖	3 to 3.5
2014	R/L1, S/L2, T/L3	3.5	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	2145	R/L1, S/L2, T/L3	80	50 to 100 (80 to 100)	37	M10	⑧	12 to 14
	U/T1, V/T2, W/T3	3.5	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	80	50 to 125 (80 to 125)	37	M10	⑧	12 to 14
	- , +1, +2	5.5	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , - , +1, +1*3	38*4	22 to 50 (50)	28	M6	⑤	8 to 9
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		+3	60	30 to 80*5 (50 to 80)*5	28	M8	⑥	8 to 9
2018	R/L1, S/L2, T/L3	8	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	2180	R/L1, S/L2, T/L3	100	50 to 100 (80 to 100)	37	M10	⑧	12 to 14
	U/T1, V/T2, W/T3	3.5	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	125	50 to 125 (80 to 125)	37	M10	⑧	12 to 14
	- , +1, +2	8	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , - , +1, +1*3	50	22 to 50 (50)	28	M6	⑤	8 to 9
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		+3	80	30 to 80*5 (50 to 80)*5	28	M8	⑥	8 to 9
2025	R/L1, S/L2, T/L3	14	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	2025	R/L1, S/L2, T/L3	14	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7
	U/T1, V/T2, W/T3	8	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	8	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7
	- , +1, +2	14	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , +1, +2	14	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2
	B1, B2	3.5	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	3.5	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7
2033	R/L1, S/L2, T/L3	14	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	2033	R/L1, S/L2, T/L3	14	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7
	U/T1, V/T2, W/T3	14	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	14	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7
	- , +1, +2	22	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , +1, +2	22	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2
	B1, B2	5.5	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	5.5	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7
2047	R/L1, S/L2, T/L3	22	2 to 22 (8 to 22)	18	M5	⊖	2.3 to 2.5*2	2047	R/L1, S/L2, T/L3	22	2 to 22 (8 to 22)	18	M5	⊖	2.3 to 2.5*2
	U/T1, V/T2, W/T3	14	2 to 14 (5.5 to 14)	18	M5	⊖	2.3 to 2.5*2		U/T1, V/T2, W/T3	14	2 to 14 (5.5 to 14)	18	M5	⊖	2.3 to 2.5*2
	- , +1, +2	38	2 to 38 (8 to 38)	20	M6	⑤	5 to 5.5		- , +1, +2	38	2 to 38 (8 to 38)	20	M6	⑤	5 to 5.5
	B1, B2	14	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		B1, B2	14	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7

*1: Remove the insulator from the tips of wires to the length shown in "Wire Stripping Length."
 *2: When using wire with a gauge over 30 mm², tighten to a tightening torque of 4.1 to 4.5 N·m.
 *3: Terminals - and + have two screws. Recommended Gauge means the wire gauge of one terminal.
 *4: Use cables in the range of applicable gauges to meet the IP20 protective level.
 *5: A junction terminal is required when connecting a braking unit (CDBR-series) or a braking resistor unit (LKEB-series).
 Note: The recommended wire gauges based on drive continuous current ratings using 75°C 600 V class 2 heat resistant indoor PVC wire.
 Assume the following usage conditions:
 - Ambient temperature: 40°C or lower
 - Wiring distance: 100 m or shorter
 - Rated current value

Symbols indication the shape of the terminal screws:

⊖ : Slot (-), ⊖ : Minus (-), ⑤ : Hex socket (WAF: 5), ⑥ : Hex socket (WAF: 6), ⑧ : Hex socket (WAF: 8)

400 V Class

Catalog code CH70A□	Terminal	Recommended Gauge mm ²	Wire Range (IP20 Compatible Gauge) mm ²	Wire Stripping Length*1 mm	Terminal Screw		Tightening Torque N·m	Catalog code CH70A□	Terminal	Recommended Gauge mm ²	Wire Range (IP20 Compatible Gauge) mm ²	Wire Stripping Length*1 mm	Terminal Screw		Tightening Torque N·m
					Size	Shape							Size	Shape	
4002	R/L1, S/L2, T/L3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	4031	R/L1, S/L2, T/L3	14	2 to 22 (8 to 22)	18	M5	⊖	2.3 to 2.5*2
	U/T1, V/T2, W/T3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	14	2 to 14 (5.5 to 14)	18	M5	⊖	2.3 to 2.5*2
	- , +1, +2	2	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , +1, +2	22	2 to 38 (8 to 38)	20	M6	⑤	5 to 5.5
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	5.5	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7
4003	R/L1, S/L2, T/L3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	4039	R/L1, S/L2, T/L3	14	2 to 14 (3.5 to 14)	18	M5	⊖	2.3 to 2.5*2
	U/T1, V/T2, W/T3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	14	2 to 14 (5.5 to 14)	18	M5	⊖	2.3 to 2.5*2
	- , +1, +2	2	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , +1, +2	22	2 to 22 (3.5 to 22)	18	M5	⊖	2.3 to 2.5*2
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	8	2 to 8 (2 to 8)	10	M4	⊖	1.5 to 1.7
4005	R/L1, S/L2, T/L3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	4045	R/L1, S/L2, T/L3	14	2 to 14 (3.5 to 14)	18	M5	⊖	2.3 to 2.5*2
	U/T1, V/T2, W/T3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	14	2 to 14 (5.5 to 14)	18	M5	⊖	2.3 to 2.5*2
	- , +1, +2	2	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , +1	22	2 to 22 (3.5 to 22)	18	M5	⊖	2.3 to 2.5*2
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	14	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7
4006	R/L1, S/L2, T/L3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	4060	R/L1, S/L2, T/L3	22	2 to 22 (3.5 to 22)	18	M5	⊖	2.3 to 2.5*2
	U/T1, V/T2, W/T3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	22	2 to 22 (3.5 to 22)	18	M5	⊖	2.3 to 2.5*2
	- , +1, +2	2	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , +1	30	2 to 30 (3.5 to 30)	18	M5	⊖	2.3 to 2.5*2
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	14	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7
4007	R/L1, S/L2, T/L3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	4075	R/L1, S/L2, T/L3	30	2 to 30 (5.5 to 30)	18	M5	⊖	2.3 to 2.5*2
	U/T1, V/T2, W/T3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	30	2 to 30 (5.5 to 30)	18	M5	⊖	2.3 to 2.5*2
	- , +1, +2	2	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , +1	38	2 to 38 (22 to 38)	20	M6	⑤	5 to 5.5
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	22	2 to 22 (3.5 to 22)	18	M5	⊖	2.3 to 2.5*2
4009	R/L1, S/L2, T/L3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	4091	R/L1, S/L2, T/L3	38	22 to 60 (38 to 60)	27	M6	⑤	8 to 9
	U/T1, V/T2, W/T3	2	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	38	22 to 60 (38 to 60)	27	M6	⑤	8 to 9
	- , +1, +2	3.5	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , +1	50	30 to 80 (50 to 80)	27	M8	⑥	10 to 12
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	30	8 to 30 (8 to 30)	21	M6	⊖	3 to 3.5
4015	R/L1, S/L2, T/L3	3.5	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	4112	R/L1, S/L2, T/L3	60*4	50 to 100 (80 to 100)	37	M10	⑧	12 to 14
	U/T1, V/T2, W/T3	3.5	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	60*4	50 to 125 (80 to 125)	37	M10	⑧	12 to 14
	- , +1, +2	5.5	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , - , +1, +1*3	30*4	22 to 50 (50)	28	M6	⑤	8 to 9
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	50	30 to 80*5 (50 to 80)*5	28	M8	⑥	8 to 9
4018	R/L1, S/L2, T/L3	8	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7	4150	R/L1, S/L2, T/L3	80	50 to 100 (80 to 100)	37	M10	⑧	12 to 14
	U/T1, V/T2, W/T3	5.5	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		U/T1, V/T2, W/T3	80	50 to 125 (80 to 125)	37	M10	⑧	12 to 14
	- , +1, +2	14	2 to 22 (2 to 22)	18	M5	⊖	2.3 to 2.5*2		- , - , +1, +1*3	38*4	22 to 50 (50)	28	M6	⑤	8 to 9
	B1, B2	2	2 to 5.5 (2 to 5.5)	10	M4	⊖	1.5 to 1.7		B1, B2	60	30 to 80*5 (50 to 80)*5	28	M8	⑥	8 to 9
4024	R/L1, S/L2, T/L3	14	2 to 22 (8 to 22)	18	M5	⊖	2.3 to 2.5*2	*1: Remove the insulator from the tips of wires to the length shown in "Wire Stripping Length." *2: When using wire with a gauge over 30 mm ² , tighten to a tightening torque of 4.1 to 4.5 N·m. *3: Terminals - and + have two screws. Recommended Gauge means the wire gauge of one terminal. *4: Wire cables in the range of applicable gauges to meet the IP20 protective level. *5: A junction terminal is required when connecting a braking unit (LKEB-series) or a braking resistor unit (LKEB-series).	R/L1, S/L2, T/L3	14	2 to 22 (8 to 22)	18	M5	⊖	2.3 to 2.5*2
	U/T1, V/T2, W/T3	8	2 to 14 (5.5 to 14)	18	M5	⊖	2.3 to 2.5*2		U/T1, V/T2, W/T3	8	2 to 14 (5.5 to 14)	18	M5	⊖	2.3 to 2.5*2
	- , +1, +2	14	2 to 38 (8 to 38)	20	M6	⑤	5 to 5.5		- , +1, +2	14	2 to 38 (8 to 38)	20	M6	⑤	5 to 5.5
	B1, B2	3.5	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7		B1, B2	3.5	2 to 14 (2 to 14)	10	M4	⊖	1.5 to 1.7

Note: The recommended wire gauges based on drive continuous current ratings using 75°C 600 V class 2 heat resistant indoor PVC wire.
Assume the following usage conditions:
- Ambient temperature: 40°C or lower
- Wiring distance: 100 m or shorter
- Rated current value

Dimensions

Enclosure Protection Design

200 V Class

Catalog Code CH70A	2003	2005	2008	2011	2014	2018	2025	2033	2047	2060	2075	2088	2115	2145	2180	2215	2283	2346	2415
Max. Applicable Motor Capacity kW	0.4	0.75	1.5	2.2	3	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
IP20/UL Open Type	IP20 supported with standard model																		
IP20/UL Type 1	Optional (Install a UL Type 1 kit on an IP20/UL Open Type drive.)																		

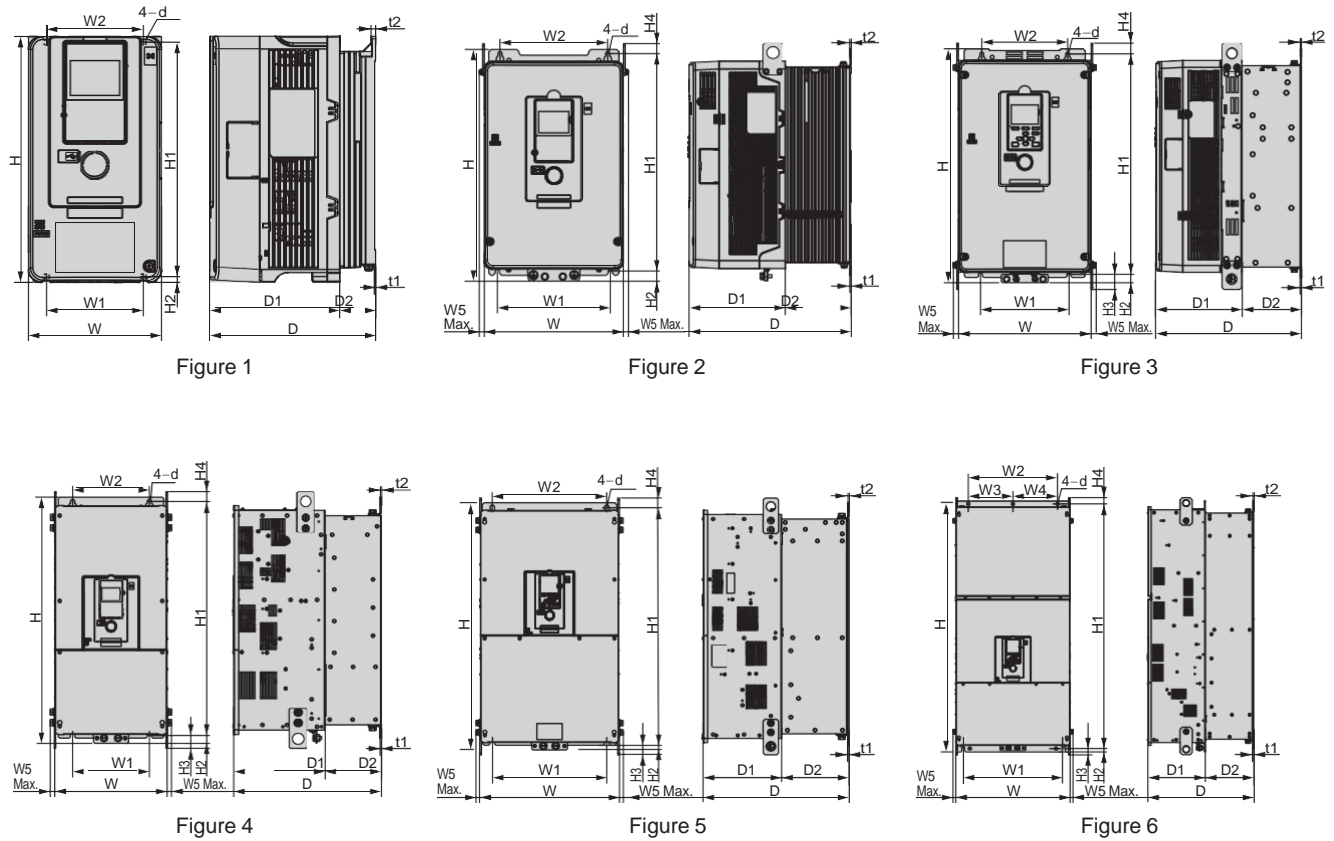
400 V Class

Catalog Code CH70A	4002	4003	4005	4006	4007	4009	4015	4018	4024	4031	4039	4045	4060	4075
Max. Applicable Motor Capacity kW	0.4	0.75	1.5	2.2	3	3.7	5.5	7.5	11	15	18.5	22	30	37
IP20/UL Open Type	IP20 supported with standard model													
IP20/UL Type 1	Optional (Install a UL Type 1 kit on an IP20/UL Open Type drive.)													

Catalog Code CH70A	4091	4112	4150	4180	4216	4260	4304	4371	4414	4453	4605
Max. Applicable Motor Capacity kW	45	55	75	90	110	132	160	200	220	250	315
IP20/UL Open Type	IP20 supported with standard model										
IP20/UL Type 1	Optional (Install a UL Type 1 kit on an IP20/UL Open Type drive.)										

*: UL Type 1 is not available for this capacity.

IP20/UL Open Type



200 V Class

Catalog Code CH70A□□	Figure	Dimensions mm																Weight kg	
		W	H	D	D1	D2	W1	W2	W3	W4	W5	H1	H2	H3	H4	t1	t2		d
2003	1	140	260	176	138	38	102	102	—	—	—	248	6	—	—	1.6	5	M5	3.5
2005																			
2008																			
2011																			
2014	1	140	260	211	138	73	102	102	—	—	—	248	6	—	—	1.6	5	M5	3.9
2018																			
2025	1	140	260	211	138	73	102	102	—	—	—	248	6	—	—	1.6	5	M5	4.2
2033																			
2047	1	180	300	202	134	68	140	140	—	—	—	284	8	—	—	1.6	1.6	M5	6.0
2060	1	220	350	227	140	87	192	192	—	—	—	335	8	—	—	2.3	2.3	M6	8.5
2075	1	220	350	227	140	87	192	192	—	—	—	335	8	—	—	2.3	2.3	M6	9
2088	2	240	400	280	166	114	195	186	—	—	12	375	17.5	—	17.5	2.3	2.3	M6	22
2115	3	255	450	280	166	114	170	165	—	—	12	424	16	29	21	2.3	2.3	M6	24
2145	3	264	543	335	186	149	190	182	—	—	12	516	17.5	28.5	20.5	2.3	2.3	M8	39
2180	3	264	543	335	186	149	190	182	—	—	12	516	17.5	28.5	20.5	2.3	2.3	M8	40
2215	4	312	700	420	260	160	218	218	—	—	18	659	28	43.5	28.5	4.5	4.5	M10	67
2283																			
2346	5	440	800	472	254	218	370	370	—	—	20	757	28	44	30	4.5	4.5	M12	104
2415	5	440	800	472	254	218	370	370	—	—	20	757	28	44	30	4.5	4.5	M12	119

400 V Class

Catalog Code CH70A□□	Figure	Dimensions mm																Weight kg	
		W	H	D	D1	D2	W1	W2	W3	W4	W5	H1	H2	H3	H4	t1	t2		d
4002	1	140	260	176	138	38	102	102	—	—	—	248	6	—	—	1.6	5	M5	3.5
4003																			
4005																			
4006																			
4007	1	140	260	211	138	73	102	102	—	—	—	248	6	—	—	1.6	5	M5	3.9
4009																			
4015	1	140	260	211	138	73	102	102	—	—	—	248	6	—	—	1.6	5	M5	4.2
4018																			
4024	1	180	300	202	134	68	140	140	—	—	—	284	8	—	—	1.6	1.6	M5	6.0
4031																			
4039	1	220	350	227	140	87	192	192	—	—	—	335	8	—	—	2.3	2.3	M6	7.5
4045	1	220	350	246	140	106	192	192	—	—	—	335	8	—	—	2.3	2.3	M6	12
4060	2	240	400	280	166	114	195	186	—	—	12	375	17.5	—	17.5	2.3	2.3	M6	17
4075	3	255	450	280	166	114	170	165	—	—	12	424	16	29	21	2.3	2.3	M6	22
4091	3	255	450	280	166	114	170	165	—	—	12	424	16	29	21	2.3	2.3	M6	25
4112	3	264	543	335	186	149	190	182	—	—	12	516	17.5	28.5	20.5	2.3	2.3	M8	38
4150	3	264	543	335	186	149	190	182	—	—	12	516	17.5	28.5	20.5	2.3	2.3	M8	39
4180	4	312	700	420	260	160	218	218	—	—	18	659	28	43.5	28.5	4.5	4.5	M10	71
4216																			
4260																			
4304	5	440	800	472	254	218	370	370	—	—	20	757	28	44	30	4.5	4.5	M12	122
4371	5	440	800	472	254	218	370	370	—	—	20	757	28	44	30	4.5	4.5	M12	126
4414	6	510	1136	480	260	220	450	450	225	225	20	1093	25.5	43.5	30.5	4.5	4.5	M12	198
4453																			
4605	6	510	1136	480	260	220	450	450	225	225	20	1093	25.5	43.5	30.5	4.5	4.5	M12	207

Note: External and mounting dimensions are different for standard mounting and panel through mounting.
Please refer to page 39 for panel through mounting.

Features
Model Number/
Catalog Code /
Selecting the Capacity
Basic
Instructions
Standard
Specifications
Standard
Connection Diagram
Terminal
Specifications
Dimensions
Fully-Enclosed
Design and Drive
Watt Loss Data
Peripheral Devices
and Options

Dimensions

■ IP20/UL Type 1

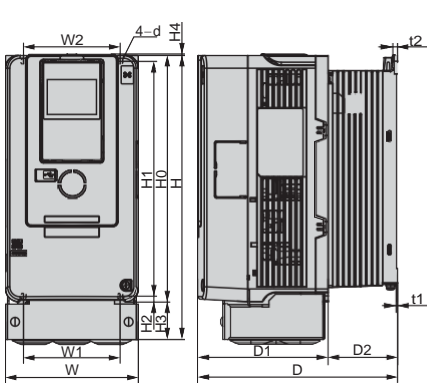


Figure 1

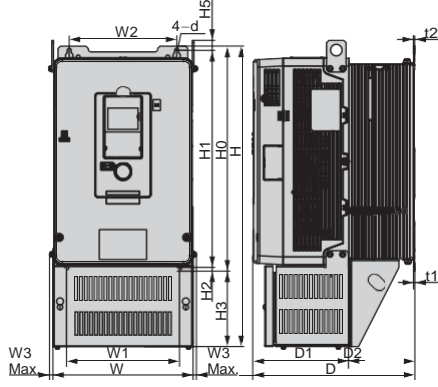


Figure 2

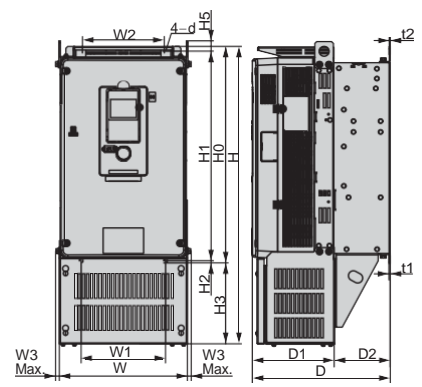


Figure 3

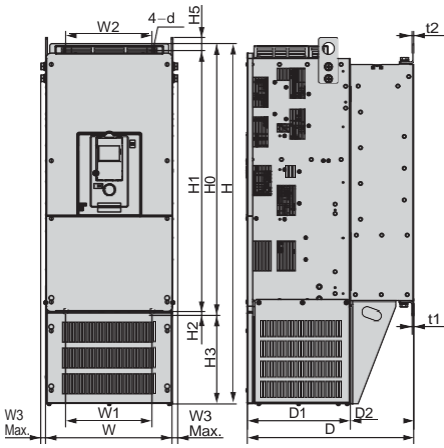


Figure 4

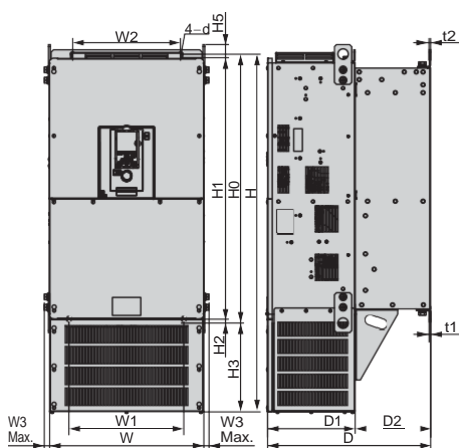


Figure 5

200 V Class: IP20/UL Type 1

Catalog Code CH70A	Figure	Dimensions mm																Weight kg	UL Type 1 Kit Model (Code No.)	
		W	H	D	D1	D2	W1	W2	W3	H0	H1	H2	H3	H4	H5	t1	t2			d
2003	1	140	300	176	138	38	102	102	—	260	248	6	40	1.5	—	1.6	5	M5	4.1	900-192-121-001 (100-202-326)
2005																				
2008																				
2011																				
2014	1	140	300	211	138	73	102	102	—	260	248	6	40	1.5	—	1.6	5	M5	4.5	900-192-121-001 (100-202-326)
2018																				
2025	1	140	300	211	138	73	102	102	—	260	248	6	40	1.5	—	1.6	5	M5	4.8	900-192-121-001 (100-202-326)
2033																				
2047	1	180	340	202	134	68	140	140	—	300	284	8	40	1.5	—	1.6	1.6	M5	7.0	900-192-121-002 (100-202-327)
2060	1	220	400	227	140	87	192	192	—	350	335	8	50	1.5	—	2.3	2.3	M6	9	900-192-121-003 (100-202-328)
2075	1	220	435	227	140	87	192	192	—	350	335	8	85	1.5	—	2.3	2.3	M6	10	900-192-121-004 (100-202-329)
2088	2	244	500	280	166	114	195	186	10	400	375	17.5	100	—	17.5	2.3	2.3	M6	24	900-192-121-005 (100-202-330)
2115	3	259	580	280	166	114	170	165	10	450	424	16	130	—	21	2.3	2.3	M6	27	900-192-121-006 (100-208-526)
2145	3	268	700	335	186	149	190	182	10	543	516	17.5	157	—	20.5	2.3	2.3	M8	44	900-192-121-007 (100-208-527)
2180	3	268	770	335	186	149	190	182	10	543	516	17.5	227	—	20.5	2.3	2.3	M8	46	900-192-121-008 (100-208-528)
2215	4	316	915	420	260	160	218	218	16	700	659	28	215	—	28.5	4.5	4.5	M10	72	900-192-121-009 (100-208-549)
2283																				
2346	5	444	1045	472	254	218	370	370	18	800	757	28	245	—	30	4.5	4.5	M12	113	900-192-121-010 (100-213-136)

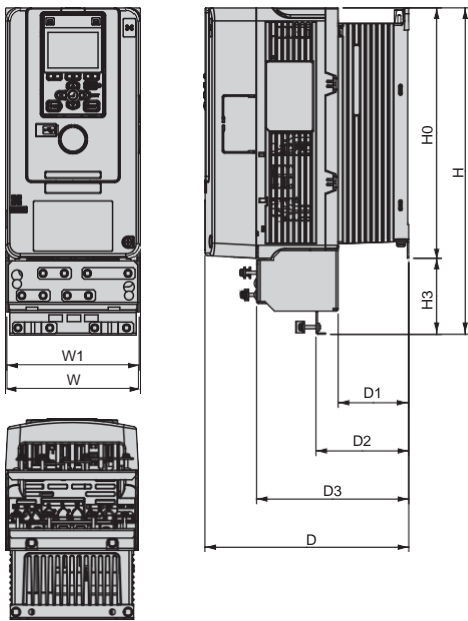
400 V Class: IP20/UL Type 1

Catalog Code CH70A	Figure	Dimensions mm																Weight kg	UL Type 1 Kit Model (Code No.)	
		W	H	D	D1	D2	W1	W2	W3	H0	H1	H2	H3	H4	H5	t1	t2			d
4002	1	140	300	176	138	38	102	102	—	260	248	6	40	1.5	—	1.6	5	M5	4.1	900-192-121-001 (100-202-326)
4003																				
4005																				
4006																				
4007	1	140	300	211	138	73	102	102	—	260	248	6	40	1.5	—	1.6	5	M5	4.5	900-192-121-001 (100-202-326)
4009																				
4015	1	140	300	211	138	73	102	102	—	260	248	6	40	1.5	—	1.6	5	M5	4.8	900-192-121-001 (100-202-326)
4018																				
4024	1	180	340	202	134	68	140	140	—	300	284	8	40	1.5	—	1.6	1.6	M5	7.0	900-192-121-002 (100-202-327)
4031																				
4039	1	220	400	227	140	87	192	192	—	350	335	8	50	1.5	—	2.3	2.3	M6	8.5	900-192-121-003 (100-202-328)
4045	1	220	400	246	140	106	192	192	—	350	335	8	50	1.5	—	2.3	2.3	M6	13	900-192-121-003 (100-202-328)
4060	2	244	500	280	166	114	195	186	10	400	375	17.5	100	—	17.5	2.3	2.3	M6	20	900-192-121-005 (100-202-330)
4075	3	259	580	280	166	114	170	165	10	450	424	16	130	—	21	2.3	2.3	M6	25	900-192-121-006 (100-208-526)
4091	3	259	580	280	166	114	170	165	10	450	424	16	130	—	21	2.3	2.3	M6	29	900-192-121-006 (100-208-526)
4112	3	268	700	335	186	149	190	182	10	543	516	17.5	157	—	20.5	2.3	2.3	M8	43	900-192-121-007 (100-208-527)
4150	3	268	700	335	186	149	190	182	10	543	516	17.5	157	—	20.5	2.3	2.3	M8	44	900-192-121-007 (100-208-527)
4180	4	316	915	420	260	160	218	218	16	700	659	28	215	—	28.5	4.5	4.5	M10	76	900-192-121-009 (100-208-549)
4216																				
4260																				
4304	5	444	1045	472	254	218	370	370	18	800	757	28	245	—	30	4.5	4.5	M12	130	900-192-121-010 (100-213-136)

Note: UL Type 1 kit (option) is required. The values in the table are the dimensions for the UL Type 1 kit mounted to the IP20/UL Open Type drive.

Dimensions

■ IP20/UL Open Type (Shield Clamp Kit)



200 V Class: IP20/UL Open Type (Shield Clamp Kit)

Catalog Code CH70A□	Dimensions mm									Shield Clamp Kit Model (Code No.)
	W	H	D	D1	D2	D3	W1	H0	H3	
2003	140	339	176	38	61	123	137	260	79	900-195-896-001 (100-206-983)
2005										
2008										
2011										
2014	140	339	211	73	96	158	137	260	79	900-195-896-001 (100-206-983)
2018										
2025										
2033										
2047	180	439	202	68	93	148	175	298	141	900-195-896-002 (100-206-984)
2060	220	468	227	87	112	174	220	350	118	900-195-896-003 (100-229-140)
2075	220	468	227	87	112	174	220	350	118	900-195-896-004 (100-229-141)
2088	240	490	280	114	139	217	244	390	100	900-195-896-007 (100-229-144)
2115	255	582	280	114	151	226	259	440	142	900-195-896-009 (100-229-146)
2145	264	697	335	149	189	266	268	533	164	900-195-896-012 (100-233-647)
2180	264	697	335	149	189	266	268	533	164	900-195-896-013 (100-233-700)

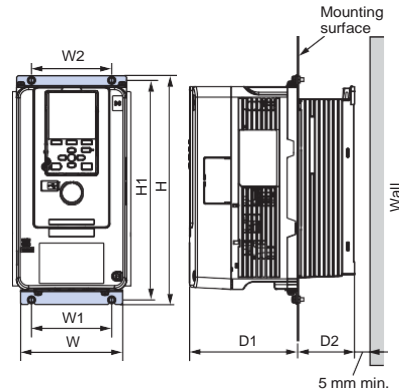
400 V Class: IP20/UL Open Type (Shield Clamp Kit)

Catalog Code CH70A□	Dimensions mm									Shield Clamp Kit Model (Code No.)
	W	H	D	D1	D2	D3	W1	H0	H3	
4002	140	339	176	38	61	123	137	260	79	900-195-896-001 (100-206-983)
4003										
4005										
4006	140	339	211	73	96	158	137	260	79	900-195-896-001 (100-206-983)
4007										
4009										
4015										
4018	180	439	202	68	93	148	175	298	141	900-195-896-002 (100-206-984)
4024										
4031	220	468	227	87	112	174	220	350	118	900-195-896-005 (100-229-142)
4039										
4045	220	468	227	87	112	174	220	350	118	900-195-896-006 (100-229-143)
4060	240	490	280	114	139	217	244	390	100	900-195-896-008 (100-229-145)
4075	255	557	280	114	151	226	259	440	117	900-195-896-010 (100-233-645)
4091	255	582	280	114	151	226	259	440	142	900-195-896-011 (100-233-646)
4112	264	697	335	149	189	266	268	533	164	900-195-896-014 (100-233-701)
4150	264	697	335	149	189	266	268	533	164	900-195-896-012 (100-233-647)

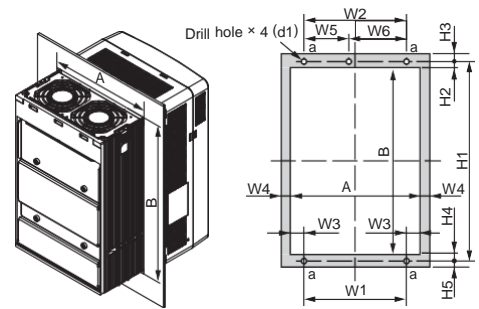
Features
Model Number/ Catalog Code / Selecting the Capacity
Basic Instructions
Standard Specifications
Standard Connection Diagram
Terminal Specifications
Dimensions
Fully-Enclosed Design and Drive Watt Loss Data
Peripheral Devices and Options

● Heatsink External Mounting Kit

When the heatsink is installed outside the drive, additional attachments are required. Additional attachments are not required for models CH70A2088 and above, and CH70A4060 and above because installing a heatsink outside the drive can be performed on these models by replacing their standard mounting feet. Contact Yaskawa if an instruction manual is needed.



● Panel Modification for External Heatsink



Panel cut out dimensions

Note: The shaded area is the size when installing the gasket. Guarantee a wider and higher gasket width space than the following W and H information.

200 V Class

Catalog Code CH70A...	Exterior and Mounting Dimensions and Cut-out Dimensions mm																Attachment for External Heatsink Model (Code No.)	
	W	H	D1	D2	W1	W2	W3	W4	H1	H2	H3	H4	H5	A	B	d1		
2003																		
2005																		
2008	140	294	138	38	102	102	16	3	282	23	6	26	6	134	233	M5	900-193-209-001 (100-203-229)	
2011																		
2014																		
2018	140	294	138	73	102	102	16	3	282	23	6	26	6	134	233	M5	900-193-209-001 (100-203-229)	
2025																		
2033																		
2047	180	329	134	68	140	140	17	3	318	23.5	5	24.5	6	174	270	M5	900-193-209-002 (100-203-230)	
2060																		
2075	220	384	140	87	192	192	11	3	371	27	7	25	6	214	319	M6	900-193-209-003 (100-203-231)	
2088	240	400	166	114	195	204	14.5	8	385	19.5	7.5	19.5	7.5	224	346	M6	—	
2115	255	450	166	114	170	210	34.5	8	436	20	8	20	6	239	396	M6	—	
2145																		
2180	264	543	186	149	190	220	29	8	527	19.5	8.5	20.5	7.5	248	487	M8	—	
2215																		
2283	312	700	260	160	218	263	39	8	675	33	12	32	13	296	610	M10	—	
2346																		
2415	440	800	254	218	370	310	23	12	773	31.5	14	31.5	13	416	710	M12	—	

400 V Class

Catalog Code CH70A...	Exterior and Mounting Dimensions and Cut-out Dimensions mm																Attachment for External Heatsink Model (Code No.)		
	W	H	D1	D2	W1	W2	W3	W4	W5	W6	H1	H2	H3	H4	H5	A		B	d1
4002																			
4003	140	294	138	38	102	102	16	3	—	—	282	23	6	26	6	134	233	M5	900-193-209-001 (100-203-229)
4005																			
4006																			
4007																			
4009	140	294	138	73	102	102	16	3	—	—	282	23	6	26	6	134	233	M5	900-193-209-001 (100-203-229)
4015																			
4018																			
4024																			
4031	180	329	134	68	140	140	17	3	—	—	318	23.5	5	24.5	6	174	270	M5	900-193-209-002 (100-203-230)
4039																			
4045	220	384	140	87	192	192	11	3	—	—	371	27	7	25	6	214	319	M6	900-193-209-003 (100-203-231)
4060	240	400	166	114	195	204	14.5	8	—	—	385	19.5	7.5	19.5	7.5	224	346	M6	—
4075	255	450	166	114	170	210	34.5	8	—	—	436	20	8	20	6	239	396	M6	—
4091																			
4112	264	543	186	149	190	220	29	8	—	—	527	19.5	8.5	20.5	7.5	248	487	M8	—
4150																			
4180																			
4216	312	700	260	160	218	263	39	8	—	—	675	33	12	32	13	296	610	M10	—
4260																			
4304																			
4371	440	800	254	218	370	310	23	12	—	—	773	31.5	14	31.5	13	416	710	M12	—
4414																			
4453	510	1140	260	220	450	404	18	12	179	225	1110	34	15	34	15	486	1042	M12	—
4605																			

Option Cards

RoHS compliant. Shipment of factory installed option is available. Contact Yaskawa.

Type	Name	Model	Function	Manual No.
Speed Reference Card	Analog Input	AI-A3	Enables high-precision and high-resolution analog speed reference setting. · Input signal level: -10 to +10 Vdc (20 k▲), 4 to 20 mA (250 ▲) · Input channels: 3 channels, DIP switch for input voltage/input current selection · Input resolution: Input voltage 13 bit signed (1/8192) Input current 1/4096	TOBPC73060078
	Digital Input	DI-A3	Enables 16-bit digital speed reference setting. · Input signal: 16 bit binary, 4 digit BCD +sign signal +set signal · Input voltage: 24 V (isolated) · Input current: 8 mA User-set: 8 bit, 12 bit, 16 bit	TOBPC73060080
Communications Option Card	MECHATROLINK-II Interface	SI-T3	Used for running or stopping the drive, setting or referencing parameters, and monitoring output frequency, output current, or similar items through MECHATROLINK-II communication with the host controller. Note: Use options with software versions of 6108 or later.	TOEPC73060086
				SIEPC73060086
	MECHATROLINK-III Interface	SI-ET3	Used for running or stopping the drive, setting or referencing parameters, and monitoring output frequency, output current, or similar items through MECHATROLINK-III communication with the host controller. Note: Use options with software versions of 6202 or later.	TOEPC73060088
				SIEPC73060088
	CC-Link Interface	SI-C3	Used for running or stopping the drive, setting or referencing parameters, and monitoring output frequency, output current, or similar items through CC-Link communication with the host controller.	TOBPC73060083
				SIEPC73060083
	DeviceNet Interface	SI-N3	Used for running or stopping the drive, setting or referencing parameters, and monitoring output frequency, output current, or similar items through DeviceNet communication with the host controller. Note: Use options with software versions of 1114 or later.	TOBPC73060084
				SIEPC73060084
	PROFIBUS-DP Interface	SI-P3	Used for running or stopping the drive, setting or referencing parameters, and monitoring output frequency, output current, or similar items through PROFIBUS-DP communication with the host controller.	TOBPC73060082
				SIEPC73060082
CANopen Interface	SI-S3	Used for running or stopping the drive, setting or referencing parameters, and monitoring output frequency, output current, or similar items through CANopen communication with the host controller.	TOBPC73060085	
			SIEPC73060085	
EtherNet/IP Interface	SI-EN3	Used for running or stopping the drive, setting or referencing parameters, and monitoring output frequency, output current, or similar items through EtherNet/IP communication with the host controller.	TOEPC73060092	
			SIEPC73060092	
Modbus TCP/IP Interface	SI-EM3	Used for running or stopping the drive, setting or referencing parameters, and monitoring output frequency, output current, or similar items through Modbus TCP/IP communication with the host controller.	TOEPC73060091	
			SIEPC73060091	
PROFINET Interface	SI-EP3	Used for running or stopping the drive, setting or referencing parameters, and monitoring output frequency, output current, or similar items through PROFINET communication with the host controller. Note: The drive is compatible with option software versions 4400 and later.	TOEPC73060089	
			SIEPC73060089	
Monitor Option Card	Analog Monitor	AO-A3	Outputs analog signal for monitoring drive output state (output freq., output current etc.). · Output resolution: 11 bit signed (1/2048) · Output voltage: -10 to +10 Vdc (non-isolated) · Terminals: 2 analog outputs	TOBPC73060079
	Digital Output	DO-A3	Outputs isolated type digital signal for monitoring drive run state (alarm signal, zero speed detection, etc.) · Terminals: 6 photocoupler outputs (48 V, 50 mA or less) 2 relay contact outputs (250 Vac, 1 A or less 30 Vdc, 1 A or less)	TOBPC73060081
PG Speed Controller Card	Complimentary Type PG	PG-B3	For control modes requiring a PG encoder for motor feedback. - Phase A, B, and Z pulse (3-phase) inputs (complementary type) - Max. input frequency: 50 kHz - Pulse monitor output: Open collector, 24 V, max. current 30 mA - Power supply output for PG: 12 V, max. current 200 mA	TOBPC73060075
	Line Driver PG	PG-X3	For control modes requiring a PG encoder for motor feedback. - Phase A, B, and Z pulse (differential pulse) inputs (RS-422) - Max. input frequency: 300 kHz - Pulse monitor output: RS-422 - Power supply output for PG: 5 V or 12 V, max. current 200 mA	TOBPC73060076
	Resolver Interface for TS2640N321E64	PG-RT3	For control modes requiring a PG encoder for motor feedback. Can be connected to the TS2640N321E64 resolver made by Tamagawa Seiki Co., Ltd. And electrically compatible resolvers. The representative electrical characteristics of the TS2640N321E64 are as follows. - Input voltage: 7 Vac rms 10 kHz - Transformation ratio: 0.5 ± 5% - maximum input current: 100 mArms - Wiring length: 10 m max.	TOBPC73060087

Note: 1. Each communication option card requires a separate configuration file to link to the network.
2. PG speed controller card is required for PG control.

Note: DriveWizard is a PC software package for managing parameters and functions in Yaskawa drives.

Features
Model Number / Catalog Code / Selecting the Capacity
Basic Instructions
Standard Specifications
Standard Diagram
Connection Diagram
Terminal Specifications
Dimensions
Fully-Enclosed Design and Drive Watt Loss Data
Peripheral Devices and Options



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