

# YASKAWA AC Drive 1000-Series Option Braking Unit, Braking Resistor Unit Installation Manual

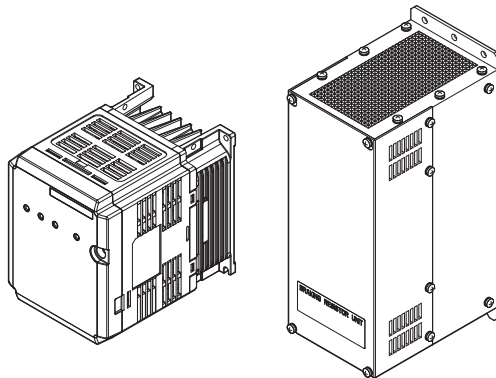
Type: CDBR-□□D  
LKEB-□□

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 1000シリーズオプション 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-□□

製品を安全にお使い頂くために、本書を必ずお読みください。  
また、本書をお手元に保管していただくとともに、最終的に本製品をご使用になるユーザー様のお手元に確実に届けられるよう、お取り計らい願います。



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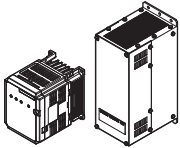
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# 1 Preface and Safety

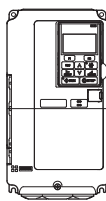
### ◆ Applicable Documentation

The following manuals are available for the option:

#### CDBR Braking Unit, LKEB Braking Resistor Unit

	<p>Yaskawa AC Drive 1000-Series Option Braking Unit, Braking Resistor Unit Installation Manual Manual No: TOBP C720600 01 (this book)</p>
<p>Read this manual first. The installation manual is packaged with the option and contains information required to install the option and set up related drive parameters.</p>	

#### Yaskawa Drive

	<p>Yaskawa AC Drive 1000-Series Quick Start Guide</p>
<p>Yaskawa AC Drive 1000-Series Technical Manual</p>	
<p>Refer to the manual of the drive this option is being used with. The drive manuals cover basic installation, wiring, operation procedures, functions, troubleshooting, and maintenance information. The manuals also include important information about parameter settings and drive tuning. Access these sites to obtain Yaskawa instruction manuals: U.S.: <a href="http://www.yaskawa.com">http://www.yaskawa.com</a> Europe: <a href="http://www.yaskawa.eu.com">http://www.yaskawa.eu.com</a> Japan: <a href="http://www.e-mechatronics.com">http://www.e-mechatronics.com</a> For questions, contact your local Yaskawa sales office or the nearest Yaskawa representative.</p>	

### ◆ Terms

**Note:** Indicates supplemental information that is not related to safety messages

**Drive:** Yaskawa AC Drive 1000-Series

**Option unit:** Yaskawa AC Drive 1000-Series Option CDBR Braking Unit <1>, LKEB Braking Resistor Unit

<1> Spec. D

## ◆ 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.

# 1 Preface and Safety

---

## ■ 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.
- Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all products to which this manual is applicable.
- 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.
- When ordering new copies of the manual, contact a Yaskawa representative or the nearest Yaskawa sales office and provide the manual number shown on the front cover.

### DANGER

#### **Heed the safety messages in this manual.**

Failure to comply will result in 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 touch any terminals before the capacitors have fully discharged.**

Failure to comply could result in death or serious injury.

**Be sure to ground the drive ground terminal (200 V class: Ground to 100  $\Omega$  or less, 400 V class: Ground to 10  $\Omega$  or less, 600 V class: Ground to 10  $\Omega$  or less).**

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

## NOTICE

### **Do not modify the drive or option circuitry.**

Failure to comply could result in damage to the drive or option and will void warranty. Yaskawa is not responsible for any modification of the product made by the user. This product must not be modified.

### **Do not expose the drive or option to halogen group disinfectants.**

Failure to comply may cause damage to the electrical components in the drive or option. Do not pack the drive in wooden materials that have been fumigated or sterilized. Do not sterilize the entire package after the product is packed.

### **Install adequate branch circuit short circuit protection per applicable codes.**

- The device is suitable for circuits capable of delivering up to 100 kA RMS Symmetrical Amperes, 240 Vac maximum (200 V Class), 480 Vac maximum (400 V Class) and 600 Vac maximum (600 V Class) or equivalent to the SCCR rating of the VFD to which it is connected - whichever value is less.
- CDBR Series of Dynamic Braking devices shall be connected to a VFD which incorporates Solid State Short Circuit Protection Circuitry and was found to comply with the High Fault Current Short Circuit Test.

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

## **Crush Hazard**

### **Do not carry the drive by the front cover.**

Failure to comply may result in minor or moderate injury from the main body of the drive falling.

## ■ 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.

**🔥 Fire Hazard**

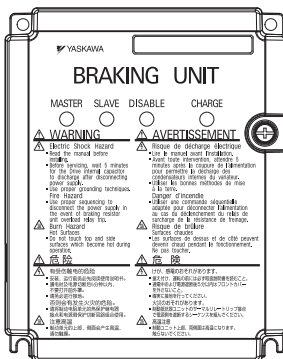
- Use proper grounding techniques.

**🔥 Burn Hazard  
Hot Surface**

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

- 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

Installing a CDBR Braking Unit or an LKEB Braking Resistor Unit helps 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](#). Contact Yaskawa or your Yaskawa agent for other drives. Also may be used as a replacement for CDBR spec. B type. Contact your Yaskawa representative for more information.

**Table 1 CDBR Braking Unit Applicable Models**

Drive	Models
A1000	CIMR-A□2A0169 to 2A0250 CIMR-A□4A0088 to 4A0208 CIMR-A□5A0062 and 5A0077
T1000A	CIMR-T□2A0169 to 2A0250 CIMR-T□4A0088 to 4A0208
L1000A	CIMR-L□2A0145 to 2A0215 CIMR-L□4A0075 to 4A0180

#### ■ 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 for other drives.

**Table 2 LKEB Braking Resistor Unit Applicable Models**

Drive	Models
A1000	All Models
V1000	
J1000	
L1000A	
T1000A	
T1000V	


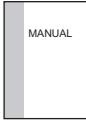
### 3 Receiving

Please perform the following tasks upon receiving the option:

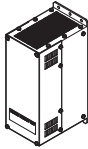
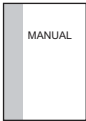
- Inspect the option for damage. Contact the shipper immediately if the option appears damaged upon receipt.
- Verify receipt of the correct model by checking the model number printed on the option nameplate. (Refer to [Figure 4](#) on page [12](#) for more information)
- Contact your supplier if you have received the wrong model or the option does not function properly.

#### ◆ 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

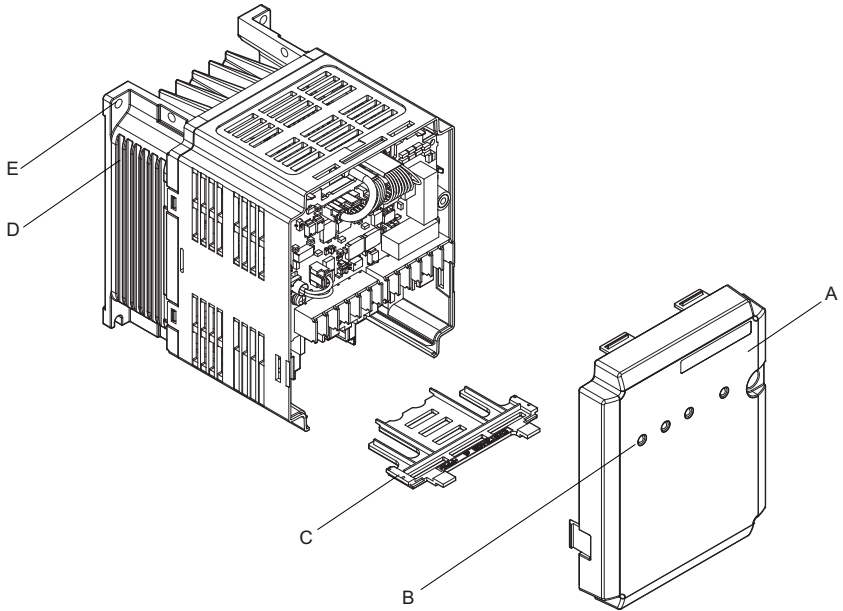
#### ◆ Tools Required for Installation

A Phillips screwdriver (M3.5 to M4 metric / #1, #2, and #3 U.S. standard size) is required to install the option and wire the option terminal blocks.

**Note:** Tools required to prepare option cables for wiring are not listed in this manual.

## 4 CDBR Braking Unit Components

### ◆ CDBR Braking Unit



- A – Front Cover
- B – LED Display (Refer to page 16 for details)
- C – Bottom Cover
- D – Heatsink
- E – Installation Hole

Figure 3 CDBR Braking Unit Components (Example: CDBR-2037D)

## 4 CDBR Braking Unit Components

### ◆ Option Nameplate

#### ■ CDBR Braking Unit

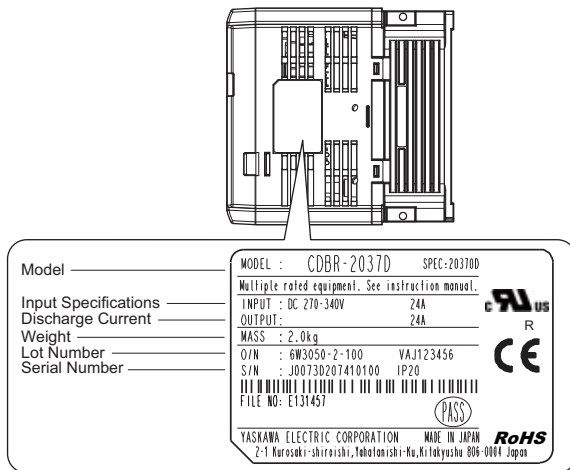


Figure 4 Nameplate Example (CDBR Braking Unit)

#### ■ LKEB Braking Resistor Unit

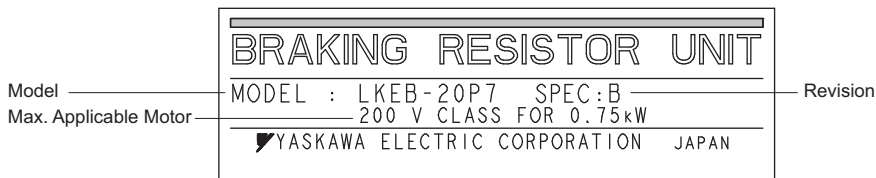
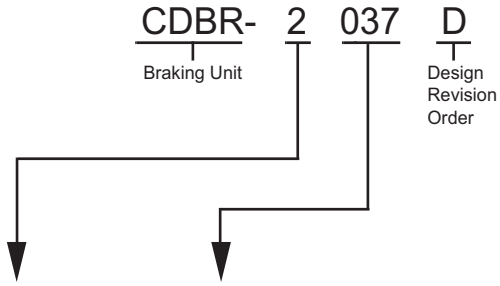


Figure 5 Nameplate Example (LKEB Braking Resistor Unit)

## 4 CDBR Braking Unit Components

### ◆ Model Number

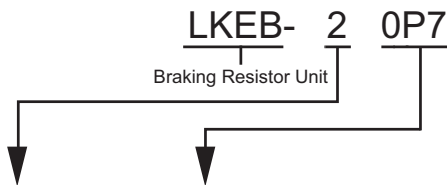
#### ■ CDBR Braking Unit



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
4	400 V	030	30 (40)	15	40
		045	45 (60)	18	60
5	600 V	037	37 (50)	15	40

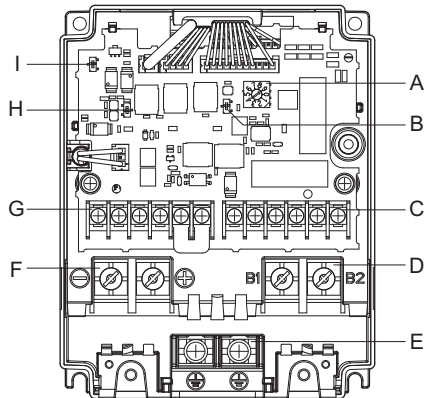
## 4 CDBR Braking Unit Components

### ■ LKEB Braking Resistor Unit



Voltage Class		No.	Max. Motor Capacity (kW)	Average Dissipated Power (W)	Resistance ( $\Omega$ )
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

### ◆ CDBR Braking Unit Front Views



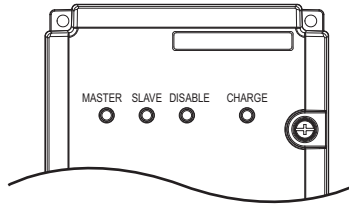
- |   |  |
|---|--|
| A – Braking Activation Voltage Rotary Switch (S3) | F – Main Circuit Terminal Board (⊕, ⊖)   |
| B – Master/Slave Selection Switch (S2)            | G – Control Circuit Terminal Board (TB1) |
| C – Control Circuit Terminal Board (TB2)          | H – N.O./N.C. Switch (S4)                |
| D – Main Circuit Terminal Board (B1, B2)          | I – Sink/Source Switch (S1)              |
| E – Grounding Terminal                            |  |

Figure 6 Front View of CDBR Braking Unit

## 4 CDBR Braking Unit Components

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### ◆ CDBR Braking Unit LED Display



LED	Color	Lit	Off	Flashing
MASTER	Green	CDBR is functioning as Master	CDBR is functioning as Slave	CDBR is activating
SLAVE	Green	CDBR is functioning as Slave	CDBR is functioning as Master	CDBR is activating
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 use equipment.**

Failure to comply could result in death or serious injury.

Maintenance, inspection, and replacement of parts must be performed only by authorized personnel familiar with installation, adjustment, and maintenance of this product.

#### NOTICE

##### Damage to Equipment

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

Failure to comply may result in ESD damage to circuitry.

**Do not operate damaged equipment.**

Failure to comply may cause further damage to the equipment.

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

## 5 Mechanical Installation

### ◆ Installation Environment

Install the CDBR Braking Unit in an environment matching the specifications below.

Environment	Conditions
Installation Area	Indoors
Ambient Temperature	-10 to +50°C (IP00, IP20) -10 to +40°C (NEMA Type 1)
Storage Temperature	-20 to +60°C (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"><li>• oil mist and dust</li><li>• metal shavings, oil, water, or other foreign materials</li><li>• radioactive materials</li><li>• combustible materials (e.g., wood)</li><li>• harmful gases and liquids</li><li>• excessive vibration</li><li>• chlorides</li><li>• direct sunlight.</li></ul>
Altitude	Up to 1000 meters without derating; up to 3000 m with output and current derating. Contact Yaskawa or your nearest sales representative for applications above 1000 meters.
Vibration / Shock	10 to 20 Hz: 9.8 m/s <sup>2</sup> 20 to 55 Hz: 5.9 m/s <sup>2</sup>
Installation orientation	Install the option unit upright to maintain proper cooling.

### ■ UL and CE Compliance

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

For main circuit terminal wiring (⊕, ⊖, B1, B2), UL approval requires using UL Listed copper wires (rated at 75°C).

### ◆ Installation Orientation

Install the CDBR Braking Unit upright as illustrated in *Figure 7* to maintain proper cooling.

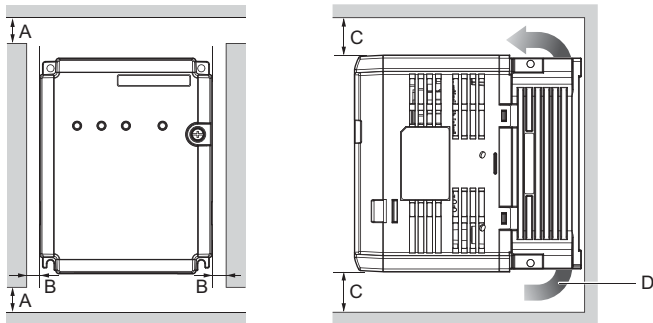


Figure 7 Correct Installation Orientation (Braking Unit)

### ◆ Installation Spacing

*Figure 8* and *Figure 10* show the installation distance required to maintain sufficient space for airflow and wiring.

#### ■ CDBR Braking Unit Spacing



A – 50 mm (2.0 in) minimum

B – 30 mm (1.2 in) minimum

C – 100 mm (3.9 in) minimum

D – Airflow direction

Figure 8 CDBR Braking Unit Installation Spacing

## 5 Mechanical Installation

### Multiple Drive Installation (Side-by-Side Installation)

When installing multiple drives into the same enclosure panel, mount the drives according to *Figure 8*.

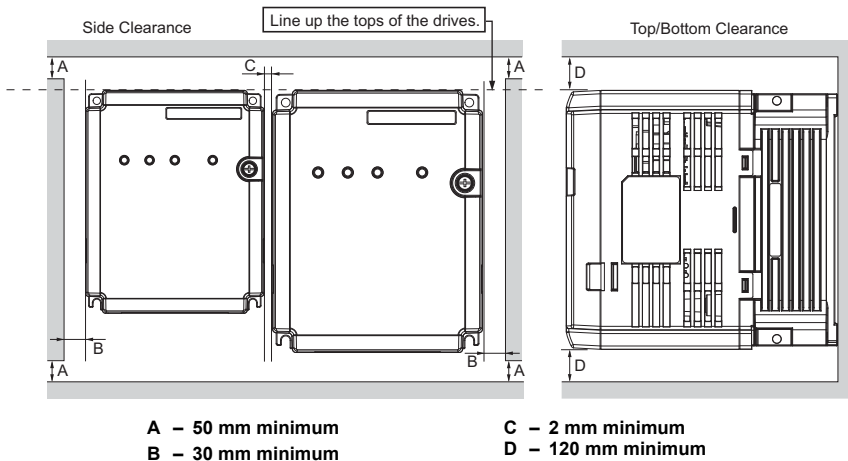


Figure 9 Space Between CDBR braking units (Side-by-Side Mounting)

### ■ LKEB Braking Resistor Unit Spacing

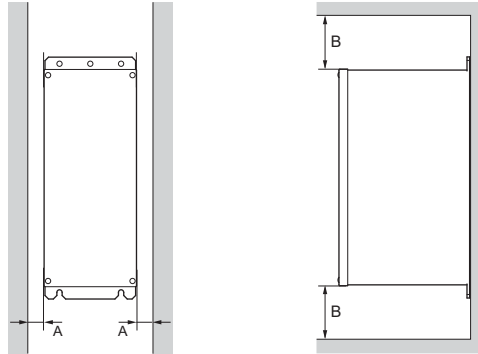


Figure 10 LKEB Braking Resistor Unit Installation Spacing

Table 3 Correct Installation 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

IP00, IP20

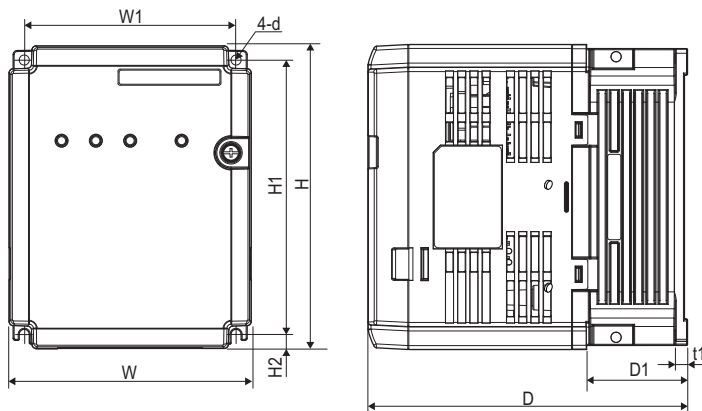
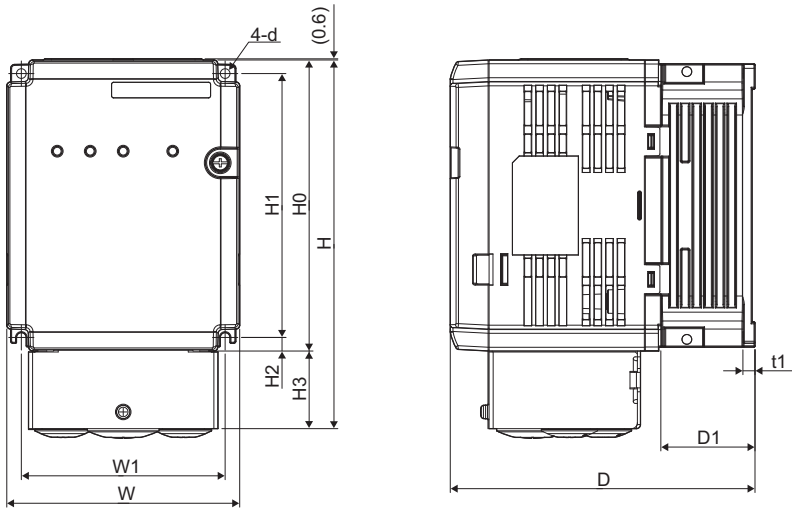


Table 4 Dimensions for CDBR Braking Unit

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

## NEMA Type 1



Model CDBR-	Dimensions mm (in)											Weight kg (lb)
	W	H	D	W1	H0	H1	H2	H3	D1	t1	d	
2022D	120 (4.72)	190 (7.48)	157 (6.18)	105 (4.13)	150 (5.91)	136 (5.35)	7 (0.28)	40 (1.57)	48 (1.89)	6 (0.24)	M4	2.3 (5.08)
2037D												
4030D												
4045D												
5037D												

## 5 Mechanical Installation

### ■ LKEB Braking Resistor Unit

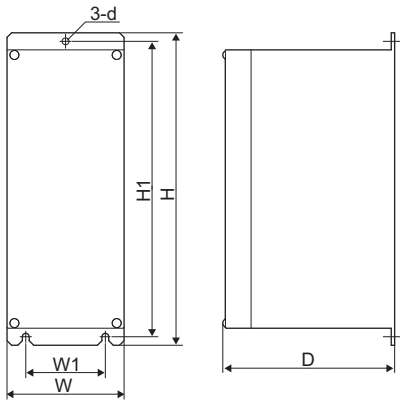


Figure 1

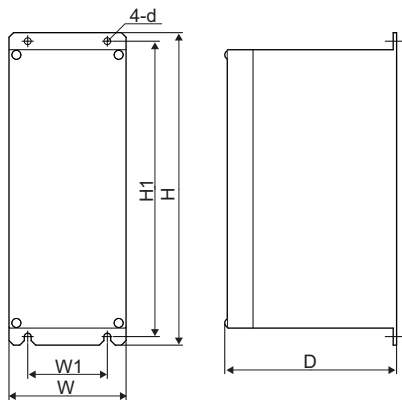


Figure 2

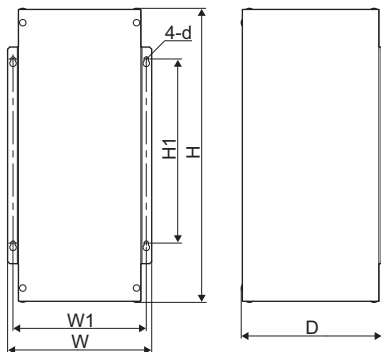


Figure 3



**Table 5 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)	150 (5.91)	75 (2.95)	335 (13.19)	M5	4.5 (9.9)
22P2		130 (5.12)	350 (13.78)	150 (5.91)	75 (2.95)	335 (13.19)	M5	4.5 (9.9)
23P7		130 (5.12)	350 (13.78)	150 (5.91)	75 (2.95)	335 (13.19)	M5	5.0 (11.0)
25P5		250 (9.84)	350 (13.78)	150 (5.91)	200 (7.87)	335 (13.19)	M6	7.5 (16.5)
27P5		250 (9.84)	350 (13.78)	150 (5.91)	200 (7.87)	335 (13.19)	M6	8.5 (18.7)
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)	543 (21.38)	260 (10.24)	336 (13.23)	340 (13.39)	M8	15 (33.0)
2018		446 (17.56)	543 (21.38)	260 (10.24)	426 (16.77)	340 (13.39)	M8	19 (41.8)
2022		446 (17.56)	543 (21.38)	260 (10.24)	426 (16.77)	340 (13.39)	M8	19 (41.8)

**Table 6 Dimensions for LKEB Braking Resistor Unit (400 V)**

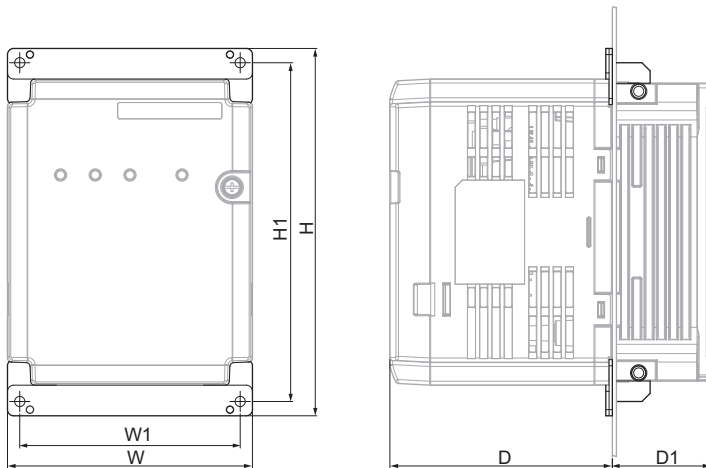
Model LKEB-	Figure	Dimensions mm (in)						Weight kg (lb)
		W	H	D	W1	H1	d	
40P7	1	105 (4.13)	275 (10.83)	150 (5.91)	50 (1.97)	260 (10.24)	M5	3.0 (6.6)
41P5	2	130 (5.12)	350 (13.78)	150 (5.91)	75 (2.95)	335 (13.19)	M5	4.5 (9.9)
42P2		130 (5.12)	350 (13.78)	150 (5.91)	75 (2.95)	335 (13.19)	M5	4.5 (9.9)
43P7		130 (5.12)	350 (13.78)	150 (5.91)	75 (2.95)	335 (13.19)	M5	5.0 (11.0)
45P5		250 (9.84)	350 (13.78)	150 (5.91)	200 (7.87)	335 (13.19)	M6	7.5 (16.5)
47P5		250 (9.84)	350 (13.78)	150 (5.91)	200 (7.87)	335 (13.19)	M6	8.5 (18.7)
4011	3	350 (13.78)	412 (16.22)	260 (10.24)	330 (12.99)	325 (12.80)	M6	16 (35.2)
4015		350 (13.78)	412 (16.22)	260 (10.24)	330 (12.99)	325 (12.80)	M6	18 (39.6)
4018		446 (17.56)	543 (21.38)	260 (10.24)	426 (16.77)	340 (13.39)	M8	19 (41.8)
4022		446 (17.56)	543 (21.38)	260 (10.24)	426 (16.77)	340 (13.39)	M8	19 (41.8)
4030		356 (14.02)	956 (37.64)	260 (10.24)	336 (13.23)	740 (29.13)	M8	25 (55.0)
4037		446 (17.56)	956 (37.64)	260 (10.24)	426 (16.77)	740 (29.13)	M8	33 (72.6)
4045		446 (17.56)	956 (37.64)	260 (10.24)	426 (16.77)	740 (29.13)	M8	33 (72.6)

## 5 Mechanical Installation

### ■ Attachment

#### External Heatsink Attachment

Use the External Heatsink Attachment for installation with the heatsink outside the enclosure.



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							

## Panel Cutout Dimensions

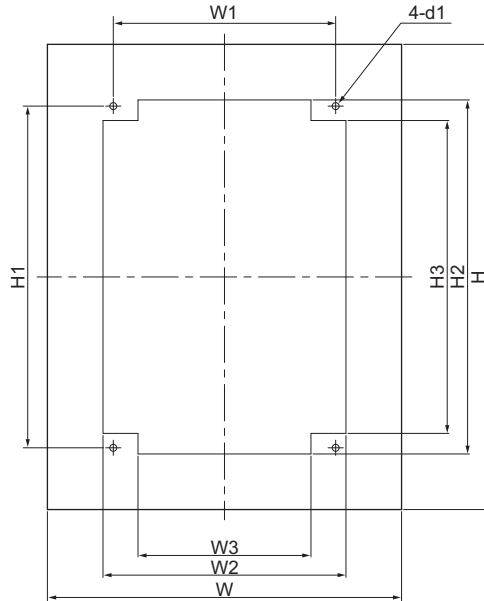


Figure 11 Panel Cut Dimension for External Heatsink Attachment

Braking Unit CDBR-	W	H	W1	W2	W3	H1	H2	H3	d1
2022D	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									

## 5 Mechanical Installation

### Retrofit Attachment

Use the Retrofit Attachment when replacing an older model CDBR Braking Unit (CDBR-□B, CDBR-□C). Contact your local Yaskawa representative for ordering.

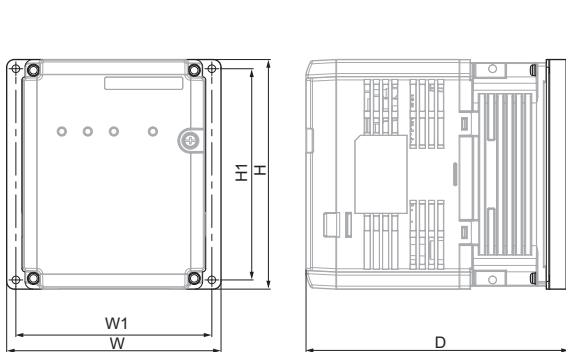


Figure 1

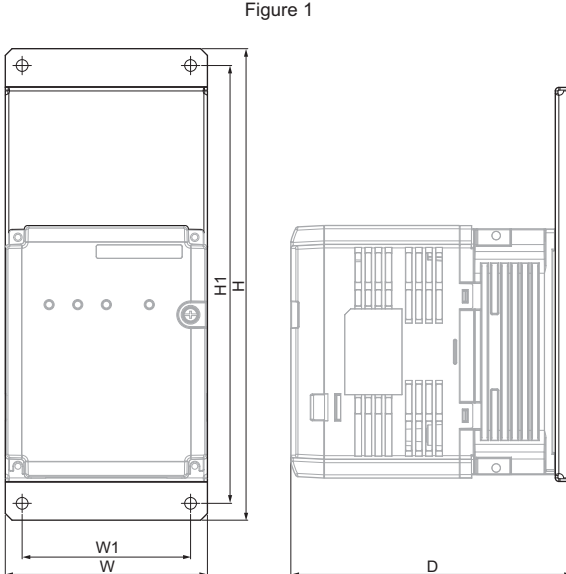
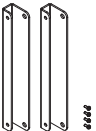
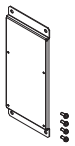


Figure 2

## 5 Mechanical Installation

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							
	5037D	2	EZZ021710B (100-066-478)	120 (4.72)	280 (11.02)	167 (6.57)	100 (3.94)	260 (10.24)

# 6 Electrical Installation

### ◆ Section Safety

#### DANGER

##### **Electric Shock Hazard**

**Do not connect or disconnect wiring while the power is on.**

Failure to comply will result in death or serious injury.

Disconnect all power to the drive or the option unit and wait at least the amount of time specified on the drive front cover safety label. After all indicators are off, measure the DC bus voltage to confirm safe level, and check for unsafe voltages before servicing. The internal capacitor remains charged after the power supply is turned off.

#### WARNING

##### **Electrical Shock Hazard**

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

Failure to comply could result in death or serious injury.

The diagrams in this section may include options and drives without covers or safety shields to show details. Be sure to reinstall covers or shields before operating any devices. Use the option according to the instructions described in this manual.

**Do not allow unqualified personnel to use equipment.**

Failure to comply could result in death or serious injury.

Maintenance, inspection, and replacement of parts must be performed only by authorized personnel familiar with installation, adjustment, and maintenance of this product.

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

Failure to comply could result in death or serious injury.

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

Failure to comply could result in death or serious injury.

### **WARNING**

#### **Fire Hazard**

**Tighten all terminal screws to the specified tightening torque.**

Loose electrical connections could result in death or serious injury by fire due to overheating of electrical connections.

### **NOTICE**

#### **Damage to Equipment**

**Install adequate branch circuit short circuit protection per applicable codes.**

The device is suitable for circuits capable of delivering up to 100 kA RMS Symmetrical Amperes, 240 Vac maximum (200 V Class), 480 Vac maximum (400 V Class) and 600 Vac maximum (600 V Class) or equivalent to the SCCR rating of the VFD to which it is connected - whichever value is less.

**CDBR Series of Dynamic Braking devices shall be connected to a VFD which incorporates Solid State Short Circuit Protection Circuitry and was found to comply 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 may result in ESD damage to circuitry.

**Never shut the power off while the drive is running or outputting voltage.**

Failure to comply may cause the application to operate incorrectly or damage the drive.

**Do not operate damaged equipment.**

Failure to comply may cause further damage to the equipment.

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

**Tighten all terminal screws to the specified tightening torque.**

Failure to comply could result in damage to the terminal block.

### NOTICE

**Do not use unshielded cable 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.**

Failure to comply may prevent proper operation and possibly damage equipment.

**Check wiring to ensure that all connections are correct after installing the option to the drive.**

Failure to comply may result in damage to the option.



### ◆ Removing the Front Cover and Bottom Cover (Braking Unit)

Follow the instructions below to install the CDBR Braking Unit. Replace the front cover on the CDBR Braking Unit when wiring is complete.

#### ■ Removing the Front Cover and Bottom Cover

1. Loosen the front cover screw.

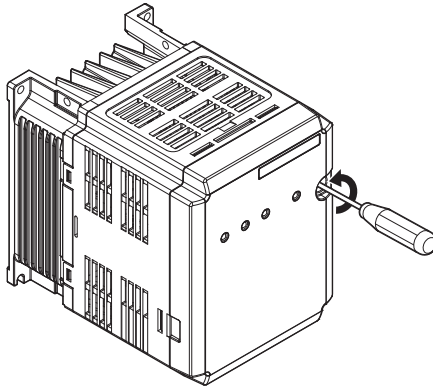


Figure 12 Loosen the Screw Securing the Front Cover

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

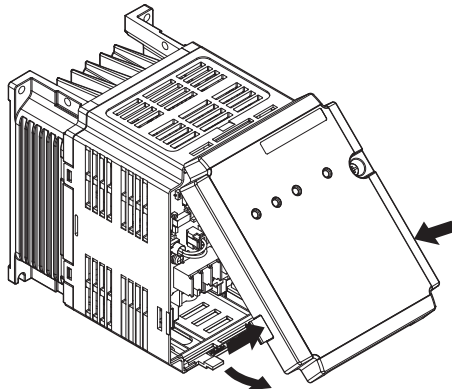
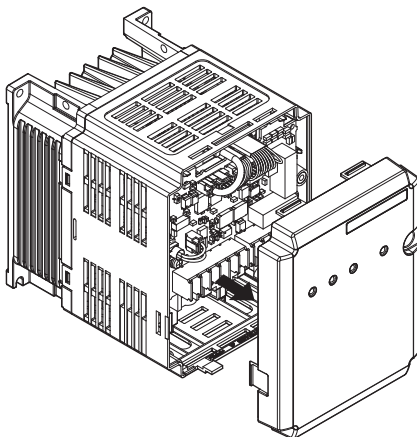


Figure 13 Push the Tabs Inward and Pull Forward on the Front Cover

## 6 Electrical Installation

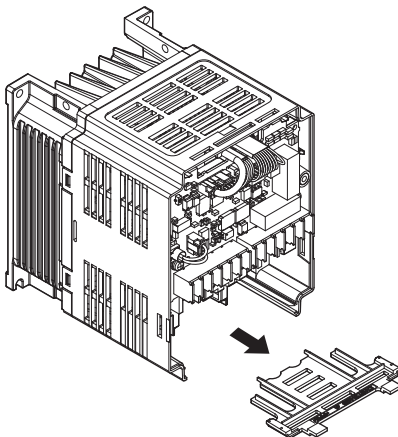
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3. Free the tab on the top of the front cover to remove the cover.



**Figure 14 Remove the Front Cover**

4. Remove the bottom cover.

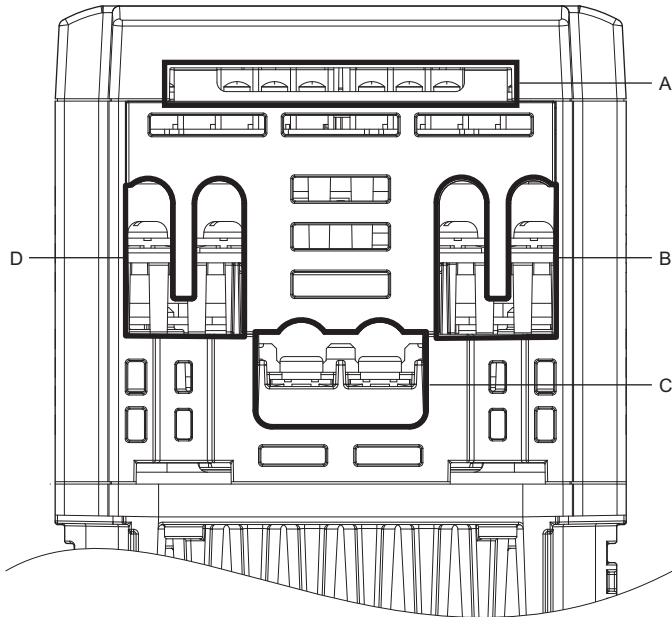


**Figure 15 Remove the Bottom Cover**

### ■ Bottom Cover Wiring Space

When reattaching the covers, route the wiring between the cutouts of the covers as shown in [Figure 16](#).

**Note:** Take proper precautions when wiring the option unit so that the covers will easily fit back into the original position. Make sure cables are not pinched between the covers and the option unit when replacing the covers.



**A** – Wiring space for control circuit terminals

**B** – Wiring space for LKEB braking resistor unit

**C** – Wiring space for ground terminals

**D** – Wiring space for main circuit terminals

**Figure 16** Wiring Spaces

### ◆ Wiring the CDBR Braking Unit

#### ■ Wiring Precautions

Prior to installing the CDBR Braking Unit or the LKEB Braking Resistor Unit, wire the drive, make the necessary connections to the drive terminals, and verify that the drive functions normally without the option installed. Refer to the Quick Start Guide packaged with the drive for information on removing the digital operator and front covers, wiring, and connecting the drive.

**WARNING! Electrical Shock Hazard.** Be sure to ground the drive ground terminal (200 V class: ground to 100  $\Omega$  or less; 400 V class: ground to 10  $\Omega$  or less; 600 V class: ground to 10  $\Omega$  or less). Improper equipment grounding could result in death or serious injury by contacting ungrounded electrical equipment.

**WARNING! Fire Hazard.** When installing dynamic braking options, perform all wiring exactly as specified in the wiring diagrams provided. Failure to do so can result in fire.

**WARNING! Electrical Shock Hazard.** Mount the LKEB Braking Resistor Unit on a grounded metallic plate. When it cannot be mounted on a grounded metallic plate, connect a ground wire from a mounting LKEB screw to earth ground. Improper equipment grounding could result in 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 result in drive or equipment malfunction due to short circuit.

**NOTICE:** Do not solder the ends of wire connections to the option unit. Soldered wiring connections can loosen over time. Improper wiring practices could result in option unit malfunction due to loose terminal connections.

- 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.
  3. Keep wiring distance between the CDBR Braking Unit and LKEB Braking Resistor Unit shorter than 10 meters (32.80 feet) and keep wiring between the drive and the CDBR Braking Unit shorter than 5 meters (16.40 feet).

### ■ Wiring Procedure

**WARNING!** Fire Hazard. Tighten terminal screws to the specified tightening torque. Loose electrical connections could result in death or serious injury by fire due to overheating. Tightening screws beyond the specified tightening torque may cause erroneous operation, damage the terminal block, or cause a fire. Refer to [Wire Gauge and Torque Specifications on page 43](#) for details.

1. For all CDBR wiring refer to [Table 9](#) for wire gauge and torque specifications and refer to [Figure 22](#) for the drive and option connection diagram
2. Connect ground wiring to the ground terminals. Refer to [Table 7](#) 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 7](#) for descriptions of CDBR Braking Unit Main Circuit Terminals.
4. Connect control circuit wiring to the control circuit terminals. Refer to [Table 8](#) 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.

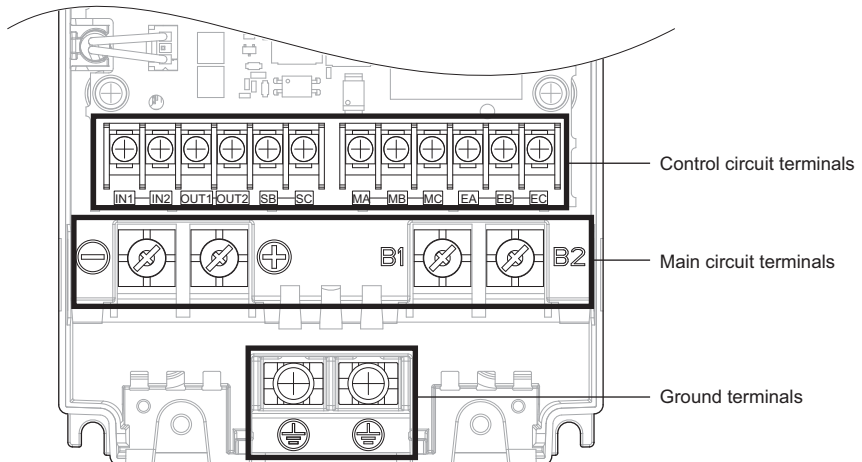


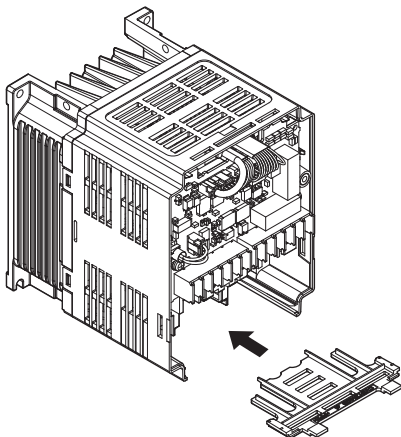
Figure 17 Wiring the Terminals

6. Reattach the bottom and front cover. After wiring to the CDBR Braking Unit and drive is complete, double-check all connections before reattaching covers.

## 6 Electrical Installation

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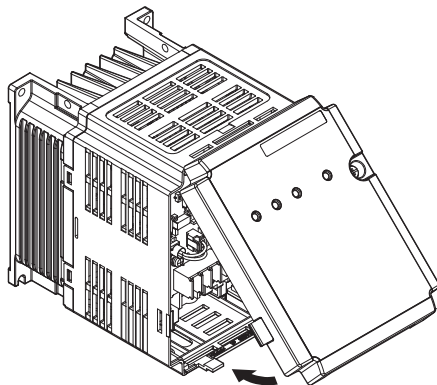
7. Replace and secure the bottom cover.



**Figure 18 Reattach the Bottom Cover**

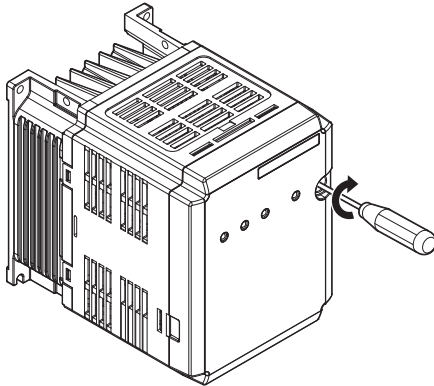
**Note:** Take proper precautions not to pinch cables between the cover and the drive when replacing CDBR Braking Unit covers.

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 19 Reattach the Front Cover**

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

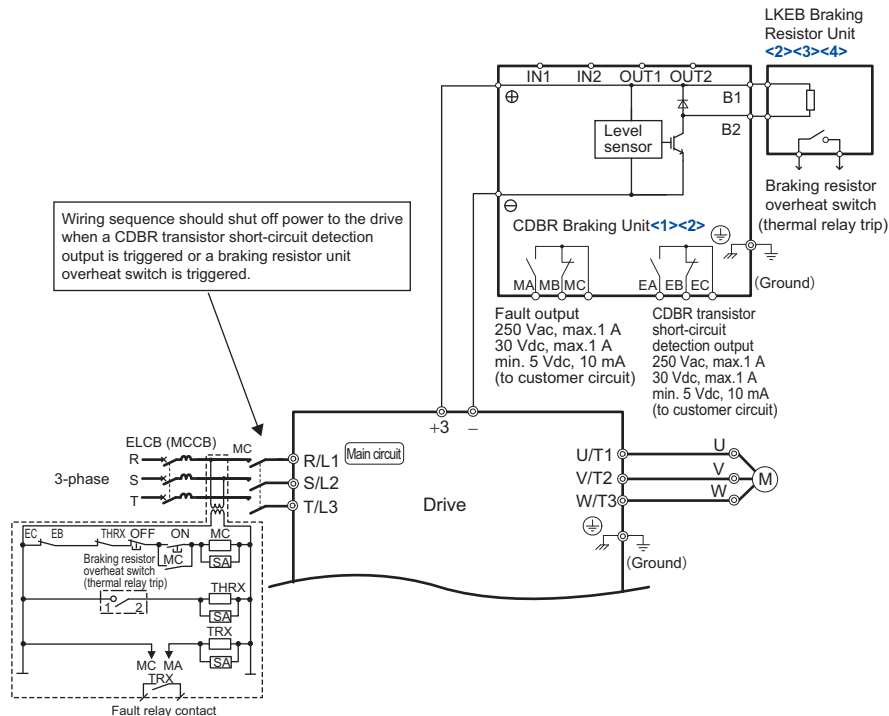


**Figure 20 Tighten the Front Cover Screw**

## 6 Electrical Installation

### ■ Connection Diagram

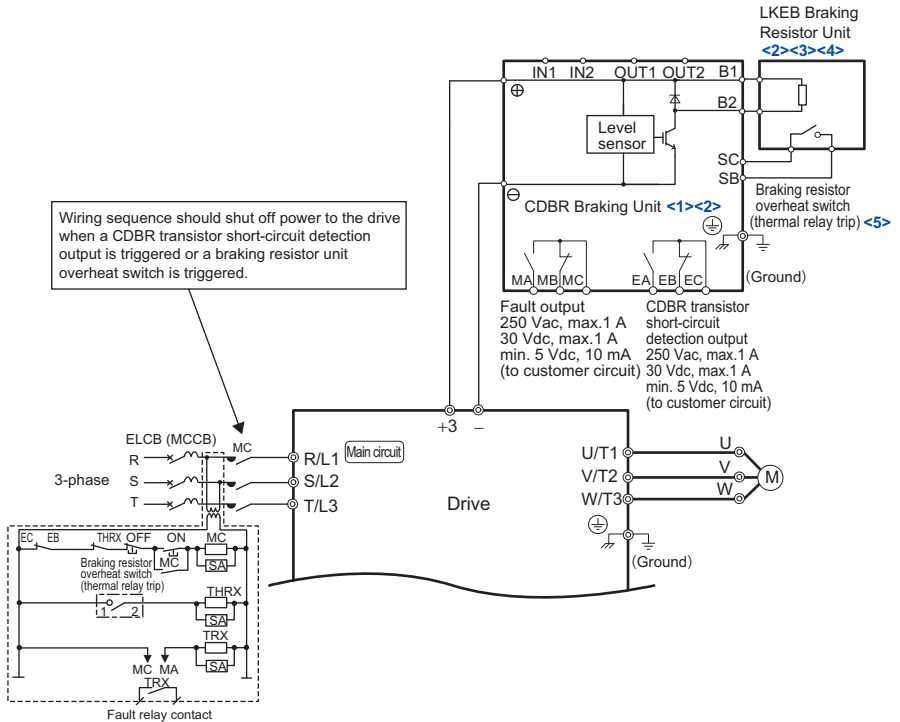
**WARNING! Fire Hazard.** To prevent electrical fire, follow the connection diagrams. Failure to comply may result in serious injury or death.



**Figure 21 Connection Diagram for Drive and Option: Same as Previous Version**

- <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. If the protection function is enabled under these conditions, it may cause a braking resistor fault (rF).
- <2> Set L3-04 to 0 to disable Stall Prevention when using a regenerative converter, a regenerative unit, or a dynamic braking option. If the function is enabled under these conditions, the drive may not stop 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.





**Figure 22 Drive and Option Connection Diagram: When Using Enable Inputs**

**Note:** IN1, IN2, OUT1, OUT2 used when connecting multiple CDBR braking units. Refer to [Using CDBR Braking Units in Parallel on page 44](#) or details.

- <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. If the protection function is enabled under these conditions, it may cause a braking resistor fault (rF).
- <2> Set L3-04 to 0 to disable Stall Prevention when using a regenerative converter, a regenerative unit, or a dynamic braking option. If the function is enabled under these conditions, the drive may not stop within the specified deceleration time.
- <3> Set L8-01 to 1 to enable braking resistor overload protection in the drive when using Yaskawa ERF-type resistors.
- <4> Be sure to protect non-Yaskawa braking resistors by thermal overload relay.
- <5> When connection the thermal relay trip contact on the LKEB braking resistor unit, set the S1 and S4 switches according to the specifications of the thermal relay trip contact. Refer to [Braking Unit Enable Input Setting \(S1, S4\) on page 46](#) for details.

## 6 Electrical Installation

### ■ CDBR Braking Unit Terminal Functions

This section explains terminal functions and specifications to ensure safe and proper installation of the CDBR Braking Unit.

**Table 7 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
TB4	B1	Main Circuit B1 Terminal	Connects to the B1 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 B2 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

**Table 8 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	Slave Input Common	
	OUT1	Master Output	Output the signal when using CDBR braking units in parallel
	OUT2	Master Output Common	
	SC </>	Enable Input Common	Enable/Disable contact input to disable the CDBR and activate MA-MB-MC fault contact output.
	SB </>	Enable Input	

Terminal Block	Terminal No.	Terminal Name	Specification
TB2	MA	Fault Contact Output (N.O.)	Output the 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) Relay output 250 Vac, max. 1A 30 Vdc, max. 1A 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 the signal when LKEB braking resistor unit short-circuit or CDBR braking unit fault is detected. Wiring sequence should shut off power to the drive when the signal is output. Relay output 250 Vac, max. 1A 30 Vdc, max. 1A 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. If external power supply used, it shall be UL Listed Class 2 power source only or equivalent.

### ■ Wire Size and Torque Specifications

Select appropriate wire type and gauges from [Table 9](#).

**Note:** For main circuit terminal wiring (⊕, ⊖, B1, B2), UL approval requires using UL Listed copper wires (rated at 75°C).

**Table 9 Wire Gauge and Torque Specifications**

Model CDBR-	Terminal	For Japan		For U.S.A.		For Europe and China		Screw Size	Tightening Torque N·m (lb.in.)
		Recommended Gauge mm <sup>2</sup>	Applicable Gauge mm <sup>2</sup>	Recommended Gauge AWG, kcmil	Applicable Gauge AWG, kcmil	Recommended Gauge mm <sup>2</sup>	Applicable Gauge mm <sup>2</sup>		
2022D 2037D 4030D 4045D 5037D	⊕, ⊖ B1, B2	5.5	5.5 to 8	10	10 to 8	5.5	5.5 to 8	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	18	18 to 14	0.75	0.75 to 2	M3.5	0.8 to 1.0 (7.1 to 8.9)
	⊕	8	8	8	8	8	8	M5	2 to 2.5 (17.7 to 22.1)

## 6 Electrical Installation

### Replacing Previous Version CDBR Braking Unit Models

The terminal size and location are different from the ones on the older models of the CDBR braking units (CDBR-□, CDBR-□B, CDBR-□C).

Refer to [Table 10](#) when replacing an older model CDBR Braking Units to ensure proper wiring.

**Table 10 Main Circuit Terminal Cross-reference Chart  
for New and Previous Version Model CDBR Braking Units**

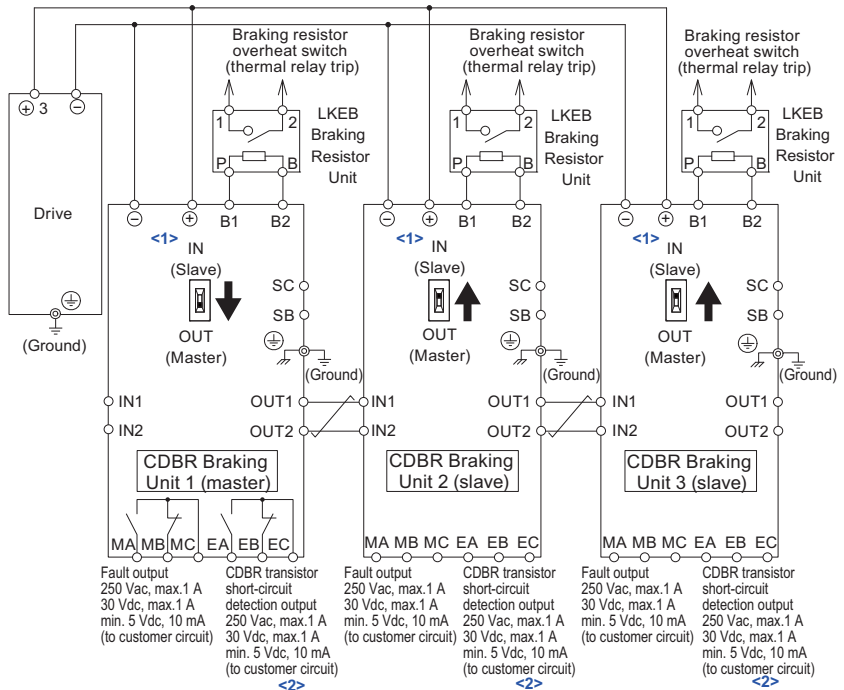
CDBR-□D	CDBR-□B, CDBR-□C	CDBR-□
⊖	⊖	N
⊕	⊕	P
B1	⊕ <sub>0</sub>	P <sub>0</sub>
B2	⊖ <sub>0</sub>	B

### ■ Using CDBR Braking Units in Parallel

Be sure to install multiple CDBR Braking Units in a master/slave configuration with a single CDBR Braking Unit as the master. [Figure 23](#) illustrates how to wire CDBR Braking Units in parallel.

**NOTICE:** Perform all wiring and installation as instructed below. 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 48](#) for details.
- Follow wire specifications when connecting the CDBR Braking Unit. Refer to [Table 9](#) for details.
- 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.



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

<2> Connect the CDBR transistor short-circuit detection output to disconnect main input power to the drive.

**Figure 23 Braking Units in Parallel**

**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

### ◆ Setting the CDBR Braking Unit

After completing drive and CDBR Braking Unit wiring, confirm the setting of the CDBR Braking Unit onboard switches.

**WARNING!** *Electrical Shock Hazard. Do not remove covers or touch the circuit boards while the power is on. Failure to comply could result in death or serious injury.*

**CAUTION!** *Burn Hazard. Do not touch a hot heatsink. Failure to comply could result in minor or moderate injury. To prevent burns, wait at least 15 minutes after power off and ensure the heatsink has cooled down.*

### ■ Braking Unit Enable Input Setting (S1, S4)

The braking unit will turn on only if SB-SC Enable Input is applied. Use the Sinking/Sourcing Switch (S1) to select sinking or sourcing mode for terminals SB-SC. When selecting the sourcing mode, an external 24 Vdc power supply is required.

Use switch S4, A or B setting for selecting N.O./N.C input type for SB-SC Enable Input terminals.

The default settings are sinking mode S1 = SINK, and normally open S4 = A.

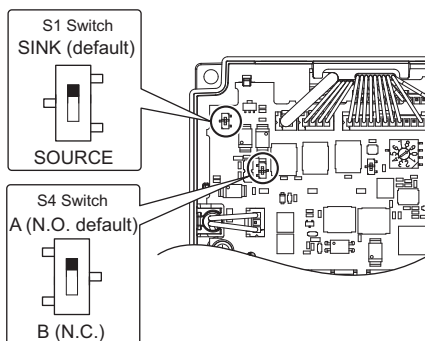


Figure 24 Setting Sink/Source Switch (S1) and N.O./N.C. Switch (S4)

## 7 Setting and Confirming CDBR Braking Unit Operation

Table 11 CDBR Enable/Disable Status

S1- SINK/SOURCE	S4-SB/SC Terminals N.O./N.C.	SB-SC-Enable	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 (0 V Common), Internal Power Supply

Position the switch S1 for sinking as shown in [Figure 25](#), when controlling the digital SB-SC inputs by NPN transistors (0 V common/sinking mode) or contacts using the drive internal power supply.

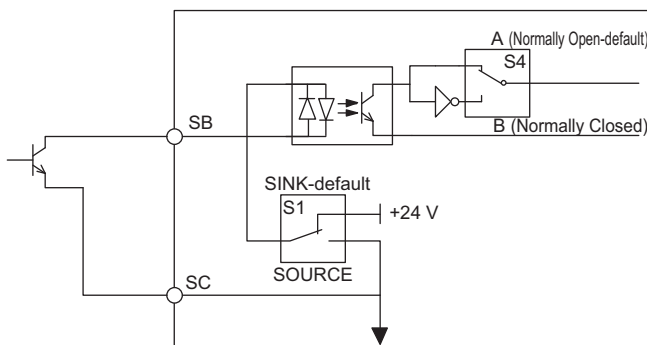


Figure 25 CDBR Braking Unit Sinking Mode using Internal Power Supply

Note: Refer to [Table 11](#) for CDBR Enable/Disable conditions.

## 7 Setting and Confirming CDBR Braking Unit Operation

### Source Mode (+24 V Common), Internal Power Supply

When controlling digital inputs by PNP transistors (+24 V common/sourcing mode) or contact inputs using the drive internal power supply, set switch S1 for sourcing as shown in [Figure 26](#).

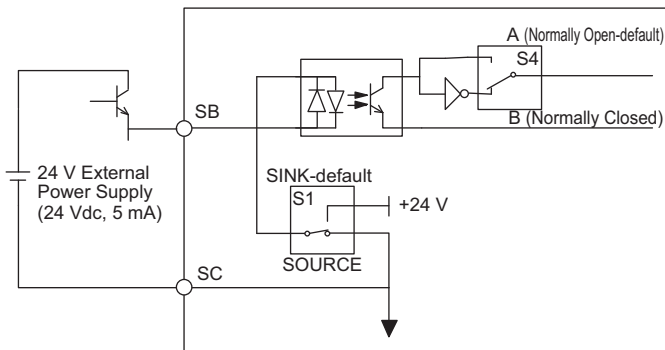


Figure 26 CDBR Braking Unit Sourcing Mode

**Note:** Refer to [Table 11](#) for CDBR Enable/Disable Conditions.

### ■ Master/Slave Selection Switch (S2)

The default setting of switch S2 is OUT (Master). Change the switch position only when operating the unit as a slave device.

Only the properly configured master CDBR should have S2 set to OUT (master). All other units in the circuit must have S2 set to IN (slave). Refer to [Using CDBR Braking Units in Parallel on page 44](#) for details.

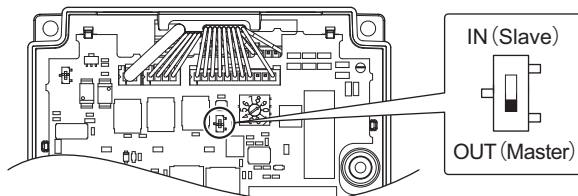


Figure 27 Master/Slave Selection Switch (S2)



## 7 Setting and Confirming CDBR Braking Unit Operation

### ■ CDBR Braking Start Voltage Switch (S3)

Set the braking start level voltage level switch S3 to match the power supply of the main circuit. The default S3 setting is 9. Refer to [Table 12](#) for details on S3 switch position and braking start voltage.

- Note:**
1. The setting does not typically require adjustment.
  2. Consider the amount of voltage fluctuation in the DC bus when changing S3 setting values. If the starting voltage is incorrectly set to a low value, applying power to the drive may activate the CDBR and overheat the braking resistor.
  3. Be sure to firmly click the switch into the proper position in accordance with the incoming power supply. A switch that is stuck in between positions may cause the CDBR to operate incorrectly.

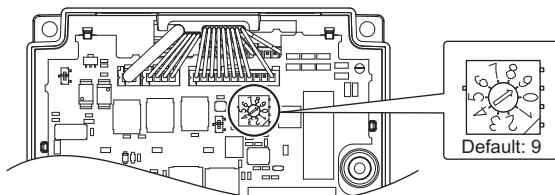


Figure 28 CDBR Voltage Activation Level, Switch (S3)

Table 12 Switch S3 Settings and Voltage Activation Levels

No.	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 < >	230	380 (TYP)	460	760 (TYP)	575	950 (TYP)

<|> Default Setting

## 7 Setting and Confirming CDBR Braking Unit Operation

### ■ Switch Layout

CDBR Braking Unit switch layout and settings are labeled on the back of the front cover.

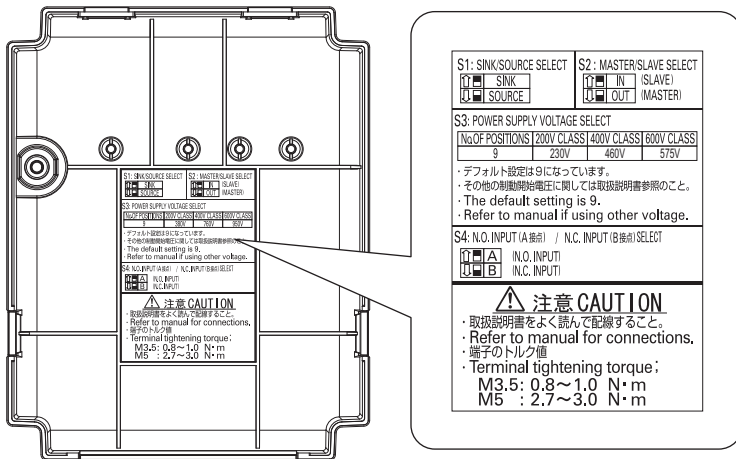


Figure 29 Switch Layout

### ◆ Confirming Proper Operation

**WARNING! Electrical Shock Hazard.** Turn on the power supply only after properly installing the front cover, and never remove the front cover while the power is on. Failure to comply could result in serious injury or death from electric shock.

Check that required motor deceleration characteristics can be obtained.

When the CDBR Braking Unit is in operation, the LEDs on the front cover will illuminate to confirm the operation state. Refer to [CDBR Braking Unit LED Display on page 16](#) for details on the different 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).	No CDBR braking unit is connected and the transistor for DC bus discharge in the drive is shorted.	Replace the drive.
	The transistor for DC bus discharge in the CDBR braking unit is shorted as indicated by contacts EA-EB-EC.	Replace the CDBR braking unit.
	CDBR braking unit switch S3 for the power supply voltage is set to the wrong position.	Set the 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 and 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 supply voltage increases momentarily.	Investigate the cause of high input voltage.
Fault output contacts MA-MB-MC changes states. Overvoltage (ov) may occur on drive: - CDBR heatsink over temperature - 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.	Use the correct combination of CDBR braking unit and LKEB braking resistor unit.
	Resistor is wired incorrectly	Check for proper resistance
	Ambient temperature exceeded 50°C. CDBR heatsink is too hot.	Reduce the ambient temperature.
	The CDBR braking unit is damaged.	Replace the CDBR braking unit.
The fault contact on the CDBR braking unit closed momentarily when input power was applied.	No braking resistor (LKEB braking resistor unit) is installed.	Install a braking resistor (LKEB braking resistor unit).

## 8 Troubleshooting

Problems	Cause	Possible Solution
<p>The CDBR braking unit is not operating.</p>	<ul style="list-style-type: none"> <li>• A master unit is incorrectly set to be a slave device and there is no master unit.</li> <li>• Incorrect braking activation switch position.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the CDBR braking unit Master/Slave switch S2 and make sure it is properly set. The master LED (green) should be illuminated on the master CDBR unit.</li> <li>• Check brake activation level switch S3 for proper setting.</li> <li>• Observe the Master and Slave LEDs (only if slave units are used). The LEDs should blink when the CDBR is activating.</li> </ul>
	<p>The braking unit is damaged.</p>	<p>Replace the CDBR braking unit.</p>

# 9 CDBR Braking Unit and LKEB Braking Resistor Selection

### ■ CDBR Braking Unit and LKEB Braking Resistor Selection

Selecting a CDBR Braking Unit and LKEB Braking Resistor Unit is based on application-specific requirements and the selected AC drive. **Table 13** is an example selection matrix for A1000 model drives. Refer to the local catalog for selections based on other drive models.

**Table 13 CDBR Braking Unit and LKEB Braking Resistor Selection**  
(Example: A1000)

A1000	Drive Duty <1>	Max. Applicable Motor kW (HP)	Braking Unit		Braking Resistor Unit (Duty Rating: 10% ED, 10 s max.) <2>					Min. Connectable Resistance (Ω) <4>
			CDBR-	Qty	LKEB-	Resistor Specification (per unit)	Qty	Connection Diagram	Braking Torque (%) <3>	
<b>200 V class</b>										
2A0004	HD	0.4 (0.75)	built-in	A	20P7	70 W 200 Ω	1	A	220	48
	ND	0.75 (1)			20P7	70 W 200 Ω	1		125	48
2A0006	HD	1.1 (2)			20P7	70 W 200 Ω	1		85	48
	ND				21P5	260 W 100 Ω			150	
2A0008	HD	1.5 (2)			21P5	260 W 100 Ω	1		125	48
	ND				22P2	260 W 70 Ω	1		120	48
2A0010	HD	2.2 (3)							23P7	390 W 40 Ω
	ND				16					
2A0012	HD	3.0 (3)			23P7	390 W 40 Ω	1		150	16
	ND								125	16
2A0018	HD	3.7 (5)			25P5	520 W 30 Ω	1		115	16
	ND								27P5	780 W 20 Ω
2A0021	HD	5.5 (7.5)			2011	2400 W 13.6 Ω	1			
	ND								9.6	
2A0030	HD	7.5 (10)			2015	3000 W 10 Ω	1		125	9.6
	ND								9.6	
2A0040	HD	11 (15)			2015	3000 W 10 Ω	1		100	9.6
	ND								9.6	
2A0056	HD	15 (20)			2015	3000 W 10 Ω	1		100	9.6
	ND								9.6	
2A0069	HD	18.5 (25)	2015	3000 W 10 Ω	1	100	9.6			
	ND					9.6				

## 9 CDBR Braking Unit and LKEB Braking Resistor Selection

A1000	Drive Duty <1>	Max. Applicable Motor kW (HP)	Braking Unit		Braking Resistor Unit (Duty Rating: 10% ED, 10 s max.) <2>					Min. Connectable Resistance (Ω) <4>			
			CDBR-	Qty	LKEB-	Resistor Specification (per unit)	Qty	Connection Diagram	Braking Torque (%) <3>				
2A0081	HD	18.5 (25)	built-in		2015	3000 W 10 Ω	1	A	100	9.6			
	ND	22 (30)			2015	3000 W 10 Ω	1		85	9.6			
2A0110	HD				30 (40)	2022	4800 W 6.8 Ω		1	125	6.4		
	ND	2022				4800 W 6.8 Ω	1			90	6.4		
2A0138	HD	37 (50)			2022	4800 W 6.8 Ω	1		70	6.4			
	ND				2037D	1	2015		3000 W 10 Ω	2	100	5.0	
2A0169	HD	45 (60)	2037D	1	2015	3000 W 10 Ω	2	80	5.0				
	ND		2022D	2	2022	4800 W 6.8 Ω		120	5.0				
2A0211	HD	55 (75)	2022D	2	2022	4800 W 6.8 Ω	2	C	100	5.0			
	ND								2022	4800 W 6.8 Ω	3	110	1.6
2A0250	HD	75 (100)	<3>		2022	4800 W 6.8 Ω	4	D	120	1.6			
	ND								2018	4800 W 8 Ω	5	100	1.6
2A0312	HD	90 (125)			2022	4	4800 W 6.8 Ω		4	120	1.6		
	ND											2018	4800 W 8 Ω
2A0360	HD	110 (150)			2022D	2	2022		4800 W 6.8 Ω	2	C	100	5.0
	ND											2022	4800 W 6.8 Ω
2A0415	HD	110 (150)	2022D	2	2022	4800 W 6.8 Ω	2	C	100	5.0			
	ND								2022	4800 W 6.8 Ω	3	110	1.6
<b>400 V class</b>													
4A0002	HD	0.4 (0.75)	built-in		40P7	70 W 750 Ω	1	A	230	96			
	ND	0.75 (2)									40P7	70 W 750 Ω	1
4A0004	HD				1.5 (3)	41P5	260 W 400 Ω		1	125			
	ND	42P2									260 W 250 Ω	1	135
4A0005	HD				2.2 (3)	42P2	260 W 250 Ω		1	100			
	ND	43P7									390 W 150 Ω	1	150
4A0007	HD				3.0 (3)	43P7	390 W 150 Ω		1	135			
	ND	45P5									520 W 100 Ω	1	135
4A0009	HD				3.7 (5)	43P7	390 W 150 Ω		1	135			
	ND	47P5									780 W 75 Ω	1	130
4A0011	HD				5.5 (7.5)	45P5	520 W 100 Ω		1	135			
	ND	47P5									780 W 75 Ω	1	130
4A0018	HD				7.5 (10)	47P5	780 W 75 Ω		1	130			
	ND	47P5									780 W 75 Ω	1	130

## 9 CDBR Braking Unit and LKEB Braking Resistor Selection

A1000	Drive Duty <1>	Max. Applicable Motor kW (HP)	Braking Unit		Braking Resistor Unit (Duty Rating: 10% ED, 10 s max.) <2>					Min. Connectable Resistance (Ω) <4>			
			CDBR-	Qty	LKEB-	Resistor Specification (per unit)	Qty	Connection Diagram	Braking Torque (%) <3>				
4A0023	HD	7.5 (10)	built-in		47P5	780 W 75 Ω	1	A	130	32			
	ND	11 (15)			4011	1040 W 50 Ω	1		135	32			
4A0031	HD				15 (20)	4015	1560 W 40 Ω		1	125	20		
	ND												
4A0038	HD	18.5 (25)			4018	4800 W 32 Ω	1		125	20			
	ND												
4A0044	HD	22 (30)			4022	4800 W 27.2 Ω	1		125	19.2			
	ND												
4A0058	HD	30 (40)			4030	6000 W 20 Ω	1		125	19.2			
	ND												
4A0072	HD	37 (50)			4030	6000 W 20 Ω	1		100	19.2			
	ND												
4A0088	HD	45 (60)			4045D	1	4037		9600 W 16 Ω	1	B	125	12.8
	ND												
4A0103	HD	55 (75)			4045D	1	4045		9600 W 13.6 Ω	1	B	125	12.8
	ND												
4A0139	HD	75 (100)	4030D	2	4030	6000 W 20 Ω	2	C	135	12.8			
	ND												
4A0165	HD	90 (125)	4045D	2	4045	9600 W 13.6 Ω	2	C	145	12.8			
	ND												
4A0208	HD	110 (150)	<5>		4045	9600 W 13.6 Ω	2	D	120	12.8			
	ND												
4A0250	HD	132 (200)	<5>		4030	6000 W 20 Ω	3	D	100	3.2			
	ND												
4A0296	HD	160 (250)	<5>		4045	9600 W 13.6 Ω	4	D	150	3.2			
	ND												
4A0362	HD	185 (300)	<5>		4045	9600 W 13.6 Ω	4	D	140	3.2			
	ND												
4A0414	HD	220 (350)	<5>		4045	9600 W 13.6 Ω	4	D	120	3.2			
	ND												
4A0515	HD	250 (400)	<5>		4037	9600 W 16 Ω	5	D	110	3.2			
	ND												
					4037	9600 W 16 Ω	5		90	3.2			

## 9 CDBR Braking Unit and LKEB Braking Resistor Selection

A1000	Drive Duty <1>	Max. Applicable Motor kW (HP)	Braking Unit		Braking Resistor Unit (Duty Rating: 10% ED, 10 s max.) <2>					Min. Connectable Resistance (Ω) <4>			
			CDBR-	Qty	LKEB-	Resistor Specification (per unit)	Qty	Connection Diagram	Braking Torque (%) <3>				
4A0675	HD	315 (450)	<5>		4045	9600 W 13.6 Ω	6	D	100	3.2			
	ND	355 (550)			4045	9600 W 13.6 Ω	8		120	3.2			
4A0930	HD	450 (650)			4037	9600 W 16 Ω	10		100	3.2			
	ND	500 (750)			4037	9600 W 16 Ω	10		90	3.2			
4A1200	HD	560 (900)			4037	9600 W 16 Ω	15		120	3.2			
	ND	630 (1000)			4037	9600 W 16 Ω	15		100	3.2			
<b>600 V class</b>													
5A0003	HD	0.75(1)			built-in		<6>		201W 400 Ω	1	A	150	150
5A0003	ND		134W 575 Ω	1				100	150				
5A0004	HD	1.5(2)	201W 400 Ω	1				150	150				
5A0003	ND		134W 575 Ω	1				100	150				
5A0006	HD	2.2(3)	302W 260 Ω	1				150	150				
5A0004	ND		201W 400 Ω	1				100	150				
5A0006	HD	3.7(5)	336W 235 Ω	1				100	150				
5A0009	HD		504W 160 Ω	1				150	130				
5A0009	ND	5.5(7.5)	504W 150 Ω	1				100	130				
5A0011	HD		755W 100 Ω	1				150	90				
5A0011	ND	7.5(10)	671W 120 Ω	1				100	90				
5A0017	HD		1007W 80 Ω	1				150	65				
5A0017	ND	11(15)	1007W 78 Ω	1				100	65				
5A0022	HD		1511W 52 Ω	1				150	44				
5A0022	ND	15(20)	1343W 59 Ω	1				100	44				
5A0027	HD		2014W 39 Ω	1				150	32				
5A0027	ND	18.5(25)	1679W 47 Ω	1				100	32				
5A0032	HD		2518W 32 Ω	1				150	29				
5A0032	ND	22(30)	2014W 39 Ω	1				100	29				
5A0041	HD		3021W 26 Ω	1				150	15				
5A0041	ND	30(40)	4165W 21.25 Ω	1				100	15				
5A0052	HD		<7>	150				15					
5A0052	ND	37(50)	1679W 47 Ω	1				100	15				
5A0062	HD		5037D	1				B	150	23.8			
5A0062	ND	5037D	2	150					23.8				
5A0077	HD		45(60)	5440W 27.2 Ω					2	150		23.8	



## 9 CDBR Braking Unit and LKEB Braking Resistor Selection

A1000 CIMR-A□	Drive Duty <1>	Max. Applicable Motor kW (HP)	Braking Unit		Braking Resistor Unit (Duty Rating: 10% ED, 10 s max.) <2>				Min. Connectable Resistance (Ω) <4>					
			CDBR-	Qty	LKEB-	Resistor Specification (per unit)	Qty	Connection Diagram		Braking Torque (%) <3>				
5A0077	ND	55(75)	<5>	<6>	<6>	7098W 10.5 Ω	1	<6>	150	9.5				
5A0099	HD					10,866W 4.2 Ω	1		150	3.8				
5A0099	ND	75(100)				13,542W 3.2 Ω	1		150	3.8				
5A0125	HD					14,060W 5.2 Ω	1		150	3.8				
5A0125	ND	90(125)				17,203W 4.2 Ω	1		150	3.8				
5A0145	HD					13,542W 3.2 Ω	2		150	3.8				
5A0145	ND	110(150)				<5>	<6>		<6>	7098W 10.5 Ω	1	<6>	150	9.5
5A0192	HD									10,866W 4.2 Ω	1		150	3.8
5A0192	ND	160(200)								13,542W 3.2 Ω	1		150	3.8
5A0242	HD									14,060W 5.2 Ω	1		150	3.8
5A0242	ND	185(250)	17,203W 4.2 Ω	1	150			3.8						
5A0242	HD		13,542W 3.2 Ω	2	150			3.8						

<1> Refer to the drive manual for details on Normal Duty (ND)/Heavy Duty (HD).

<2> Refers to a motor decelerating with constant torque. Applications requiring braking while operating at constant speed will reduce the duty factor.

<3> Applications with a relatively large amount of regenerative power (elevators, etc.) may require more braking power than is possible with only the standard CDBR Braking Unit and LKEB Braking Resistor Unit. Contact Yaskawa for information if braking torque exceeds the value shown.

<4> Assumes the use of a single CDBR Braking Unit. The CDBR Braking Unit should have a resistance higher than the minimum connectable resistance value and be able to generate enough braking torque to stop the motor.

<5> Contact your Yaskawa representative for availability.

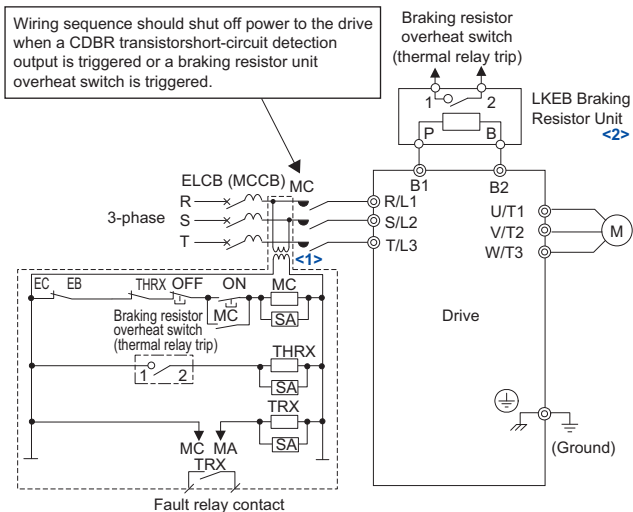
<6> Contact Yaskawa or your Yaskawa agent for selection of braking resistor units.

<7> Make the connection braking resistor unit to parallel the resistors to change resistance from 42.5 Ω to 21.25 Ω.

## 9 CDBR Braking Unit and LKEB Braking Resistor Selection

### ◆ CDBR Braking Unit Fault Circuit Connection Diagrams

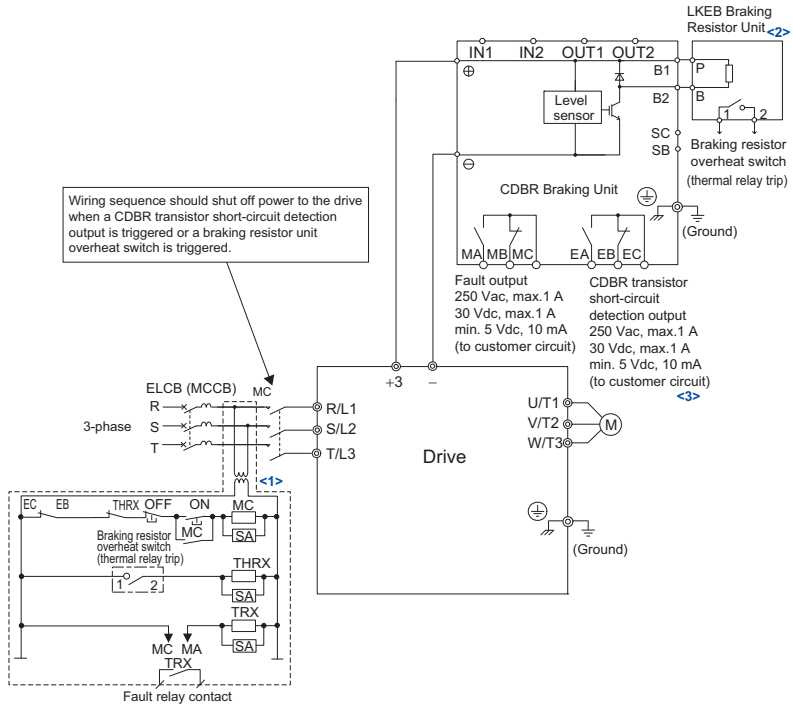
**Note:** When connecting a separately-installed type LKEB Braking Resistor Unit to drives with a built-in braking transistor (200 V/400 V/600 V 30 kW or less), connect the B1 terminal of the drive to the positive terminal of the LKEB Braking Resistor Unit and connect the negative terminal of the drive to the negative terminal of the LKEB Braking Resistor Unit. The B2 terminal is not used in this example.



**Figure 30 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. The motor may not stop within the deceleration time if this setting is not changed.

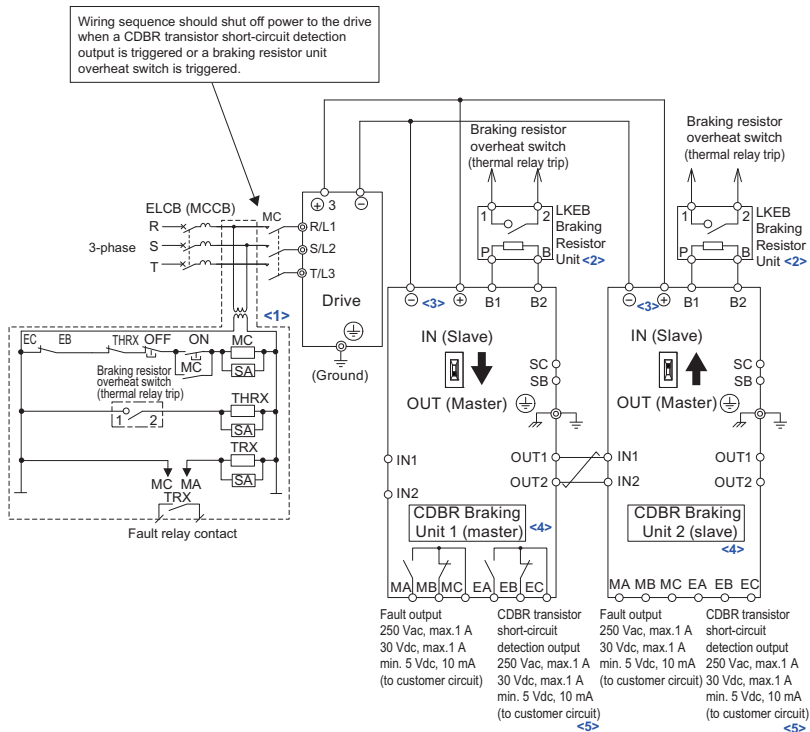
## 9 CDBR Braking Unit and LKEB Braking Resistor Selection



**Figure 31 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. The motor may not stop within the deceleration time if this setting is not changed.
- <3> Connect the CDBR transistor short-circuit detection output to disconnect main input power to the drive.

## 9 CDBR Braking Unit and LKEB Braking Resistor Selection

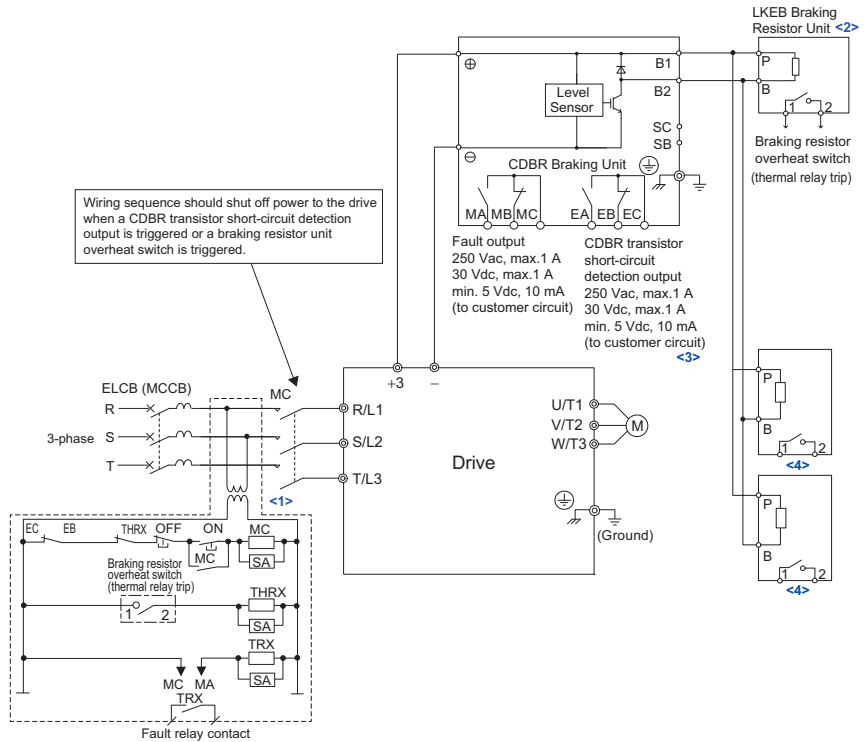


**Figure 32** Fault Circuit Connection Diagram C (CDBR Braking Unit in parallel)

- <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. The motor may not stop within the deceleration time if this setting is not changed.
- <3> Connect directly to the drive terminal or install a terminal block.
- <4> When using more than one CDBR Braking Unit connected in parallel, set one of the CDBR Braking Units as the master, and set the others as slaves.
- <5> Connect the CDBR transistor short-circuit detection output 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-□ or CDBR-□B)

## 9 CDBR Braking Unit and LKEB Braking Resistor Selection



**Figure 33 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. The motor may not stop within the deceleration time if this setting is not changed.
- <3> Connect the CDBR transistor short-circuit detection output to disconnect main input power to the drive.
- <4> When connecting multiple CDBR braking units, wire the thermal relay trip contacts in parallel.

## 10 Specifications

**Table 14 Specifications**

Voltage Class		200 V Class		400 V Class		600 V Class	
Model CDBR-□D		2022	2037	4030	4045	5037	
Applicable Motor Output Capacity (kW)		22	37	30	45	37	
Output	Peak Discharge Current (A) (10% ED, 10 s)	60	80	40	60	40	
	Continuous Rated Discharge Current (A)	20	24	15	18	15	
	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 meters without derating; up to 3000 m with drive output and current derating. Contact Yaskawa or your nearest sales representative for details.					
	Ambient Temperature	-10 to +50°C (IP00, IP20) -10 to +40°C (NEMA Type 1)					
	Storage Temperature	-20 to +60°C					
	Humidity	95 RH% or less (no condensation)					
	Vibration / Shock	10 to 20 Hz: 9.8 m/s <sup>2</sup> 20 to 55 Hz: 5.9 m/s <sup>2</sup>					
Standards		UL508C, CE <2>, RoHS					
Protection Design		IP00 enclosure, IP20 enclosure					
Watt Loss (W)		27	38	24	36	24	

<1> Adjustable by ten incremental steps.

<2> Not available for 600 V class models.

## ◆ Revision History

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

MANUAL NO. TOBP C720600 01A

Published in Japan November 2011 11-11 ◇

Date of Publication	Revision Number	Section	Revised Content
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: Review and corrected entire documentation.
November 2011	–	–	First Edition

# YASKAWA AC Drive 1000-Series 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.

Specifications are subject to change without notice for ongoing product modifications and improvements.

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MANUAL NO. TOBP C720600 01B

Published in Japan May 2012 11-11 -0  
11-12-7