

YASKAWA AC Drive Option

Braking Unit, Braking Resistor Unit Installation Manual

Type: CDBR-D
LKEB-

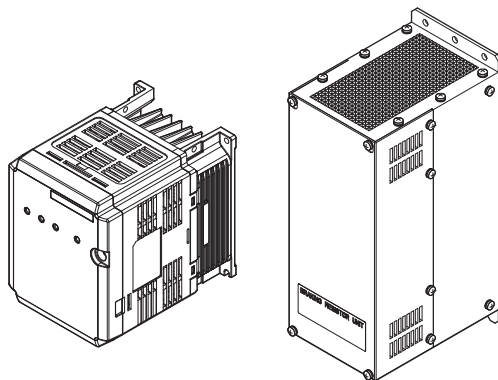
To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this manual.

安川インバータ オプション

制動ユニット, 制動抵抗器ユニット 取扱説明書

形式: 制動ユニット CDBR-D
制動抵抗器ユニット LKEB-

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1 Preface and Safety

◆ Applicable Documentation

The following manuals are available for the option:

CDBR Braking Unit, LKEB Braking Resistor Unit

YASKAWA AC Drive Option Braking Unit, Braking Resistor Unit Installation Manual Manual No: TOBP C720600 01 (This book)	Read this manual first. This guide is packaged together with the product and contains information necessary to install and setup the option.
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Drive

YASKAWA AC Drive Manuals	Drive manuals contain basic installation and wiring information in addition to detailed parameter setting, fault diagnostic, and maintenance information. The most recent versions of these manuals are available for download on our documentation websites. Refer to the back cover of this manual for links to each regional site.
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◆ Terms

- Note:** Indicates supplemental information that is not related to safety messages.
- Drive:**
- Varispeed G7-Series
 - YASKAWA AC Drive 1000-Series
 - YASKAWA AC Drive GA700
 - YASKAWA AC Drive CH700
 - YASKAWA AC Drive CR700
- Option:** YASKAWA AC Drive Option CDBR Braking Unit, LKEB Braking Resistor Unit
- Digital Operator:**
- LCD Operator for YASKAWA AC Drive 1000-Series
 - LED Operator for YASKAWA AC Drive 1000-Series
 - LCD Keypad for YASKAWA AC Drive GA700, CH700, and CR700
 - LED Keypad for YASKAWA AC Drive GA700, CH700, and CR700

◆ Registered Trademarks

Trademarks are the property of their respective owners.

◆ Supplemental Safety Information

Read and understand this manual before installing, operating, or servicing this option. Install the option according to this manual and local codes.

The following conventions indicate safety messages in this manual. Failure to heed these messages could cause fatal injury or damage products and related equipment and systems.

DANGER

Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazardous situation, which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates an equipment damage message.

■ General Safety

General Precautions

- The diagrams in this book may include options and drives without covers or safety shields to illustrate details. Be sure to reinstall covers or shields before operating any devices. Use the option according to the instructions described in this manual.
- The diagrams in this manual are provided as examples only and may not pertain to all products covered by this manual.
- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual.
- Contact a Yaskawa representative or the nearest Yaskawa sales office and provide the manual number shown on the front cover to order new copies of the manual.

DANGER

Heed the safety messages in this manual.

Failure to comply will cause death or serious injury.

The operating company is responsible for any injuries or equipment damage resulting from failure to heed the warnings in this manual.

Electrical Shock Hazard

Do not inspect, connect, or disconnect any wiring while the drive is energized.

Failure to comply will cause death or serious injury. Before servicing, disconnect all power to the equipment and wait for at least the time specified on the warning label. The internal capacitor remains charged even after the drive is de-energized. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc. When all indicators are OFF, measure for unsafe voltages to confirm the drive is safe.

Ground the drive ground terminal (200 V class: Ground to 100 Ω or less, 400 V class: Ground to 10 Ω or less, 600 V class: Ground to 10 Ω or less).

Improper equipment grounding could result in death or serious injury by contacting ungrounded electrical equipment.

WARNING

Electrical Shock Hazard

Do not attempt to modify or alter the drive or option circuitry in any way not explained in this manual.

Failure to comply could cause death or serious injury and will void warranty. Yaskawa is not responsible for any modification of the product made by the user. Do not modify this product.

Fire Hazard

Install adequate branch circuit short circuit protection per applicable codes and this manual.

Failure to comply could cause death or serious injury. The device is suitable for circuits capable of delivering up to the lesser value between 100 kA RMS Symmetrical Amperes, 240 Vac maximum (200 V Class), 480 Vac maximum (400 V Class), or 600 Vac maximum (600 V Class) or the equivalent SCCR rating of the drive to which it is connected.

CAUTION

Crush Hazard

Do not carry the drive by the front cover.

Do not carry the drive by the front cover or the terminal cover. Failure to comply could cause minor or moderate injury from the main body of the drive falling.

NOTICE

Do not expose the drive or the option to halogen group disinfectants. Do not pack the drive or the option in fumigated or sterilized wooden materials. Do not sterilize the entire package after packing the product.

Failure to comply could damage electrical components in the option.

Connect CDBR Series of Dynamic Braking devices to a drive that incorporates Solid State Short Circuit Protection Circuitry and complies with the High Fault Current Short Circuit Test.

Failure to comply may result in damage to the drive or CDBR.

■ Option Label Warnings

Always heed the warning information listed in *Figure 1* in the position shown in *Figure 2*.

⚠ WARNING

⚡ Electric Shock Hazard

- Read the manual before installing.
- Before servicing, wait 5 minutes for the Drive internal capacitor to discharge after disconnecting power supply.
- Use proper grounding techniques.

Fire Hazard

- Use proper sequencing to disconnect the power supply in the event of braking resistor until overload relay trip.

**⚠ Burn Hazard
Hot Surface**

- Do not touch top and side surfaces which become hot during operation.

Figure 1 Warning Information

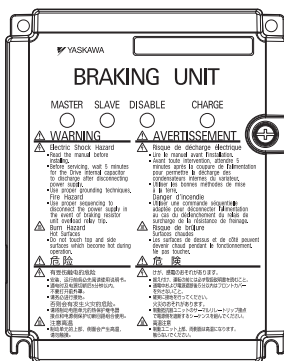


Figure 2 Warning Information Position

2 Product Overview

◆ About this Product

CDBR Braking Units and LKEB Braking Resistor Units help dissipate regenerative energy from the motor. This is useful in applications that require sudden deceleration and frequent stops and it allows for shorter deceleration times in applications running heavy loads.

◆ Applicable Models

■ CDBR Braking Unit

The CDBR Braking Unit is designed for use with the drive models in [Table 1](#). It can also replace a spec B type CDBR. Contact Yaskawa or your Yaskawa agent for more information or to use the CDBR on drives not listed.

Table 1 CDBR Braking Unit Applicable Models

Drive Series	Models
Varispeed G7	CIMR-G7□2018 to 2110 CIMR-G7□4018 to 4300
A1000	CIMR-A□2A0169 to 2A0415 CIMR-A□4A0088 to 4A1200 CIMR-A□5A0062 and 5A0077
T1000A	CIMR-T□2A0169 to 2A0415 CIMR-T□4A0088 to 4A0362
L1000A	CIMR-L□2A0145 to 2A0415 CIMR-L□4A0075 to 4A0216
H1000	CIMR-H□4A0075 to 4A1090
GA700	CIPR-GA70□2□□□ CIPR-GA70□4□□□
CH700	CIPR-CH70□2□□□ CIPR-CH70□4□□□
CR700	CIPR-CR70□2□□□ CIPR-CR70□4□□□

2 Product Overview

■ LKEB Braking Resistor Unit

The LKEB Braking Resistor Unit is designed for use with the drive models in [Table 2](#). Contact Yaskawa or your Yaskawa agent to use the CDBR on drives not listed.

Table 2 LKEB Braking Resistor Unit Applicable Models

Drive Series	Models
Varispeed G7	All Models
V1000	
J1000	
T1000V	
A1000	
T1000A	
L1000A	
H1000	
GA700	
CH700	
CR700	

3 Receiving

After receiving the option package:


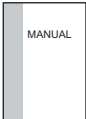
1. Make sure that the option is not damaged and no parts are missing. Contact your sales outlet if the option or other parts appear damaged.

NOTICE: Do not use damaged parts to connect the drive and the option. Failure to comply could damage the drive and option.


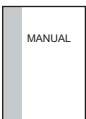
2. Confirm that the model number on the option nameplate and the model listed in the purchase order are the same. Refer to [Figure 3](#) on page 12 for details. Contact the distributor where the option was purchased or the Yaskawa sales office immediately about any problems with the option.

◆ Option Package Contents

■ CDBR Braking Unit

Description:	CDBR Braking Unit	Installation Manual (This Book)
—		
Quantity:	1	1

■ LKEB Braking Resistor Unit

Description:	LKEB Braking Resistor Unit	Installation Manual (This Book)
—		
Quantity:	1	1

3 Receiving

◆ Installation Tools

- A Phillips screwdriver (M3.5 to M5 metric / #1, #2, and #3 U.S. standard size).
- A flat-blade screwdriver (blade depth: 0.4 mm (0.02 in.), width: 2.5 mm (0.1 in.)).

Note: This manual does not list tools required to prepare option cables for wiring.

◆ Option Nameplate

■ CDBR Braking Unit

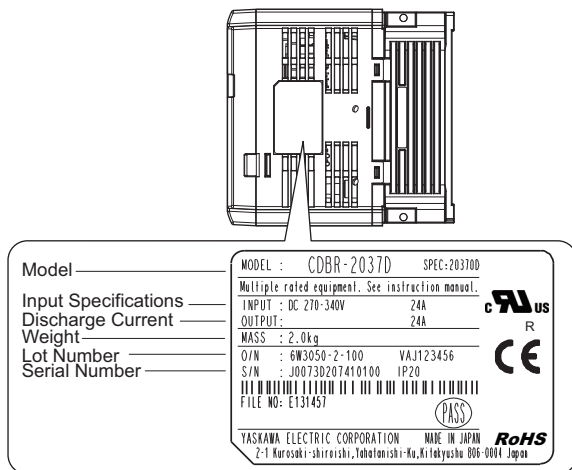


Figure 3 Nameplate Example (CDBR Braking Unit)

■ LKEB Braking Resistor Unit

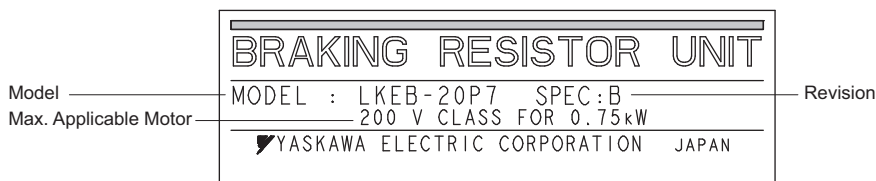


Figure 4 Nameplate Example (LKEB Braking Resistor Unit)

◆ Model Number

■ CDBR Braking Unit

CDBR-
2
037
D

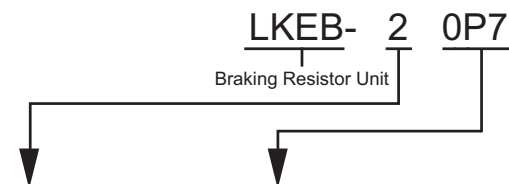
Braking Unit

Design
Revision
Order

Voltage Class		No.	Max. Motor Capacity kW (HP)	Rated Discharge Amps	Maximum Discharge Amps Peak 10% Duty
2	200 V	022	22 (30)	20	60
		037	37 (50)	24	80
		055	55 (74)	40	120
		110	110 (148)	80	250
4	400 V	030	30 (40)	15	40
		045	45 (60)	18	60
		090	90 (121)	30	100
		220	220 (295)	80	250
5	600 V	037	37 (50)	15	40
		110	110 (148)	30	100
		300	300 (402)	80	250

3 Receiving

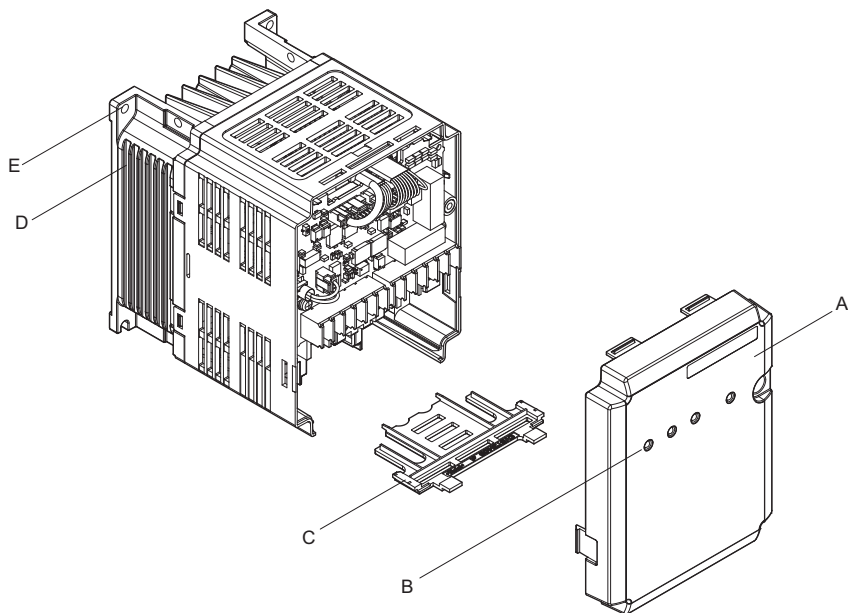
■ LKEB Braking Resistor Unit



Voltage Class		No.	Max. Motor Capacity (kW)	Average Dissipated Power (W)	Resistance (Ω)
2	200 V	0P7	0.75	70	200
		1P5	1.5	260	100
		2P2	2.2	260	70
		3P7	3.7	390	40
		5P5	5.5	520	30
		7P5	7.5	780	20
		011	11	2400	13.6
		015	15	3000	10
		018	18.5	4800	8
		022	22	4800	6.8
4	400 V	0P7	0.75	70	750
		1P5	1.5	260	400
		2P2	2.2	260	250
		3P7	3.7	390	150
		5P5	5.5	520	100
		7P5	7.5	780	75
		011	11	1040	50
		015	15	1560	40
		018	18.5	4800	32
		022	22	4800	27.2
		030	30	6000	20
		037	37	9600	16
		045	45	9600	13.6

4 CDBR Braking Unit Components

◆ CDBR Braking Unit



A – Front Cover

B – LED Display (Refer to page 18 for details)

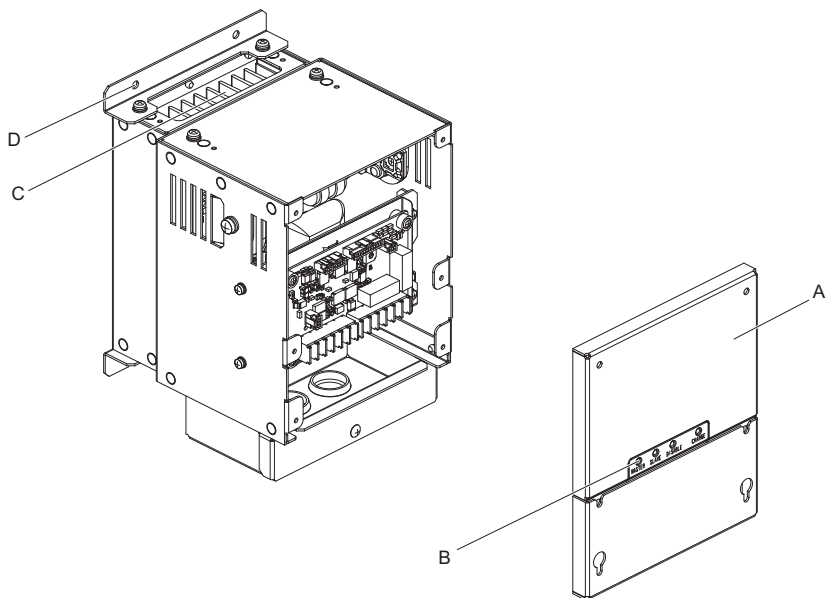
C – Bottom Cover

D – Heatsink

E – Installation Hole

Figure 5 CDBR Braking Unit Components (Example: CDBR-2037D)

4 CDBR Braking Unit Components



A – Front Cover

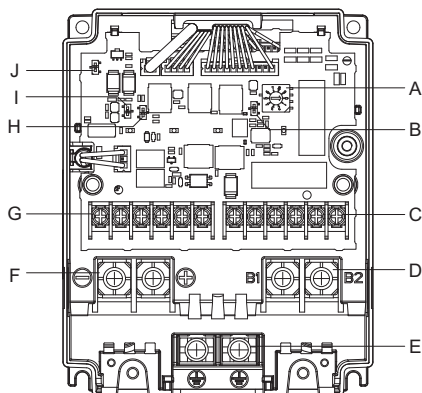
B – LED Display (Refer to page 18 for details)

C – Heatsink

D – Installation Hole

Figure 6 CDBR Braking Unit Components (Example: CDBR-2055D)

◆ CDBR Braking Unit Front View

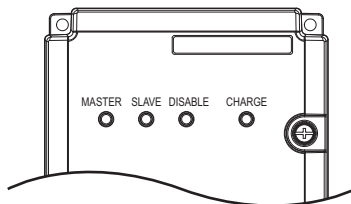


- | | |
|--|--|
| A – Braking Activation Voltage
Rotary Switch S3 | F – + and - Main Circuit Terminals (TB3) |
| B – Master/Slave Selection DIP
Switch S2 | G – Control Circuit Terminals (TB1) |
| C – Control Circuit Terminals
(TB2) | H – Fault Relay Enable/Disable DIP Switch S5
Note: Available in Rev. B and later. |
| D – Main Circuit Terminals
(B1, B2) | I – N.O./N.C. DIP Switch S4 |
| E – Grounding Terminal | J – Sink/Source DIP Switch S1 |

Figure 7 Front View of CDBR Braking Unit

4 CDBR Braking Unit Components

◆ CDBR Braking Unit LED Display



LED	Color	Lit	Off
MASTER	Green	CDBR is functioning as Master	CDBR is functioning as Slave
SLAVE	Green	CDBR is functioning as Slave	CDBR is functioning as Master
DISABLE	Red	Fault has occurred	Normal operation
CHARGE	Red	CDBR is powered on	—

5 Mechanical Installation

◆ Section Safety



WARNING

Electrical Shock Hazard

Do not allow unqualified personnel to perform work on the drive or option.

Failure to comply could cause death or serious injury.

Only authorized personnel familiar with installation, adjustment, and maintenance of AC drives and options may perform work.

NOTICE

Damage to Equipment

Observe proper electrostatic discharge (ESD) procedures when handling the option, drive, and circuit boards.

Failure to comply could cause ESD damage to circuitry.

Do not connect or operate any equipment with visible damage or missing parts.

Failure to comply could further damage the equipment.

5 Mechanical Installation

◆ Installation Environment

The installation environment is crucial to ensure proper performance and the expected lifespan of the product.

Ensure the installation environment satisfies the following specifications.

Environment	Conditions
Installation Area	Indoors
Ambient Temperature	IP00, IP20: -10 to +50°C (14 to +122°F) UL Type 1: -10 to +40°C (14 to +104°F)
Storage Temperature	-20 to +60°C (-4 to +140°F) (short-term temperature during transportation)
Humidity	95% RH or less and free of condensation
Surrounding Area	Install the option in an area free from: <ul style="list-style-type: none">• oil mist and dust• metal shavings, oil, water, or other foreign materials• radioactive materials• combustible materials (e.g., wood)• harmful gases and liquids• excessive vibration• chlorides• direct sunlight
Altitude	Up to 1000 m (3280 ft) without derating; up to 3000 m (9842 ft) with output and current derating. Contact Yaskawa or your nearest sales representative for applications above 1000 m (3280 ft).
Vibration/Shock	10 to 20 Hz: 9.8 m/s ² , 20 to 55 Hz: 5.9 m/s ²
Installation Orientation	Install the option upright to maintain proper cooling.

■ UL and CE Compliance

Place the braking unit within an appropriate enclosure suitable to its environment to comply with UL and CE standards. Install the braking unit in a pollution degree 2 environment or equivalent according to UL standards.

Use UL Listed copper wires rated at 75°C (167°F) for main circuit terminal wiring (+, -, B1, B2) for UL approval.

◆ Installation Orientation

Install the CDBR Braking Unit upright as illustrated in *Figure 8* to maintain proper cooling.



Figure 8 Correct Installation Orientation (Braking Unit)

◆ Installation Spacing

Figure 9 and *Figure 10* show the installation distance required to maintain sufficient space for airflow and wiring.

■ CDBR Braking Unit Spacing

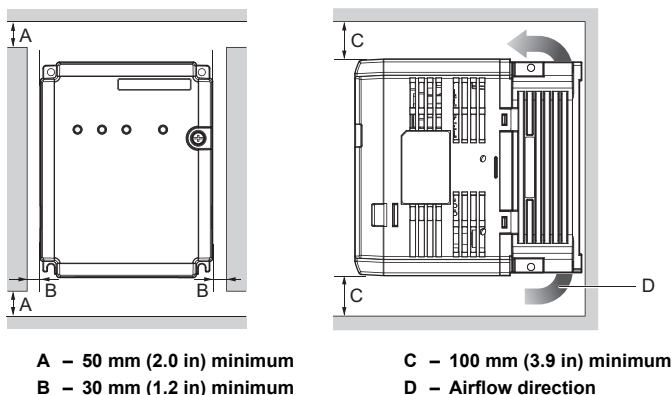


Figure 9 CDBR Braking Unit Installation Spacing

5 Mechanical Installation

Multiple Drive Installation (Side-by-Side Installation)

Mount the drives according to [Figure 9](#) when installing multiple drives into the same enclosure panel.

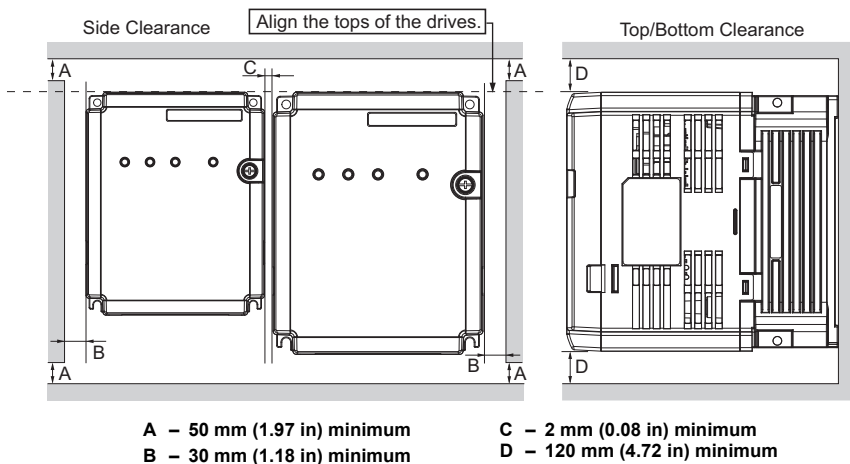
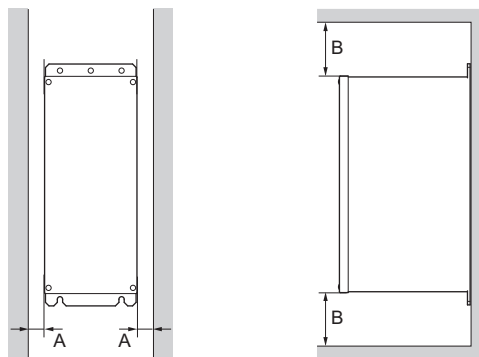


Figure 10 Space Between CDBR Braking Units (Side-by-Side Mounting)

■ LKEB Braking Resistor Unit Spacing



Model LKEB-	Dimension mm (in)	
	A	B
20P7 to 27P5	30 (1.18)	150 (5.91)
2011 to 2022	50 (1.97)	200 (7.87)
40P7 to 47P5	30 (1.18)	150 (5.91)
4011 to 4045	50 (1.97)	200 (7.87)

5 Mechanical Installation

◆ Exterior Dimensions

■ CDBR Braking Unit

IP20

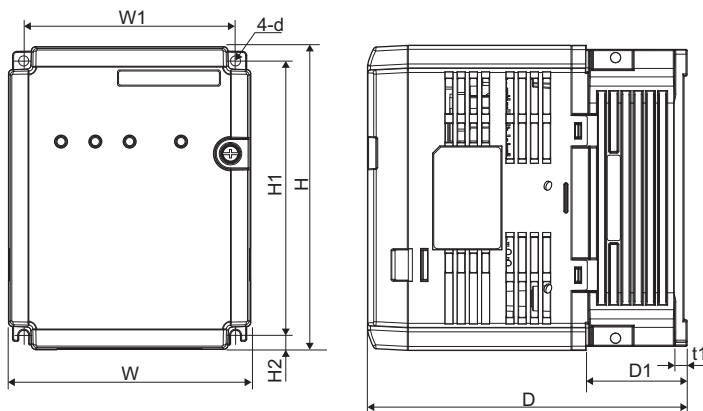


Table 3 Dimensions for CDBR Braking Unit (IP20)

Model CDBR-	Dimensions mm (in)									Weight kg (lb)
	W	H	D	W1	H1	H2	D1	t1	d	
2022D	120 (4.72)	150 (5.91)	157 (6.18)	105 (4.13)	136 (5.35)	7 (0.28)	48 (1.89)	6 (0.24)	M4	2 (4.4)
2037D										
4030D										
4045D										
5037D										

IP00

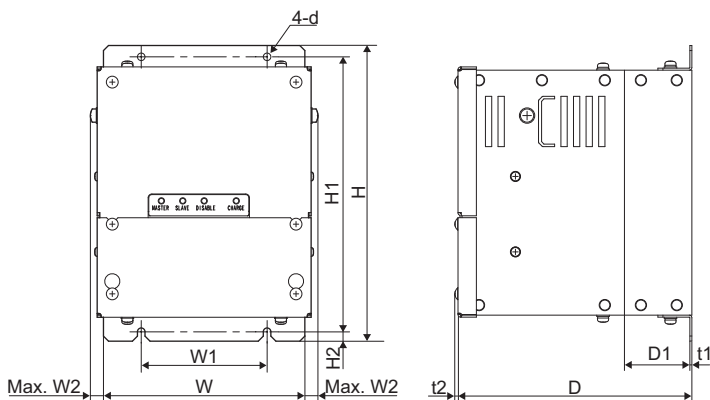


Figure 1

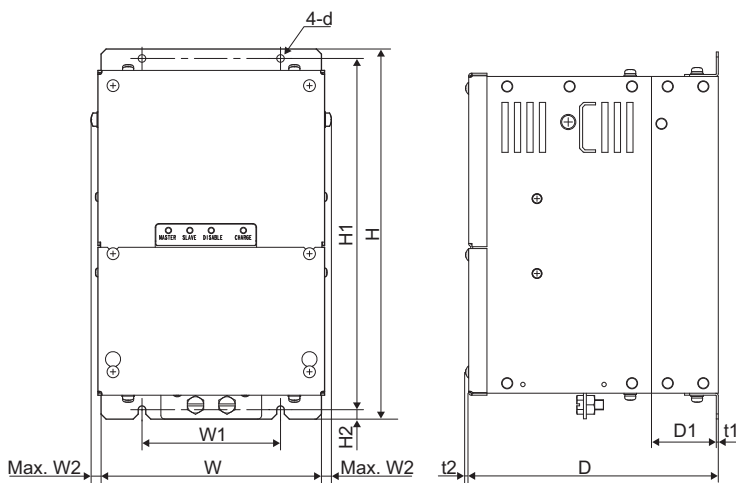


Figure 2

5 Mechanical Installation

Table 4 Dimensions for CDBR Braking Unit (IP00)

Model CDBR-	Figure	Dimensions mm (in)											Weight kg (lb)	
		W	H	D	W1	W2	H1	H2	D1	t1	t2	d		
2055D	1	160 (6.30)	235 (9.25)	185.9 (7.32)	100 (3.94)	10.4 (0.41)	218.5 (8.60)	7.5 (0.30)	53.6 (2.11)	1.6 (0.06)	2.5 (0.10)	M5	5.5 (12.13)	
2110D	2	175 (6.89)	294 (11.57)	200 (7.87)	110 (4.33)	7.9 (0.31)	279 (10.98)		53.5 (2.11)				7.5 (16.53)	
4090D	1	160 (6.30)	235 (9.25)	185.9 (7.32)	100 (3.94)	10.4 (0.41)	218.5 (8.60)		53.6 (2.11)				5.5 (12.13)	
4220D	2	175 (6.89)	294 (11.57)	200 (7.87)	110 (4.33)	7.9 (0.31)	279 (10.98)		53.5 (2.11)				7.5 (16.53)	
5110D														
5300D														

UL Type 1

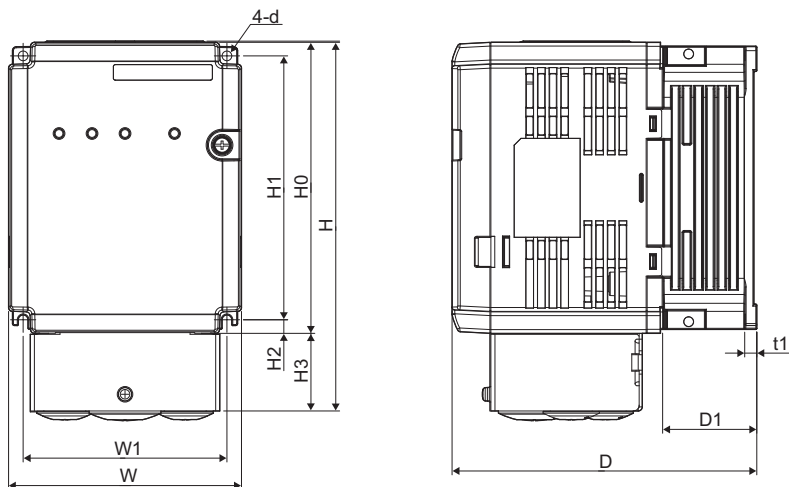


Figure 1

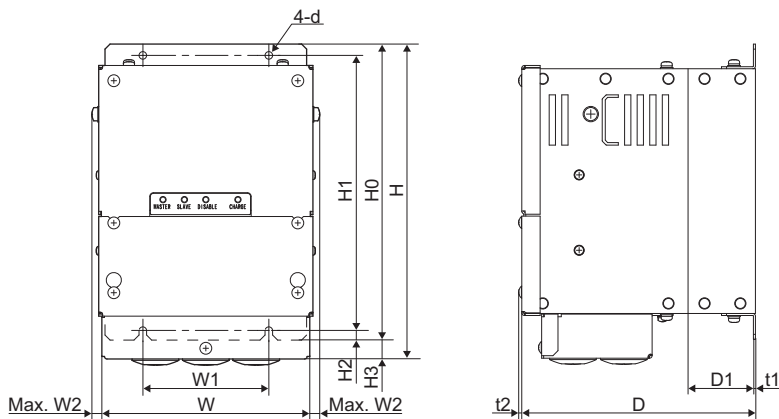


Figure 2

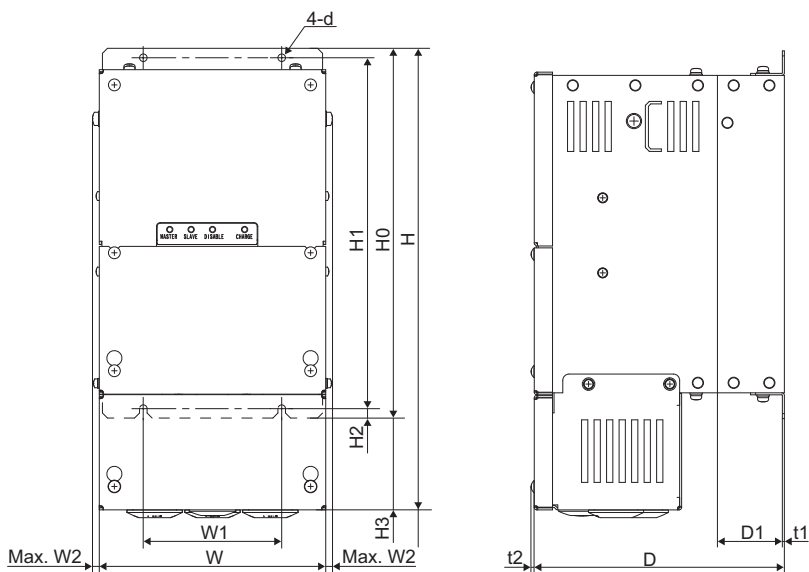


Figure 3

5 Mechanical Installation

Table 5 Dimensions for CDBR Braking Unit (UL Type 1)

Model CDBR-	Figure	Dimensions mm (in)													Weight kg (lb)
		W	H	D	W1	W2	H0	H1	H2	H3	D1	t1	t2	d	
2022D	1	120	190	157	105	—	150	136	7	40	48	6	—	M4	2.3
2037D		(4.72)	(7.48)	(6.18)	(4.13)		(5.90)	(5.35)	(0.28)	(1.57)	(1.89)	(0.24)			(5.07)
2055D	2	165	250	185.9	100	7.9	235	218.5	7.5 (0.30)	15	53.6	1.6 (0.06)	2.5 (0.10)	M5	5.9
		(6.50)	(9.84)	(7.32)	(3.94)	(0.31)	(9.25)	(8.60)		(0.59)	(2.11)				(13.01)
2110D	3	180	367	200	110	5.4	294	279	(0.30)	73	53.5	(0.06)	(0.10)	M5	8.3
		(7.09)	(14.45)	(7.87)	(4.33)	(0.21)	(11.57)	(10.98)		(2.87)	(2.11)				(18.30)
4030D	1	120	190	157	105	—	150	136	7	40	48	6	—	M4	2.3
4045D		(4.72)	(7.48)	(6.18)	(4.13)		(5.90)	(5.35)	(0.28)	(1.57)	(1.89)	(0.24)			(5.07)
4090D	2	165	250	185.9	100	7.9	235	218.5	7.5 (0.30)	15	53.6	1.6 (0.06)	2.5 (0.10)	M5	5.9
		(6.50)	(9.84)	(7.32)	(3.94)	(0.31)	(9.25)	(8.60)		(0.59)	(2.11)				(13.01)
4220D	3	180	367	200	110	5.4	294	279	(0.30)	73	53.5	(0.06)	(0.10)	M5	8.3
		(7.09)	(14.45)	(7.87)	(4.33)	(0.21)	(11.57)	(10.98)		(2.87)	(2.11)				(18.30)
5037D	1	120	190	157	105	—	150	136	7	40	48	6	—	M4	2.3
		(4.72)	(7.48)	(6.18)	(4.13)		(5.90)	(5.35)	(0.28)	(1.57)	(1.89)	(0.24)			(5.07)
5110D	2	180	367	200	110	5.4	294	279	7.5	73	53.5	1.6	2.5	M5	8.3
5300D	3	(7.09)	(14.45)	(7.87)	(4.33)	(0.21)	(11.57)	(10.98)	(0.30)	(2.87)	(2.11)	(0.06)	(0.10)		(18.30)

■ LKEB Braking Resistor Unit Dimensions

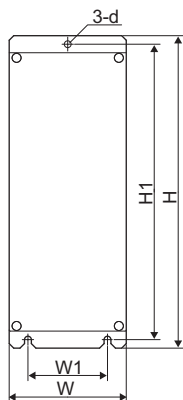


Figure 1

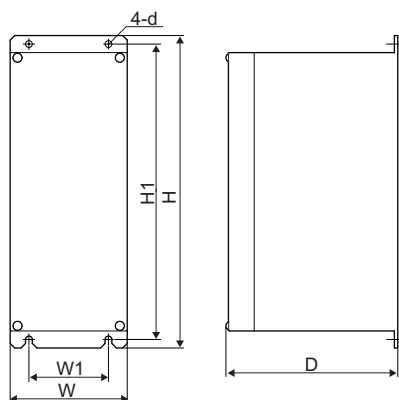


Figure 2

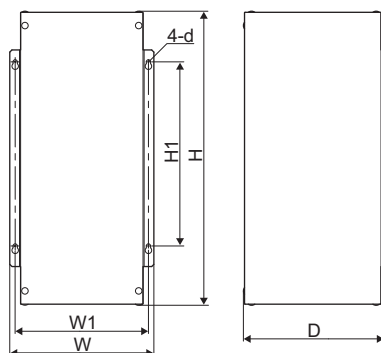


Figure 3

5 Mechanical Installation

Table 6 Dimensions for LKEB Braking Resistor Unit (200 V)

Model LKEB-	Figure	Dimensions mm (in)						Weight kg (lb)				
		W	H	D	W1	H1	d					
20P7	1	105 (4.13)	275 (10.83)	150 (5.91)	50 (1.97)	260 (10.24)	M5	3.0 (6.6)				
21P5	2	130 (5.12)	350 (13.78)		75 (2.95)	335 (13.19)		4.5 (9.9)				
22P2								5.0 (11.0)				
23P7		250 (9.84)			200 (7.87)	M6	7.5 (16.5)					
25P5							8.5 (18.7)					
27P5												
2011	3	266 (10.47)	543 (21.38)	260 (10.24)	246 (9.69)	340 (13.39)	M8	10 (22.0)				
2015		356 (14.02)			336 (13.23)			15 (33.0)				
2018		446 (17.56)			426 (16.77)			19 (41.8)				
2022												

Table 7 Dimensions for LKEB Braking Resistor Unit (400 V)

Model LKEB-	Figure	Dimensions mm (in)						Weight kg (lb)
		W	H	D	W1	H1	d	
40P7	1	105 (4.13)	275 (10.83)	150 (5.91)	50 (1.97)	260 (10.24)	M5	3.0 (6.6)
41P5	2	130 (5.12)	350 (13.78)		75 (2.95)	335 (13.19)		4.5 (9.9)
42P2								
43P7		250 (9.84)			200 (7.87)		M6	7.5 (16.5)
45P5								
47P5	3	350 (13.78)	412 (16.22)	260 (10.24)	330 (12.99)	325 (12.80)	M6	16 (35.2)
4011								
4015		446 (17.56)	543 (21.38)		426 (16.77)	340 (13.39)	M8	19 (41.8)
4018								
4022		446 (17.56)			426 (16.77)			33 (72.6)
4030								
4037								
4045								

◆ CDBR Attachments

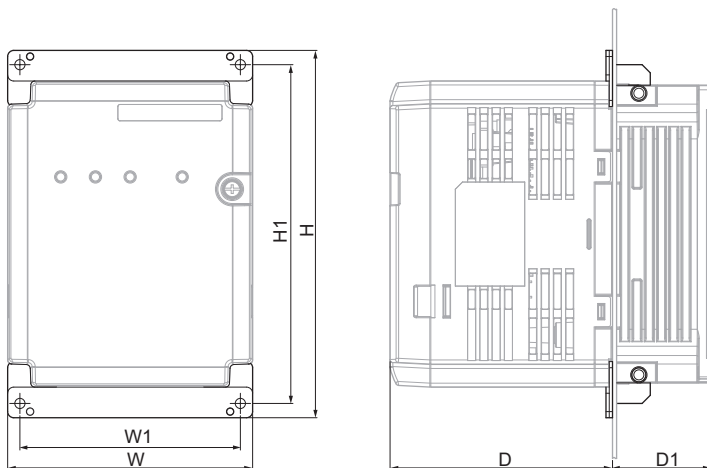
■ External Heatsink Attachment

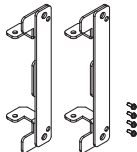
Use the External Heatsink Attachment to install the heatsink outside the enclosure on models 2022D, 2037D, 4030D, and 4045D.

Please note that the External Heatsink Attachment is larger than the option. Refer to the dimension tables for exact measurements. Contact your local Yaskawa representative to order the External Heatsink Attachment.

Models 2055D, 2110D, 4090D, and 4220D do not require the External Heatsink Attachment.

External Heatsink Attachment Dimensions



External Heatsink Attachment	Braking Unit CDBR-	EZZ No. (Global Code)	Dimension mm (in)					
			W	H	D	W1	H1	D1
	2022D	EZZ021711A (100-066-355)	120 (4.72)	180 (7.09)	109 (4.29)	108 (4.25)	166 (6.54)	48 (1.89)
	2037D							
	4030D							
	4045D							
	5037D							

5 Mechanical Installation

Panel Cutout Dimensions

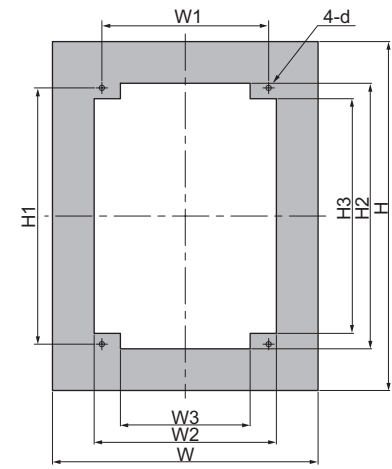


Figure 1

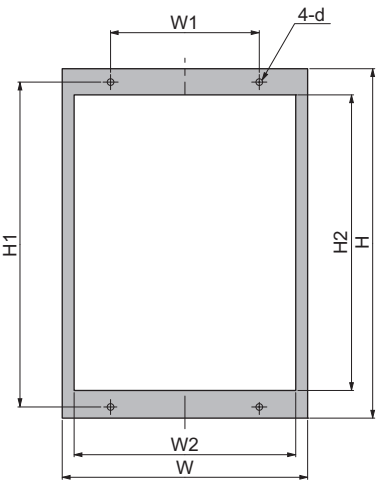


Figure 2

Braking Unit CDBR-	Figure	Dimension mm (in)															
		W	H	W1	W2	W3	H1	H2	H3	d							
2022D	1	172 (6.77)	226 (8.90)	108 (4.25)	118 (4.65)	84 (3.31)	166 (6.54)	172 (6.77)	152 (5.98)	M4							
2037D																	
4030D																	
4045D																	
5037D																	
2055D	2	165 (6.50)	235 (9.25)	100 (3.94)	149 (5.87)	—	218.5 (8.60)	198.8 (7.83)	—	M5							
4090D							279 (10.98)	257.8 (10.15)									
2110D		175 (6.89)	294 (11.57)	110 (4.33)	159 (6.26)												
4220D																	
5110D																	
5300D																	

5 Mechanical Installation

■ Retrofit Attachment

Use the Retrofit Attachment to replace a CDBR-XB or CDBR-XC model CDBR Braking Unit.

Contact your local Yaskawa representative to order the retrofit attachment.

Retrofit Attachment Dimensions

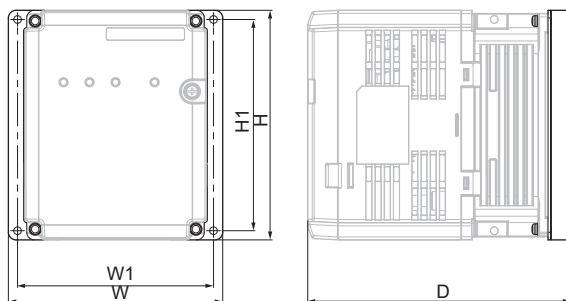


Figure 1

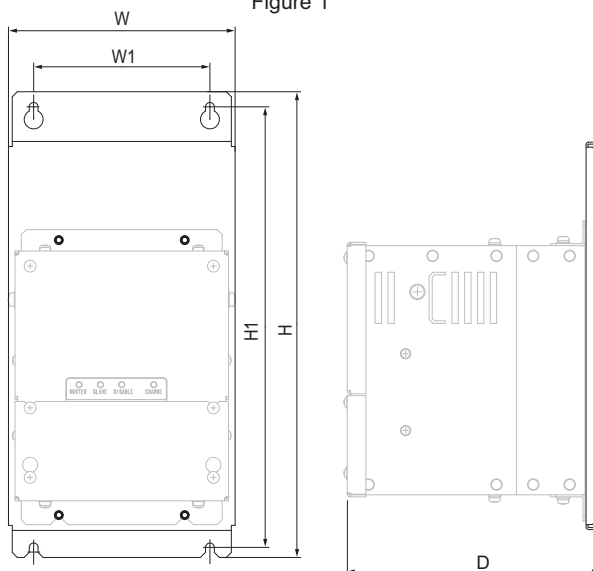


Figure 2

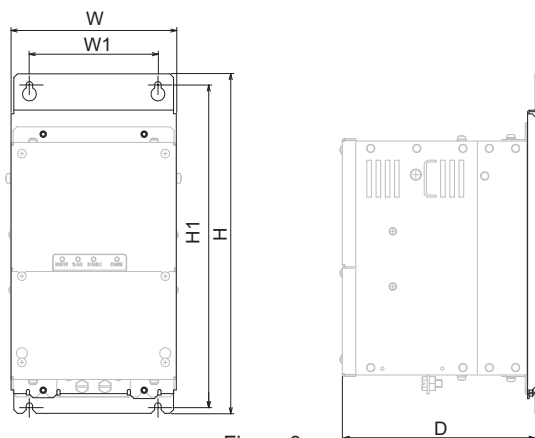


Figure 3

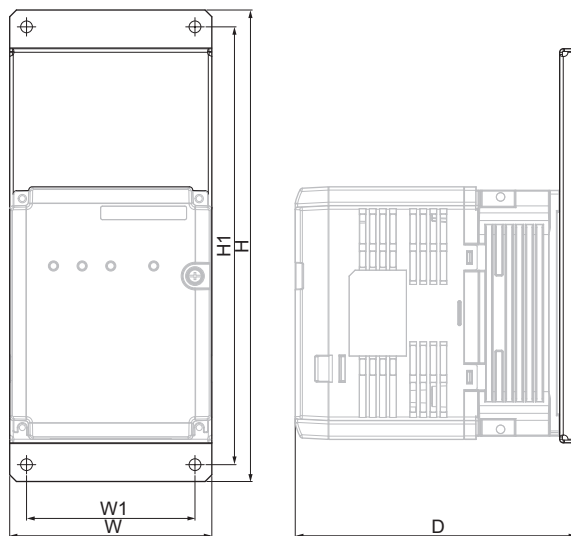

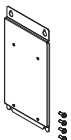
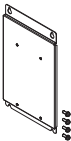
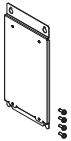
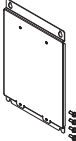
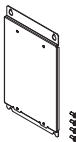



Figure 4

5 Mechanical Installation

Retrofit Attachment	Braking Unit CDBR-	Figure	EZZ No. (Global Code)	Dimension mm (in)				
				W	H	D	W1	H1
	2022D	1	EZZ021710A (100-066-354)	140 (5.51)	150 (5.91)	172 (6.77)	128 (5.04)	138 (5.43)
	2037D							
	4030D							
	4045D							
	2055D	2	EZZ022243A (100-091-605)	180 (7.09)	370 (14.57)	195.9 (7.71)	140 (5.51)	350 (13.78)
	4090D		EZZ022243C (100-091-607)	220 (8.66)			180 (7.09)	355 (13.98)
	2110D	3	EZZ022243B (100-091-606)	180 (7.09)	370 (14.57)	210 (8.27)	140 (5.51)	350 (13.78)
	4220D		EZZ022243D (100-091-608)	250 (9.84)			210 (8.27)	355 (13.98)
	5300D							
	5110D		EZZ022243E (100-091-609)	220 (8.66)				

5 Mechanical Installation

Retrofit Attachment	Braking Unit CDBR-	Figure	EZZ No. (Global Code)	Dimension mm (in)				
				W	H	D	W1	H1
	5037D	4	EZZ021710B (100-066-478)	120 (4.72)	280 (11.02)	167 (6.57)	100 (3.94)	260 (10.24)

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◆ Section Safety

DANGER

Electric Shock Hazard

Failure to comply will cause death or serious injury. Before servicing, disconnect all power to the equipment and wait for at least the time specified on the warning label. The internal capacitor remains charged even after the drive is de-energized. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc. When all indicators are OFF, measure for unsafe voltages to confirm the drive is safe.

WARNING

Electrical Shock Hazard

Do not remove the front covers of the drive or the option while the power is on.

Failure to comply could cause death or serious injury.

Do not operate equipment with covers removed.

Failure to comply could cause death or serious injury.

The diagrams in this section may include options and drives without covers or safety shields to illustrate details. Reinstall covers and shields before operating the drive and run the drive according to the instructions described in this manual.

Do not allow unqualified personnel to perform work on the drive.

Failure to comply could cause death or serious injury. Only authorized personnel familiar with installation, adjustment, and maintenance of AC drives may perform work.

Do not touch circuit boards while the power to the drive and option is on.

Failure to comply could cause death or serious injury.

Do not use damaged wires, stress the wiring, or damage the wire insulation.

Failure to comply could cause death or serious injury.

WARNING

Fire Hazard

Tighten all terminal screws to the specified tightening torque.

Loose or overtightened connections could cause erroneous operation and damage to the terminal block or start a fire and cause death or serious injury.

Install adequate branch circuit short circuit protection per applicable codes and this manual.

Failure to comply could cause death or serious injury. The device is suitable for circuits capable of delivering up to the lesser value between 100 kA RMS Symmetrical Amperes, 240 Vac maximum (200 V Class), 480 Vac maximum (400 V Class), or 600 Vac maximum (600 V Class) or the equivalent SCCR rating of the drive to which it is connected.

NOTICE

Damage to Equipment

Connect CDBR Series of Dynamic Braking devices to a drive that incorporates Solid State Short Circuit Protection Circuitry and complies with the High Fault Current Short Circuit Test.

Failure to comply may result in damage to the drive or CDBR.

Observe proper electrostatic discharge (ESD) procedures when handling the option, drive, and circuit boards.

Failure to comply could cause ESD damage to circuitry.

Never connect or disconnect the motor from the drive while the drive is outputting voltage.

Improper equipment sequencing could damage the drive.

NOTICE

Do not use unshielded wire for control wiring.

Failure to comply may cause electrical interference resulting in poor system performance.
Use shielded, twisted-pair wires and ground the shield to the ground terminal of the drive.

Properly connect all pins and connectors on the option and drive.

Failure to comply could prevent proper operation and damage equipment.

Confirm that all connections are correct after installing the option and connecting peripheral devices.

Failure to comply could damage the option.

◆ CDBR Braking Unit Installation

Follow the instructions below to install the CDBR Braking Unit.

■ Remove the Front Cover and Bottom Cover

1. Loosen the front cover screw.

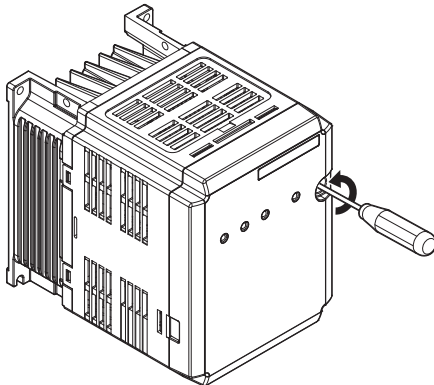


Figure 11 Loosen the Screw Securing the Front Cover

2. Push in on the hooks located on the sides of the front cover and gently pull forward.

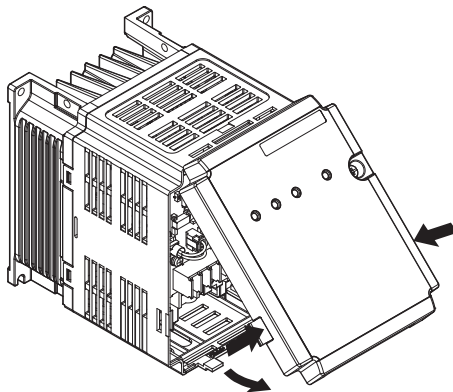


Figure 12 Push the Tabs Inward and Pull Forward on the Front Cover

6 Electrical Installation

3. Free the tab on the top of the front cover to remove the cover.

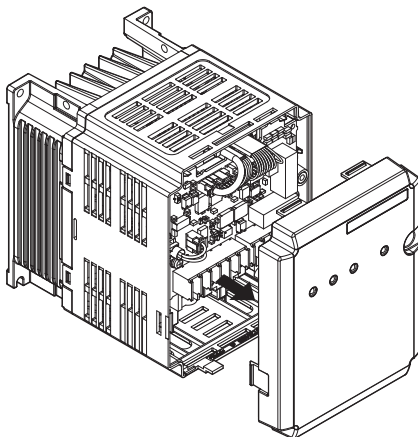


Figure 13 Remove the Front Cover

4. Pull forward on the bottom cover to remove it from the unit. Remove the bottom cover.

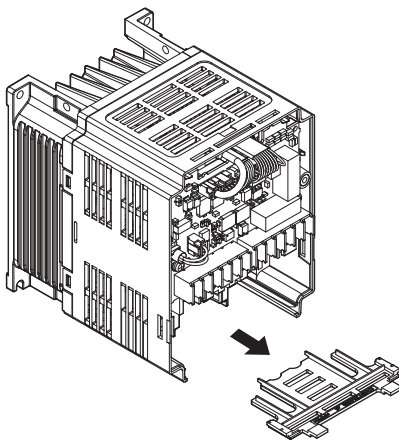


Figure 14 Remove the Bottom Cover

■ Bottom Cover Wiring Space

Route the wiring between the cutouts of the covers as shown in *Figure 15* when reattaching the covers.

Note: Take proper precautions so that the front covers will easily fit back onto the unit.

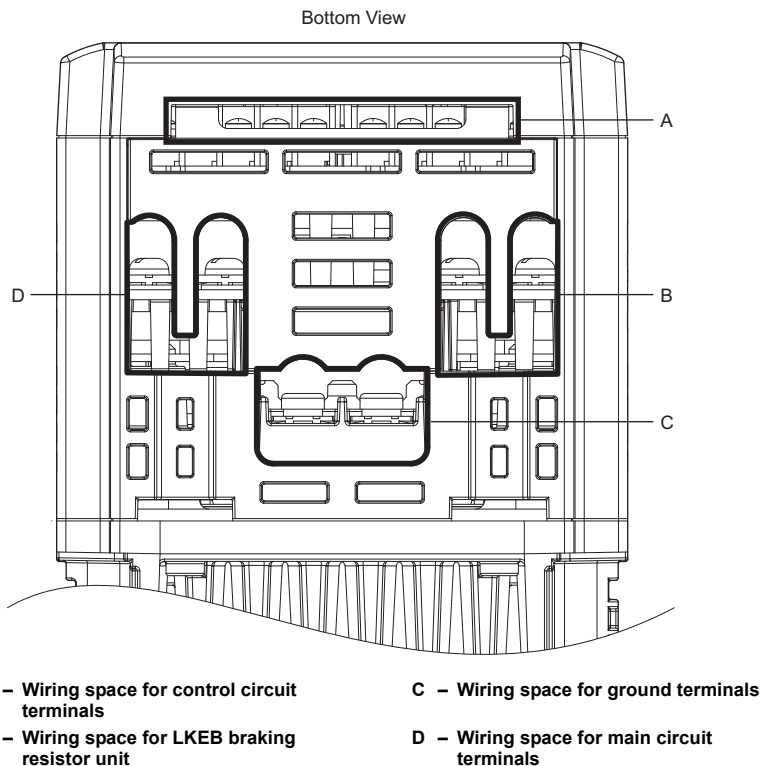


Figure 15 Wiring Spaces

◆ Wiring the CDBR Braking Unit

■ Wiring Precautions

Before beginning the installation procedure:

1. Wire the drive and make the proper connections to drive terminals according to the manual packaged with the drive.
2. Verify that the drive functions normally.

WARNING! Electrical Shock Hazard. Ground the drive ground terminal (200 V class: ground to 100 Ω or less; 400 V class: ground to 10 Ω or less; 600 V class: ground to 10 Ω or less). Improper equipment grounding could cause death or serious injury from contacting ungrounded electrical equipment.

WARNING! Fire Hazard. Perform all dynamic braking option wiring as specified in the provided wiring diagrams. Improper wiring could cause death or serious injury.

WARNING! Electrical Shock Hazard. Mount the LKEB Braking Resistor Unit on a grounded metallic plate or connect a ground wire from an LKEB mounting screw to earth ground. Improper equipment grounding could cause death or serious injury.

NOTICE: Insulate shields with tape or shrink tubing to prevent contact with other signal lines and equipment. Improper wiring practices could cause drive or equipment malfunction due to short circuit.

NOTICE: Do not solder the ends of wire connections to the option. Soldered wiring connections can loosen over time and cause option malfunction.

- Note:**
1. Keep ground cables as short as possible and ensure cabling complies with local codes.
 2. Separate CDBR Braking Unit and LKEB Braking Resistor Unit wiring from control wiring.

Components	Wiring Distance
CDBR and LKEB	< 10 m (32.8 ft.)
Drive and CDBR	< 5 m (16.4 ft.)

■ Wiring Procedure

WARNING! Tighten all terminal screws to the specified tightening torque. Loose or overtightened connections could cause erroneous operation and damage to the terminal block or start a fire and cause death or serious injury.

Refer to [Wire Gauge and Torque Specifications on page 51](#) for details.

1. For all CDBR wiring refer to [Table 10](#) for wire gauge and torque specifications and refer to [Figure 20](#) for the drive and option connection diagram
2. Connect ground wiring to the ground terminals. Refer to [Table 8](#) for descriptions of CDBR Braking Unit Main Circuit Terminals.
3. Connect main circuit wires to the main circuit terminals B1, B2, + and -. Refer to [Table 8](#) for descriptions of CDBR Braking Unit Main Circuit Terminals.
4. Connect control circuit wiring to the control circuit terminals. Refer to [Table 9](#) for details on CDBR braking unit control circuit terminals.
5. Ensure all main circuit and control circuit wires exit through the openings in the bottom of the CDBR Braking Unit enclosure. Refer to [Bottom Cover Wiring Space on page 43](#) for details.

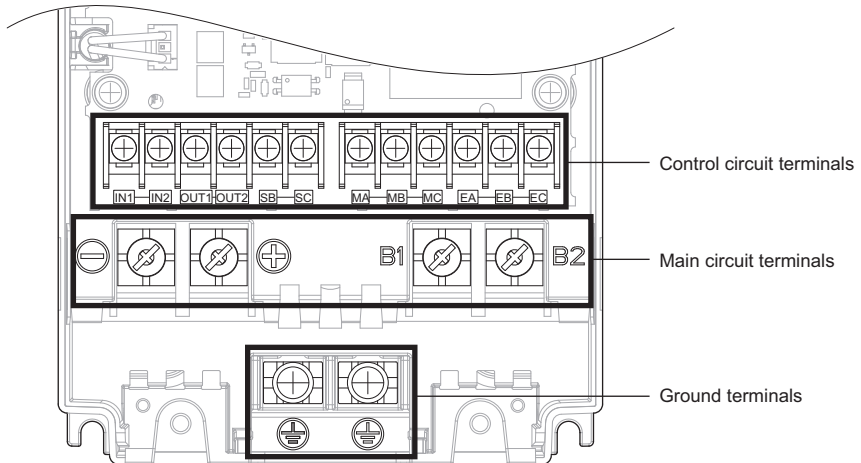


Figure 16 CDBR Wiring Terminals

6. Confirm wiring connections.

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7. Replace and secure the bottom cover.

NOTICE: Do not pinch cables between the covers and the unit. Failure to comply could cause erroneous operation.

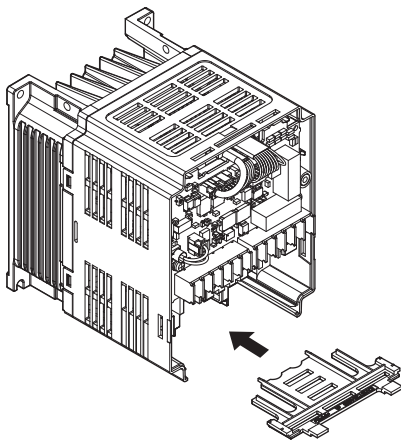


Figure 17 Reattach the Bottom Cover

8. Insert the tab on the upper portion of the front cover to the corresponding opening, then connect the cover into place from the front of the unit.

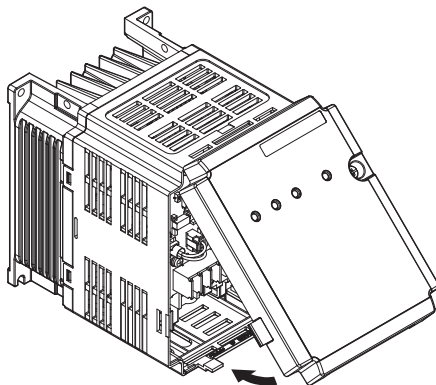


Figure 18 Reattach the Front Cover

9. Tighten the screw to secure the front cover in place.

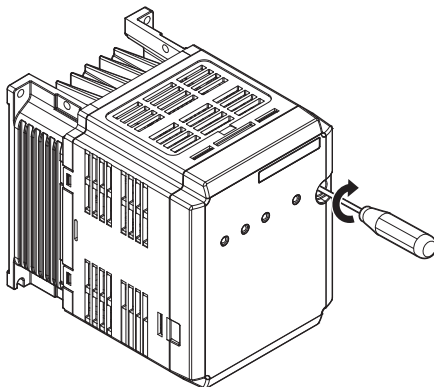


Figure 19 Tighten the Front Cover Screw

6 Electrical Installation

■ Connection Diagram

WARNING! Fire Hazard. Perform all dynamic braking option wiring as specified in the provided wiring diagrams. Improper wiring could cause death or serious injury.

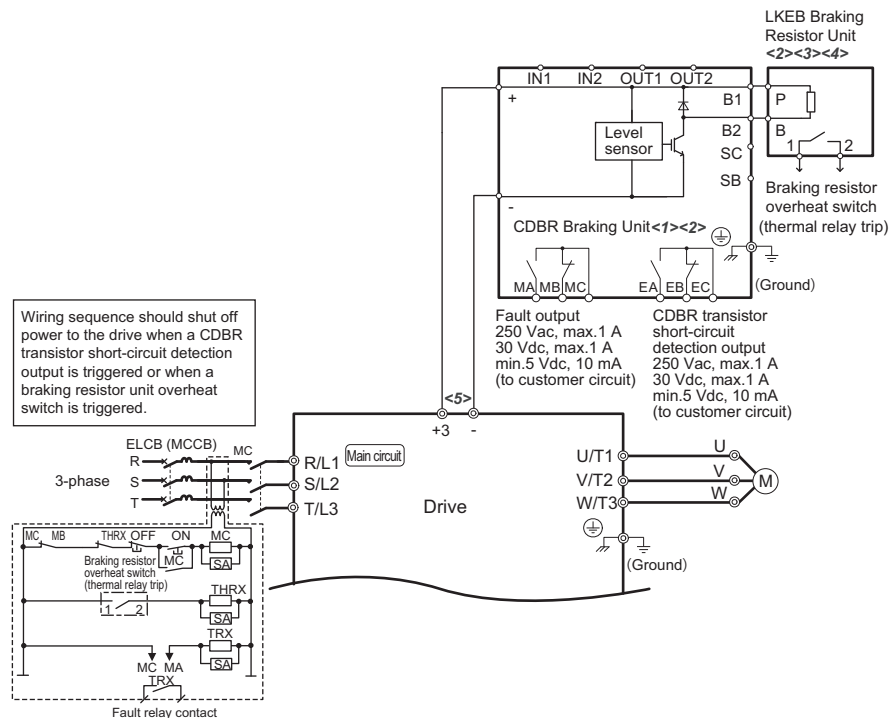



Figure 20 Connection Diagram

- <1> Set L8-55 to 0 to disable the protection function for the internal braking transistor when using a regenerative unit or another type of dynamic braking option in lieu of the internal braking transistor. Enabling the protection function under these conditions may cause a braking resistor fault (rF). This is not available for Varispeed G7-series.
- <2> Set L3-04 to 0 to disable Stall Prevention when using a regenerative converter, a regenerative unit, or a dynamic braking option. Enabling the function under these conditions may prevent the drive from stopping within the specified deceleration time.
- <3> Set L8-01 to 1 to enable braking resistor overload protection in the drive when using ERF-type resistors.
- <4> Be sure to protect non-Yaskawa braking resistors by thermal overload relay.
- <5> Refer to the manual packaged with the drive for details on wiring ends.

■ CDBR Braking Unit Terminal Functions

This section explains terminal functions and specifications to help safely and properly install the CDBR Braking Unit.

Table 8 CDBR Braking Unit Main Circuit Terminals

Terminal Block	Terminal No.	Terminal Name	Specification
TB3	-	Main Circuit Negative Terminal	Connects to the negative - terminal on the drive.
	+	Main Circuit Positive Terminal	Connects to the +3 terminal on the drive. <1>
TB4	B1	Main Circuit B1 Terminal	Connects to the P terminal on the LKEB braking resistor unit. May also connect to a braking resistor terminal of a non-Yaskawa resistor unit.
	B2	Main Circuit B2 Terminal	Connects to the B terminal on the LKEB braking resistor unit. May also connect to a braking resistor terminal of a non-Yaskawa resistor unit.
-		Grounding terminal	For 200 V class: 100 Ω or less For 400 V class and 600 V class: 10 Ω or less

<1> Use drive terminal B1 when installing the CDBR braking unit on the drive with built-in braking transistor.

Table 9 CDBR Braking Unit Control Circuit Terminals

Terminal Block	Terminal No.	Terminal Name	Specification
TB1	IN1	Slave Input	Input the signal when using CDBR braking units in parallel.
	IN2		
	OUT1	Master Output	Output the signal when using CDBR braking units in parallel.
	OUT2		
	SC <1>	Enable Input	Enable/Disable contact input to disable the CDBR and activate MA-MB-MC fault contact output.
	SB <1>		
TB2	MA	Fault Contact Output (N.O.)	Output signal when a fault occurs or when SB-SC is closed (default) (example: CDBR braking unit overheating, LKEB braking resistor unit short-circuit detection, external fault). Wiring sequence should shut off power to the drive when the signal is output. Relay output 250 Vac, max.1 A 30 Vdc, max.1 A min.5 Vdc, 10 mA
	MB	Fault Contact Output (N.C.)	
	MC	Fault Contact Output Common	
	EA	CDBR Transistor Short-Circuit Detection Output (N.O.)	Output signal when braking unit fault is detected. If needed, wiring sequence should shut off power to the drive when the signal is output. Relay output 250 Vac, max.1 A 30 Vdc, max.1 A min.5 Vdc, 10 mA
	EB	CDBR Transistor Short-Circuit Detection Output (N.C.)	
	EC	CDBR Transistor Short-Circuit Detection Output Common	




<1> Digital Input-SB, SC. Powered by internal 24 Vdc LVLC source. When using an external power supply, it shall be UL Listed Class 2 power source only or equivalent.

■ Wire Size and Torque Specifications

Select the appropriate wire types and gauges from [Table 10](#).

- Note:**
1. For main circuit terminal wiring (+, -, B1, B2), UL approval requires using UL Listed copper wires (rated at 75°C (167°F)).
 2. Use the wires with recommended gauge to make models 2022D, 2037D, 4030D, 4045D, and 5037D conform to IP20 enclosure requirements.

Table 10 Wire Gauge and Torque Specifications

Model	Terminal	For Japan		For U.S.A.		For Europe and China		Screw Size	Tightening Torque N·m (lb.in.)
		Recommended Gauge mm ²	Applicable Gauge mm ²	Recommended Gauge AWG, kcmil	Applicable Gauge AWG, kcmil	Recommended Gauge mm ²	Applicable Gauge mm ²		
Braking Unit CDBR- 2022D </> 2037D </> 4030D 4045D 5037D	+, -, B1, B2	5.5	5.5 to 8.0	10	10 to 8	6	6 to 10	M5	2.7 to 3.0 (23.9 to 26.6)
	IN1, IN2, OUT1, OUT2, SB, SC, MA, MB, MC, EA, EB, EC	0.75	0.75 to 2.00	18	18 to 14	0.75	0.75 to 2.50	M3.5	0.8 to 1.0 (7.1 to 8.9)
		5.5	5.5 to 8.0	8	8	6	6 to 10	M5	2.0 to 2.5 (17.7 to 22.1)
Braking Unit CDBR- 2055D 4090D	+, -, B1, B2	14	14	8	8 to 6	10	10 to 16	M5	2.0 to 2.5 (17.7 to 22.1)
	IN1, IN2, OUT1, OUT2, SB, SC, MA, MB, MC, EA, EB, EC	0.75	0.75 to 2.00	18	18 to 14	0.75	0.75 to 2.50	M3.5	0.8 to 1.0 (7.1 to 8.9)
		14	14	6	6	10	10 to 16	M5	2.0 to 2.5 (17.7 to 22.1)
Braking Unit CDBR- 2110D 4220D 5110D 5300D	+, -, B1, B2	30	30 to 38	3	3 to 2	35	35	M8	8 to 10 (70.8 to 88.5)
	IN1, IN2, OUT1, OUT2, SB, SC, MA, MB, MC, EA, EB, EC	0.75	0.75 to 2.00	18	18 to 14	0.75	0.75 to 2.50	M3.5	0.8 to 1.0 (7.1 to 8.9)
		22	22 to 30	3	3 to 2	25	25 to 35	M8	8 to 10 (70.8 to 88.5)

6 Electrical Installation

Model	Terminal	For Japan		For U.S.A.		For Europe and China		Screw Size	Tightening Torque N·m (lb.in.)
		Recommended Gauge mm ²	Applicable Gauge mm ²	Recommended Gauge AWG, kcmil	Applicable Gauge AWG, kcmil	Recommended Gauge mm ²	Applicable Gauge mm ²		
Braking Resistor Unit LKEB-20P7 21P5 22P2 23P7 25P5 27P5 40P7 41P5 42P2 43P7 45P5 47P5	P, B, 1, 2	5.5	1.25 to 5.5	10	16 to 10	6	1.5 to 6	M4	1.19 to 1.99 (10.4 to 17.4)
Braking Resistor Unit LKEB-2011 2015 2018 2022 <> 4018 4022 4030 <> 4037 4045 <> <>	P, B, 1, 2	8	1.25 to 8	8	16 to 8	10	1.5 to 10	M5	1.99 to 2.49 (17.4 to 21.7)
Braking Resistor Unit LKEB-4011 4015	P, B, 1, 2	5.5	5.5	10	10	6	6	M4	1.2 to 1.8 (10.6 to 15.9)

<1> Junction terminals are needed to connect to the drives when terminals - and + are connected to the following drives. Contact Yaskawa or your nearest sales representative when selecting and connecting junction terminals.
Drive models: CIPR-GA70□2169, 2211, CIPR-CH70□2145, 2180, CIPR-CR70□2145, 2180

<2> Use a gauge that is within the applicable range for gauges for the drive when terminals P and B are connected to the following drives. Junction terminals are needed to connect to the drives if using a gauge that is smaller than the applicable range for gauges for the drives. Contact Yaskawa or your nearest sales representative when selecting and connecting junction terminals.

Drive models: CIPR-GA70□2110, 2138, 4103, CIPR-CH70□2088, 2115, 4091, CIPR-CR70□2088, 2115, 4091

<3> Junction terminals are needed to connect to the drives when terminals P and B are connected to the following drives. Contact Yaskawa or your nearest sales representative when selecting and connecting junction terminals.

Drive models: CIPR-GA70□4140, 4168, CIPR-CH70□4112, 4150, CIPR-CR70□4112, 4150

Note: Use the recommended gauges to connect the CDBR Braking Unit to the following drives and to comply with an IP20 enclosure. The wiring cover for the +3 and - drive terminal must be cut out. Refer to the drive manual for details.

Drive models: CIPR-GA70□2257 to 2415, 4208 to 4675, CIPR-CH70□2215 to 2415, 4180 to 4605, CIPR-CR70□2215 to 2415, 4180 to 4605

Replacing Previous Version CDBR Braking Unit Models

The terminal size and location are different on CDBR-X, CDBR-XB, or CDBR-XC model CDBR Braking Units.

Refer to [Table 11](#) to ensure proper wiring when replacing an older model CDBR Braking Unit.

Table 11 CDBR Main Circuit Terminal Cross-Reference Chart

CDBR-□D	CDBR-□B, CDBR-□C	CDBR-□
-	-	N
+	+	P
B1	+ ₀	P ₀
B2	- ₀	B

■ Using CDBR Braking Units in Parallel

Install multiple CDBR Braking Units in a master/slave configuration with a single CDBR Braking Unit as the master as shown in [Figure 21](#).

NOTICE: Perform all wiring and installation as instructed in [Figure 21](#). Failure to follow specifications may damage the drive and the CDBR braking unit.

- Set the Master/Slave Selection Switch (S2) to “Master (OUT)” on one CDBR Braking Unit only. Set all other CDBR Braking Units to “Slave (IN)”. Refer to [Master/Slave Selection Switch \(S2\) on page 57](#) for details.
- Select the appropriate CDBR Braking Unit wire types and gauges from [Table 10](#).
- Use shielded twisted-pair cables and keep the wiring distance between the OUT1-IN1 and OUT2-IN2 terminals of the CDBR Braking Unit shorter than 1 meter (3.28 ft).

6 Electrical Installation

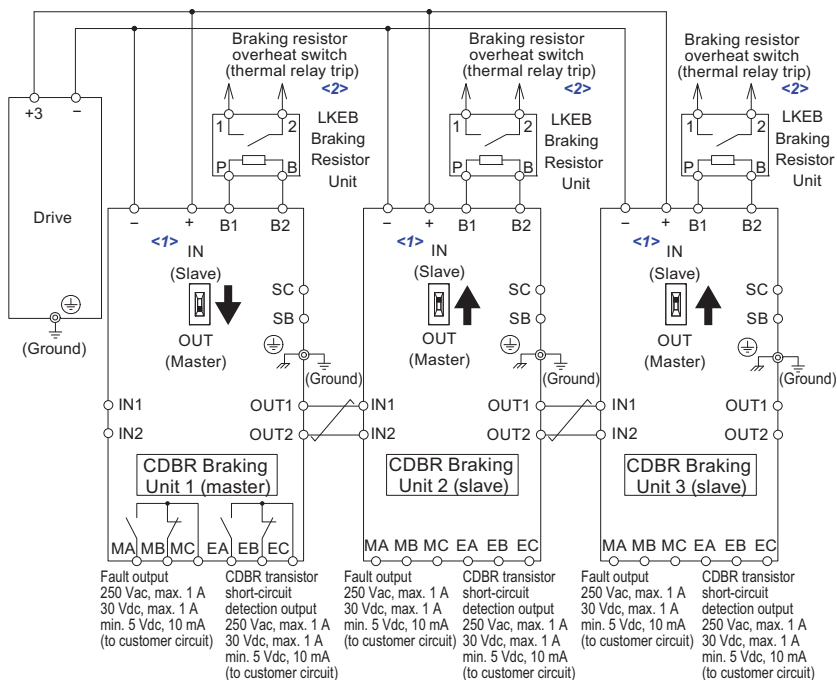


Figure 21 Braking Units in Parallel

<1> Connect directly to the drive or install a terminal block.

<2> Connect the thermal relay trip contact to disconnect main input power to the drive.

Note: Contact your Yaskawa representative or nearest agent when using the CDBR Braking Unit (CDBR-□D) with earlier models (CDBR-□, CDBR-□B, or CDBR-□C).

7 Setting and Confirming CDBR Braking Unit Operation

◆ Set the CDBR Braking Unit Switches

Confirm the CDBR Braking Unit on-board switch settings after wiring the drive and CDBR Braking Unit.

WARNING! Electrical Shock Hazard. Do not remove covers or touch the circuit boards while the drive is energized. Failure to comply could cause death or serious injury.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink. Failure to comply could cause minor or moderate injury. De-energize the drive and wait at least 15 minutes to ensure the heatsink has cooled down to prevent burns when replacing cooling fans.

■ Braking Unit DIP Switch S1, S4, and S5 Settings

Apply SB-SC Enable Input to turn on the braking unit set to the default setting.

DIP switch S1 selects select SINK or SOURE mode for the SB-SC Enable Input. SOURCE mode requires an external 24 Vdc (Class 2) power supply.

DIP switch S4 selects whether a N.O or N.C contact type activates the SB-SC Enable Input.

DIP switch S5 enables and disables Fault Contact Output MA-MB-MC when SB-SC Enable Input is activated.

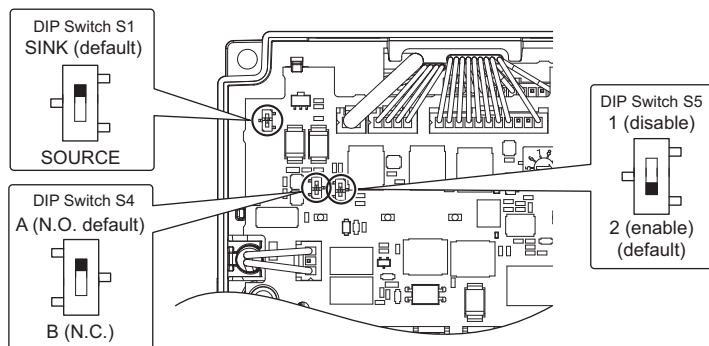


Figure 22 CDBR DIP Switch Locations

7 Setting and Confirming CDBR Braking Unit Operation

Table 12 CDBR Enable/Disable Status (DIP Switch S1, S4)

DIP Switch S1-SINK/ SOURCE	DIP Switch S4-SB/SC Terminals N.O./N.C.	SB-SC-Enable Input	CDBR Status
SINK	A	Open	Enabled
SINK	A	Close	Disabled
SINK	B	Open	Disabled
SINK	B	Close	Enabled
SOURCE	A	0 V Input	Enabled
SOURCE	A	24 V Input	Disabled
SOURCE	B	0 V Input	Disabled
SOURCE	B	24 V Input	Enabled

SINK Mode, Internal Power Supply

Set DIP switch S1 to SINK as shown in *Figure 23* when controlling the digital SB-SC inputs by NPN transistors (0 V common/sinking mode) and contacts using the drive internal power supply.

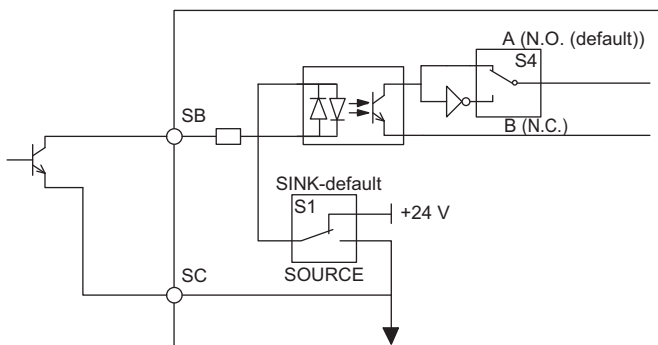


Figure 23 CDBR Braking Unit SINK Mode using Internal Power Supply

7 Setting and Confirming CDBR Braking Unit Operation

SOURCE Mode, External Power Supply

Set DIP switch S1 to SOURCE as shown in [Figure 24](#) when controlling digital inputs by PNP transistors (+24 V common/sourcing mode) and contact inputs using an external 24 V power supply,

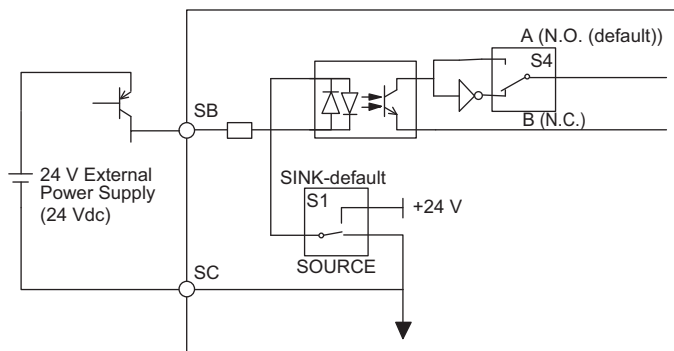


Figure 24 CDBR Braking Unit SOURCE Mode

■ Master/Slave Selection Switch (S2)

Leave DIP switch S2 set to the default setting OUT (Master) on the properly-configured master CDBR. Set DIP switch S2 to IN (Slave) on all other units in the circuit. Refer to [Using CDBR Braking Units in Parallel on page 53](#) for details.

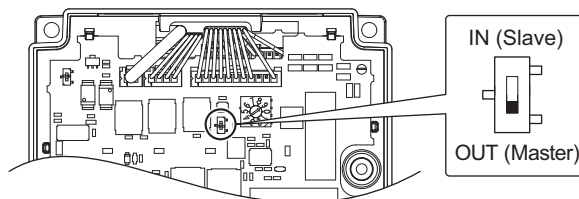


Figure 25 Master/Slave Selection Switch (S2)

7 Setting and Confirming CDBR Braking Unit Operation

■ Braking Activation Voltage Rotary Switch (S3)

Set the braking activation voltage rotary switch S3 to match the power supply of the main circuit. Refer to [Table 13](#) for details on rotary switch S3 position and braking activation voltage.

Note: Rotary switch S3 does not typically require adjustment.

NOTICE: Consider the amount of voltage fluctuation in the DC bus when changing rotary switch S3 setting values. Setting the braking activation voltage to a low value and energizing the drive may activate the CDBR and overheat the braking resistor.

NOTICE: Firmly click the switch into the proper position. A switch stuck between positions may cause the CDBR to operate incorrectly.

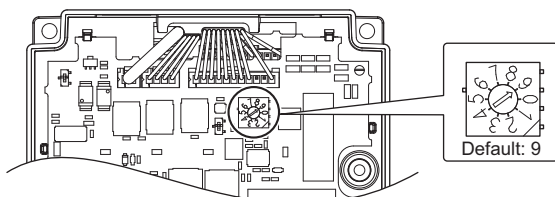


Figure 26 Braking Activation Voltage Rotary Switch (S3)

Table 13 Rotary Switch S3 Settings and Braking Activation Voltage

Setting	200 V Class		400 V Class		600 V Class	
	Input Voltage (V)	Braking Activation Voltage (V) (PN Bus Voltage)	Input Voltage (V)	Braking Activation Voltage (V) (PN Bus Voltage)	Input Voltage (V)	Braking Activation Voltage (V) (PN Bus Voltage)
0	160	270 (TYP)	380	630 (TYP)	500	825 (TYP)
1	170	282 (TYP)	390	644 (TYP)	505	839 (TYP)
2	175	294 (TYP)	400	659 (TYP)	515	853 (TYP)
3	185	307 (TYP)	405	673 (TYP)	525	867 (TYP)
4	190	319 (TYP)	415	688 (TYP)	530	881 (TYP)
5	200	331 (TYP)	425	702 (TYP)	540	894 (TYP)
6	208	343 (TYP)	430	717 (TYP)	550	908 (TYP)
7	215	356 (TYP)	440	731 (TYP)	555	922 (TYP)
8	220	368 (TYP)	450	746 (TYP)	565	936 (TYP)
9 <I>	230	380 (TYP)	460	760 (TYP)	575	950 (TYP)

<I> Default Setting

7 Setting and Confirming CDBR Braking Unit Operation

■ Switch Layout

The inside of the CDBR Braking Unit front cover shows the layout and settings of the switches.

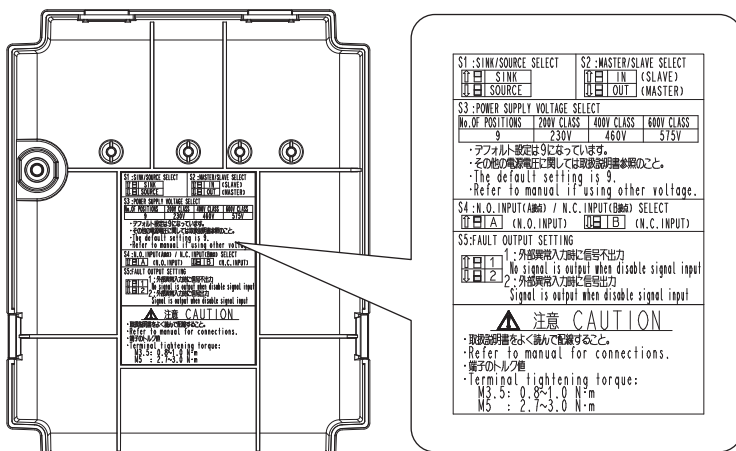


Figure 27 Switch Layout

◆ Confirming Proper Operation

WARNING! *Electrical Shock Hazard. Do not energize the drive with covers removed and do not remove covers when the drive is energized. Failure to comply could result in death or serious injury.*

Confirm the required motor deceleration characteristics.

The LEDs on the front confirm the operation state. Refer to [CDBR Braking Unit LED Display on page 18](#) for details on the LEDs.

8 Troubleshooting

Problems	Cause	Possible Solution
The thermal relay (or the thermal protector) on the LKEB braking resistor unit trips while stopped or operating at steady speed (no deceleration).	There is not a CDBR braking unit connected and the DC bus braking transistor short circuited.	Replace the drive.
	The DC bus braking transistor in the CDBR braking unit is short circuited as indicated by contacts EA-EB-EC.	Replace the CDBR braking unit.
	CDBR braking unit DIP switch S3 for the power supply voltage is set to the wrong position.	Set DIP switch S3 to the correct position.
The drive faults on overvoltage.	The braking resistor unit is too small.	Re-evaluate the braking conditions required for the application.
	Incorrect wiring or CDBR switch positions.	Inspect the wiring, switch settings, and correct any mistakes.
	The CDBR braking unit is damaged.	Replace the CDBR braking unit.
The thermal relay (or the thermal protector) on the braking resistor unit trips occasionally.	The braking resistor unit is too small.	Re-evaluate the braking conditions required for the application.
	The CDBR braking unit is damaged.	Replace the CDBR braking unit.
	Incorrect CDBR switch position.	Correct the switch settings.
	Incoming main power supply voltage increases momentarily.	Investigate the cause of high input voltage.
Fault output contacts MA-MB-MC change states. Overvoltage (ov) may occur on drive: - CDBR heatsink overheat - CDBR transistor overcurrent	The application is experiencing excessive starting and stopping, or the load inertia is too large for the CDBR unit.	Re-evaluate the braking requirements.
	The CDBR braking unit and LKEB braking resistor unit are not appropriately matched.	Correctly match the CDBR braking unit and LKEB braking resistor unit.
	Resistor is wired incorrectly.	Check for proper resistance.
	Ambient temperature exceeded 50°C (122°F). CDBR heatsink is too hot.	Reduce the ambient temperature.
	The CDBR braking unit is damaged.	Replace the CDBR braking unit.

Problems	Cause	Possible Solution
The CDBR braking unit is not operating.	<ul style="list-style-type: none"> A master unit is incorrectly set to be a slave device and there is no master unit. Incorrect braking activation switch position. 	<ul style="list-style-type: none"> Properly set the CDBR braking unit Master/Slave selection DIP switch S2. Ensure that the master LED (green) is illuminated on the master CDBR unit. Check brake activation level switch S3 for proper setting. Observe the Master and Slave LEDs when using slave units. The LEDs should blink when the CDBR is activating.
	The braking unit is damaged.	Replace the CDBR braking unit.

9 CDBR Braking Unit and LKEB Braking Resistor Selection

◆ CDBR Braking Unit and LKEB Braking Resistor Selection

Select a CDBR Braking Unit and LKEB Braking Resistor Unit based on application-specific requirements and the selected AC drive.

Refer to the local catalog for selections based on other drive models.

◆ CDBR Braking Unit Fault Circuit Connection Diagrams

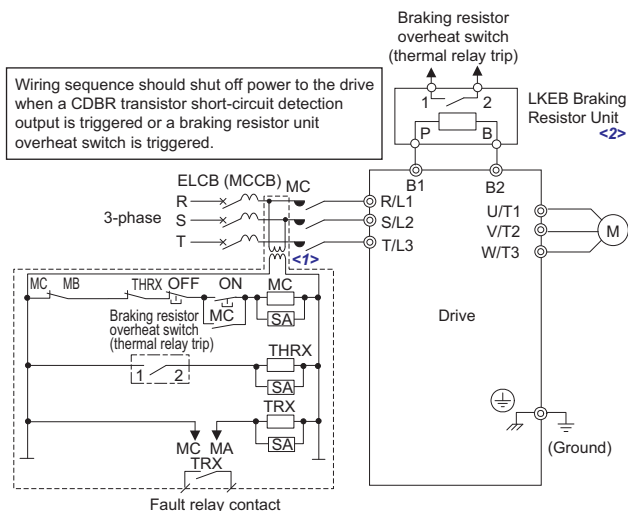


Figure 28 Fault Circuit Connection Diagram A (LKEB Braking Resistor Unit)

- <1> 200 V class drives do not require a control circuit transformer.
- <2> Set L3-04 to 0 or 3 to disable Stall Prevention during deceleration when using an LKEB Braking Resistor Unit. Enabling the function under these conditions may prevent the drive from stopping within the specified deceleration time.

9 CDBR Braking Unit and LKEB Braking Resistor Selection

Connect drive terminal B1 to the positive terminal on the CDBR Braking Unit. Connect the negative drive terminal to the negative terminal on the CDBR Braking Unit when connecting a separately-installed type CDBR Braking Unit to drives with a built-in braking transistor. The B2 terminal is not used in this example.

Note: Refer to the specific drive manual for details on the drive with built-in braking transistor.

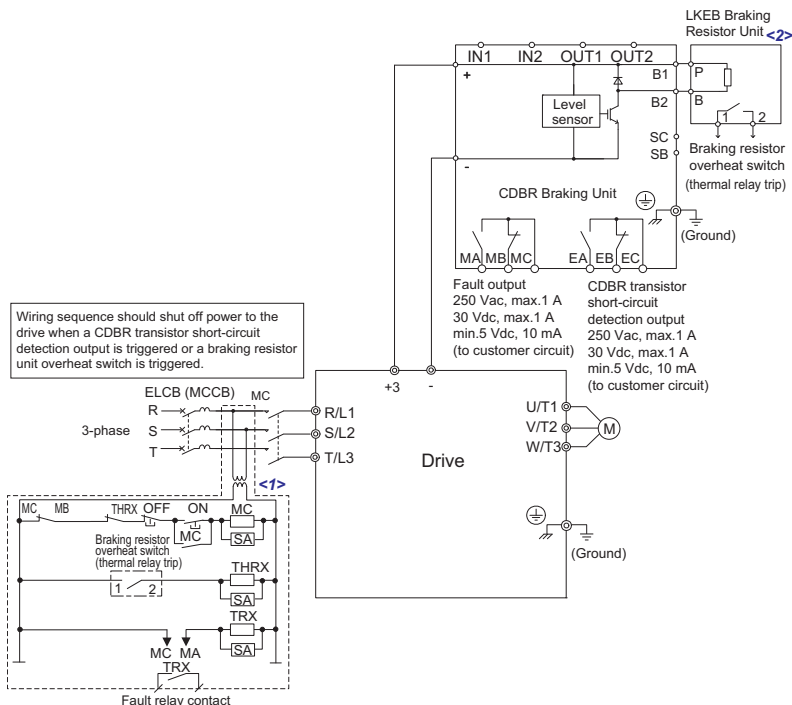


Figure 29 Fault Circuit Connection Diagram B (CDBR Braking Unit)

<1> 200 V class drives do not require a control circuit transformer.

<2> Set L3-04 to 0 or 3 to disable Stall Prevention during deceleration when using an LKEB Braking Resistor Unit. Enabling the function under these conditions may prevent the drive from stopping within the specified deceleration time.

9 CDBR Braking Unit and LKEB Braking Resistor Selection

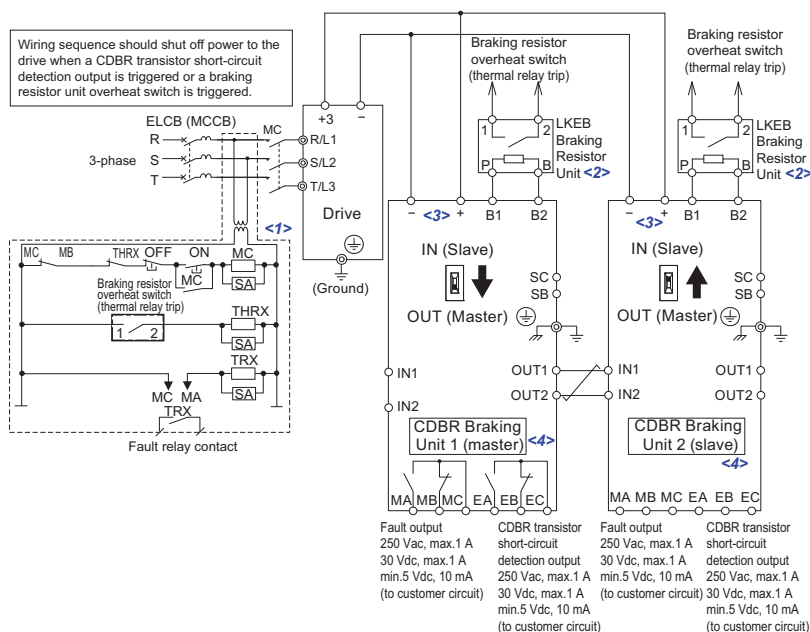


Figure 30 Fault Circuit Connection Diagram C (CDBR Braking Unit in parallel)

- <1> 200 V class drives do not require a control circuit transformer.
- <2> Set L3-04 to 0 or 3 to disable Stall Prevention during deceleration when using an LKEB Braking Resistor Unit. Enabling the function under these conditions may prevent the drive from stopping within the specified deceleration time.
- <3> Connect directly to the drive terminal or install a terminal block.
- <4> Set one of the CDBR Braking Units as the master and set all others as slaves when using more than one CDBR Braking Unit connected in parallel.

Note: Contact your Yaskawa representative or the nearest Yaskawa sales office when using a CDBR-XD model Braking Unit with CDBR-X or CDBR-XB models.

9 CDBR Braking Unit and LKEB Braking Resistor Selection

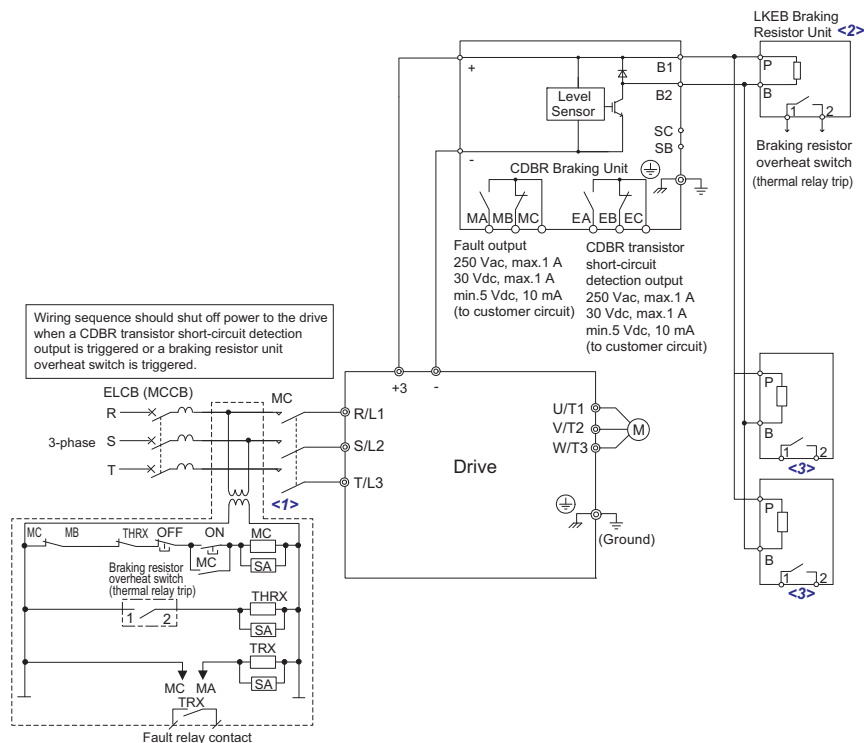


Figure 31 Fault Circuit Connection Diagram D
(CDBR Braking Unit and LKEB Braking Resistor Unit in Parallel)

- <1> 200 V class drives do not require a control circuit transformer.
- <2> Set L3-04 to 0 or 3 to disable Stall Prevention during deceleration when using an LKEB Braking Resistor Unit. Enabling the function under these conditions may prevent the drive from stopping within the specified deceleration time.
- <3> Wire the thermal relay trip contacts in parallel when connecting multiple LKEB Braking Resistor units.

10 China RoHS Compliance



Figure 32 China RoHS Mark

The China RoHS mark is displayed on products containing six specified hazardous substances that are in excess of regulatory limits, based on the “Administrative Measures for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products” and “Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products” (SJ/T 11364-2014), which were promulgated on January 26, 2016. The number displayed in the center of the mark indicates the environment-friendly use period (number of years) in which electrical and electronic products that are being produced, sold, or imported to China can be used. The date of manufacture of the electrical and electronic product is the starting date of the environment-friendly use period for the product. The six specified hazardous substances contained in the product will not leak outside of the product during normal use within this period and will have no serious impact on the environment, the human body, or property.

The environment-friendly use period for the CDBR Braking Unit is 15 years. This period is not the product warranty period.

Note: This mark will be added to factory shipments from late June 2016. There may be a mix of products that reflect or do not reflect this change during the distribution stage. Thank you for your understanding.

◆ Information on Hazardous Substances in the CDBR Braking Unit

Table 14 shows the details on hazardous substances contained in the CDBR Braking Unit.

Table 14 Contents of Hazardous Substances in the CDBR Braking Unit

Parts Name	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Circuit Board	×	○	○	○	○	○
Electronic Parts	×	○	○	○	○	○
Brass Screw	×	○	○	○	○	○
Aluminum Die Casting	×	○	○	○	○	○
<p>This table has been prepared in accordance with the provisions outlined in SJ/T 11364.</p> <p>○: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below or equal to the limit requirement of GB/T 26572.</p> <p>×: Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.</p> <p>Note: The CDBR Braking Unit complies with EU RoHS directives. In this table, “×” indicates that hazardous substances that are exempt from EU RoHS directives are contained.</p>						

11 对应中国 RoHS 指令



图 33 中国 RoHS 标志

中国 RoHS 标志依据 2016 年 1 月 26 日公布的《电器电子产品有害物质限制使用管理办法》，以及《电子电气产品有害物质限制使用标识要求》(SJ/T 11364-2014) 作成。电子电气产品中特定 6 种有害物质的含量超过规定值时，应标识此标志。中间的数字为在中国生产销售以及进口的电子电气产品的环保使用期限（年限）。电子电气产品的环保使用期限从生产日期算起。在期限内，正常使用产品的过程中，不会有特定的 6 种有害物质外泄进而对环境，人和财产造成深刻影响。

制动单元 (CDBR) 的环保使用期限为 15 年。但需要注意的是环保使用期限并非产品的质量保证期限。

(注) 2016 年 6 月下旬以后出厂的产品会依次进行标识。此外，标识和未标识的产品可能会在物流阶段混在一起，敬请注意。

◆ 制动单元 (CDBR) 中含有有害物质的信息

制动单元 (CDBR) 中所含有害物质的详细信息如表 15 所示。

表 15 制动单元 (CDBR) 中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
实装基板	×	○	○	○	○	○
电子元件	×	○	○	○	○	○
黄铜螺钉	×	○	○	○	○	○
铝压铸	×	○	○	○	○	○
本表格依据 SJ/T 11364 的规定编制。 ○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。 ×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。 (注) 制动单元 (CDBR) 符合欧盟 RoHS 指令。上表中的“×”表示含有欧盟 RoHS 指令豁免的有害物质。						

12 Specifications

Table 16 Specifications

Voltage Class		200 V Class				400 V Class				600 V Class		
Model CDBR-□□D		2022	2037	2055	2110	4030	4045	4090	4220	5037	5110	5300
Applicable Motor Output Capacity (kW)		22	37	55	110	30	45	90	220	37	110	300
Output	Peak Discharge Current (A) (10% ED, 10 s)	60	80	120	250	40	60	100	250	40	100	250
	Continuous Rated Discharge Current (A)	20	24	40	80	15	18	30	80	15	30	80
	Braking Voltage Activation Level (Vdc)	270 to 380 <1> (Default setting: 380)				630 to 760 <1> (Default setting: 760)				825 to 950 <1> (Default setting: 950)		
	Max. Hysteresis (V)	Approx. 8				Approx. 16				Approx. 20		
Input	DC Voltage (V)	243 to 400				460 to 800				607 to 1000		
Protection Function	Heatsink Overheat	Thermistor										
	Charge LED	Charge lamp stays ON until bus voltage drops below 50 V.										
	Overcurrent Protection	Faults the CDBR in the event of IGBT overcurrent.										
Environment	Area of use	Indoors (free from corrosive gasses and dust)										
	Altitude	Up to 1000 m (3281 ft.) without derating; up to 3000 m (9843 ft.) with drive output and current derating. Contact Yaskawa or your nearest sales representative for details.										
	Ambient Temperature	IP00, IP20: -10 to +50°C (+14 to +122°F) UL Type 1: -10 to +40°C (+14 to +104°F)										
	Storage Temperature	-20 to +60°C (-4 to +140°F)										
	Humidity	95 RH% or less (no condensation)										
	Vibration/Shock	10 to 20 Hz: 9.8 m/s², 20 to 55 Hz: 5.9 m/s²										
Standards		UL 508C, IEC/EN 61800-3 <2>, IEC/EN 61800-5-1 <2>, RoHS										
Protection Design		IP00 enclosure, IP20 enclosure, UL Type 1 enclosure										
Heatsink Loss (W)		20	29	48	114	18	27	38	114	18	29	105
Interior Unit Loss (W)		7	10	16	38	6	9	13	38	6	10	35
Total Watt Loss (W)		27	38	64	152	24	36	51	152	24	39	140

<1> Adjustable by 10 incremental steps.

<2> Not available for 600 V class models.

12 Specifications

◆ Revision History

Revision dates and manual numbers appear on the bottom of the back cover.

MANUAL NO.

TOBP C720600 01A <1>

Revision number

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Date of publication

Date of Publication	Revision Number	Section	Revised Content
August 2017	<9>	All	Addition: Information on CH700 and CR700 Revision: Reviewed and corrected entire documentation.
		Chapter 6	Addition: Note on junction terminals
July 2017	<8>	Back cover	Revision: Address
November 2016	<7>	Chapter 10	Correction: Table 14 Contents of Hazardous Substances in This Product CrVI (Wrong) → Cr(VI) (Correct)
		Chapter 11	Correction: Table 15 Contents of Hazardous Substances in This Product • Gd (Wrong) → Cd (Correct) • CrVI (Wrong) → Cr(VI) (Correct) • 多溴联二苯醚 (Wrong) → 多溴二苯醚 (Correct) • 欧洲 RoHS 指令 (Wrong) → 欧盟 RoHS 指令 (Correct)
		Back cover	Revision: Address
August 2016	<6>	All	Addition: Information on GA700 Revision: Reviewed and corrected entire documentation.
		Chapter 10, Chapter 11	Addition: China RoHS Compliance
		Back cover	Revision: Address
June 2015	<5>	Front cover, back cover	Revision: Format
December 2014	<4>	Back cover	Revision: Address
November 2013	<3>	All	Addition: Additional models added along with corresponding data 200 V: CDBR-2055D, 2110D 400 V: CDBR-4090D, 4220D 600 V: CDBR-5110D, 5300D Revision: Reviewed and corrected entire documentation.
		Back cover	Revision: Address
May 2012	<2>	All	Addition: Additional models added along with corresponding data 200 V: CDBR-2022D, 400 V: CDBR-2030D
November 2011	<1>	All	Revision: Reviewed and corrected entire documentation.

Date of Publication	Revision Number	Section	Revised Content
November 2011	—	—	First Edition

YASKAWA AC Drive Option Braking Unit, Braking Resistor Unit Installation Manual

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.
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