YASKAWA

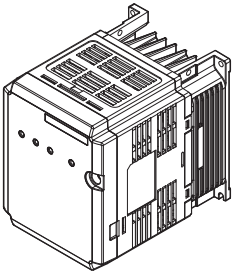
YASKAWA AC Drive 1000-Series Option

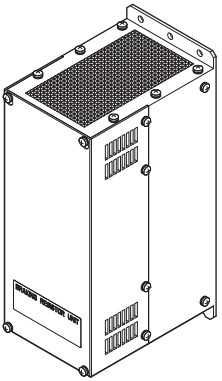
Braking Unit, Braking Resistor Unit

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.





MANUAL NO. TOBP C720600 01C

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Table of Contents

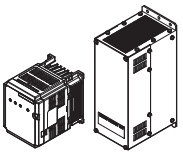
1 PREFACE AND SAFETY 4
2 PRODUCT OVERVIEW 9
3 RECEIVING. 11
4 CDBR BRAKING UNIT COMPONENTS 12
5 MECHANICAL INSTALLATION. 19
6 ELECTRICAL INSTALLATION 38
7 SETTING AND CONFIRMING CDBR BRAKING UNIT OPERATION 54
8 TROUBLESHOOTING 59
9 CDBR BRAKING UNIT AND LKEB BRAKING RESISTOR SELECTION. 61
10 SPECIFICATIONS 70

1 Preface and Safety

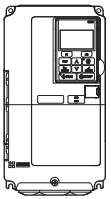
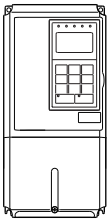
◆ Applicable Documentation

The following manuals are available for the option:

CDBR Braking Unit, LKEB Braking Resistor Unit

	**YASKAWA AC Drive 1000-Series Option Braking Unit, Braking Resistor Unit Installation Manual Manual No: TOBP C720600 01 (This book)**	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. This manual is available for download on our documentation website, http://www.e-mechatronics.com.

Drive

	**YASKAWA AC Drive 1000-Series Quick Start Guide**	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.: http://www.yaskawa.com Europe: http://www.yaskawa.eu.com Japan: http://www.e-mechatronics.com For questions, contact your local Yaskawa sales office or the nearest Yaskawa representative.
	YASKAWA AC Drive 1000-Series Technical Manual	
	**General Purpose Inverter (Advanced Vector Control) Varispeed G7 Safety Precautions**	
	General Purpose Inverter (Advanced Vector Control) Varispeed G7 Instruction Manual	

◆ Terms

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

Drive: YASKAWA AC Drive 1000-Series, Varispeed G7-Series

Option: YASKAWA AC Drive 1000-Series Option CDBR Braking Unit, LKEB Braking Resistor Unit

◆ 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.
- 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 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.

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***.

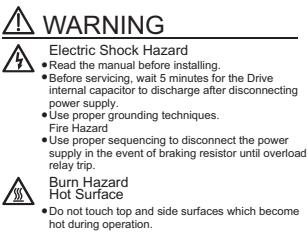


Figure 1 Warning Information

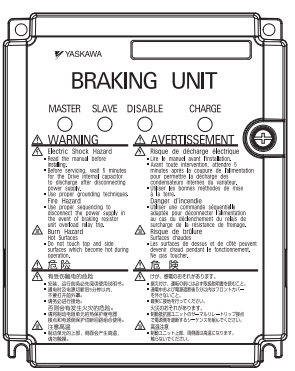


Figure 2 Warning Information Position

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 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
Varispeed G7	CIMR-G7☐2018 to 2110 CIMR-G7☐4018 to 4300

■ 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	
H1000	
Varispeed G7	

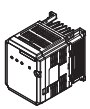
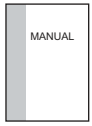
3 Receiving

Please perform the following tasks upon receiving the option:

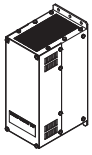
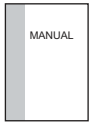
- Inspect the option for damage. Contact the shipper immediately if the option appears damaged upon receipt.
- Verify receipt of the correct model by checking the model number printed on the option nameplate. (Refer to *Figure 5* on page *14* for more information)
- Contact your supplier if you have 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

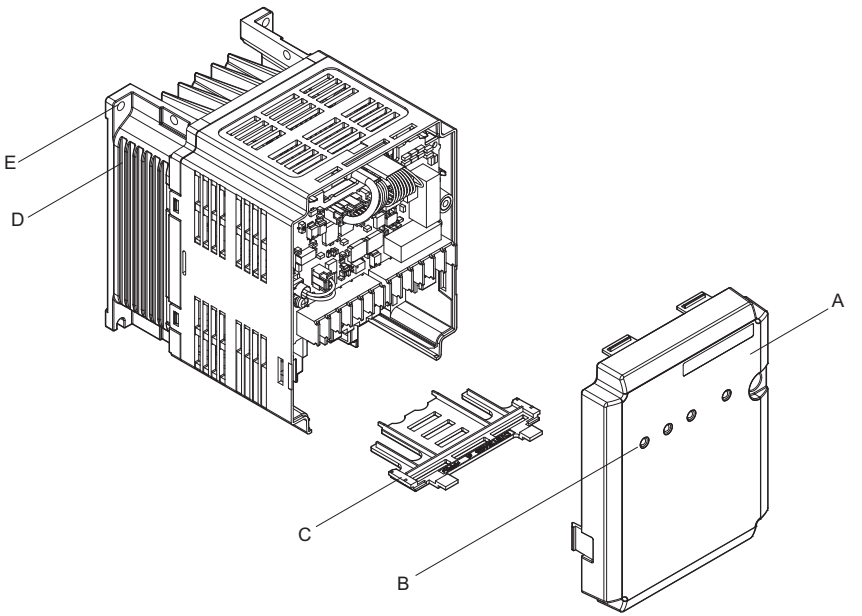
◆ Tools Required for Installation

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.

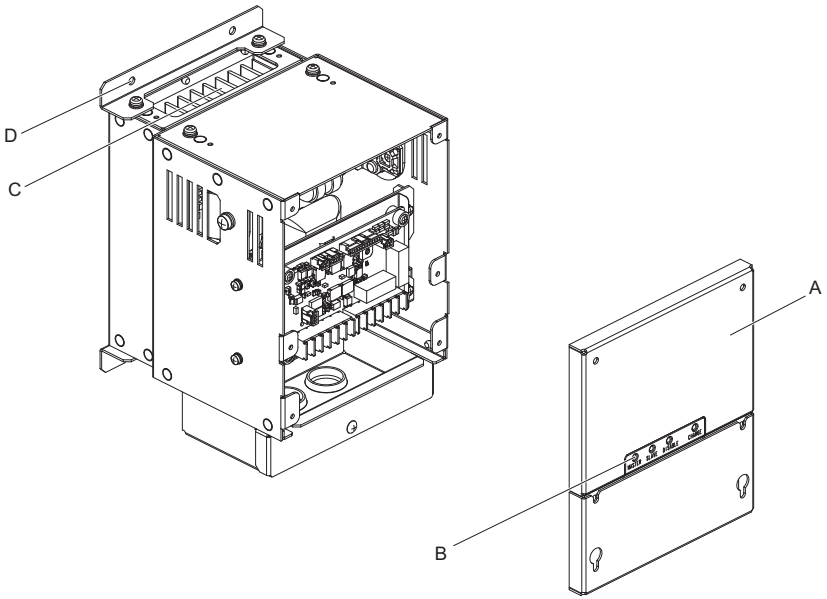
4 CDBR Braking Unit Components

◆ CDBR Braking Unit



A – Front Cover
B – LED Display (Refer to page *18* for details)
C – Bottom Cover
D – Heatsink
E – Installation Hole

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



A – Front Cover
B – LED Display (Refer to page *18* for details)
C – Heatsink
D – Installation Hole

Figure 4 CDBR Braking Unit Components (Example: CDBR-2055D)

◆ Option Nameplate

■ CDBR Braking Unit

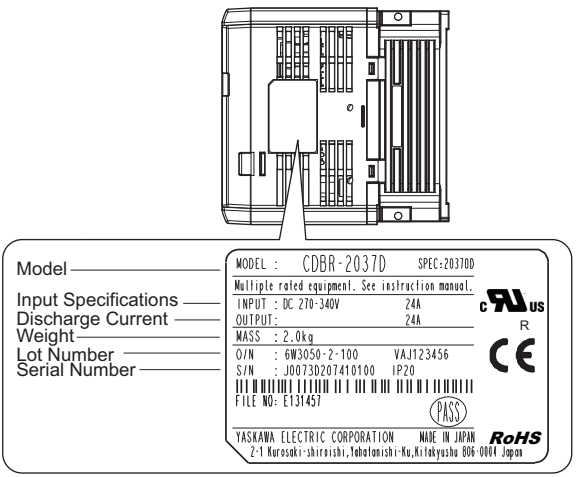


Figure 5 Nameplate Example (CDBR Braking Unit)

■ LKEB Braking Resistor Unit

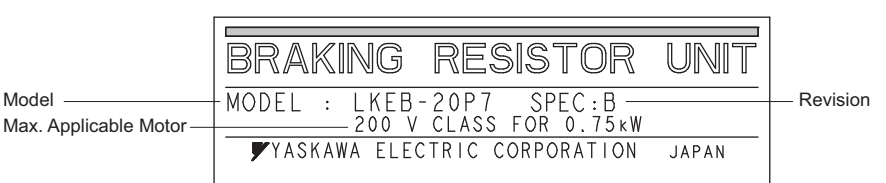
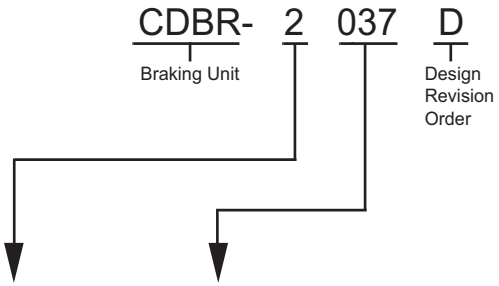


Figure 6 Nameplate Example (LKEB Braking Resistor Unit)

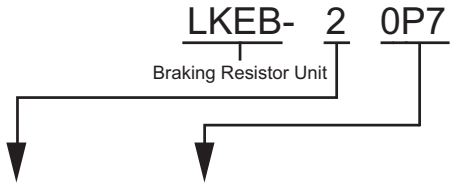
◆ Model Number

■ CDBR Braking Unit



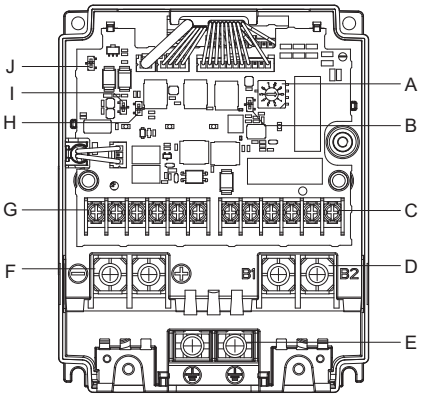
Voltage Class		No.	Max. Motor Capacity kW (HP)	Rated Discharge Amps	Maximum Discharge Amps Peak 10% Duty
2	200 V	022	22 (30)	20	60
		037	37 (50)	24	80
		055	55 (74)	40	120
		110	110 (148)	80	250
4	400 V	030	30 (40)	15	40
		045	45 (60)	18	60
		090	90 (121)	30	100
		220	220 (295)	80	250
5	600 V	037	37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

■ 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

◆ CDBR Braking Unit Front Views



A – Braking Activation Voltage Rotary Switch (S3)

B – Master/Slave Selection DIP Switch (S2)

C – Control Circuit Terminals (TB2)

D – Main Circuit Terminals (B1, B2)

E – Grounding Terminal

F – ⊕ and ⊖ Main Circuit Terminals (TB3)

G – Control Circuit Terminals (TB1)

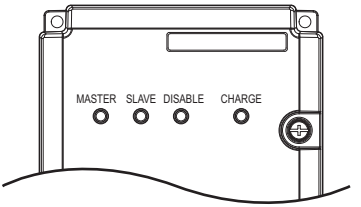
H – Fault Relay Enable/Disable DIP Switch (S5) Note: Available from Rev. B or later.

I – N.O./N.C. DIP Switch (S4)

J – Sink/Source DIP Switch (S1)

Figure 7 Front View of CDBR Braking Unit

◆ 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 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.

◆ Installation Environment

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

Environment	Conditions
Installation Area	Indoors
Ambient Temperature	IP00, IP20: -10 to +50°C (14 to +122°F) NEMA 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: • 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 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 (167°F)).

◆ Installation Orientation

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

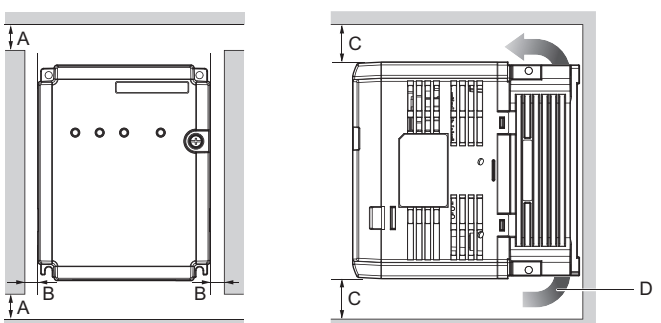


Figure 8 Correct Installation Orientation (Braking Unit)

◆ Installation Spacing

Figure 9, *Figure 10*, and *Figure 11* show the installation distance required to maintain sufficient space for airflow and wiring.

■ CDBR Braking Unit Spacing

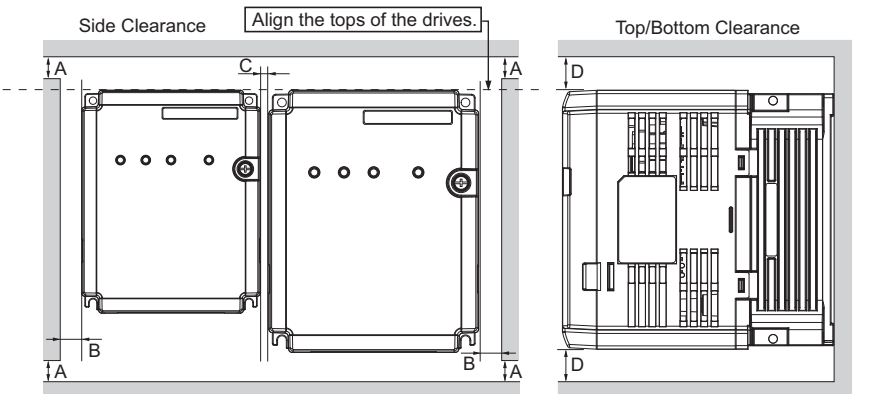


A – 50 mm (2.0 in) minimum
B – 30 mm (1.2 in) minimum
C – 100 mm (3.9 in) minimum
D – Airflow direction

Figure 9 CDBR Braking Unit Installation Spacing

Multiple Drive Installation (Side-by-Side Installation)

When installing multiple drives into the same enclosure panel, mount the drives according to *Figure 9*.



A – 50 mm (1.97 in) minimum
B – 30 mm (1.18 in) minimum
C – 2 mm (0.08 in) minimum
D – 120 mm (4.72 in) minimum

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

■ LKEB Braking Resistor Unit Spacing

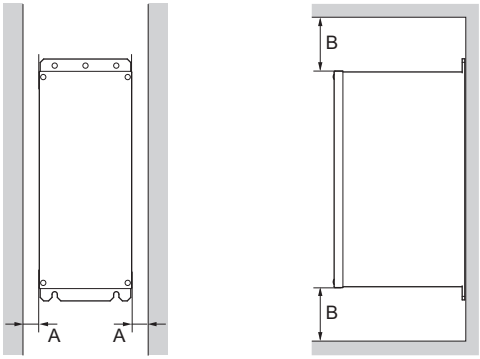


Figure 11 LKEB Braking Resistor Unit Installation Spacing

Table 3 Correct LKEB 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)

◆ Exterior Dimensions

■ CDBR Braking Unit

IP20

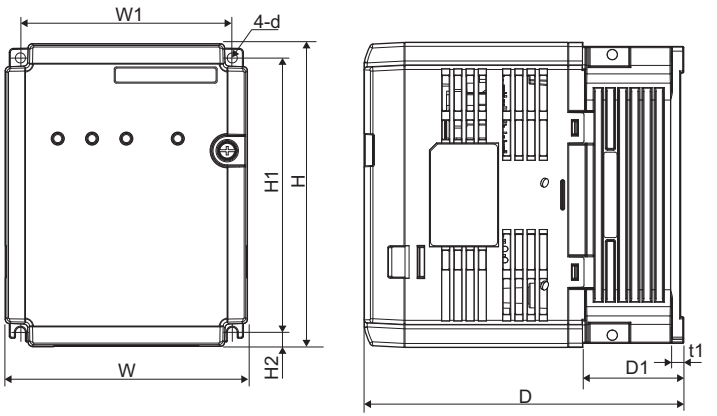


Table 4 Dimensions for CDBR Braking Unit (IP20)

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

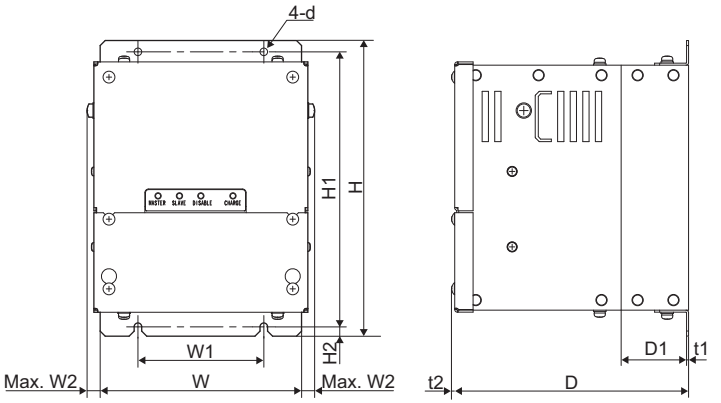


Figure 1

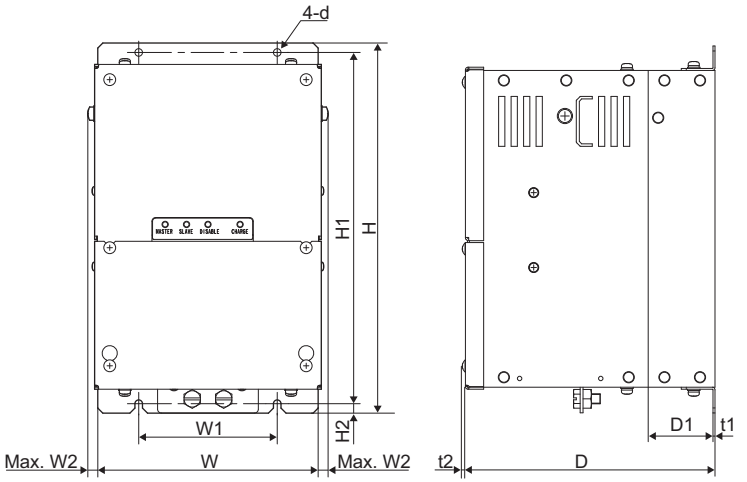


Figure 2

Table 5 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													

NEMA Type 1

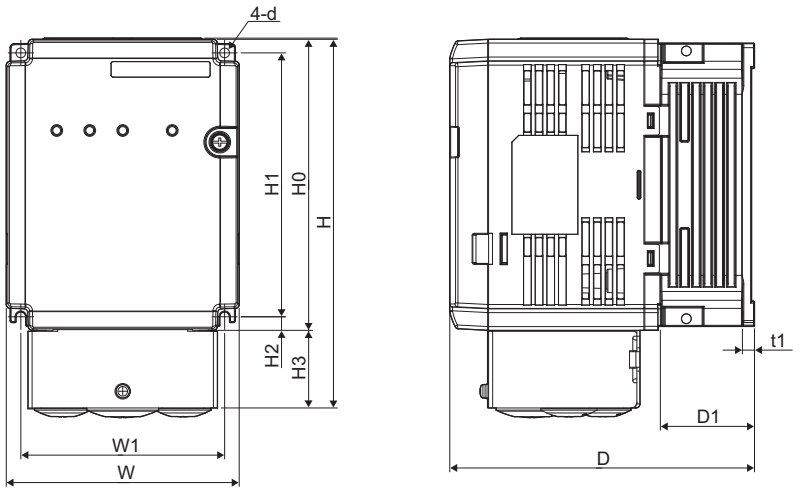


Figure 1

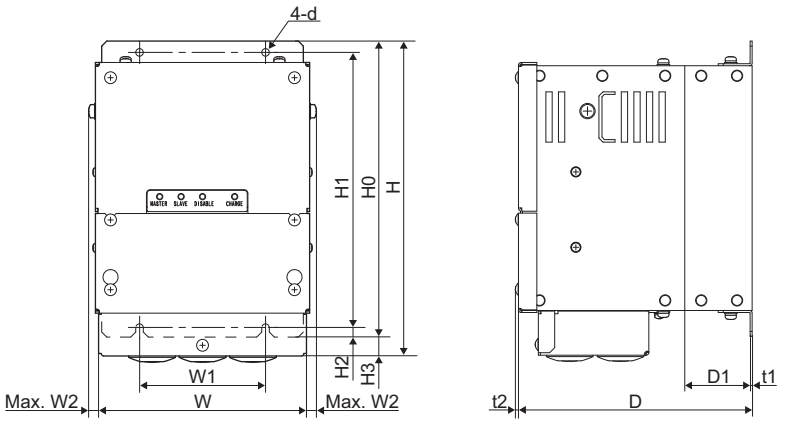


Figure 2

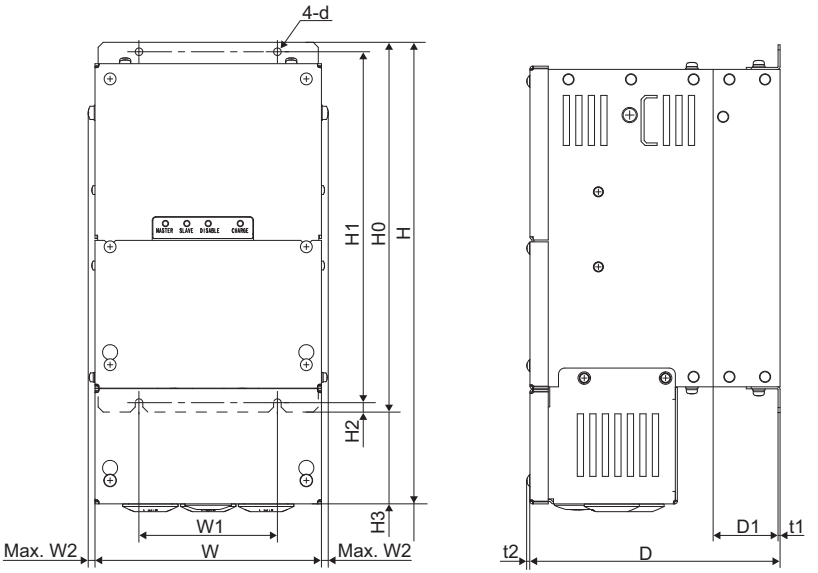


Figure 3

Table 6 Dimensions for CDBR Braking Unit (NEMA 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 (4.72)	190 (7.48)	157 (6.18)	105 (4.13)	–	150 (5.90)	136 (5.35)	7 (0.28)	40 (1.57)	48 (1.89)	6 (0.24)	–	M4	2.3 (5.07)
2037D															
2055D	2	165 (6.50)	250 (9.84)	185.9 (7.32)	100 (3.94)	7.9 (0.31)	235 (9.25)	218.5 (8.60)	7.5 (0.30)	15 (0.59)	53.6 (2.11)	1.6 (0.06)	2.5 (0.10)	M5	5.9 (13.01)
2110D	3	180 (7.09)	367 (14.45)	200 (7.87)	110 (4.33)	5.4 (0.21)	294 (11.57)	279 (10.98)		73 (2.87)	53.5 (2.11)				8.3 (18.30)
4030D	1	120 (4.72)	190 (7.48)	157 (6.18)	105 (4.13)	–	150 (5.90)	136 (5.35)	7 (0.28)	40 (1.57)	48 (1.89)	6 (0.24)	–	M4	2.3 (5.07)
4045D															
4090D	2	165 (6.50)	250 (9.84)	185.9 (7.32)	100 (3.94)	7.9 (0.31)	235 (9.25)	218.5 (8.60)	7.5 (0.30)	15 (0.59)	53.6 (2.11)	1.6 (0.06)	2.5 (0.10)	M5	5.9 (13.01)
4220D	3	180 (7.09)	367 (14.45)	200 (7.87)	110 (4.33)	5.4 (0.21)	294 (11.57)	279 (10.98)		73 (2.87)	53.5 (2.11)				8.3 (18.30)
5037D	1	120 (4.72)	190 (7.48)	157 (6.18)	105 (4.13)	–	150 (5.90)	136 (5.35)	7 (0.28)	40 (1.57)	48 (1.89)	6 (0.24)	–	M4	2.3 (5.07)
5110D	2	180 (7.09)	367 (14.45)	200 (7.87)	110 (4.33)	5.4 (0.21)	294 (11.57)	279 (10.98)	7.5 (0.30)	73 (2.87)	53.5 (2.11)	1.6 (0.06)	2.5 (0.10)	M5	8.3 (18.30)
5300D	3														

■ LKEB Braking Resistor Unit Dimensions

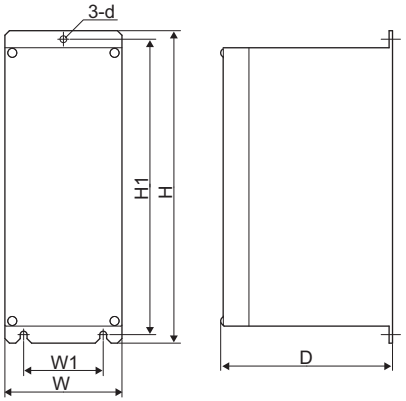


Figure 1

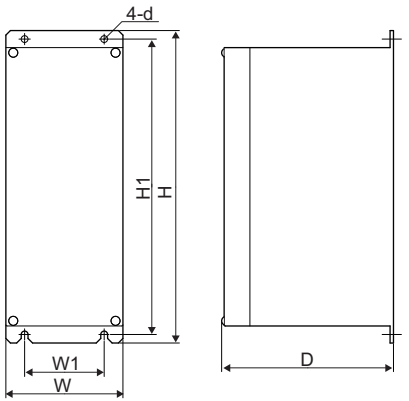


Figure 2

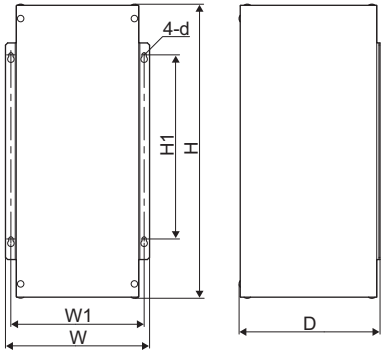


Figure 3

Table 7 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								
23P7								5.0 (11.0)
25P5		250 (9.84)			200 (7.87)		M6	7.5 (16.5)
27P5								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)			336 (13.23)			15 (33.0)
2018		446 (17.56)			426 (16.77)			19 (41.8)
2022								

Table 8 Dimensions for LKEB Braking Resistor Unit (400 V)

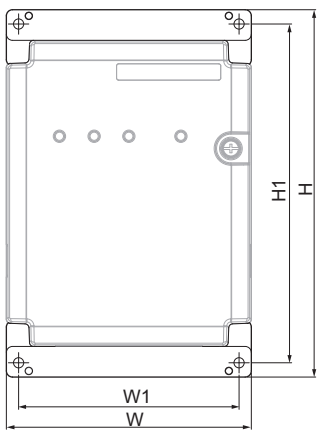
Model LKEB-	Figure	Dimensions mm (in)						Weight kg (lb)
		W	H	D	W1	H1	d	
40P7	1	105 (4.13)	275 (10.83)	150 (5.91)	50 (1.97)	260 (10.24)	M5	3.0 (6.6)
41P5	2	130 (5.12)	350 (13.78)		75 (2.95)	335 (13.19)		4.5 (9.9)
42P2								
43P7								5.0 (11.0)
45P5		250 (9.84)			200 (7.87)		M6	7.5 (16.5)
47P5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

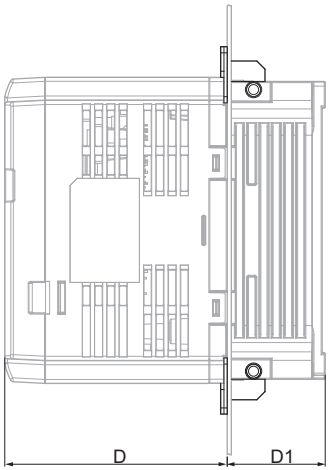
◆ Attachment

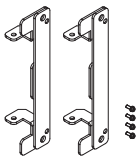
■ External Heatsink Attachment

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

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							

Panel Cutout Dimensions

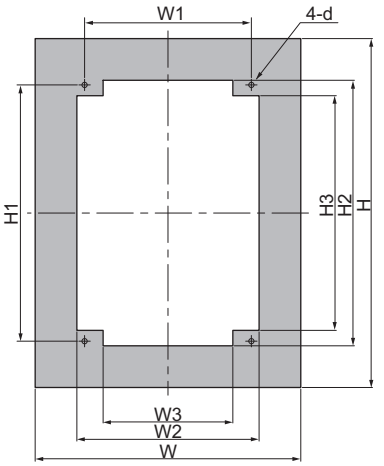


Figure 1

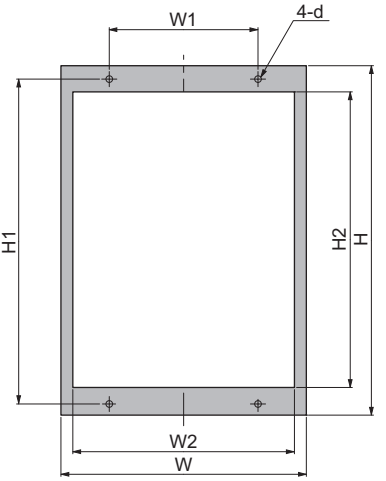


Figure 2

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										
2110D		175 (6.89)	294 (11.57)	110 (4.33)	159 (6.26)		279 (10.98)	257.8 (10.15)		
4220D										
5110D										
5300D										

■ 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.

Dimensions

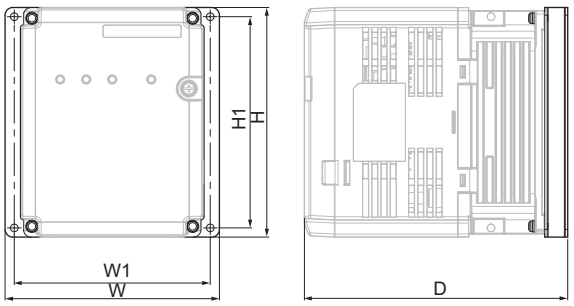


Figure 1

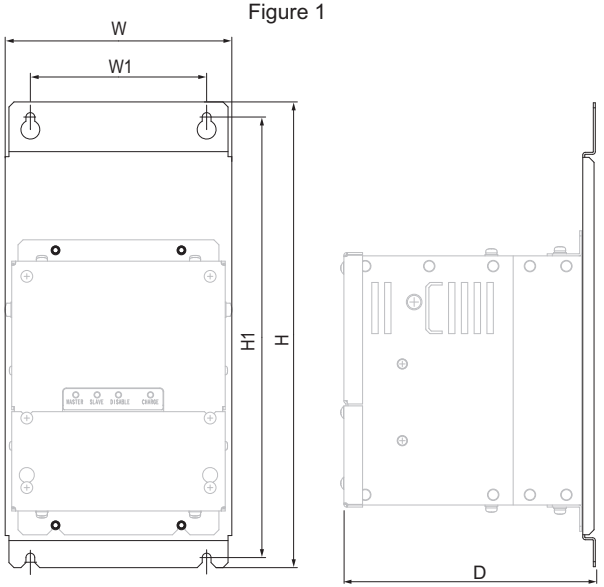


Figure 2

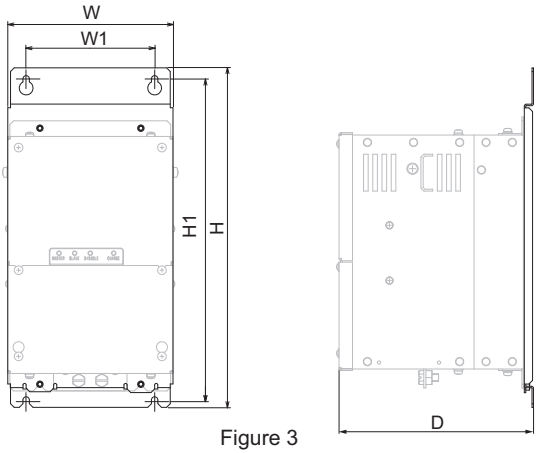


Figure 3

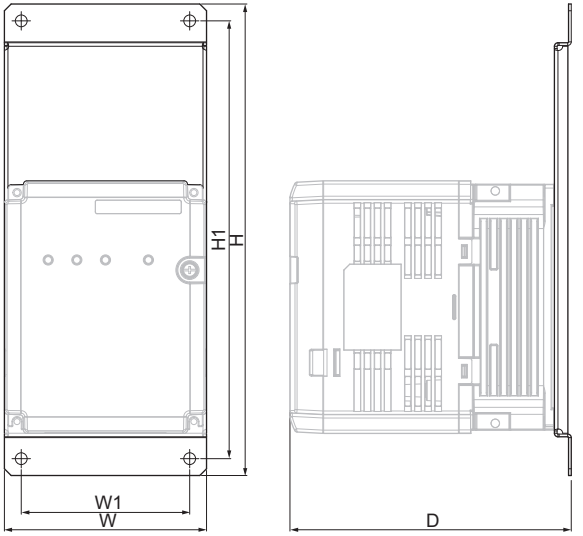
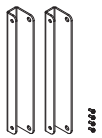
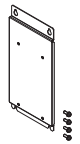
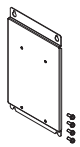
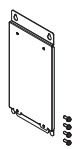
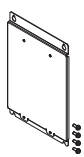
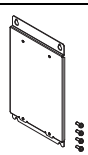
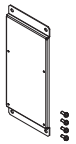


Figure 4

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)			180 (7.09)	

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)

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 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 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 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.

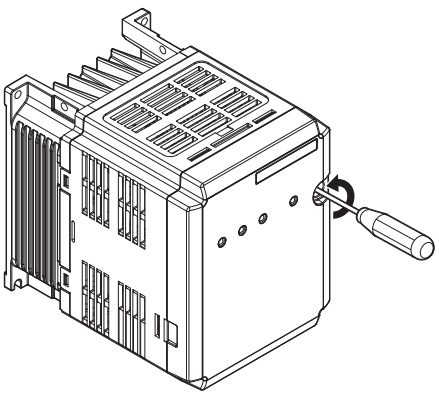


Figure 12 Loosen the Screw Securing the Front Cover

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

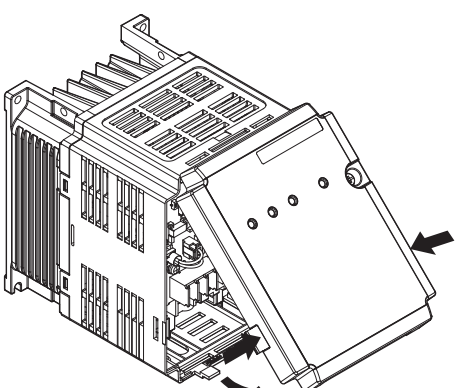


Figure 13 Push the Tabs Inward and Pull Forward on the Front Cover

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

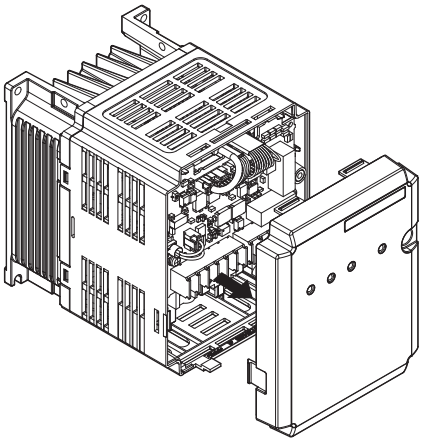


Figure 14 Remove the Front Cover

4. Remove the bottom cover.

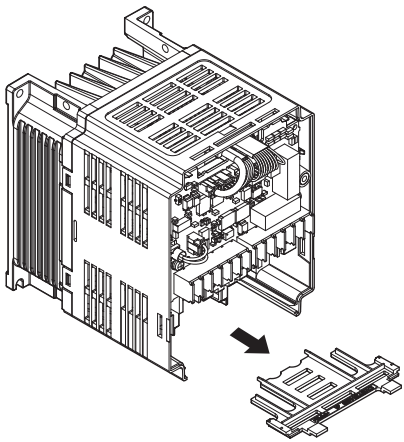
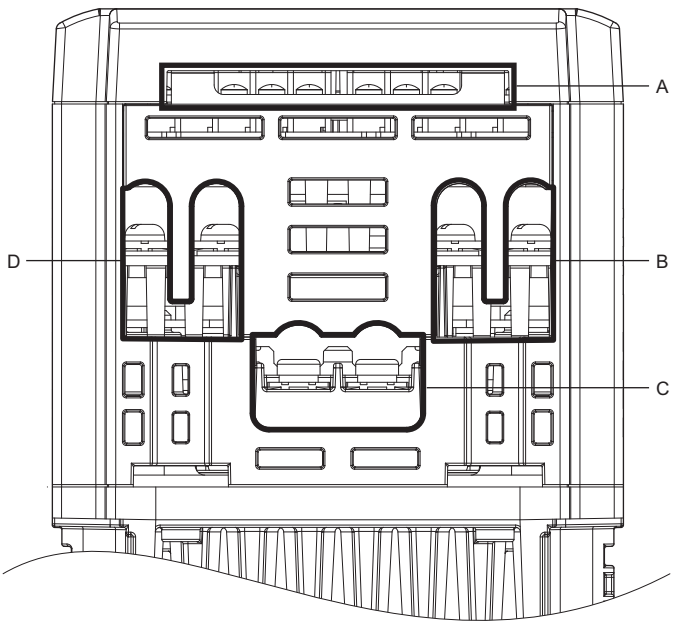


Figure 15 Remove the Bottom Cover

■ 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 so that the covers will easily fit back into the original position. Make sure cables are not pinched between the covers and the option 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 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! *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. Soldered wiring connections can loosen over time. Improper wiring practices could result in option 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 51*** *for details.*

1. For all CDBR wiring refer to ***Table 11*** for wire gauge and torque specifications and refer to ***Figure 21*** for the drive and option connection diagram
2. Connect ground wiring to the ground terminals. Refer to ***Table 9*** 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 9*** for descriptions of CDBR Braking Unit Main Circuit Terminals.
4. Connect control circuit wiring to the control circuit terminals. Refer to ***Table 10*** 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.

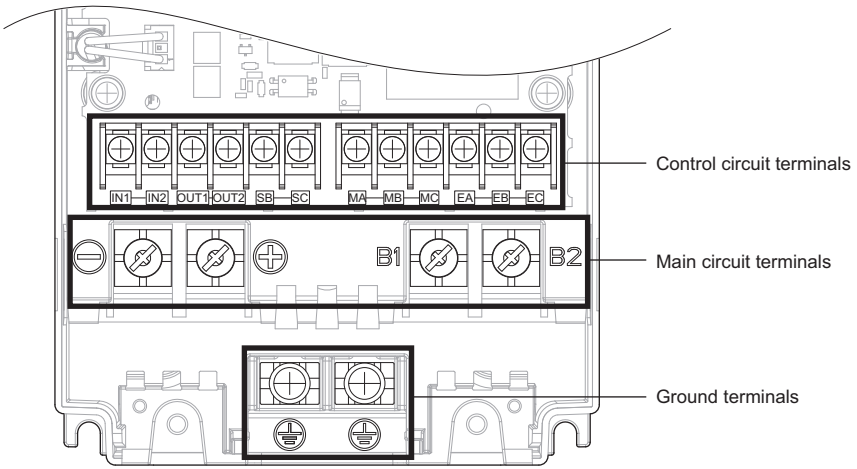


Figure 17 Wiring the Terminals

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.

7. Replace and secure the bottom cover.

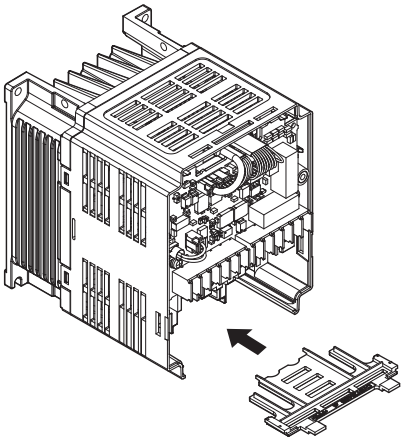


Figure 18 Reattach the Bottom Cover

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.

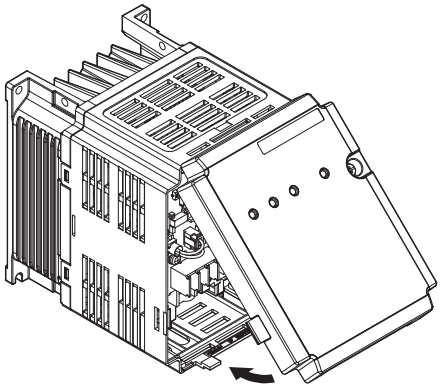


Figure 19 Reattach the Front Cover

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

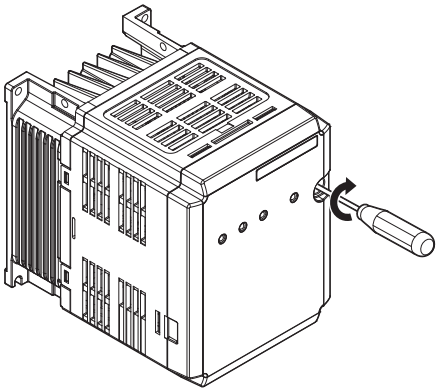


Figure 20 Tighten the Front Cover Screw

■ Connection Diagram

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

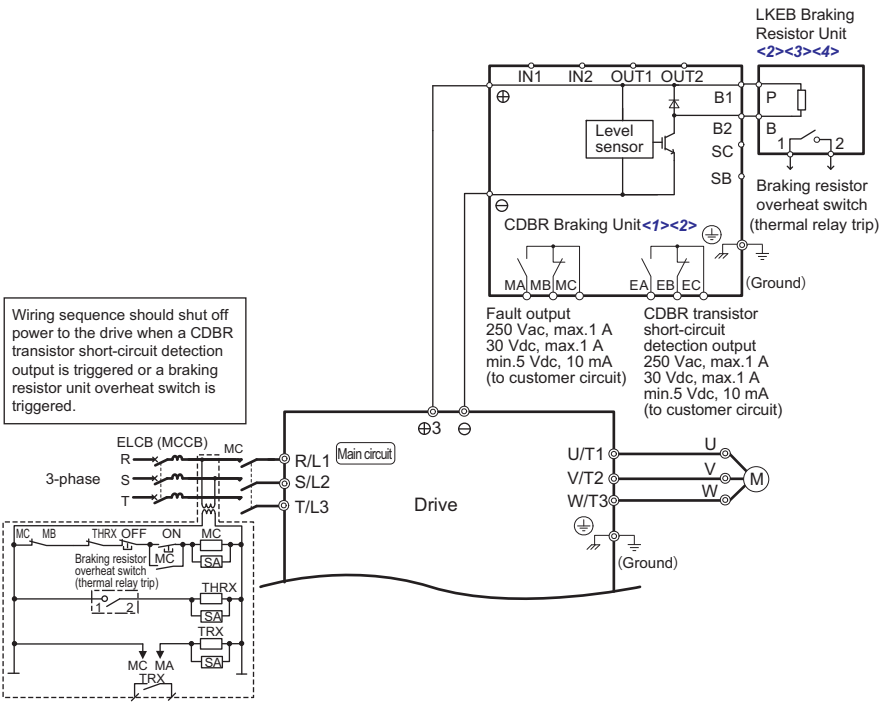


Figure 21 Connection Diagram

<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). 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. 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.

■ CDBR Braking Unit Terminal Functions

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

Table 9 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 10 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 <1>	Enable Input Common	Enable/Disable contact input to disable the CDBR and activate MA-MB-MC fault contact output.
	SB <1>	Enable Input	
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. 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 11*.

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 11 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 mm²	Applicable Gauge mm²	Recommended Gauge AWG, kcmil	Applicable Gauge AWG, kcmil	Recommended Gauge mm²	Applicable Gauge mm²		
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)
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)
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)

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 12* when replacing an older model CDBR Braking Units to ensure proper wiring.

Table 12 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	$\oplus_0$	P_0
B2	$\ominus_0$	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 22* 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 56* for details.
- Follow wire specifications when connecting the CDBR Braking Unit. Refer to *Table 11* 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.

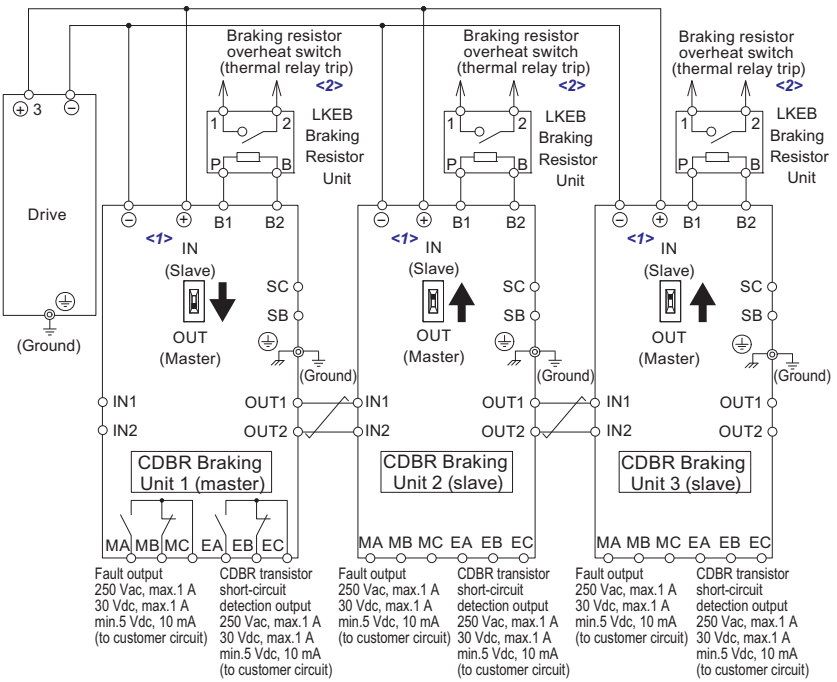


Figure 22 Braking Units in Parallel

<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

◆ 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, S5 DIP Switch)

The braking unit set to the default setting will turn on only if SB-SC Enable Input is applied.

DIP switch S1 is used to select SINK or SOURE mode for the SB-SC Enable Input. An external 24 Vdc (Class 2) power supply is required for SOURCE mode.

DIP switch S4 is used to select the contact type N.O or N.C, that will activate the SB-SC Enable Input.

DIP switch S5 is used to enable or disable the Fault Contact Output MA-MB-MC when SB-SC Enable Input is activated.

DIP switch default settings:

S1 = SINK Mode
S4 = N.O., setting A
S5 = Enable, setting 2

Note: DIP switch S5 is available from Rev. B or later.

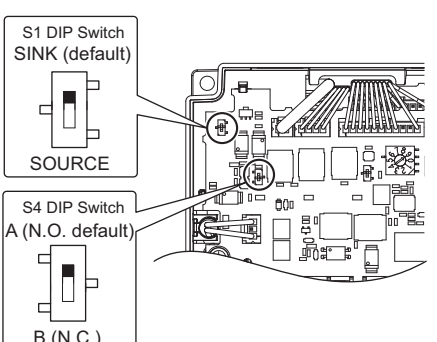


Figure 23 Setting CDBR Onboard DIP Switches

Table 13 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 (0 V Common), Internal Power Supply

Position DIP switch S1 for sinking as shown in *Figure 24*, when controlling the digital SB-SC inputs by NPN transistors (0 V common/sinking mode) or contacts using the drive internal power supply.

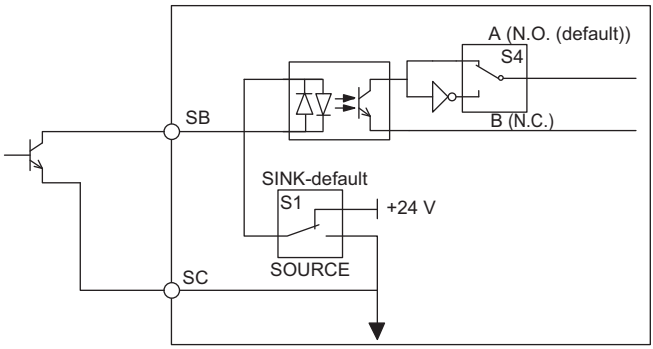


Figure 24 CDBR Braking Unit Sinking Mode using Internal Power Supply

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 DIP switch S1 for sourcing as shown in *Figure 25*.

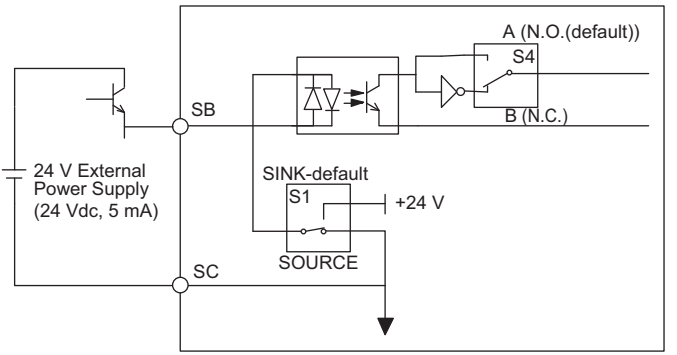


Figure 25 CDBR Braking Unit Sourcing Mode

■ Master/Slave Selection Switch (S2)

The default setting of DIP 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 DIP switch S2 set to OUT (master). All other units in the circuit must have DIP switch S2 set to IN (slave). Refer to *Using CDBR Braking Units in Parallel on page 52* for details.

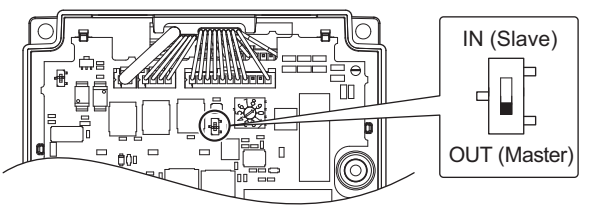


Figure 26 Master/Slave Selection Switch (S2)

■ CDBR Braking Start Voltage Rotary Switch (S3)

Set the braking start level voltage level rotary switch S3 to match the power supply of the main circuit. The default rotary switch S3 setting is 9. Refer to ***Table 14*** for details on rotary switch S3 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 rotary switch S3 setting values. If the starting voltage is incorrectly set to a low value, applying power to the drive may active 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.

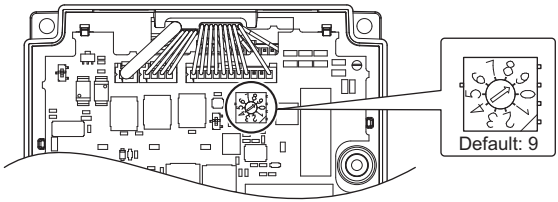


Figure 27 CDBR Voltage Activation Level, Rotary Switch (S3)

Table 14 Rotary 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 <1>	230	380 (TYP)	460	760 (TYP)	575	950 (TYP)

<1> Default Setting

■ Switch Layout

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

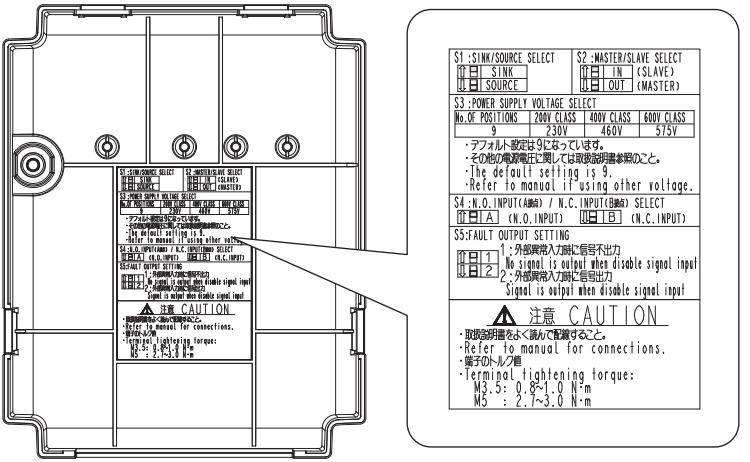


Figure 28 Switch Layout

◆ 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 18*** 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 (122°F). 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).

Problems	Cause	Possible Solution
The CDBR braking unit is not operating.	• A master unit is incorrectly set to be a slave device and there is no master unit. • Incorrect braking activation switch position.	• Check the CDBR braking unit Master/Slave selection DIP switch S2 and make sure it is properly set. The master LED (green) should be illuminated on the master CDBR unit. • Check brake activation level switch S3 for proper setting. • Observe the Master and Slave LEDs (only if slave units are used). 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

Selecting a CDBR Braking Unit and LKEB Braking Resistor Unit is based on application-specific requirements and the selected AC drive. *Table 15* is an example selection matrix for A1000 model drives. Refer to the local catalog for selections based on other drive models.

Table 15 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>
CIMR-A☐			CDBR-	Qty	LKEB-	Resistor Specification (per unit)	Qty	Connection Diagram	Braking Torque (%) <3>	
200 V class										
2A0004	HD	0.4 (0.75)	built-in		20P7	70 W 200 Ω	1	A	220	48
	ND	0.75 (1)			20P7	70 W 200 Ω	1		125	48
2A0006	HD									
	ND	1.1 (2)			20P7	70 W 200 Ω	1		85	48
2A0008	HD				21P5	260 W 100 Ω			150	
	ND	1.5 (2)			21P5	260 W 100 Ω	1		125	48
2A0010	HD									
	ND	2.2 (3)			22P2	260 W 70 Ω	1		120	48
2A0012	HD									16
	ND	3.0 (3)			23P7	390 W 40 Ω	1		150	16
2A0018	HD									
	ND	3.7 (5)			23P7	390 W 40 Ω	1		125	16
2A0021	HD									
	ND	5.5 (7.5)			25P5	520 W 30 Ω	1		115	16
2A0030	HD									
	ND	7.5 (10)			27P5	780 W 20 Ω	1		125	16
2A0040	HD									9.6
	ND	11 (15)			2011	2400 W 13.6 Ω	1		125	9.6
2A0056	HD									
	ND	15 (20)			2015	3000 W 10 Ω	1		125	9.6
2A0069	HD									
	ND	18.5 (25)			2015	3000 W 10 Ω	1		100	9.6

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>
CIMR-A☐			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				2022	4800 W 6.8 Ω			125	6.4
	ND	30 (40)			2022	4800 W 6.8 Ω	1		90	6.4
2A0138	HD									
	ND	37 (50)			2022	4800 W 6.8 Ω	1		70	6.4
2A0169	HD		2037D	1	2015	3000 W 10 Ω	2	D	100	5.0
	ND	45 (60)	2037D	1	2015	3000 W 10 Ω	2		80	5.0
2A0211	HD		2022D	2	2022	4800 W 6.8 Ω		C	120	6.4
	ND	55 (75)	2022D	2	2022	4800 W 6.8 Ω	2		100	6.4
2A0250	HD									
	ND	75 (100)	2110D	1	2022	4800 W 6.8 Ω	3	D	110	1.6
2A0312	HD									
	ND	90 (125)	2110D	1	2022	4800 W 6.8 Ω	4		120	1.6
2A0360	HD									
	ND	110 (150)	2110D	1	2018	4800 W 8 Ω	5		100	1.6
2A0415	HD									
	ND									
400 V class										
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		130	96
4A0004	HD									
	ND	1.5 (3)			41P5	260 W 400 Ω	1		125	96
4A0005	HD									64
	ND	2.2 (3)			42P2	260 W 250 Ω	1		135	64
4A0007	HD									
	ND	3.0 (3)			42P2	260 W 250 Ω	1		100	64
4A0009	HD				43P7	390 W 150 Ω			150	32
	ND	3.7 (5)			43P7	390 W 150 Ω	1		135	32
4A0011	HD									
	ND	5.5 (7.5)			45P5	520 W 100 Ω	1		135	32
4A0018	HD									
	ND	7.5 (10)			47P5	780 W 75 Ω	1		130	32

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>
CIMR-A☐			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									20
	ND	15 (20)			4015	1560 W 40 Ω	1		125	20
4A0038	HD									
	ND	18.5 (25)			4018	4800 W 32 Ω	1		125	20
4A0044	HD									19.2
	ND	22 (30)			4022	4800 W 27.2 Ω	1		125	19.2
4A0058	HD									
	ND	30 (40)			4030	6000 W 20 Ω	1		125	19.2
4A0072	HD									
	ND	37 (50)			4030	6000 W 20 Ω	1		100	19.2
4A0088	HD		4045D	1	4037	9600 W 16 Ω		B	125	12.8
	ND	45 (60)	4045D	1	4045	9600 W 13.6 Ω	1		125	12.8
4A0103	HD									
	ND	55 (75)	4045D	1	4045	9600 W 13.6 Ω	1		100	12.8
4A0139	HD		4030D	2	4030	6000 W 20 Ω	2	C	135	19.2
	ND	75 (100)	4030D	2	4030	6000 W 20 Ω	2		100	19.2
4A0165	HD		4045D	2	4045	9600 W 13.6 Ω			145	12.8
	ND	90 (125)	4045D	2	4045	9600 W 13.6 Ω	2		120	12.8
4A0208	HD									
	ND	110 (150)	4220D	1	4030	6000 W 20 Ω	3	D	100	3.2
4A0250	HD									
	ND	132 (200)	4220D	1	4045	9600 W 13.6 Ω	4		150	3.2
4A0296	HD									
	ND	160 (250)	4220D	1	4045	9600 W 13.6 Ω	4		140	3.2
4A0362	HD									
	ND	185 (300)	4220D	1	4045	9600 W 13.6 Ω	4		120	3.2
4A0414	HD			1						
	ND	220 (350)	4220D	1	4037	9600 W 16 Ω	5		110	3.2
4A0515	HD			1						
	ND	250 (400)	4220D	1	4037	9600 W 16 Ω	5		90	3.2

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>
CIMR-A☐			CDBR-	Qty	LKEB-	Resistor Specification (per unit)	Qty	Connection Diagram	Braking Torque (%) <3>	
4A0675	HD	315 (450)	4220D	2	4045	9600 W 13.6 Ω	6	D	100	3.2
	ND	355 (550)	4220D	2	4045	9600 W 13.6 Ω	8		120	3.2
4A0930	HD	450 (650)	4220D	2	4037	9600 W 16 Ω	10		100	3.2
	ND	500 (750)	4220D	2	4037	9600 W 16 Ω	10		90	3.2
4A1200	HD	560 (900)	4220D	3	4037	9600 W 16 Ω	15		120	3.2
	ND	630 (1000)	4220D	3	4037	9600 W 16 Ω	15		100	3.2
600 V class										
5A0003	ND	0.75 (1)	built-in		<6>	134 W 575 Ω	1	A	100	150
5A0003	HD					201 W 400 Ω	1		150	150
5A0003	ND	1.5 (2)				134 W 575 Ω	1		100	150
5A0004	HD					201 W 400 Ω	1		150	150
5A0004	ND	2.2 (3)				201 W 400 Ω	1		100	150
5A0006	HD					302 W 260 Ω	1		150	150
5A0006	ND	3.7 (5)				336 W 235 Ω	1		100	150
5A0009	HD					504 W 160 Ω	1		150	130
5A0009	ND	5.5 (7.5)				504 W 150 Ω	1		100	130
5A0011	HD					755 W 100 Ω	1		150	90
5A0011	ND	7.5 (10)				671 W 120 Ω	1		100	90
5A0017	HD					1007 W 80 Ω	1		150	65
5A0017	ND	11 (15)				1007 W 78 Ω	1		100	65
5A0022	HD					1511 W 52 Ω	1		150	44
5A0022	ND	15 (20)				1343 W 59 Ω	1		100	44
5A0027	HD					2014 W 39 Ω	1		150	32
5A0027	ND	18.5 (25)				1679 W 47 Ω	1		100	32
5A0032	HD					2518 W 32 Ω	1		150	29
5A0032	ND	22 (30)				2014 W 39 Ω	1		100	29
5A0041	HD					3021 W 26 Ω	1		150	15
5A0041	ND	30 (40)				4165 W 21.25 Ω <7>	1		100	15
5A0052	HD								150	15
5A0052	ND	37 (50)				1679 W 47 Ω	1		100	15
5A0062	HD		5037D	1		5440 W 27.2 Ω	1	B	150	23.8
5A0062	ND	45 (60)	5037D	2		5440 W 27.2 Ω	2		150	23.8
5A0077	HD									

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>
CIMR-A☐			CDBR-	Qty	LKEB-	Resistor Specification (per unit)	Qty	Connection Diagram	Braking Torque (%) <3>	
5A0077	ND	55 (75)	5037D	2	<6>	7098 W 10.5 Ω	1	<6>	150	9.5
5A0099	HD									
5A0099	ND	75 (100)	5037D	2		10,866 W 4.2 Ω	1		150	3.8
5A0125	HD									
5A0125	ND	90 (125)	5110D	1		13,542 W 3.2 Ω	1		150	3.8
5A0145	HD									
5A0145	ND	110 (150)	5110D	1		14,060 W 5.2 Ω	1		150	3.8
5A0192	HD									
5A0192	ND	160 (200)	5300D	1		17,203 W 4.2 Ω	1		150	3.8
5A0242	HD									
5A0242	ND	185 (250)	<5>			13,542 W 3.2 Ω	2		150	3.8
5A0242	HD									

<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.

◆ CDBR Braking Unit Fault Circuit Connection Diagrams

Note: When connecting a separately-installed type CDBR Braking 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 CDBR Braking Unit and connect the negative terminal of the drive to the negative terminal of the CDBR Braking Unit. The B2 terminal is not used in this example.

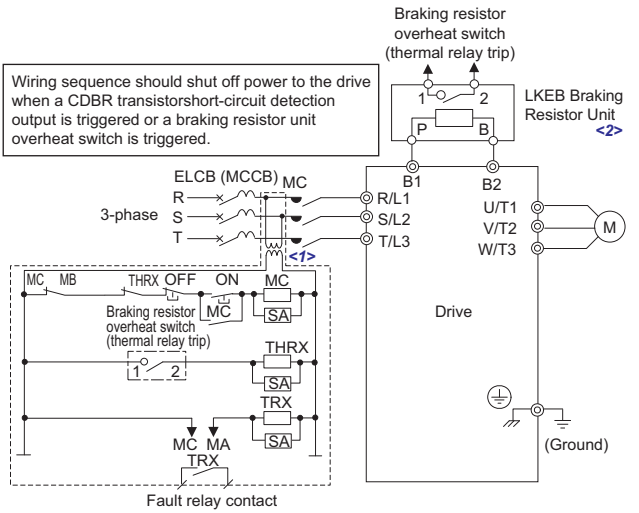


Figure 29 Fault Circuit Connection Diagram A (LKEB Braking Resistor Unit)

<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.

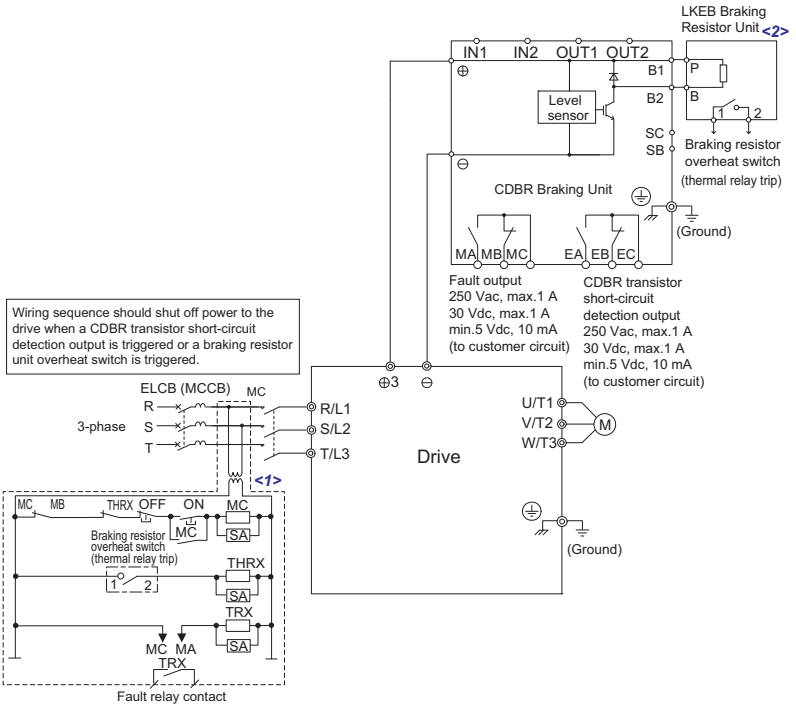


Figure 30 Fault Circuit Connection Diagram B (CDBR Braking Unit)

<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.

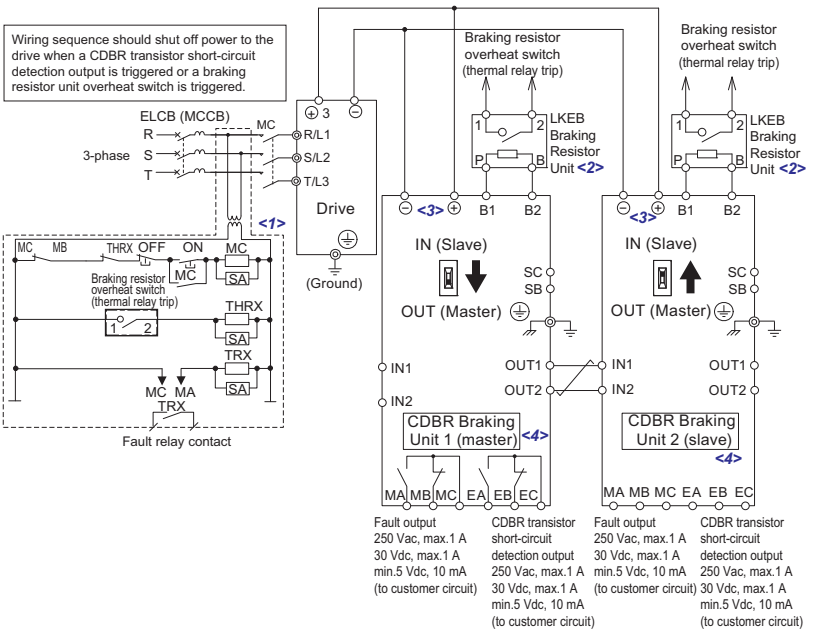


Figure 31 Fault Circuit Connection Diagram C (CDBR Braking Unit in parallel)

<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.

Note: Contact your Yaskawa representative or the nearest Yaskawa sales office when using the CDBR Braking Unit (CDBR-□D) with earlier models (CDBR-□ or CDBR-□B)

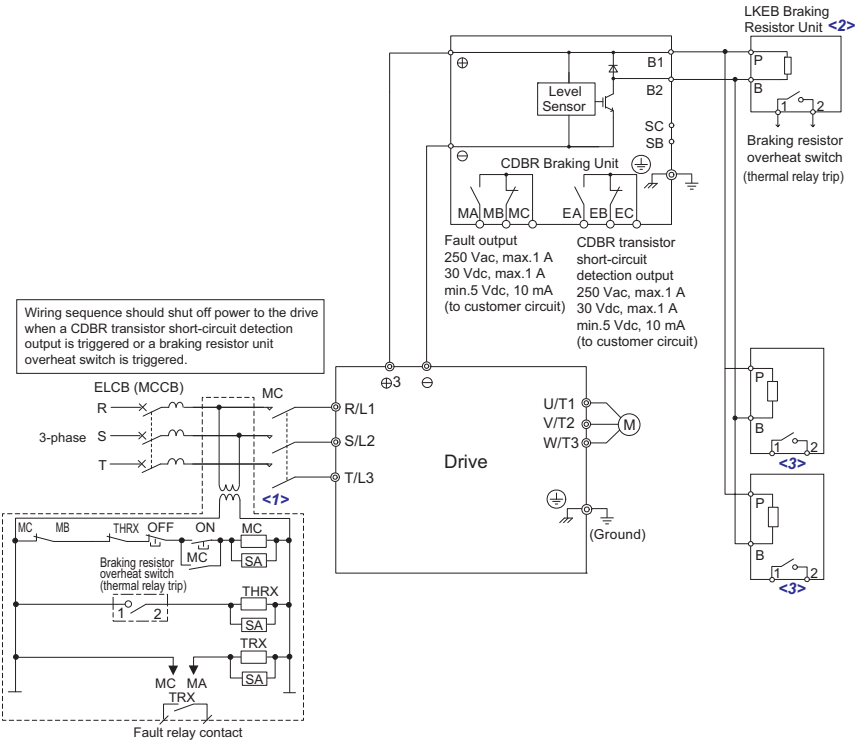


Figure 32 Fault Circuit Connection Diagram D
(CDBR Braking Unit and LKEB Braking Resistor Unit in parallel)

<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> When connecting multiple LKEB Braking Resistor units, wire the thermal relay trip contacts in parallel.

10 Specifications

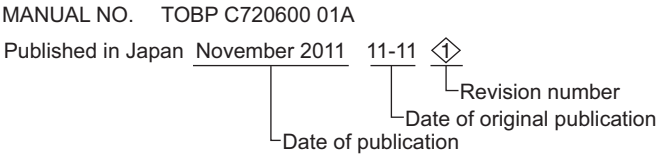
Table 16 Specifications

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 meters without derating; up to 3000 m 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) NEMA 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/s^2, 20 to 55 Hz: 5.9 m/s^2										
Standards		UL 508C, IEC/EN 61800-3 <2>, IEC/EN 61800-5-1 <2>, RoHS										
Protection Design		IP00 enclosure, IP20 enclosure, NEMA 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 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.



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

YASKAWA AC Drive 1000-Series Option

Braking Unit, Braking Resistor Unit
Installation Manual

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