CDBR-D

Dynamic Braking Unit

Instruction Manual

MAGNETEK
MATERIAL HANDLING

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Part Number: 146-10068 R1

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PRODUCT SAFETY INFORMATION

Magnetek, Inc. (Magnetek) offers a broad range of radio remote control products, control products and adjustable frequency drives, and industrial braking systems for material handling applications. This manual has been prepared by Magnetek to provide information and recommendations for the installation, use, operation and service of Magnetek's material handling products and systems (Magnetek Products). Anyone who uses, operates, maintains, services, installs or owns Magnetek Products should know, understand and follow the instructions and safety recommendations in this manual for Magnetek Products.

The recommendations in this manual do not take precedence over any of the following requirements relating to cranes, hoists lifting devices or other material handling equipment which use or include Magnetek Products:

- Instructions, manuals, and safety warnings of the manufacturers of the equipment where the Magnetek Products are used,
- Plant safety rules and procedures of the employers and the owners of the facilities where the Magnetek Products are being used,
- Regulations issued by the Occupational Health and Safety Administration (OSHA),
- Applicable local, state or federal codes, ordinances, standards and requirements, or
- Safety standards and practices for the industries in which Magnetek Products are used.

This manual does not include or address the specific instructions and safety warnings of these manufacturers or any of the other requirements listed above. It is the responsibility of the owners, users, and operators of the Magnetek Products to know, understand, and follow all of these requirements. It is the responsibility of the employer to make its employees aware of all of the above listed requirements and to make certain that all operators are properly trained. **No one should use Magnetek Products prior to becoming familiar with and being trained in these requirements and the instructions and safety recommendations for this manual.**

PRODUCT WARRANTY INFORMATION

Magnetek, hereafter referred to as Company, assumes no responsibility for improper installation of an option by untrained personnel. An option should only be installed and configured by a trained technician who has read and understands the contents of this manual. Improper installation can lead to unexpected, undesirable, or unsafe operation or performance of the controls. This may result in damage to equipment or personal injury. Company shall not be liable for economic loss, property damage, or other consequential damages or physical injury sustained by the purchaser or by any third party as a result of such installations. Company neither assumes nor authorizes any other person to assume for Company any other liability in connection with the sale or use of this product.

For information on Magnetek's product warranties by product type, please visit www.magnetek.com.

WARNING

- Do not touch any circuitry components while the main AC power is on. In addition, you must wait until the red “CHARGE” LED is out before performing any service on that unit. Wait five minutes for the charge on the main DC bus capacitors to drop to a safe level.
- Do not check signals during operation.
- Make sure the unit is set for the appropriate voltage.
- Make sure to ground the ground terminal.
- Failure to observe these warnings can result in electrical shock.

A warning label is displayed on the front cover of the braking unit. Follow these instructions when handling the braking unit.

CDBR-D Installation Instructions

Preface

A Dynamic Braking Unit and Resistor are used to dissipate regenerative energy from the motor. Whenever an excited motor is operated in the negative slip region or is subjected to an overhauling load, the motor will behave as an induction generator. In this mode, energy will actually flow from the motor back into the drive.

This will cause the DC bus voltage to rise. When the DC bus voltage reaches a certain level, the Dynamic Braking Unit will activate. The Dynamic Braking Unit will shunt the regenerative energy away from the DC bus capacitors and will dissipate it as heat in the DB resistors. Since the regenerative energy is dissipated in the resistors, the overvoltage (OV) trip is prevented; thus the motor remains excited and continues to produce braking torque.

The following Magnetek products can be used with these units:

- IMPULSE®•G
- IMPULSE®•G+
- IMPULSE®•VG+
- IMPULSE®•G+ Series 2
- IMPULSE®•VG+ Series 2
- IMPULSE®•G+ Series 3
- IMPULSE®•VG+ Series 3
- IMPULSE®•G+ Series 4
- IMPULSE®•VG+ Series 4
- MagnePulse™ Digital Magnet Control (DMC)

Receiving

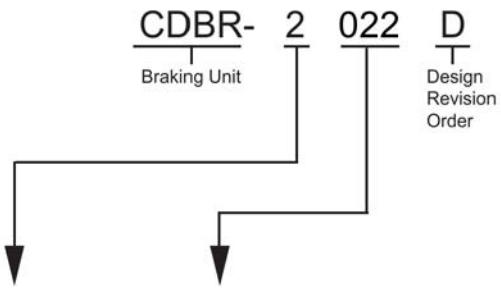
All equipment is tested against defects at the factory. After unpacking, verify that there is no damage evident. Report any damage or shortage to the commercial carrier who transported the equipment. Contact your Magnetek sales representative for assistance.

Storage

If the Dynamic Braking unit is not installed immediately, it must be stored under the following conditions:

- Ambient temperature: -10 to +70°C (+14 to +158°F)
- Protected from rain and moisture
- Free from corrosive gases or liquids
- Free from dust or metal particles
- Clean and dry
- Free from excessive vibration

Model Number



Voltage Class		No.	Max. Motor Capacity kW (HP)	Rated Discharge Amps	Maximum Discharge Amps Peak 10% Duty
2	230 V	022	22 (30)	20	60
	230 V	055	55 (74)	40	120
	230 V	110	110 (148)	80	250
4	460 V	045	45 (60)	18	60
	460 V	090	90 (121)	30	100
	460 V	220	220 (295)	80	250
5	575 V	037	37 (50)	15	40
	575 V	110	110 (148)	30	100
	575 V	300	300 (402)	80	250

Installation

Mounting/Wiring

1. Disconnect all electrical power to the drive.
2. Remove drive front cover.
3. Verify that voltage has been disconnected by using a voltmeter to check for voltage at the incoming power terminals.
4. The braking unit and braking resistor emit heat during operation. Select a mounting location away from other heat emitting devices or devices that are heat sensitive. To guarantee proper air-flow for cooling, the braking unit should not be mounted any closer to external devices than 1.18 in. (30 mm) on either side and 4.72 in. (120 mm) of the top and bottom. Select mounting locations so that the wiring distances between the drive and the braking unit is **less than** 16.4 feet (5 m), and the distance between the braking unit and the braking resistor is **less than** 32.8 feet (10 m).
5. Make connections between the drive, braking unit(s), and braking resistor(s) according to Figure 9 (single units) or Figure 10 (multiple units).

Grounding

6. The enclosure of the braking resistor should be grounded. If the braking unit cannot be mounted in a grounded enclosure, ground it by using a lead from the mounting screw of the unit.
7. Grounding resistance of the braking unit should be 100 ohms or less.
8. Use of a grounding lead should be in conformance with the National Electric Code.

Adjustments

9. Configuration

    a) It may be necessary to change the appropriate input voltage selection. This determines the voltage that the dynamic braking unit will turn on. See Figure 14 and turn S3 to the nominal three phase supply voltage. Table 4 indicates the DC voltage level that the braking unit will turn on for different settings. Failure to set the switch at the nominal voltage can cause premature failure of the braking unit.

    b) If two or more braking modules are applied, ensure that unit #1 is set as the MASTER while the other unit(s) are set for SLAVE (see Figure 10). If only one braking unit is applied, verify that the switch is set to MASTER.

10. The installation of the braking unit may require programming of the drive.

    a) For an IMPULSE®•G: Program Sn-05 to xx**1**x, which disables stall prevention during deceleration.

    b) For an IMPULSE®•G+: Program Sn-07 to xx**1**x, which disables stall prevention during deceleration.

    c) For an IMPULSE®•G+ and VG+ Series 2 and Series 3: Program L3-04 to **0**, which disables stall prevention during deceleration.

    d) For an IMPULSE®•G+ and VG+Series 4: Program L08-55 to **0**, which disables the RF fault.

Installation

Be sure the CDBR-D is mounted in a location that conforms to the following conditions:

- Provide at least 4.72 in. (120 mm) above and below the CDBR-D.
- Provide at least 1.18 in (30 mm) on either side of the CDBR-D.
- Provide sufficient space between other components that generate heat or do not tolerate heat.
- Free from drops of water and corrosive gases.
- Free of dirt and dust.
- Free of physical shock and vibration.

Figure 1: Correct Installation Orientation (Braking Unit)

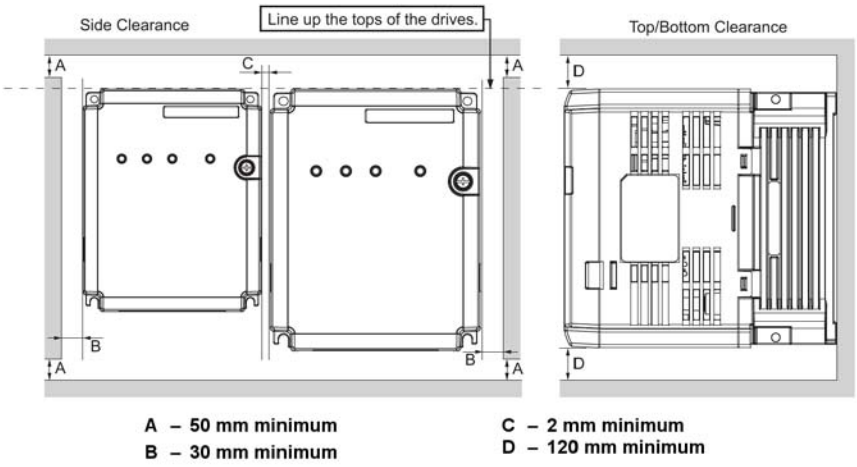


Figure 2: Space Between CDBR braking units (Side-by-Side Mounting)

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. Failure to observe these warnings can result in electrical shock.

1. Loosen the front cover screw.

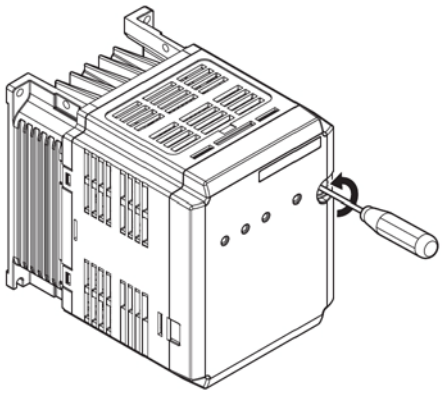


Figure 3: Loosen the Screw Securing the Front Cover

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

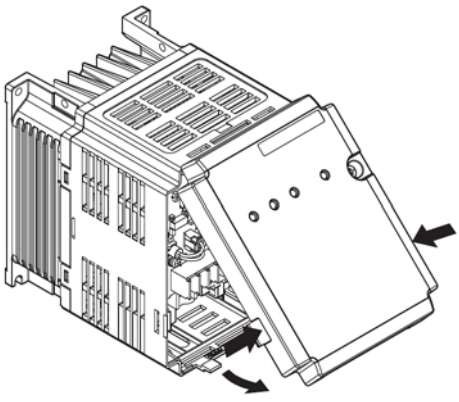


Figure 4: Push the Tabs Inward and Pull Forward on the Front Cover

3. Connect ground wiring to the ground terminals.
4. Connect main circuit wires to the main circuit terminals B1, B2, (+) and (-).
5. Connect control circuit wiring to the control circuit terminals.
6. Ensure all main circuit and control circuit wires exit through the openings in the bottom of the CDBR Braking Unit enclosure.

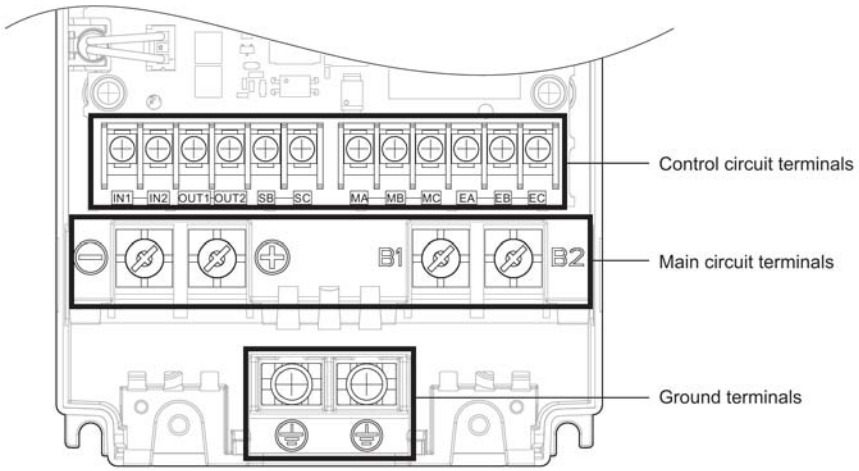


Figure 5: Wiring the Terminals

7. Reattach the front cover. After wiring to the CDBR Braking Unit and drive is complete, double-check all connections before reattaching the cover.
8. Insert the tab on the upper portion of the front cover to the corresponding opening, then connect the cover into place from the front of the unit.

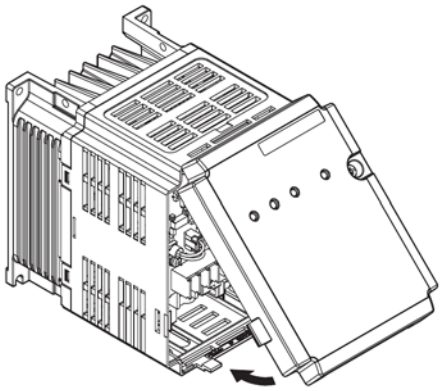


Figure 6: Reattach the Front Cover

9. Reinstall and secure the front cover on the drive.

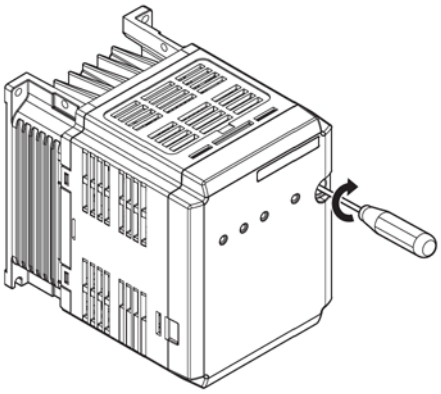


Figure 7: Tighten the Front Cover Screw

Operational Verification

During dynamic braking operations, make sure that the required deceleration characteristic is obtained. The MASTER/SLAVE LED flashes to indicate operation of the unit.

Table 1: Minimum Resistance Values for Braking Resistors

Supply Voltage	Turn On Voltage	Minimum Resistance (Ω)								
		2022D	2055D	2110D	4045D	4090D	4220D	5037D	5110D	5300D
200 VAC	331 VDC	5.5	2.8	1.3	–			–		
208 VAC	343 VDC	5.7	2.9	1.4	–			–		
220 VAC	368 VDC	6.1	3.1	1.5	–			–		
230 VAC	380 VDC	6.3	3.2	1.5	–			–		
380 VAC	630 VDC	–			10.5	6.3	2.5	–		
400 VAC	659 VDC	–			11.0	6.6	2.6	–		
415 VAC	688 VDC	–			11.5	6.9	2.8	–		
440 VAC	731 VDC	–			12.2	7.3	2.9	–		
460 VAC	760 VDC	–			12.7	7.6	3.0	–		
500 VAC	825 VDC	–			–			20.7	8.3	3.3
575 VAC	950 VDC	–			–			23.8	9.5	3.8

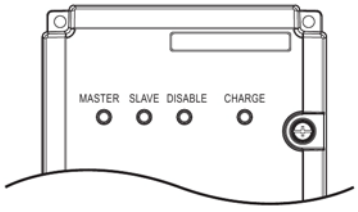
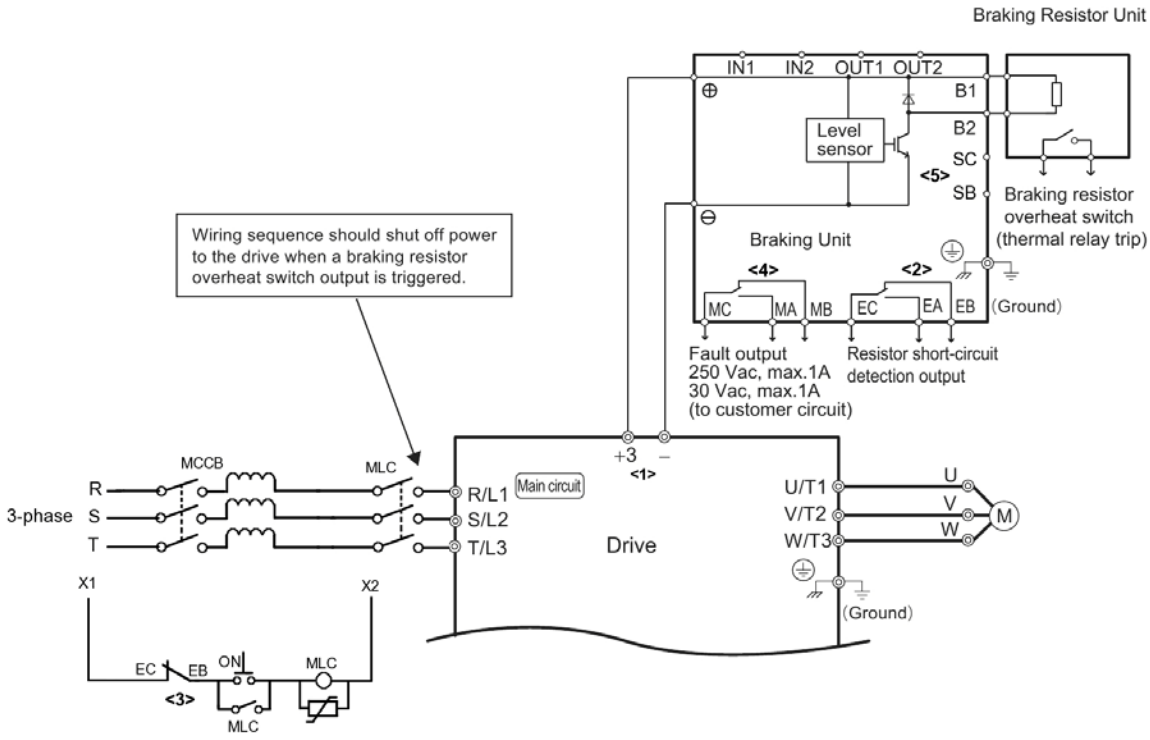


Figure 8: CDBR Braking Unit LED Display

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	--	--

NOTE: During CDBR activation, flashing of the LED is based on the bus voltage level. When the bus voltage goes above the activation level, the LED turns off and the bus is then discharged. When the bus voltage falls below the activation level, the LED will turn back on.



<1> If drive does NOT have a +3 terminal, use B1.

Figure 9: Single Unit Wiring Diagram

Protection Features

Short Circuit Relay

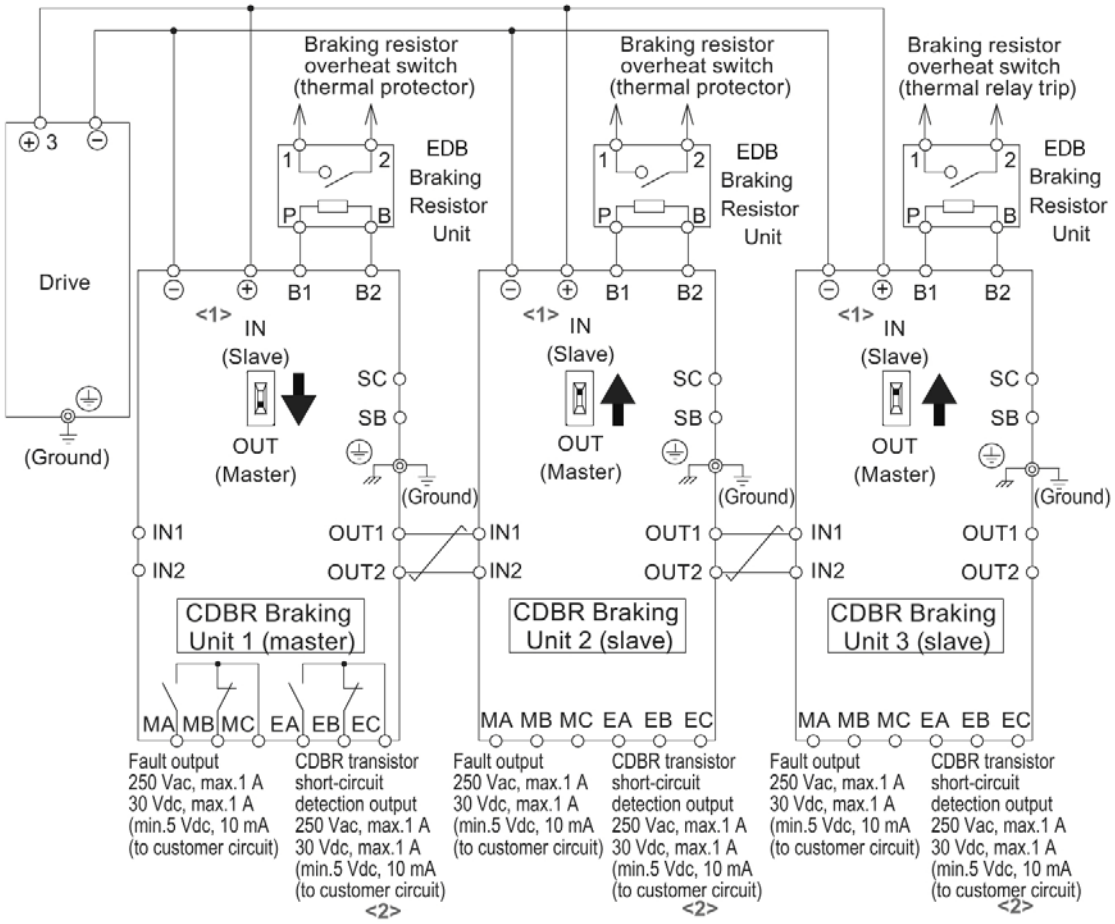
When wired as shown in Figure 9, the Short Circuit Relay (EC/EA/EB) <2> protects the drive from failure when a braking resistor short circuits, and also protects the resistor in the event of a CDBR short circuit. The latching circuit shown in Figure 9 above <3> is designed to power down the drive and CDBR in the event of a short. Assuming no CDBR short circuit is present, pushing the momentary ON switch will latch in the main line contactor and enable the drive. When a short occurs, EB will open and the main line contactor coil will de-energize causing the drive to shut down.

Fault Relay

The Fault Relay (MC/MA/MB) <4> will change state in the event of any CDBR fault including a short circuit. If connected to a drive input, program H1-xx for an IMPULSE Series 2 to Series 4 drive or G11 for a MagnePulse drive to include this feature.

Enable Input

The Enable contact SB <5> can be connected to a drive output to have the CDBR shut off in the event of a specific fault, or connected through a Klixon to have the unit shut off as a result of high temperatures in the braking resistors.



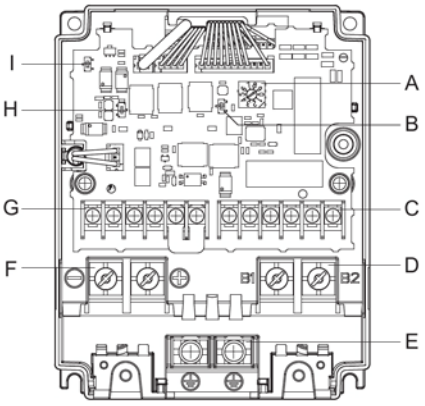
<1> Connect directly to the drive or install a terminal block.

<2> Connect the CDBR transistor short-circuit detection output to disconnect power to the drive when any master or slave CDBR EA-EB-EC fault is output.

Figure 10: CDBR-D Parallel Connection of Braking Unit

CDBR-D Parallel Connection Notes

- Braking units have a MASTER/SLAVE selection switch, with S2 defaulted to the MASTER position. Select MASTER for Braking Unit 1 and SLAVE for all subsequent braking units (see Figure 11 for location).
- Connect thermal protectors of the parallel braking resistors in parallel to the drive's multi-function input.
- Use twisted pair wire, 20 or 22 AWG with ferrules, for connections between terminals OUT1, IN1 and OUT2, IN2 of the CDBR-Ds.



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

Figure 11: CDBR 2022D, 4045D, and 5037D (Terminal Cover and Indicating Cover Removed)

CDBR-D Braking Unit Dimensions

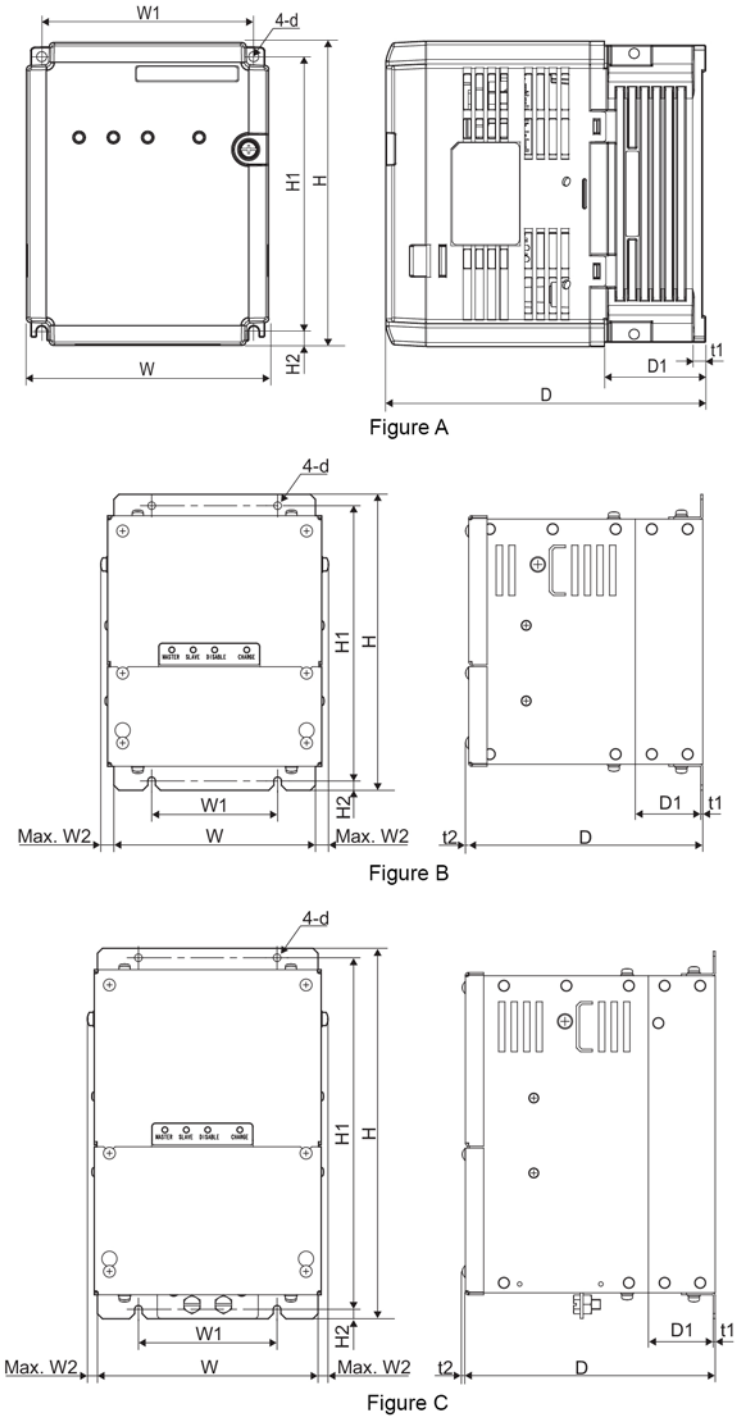


Figure 12: CDBR-D Drawing

Table 2: CDBR-D Dimensions

Model Number	Figure 12.x	Dimensions in inches (mm)											Wt. in lbs. (kg)
		W	H	D	W1	W2	H1	H2	D1	t1	t2	d	
CDBR-2022D	A	4.72 (120)	5.91 (150)	6.18 (157)	4.13 (105)	--	5.35 (136)	0.28 (7)	1.89 (48)	0.24 (6)	--	M4	4.4 (2)
CDBR-2055D	B	6.30 (160)	9.25 (235)	7.32 (185.9)	3.94 (100)	0.41 (10.4)	8.60 (218.5)	0.30 (7.5)	2.11 (53.5)	0.06 (1.6)	0.10 (2.5)	M5	12.13 (5.5)
CDBR-2100D	C	6.89 (175)	11.57 (294)	7.87 (200)	4.33 (110)	0.31 (7.9)	10.98 (279)	0.30 (7.5)	2.11 (53.5)	0.06 (1.6)	0.10 (2.5)	M5	16.53 (7.5)
CDBR-4045D	A	4.72 (120)	5.91 (150)	6.18 (157)	4.13 (105)	--	5.35 (136)	0.28 (7)	1.89 (48)	0.24 (6)	--	M4	4.4 (2)
CDBR-4090D	B	6.30 (160)	9.25 (235)	7.32 (185.9)	3.94 (100)	0.41 (10.4)	8.60 (218.5)	0.30 (7.5)	2.11 (53.6)	0.06 (1.6)	0.10 (2.5)	M5	12.13 (5.5)
CDBR-4220D	C	6.89 (175)	11.57 (294)	7.87 (200)	4.33 (110)	0.31 (7.9)	10.98 (279)	0.30 (7.5)	2.11 (53.5)	0.06 (1.6)	0.10 (2.5)	M5	16.53 (7.5)
CDBR-5037D	A	4.72 (120)	5.91 (150)	6.18 (157)	4.13 (105)	--	5.35 (136)	0.28 (7)	1.89 (48)	0.24 (6)	--	M4	4.4 (2)
CDBR-5110D	B	6.30 (160)	9.25 (235)	7.32 (185.9)	3.94 (100)	0.41 (10.4)	8.60 (218.5)	0.30 (7.5)	2.11 (53.6)	0.06 (1.6)	0.10 (2.5)	M5	12.13 (5.5)
CDBR-5300D	C	6.89 (175)	11.57 (294)	7.87 (200)	4.33 (110)	0.31 (7.9)	10.98 (279)	0.30 (7.5)	2.11 (53.5)	0.06 (1.6)	0.10 (2.5)	M5	16.53 (7.5)

Braking Unit Enable Input Setting (S1, S4, S5, DIP Switch)

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.

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

The default settings are sinking mode S1 = SINK, normally open S4 = A, and enable S5 = 2.

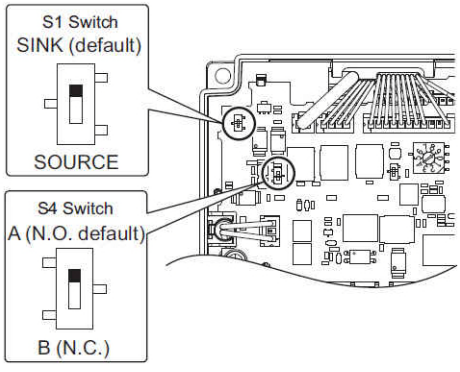


Figure 13: Setting Sink/Source Switch (S1) and N.O./N.C. Switch (S4)

Table 3: CDBR Enable/Disable Status

S1- SINK/SOURCE	S4-SB/SC Terminals N.O./N.C.	SB-SC-Enable	CDBR Status
SINK <1>	A <1>	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

<1> Default settings.

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 4 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.
4. For DMC applications, set switch S3 so the Braking Activation Voltage (VDC) listed in Table 4 is equal to 120% of the normal DC voltage supplied to the DMC.

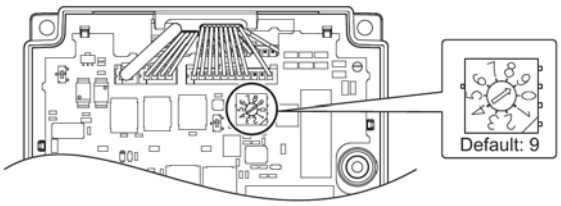


Figure 14: CDBR Voltage Activation Level, Switch (S3)

Table 4: Switch S3 Settings and Voltage Activation Levels

No.	230 V Class		460 V Class		575 V Class	
	Input Voltage (VAC)	Braking Activation Voltage (VDC)	Input Voltage (VAC)	Braking Activation Voltage (VDC)	Input Voltage (VAC)	Braking Activation Voltage (VDC)
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	835 (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	894 (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

Retrofit Attachment

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

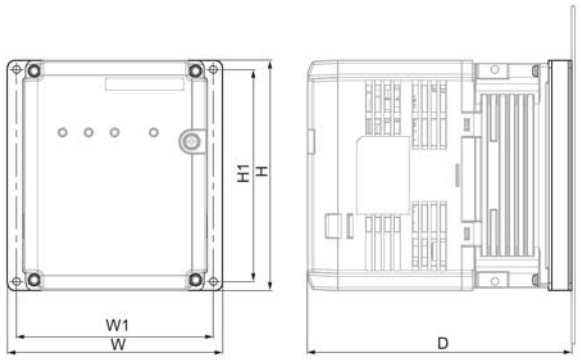


Figure 15: Retrofit Attachment for CDBR-2022D and CDBR-4045D

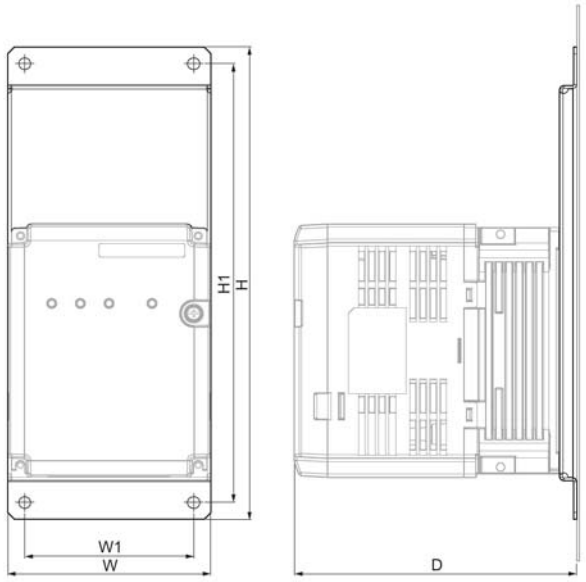


Figure 16: Retrofit Attachment for CDBR-5037D

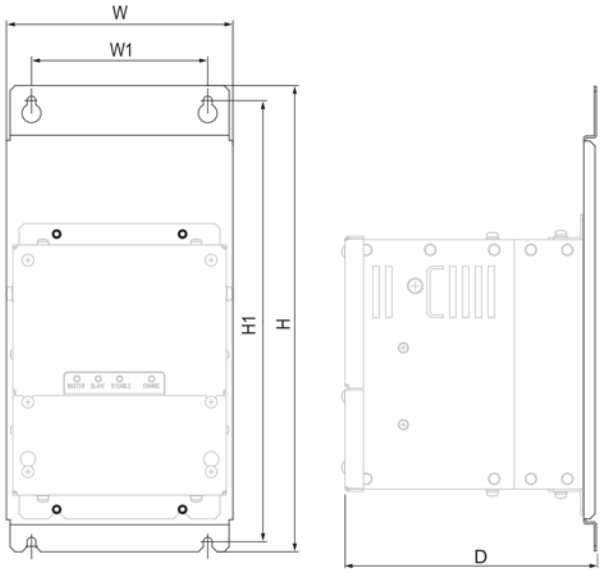


Figure 17: Retrofit Attachment for CDBR-2055D and CDBR-4090D

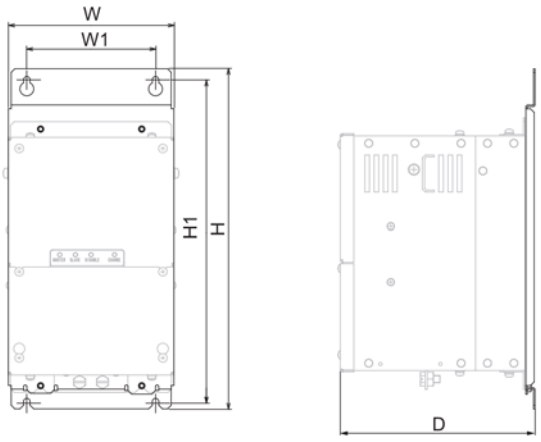


Figure 18: Retrofit Attachment for CDBR-2110D, CDBR-4220D, CDBR-5110D, and CDBR-5300D

Table 5: Retrofit Attachment Dimensions

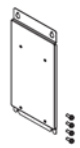
Attachment	Braking Unit CDBR-	Figure	Model No.	Dimensions in inches (mm)				
				W	H	D	W1	H1
	2022D	15	CDBR-BD-A	5.51 (140)	5.91 (150)	6.77 (172)	5.04 (128)	5.43 (138)
	4045D							
	2055D	17	CDBR-BD-C	7.09 (180)	14.57 (370)	7.71 (195.9)	5.51 (140)	13.78 (350)
	4090D		CDBR-BD-D	8.66 (220)			7.09 (180)	13.98 (355)
	2110D	18	CDBR-BD-E	7.09 (180)	14.57 (370)	8.27 (210)	5.51 (140)	13.78 (350)
	4220D		CDBR-BD-F	9.84 (250)			8.27 (210)	13.98 (355)
	5300D							
	5110D		CDBR-BD-G	8.66 (220)			7.09 (180)	
	5037D	16	CDBR-BD-B	4.72 (120)	11.02 (280)	6.57 (167)	3.94 (100)	10.24 (260)

Table 6: Main Circuit Terminal Cross-Reference Chart for New and Previous Version Model CDBR Braking Units

CDBR-XD	CDBR-XB, CDBR-XC	CDBR-X
⊖	⊖	N
⊕	⊕	P
B1	$\oplus_0$	P_0
B2	$\ominus_0$	B

Circuits and Wiring Specifications

Table 7: Circuits and Wiring Specifications

Model Number	Circuit	Terminals		Wire Size AWG	Wire Type	Terminal Screw	Max. Torque lb. in.
CDBR-2022D, 4045D, 5037D	Main	B1 B2	⊕ ⊖	10–8	600 V vinyl sheathed wire or equivalent	M5	23.9 to 26.6
	Control	IN1, IN 2, OUT1, OUT2, SB		18–14		M3.5	7.1 to 8.9
CDBR-2055D, 4090D	Main	B1 B2	⊕ ⊖	8–6		M5	17.7 to 22.1
	Control	IN1, IN 2, OUT1, OUT2, SB, SC, MA, MB, MC, EA, EB, EC		18–14		M3.5	7.1 to 8.9
CDBR-2110D, 4220D, 5110D, 5300D	Main	B1 B2	⊕ ⊖	3–2		M8	70.8 to 88.5
	Control	IN1, IN 2, OUT1, OUT2, SB, SC, MA, MB, MC, EA, EB, EC		18–14		M3.5	7.1 to 8.9

Table 8: CDBR Braking Unit Main Circuit Terminals

Terminal Block	Terminal No.	Terminal Name	Specifications
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. (Use B1 when +3 is unavailable.)
TB4	B1	Main Circuit B1 Terminal	Connects to the B1 terminal on the EDB braking resistor unit, or connects to braking resistor terminal of non-Magnetek resistor unit.
	B2	Main Circuit B2 Terminal	Connects to the B2 terminal on the EDB braking resistor unit, or connects to braking resistor terminal of non-Magnetek resistor unit.
--	⏚	Grounding terminal	For 230 V class: 100 Ω or less For 460 V class and 575 V class: 10 Ω or less

Table 9: CDBR Braking Unit Control Circuit Terminals

Terminal Block	Terminal No.	Terminal Name	Specifications
TB1	IN1	Slave Input	This is the input signal when using CDBR braking units in parallel
	IN2	Slave Input Common	
	OUT1	Master Output	This is the output signal when using CDBR braking units in parallel
	OUT2	Master Output Common	
	SC <1>	Enable Input Common	This is the 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.)	Outputs the signal when a fault occurs or when SB-SC is closed (default) (example: CDBR braking unit overheating, EDB braking resistor unit short-circuit detection, external fault) 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 Detection Output (N.O.)	Outputs the signal when EDB braking resistor unit short circuit or CDBR braking unit fault is detected. Wiring sequence should shut off power to the drive when the output is activated. Relay output 250 VAC, max. 1 A 30 VDC, max. 1 A min. 5 VDC, 10 mA
	EB	CDBR transistor Short Detection Output (N.C.)	
	EC	CDBR transistor Short 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.

Braking Unit Specification

Table 10: Braking Unit Specifications

Braking Unit Model CDBR-		230 V Class			460 V Class			575 V Class		
		2022D	2055D	2110D	4045D	4090D	4220D	5037D	5110D	5300D
Applicable Motor Output Capacity (kW)		22	55	110	45	90	220	37	110	300
Output	Peak Discharge Current (A) (10% ED, 10 s)	60	120	250	60	100	250	40	100	250
	Continuous Rated Discharge Current (A)	20	40	80	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 Magnetek or your nearest sales representative for details.								
	Ambient Temperature	-10 to +60 °C (IP00, IP20)								
	Storage Temperature	-20 to +70 °C								
	Humidity	95 RH% or less (no condensation)								
	Vibration/Shock	10 to 20 Hz: 9.8 m/s2 20 to 55 Hz: 5.9 m/s2								
Standards		UL508C, IEC/EN 61800-3 <2>, IEC/EN 61800-5-1 <2>, RoHS								
Protection Design		IP00 enclosure, IP20 enclosure								
Heatsink Loss (W)		20	48	114	27	38	114	18	29	105
Interior Unit Loss (W)		7	16	38	9	13	38	6	10	35
Watt Loss (W)		27	64	152	36	51	152	24	39	140

<1> Allows for 10 separate steps to be set

<2> Not available for 575 V class models.

Troubleshooting

To troubleshoot the dynamic braking circuit (braking unit and braking resistor unit), refer to the chart below:

Fault Status	Possible Cause	Corrective Action
Drive trips at overvoltage (OV)	• Insufficient braking unit capacity • Insufficient resistor capacity • Improper wiring • Deceleration time too short • Braking unit fault	• Verify switch S3 setting • Verify CDBR-D capacity • Verify resistor capacity • Verify wiring is correct • Lengthen deceleration time • Replace the braking unit
Braking Unit Thermal Overload trips when not decelerating	• Improper braking unit power supply voltage selection setting • Incoming (line) voltage too high • Discharge transistor shorted	• Verify switch S3 setting • Correct line voltage • Replace the braking unit
The thermal relay (or the thermal protector) on the braking resistor unit trips occasionally.	• The braking resistor unit is too small. • The CDBR braking unit is damaged. • Incorrect CDBR switch position. • Incoming main supply voltage increases momentarily.	• Re-evaluate the braking conditions required for the application. • Replace the CDBR braking unit. • Correct the switch settings. • 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. • The CDBR braking unit and EDB braking resistor unit are not appropriately matched. • Resistor is wired incorrectly. • Ambient temperature exceeded 60°C. CDBR heatsink is too hot. • The CDBR braking unit is damaged.	• Re-evaluate the braking requirements. • Use the correct combination of CDBR braking unit and EDB braking resistor unit. • Check for proper resistance. • Reduce the ambient temperature. • Replace the CDBR braking unit.
The fault contact on the CDBR braking unit closed momentarily when input power was applied.	• No braking resistor (EDB braking resistor unit) is installed.	• Install a braking resistor (EDB braking resistor unit).
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 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.
Braking Unit trips by heatsink overheat	• Excessive load inertia • Improper combination of braking unit and resistor • Ambient Temperature >140°F (60°C)	• Reduce load • Verify proper braking unit/resistor • Install air conditioner

Braking Module Test Procedure

WARNING

Do NOT touch any circuit components while AC main power is on or immediately after main AC power is disconnected from the unit. You must wait until the red “CHARGE” lamp is extinguished. Wait five minutes for the charge on the main DC bus capacitors to drop to a safe level. Failure to adhere to this warning could result in serious injury.

Power Off Test

1. Check for physical damage.
2. Remove the wires going to B1, B2, ⊖, and ⊕.
3. Using a Digital Multimeter, set the Diode Check function and perform static checks on the main transistor module. Table 11 lists the results that should appear on the diode scale when the leads are placed in the following configurations:

Table 11: CDBR Power Section Test

Positive Terminal	Negative Terminal	Reading (Diode Scale)
⊕/B1	B2	O.L.
B2	⊕/B1	≈0.402 V
⊕/B1	⊖	O.L.
⊖	⊕/B1	≈0.522 V
B2	⊖	O.L.
⊖	B2	≈0.431 V

NOTE: Diode voltage drop can vary between 0.3 V and 0.6 V.

Power On Test

1. Switch S2 to “Master” position.
2. **230 V Models**

   With a variable DC power supply, which is capable of producing 400 VDC output, apply the DC voltage to terminals ⊕ and ⊖. Slowly increase the voltage to approximately 50 V, at which time the Charge LED should illuminate. With a DC Voltmeter, monitor terminals B2 and B1, and continue to increase the DC voltage to 380 VDC. The voltmeter should read the 380 VDC applied voltage, and the Master LED should flash. At this same time, the voltmeter should also read 15 VDC across terminals OUT1 and OUT2, which indicates that the output to activate a slave CDBR has turned on.

460 V Models

With a variable DC power supply, which is capable of producing 800 VDC output, apply the DC voltage to terminals ⊕ and ⊖. Slowly increase the voltage to approximately 50 V, at which time the Charge LED should illuminate. With a DC Voltmeter, monitor terminals B1 and B2, and continue to increase the DC voltage to 780 VDC. The voltmeter should read the 780 VDC applied voltage, and the Master LED on should flash. At this same time the voltmeter should also read 15 VDC across terminals OUT1 and OUT2, which indicates that the output to activate a slave CDBR has turned on.

575 V Models

With a variable DC power supply, which is capable of producing 1000 VDC output, apply the DC voltage to terminals ⊕ and ⊖. Slowly increase the voltage to approximately 50 V, at which time the Charge LED should illuminate. With a DC Voltmeter, monitor terminals B1 and B2, and continue to increase the DC voltage to 950 VDC. The voltmeter should read the 950 VDC applied voltage, and the Master LED on should flash. At this same time the voltmeter should also read 15 VDC across terminals OUT1 and OUT2, which indicates that the output to activate a slave CDBR has turned on.

3. Remove power from terminals ⊕ and ⊖.
4. Turn S2 to Slave position.
5. Apply power (325 VDC for 230 V models, 650 VDC for 460 V models, and 812 VDC for 575 V models) to terminals ⊕ and ⊖. Using a separate DC power supply, apply 15 VDC to terminals IN1 and IN2. The 15 VDC signal should cause the main transistor to turn on and a voltmeter should read the applied DC Bus Voltage across terminals B1 and B2, and the Slave LED should flash.
6. With power still applied to terminals ⊕ and ⊖, monitor terminals MC and MA with an Ohmmeter. This meter should read Infinite Ohms. Place a jumper across the terminal switch (pins 1 and 2 on CN35), which should cause the Fault Relay to change state, and 0 Ohms should read on the Ohmmeter. Remove the jumper and replace the wires.
7. With power still applied to terminals ⊕ and ⊖, monitor terminals EC and EA with an Ohmmeter. The meter should read Infinite Ohms. Move the ohmmeter leads to terminals EC and EB which should read 0 ohms
8. Remove power from terminals ⊕ and ⊖. Return S2 back to “Master” position.

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